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THE EXPERIENCES AND BELIEFS AMONG HILL TRIBESPERSONS LIVING WITH TYPE 2 DIABETES MELLITUS IN CHIANG RAI, THAILAND: AN ETHNOGRAPHIC STUDY

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A THESIS SUBMITTED TO THE UNIVERSITY OF HUDDERSFIELD IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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Copyright statement

Abstract

This research aims to explore the experiences and beliefs of hill tribespersons living with type 2 diabetes mellitus in Chiang Rai, Thailand. Also, how this group manage their disease, including the needs and barriers of a diabetes mellitus health promotion. A qualitative research, utilising an ethnographic study was adopted as the methodology of this research.

A convenience sample of hill tribespersons with type 2 diabetes mellitus who have been receiving health care services in a diabetes clinic at a regional hospital in Chiang Rai was selected. Data elicited from the study included 16 in-depth interviews using a semi-structured interview schedule, participative observation of hill tribespersons in their community, and a focus group discussion with five health professionals and three in-depth interviews. These were audio recorded with verbatim transcription in Thai, which was translated into English. The study analysed data using content and thematic analysis and elicited themes via a thematic analysis network.

The findings from the hill tribespersons were three major themes of their beliefs. Firstly, the causes of disease including heredity, over consumption of sugar, the use of agricultural chemicals and ‘Lom Pid Duan’ sickness, which is a cultural belief of following unofficial protocols after childbirth. Secondly, the perception of having diabetes mellitus including being different to others, normal like others, having bad blood and incurable disease. Finally, the beliefs of complications including perceived severity and perceived susceptibility. In terms of the experiences and self-management, this was divided into five themes, consisting of experiences of being diagnosed, dealing with diet and beverage, compliance with prescribed diabetes medication, exercise behaviour, and dealing with complications.

This study found that both hill tribespersons and health professionals had a strong agreement that language was the most significant barrier to accessing health care services effectively. In addition, the barriers from the health professionals’ perspectives were categorised into two themes. The first one was the health care system itself, including staff shortages, financial constraints and discrepencies between the theoretical national standard guidelines and indicators and their practical application with this group. The second barrier was social and cultural including the culture of festivals, lifestyle, and social support from family. The requirements from the health professionals were; providing an adequate workforce, an appropriate media and health programme, a budget for developing diabetes care and cooperation from all sectors. These findings suggest health professionals and related sectors need to be culturally sensitive when dealing with this group and be aware of the barriers to information facing the hill tribespersons.

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List of Abbreviations

ADA	American Diabetes Association
DM	Diabetes Mellitus
HbA1c	Haemoglobin A1c
ID	Identification (An identity document)
IDF	International Diabetes Federation
T1DM	Type 1 diabetes mellitus
T2DM	Type 2 diabetes mellitus
WHO	World Health Organisation

Glossary

Diabetes Mellitus	A disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin its produces.
Doctor or Physician	A person who graduated as a general doctor and can treat all patients but has no specialist field
Health Professional	A person associated with either a specialty or discipline and who is qualified and allowed by regulatory bodies to provide a healthcare service to a patient
Hill tribespersons	A group of people who live in a mountainous area of Thailand, have their custom, language, beliefs, culture, costume and lifestyle which are different from general Thai people.
Lom-Pid-Duen sickness	A symptom that occur with women who have experience of not following traditional conventions of behaviour after giving birth.
Type 2 diabetes mellitus	The characteristic of elevated blood sugar caused by defective insulin action or secretion
Village Health Volunteer	A community member who works in community settings to provide self-care and to communicate health information to people.

Chapter1 – Introduction

1.1 Introduction

This chapter provides an overview of the prevalence and incidences of diabetes mellitus globally with a particular focus on Thailand and type 2 diabetes mellitus situation. It includes my motivation to study this research and discusses the diabetes mellitus in the context of hill tribespersons in Thailand. It further explores the health care services, background and problems that they have been facing especially, in terms of their health status and obstacles to accessing public health services. Following discussion of the above issues, this chapter also presents the thesis structure.

1.2 A Global Problem

Non-communicable diseases such as hypertension, cancer and diabetes mellitus are becoming important issues (Beaglehole et al., 2011; Tuitama et al., 2014). They are the major causes of death and illness of the world populations (Palmer et al., 2016; Shaya et al., 2014; WHO, 2017). This is as a result of current technological developments, living conditions and lifestyles changes. This situation has led to an increase in chronic diseases, particularly in low-income and middle-income countries such as Vietnam, Indonesia and Thailand (Beran, 2015; WHO, 2017), where some people have adopted unhealthy lifestyles with a poor diet and lack of exercise (Nugent, 2016).

One of the most highlighted chronic diseases is diabetes mellitus which is caused by the body being unable to utilise glucose properly (Cranston et al., 2011). It occurs due to the dysfunction or complete deficiency of insulin, a pancreatic hormone responsible for allowing glucose from food to enter into the body’s cells (Leslie et al., 2012). As a consequence of insulin deficiency, or dysfunction, glucose fails to enter cells, resulting in raised blood glucose (hyperglycaemia) which is the diagnostic hallmark of diabetes mellitus. In the short term, the symptoms are: more frequent urination than usual, weight loss, increased thirst and hunger (Hartweg et al., 2008; Hansen, 2006). In the long term, the disease causes damage to various organs such as the eyes, kidneys and feet and increases the risk of heart disease (Cohen et al., 2012; WHO, 2017).

In general, diabetes mellitus is divided into two types (Dastani et al., 2012; Leslie et al., 2012):

Type 1 diabetes, once known as insulin dependent diabetes, which is when insulin can be produced only in small amounts or cannot be generated at all, because the pancreatic beta (β) cells in the pancreas have been destroyed. This type of diabetes mellitus can be diagnosed in children or young adults. These people require life-long insulin injections to control their level of blood glucose (Leslie et al., 2012, p.11).

Type 2 diabetes, once known as non-insulin dependent diabetes, is when insulin can be produced but the body does not respond to it effectively. People who have this type of diabetes need to control their diet, exercise, and take medication as a mainstay of diabetes mellitus management (Leslie et al., 2012, p11).

In the last ten years, there has been an overall rise in the number of people with diabetes mellitus all over the world (Abebe et al., 2013; Scobie & Samaras, 2012, WHO, 2017). It is predicted that by the year 2040, the global population with diabetes mellitus will increase dramatically from 415 million in 2015, to about 642 million people or one person in ten (10%)(IDF, 2015). The epidemic of diabetes mellitus remains a primary issue of public health concern. It is estimated that every six seconds a person dies from diabetes and it caused five million deaths in 2015. Around 90-95 % of individuals with diabetes mellitus have type 2 (Lancet, 2014; Tuei, 2010). The burden of this disease in low-income and middle-income countries such as China and India is increasing (Beran, 2015) and 80 % of people with diabetes mellitus live in these countries. As a result, the governments in these countries spend more money on health care services for diabetes patients than on services for patients with other diseases (WHO, 2017).

1.3 Fundamental Data of Thailand and Diabetes Mellitus Situation

1.3.1 Thailand Profile

Thailand is located at the central area of the Indochina Peninsula, having a boundary with Myanmar, Laos, Cambodia and Malaysia, with an area of 513,120 km^2 and a population of 68.9 million in 2017 (Office of the National Statistics, 2017). After the “democratic revolution” in 1932, Thailand has been under the rule of a military coup many times, with the latest one, the 13th, bringing in the present military government since 2014.

Figure 1 Map of Thailand (source: Asian corner, 2010)

1.3.2 Economic and Health Development.

During 1970-1990, Thailand had had a rapid economic growth which led to an increased Gross Domestic Product (GDP) of 7.5% year on year. However, during the years 1970-2000, Thailand faced a macroeconomic crisis which caused major disruptions of the country's economics and slowed down the growth of the Gross Domestic Product. Even though Thailand was grouped as an upper middle-income country (World Bank, 2015), it had to confront a decelerated economics during the past decade when the average Gross Domestic Product has been at 3.5 % per year.

In spite of periodic economic and political instabilities in Thailand, its social and healthcare development has not been too adversely affected. Successive governments continue to recognise the importance of healthcare development and fight against poverty, especially in rural areas. The allocated budget for public health during the years 1982-1986 had to be borrowed from the International Monetary Fund (IMF) to invest in the development of district hospitals and health outposts (later, the name was changed to Tambol, or sub-district Health Promotion Hospitals). At the same time, the investment in the tertiary hospitals at the provincial level had not increased (National Statistics, 2015).

The outstanding accomplishments in the past decades since 1980 are the enrolment rate of primary school students in Thailand, which had increased more than 95 % and since 2003, extreme poverty has dropped to below 1%, while universal health coverage started life in the national policy in 2002. However, a previous study reported that although Thailand had launched this health insurance, there was an inequality of health care services between rural and urban residents. Those who lived in urban areas have a better opportunity to receive the standard care than those who lived in rural areas (Papier et al., 2016). Furthermore, 7.3 million people, including ethnic groups who lived in rural areas in the Northern and North-eastern part, were defined as poor, consequently, the benefits of economic success have not been shared equally (Human development report, 2015).

1.3.3 The Changes of Population and Epidemiology

The Thai life expectancy is now 72.2 years for men and 78.0 for women, while population growth is rapidly changing. The number of people in the working-age group is decreasing, while that of the elderly is going up due to the lower reproductive rate, birth rate, and mortality rate. This population change led to the higher demand of health and social expenses (Department of Disease Control, 2015). The mortality rate of 3.2 per 100,000 population per year, has been due to the decrease in the number of deaths due to infectious diseases, which declined as much as five times during 1958-1997.However, during the years 1998-2003, the mortality rate of infectious diseases increased once again to 70.0 per 100,000 population because of AIDS, tuberculosis, and pneumonia.

Later, the 100% access to the anti-virus medicine (ART), helped to reduce the mortality rates of AIDS and its related infectious diseases to 41.0 per 100,000 population during the years 2004-2009 (Department of Disease Control, 2015).

Even though infectious diseases seemed to be better controlled, tuberculosis remains an important public health problem, of which Thailand is one among the 20 countries that have the highest burden of tuberculosis. Between 2009 and 2014 non-infectious diseases have been rising in their incidences and mortality rates. Cerebrovascular disease was the highest cause of death at 44.84, followed by ischemic heart disease at 31.84, diabetes 21.94, and hypertension 13.64 per 100,000 population respectively (Department of Disease Control, 2015).

When the rate of increase in mortality is examined, hypertension as a cause of death had risen three times from 4.54/100,100 in 2009 to 13.64/100,100 in 2014; followed by cerebrovascular disease 1.76 times from 25.49/100,000 to 44.84 /100,000, diabetes 1.53 times from 14.26 to 21.94 and Ischemic heart disease, 1.32 times from 24.07 to 31.84/100,000. The results from these diseases not only impact the physical and mental well-being of the Thai population but also affect their families and national economics (Naowaboot et al., 2013).

1.3.4 Diabetes Mellitus Situation in Thailand

Thailand also faces the problem of coping with diabetes mellitus within the population. The trend of this disease in Thailand is similar to the other countries such as United Kingdom, the United State of America and Australia (WHO, 2017). The Bureau of Non-Communicable disease of Thailand (2014) stated that in 2012 the prevalence of diabetes mellitus was 1,050.05 per 100,000 population and the diabetes mellitus death rate was 12.06 per 100,000 population or 22 deaths per day, while 2013 the prevalence was 1,081.25 per 100,000 population and there were 9,643 deaths from diabetes mellitus or 27 deaths per day. The rate of deaths from diabetes mellitus was 14.93 per 100,000 population.

Data from the Thai Department of Disease Control in 2016 on the prevalence of diabetes mellitus in the population aged ≥15 during 2010-2014, showed that the prevalence of the disease increased with age, peaking in the age group 60-69, then declined in the ≥70 age group, which may be due to a higher death rate in the elderly. In the age group 30-39 the prevalence rate was three times (3.00-3.18) that of the age group 15-29, while in the age group 60-69, the rate was one time (1.25-1.40) that higher than of the age group 50-59 years. The highest increase in the prevalence rate occurred among men aged 40-49, about three times (2.71-2.85) that of the age group 30-39. Men aged 30-39 had twice the rate of diabetes mellitus of men aged 15-29. In women, the highest prevalence rate was found among the age group 30-39 which was three times (3.33-3.59) higher than the age group 15-29. Therefore, in both sexes, the age between 30-39 appeared to be critical for when any intervention or prevention should be focused on, ideally intervention should start at a far earlier age. The total number of deaths caused by type 2 diabetes mellitus was 20,570 cases; in the 30-69 age group, the number of deaths was 8,120 cases (3,610 males, 4,510 females) and in the ≥ 70 years age group, the number of deaths was 12,450 cases (4,760 males, 7,690 females). Moreover, the total number of deaths attributable to high blood glucose was 35,640 cases; in the 30-69 year age group, the number of deaths was 13,810 cases (7,220 males, 6,590 females) and in the ≥ 70 years age group, the number of deaths was 21,830 cases (9,430 males, 12,400 females)(World Health Organisation, 2016). In addition, individual with type 2 diabetes mellitus were admitted to hospital 698,720 tims per year.

Thailand has been spent a large amount of money on these patients due to the average cost for each patient being 451 GBP for an independent case and 2,037 GBP for a disabled case (Cohen, 2012). As the trend of prevalence is shown to be increasing, if no action is taken, the challenge waiting ahead is that 70% of 7.5 million adults with diabetic risk at present will become diabetic in future (Thai National Health Examination Survey, 2014; Tabak et al., 2014; Clinical Practice Guideline for Diabetes, 2017; Cohen, 2012; Naowaboot et al., 2013; Tabak et al., 2014; Thai National Health Examination Survey, 2014).

1.3.5 Health Services in Thailand

The health service is a fundamental part of the health care system. It is an important part that helps to support, enhance knowledge, think critically, make decisions, and act properly in order to promote health and prevent complications (Cavanagh, 1991). The Thai health service system has change massively from using basic local wisdoms for healing illness in accordance with social and cultural context to the situation at present, which is dependent on modern medicine. In regard to the organisation of health services, it can be divided into various levels and systems which depend on the basic concept for analysis (Tabur et al., 2010). The health service system can be divided into four levels in accordance with the principle of management, individual and family health, community health, primary care, and hospital care. The 12th National Health Plan is divided into three health service levels as follows:

1. Primary Health Care, (PHC). This level is concerned with the health services organised by people with support from the health team and aims to enhance people's self-care. The focus is on family health.
2. Non-Hospital Care. This level is concerned with primary health services by health professionals. The services are organised for out-patients and health services will also be

organised in the community. If it is necessary to transfer patients, a referral system is available to the patients to hospitals.

3. Hospital Care. This level focuses on providing care in hospital. Health services at the hospital level are divided into two types: 1) the community hospital which operates at district level and 2) services by specialised hospitals, which are provided at provincial hospital level and higher.

Tabur et al. (2010) studied health services provided for people with diabetes mellitus by government organisations. The health services for these patients were divided into two parts; the care provided at home in each community and the care provided at the special clinic at the hospital. With regard to the care provided at home, the services were organised by local government organisations which are the sub-district primary health care centre of each sub-district. The strategies used were aimed to develop the self-care capacity of diabetes patients, care givers and community participation in managing the care in order to improve quality of life including home-visits which the local health service team used in the community.

The services provided at the primary health care centres were blood sugar level checks, prescriptions and information about T2DM and self-care practices in regard to food preparation, exercise and prevention of complications. In terms of care at the diabetes clinic at the hospital, the strategies used were aimed at controlling blood sugar level and the prevention and treatment of complications. For the patients who had an unstable blood sugar level, home visits were made for providing consultation and health information. Other connected care between hospital and home was not provided due to the limits of coordination. Moreover, there were other alternative therapies available for these patients through, private clinics and local healers, for example blowing-healers, herbalists, including self-care in the family and community such as taking herbal medicines for reducing blood sugar level (Nakagasien, 2012). The study of the health care system for people with T2DM showed that they used mixed or integrated-self-care which included treatment of various symptoms by using herbs as well as local medicines, for example, boiled herbs and herbal medicines put together in a pot, along with modern medicines (Klunklin et al., 2013).

1.4 Hill Tribespersons in Thailand.

The Bureau of Civil Registration, Department of Local Administration, October 1996, defines "hill tribes or "Chao Khao" as a highland ethnic minority group who settled in the mountain areas of 20 provinces of the Northern and Western Regions, which include Chiang Mai, Chiang Rai, Mae Hong Son, Lum Phun, Lum Pang, Phayao, Tak, Sukhothai, Nan, Kumpaemgphet, Phrae, Phitsanulok, Phetchaboon, Loei, Uthaithani, Kanchanaburi, Supanburi, Rachaburi, Phetchaburi, and Prachuap

Khiri Khan. They have different languages, values, beliefs, traditions, and culture to those of Thai people living on the plain.

1.4.1 Background of the Government Policy and Hill Tribespersons

"Hill tribespersons" in the Thai language refers to the minority groups of the population who have settled in the hill areas over a long period of at least a century who should be legally Thai. However, many have not had their nationality established due to their remote settlements and their social, cultural and linguistic isolation (Apidechkul et al., 2016). They tend to live separate lives from lowland people and are out of sight of official administration. They are inadequately registered, often forgotten and ignored. A lack of evidence of their nationality or ID papers means losing their rights and access to services available to Thai citizens. Infringement of human rights regularly occurs by officials towards hill tribespersons, particularly those living along the borders between Thailand and Myanmar (Keeratiyutiwong, 2018).

Hill tribes people traditionally cross back and forth across international borders for living and trading where there is no official checkpoint, which is of course illegal. Likewise, their homes and farmlands are rarely registered for ownership or allowance for the correct type of land use. Occasional sweeping actions taken by governments of either side for land reclaiming or clearances of illegal crops have caused hill farmers to flee across into the neighbouring country (Gerharz & Chakkarat, 2017). This explains the existence of ethnic settlements along borderlands, as many migrants became permanent settlers. However, the process of nationality verification and identification are complicated, costly, and open up channels for corruption in obtaining a Thai ID card, or passports, which are of many classes and colours, each conferring different levels of rights and restrictions (Gerharz & Chakkarath, 2017).

However, at different times and under several successive Thai governments there have been several amnesties to legalise the settlement of hill tribespersons. The First National Committee to help hill tribes was formed in 1949. In 1951, the Thai government Department of Public Welfare initiated a provision of welfare for hill tribes which was supported and delivered by the border patrol police and military. In 1959, the government started the process of civil registration of the hill tribes (To Ro. Cho Cho. 1) by recording the list of household members without taking photographs, but no civil rights were granted (Keeratiyutiwong, 2018). In 1984, Thai nationality was granted to hill tribes' household members who were recorded during a census registration and had submitted a petition to their local registration offices. The petition then went to the provincial government for the final decision and registration. The process had granted Thai nationality to 182,065 hill tribes people from 20 provinces (The Summary Document of Statistics About the Minority Group Whom the

Department of Local Administration Had Recorded History and Identification Cards, October, 1996). During the years 1990-1991, the Department of Public Welfare created historical records and Identification Cards for highland hill tribes and highland minorities. The Regulations of the Central Registration Bureau on Considerations for Granting Thai Nationality to the Hill Tribes Involving Housing Registration Cards, A.D. 2535 (1992) was passed as law and became effective on September 16, 1992.

1.4.2 Legislative Status of Hill Tribespersons

The government classifies the minority tribal people living in highlands and the hills into three groups as follows: (Keeratiyutiwong, 2018)

Group1: Those who have Thai Nationality. This group received Thai Nationality in accordance with the Ministry of Interior Regulations on Considerations for Granting Thai Nationality to the Hill Tribes Involving Housing Registration Cards A.D. 2517 (1974) and some special cases in accordance with the Central Registration Bureau's Regulations on Considerations for Granting Thai Nationality for the Hill Tribes Involving Housing Registration Card A.D. 2535 (1992). Therefore, this group of hill tribesperson are not immigrants anymore.

Group 2: The highlanders and hill tribespersons who have not been granted Thai nationality, but their historical background had been recorded and identification cards had been granted, during 1990-1991. Therefore, these people are still immigrants even though they have identification cards issued by the Department of Local Administration. However, they are still illegal migrants. This condition means they lack rights as Thai citizens, such as not receiving basic education and health care services for free.

Group 3: This group consists of the remainder, who had neither a nationality, not had their historical background recorded, nor own identification cards. They are called illegal immigrants as they had an illegal entry. This group faced the same problems as group two.

Among those hill tribespersons who have no proof of Thai citizenship, the Department of Local Administration can certify them as “the immigrants who have the right to have permanent residency in Thailand” in accordance with the “Law About Immigrants” which made this group of the hill tribes “the immigrants that have legal immigration” (Thanathakornkul et al., 2016).

In this study, we define “hill tribesperson” as people who have received Thai nationality regardless of how.

1.4.3 Hill Tribesperson without Nationality and Impacts

1) Disadvantages in Receiving Government Services.

From the previous studies of hill tribespersons, it is factual that government public services are provided through the country's budget for Thai citizens and health care is no exception. To receive free health care, the patient needs to show his or her ID card (Lockwood & Magriples, 2017; Nakagasien, 2012; Chaveepojnkamjorn et al., 2008). Health officials need to keep records of the patient's identification for clinical, pharmaceutical, and budgetary purposes. In the absence of ID, service charges are payable, however in practice, health officials often turn a blind eye to this for hill tribes' patients (Chaveepojnkamjorn et al., 2008). Officials fully understand the difficulties some patients have faced in obtaining ID and it is hard for them to turn a patient in need of treatment away from the hospital door (Nakagasien, 2012). The patients without an ID, know that they have no right of access to treatment but in an emergency they have no choice but to seek help at the local health service. Normally they tend to avoid interaction with a government facility for fear of being recorded as an illegal immigrant which may mean they are liable for arrest or deportation. The threat of being arrested and searched by officials is a real one for hill tribespersons, particularly as the northern border areas are notorious for narcotic production and smuggling, so they try to avoid this at all costs. The health professionals' humanitarian actions are praiseworthy. There are also the circumstances when it is a necessity to give health service regardless of who the recipient is. The obvious example is public health services relating to infectious diseases control, treatment, prevention and immunisation (Krairach & Thammawat, 2006). However, when the majority of people receiving items of service for free cannot be accounted for by the register, the local health service or hospital will bear the cost, which may be reflected in "balancing the books" or requesting the next annual budget. The government is aware of this problem and has allowed community hospitals to have some extra money to solve this issue.

2) Disadvantages in Education.

The Ministry of Education (2017) has declared new regulations regarding the admission of students without civil registration in order to open educational opportunity and give certificate cards for those who do not have Thai nationality (stateless people). However, in reality, many hill tribe areas still have not benefited from this principle. It has been found that a large number of hill tribes children or minority groups, especially those who do not have identification cards, have not enrolled in elementary schools of the National Elementary Education Office. The reason was "Teacher told parents that children did not have identification card". Sometimes it was due to the limited number of seats available for admission and schools give priority to children who have proof of being Thai (Thanathakornkul et al., 2016).

The issuing of certificates of having had a required education level has also run into obstacles, as schools are unsure if they can issue certificates to children who are not registered as living in the school's catchment area. Schools are also unsure if they can issue certificates to people without a Thai ID (Krairach & Thammawat, 200; Thanathakornkul et al., 2016). In some instances, teachers are unsure if they are allowed to give out certificates to children who have completed courses from another district. Even with an education certificate in hand, stateless people still find it hard to be legally employed as many employers dare not employ paperless persons because it is illegal. If an employer decides to employ one such person, it is most likely that they will counter the risk by offering the job with far less pay. (Luangaramsri, 2005).

3) Limitation of Land Ownership.

Foreigners cannot own Thai soil without obtaining Thai citizenship, which means a stateless hill tribesperson would be unable to own the land they live on (Chaveepojnkamjorn et al., 2008). They are insecure in working to earn their living on the land they may have lived on for generations. This group may be forced to keep moving instead of taking responsibility for looking after and developing the land they live and work on. Even if they cannot own land outright, there are openings for them to legally stay and work as a land privilege if they have been there for a long time and have taken proper care of the land and its environment. Many hill tribespersons have no knowledge of their rights in this matter (Nakagasien, 2012). Having this problem, some hill tribespersons feel they have to keep moving. Consequently, they have difficulty in accessing healthcare services and "drop off the radar" from the government (Thanathakornkul et al., 2016).

1.4.4 Public Health Policy for Minority Groups in Thailand

In the past four decades, Thailand has accomplished growth in economic development, therefore the government allocated an increased amount of budget for developing a public health programme especially since the Fourth National Economic and Social Development Plan from 1997 until present. From 1997, the government had adopted a policy which made primary health care as the focus on the health of the population and the public health infrastructures were rapidly developed. New hospitals were built in every district and new primary health care centres in every sub-district in order to reduce the inequity of access to health care services, especially in remote areas. "Special areas", defined as the highlands, the isolated rural areas, the five provinces in the north, and the border areas, were to receive special attention from the policy to develop rural areas where the rate of change toward urbanisation was slow, being surrounded by forests and mountains, with agriculture being the main economy. The minorities who were living in the highlands did benefit from the policy, however the development of primary health care faced implementation problems due to the model of health services offered by the primary health care centre not matching the community needs (Khantisiwanont, 2018). The activities were too rigidly controlled to follow the targets designed by the government rather than aiming for outcomes that worked (Uttamawatin, 2010). The Central Administration Organisation was unable to adequately solve local physical and cultural obstacles (Khantisiwanont, 2018; Kuntisiwanon, 2013; Uttamawatin, 2010). The work of the Department of Provincial Public Health had a policy on providing health services to highlanders during the 4th - 6th National Economic and Social Plans and this special programme implemented was relevant to the development of primary health care. The objectives of the programme were to provide public health services coverage continuously and fairly for most Thai people, attempting to lower the inequity of government health service provision. The methods used were as follows: (Buasonte et al., 2012)

1. Development of the infrastructure by establishing and improving community health service organisations including adequate supplies.

2. Producing and developing the quality of the personnel working in the local areas through training and refresher training for community health workers, along with the development of community public health service organisations.

3. Providing integrated public health services both inside the health service organisations and in the mobile public health unit.

4. Development of management in regard to public health information systems in highland areas including supervision, monitoring and evaluation.

5. Development of academic service support by developing and improving the working manuals for local personnel.

The programme activities, in accordance with the primary health care guidelines implemented in the highland areas had identified 20 provinces composed of 99 districts, 325 sub-districts and 3,553 villages where hill tribespersons resided (Kuntisiwanon, 2013). The public health workers, (Po So Sho) were responsible for working in these local areas. Their main responsibilities were providing primary treatment and referring to a larger hospital if required. In regard to health promotion, the activities organised had four aspects: maternal and child health, family planning, nutrition, and school health. With regard to the services of sanitation and disease control and prevention, the activities were concerned with the provision of: vaccinations, clean water, sanitation and disease surveillance (Kuntisiwanon, 2013; Buasonte et al., 2012).

During the Sixth National Economic and Social Development Plan, the community primary health care centres, (So So Mo Sho) were established as the service bases in villages (Punyakaew, 2005).

These centres were responsible for being the sources of information in the villages and for the dissemination of knowledge, including providing services for managing various foundations and being the collaborating centre of social activities (Yodrungroaj, 2018). During the Seventh National Economic and Social Development Plan, the community public health services which were run by community health workers had been terminated, because these health workers had been trained for only 6 months, so they lacked knowledge and ability (Kacharat, 2017). Moreover, the working offices were small and inconvenient. The new policy for this situation was to change the offices to be a bigger primary health care centre and the health professionals were replaced by community workers (Khunluek, 2017). This change has increased the number of community public health organisations since 1997. In these periods, the public health policy of hill tribespersons did not focus on non-communicable or chronic disease such as diabetes mellitus and hypertension. This was due to the high prevalence and incidences of infectious diseases (Kacharat, 2017; Khunluek, 2017) and the development of infrastructure in these areas was still needed (Yodrungroaj, 2018).

In terms of the provision of public health services for the minorities, the Cabinet had approved the Master Plan for the development of community, the environment, and the control of narcotic crops with the aim to help other government organisations. This master plan was used as the framework and guideline for the development of quality of life of the minority groups, for example, the border patrols, the Third Army Area, and Department of Local Administration (Ministry of Social Development and Human Security, 2015). At an international level, an organisation called "Cooperative American Relief Everywhere (CARE)", started its activities in Thailand in 1979 with the aim of taking care of refugees. Later, CARE changed its focus to generally helping people such as the poor and other disadvantaged groups. In 1992, CARE started the programme in rural areas in various regions in Thailand working with minority groups. This organisation helped hill tribespersons communities in Chiang Rai province with the emphasis on family planning and currently support AIDS patients among the hill tribes population (Ministry of Social Development and Human Security, 2015). It was evidenced that many Thai government and non-government organisations, have recognised the importance of health problems among the hill tribes or Thai minorities. They also tried to promote health policies for the hill tribespersons with the aim of reducing the inequity and expanding health services to rural areas. However, problems were found as related to language, culture, acceptance and interaction between officers and the hill tribespersons (Ministry of Social Development and Human Security, 2015).

1.5 Health Status of the Hill Tribespersons in Thailand

In 2008, there was a survey of Thai people in the highlands of seven provinces by the Ministry of Public Health Bureau of Policy and Public Health Plan, which showed that in five provinces of the northern region of Thailand, with more than 20,000 hill tribespersons, the mortality rate was 5.9 per 1,000 of the population compared to the rest of the country which was 5.0 per 1,000 population. Another Report entitled Health Status of Minorities in Thailand, showed that the minorities in the highlands especially five provinces of the northern region, which included Chiangrai, Chiangmai, Mae Hong Son, Nan, and Tak, where the borders are shared with Myanmar and Laos, were at the highest risk of malaria. In 2010, 45-46 % of total patients were in the border areas of Thailand-Myanmar. In regard to dengue hemorrhagic fever, among five provinces of the North, next was Chiangmai (52.08), Mae Hong Son (42.07), Chiangrai (41.70) and Nan (41.17) per 100,000 population, respectively) (Department of Communicable Diseases Control, 2012). From this data, it can be seen that the hill tribespersons are more likely to be susceptible to the disease than the general Thai population.

After the implementation of the programme on iodine deficiency control which started with the 8th National Economic Social Development Plan which aimed to reduce Goiter among school children, the survey by the Bureau of Strategy and Public Health Plan 2004 showed that the students who lived in the northern region where the highlanders resided had higher rates of iodine deficiency than students in other areas. This was due to the great distance from the coast and lack of easy access to rock salt which contains this mineral. The iodine deficiency rate in Chiang Rai was found to be 83.3% and in Nan, Mae Hong Son, Chiang Mai, and Tak province, 79.4, 74.8, 68.6 and 59.9% respectively. In regard to immunisation among children in the minority group, the report of the survey by the Bureau of Strategy and Public Health Plan in 2008, showed that of more than 20,000 highland children of five provinces of the northern region, less than half (48.5%) had received complete vaccination, 39.3% had received a mixture of vaccines but not completed courses, while 10.7% had never received any. The study of the health situation of Akha hill tribes in Chiang Rai province in 2016 (Apidechkul et al., 2016) found that most Akha lived in poor conditions and drank untreated water. Most Akha pregnant women did not receive care at the health care services unit. They also did not receive postpartum care and cervical cancer screening (Apidechkul, 2016; Keeratiyutiwong, 2014). Moreover, it was found that young children did not receive appropriate immunisation when compared to the general Thai population. In addition, Akha adults had negative health behaviours for example, their smoking rate was 28.0% while the general Thai population was 19.9% (Nation Health Examination Survey Office, 2011).

In terms of T2DM, as mentioned before, the number of patients has been rising in all areas of Thailand, including among the ethnic groups of ‘’hill tribespersons’’. It was estimated that in 2016, around 2.5 million hill tribespersons were living in Thailand (Apidechkul, 2016). The study of the prevalence and factors associated with T2DM in northern Thailand (Apidechkul, 2018) found that the prevalence of elderly in this group was 1.75 times higher than of the general Thai population. Moreover, the annual reports of the hospital in a region of Chiang Rai where each year many hill tribespersons come to receive health care services, showed that the prevalence of diabetes mellitus in this group was increasing compared with previous years. From 2012-2016 the ratios of hill tribespersons with this condition to all T2DM patients attending the hospital has been steadily rising, from 14.6% to 16.4%, 17.9%, 18.8% and 19.3% respectively.

All of the above information indicates that hill tribespersons have a lower health status than the general Thai population and have difficulty accessing health care service systems. This reflects an ineffectiveness of the health care system in Thailand for those ethnic groups. Moreover, most hill tribespersons live in the border areas and many are still migrating between countries. As a result, it means they are at risk of many infectious diseases. It can be concluded that hill tribespersons who live in the border and highland areas of the country have had irregular access to public health programmes as well as having evidence of poorer health than government target standards.

1.6 Obstacles to the deliverance of public health services for the hill tribesperson community

The language barrier is an important obstacle that creates difficulty in communicating between health professionals and patients which in turn, affects the quality of care (Cobb, 2010; Soontaraviratana, 2016; Mitchell-Brown et al., 2017). Misunderstanding each other is an obstacle. The health professionals want to ask the patients' problems and symptoms to make a correct diagnosis; the patients in the meantime need to understand what the health professionals explain about their illnesses and instructions or recommendations for treatment (Meuter et al., 1980). The patients also need to be able to read and understand the medicine labels, doses and time to take as prescribed. Misreading labelling or guessing instructions makes treatment ineffectual if not outright dangerous (Gany et al., 2013). Hill tribespersons speak their own language and there are many dialects which are often unique only to their own small areas. Patients often cannot understand health professionals providing instructions for medicine, diet, or negative behaviours to avoid because of a language barrier (Nakagasien, 2012). Clinics in hospitals rely on young locals or children who go to school and hopefully can interpret for the older patients (Apidechkul et al., 2016). Some health professionals themselves belong to the ethnic group which is a great help in the clinic with ethnic patients, whether it is for history taking, examination, lab investigation, follow-up, delivering health education, providing instruction for medication, dietary advice, making appointments, or research. Previous studies have revealed that hill tribespersons have a language barrier for accessing health care services. This is because most of them were illiterate (Apidechkul et al., 2016;

Nakagasien, 2012). Apidechkul et al. (2016) stated that most hill tribespersons aged over 45 years old could not understand Thai. The policy or health education and disease prevention needed to be reviewed in order to be appropriate with care in every social group. Another activity that can be done is organising a training programme in the hill tribes' language for health professionals so they can communicate with hill tribes patients. These measures should be implemented to help improve quality of health services in order to develop equity for hill tribes' groups in Thailand.

Punyakaew (2005) reported that the majority of Thai people own many kinds of health welfare cards, while the hill tribespersons tend to own only one from the universal coverage scheme. This is the main system of health insurance in Thailand, all Thai people have this right and get a card called "Universal Coverage Health card" or "30 Baht Golden card" or "30 Baht for every illness card" due to patients paying 30 baht per visit. There are several other types of cards that non-hill tribespersons often have in their collection, which entitle them to different types of access to health care services, dependent on private funding or status such as being a civil servant, or student health care schemes. Examples are the Health Security or Gold Card for Free Medical Care, Card for Village Health Volunteers, Elderly Card, Government Official, Social Security Card, and private health insurance cards. Waber et al. (1981) stated that economic status signifies the ability and opportunity to generate income. People with a high economic status will have more opportunity and ability to get health security for themselves and their families than those with a low economic status. Hill tribespersons are poor and do not have many choices in their access to health care services (Apidechkul, 2018). The most disadvantaged people are those without Thai nationality status, or those whose ID card number starts with "6" or "7" as designed by the National Health Insurance Office, with the assumption that this hill tribes group are not legal Thai citizens. The Universal Coverage Health Card entitles every Thai to receive health care provided by the government, either free or paying only 30 Bath per visit. However, many people are concerned that being free or very cheap, the quality of service may be compromised, while the perception is that being universal and free probably means being cheap and only suits the poor. Research also found that people with a low socio-economic status (LSES) often worry about getting inferior treatments (Thinkhamrop et al., 2017), low quality medicines and services, or that the doctors may not be adequately attentive to their illness.

However, Sirikamonsatien and Tossanoot (2016) found that the "30 Baht Gold Card" has led to a higher level of health service utilisation. It helps those in rural areas and the poor to have better access to health services. Moreover, hill tribespersons are a low socio-economic status group who have used more services than the general Thai from low socioeconomic groups. Furthermore, the general Thai people have expressed less satisfaction with the convenience and quality of service than the hill tribespersons (Punyakaew, 2005). In addition, transportation is one of the problems affecting the health status of hill tribespersons who live in remote areas, as they cannot access the standard health care of Thailand.

The differences of health status and health service utilisation between Thai citizens and hill tribespersons mentioned above can be used as a set of data for analysing health inequity. This was defined as differences in health status caused by social and economic health determinants (Woolf & Braveman, 2011; Whitehead, 1992, Whitehead, 2001), whereas the differences of socio-economic status do not mean only in terms of wealth, power or fame but also the differences of gender, geographic location, race and ethnicity, religion, and age (Brenner et al., 2001).

In summary, diabetes mellitus is a chronic disease and patients need to understand their conditions, manage and adjust their behaviour, and take care of themselves according to health professionals' recommendations. The lack of correct diabetes mellitus knowledge and awareness of complications in hill tribespersons are important issues. These patients are cared for by health professionals such as general doctors, nurses and public health officers. There are few specialist diabetes doctors and nurses in Thailand. These health professionals are Thai people who cannot understand the hill tribespersons language, as well as some hill tribespersons who cannot understand the Thai language. Although the ministry of public health has standard guidelines for diabetic care, these patients still cannot control their blood sugar levels. This is because this ethnic group has their own lifestyle, beliefs and cultures which are different to the general Thai population. In addition, there are no structured health promotion programmes appropriate for them. In order to provide effective diabetes care, it is necessary to understand the views of hill tribespersons in relation to their lifestyles, health beliefs and experiences, self-management behaviour, needs, essential requirements, and any possible barriers. Therefore, a qualitative study regarding the aforementioned among these patients is needed, as a basis to develop a strategy for implementing special guidelines or a health promotion programme which is suitable for this unique group.

1.7 Motivation for the research

I was born in Chiang Rai, Thailand in 1982, and learned the word "Chao-Khao" or "hill tribespersons" at a young age as my family and babysitter often told me they would give me to the "hill tribespersons" if I was not a good girl. My perception of the hill tribespersons and that of those who lived in my town, at that time was negative, as they are animists and the area they live in was known to be remote. In 2000-2007, I moved to Bangkok to study at the Faculty of Public Health, Mahidol University. After I graduated, I returned to my home town and worked as a lecturer in the Department of Public Health, School of Health Sciences, Mae Fah Luang University. I had opportunities to teach many subjects in relation to public health, such as Epidemiology, Health Education, Health Promotion and Community Health and this proved to be a turning point in my interest in hill tribespersons. A year before I left to study for my Doctoral degree, I became involved with this group by taking my students to study community health and field training in a hill tribespersons' community. It appeared that this special group had a lower health status than the general Thai population and I was surprised to find that most hill tribespersons with T2DM could not control their blood sugar level although they had access to health care services and updated standard guidelines. As my educational background is in public health, I was interested in health promotion and intended to create a bespoke health promotion programme aimed specifically at this group. However, after reviewing some of the literature and having had a discussion with my supervisory team, I changed my previous idea and decided to explore the factors that prevent hill tribespersons with T2DM from following the health professionals' advice. The main reason for this change of direction was a realisation, following my supervision and literature review, that I could not design an appropriate intervention effectively without a deep basic knowledge and understanding of their beliefs, experiences and requirements with regards to T2DM and any possible factors that affect the hill tribespersons patients' health behaviour. Thereafter my purpose was to explore the beliefs and experiences among hill tribespersons with T2DM in Chiang Rai, Thailand.

1.8 Thesis structure

This summary briefly outlines the content of each chapter in this thesis in an attempt to provide illumination of the process and rationale informing this study. This thesis is organised into six chapters:

Chapter 1 presents an overview of this study, a profile of Thailand and discusses the prevalence and incidence of diabetes mellitus in the context of Thailand and background to the issue of diabetes mellitus in hill tribespersons in Thailand. It reveals the research problem and highlights the importance of the study.

Chapter 2 reviews the relevant literature. It is divided into eleven parts: general information about diabetes mellitus, health status of the diabetes patients in Thailand, blood sugar level control among patients with type 2 diabetes mellitus, personal factors influencing blood sugar level control, sociocultural factors influencing blood sugar level control in people with T2DM, health care related factors, social support, the self-management of patients with T2DM and "Individual Process", guidelines for diabetes management in people with this condition, the burden and knowledge gap of diabetes care in hill tribespersons in Thailand, concluding with the aim and objectives of the study.

Chapter 3 provides the methodology which underpins this study. It also describes the research methods, data collection and data analysis.

Chapter 4 presents the findings of the study in terms of the context of the community, health care services and the stories of each of the participants.

Chapter 5 discusses and integrates the findings from in-depth interviews with hill tribespersons patients, a focus group from the health professionals in relation to existing research, policy and practice.

Chapter 6 concludes the findings and examines their implications. Recommendations for further research are made.

Chapter 2 – Literature Review

2.1 Introduction

This chapter presents a comprehensive review of literature in areas pertinent to the focus of the research. The search strategy was from the main key words, database and other sources including publications from the Thai government and other institutions. Several searches were conducted using the keywords “type 2 diabetes beliefs”, “type 2 diabetes social culture” “type 2 diabetes experiences”, “type 2 diabetes self-management”, “type 2 diabetes self-care”, and “type 2 diabetes barriers”, ‘’type 2 diabetes hill tribes’’ from the database of the University of Huddersfield and Mae Fah Luang University covering academic articles published between 2004 – 2019. This was accessed through this study. The databases include The Cumulative Index to Nursing and Allied Health – PLUS (CINAHL), MEDLINE (PubMed), PsycINFO, Science Direct, IngentaConnect, Wiley Interscience and Thai Library Integrated System (THAILIS), which were all accessed electronically. Websites dedicated to relaying and discussing information about diabetes were searched, namely: the International Diabetes Federation (IDF), the American Diabetes Association (ADA), the World Health Organisation (WHO), the National Institute for Health and Clinical Excellence (NICE) Clinical Guideline, Thailand guidelines for medical practice for diabetes and the Cochrane database.

This chapter begins by explaining general information about diabetes mellitus, focuses on diabetes care; the review specifically concerns standard guidelines in Thailand. Section 2.3 explains the classification of people with diabetes’ health in Thailand and is followed by 2.4 which presents and critiques blood sugar level control among patients with diabetes mellitus. Section 2.5 focuses on personal factors influencing blood sugar level control. The next section, 2.6 focuses on the sociocultural factors influencing blood sugar level control in people with type 2 diabetes mellitus (T2DM), then section 2.7 focuses on social support. Section 2.8 analyses the factor affecting blood sugar control of people with diabetes in terms of health care related factors. In addition, the reviewed literature which focuses on self-management is explained in section 2.9. The reviewed guidelines for diabetes management in people with T2DM including guidelines for changing food consumption behaviours for Thai diabetes patients are presented in section 2.10. This chapter will conclude with the burden and knowledge gap of diabetes care in hill tribespersons in Thailand. Following this, the research aims and objective of this study will be presented.

2.2 Knowledge of Diabetes Mellitus

2.2.1 Meaning

Diabetes mellitus (DM), commonly referred to as diabetes, is a group of metabolic disorders characterised by high blood sugar. It is caused by the failure of pancreatic insulin hormone production, deficiency, or ineffectual action of cell utilisation of glucose. Chronic high blood glucose levels, and inability for cells to use nutrients, results in pathological changes of blood vessel structures, loss of end organ functions and failure of the kidneys, retina, and nerve endings, seen as renal failure, blindness, and peripheral neuropathy in particular (WHO, 2017).

2.2.2 Types of Diabetes Mellitus

In classifying the types of diabetes mellitus, clinical characteristics are mainly used. If its type cannot be clearly assigned at first, provisional diagnosis can be made and the type can be diagnosed later in accordance with additional data. Typing may have to be done by laboratory methods if necessary. There are four types of diabetes mellitus in accordance with the causes of the disease (Masingboon, 2017; Wimontham, 2013,), as follows:

Type 1 Diabetes Mellitus (Type 1 Diabetes Mellitus: T1DM or Insulin-Dependent Diabetes Mellitus: IDDM) is caused by total insulin deficiency. The damage of beta cells of the pancreas is usually due to autoimmunity through a cellular mediated process. Most of T1DM patients are found in childhood or youth. Patients are often thin and rarely overweight. The symptoms are: frequent urination, increased thirst, drinking a lot of water, weakness, and weight loss. The symptoms may occur rapidly and severely. Ketoacidosis may be the first sign of the disease. Type 1 diabetes mellitus patients must receive insulin replacement for life in order to survive. If left untreated with insulin T1DM will rapidly deteriorate into metabolic diabetic ketoacidosis, severe dehydration and death.

Type 2 Diabetes Mellitus (Type 2 Diabetes Mellitus: T2DM or Non-Insulin-Dependent Diabetes Mellitus: NIDDM) is caused by insulin resistance and relative insulin deficiency. It occurs most often in people who are over 30 years old and overweight (average Body Mass Index of Asian people is 23 kg/m2). Patients may not have symptoms or the symptoms may not be specific or severe. The onset and progress of the disease is gradual. Their parents or siblings often have T2DM too. The risk increases with age, increasing body weight, lack of exercise, and females who have experienced gestational diabetes during their pregnancy. In Thailand, 95% of all persons with diabetes have T2DM (Department of Disease Control, 2015). Both type 1 and type 2 have several common features, for instance, both types may affect either children or adults; some persons with T2DM may have diabetic ketoacidosis as a complication like type 1, making initial diagnosis of typing difficult without additional laboratory tests, such as measuring preinsulin C-peptide or identifying the presence of anti-insulin antibodies. T2DM patients may present with ketoacidosis, especially in ethnic groups (Marquez et al., 2016; & Fujioka et al., 2000).

Gestational Diabetes Mellitus (GDM) is caused by having increased insulin resistance, usually during the 2nd and 3rd trimesters of pregnancy, or at the gestation age of 24-28 weeks. In gestational diabetes the pancreas during pregnancy cannot produce sufficient insulin under the stress of pregnancy, resulting in raised blood sugar. Gestational diabetes affects 12.9% of all Thai pregnant women (Baghbanian & Tol, 2012).

Specific Types of Diabetes Mellitus Due to Other Causes This group concerns diabetes that is secondary to clearly identifiable causes. Examples are diabetes caused by heredity, Maturity Onset Diabetes of the Young (MODY), diabetes caused by diseases of the pancreas, abnormality of other endocrine glands for example Cushing syndrome, medicine such as corticosteroids, infection, immunity reaction, or diabetes that is part of other syndromes. Patients will have specific characteristics of the causal disease or specific syndrome.

2.2.3 Risk factor of Diabetes Mellitus

There are many risk factors which cause T2DM including a combination of environmental and genetic risk factors (Bi et al., 2012; Villegas et al., 2012). Previous research reveals that gene related to T2DM (Dupuis et al., 2010; Kong et al., 2009; Dajani et al., 2017). Risk factors of diabetes mellitus other than heredity are as follows:

1. Obesity: causes abnormal body tissues' responses to insulin (Hojlund & Bostrom, 2013; Toplak et al.,2016)
2. Elderly: the risk of developing T2DM increases with advancing age due to less synthesis and production of insulin (Reeves, et al.,2013).
3. Damage of pancreas such as pancreatitis, alcohol consumption (Beulens et al.,2005; Rasouli et al.,2013).
4. Viral infection: hepatitis B and hepatitis C can infect the pancreas (Abdelaziz et al.,2016; Lu et al.,2017).
5. Some drugs, for example, steroids, diuretics, and some contraceptive pills, cause more sugar production in the body or abnormal responses to insulin (Hwang et al.,2014; S.O. SkoubyHormonal contraception in obesity, 2010).
6. Pregnancy: due to the changes of many kinds of hormones from the placenta which act to raise blood sugar (Hiéronimus et al.,2004; Lapolla et al.,2007;2008).

However, behavioural risks factors conduce to the pathogenesis of this disease (Bi et al., 2012; Liu et al., 2017). These factors are lifestyle choices such as inadequate or over caloric intake (Fareed et al., 2017; Malik et al., 2012; Sakurai et al., 2016), lack of physical activity (Oyewole et al., 2015; Temelkova-Kurktschiev et al., 2013), smoking (Rasouli et al., 2013) and excess alcohol consumption (Liu et al., 2017; Rasouli et al., 2013).

In Thai adults, obesity, ageing and heredity are the prominent risk factors for the development of T2DM (Muktabhant et al, 2015; Papier et al., 2016;2017). Thai Cohort Study (TCS) surveyed 39,507 participants in 2005, 2009 and 2013 by Papier et al (Papier et al., 2016). This study revealed aging and higher Body Mass Index (BMI) to be the main factors associated with risk of developing T2DM (odds ratio = 23.1, 95% confidence interval = 16.1-33.0 in men and odds ratio = 28.5, 95% confidence interval = 18.7-43.4 in women). In terms of heredity, previous studies concluded the family history is a high risk factor for developing T2DM in Thai people (Jaruwat, 2009; Kengkard, 2016; Mahantussanapong, 2019; Muktabhant et al, 2015). For example, a study by Muktabhant et al (2015) showed that a first-degree relative with diabetes associated with increased T2DM risk (odds ratio = 2.9, 95% confidence interval = 1.84-4.57) among 609 villagers in rural areas of northeastern Thailand. Therefore, the ministry of Public Health have used this information to improve the screening procedure (Muktabhant et al, 2015).

2.2.4 Signs and Symptoms of Diabetes Mellitus

Among persons without diabetes, before breakfast the level of plasma glucose is 70-99 mg/dl and two hours after breakfast the plasma glucose should not rise higher than 140 mg/dl. Normal renal threshold of glucose is at plasma glucose >180 mg/dl (Campbell, 1998; Sacks et al, 2002). In people with diabetes mellitus, the plasma glucose control is defective because cells cannot effectively use glucose, leaving the plasma level high. If the plasma glucose level is above the renal threshold, the glucose “spills” into the urine. Glucose molecules by osmotic pressure will pull out water molecules with them when being excreted into the urine. Urine volume and urine specific gravity increase while extracellular compartment is dehydrated. The patient will feel thirsty (Alberti et al.,1998; American Diabetes Association, 2010). In addition, if they choose to drink beverages with high sugar content, the cycle of hyperglycaemia- high blood sugar, glycosuria-sugar present in urine, thirst and dehydration will be repeated (Campbell, 1998). The patient will also feel increased hunger and weakness, as the cells are not getting enough energy by normal glucose metabolism. Increased food consumption leads to weight gain and obesity, which increases insulin resistance. Blurred vision may be a complaint as the altered glucose level affects the fluid content in the eyes (Drury, 1986). Skin and urinary tract infections are frequent due to high sugar in bodily fluids being fertile grounds for bacterial growth. At the later stage of the disease, complications may affect several organs and patients could begin to have frequent infections. Skin infection and wounds are slow to heal; peripheral neuropathy often manifests as numbness of fingers and toes. Reduced pain and touch sensation of the toes leads to minor injuries of the feet without feeling pain, therefore the injury and infection spreads wider and deeper before the patient recognises that they have a problem (LeRoith et al., 2004). In addition, chronic leg ulcers are slow to heal due to poor nutritional state of the skin. Amputation of toes and lower limbs are feared and may happen in severe cases (George et al., 2014). As many as 30% of diabetes patients present with chronic complications when the diagnosis is made. Screening tests for diabetes mellitus is therefore the only way to prevent long term morbidity by early diagnosis, early intervention and treatment to control blood sugar in accordance with the goal set (Chuengsatiansup, 2007; Masingboon, 2017).

2.2.5 Diabetic Diagnostic Criteria

The World Health Organisation uses the criteria of fasting plasma glucose which may not be as accurate as oral glucose tolerance test (OGTT). For Thailand, the Ministry of Public Health and Thailand Diabetes Association under the Royal Patronage of Somdej Prateparatana Rachasuda (2011) recommends the following criteria for diagnosing diabetes:

1. Those who have explicit diabetic symptoms as follows: very thirsty, frequent urination, weight loss without other reason, plasma glucose level of 200 mg/dl (not fasting, at any time), can be diagnosed as having diabetes.
2. Fasting plasma glucose ≥126 mg/dl, but this needs a repeat test on another day for confirmation.
3. 75 g Oral Glucose Tolerance Test (OGTT) should be done in a high risk person whose FPG ≤ 126 mg/dl. If plasma glucose two hours after drinking 75 gm glucose is ≥200 mg/dl, a diagnosis of diabetes should be made.
4. The recommended cut off point for a diagnosis of diabetes is an HbA1c of 48 mmol/mol (6.5%). A value of less than this does not exclude diabetes diagnosed using glucose tests (American Diabetes Association, 2013).

When any of the above three criteria are used, it is necessary to repeat the test for confirmation (Guideline for Medical Practices on Diabetes of Thailand, 2017; MacLachlan, 2006; Office of the National Health Insurance, 2008; Srimada, 2006; Thailand Diabetic Knowledge Dissemination Association, 2006; World Health Organisation, 2015)

As diabetes mellitus, especially type 2, in the early stages, causes no symptoms, by the time symptoms or signs become apparent, they are often already symptoms of complications. Therefore, a screening test for the diabetic risk group is very important in order to make an early diagnosis.

Thailand guidelines for medical practice for diabetes (2017) recommend the following diabetic screening criteria for adults who are not pregnant women:

1. Age ≥35 years.
2. Obesity: BMI ≥25 kg/m2 and/or waist circumference ≥90 cm for men, ≥80 cm for women.
3. Having parent or sibling with diabetes.
4. Having hypertension or taking medication for controlling blood pressure.
5. Having dyslipidemia.
6. History of gestational diabetes or delivering a baby with birth weight > 4 kg.
7. Having had any of the following test results indicating an impaired glucose tolerance (IGT):
    i. abnormal oral glucose tolerance test by showing plasma glucose 140-199 mg/dl 2 hours after a glucose drink or
    ii. having ever had an abnormal fasting glucose (IFG 100-125mg/dl) in the past; the person should be recommended to act preventatively by dietary control and regular exercise with regular following-up to test FPG every 1-3 years.
8. Having cardiovascular disease.
9. Having polycystic ovarian syndrome.

2.2.6 Diabetic Complications

There is a relationship between diabetic complications and duration of diabetes, heredity, and other risk factors such as hypertension, smoking, obesity, lack of exercise, and uncontrolled blood sugar levels (Miller, 2011). The complications can be either acute, chronic, or both (ADA, 2017).

Acute Complications

Crisis Hyperglycemia. This is an acute complication which is very severe and dangerous, known as: diabetes ketoacidosis: DKA and Hyperosmolar hyperglycaemic state (HHS). The details are presented below (Chourdakis et al., 2014; Hagobian et al., 2012 Tabur et al., 2010; Nakagasien, 2012).

Diabetes Ketoacidosis: DKA is the condition when the body totally lacks insulin, causing hyperglycemia, polyuria (frequent, increased volume of urination), dehydration, ketonemia and acidaemia, and coma respectively. Ketone and acidic substances are the toxic byproducts of inadequate insulin for cells to use glucose and they turn to metabolise proteins and fats (Chourdakis et al., 2014). The process creates ketonemia and ketoacidosis which causes nausea, vomiting, and rapid deep breathing. Physical examination shows an acutely ill patient with severe dehydration, low blood pressure, Kussmual breathing, with breath smelling of acetone, and hypothermia. If there is a fever, infection should be considered, there may also be abdominal pain, drowsiness, which may eventually lead to a coma (Kim et al., 2003). A cohort study in England by Klunklin and Savage (2018) showed during 1993-2013, T1DM and T2DM patients who were admitted to hospitals with DKA increased in number. In addition, this was associated with a lack of diabetes care improvement. Although this study found that there was a decreased length of hospital stay among these patients. Therefore, the diabetes care should focus on these issues simultaneously with other problems.

Hypoglycaemia. This complication is an acute symptom of low blood glucose that if severe can lead to death if not corrected. It is usually induced by an overtreatment or overdose of insulin or any antidiabetic drug, either by dosage mistake, accidental, or non-accidental; or when the body needs less insulin during fasting, diarrhoea, vomiting, or excessive physical exertion. Hypoglycaemia may occur with or without warning and the most dangerous form is with insulin overtreatment. The patient may feel warning signs of hunger with anxiety, hand tremor, sweating or fainting. In some instances, there may be little or no warning signs before a collapse, unconsciousness, or coma (LeRoith & Nissley, 2005). Misra-Hebert et al. (2018) studied the characteristics of T2DM patients related to severe hypoglycemia in a large, Integrated Health Care System from 2006-2015. This retrospective study revealed that the participants with severe hypoglycaemia did not experience severe complications as frequently. This result shows the risk factors should be investigated and diabetes care improved.

Chronic complications

Having chronic high blood sugar leads to dysfunction of the internal organs (Tatsumi, 1998). Chronic complications of diabetes are as follows:

Retinopathy leads to visual disability or blindness. Diabetic retinopathy is caused by uncontrollable blood sugar leading to the damage of blood vessels in the retina,which may cause vision loss. The study of Sherwani et al (2016) showed that if the level of HbA1c remains higher than 9%, the retina is at risk of degeneration. Other risk factors are the duration of diabetes, high blood sugar levels, smoking, insulin injections, high blood pressure, and high cholesterol, which are also the risk factors of early onset of cataracts and glaucoma (Liang et al., 2018; Sherwani et al., 2016).

Nephropathy. Nephropathy or degenerated kidney means the degeneration of a kidney where there is the continued leakage of protein in urine at higher than 5 grams in 24 hours for at least a month. If the blood sugar along with blood pressure are not well-controlled, the likelihood is that within the next two years the patient will suffer from renal failure. The initial symptoms include swelling of the legs, lethargy and dyspnea. The laboratory test is confirmed by a rise in blood creatinine. This progresses towards uremia, heart failure, electrolytes imbalance, which need renal dialysis and eventually a renal transplant (Scobie & Samaras 2012).

Cardiovascular Disease. Prolonged diabetes and high blood glucose lead to degenerative changes of blood vessels walls and occluded vascular lumens in large and small-sized vessels. Large vessels narrowing is due to calcium and cholesterol plagues called atherosclerosis. Narrowing of medium sized arteries affects coronary and cerebral vessels which is the cause of coronary heart diseases and stroke. Leg muscles are supplied by medium sized arteries the narrowing of which causes ischemia and pain on walking or exertion. This type of pain goes away with rest and is known as claudication. Other metabolic consequences of long term diabetes Buse, dyslipidaemia and hypertension, are causes of poor arterial blood supply and tissue anoxia (Buse et al., 2007).

Cerebrovascular Disease. Narrowing and occlusion of cerebral blood vessels is the cause of stroke. Stroke is an anoxic or ischaemic event of brain tissues from thrombosis or tear of cerebral arteries. Hypertension, hypercholesterolaemia and hypertriglyceriadaemia, are related risk factors commonly found with long-term diabetes (Phipps et al., 2012).

Neuropathy. Diabetic neuropathy is the condition when blood vessels of the peripheral nervous system have been damaged in people with diabetes mellitus caused by high levels of blood sugar leading to abnormal metabolism in the blood vessels of the nervous system, resulting in a shortage of blood flow to the peripheral nervous tissues. Peripheral neuropathy causes sensory loss or reduced perception of pain, touch, and temperature sensation. Like in beriberi (vitamin B1 deficiency), the symptoms include numbness, tingling, “pins and needles” of hands and feet which are common complaints among diabetes patients. The loss of sensation of the feet with numbness leads to minor injuries being undetected or neglected because the patient has not felt pain or discomfort. Minor foot ulcers and injuries occur 40 times more often in people with diabetes mellitus than in non-diabetics. The automatic nervous system may also be damaged which impairs the control of heart rate, causing cardiac arrhythmias. Sweat glands and sebaceous glands loss of autonomic nervous control are the cause of dry, hard skin and abnormal sweating. Skin wounds are slow to heal because of poor skin quality. Gastrointestinal motility is also controlled by autonomic nervous systems. Diabetics may experience constipation, or non-infectious severe diarrhoea due to abnormal bowel movements (Scobie & Samaras 2012; Verrotti et al., 2014).

2.2.7 Treatment

Diabetes is a chronic disease that cannot be cured but needs to be controlled by changing behaviour in regard to food consumption and exercise in combination with taking medication or insulin prescribed by a physician when necessary. Blood pressure and blood lipids should be monitored and treated when necessary (Wagner, 2011; Rasouli etal., 2013).

1) Goals of Diabetes treatment

The aim of treating diabetes mellitus is not only about symptom control. The goal must include the control of blood sugar to prevent and lower the risk of complications. However, results of blood sugar levels alone should not be the only goal or overemphasised, as it leads the patient to misunderstand the disease management process which involves a change of lifestyle rather than treating a laboratory result.

The main objectives of caring for diabetes patients are: 1) to get rid of the symptoms caused by hyperglycaemia, 2) to control blood sugar levels to be as near normal as possible without causing hypoglycaemia, 3) to lower the risk of vascular complications, 4) to treat arising complications, and 5) to help persons with diabetes live their lives happily. Table 2.1 (WHO, 2017) shows normal ranges and levels when recommended actions should be taken.

Glycemic Control Indicator	**Normal**	**Goal**	**To be Improved**
Plasma values			
Pre-meal glucose (mg/dl)	<100	90	<90 or >150
Bedtime glucose (mg/dl)	<120	110-150	<110 or >180
Whole blood values			
Pre-meal glucose (mg/dl)	<100	80-120	<80 or >140
Bedtime glucose (mg/dl)	<110	100-140	<100 or >160
HbA1c (%)	<6.0	<7.0	>8.0

Table 2.1 Indicators for the best control of blood sugar level. (Source: ADA, 2017; WHO, 2015)

It has been accepted that abnormal metabolism related to insulin resistance increases the risks of cardiovascular diseases. They are hyperlipidemia, obesity, and high blood pressure which should be tested at the time of diagnosis and at follow-ups. Therefore, targeting the blood sugar level only, will not be enough to lower diabetic complications. The World Health Organisation has specified the goals of blood sugar control in which a difference of 10-15% was found between self-examination and the laboratory test of arteries (ADA, 2017; WHO, 2015), as showed in Table 2.2.

Goal	**Good Control**	**Borderline Control**	**Poor Control**
Total cholesterol (mg/dl)	<200	200-250	>250
Fasting triglycerides (mg/dl)	<150	150-200	>200
High density lipid			
HDL – cholesterol (mg/dl)			
Male	>45	35-45	<35
Female	>55	45-55	<45
Low density lipid			
LDL – cholesterol (mg/dl)	<100	100-130	>130
Body mass index (kg/m^2)	<110	100-140	<100 or >160
Male	<25	25-27	>27
Female	<24	24-26	>26

Table 2.1 Goals for the control of diabetes (Source: ADA, 2017; WHO, 2014)

2.3 Classification of Health Status of Diabetes Patients in Thailand

Data from several existing studies of the health status of diabetes patients in Thailand (Khunluek, 2017; Kacharat, 2017; Yodrungroaj ,2018; Punyakaew et al., 2015; Kuntisiwanon, 2013; Uttamawatin, 2010) have classified these patients into three levels as follows:

1. Good health status: refers to the patients with diabetes who could control blood sugar level, could work normally and did not have any illness.
2. Moderate health status: refers to the persons with diabetes whose blood sugar level fluctuated, could do some work, got sick occasionally but not often.
3. Needs improvement: refers to the patients with diabetes mellitus whose blood sugar level was constantly high, had to depend on medication, and had illness due to diabetic complications. The caring activity for this group was the recommendation to refer them to a hospital and the emphasis was on giving advice to their relatives.

The health professionals at the health care services centre would provide care for patients with diabetes in accordance with the levels of blood sugar assessed, which were: a) the group that could control the blood sugar levels, the caring activity would emphasise asking the patient to control blood sugar level with the aim of assessing patients’ capacity in controlling and caring for themselves; b) In the group that could not control blood sugar level, a home-visit took place every week to assess patients’ blood sugar levels and recommendations were given in accordance with patients' problems. If a decreased blood sugar level was found within three consecutive home-visits and the blood sugar was normal, the home-visit would be terminated and patients would receive medication at their hospital appointment. Categorising patients with diabetes is useful for diabetic care however, there is no evidence that diabetics care which follows the guidelines is successful in all areas in Thailand (Sangtongpanichakul, 2012). This is because the context of diabetes care and characteristics of the patients with T2DM in each part of Thailand are different (Nitiyanan, 2011). For example, following the Thai standard guidelines of diabetes care in hill tribespersons who have their own beliefs, culture and lifestyle different from general Thai people, might not be successful.

2.4 Blood Sugar level control among Patients with Diabetes Mellitus

The goal of treatment in patients with diabetes mellitus is to control blood sugar levels at normal or near-normal levels (ADA, 2016). In order to control blood sugar successfully, health behaviour is the most important aspect. Patients' self-management or self-care behaviours are also crucial (Mertig, 2012). Behaviour is the action or expression of human beings that is found through experience and social learning (Conner & Norman, 2005). Health behaviour affects people's health both positively and negatively and improper health behaviour is a significant cause of illness and death (Serra-Majem, 2016). Data from the studies and the development of the model of health service management and provision at the primary level in the community, showed that most people perceived that health care is the responsibility of themselves and their families (Grant & Green, 2012; Peters et al., 2009,). However, they still have many risk behaviours, for instance, food consumption behaviours that lead to health problems such as, consumption of food containing high sugar, high salt and high fat, sedentary behaviour; unhealthy sanitation and environment, improper lifestyles, for example, lack of skills for stress management and even their health care during illness (Peters et al., 2009; Zhaokang et al., 2012). Furthermore, Lambert et al. (2004) who studied the perception of T2DM patients in rural areas showed that people have various kinds of treatments depending on their perceived severity of the illness, starting from investigation of symptoms, buying medicines, using traditional treatments such as herbs and alternative treatment, getting health services from the government or private health organisations. This finding reflected that health behaviours affected people's health status and illness including the needs for health services. The important factors regarding the onset of diabetes mellitus and the accomplishment of controlling and preventing its severity or complications, is self-care health behaviour. There are six behaviours which are significant in controlling blood sugar level; dietary control, exercise, general health care, self-care behaviour in regard to mental, emotional and social health, dealing with complications and taking medicine as prescribed. The critical analysis of the previous studies concerning health behaviours of diabetes mellitus patients showed the information regarding health behaviours as follows:

2.4.1 Dietary Control Behaviour.

Dietary control is a self-management activity which plays a significant role in controlling diabetes mellitus (Mohamed et al., 2017). Because the patients with diabetes mellitus need to take medicine, the blood sugar level will go up or down depending mostly on the action of the medicine taken, thus patients have the chance to obtain a low sugar level during the time the action of medicines is at the highest level. If the patients consumed proper foods with the correct quantity in each meal regularly, it would lead to a good level of blood sugar level control (Mohamed et al., 2017; Weerarathna et al., 2018). Besides, many studies of the self-care behaviour in patients with diabetes mellitus show that they have problems in taking care of themselves in regard to food consumption in daily life and did not control the quantity of food intake each day to make each day similar, did not eat meals punctually but when convenient or when feeling hungry (Herbozo et al., 2015; Miller et al., 2011; Pan et al., 2018; Vijan et al., 2005). It was also found that some people with diabetes did not control the consumption of very sweet foods and those containing high fat as well as the consumption of sweetened beverages. When attending social activities this was also a problem for them. This finding was congruent with the study of Lambert et al. (2004) who found that most of the people with diabetes mellitus knew what they should control themselves regarding foods and had tried to control their intake of carbohydrates, fat and sugar, but some of them could not control their blood sugar level during particular periods of time, for example, during festival ceremonies or the fruit harvesting season. In addition, some patients could not control their food consumption because they became used to eating a high quantity of food, so they could not stop this, especially when they saw their favourite foods, even though they knew what and how they should eat (Buban, 2015).

From the review concerning related literature of dietary control among patients with diabetes mellitus, it was evidenced that dietary control is difficult, since there are many factors affecting it, for example, diabetes knowledge, dietary control, perceived illness condition, beliefs, traditions, food consumption habits, and different lifestyles in different societies and environments (Ahola & Groop 2013; Campbell et al., 2017; Cheng et al., 2016; Coppell et al., 2010; Frank et al., 2018). Previous studies have been conducted regarding problems in diabetes control and the findings have shown many problems related to this. The previous studies used various educational programmes aiming to promote self-care behaviour of diabetes patients (Shaya et al., 2014; Shrestha et al., 2018; Steinsbekk et al., 2012; Van et al., 2018). Different behavioural science theories were applied in the programmes in accordance with the target groups and environmental contexts of the patients (Azar et al., 2018; Nugent & Wallston, 2016; Nadler et al., 2000). Better levels of knowledge and behaviours in blood sugar control were found among those studies. However, there were no follow-up programmes of using those educational programmes. Patients' changed behaviour may relapse again due to the lack of continuous encouragement after the end of the programmes. It can be seen that patients' self-care in regard to diet is the key to diabetes control. Even though patients may be receiving medication, it is also necessary to practice dietary control. Dietary control is aimed to help the body receive complete and balanced nutrients that will result in preventing and lowering the severity of the complications that may occur (Muchiri et al., 2016).

2.4.2 Exercise Behaviour

Exercise by using muscle function is an important method for diabetes management (Yang et al., 2014). Regular exercise can decrease the fat deposits in the body, strengthen the muscle and increase the muscle sensitivity toward insulin which means that with the same amount of insulin, the body can utilise glucose more efficiently and diabetes patients can control blood sugar level for a long period (Hansen et al., 2006). There are not only advantages to blood sugar level, but exercise also creates other benefits, for example, weight loss, better control of diabetes, and lowers the risk of heart disease, including lowering lipidemia level, cholesterol level, the risk of ischemic heart disease due to less blockage of coronary arteries, better mental health, lower stress and increased self-confidence (Hansen et al., 2006; Yang et al., 2014).

The study of Suwanwong and Pakorn (2017) studied the effects of capacity building on self-care and blood sugar control among patients with type 2 diabetes. After the experimentation, exercise was found to be effective in lowering blood sugar level. However, in the study of Jaikhamwang et al. (2015) who studied the barriers of people with T2DM in regard to exercise, it was found that lack of time, lack of awareness of obesity as a health issue, inadequate focus on exercise by health professionals, social and cultural issues, lack of equipment, and physical problems were the barriers to physically exercising. In addition to this, a clear lack of adherence to standard guidelines, by physicians was also noted. This finding was congruent with the study of Suksan and Ketpichawattana (2018), who found that patients with diabetes mellitus performed low levels of exercise or only occasionally. The reasons that the respondents gave for less exercise were the belief that working was a kind of exercise, not having enough time, having to work outside, did not want to, no place to exercise, shyness, too lazy, not being healthy, and being tired easily. Exercise is very important; people with diabetes have to understand exercise techniques in order to prevent complications that may occur. Thus, it can be seen that self-care behaviour of persons with diabetes is as one important means for controlling the disease, even though the patients are taking medications and consuming food for lowering blood sugar (Laursen et al., 2004).

2.4.3 General Health Care Behaviour

Health care is important for people with diabetes because they have a lower level of immunity than other people (Brenner, 2001). They are susceptible to getting infections, for example, fungal diseases, infection of staphylococcus of skin in oral cavities and feet, for example. Therefore, in order to prevent the problems mentioned, persons with diabetes need to take special care certain parts of the body, for example, armpit, under the breast, groin, and ensure these areas are always dry (Chuengsatiansup, 2002).

The study of Helman (2007) found that among 299 cases of people with diabetes in Thailand admitted at all government hospitals in the country, 29% of them had foot ulcers and it was found to be the first symptom among all complications that caused them to be hospitalised. There are many factors that cause foot-injury, for example, hitting a hard or sharp thing while walking with a loss of feeling, cutting the nails too short, and wearing high-heeled shoes. After being injured, the wound would become infected very easily. Some diabetes patients have a foot amputated in order to control the spread of infection. In addition, the study of Chuengsatiansup (2002) found that emotional support and information affected foot-care behaviour of diabetes patients. Their behaviour score after the experimentation was found to be higher than before. This finding agreed with the study of Kacharat (2017) who studied the effects of capacity development on self-care and blood sugar level of persons with type 2 diabetes and after the experiment, the study group had better self-care behaviours in regard to cleanliness of the body, looking after the feet and could reduce their blood sugar level. Furthermore, the study of Yodrungroaj (2018) found that the T2DM patients' self-care behaviour in regard to general health care was at a moderate level due to the fact that they had already performed their daily activities and when they had a wound, they went to see the physician immediately. However, the most problematic group pending were supposed to go for eye examinations at least once a year and also have dental health care every 6 months but never did. They gave the reasons for this as; not understanding the necessity of these services, the shortage of health professionals, and financial and transportation problems. Thus, health care of the body is very important because persons with diabetes are more susceptible to getting infections than persons without diabetes. Patients have to look after themselves because if they ignore these things, complications may occur.

In addition, the findings from Diabetes Attitudes, Wishes and Needs second study (DAWN2), conducted among 8,596 perons with diabetes in 17 countries: Algeria, Canada, China, Denmark, France, Germany, India, Italy, Japan, Mexico, the Netherlands, Poland, Russian Federation, Spain, Turkey, the UK and the United States, revealed that diabetes had a negative physical and psychological effect on all participants. In terms of physical health, it found that more than 50% of participants did not get a foot examination and only 48.8% had engaged in diabetes educational programmes/activities to help deal with their conditions. Moreover, around 40% of participants indicated that medication hindered their capacity to live a normal life (Nicolucci et al., 2013). Therefore, general health care behaviour in persons with diabetes needs to be developed in all countries.

2.4.4 Self-Care Behaviour in Regard to Mental, Emotional and Social Health

People with diabetes have to be responsible for self-care in regard to various things and they have to face the uncertainty of the diseases pathological conditions which lead to stress. In the study of Punyakaew (2005) with regard to T2DM patients' perception of illness, the patients were concerned firstly with how the disease impacted on their daily lifestyles and dietary control. The next concerns were: worrying about complications; feeling a lack of freedom, confidence and self-esteem. Among those who had retinopathy, they were found to have a lower quality of life than those who did not have complications and they also had increased depression. Those who could not control their disease were found to have more anxiety and depression than those who could control the conditions. Chronic anxiety, depression and stress could reduce the accomplishment of the blood sugar level because of the increased secretion of catecholamine and cortisol which elevates the blood sugar level though the glycogenolysis process. Therefore, patients need to learn methods for reducing stress by using appropriate methods and understand how to use social support in beneficial ways. In addition, exercise, relaxation or using religion as a way of coping can decrease the stress. This finding was congruent with the study of Buasonte et al (2012) who found that people with diabetes mellitus had tried to avoid events that caused stress and had learned methods for stress reduction. These included relaxation through reading, listening to music, watching television, talking to close friends and using religion in order to lower stress through praying, meditation, offering food to monks or going to the temple. However, it was found that female diabetes patients did not dare to express their stress or unhappiness with others. Some of them chose to keep those feelings in and think about it as a cycle of stress (Kuntisiwanon et al., 2013; Chamnongphol, 2007; Junthon, 2000; Ratanapitugs, 2007; Wanchai & Muangthong, 2017). Furthermore, receiving support from family could help them to perform good self-care behaviour and those who could not control blood sugar level well, did not receive support from family due to the fact that family members, close friends and distant relatives had a lack of perception about self-care behaviour, therefore they did not get involved in the treatment (Boonlom et al., 2017).

In 2001, the findings from Diabetes Attitudes, Wishes and Needs second study (DAWN), conducted among 5,104 perons with diabetes in 13 countries: Australia, France, Germany, India, Japan, the Netherlands, Poland, Sweden, Denmark, Norway, Spain, the United Kingdom, and the

United States, showed that psychosocial issues are an important factor influencing the control of blood sugar levels among these people (Peyrot et al., 2005). Moreover, the study from Nicolucci et al (2013) in the study of DAWN2 revealed that persons with diabetes lack psychological support and therefore, require assistance with self-care behaviour in regard to mental, emotional and social health promotion.

2.4.5 Dealing with Complications

a) Hypoglycaemia

Hypoglycaemia is a condition which means the blood sugar level is lower than 60 mg/dl. It can be found in people with diabetes who have been treated by either insulin or oral medicines. It is caused by over dosing of medicines or using the same dose but not eating enough food. The symptoms are varied and range from trembling, sweating, and confusion, drowsiness, and dizziness in milder cases. However, the most severe symptoms are losing consciousness or even going into a coma. If patients have some of these symptoms, they have to be treated and solved immediately because if nothing has been done it will damage the brain cells and the cells will not recover. The methods to solve the problems and prevent them from reoccurring are controlling the diet properly, taking the correct amount of exercise, preparing sugar, candy and sweetened beverages to have and always taking some when going out. The study of Chotimorykol (2013), found that most people with diabetes mellitus had knowledge and understanding about causes, symptoms and what to do when symptoms occurred, for example, having high perspiration, irregular breathing, drowsiness, dizziness and knew that the methods for solving those symptoms were eating food or drinking beverages containing high sugar immediately. However, the study of Duanguppama (2015) found that patients with diabetes had performed self-care behaviour in preventing hypoglycaemia at a good level because the patients had consumed less foods containing sugar or carbohydrate but some patients did not carry diabetic patients' personal note when they went out, which may be due to the patients not understanding the necessity and the benefits of having this note with them.

b) Hyperglycaemia

Hyperglycaemia may result in the onset of acute and chronic complications due to a very high blood sugar level. When the level is higher than 180 mg/dl, it is dangerously high for kidney function. The symptoms are feeling thirsty, frequent urination with a high quantity of urine at night time, nausea and vomiting, blurred vision, stomach pain akin to appendicitis, difficulty breathing, and unconsciousness. These symptoms can be caused by a lack of medication, eating too much, lack of exercise, having an infection, and severe stress. The methods for solving these problems are drinking a lot of water, as equal to the quantity of the urine out. If medication is forgotten, the patient should take it immediately when they remember, the diet should be individually appropriate to the patient, and if the symptoms have not improved, the patients should see a physician (Duanguppama, 2013). The study of Chotimongkol (1998) found that patients were found to decrease their quantity of food when they had symptoms of hyperglycaemia. The group who did not perform this measure gave the reasons as not knowing what to do. This finding reflected that they faced problems of dietary control in order to maintain the blood sugar level. Therefore, they should perform the following measures to prevent hyperglycaemia: control diets appropriately take regular exercise, take medicines correctly as prescribed, and if symptoms of infection are experienced, medical advice should be sought immediately.

2.4.6 Taking medicine as prescribed

Medication nonadherence in T2DM is related to failure to achieve glycaemic control (McSharry et al., 2016; Egede et al., 2014; Jarab et al., 2014). This factor has been identified as an important consideration in diabetic care and clinical outcome (Capoccia & Letassy, 2016; Kennedy-Martin et al., 2016). It leads to an increase in death and hospitalisation (Kong et al., 2006; Egede et al., 2014). Moreover, it causes higher diabetes care costs (Kennedy-Martin et al., 2016; Nadendla, 2015). The perceptions regarding taking medication also affects diabetes patients' behaviour (Bernhard et al., 2017; Brundisini et al., 2015; Islam et al., 2017). Brundisini et al. (2015) identified the barriers to medication adherence for type 2 diabetes patients from 86 qualitative research into seven barriers (1) the emotional experiences which can motivate patients' behaviour, (2) intentional non-compliance, (3) the relationship and communication between patients and healthcare professionals (4) the knowledge and information of the patients (5) healthcare professionals, (6) social and cultural beliefs, and (7) economic problems. This study highlighted that the gap between the understanding of patients and healthcare professionals is one of the most important barriers. While a previous systematic review of Mcsharry et al (2016) regarding the perceptions and experiences of medication taking among T2DM showed that there were three constructs. Firstly, the patients perceived taking medication as a "necessary evil" of which they did not truly see the benefit. Secondly, they perceived themselves as "passive patients but active experimenters", which revealed the divergence between their medical perceptions and dose adjustment. Lastly, "taking medication as prescribed is a unique context", which indicated that the intervention for the patients should be specific and related to their conditions. However, this study cannot be representative of "normal" people with diabetes mellitus due to the fact that these included 9 pieces of research and the participants in each research paper were specific and had different backgrounds. The development of interventions for improving medication taking behaviour among T2DM patients using the patients' viewpoints and their context might be more effective.

2.5 Personal Factors Influencing Blood Sugar Level Control

1. **Gender.** People are different and also have different abilities to manage self-care behaviour. It was found that elderly males take better care of themselves than the female elderly due to the fact that in Thai culture, males tend to be good leaders and to accept technology more easily than females (Sapchoktanakul, 20014; Mogre et al., 2017). The study of Shrestha et al., 2013 showed that females restricted foods they should avoid, while males moderated their intake of perceived unhealthy foods, except in social situations. Females used socially interactive resources, whereas men relied more on self-directed learning. Gonzalez-Zacarias et al. (2016) who studied the differences in foot self-care and lifestyle between men and women in 1,515 diabetes mellitus patients found that some types of food control were more prevalent among females. While the study of Baig et al. (2015) and Shahinfar (2001) revealed that males had significantly higher self-care behaviour scores than females among patients with diabetes mellitus. However, the data from many studies showed no relationship between sex and self-care behaviour, health promotion behaviour or blood sugar level control behaviour (Sacks et al., 2002).
2. **Age.** Age is the determinant of maturity, ability, needs, experience, knowledge, belief, thinking, perception and decision making (Younger et al., 1996). Thus, age affects the health behaviour of people with diabetes mellitus (Wessel et al., 2015; Phrompayak, 2017; Puangkham, 2017). Meir et al (2012) identified that older age significantly correlates to following a daily a healthy eating plan. However, the findings of previous studies showed there was no relationship between age and self-care behaviours, health promotion behaviour or blood sugar control behaviour (Rich, 2016; Mogre et al., 2018; Gonzalez-Zacarias, 2016).
3. **Race and ethnicity.** Previous studies have revealed the association between race and people with diabetes' behaviour. In a survey study, Islam et al (2015) showed that diabetes self-management behaviour varied among ethnic groups (Hispanics, Blacks, and three Asian American subgroups consisting of Chinese, Koreans and Indians in New York City.) This study recruited 4,403 non-Hispanic Asian Americans, 4,943 Hispanics, and 2,978 non-Hispanic Black people with T2DM. The findings showed that the Black and Hispanic groups had a higher average rate of self-management than three Asian-American subgroups. The Black group were more likely to practice self-management in all aspects than the Chinese and Korean patients and the Black people were also more likely to receive foot checks and eye examinations. Moreover, Heidemann et al (2016) showed the results from a retrospective study in 25,123 people with T2DM, that race was an independent factor to control the

glycaemic index of people with diabetes mellitus after the socioeconomic status was adjusted. These two studies indicated that health professionals should be designing self-management education programmes and by prioritising this factor.

4. **Marital status.** This is the fundamental factor affecting both, needs and ability in regard to the self-care behaviour of patients with diabetes mellitus (Gonzalez-Zacarias et al., 2016). This is because self-care behaviour in diabetes patients often requires their spouse to participate for better clinical outcomes (Khan et al., 2013; Saidel et al., 2012). Previous studies showed that patients with a spouse did not need a professional caregiver for daily care, while those who were without a spouse needed a professional caregiver for support (Crotty et al., 2015). This study supports the recommendation of involving the spouse to diabetes management programmes (Gonzalez-Zacarias et al., 2016).
5. **Religion.** This is an important factor which affects diabetes control. The study of Amadi et al (2016) showed that diabetes patients with religious beliefs have positive management skills and better treatment outcomes. In addition, these patients have lower depressive symptoms than those without religious beliefs. This might be because the religion provides emotional support and heals the mind (Amadi et al., 2016; Berardi et al., 2016).
6. **The period of having diabetes mellitus.** Due to the fact that self-care behaviour is the result of learning, skills development of self-care behaviour should help patients learn more about their condition because they have an opportunity to gain information from the health professionals and other persons (Srisawang, 2006). However, the study of Watanapahu and Saranop (2011) found that the patients with diabetes mellitus who had been suffering from their conditions for between 1-5 years could control their sugar level better than those who had diabetes mellitus for longer than 5 years. This finding agreed with the study of Kratiyutwongs (2014) who found that diabetes patients who had been diagnosed as having the first stage of the disease were found to hope that they could be cured completely or at least control it. Therefore, they were highly motivated to receive information to change their behaviours for controlling the disease. On the contrary, patients who had been diagnosed as having diabetes mellitus for a substantial period could not control the disease due to a low level of enthusiasm and motivation to change behaviour. This explanation was similar to the study of Nuntabutr et al. (2003) who found that those who had had diabetes mellitus for longer than 5 years had a lower ability to control their blood sugar level than those who had had diabetes mellitus less than 5 years by 1.43 times. This finding may be due to the fact that those who have been sick with diabetes mellitus for a long time have a lower level of interest and enthusiasm to perform proper behaviours and were bored with self-care. Thus,

the duration of being ill with of diabetes mellitus affected the control of blood sugar level and self-care behaviour.

7. **Number of concomitant diseases.** The patients with diabetes who had more than one concomitant disease could control their blood sugar level better than those who did not have a concomitant disease. This is because having other concomitant diseases made patients aware of the importance of blood sugar level and their perceived severity of diabetes mellitus. Therefore, the patients changed their behaviour for controlling blood sugar level (Pim-ium, 2009). This study differed from the study of Watanapahu and Saranope (2007) who found that having a concomitant disease did not affect the control of blood sugar level.

This previous research determined that personal factors are an important predictor of self-care behaviour in people with diabetes mellitus. Healthcare professionals should understand and be aware of these factors in order to provide appropriate diabetes care, including health education (Meir et al., 2012; Osborn et al., 2018). However, the previous studies aforementioned showed that not all factors were associated with patients' self-management due to the difference of each patients group. Therefore, tailoring the health promotion programme should also focus on the context of the patients.

2.6 Sociocultural Factors Influencing Blood Sugar Level Control in People with Type 2 Diabetes Mellitus

Much research has shown that one of the important factors related to the achievement of controlling blood sugar level among people with T2DM is sociocultural (Fortmann et al., 2014, 2015; Greenhalegh et al., 2015; Issaka et al., 2016; Juárez-Ramírez et al., 2015; Mudd-Martin et al., 2016; Patel et al., 2015; Rovner et al., 2013). Therefore, considering sociocultural factors as the first step to creating an appropriate diabetes education and interventions is needed (AADE, 2015; Fleming & Gillibrand, 2009). The sociocultural factors which influence blood sugar level control or self-management in people with T2DM are lifestyle, cultural influence, economic status, social support and access to health care.

2.6.1 Lifestyles

A lifestyle change is a key component of success in self-management among people with diabetes mellitus. However, this is often the most challenging aspect of care for both patients and health professionals. (Amirehsani et al., 2013; Howells et al., 2016). Many studies have suggested that lifestyle change will increase the risk of diabetes symptoms worsening in people who already have diabetes mellitus. For instance, Tong-uthaisri (2014) compared the lifestyles of T2DM patients who could control blood sugar level and a group that could not control their blood sugar level, at the diabetes clinic in Nong Buo Pumpoo Hospital. The study found that in regard to food consumption behaviour, both groups consumed three meals a day, but the group that could control blood sugar level consumed breakfast and dinner more punctually than the group that could not. Both groups were found to consume similar main foods but differences were found in regard to the limitation of food quantity. The group who could control blood sugar level had limited the amount of sticky rice, stopping when they had a "full" feeling, for lunch and dinner, and limited the quantity of sweet fruits intake including sweetmeats, and sweetened beverages. The limitation of the forbidden foods among the group that could control blood sugar level was found to be higher than the group that could not control it. In terms of frequency of food consumption, the group that could control blood sugar level were found to consume less fried food, fast food, and sweet fruits than the group that could not. In terms of exercise, the group that could control blood sugar level were found to have more body movement than the group that could not control blood sugar level in regard to travelling and exercise. In terms of stress, both groups were found to have "moderate" levels. As regards responsibility for health, the group that could not control blood sugar level were found to use anti-diabetic medicine more than the group that could control it. For the use of herbal medicine, supplementary food, consumption of alcoholic beverages, and smoking, both groups were found to practice the same level. Furthermore, Howells et al (2016) found that lifestyle interventions could delay progression to diabetes under trial conditions. Similarly, a meta-analysis from 16 studies by Chen et al., (2015) reported that lifestyle intervention could reduce risk factors such as body mass index (BMI) and glycated haemoglobin (HbA1c) that are known to be associated with the development of cardiovascular disease in patients with T2DM. These findings have further been confirmed by other systematic reviews which found that lifestyle interventions improved the risk factors that developed diabetes in patients with T2DM (Baker et al., 2011; Schellenberg et al., 2013; Takahashi et al.,02014; Yang et al., 2014). Previous studies reflect the lifestyle influences on blood sugar level control, however lifestyle modification among people with T2DM is difficult in practice due to their dietary behaviour and activities in daily life which they get used to over a period of time. It is crucial to focus on lifestyle changes which is practicable in the patients' context for the effectiveness of diabetes care in each target group (Kriska et al., 2018).

2.6.2 Cultural Influence

Culture is like a mirror that reflects the world. The way of life, which people inherit from their society, through a process in which they gradually learn from socialisation, is known as a culture (MacLachlan, 1997). For those who were born and grew up in that society, it is difficult for them to view this objectively because they already firmly believe that the pattern of behaviour, opinions, beliefs and actions inherent in their society are all correct, natural and normal (Huayanay-Espinoza et al., 2016). In some cases, they may think that other groups, different from their own are strange and should be looked down upon (MacLachlan, 2006). When faced with suffering due to illness people will try to overcome it because it may be symbolic of impending death and because it brings suffering, not only to themselves but also to their family and surrounding society (Huayanay-Espinoza et al., 2016). Methods of managing illness , which people understand, and adhere to, are recognised by anthropologists as a type of culture because they have been developed over time to serve the basic needs of man for physical survival (MacLachlan, 2006). Group responses are also seen during the time of need during an individual's illness, which reflect the relationship among the people of that society (McSharry et al., 2016).

Health Care Culture is defined as opinions, and beliefs about health relating to self-care, folk-health care, up to health care management (Boykin et al., 2014;2013). This is based upon academic knowledge or modern medical technology which people in that society use to manage their physical, mental, social and spiritual health covering the following four health dimensions: (MacLachlan, 1997)

1. Promoting health;
2. Preventing diseases or disability;
3. Treatment; and
4. Rehabilitation or recovery.

Health care culture of people in the community does not occur as a free-standing phenomenon, or an individual's instinct. The treatment and healing methods used in response to an illness in order to get well again have been embedded by culture. There is no single model, method, knowledge or system of health care, which has been adopted by a community without having been through a process of conscious selection (Mannion et al., 2005; 2004). It can be said that medical treatment and health care methods have been developed in parallel with the development of the people who have tried various methods of prevention and treatment through repeated experience of success and failure, until certain methods become accepted for the prevention, care, or cure of that community (Huayanay-Espinoza et al., 2016). In some remote Thai communities' age-old methods are still used for the treatment of illnesses, such as sorcery by witches, or religious rites performed by monks, while other communities may use complex cultural system under an advanced organisational management (Chourdakis et al., 2014). For example, hospitals or medical centres are concerned with disease prevention and treatment based on modern medical sciences. Health care is also determined by other factors or contexts such as family condition, economics, education, religious principles, environment, and government policy. Therefore, we can see that illness prevention and cure do not depend only on the individual patients’ level (Bhui, 2010).

Culture and health care are usually determined in accordance with social environment, which can mean different methods are used in each society. Culture is also the determinant factor in the members of each society being healthy or unhealthy. Therefore, different diseases occur in different cultures and because culture is dynamic in nature, health care patterns and methods are always changing (Mannion et al., 2005; 2004). In each society, health care patterns and methods are always influenced by health cultures from other societies. In order to effectively understand themanagement of illness and health care management, it is necessary to understand holistically, both the intrinsic and extrinsic factors that have influence upon them.

There is a cultural belief in Thailand that illness is a condition, which all humans have to confront at some stage in life, and from which no one escapes (Nakagasien, 2012). Buddhism teaches that illness is a natural and unavoidable phenomenon of human-being, a part of the cycle of birth, ageing, sickness, and death. Illness affects the relationship between physical, mental and social aspects (Sacks, 2002). It causes personal suffering by reducing physical, mental, and earning efficiency and may lead to long term or permanent disability. These problems lower the patient’s quality of life, as well as the happiness of their close family (Turner, 2000). Some illnesses, if not treated appropriately become chronic or complicated with other conditions, requiring prolonged treatment or care. Chronic illnesses and disabilities are a heavy drain on resources of the health service of every government. Patients use many types of methods to cope with their illness, in accordance with their social and cultural situation, their own direct beliefs and experience or advice from their circle of family and friends (Nakagasien, 2012).

Health and illness are the natural issues of life and death of individuals and their society. In turn culture affects people’s life, lifestyles and occupations which are strongly related to disease types and incidences. Meanings and concepts of diseases and their management are understood or interpreted differently by different societies (MacLachlan, 2006). They are shaped by each community’s cultural beliefs and genetic predisposition in their widely differing definitions, interpretations, opinions, actions, and ritualistic performances to ward off or to cure diseases. Many cultures see obesity as a sign of health and wellbeing while the educated view sees it as leading to many health problems including diabetes (Bosch et al., 2008). There are conflicts between traditional advice and official medical guidelines and people may try to compromise and act by trying to accommodate advice from both camps (Sakurai et al., 2016).

Supernatural beliefs do not follow scientific principles, nevertheless are strongly influential on people’s actions in managing their health and illnesses. Below are some examples of such beliefs.

1. Illnesses caused by ghosts and spirits. In any hill tribe society there is a cultural belief in ghosts. Hill tribes believe that ghosts exist in the surrounding environment exerting unseen powers that can give both benefit and harm to people. A bad deed or behaviour will offend ghosts who may unleash illnesses or death upon an individual or the community (Dusanee, 2001).
2. Illnesses caused by violating established social traditions, rules and norms. Breaking the aforementioned in some societies are judged as actions that can ruin life and public asset including health. An example is during the postpartum period a hill tribe woman will have specific rituals to follow. She has to lie on a bed with a fire lit nearby; eating animal meat is prohibited; and she must always dress in a way that keeps the body warm during this period. If she fails to follow these rules she will become ill with “Lom-Pid-Duan” which is believed to affect the circulation and bring on other complications (Dusanee, 2001).

A diagnosis of an illness which is based on cultural beliefs naturally produces cures or prevention in accordance with that community’s culture. Diabetes self-management is strongly influenced by cultural and spiritual beliefs. Interdependence and participation in social activities, for example, ordinations or funeral ceremonies, new house celebration ceremonies or other events affect food consumption of patients (Concha et al., 2016; Keeratiyutwongs, 2013). In regard to the social context of the people in northern Thailand, most people eat mainly glutinous rice and most people with diabetes could not change their food consumption because they felt that eating rice did not make them feel full so they had to eat a lot and considered that eating rice did not give them energy for working. During the harvesting season, they eat a lot of rice in order to gain energy to work. Also, many kinds of traditional desserts are made from sticky rice, which has a high glycaemic index, making the blood sugar elevate rapidly which is very dangerous for people with diabetes. Therefore, desserts and foods available during festival ceremonies are not recommended for them. However, it is difficult for patients to avoid those foods (Keeratiyutwongs, 2013). The data of previous studies showed that diabetes patients could avoid those foods by only tasting it. Later, some of them may have felt sorry for themselves that could not eat those foods as other people had. As a result, they tried it, knowing that diabetes mellitus could not be cured completely so they ate the foods in accordance with their desire (Sanguanprasit et al., 2016; Soisong et al., 2017; Suphunnakul et al., 2017). Moreover, the elderly in rural areas generally like to eat fruits with sticky rice, for example, ripe sweet tamarind, ripe mango, rose apple and banana. Therefore, the control of food consumption is very difficult for them (Jaklang et al., 2017; Sirikensai, 2017). The traditional foods also affected the clinical outcomes due to containing sugars, fats and carbohydrates. For example, the study of Carbone et al (2008) found that the traditional Latin-American diet is usually high in sugars, fats and carbohydrates which could make patients have poor diabetes control. Traditional events, for example, that of "Eating New Rice" of hill tribes including the community party, marriage ceremony, New Year festival, and new house celebration are the social characteristics of local areas in the northern region of Thailand. The diabetes patients could not avoid participating in these traditional events because they have to follow the social regulations of the society in which they reside. Most of them are elderly and so society expects them to participate in the ceremonial as honoured guests. After the ceremony activities, the feast usually follows (Suanpakdee, 2004). Therefore, traditional ceremonies and activities affect diabetes patients' self-care behaviours. Besides, rural people naturally gather as a group, for example, the elderly, housewives, and various other occupational groups. During these group activities, the members usually talk about their learning experiences of various things including self-care, for example, in a study of Nontabutr (2013) one of the patients talked about treating T2DM by drinking his own urine because he had read about it in a book and he found that blood sugar could be controlled successfully, so he would like to share this with other patients. The diabetes patients tend to perform behaviour in accordance with their own beliefs and experiences (Nuntabutr et al., 2013). In addition, the qualitative study in Thailand by Nuntabutr et al. (2013) found that diabetes patients had misunderstandings of caring for themselves which included taking medicines or insulin injections without other health care behaviours, since some of them could work and eat as normal. In regard to taking herbal medicines, many patients believed these could cure diabetes mellitus completely and they thought they should test varieties of medicines in order to find an effective one.

In terms of language, there are many studies indicating that a language barrier is the most important factor influencing the communication between patients and health professionals (Apidechkul, 2016; Amirehsani et al., 2013; Baig et al., 2014; Smith-Miller et al., 2016). It leads to poor diabetes knowledge, and self-management (Amirehsani et al., 2013). A study of Baig et al (2014) found that there was a relationship between English language ability and diabetes control among 167 Hispanics participants who had T2DM. The Hispanic participants who spoke English proficiently had higher HbA1c levels than those who did not speak English at all. Hallgren et al (2014) also explored the barriers related to self-management behaviours of T2DM for Marshallese in the United States. One of the important barriers to accessing diabetes care is language. Most participants report that communication to health professionals is limited by speaking English which is not their first language. In the United Kingdom, Lloyd (2018) reviewed the use of language in clinical encounters of diabetes care. The results showed that the effectiveness of communication between health professionals and people with T2DM is limited by language due to the understanding of cultural differences. This barrier contributes to poor self-management and non-adherence to diabetes care services among these patients. In the minority groups, most studies required a translator in the diabetes care service rather than using their first language. A proper training programme in cultural competence may also solve the problems of communication skills.

Cultural beliefs toward diabetes mellitus

The American Diabetes Association (2015) suggests the ‘cultural factors’ as a significant factor for planning diabetes care. This is because people with type 2 diabetes who obtain culturally appropriate diabetes self-management education (DSME) have better results of controlling their disease. Several studies revealed the cultural beliefs affecting health behaviours among people with T2DM both negatively and positively (Concha et al., 2016; Cooper & Lemonde, 2016; Espinoza et al., 2016; Hallgren et al., 2015; Patel et al., 2015; Stewart et al., 2013). A study of Cha et al., 2012 investigated cultural problems among 25 Korean immigrants with T2DM regarding self-management behaviours. The findings showed that cultural beliefs about social respect influences the interaction between patients and physicians. Although negative effects could result, in terms of building a provider-patient clinical relationship, positive effects could also happen in terms of diabetes care regimen if patients trust and respect physicians. In addition, Smith (2012) explored the T2DM belief of 30 Afro-Caribbean women with this condition. The participants believed that their traditional food was not good for controlling their blood sugar levels. They reported that their food has high carbohydrate, sugars, and fat, therefore they eat food in ‘‘moderation’’ which is a positive health behaviour. In terms of beliefs related to causes of diabetes mellitus, a qualitative study of Amarasekara et al (2014) who explored the impact of sociocultural factors on self-care behaviours in T2DM in Sri Lanka demonstrated that most of the participants believed that Karma is the cause of diabetes mellitus. Consequently, there is a negative impact, that participants would rather pray to get rid of their disease than follow the health professionals’ suggestions. Furthermore, a mixed method study conducted by Patel et al (2015) among 67 British South Asians with T2DM showed that the causal beliefs of their disease are genetics, diet and stress from quantitative data. The data from the qualitative study showed that many participants held fatalistic beliefs as their god controlled diabetes mellitus. This reflects that cultural beliefs have greater impact on their health behaviour. Participants who held this belief tended to fail to control their blood sugar levels. Another study in the USA, revealed that Spanish-speaking participants with T2DM believed that genetics, behaviours and emotion were the causes of their condition. Moreover, they indicated that work-stress meant they had no time to eat or eat fast-food. This related to their cultural belief in terms of food that they felt their original food was healthier than American food. Some cultures, for example British Indians with T2DM believe that eating karalla (bitter melon) can control their disease (Patel et al., 2015). While beliefs among Chinese Americans with T2DM believe that consumption of too much sugar is the cause of having diabetes mellitus therefore, decreasing some sweet foods was believed to control the condition (Wang et al., 2009). In addition, a study of Chun and Chesla (2004) carried out in Chinese adult with T2DM found that the participants believed that the imbalance of a hot and cold body was the cause of disease and eating certain foods was also believed to improve the conditions. The studies mentioned above demonstrated that food is not only the source of energy and nutrients but also plays a role as medicinal and determining how to balance one's life (Leung et al., 2018). Therefore, the food beliefs and practices influence diet control among these patients due to the food options and desire to eat which is deeply embedded in each social culture.

The relationship of culture to exercise among T2DM patients is important to the health care services strategy (Bertran et al., 2017). Several studies showed that cultural beliefs with regard to exercise act as barriers to taking part in physical activities. A qualitative study of 40 adults with T2DM in rural Sri Lanka by Medagama and Galgomuwa (2018) found that female participants expressed they were embarrassed and "uncomfortable" to exercise in public areas although they know they had to. This is because of the cultural belief not allowing women to go outside exercise. However, exercise in their house would be accepted but still difficult as a lot of as housework has priority to do. Furthermore, Lawton et al (2008) investigated the beliefs toward exercise among 32 British South Asians with T2DM. The findings showed that female participants were willing to exercise but the cultural taboo that they were not allowed to swim and expose their bodies to males in the gym were stated as the barriers. These beliefs also play an important role in self-care behaviour which limited regimented exercise. The culturally sensitive facilities, for instance female sessions at the gym may be beneficial and practical for this group. In addition, illness perceptions differ between cultural groups (Klienmam, 1978). There is evidence regarding Illness perception among people with T2DM who live in some particular cultures which affect self-care behaviours (Alzubaidi et al., 2012; Kugbey et al., 2015; Sharry et al., 2011). Self-care behaviours such as dietary control, exercise and taking medicine as prescribed could represent their illness perception (Ashur et al., 2015; Broadbent et al., 2011; Yilmaz-Aslan et al., 2014). Some studies also showed that people with T2DM held specific beliefs and practices about diabetes. Specifically, they believed in the treatment efficacy of herbal medicines, traditional foods, and folk medicines, which were integral to their wellness and they also held strong religious beliefs such as faith healing, prayer, and fasting, and used traditional healers to reduce the severity of diabetes or healed it. (Brown et al., 2007; Moodley & Oulanova, 2011).

In conclusion, understanding beliefs toward diabetes mellitus can be used to predict T2DM patients' self-care behaviour patterns. In addition, if health professionals deeply understand the background of patients and know how they make sense and deal with their conditions which would assist them to provide proper diabetes care (Abdulrehnan et al., 2016). This literature review contributes to growing evidence that T2DM patients held cultural beliefs and practices which impact on clinical outcomes. These patients may benefit from diabetes education and interventions that take into account cultural beliefs. Diabetes mellitus interventions that focus on both clinical and cultural aspects is crucial. For example, understanding the cultural beliefs toward diabetes mellitus in each patient group before providing diabetes treatment may support health professionals design bespoke health care services due to a culturally sensitive approach.

2.6.3 Socioeconomic Statut

Previous studies have shown that the socioeconomic status of a person affects the self-care behaviours among people with T2DM (Chen et al., 2019; Leone et al., 2012; Winkley et al.,2015). The relationship between socioeconomic status and T2DM prevalence, self-care behaviours and complications of the condition are identified as important issues in diabetes care (De Silva et al.,2016; Hsu et al., 2012; Ricci-Cabello et al., 2010; Wild et al., 2010). Recent studies showed that a low socioeconomic status affected self-care behaviour among patients with diabetes mellitus (Kimando et al., 2018, Osborn et al., 2018; Winkley et al.,2015). A qualitative study by Winkley et al (2015) into why people in the UK with a recent diagnosis of this condition did not attend the structured education sessions revealed one reason to be that participants would rather go to work than participate in diabetes information sessions. This indicates that the participants paid greater attention to their economic status than their health and this finding agreed with the study in Tianjin, China, conducted by Chen et al (2019). They indicated that financial constraint influences diabetes management of T2DM in this area. In Japan Funakoshi et al (2017) examined the correlation between socioeconomic status and diabetes complications of 672 T2DM patients, the results showed that patients with a lower socioeconomic status have a higher tendency towards complications such as retinopathy and nephropathy than those whose status is higher. Socioeconomic status, including poverty, level of education and occupation is considered an indicator of capacity for self-care behaviour and therefore, people with high socioeconomic status should have more opportunity to seek information that is conducive to self-care behaviour than those with low status (Borisuti, 2011; Promprakarn, 2008).

Poverty. Poor people are more likely to suffer illness than the middle class or wealthy (Steinman, 2017). Low economic status is identified as a barrier to controlling blood sugar levels'. Living in poverty not only influences the development of T2DM but also involve a greater risk of complications (Chaufan & Constantino, 2011; Pearson, 2015). A qualitative study in 59 people with T2DM in northeast Delhi India by Mendenhall et al. (2012), showed lower-income participants are more likely to have diabetes complications and poor access to diabetes care. In Taiwan, Hsu et al (2012) studied the relationship between economic status and the access to diabetes care. This study reported that around 50% of low-income patients with T2DM have delayed diagnosis and, therefore, of diabetes care. Compared to middle income patients, low-income patients have a 50% higher risk of a worsening prognosis (delaying progressive development of comorbidities) and this study also found that poverty is significantly associated with poor diabetes management. In the United States, low-income was identified as a factor associated with poor diabetes outcomes (Centre of Disease control and Prevention, 2014; Hill-Briggs et al., 2011; Saydah & Lochner, 2010).

After diagnosis, people with T2DM need diabetes education and self-management skills to deal with their conditions in daily life. However, poverty impacts an individual's access to information and health services. This may be because poor people tended to be older, live in rural areas and suffer from more chronic diseases (Hsu et al.,2012). Moreover, people with low- income are more likely to have poor nutrition, poor access to health care services as their houses are remote from the health care centre, a lack of time to exercise and stress of their daily existence. These factors contribute to poor health outcomes (Galobades et al., 2006; Wilkinson & Pickett, 2006. Dalstra et al., 2005; Demakakos et al., 2016; Koo et al., 2015). Grintsova et al (2014) systematically reviewed the inequalities in diabetic care for people with T2DM. It consisted of 21 full-text papers from the UK (n = 8), Germany (n = 3), USA (n=3), Israel (n=2) and one each from France, Italy, Spain, Taiwan and China. The findings found that T2DM patients who live in remote areas are less likely to achieve diabetes control targets and also tend to have higher blood pressure. Turning to the eating behaviour among lower-income diabetes patients, the previous studies have shown that people from low-income families consume a higher amount of cheap, processed foods which have little nutritional value and are high in calories (Dalstra et al., 2005; Demakakos et al., 2016; Koo et al., 2015). Foods such as these can contribute to obesity and are a factor in poor diet control among people with T2DM. A cross-sectional study was carried out by Seligmen et al (2012) to explore whether a relationship existed between food insecurity and poor management of T2DM among 711 participants in Chicago. Their findings revealed food insecurity to be a risk factor because of the problem in maintaining a healthy diet suitable for the effective management of T2DM. Furthermore, a cross-sectional study among 1237 food pantry clients who have T2DM in in California, Ohio and Texas, USA by Ippolito et al (2017) revealed that lower-food-secure patients had lower self-efficacy, more anxiety, higher medication non-adherence, and higher prevalence of severe hypoglycaemic episodes.

In Thailand, economic conditions have affected diabetes control, even though presently, various kinds of health care can be used without paying treatment costs but the cost of transportation is another problem. Some patients have to go by a "car pool" to medical appointments and remote residence is also a barrier to access health care services located in town centres (Prompayak et al., 2017; Wandao et al., 2018). The study of Kreeratiyutiwong (2014) found that factors in self-care among patients with diabetes are the burden of families and may create economic problems. It was found that diabetes patients often had too heavy a workload to pay more attention to the importance of self-care in order to control blood sugar level. This finding agreed with the study of Tuntayothai (2013), who found that economic problems and a lack of economic security resulted in a lack of interest, and less assistance and support from family members in helping diabetes patients to perform appropriate self-care to control blood sugar level. Furthermore, the study of Wiriyasup (2007) found that there was a positive relationship between higher income and health behaviours. It was evidenced that persons with an adequate income usually performed better health care than those with an inadequate income. Those with a better economic status do not have to worry about making money, therefore this leads to better health behaviours. People with T2DM need long-term health care which contribute to financial problem hence those who have low incomes are vulnerable to diabetes complications.

Education level. With a higher level of education, people have more opportunity to perceive, understand and give more attention to health than those with a lower level. Therefore, a higher level of educational achievement correlated positively with the self-care behaviour of people with T2DM (Babazadeh et al., 2017; Khunluek, 2017). Kassahun et al. (2016) studied self-care behaviour among 325 T2DM patients in Southwest Ethiopia and found that 157 patients had poor self-care behaviour which was associated with level of education. Another study conducted by Elliott et al (2013) among 309 people with T2DM in Muscat Oman found that participants with educational standard had more diabetes self-care and knowledge than those without ($p<0.001$). In Chengdu, China, a cross-sectional study by Huang et al (2014) examined the factors influencing self-management in 364 people with T2DM and showed that participants with a higher-level education have a better self-management behaviour than those with a lower-level education. In addition, previous studies found that people with a high level of education were found to have more skill in information seeking, questioning, including understanding the treatment plan and ability to make use of resources than those who had a lower level of education (Abubakari et al., 2013; Ahola & Groop, 2013; Entwistle & Watt; 2015; Hassan et al., 2013). In conclusion, a person's level of education can influence their knowledge of their diabetes mellitus and may affect their management of the disease. A person with a higher education is more likely to find the information for themselves and to use it to manage their blood sugar levels effectively. Furthermore, it is known that a higher level of education enables those with T2DM to understand why it necessary to recognise complications and to understand why exercise and the proper use of prescribed medication is important (Ahola & Groop, 2013; Entwistle & Watt, 2015; Hassan et al., 2013; Kassahun et al.,2016).

Type of occupation and working hours. There are some studies which show that types of occupation and working hours affect diabetes control in people with T2DM, according to Manodpitipong et al (2017), who investigated the relationship between night-shift work and poorer diabetes control in people with T2DM in Thailand. The participants consisted of 60 night-shift workers, 85 day workers and 104 unemployed. The findings showed that the clinical outcome in terms of HbA1c levels of night-shift workers was significantly higher than unemployed and day workers. Another study in the Abo-Korkas sugar factory, Egypt among 61 workers with T2DM by Ghazawy et al (2014) found that rotating shift work, especially night shifts had a negative impact on diabetes control among these participants. This may be because night-shift workers had a higher calorie intake and shorter sleep period which is the general life style of these people (El Tayeb et al., 2014). In terms of working hours, a recent cohort study in Japan among 782 outpatients with T2DM by Azami et al (2019), found that male participants who worked more than 60 hours per week had suboptimal glycaemic control. Hence, they indicated that long working hours, more than 60 per week, was associated with suboptimal glycemic control. A study in the United States among 369 workers with T2DM conducted by Davila et al (2011), also supports the relationship between working hours and diabetes control. The study revealed that participants who worked more than 40 hours per week were more likely to have suboptimal glycaemic control than those who worked less. Therefore, the type of occupation and working hours are the working conditions which impact on self-management. Working long hours leads to a greater stress for people with T2DM and this might affect diabetes control behaviour, for example, excessive consumption of food to help deal with stress. Furthermore, lacking time to exercise and non-adherence in taking medicine as prescribed are also an impact of working conditions which directly increase the risk of diabetes complications (Azami et al., 2019; Ghazavy et al., 2014; Davila et al., 2011).

2.7 Social Support

Social support including family, individual social networks and community, is associated with better self-care behaviour and health outcomes in people with T2DM (Koetsenruijter et al., 2015; Miller& Dimatteo, 2013). Diabetes care services and interventions for improving diabetes control should not only focus on people with diabetes. Knowledge of diabetes mellitus needs to be delivered to family members in order to have proper care of patients' relatives (Gonzalez-Zacarias, et al., 2016). The study of Baig et al (2015) indicated that family support was strongly influential in diabetic treatment. This finding is congruent with Marquez et al (2016) who found that having physical activities with family and friends was an effective intervention to improve self-care behaviours among T2DM patients. Social support has been defined as an exchange of resources between at least two persons aimed at increasing the well-being of the receiver. Relationships between family members can influence the control of diabetes mellitus for better or worse. An observational study among 1692 people with T2DM in six European countries, Bulgaria, Greece, Netherlands, Norway, Spain, and the United Kingdom conducted by Koetsenruijter et al., 2015, showed that practical support from patients' networks were associated with worse physical and mental health and less physical activity. Patients who participated in community organisations have better physical and mental health than those who did not. Therefore, health professionals should focus on the cooperation between community organizations and health care services to increase the support activities which are related to people with T2DM. A study in the UK also recommended ''community and network-centred approaches'' to enhance the effectivity of self-management (Vassilev et al., 2011).

In Thailand, a study by Srijarinai et al (2009) found that health professionals could help and encourage patients with diabetes mellitus to perform self-care behaviour, both appropriately and inappropriately. For instance, in regard to the dietary control of patients, among the group who could control their blood sugar level, it was found that the caregivers had forbidden the patients to consume foods containing high sugar. The caregivers who were close relatives of patients took great care of the patients' diet. They forbade the patients to consume foods such as desserts, fatty meat, and fried foods because they considered these bad for diabetes and were also expensive. However, in Thai culture, daughters' in-law did not dare to control diabetes patients' food due to the cultural beliefs of respecting mothers-in law. Some caregivers prepared all kinds of foods for the patients because they thought that they were old so they should eat any kind of food they wanted. Thus, the caregivers affected diabetes patients' behaviour control. In addition, a study of Treeson et al (2016) found that close support from family and community, promoting health, self-esteem and providing various assistances were found to relate to the self-care of patients with diabetes. This is because social support can help to develop self-esteem and motivation to perform better self-care. This finding agreed with the study of Sreesawang (2013) who found that social support from family, neighbours and friends with diabetes mellitus, supervisors and colleagues, were both reinforcing factors and obstacles of self-care behaviours of patients with T2DM. In addition, previous studies revealed that the relationship between family members and people with T2DM is influenced by patients' dietary control. This may be because in general, families prepare food in large portions to serve to their members and, therefore these types of food and the method of cooking aim to serve the demands of the whole family. Consequently, it may be difficult to separate cooking for the patient; furthermore, patients with T2DM should have healthy food, which is low in carbohydrate, fat, salt and sugar and it is difficult to prepare these separately due to the cost and extra time needed for cooking. Therefore, dietary control of diabetes patients also depends on their family members. In terms of weight loss which can improve health outcomes among people with T2DM (Wing et al., 2013), evidence from Marquez et al (2015) who studied 677 Latino people, showed that participants who had support for physical activity from family and friends achieved greater weight losses and participants also identified that their family and friends provided the most help in diabetes management. However, a recent study in 14 people with T2DM from Bech et al (2019) revealed that participants preferred to receive support from health professionals and did not want to involve their family and friends due to dysfunctional, norms and the vulnerability of the relationships. Evidence showed social support influences both positively and negatively on self-care behaviour, hence health professionals should understand and comprehensively meet the support needs of each patient group according to their social context.

2.8 Health Care Related Factors

In any society, the health of the individual is influenced, at least partly by the availability and subsequent usage of health care facilities and resources. Poor diabetes control in people with T2DM reflects not only a lack of self-care by the individual, but also a failure by the service provider in initiating and maintaining treatment. This means that accessibility to properly resourced services and the attitudes and beliefs of those responsible for delivering them are important factors in glycaemic control for patients with T2DM (Pichardo-Lowden et al., 2018; Raaijmakers et al., 2013). A previous study by Sina et al (2018) indicated the relationship between the absence of diabetes care services and no access to diabetes care service among 3,649 T2DM patients in the UK associated with diabetes complications. This study showed that the health care system is an important barrier to diabetes care. This finding is in agreement with Strauss et al (2006), who showed that living in a remote area is associated with complications of T2DM because it is a chronic disease and patients need regular follow-up care. The suggestions from these studies may focus on both the accessibility of health care services and individual needs (Nam et al., 2011; Sina et al., 2018). Roopnarinesingh et al (2015) studied the barriers to optimal diabetes care among 198 health professionals in the Republic of Trinidad and Tobago which indicated that the health care system is an important factor. These barriers included limited resources, such as blood test tool kits, improper delivery diabetes care because of limited time and poor access to specialists. In addition, a previous study in the Netherlands also identified that health care resources were barriers to diabetes care. Raaijmakers et al (2013) conducted a qualitative study in the Netherlands to examine the barriers in diabetes care from 18 health professionals' perspectives. They found that the barriers consisted of clinical information systems due to some indicators are impractical and need more coordination between health professionals, the financial of diabetes care which is not clear and not appropriate for chronic care, and the patients' awareness which leads to failure in delivery of diabetes care.

Furthermore, the findings from a cross-national survey study among 4,785 healthcare professionals in 17 countries: Algeria, Canada, China, Denmark, France, Germany, India, Italy, Japan, Mexico, the Netherlands, Poland, Russian Federation, Spain, Turkey, the UK and the USA, by Holt et al (2013), also supports that to achieve diabetes care, each country needs to improve their health care system. This includes having a proper number of specialists, diabetes training courses and funding support. In conclusion, similar findings from studies mentioned above, identified the need for diabetes care resources, health professionals' training and cooperation among system and diabetes care team. Therefore, the re-organising of policy and standard care in each country should be considered. However, it should be the standard guidelines which can be adapted in any area (Holt et al., 2013; Assaad-Khalil et al., 2013).

2.9 The Self-Management of Patients with Diabetes Mellitus "Individual Process"

The concept of "self-management" has been used widely in studies regarding development of health behaviours of patients with chronic diseases. It has been evidenced that self-management is an effective process for developing better outcomes for controlling chronic diseases (Barlow et al., 2002; Khemthong et al; 2010). Even though health professionals play an important role in helping patients to cope with obstacles and develop decision-making skills in practicing self-care and being able to self-manage. However, the accomplishment of self-management depends largely on the patients themselves. Therefore, the collaboration and cooperation between health professionals and patients is necessary for self-management (Throne and Peterson, 2001). Human behaviours are very complex, each person has their own desires and needs, has a different capacity and perception. Therefore, self-management regarding their illness is an "individualised process". Although people have the same illness, self-regulation may be different depending on opinions, knowledge, beliefs, experiences, and disease conditions (Udlis, 2011). This topic aimed to present the individual self-management process of self-care among people with diabetes mellitus.

2.9.1 Overview of Self-management of Patients with Chronic Diseases

According to the analysis of Richard and Shea (2011), the specification was made clearly that self-management was a part of self-care. It focuses on the thinking system, decision-making to manage life with a chronic disease, lifestyles had changed due to treatment, and the management of the impact caused by emotional, mental, spiritual and/or social and environmental factors. All of this needs to be supported by family members, the community, and health professionals with the aim of helping people with T2DM practice positive health behaviours according to disease conditions and their own contexts. The concept of self-management reflects that this complicated process is related to various dimensions that vary with daily living and is different in each person. Therefore, the accomplishment of self-management depends largely on the patients themselves. The analysis of the concept and dimensions of self-management in patients with chronic diseases of Udlis (2011) who developed a self-management model related to three components is presented as follows:

Part 1: Antecedent Stages. This first part supports self-management to be accomplished, an individual needs to success this part before he/she decides to start the self-management process seriously, for example, specific data about the disease and self-management, self-confidence about one's own capacity, and support from various sectors. The most important part is support from family members and health professionals.

Part 2: Dimensions of Self-Management. This is concerned with self-management in order to live with the disease. Many studies divide self-management into various stages and used a variety of names. From the overview, it was found that the development of self-management of each individual is different and not in a ranking order, it may go backwards and forwards depending on the situation in each time period. There are many patients who may not reach the goal in their whole life even though the self-management process had continued and each stage overlapped but could not be identified clearly. However, the overview of self-management can be categorised into the following three stages (Adlis, 2011; Audulv et al., 2009; Schulman et al., 2012)

1. Compliance Stage. This stage is concerned with the situation that individuals begin to be familiar with the disease and their new roles, due to their perceptions that they have to live with the disease for their whole life. Therefore, they try to seek and access a variety of information sources with the aim of getting the information for supporting self-management of their current illness. In this stage, individuals will comply strictly with the recommendations provided by the health professionals. However, the outcomes are different from the information received, so conflict may occur. Individuals will try to manage those conflicts while they are faced with threats from their illness in daily life (Audulv et al., 2009) and they find limitations in regard to physical conditions and their capacity.
2. Seeking Stage. In this stage, individuals learn, modify, and select appropriate methods for themselves due to the conflicting advice that impair their confidence in complying with the recommendations and they may question themselves about the accomplishment of their strict health behaviours. The conflicts which may occur are the needs to continue with their

normal life, to comply with the treatment recommendations, and to be healthy in the future as well as their direct learning experiences from their body’s responses. These conflicts push individuals to have positive health behaviours as they continue by trial and error and modification to look for the appropriate ones for them. The patients’ own experiences will be stored in their memory and actions which they perceive to have had positive effect will be repeated. Lastly, the individuals will learn from the reality that they have capability and know how much they are able to do. Besides, they will be aware that the important factor in performing self-management well, is themselves (Adlis, 2011; Audulv et al., 2009).

3. Discovery Stage. In this stage, individuals can integrate disease management and the management of normal life. This is the stage that patients can truly live with their disease. In this stage, individuals will develop their learning in every aspect. Their viewpoint has been changed from the emphasis on “disease” to the integration of disease management with daily lifestyle. Eventually, individuals will be able to have an appropriate self-management model that specifically fits them. However, when a new situation occurs, the individuals will go back to the “seeking stage” until they get an appropriate conclusion. This cycle will be repeated again and again throughout the self-management process (Adlis, 2011; Audulv et al., 2009; Schulman et al., 2012).

The final part looks at the consequences of accomplished self-management. These results are: better clinical signs, reduction in medical costs, and a better quality of life. After individuals have assessed the consequences and found positive outcomes of self-management in regard to living with the disease, these outcomes will motivate them to do it continuously and have self-confidence in their self-management.

However, even though the individuals may be keen to participate in self-management and have self-confidence in their own capability, this can be changed in accordance with instable disease conditions, and consequences on their daily living. Therefore, it is a dynamic process, not stable, not linear, as it changes and varies in accordance with the length of time, disease conditions, and environmental context. This model is showed in the picture.

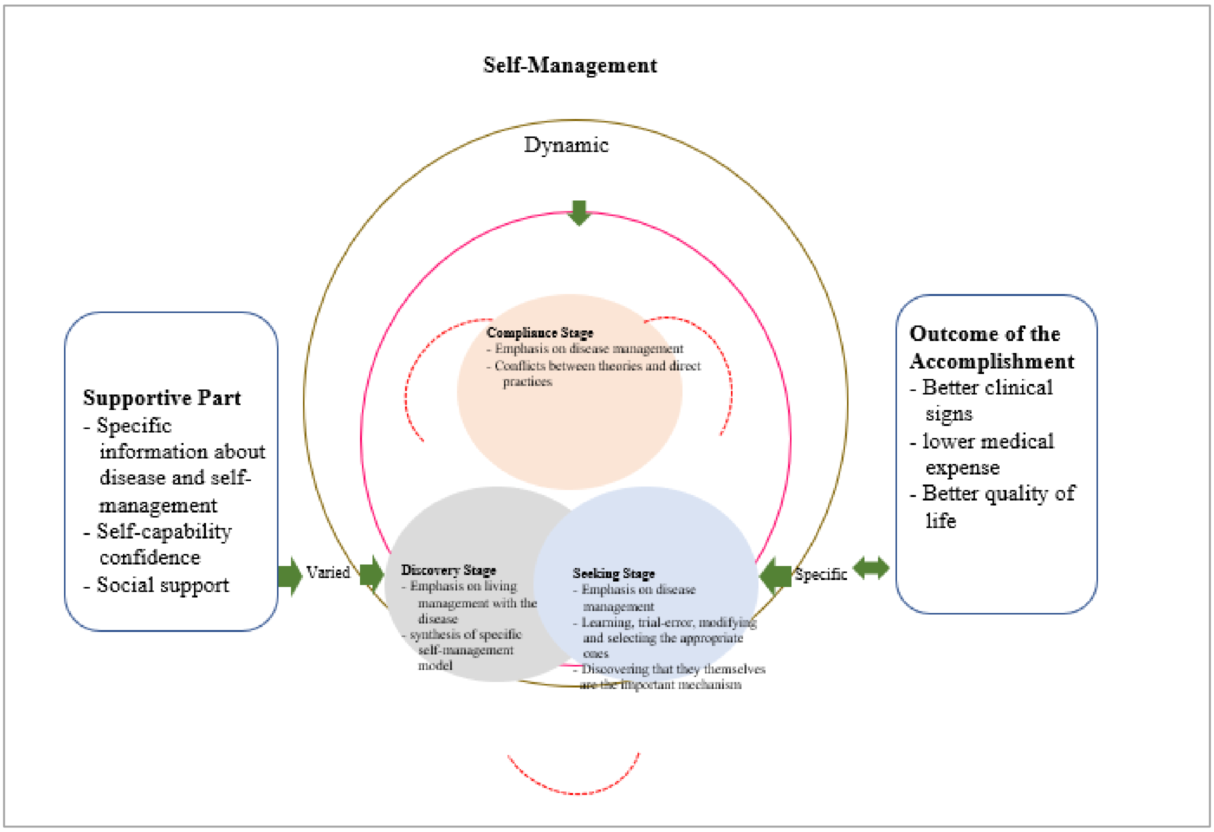

Figure 2 Self-management of individuals with chronic disease.

2.9.2 Self-Management in People with Diabetes Mellitus.

Self-management of people with T2DM is a dynamic and continuous process and each stage cannot be identified and separated clearly from others (Baghbanian & Tol, 2012; Saurabh et al., 2013). This is even though the general image of each stage of self-management in these patients has similar characteristics as self-management of patients with other chronic diseases, due to the condition of diabetes, activities needed, and different necessary skills for each disease. This is because the detailed self-management of people T2DM is different from the self-management of other chronic diseases. Furthermore, self-management of people with T2DM will have different needs depending on thoughts, beliefs, background experiences including different social contexts and social supports. These factors result in different learning processes and practices in self-management. They should be individualised, not following a ranking order, changed up and down, and back and forth constantly in accordance with various factors. In order to make it easy to understand, the presentation of the contents of this topic gave the general views of the self-management model of people with chronic diseases by emphasising specific parts of the accomplished self-management in people with diabetes mellitus who are able to develop the self-management model appropriately and relevantly with their contexts, and divided into three stages, compliance, seeking and discovery.

Before entering into the first stage of self-management, most people with diabetes mellitus will perceive and be suspicious about their own abnormality, for instance, weakness, frequent urination, often thirsty, and may anticipate the onset of diabetes mellitus before the physician's diagnosis especially those whose family members have had diabetes or have had experience of being with people with diabetes mellitus previously (Kongsup & Methakanjanasak, 2012). The diagnosis of a physician will only be the confirmation and will be the beginning of the self-management journey of the diabetes patient. After patients are informed of the diagnosis, it is the beginning of the compliance stage. People with diabetes will try to understand the disease, the treatment plan, and the lifestyle that needs to be changed, in accordance with the information received from the health professionals (Moser et al., 2008). The exposure and searching of information in regard to controlling the disease, and supportive sources for self-management of each patient are different to others, depending on the acceptance level of the patients. Individuals will try to find out the reasons why they have diabetes mellitus.

After they have found reasons that they will accept, they will begin to behave strictly in accordance with the recommendations given by health professionals, especially in regard to dietary control and taking medicines for lowering blood sugar level. At this stage, the people with diabetes will give complete responsibility in thinking and decision-making about disease control to health professionals. Diabetes will be the centre of self-management and patients expect positive outcomes from carrying out compliance behaviours (Kongsup & Methakanjanasak, 2012; Nagetherk et al., 2006). The strict behaviours mentioned may make people with diabetes feel over-burdened, they may have to tolerate things that have to be done, along with the negative impacts from the disease itself. Some may think that they are different from other persons because of "being a person with diabetes" who has specific ways of self-care practice in regard to diet, medicines, including lifestyles that have to be changed appropriately with the disease (Olshanski et al., 2008). After people have had diabetes for a period of time, they may feel that the information they have received from the health professionals is not appropriate for them, because the outcomes are different to their expectation, leading to conflicts and they may make the decision to manage the disease by themselves (Peterson & Thorne, 1998; Peterson & Thorne, 1999). This is the turning point when individuals perceive that they should begin to seek more information and manage the disease by their own methods, with the awareness that they themselves play an important role in controlling the disease. Self-management is necessary and is their own responsibility as they are the ones who know best regarding how to behave appropriately in their lifestyles and contexts (Kongsup & Methakanjanasak, 2012).

People with diabetes will get to the seeking stage to obtain an appropriate management model. The viewpoints in regard to the change occur with them, both that match and do not match their expectations, they are the challenges and open the opportunity for them to develop, to learn, to promote self-management development in a better direction (Peterson and Thorne, 1999). In this stage, persons will try to seek and improve a variety of strategies in order to control their illness by beginning to observe their bodily responses on each method used (body listening), decoding the physical signs occurring from each method used, being aware and remembering the specific model of response, what gets better or gets worse with what method. The body of knowledge and specific skills that persons learn are the results of the integration of the former knowledge and experiences with the new knowledge and direct experiences. These will be accumulated gradually and finally, will be the new knowledge and their own specific practices. This development will be undertaken continuously until getting to the “discovery stage” and will be modified in order to be appropriate with the new situation all the time. At the same time, individuals will gradually perceive that diabetes is a part of life and modify their feelings about themselves as “persons who have diabetes” to “persons who live with diabetes” (Olshansky et al., 2008).

In the discovery stage, people with diabetes really accept it as one part of their life. Their view point has been changed from “Diabetes is the centre of thought and their practices” to “Living their lives with diabetes”. Persons will keep the balance between the needs for normal life and responsibility to manage themselves in order to live with diabetes and will understand that their “self” is different from their “body” and “self” and “disease” is not the same thing. Disease clings to the body but the self has capability and a body of knowledge that can control disease and the impact occurring. In addition, persons will perceive that they themselves know the most about their own bodily responses. They know that each person has different physical responses even though they all are persons with diabetes and they have specific knowledge and skills differently, whereas people without diabetes cannot access and understand this. Persons will let go of the strict practices in accordance with the recommendations of health teams and change to follow their own knowledge that they themselves discovered, while these practices produced similar effects on blood sugar control. Patients will be aware that they are autonomous, they are the controller of their lives and are able to live a normal life while having diabetes (Moser et al., 2008).

2.9.3 Support Leading to the Accomplishment in Self-Management.

The concept of successful self-management is that people with diabetes are the important parts of the accomplishment, to learn and be skilful in self-management and be able to live their lives happily with diabetes while health professionals and family members have important roles in providing support for patients cope with problems and obstacles (Saurabh et al., 2013). However, throughout life, the patient may not be able to reach an accomplished point of self-management because it depends on many factors such as environmental contexts and health professionals. This topic focuses on the support from health professionals who can help the diabetes patients to become expert in self-management. The support is divided into two levels, system level and individual level (Novk et al., 2013; Thorne & Peterson, 2001; Udlis, 2011).

System Level. This viewpoint emphasises having patients strictly comply with advice given by the health professionals. These health professionals are the persons, who give recommendations, think and make decisions for the diabetes patients (Novk et al., 2013). The shifted viewpoint was focused on “person-centred” or “people-centred” This chasing should be done continuously and preceded gradually in every unit of the system. A variety of strategies should be completed, for example, training for embedding new concepts, learning from direct experiences of colleagues, exposure to the experiences of diabetes patients who can control blood sugar well, and other strategies appropriately with each organisation. Furthermore, the concept of supporting self-management should be outlined in the policy of all units, the support should be done by giving guidelines of concrete practices integrated in routine work, whereas the changes should be done step by step, continuously and relevantly with every level of other units. Moreover, the practice manual should be developed explicitly in every work unit as well as collaboration from all sectors.

At an operational level, health professionals should be aware of the difficulty of persons who live their lives with diabetes who have missions to make decisions and manage things everyday relentlessly. Furthermore, health professionals should understand the differences of self-management that have special characteristics for each individual, which have passed through the learning process for a long time until getting to synthesising specific knowledge appropriate for each individual. Therefore, health professionals should accept the basic fact that they may know best regarding diabetes. However, the patients will know the best regarding management and living with their conditions appropriately. Understanding self-management in accordance with the viewpoints of those with diabetes will help health professionals develop good relationships based on the collaboration and cooperation between the two partners. Supporting the patients to be aware of the importance of themselves to be able to overcome psychological conflicts and to start self-managing seriously is highly important. This situation will result in having a concrete self-management plan with the goal relevant to the patients’ real needs (Thorne & Peterson, 2001; Udlis, 2011).

In the first period of the diagnosis where the patients are not ready to accept the illness and responsibility for self-management, the health professionals may help them to think, and make decisions including providing recommendations about the disease and sources of information, teaching specific skills, for example, the selection of appropriate foods and insulin injections which are important during the first period. Later on, in the first period, health professionals should assess readiness of the diabetes patients and try to pull out their real capacities through a good relationship, collaboration, and cooperation among them. The health professionals should respect and accept diabetes patients' thoughts as well as allowing flexibility in thinking and decision-making in accordance with the changing situations and contexts, selecting appropriate practices for each disease stage. They should enhance the patients' understanding that the accomplishment of self-management depends largely on intrinsic impulsion which concerns their needs and desires, thoughts and decision-making as it is their direct responsibility. Besides, it is also important for organising training programmes for home-caregivers and family members who provide assistance to persons with diabetes in regard to appropriate self-management (Novk et al., 2013; Thorne & Peterson, 2001; Udlis, 2011).

A good example of its application in practice is shown that in 2010 Diabetes UK created a '15 diabetes healthcare essentials' check-list for persons with diabetes, to ensure that they get the basic standard of care from health professionals. Following this, between October 2011 and March 2012, Grant & Barnes (2012) had retrospectively reviewed 200 patients from the diabetes review clinic and examined whether documented evidence of the care processes described above and of investigations having taken place was present. The study found the check-list to be a useful starting point in ensuring that important screening checks were not being omitted for patients attending the service. It needs to be realised that new essentials are in place for inclusion into the diabetes screening service.

2.10 Guidelines for Diabetes Management in People with Type 2 Diabetes Mellitus

In order to deal with diabetes mellitus, patient education is recommended within guidelines. According to the National Institute for Heath and Care Excellence (NICE) (2016), there is a guideline which points out patient education for care and management of people with T2DM. The overall purpose of diabetes education is to help patients to create a health professional-patient relationship in terms of educator and learner, deliver diabetes knowledge and relevant information. Problem-solving skills, including self-care behaviours providing appropriate support to patients, family and care-givers should be established and developed. An underlying assumption is that the educator has the relevant education and assessment, teaching, clinical and helping skills, and adopts a person - centred rather than a problem-centred approach (Dunning, 2012, 2013; NICE, 2015). These concepts of patient education are a part of health promotion (Caraher, 1998; Dines & Cribb, 1993). Therefore in this topic, health promotion will be used to cover both patient education and health promotion. Furthermore, an important part of the treatment of diabetes mellitus, apart from medication, is dietary control and exercise which is clearly related to the role of health education and health promotion.

Health promotion is an important concept which can be used to promote positive health-related behaviour and reduce health care costs (Baum & Fisher, 2014). The World Health Organisation (2017, p.1) defines health promotion as

> *''The process of enabling people to increase control over, and to improve their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions''.*

Health promotion in people with T2DM should focus on self-management by helping patients understand the importance of diet, physical activity, checking or monitoring signs of complications, and properly taking their prescribed medication. Patients need to understand the nature and course of their disease; be empowered to consume healthy food, exercise, maintain weight, control blood sugar level, and avoid smoking. They also need to know how to access available professional care (Masingboon, 2017; Chaveepojnkamjorn et al., 2008; WHO, 2017). Therefore, patient education is crucially important (Lawton et al., 2015). There is evidence in the UK that revealed the patient education programme ''Education for Diabetes (EDDI)'' by Hackney Diabetes Centre significantly improved HbA1c up to 12 months post-education among various groups of ethnic patients with T2DM (Diabetes UK education and Self-Management award, 2019). In addition, a cohort study in the UK conducted by Walters et al (2019) who examined the effect of structured group education on HbA1c levels 1,123 patients with T2DM using records from a National Health Service (NHS) patient database. The results after 6 and 12 month education programmes found that this programme significantly reduced HbA1c levels among these patients. Another study by Patel et al (2015) indicated that using DVD intervention among South Asians with T2DM, community members and when training health professionals to be effective. They also highlighted that the programme was tailored to this special group which focus on their culture and context. It reflected the success of appropriate programmes which suit and respond to the needs of individual which is one of the components of patient education from the NICE guidelines (NICE, 2016). However, this research studied was conduct in a specific area and a small scale community, hence it cannot refer to a larger population.

The provision of health promotion to individuals is generally the responsibility of health professionals such as nurses, dentists and pharmacists. Basak Cinar and Schou (2014) suggested that models of health behaviour change could be applied in health promotion programmes for improving health and controlling blood sugar levels in individuals with T2DM. Models and concepts of health behavioural approaches, such as self-efficacy, empowerment and social support have been applied to health promotion programmes. These concepts have been shown to be effective in the self-management of diabetes patients (McEwen et al., 2010; Sirikamonsatien & Tossanoot, 2016; Cheng et al., 2016).

The effectiveness of a self-efficacy programme for persons with T2DM in Taiwan was studied by Cheng et al (2016). This study used a randomised control trial and divided participants into two groups. A self-efficacy programme, which consisted of a DVD, book, and participation session, was followed up at three and six months by telephone. The intervention was given to the experimental group, whilst the control group only received a standard health education session. The results showed that the experimental group which consisted of 72 participants achieved significantly better scores of efficacy expectations, outcome expectations and self-care activities than those of the control group which consisted of 73 participants.

Sirikamonsatien and Tossanoot (2014), examined the effects of empowerment concepts for patients with type 2 diabetes mellitus who received health services in a hospital in Thailand. A quasi-experimental study involved 80 participants who were divided into two equal groups. The experimental group received an empowerment programme and standard advice delivered by the staff, while the comparison group received the standard advice only. After the implementation, the results showed that the experimental group had a fasting blood sugar level, which was significantly better than that of the comparison group. Moreover, their scores of diabetes knowledge, perceived self-efficacy and self-management were significantly higher than those of the comparison group.

Social support is another important aspect of the health promotion programme (Hagobian et al., 2012). McEwen et al. (2010) assessed the effectiveness of social support in 21 participants who were Mexican-American adults with T2DM. This study was conducted with a one group pre-test and post-test design. Social support, which consisted of emotional, appraisal, information and instrumental support, was applied to the 6 month intervention. The post-test results showed that the participants achieved significantly better scores of behaviour outcome and distress than at the pre-test. No statistically significant difference was found in physiological outcomes, such as Body Mass Index (BMI) and glycated haemoglobin (HbA1C). The barriers in accessing the intervention were reported as sickness and transportation and, as a consequence, only five participants took part in all intervention sessions.

The findings of the research above, support that the interventions the researchers applied were effective. However, the work of Wu et al., 2011 did not report such important outcomes as Body Mass Index (BMI) and glycated haemoglobin (HbA1C), while the study of McEwen et al. (2010) had a limitation of small samples, which made it difficult to generalise to the population as a whole. Moreover, these studies and the one by Sirikamonsatien and Tossanoot (2014) were carried out in a specific context and with a specific group of people. In addition, both the Wu and Siri papers had the weakness of a lack of follow-up after intervention, so the long-term sustainability of the programme was unknown. Furthermore, all of the interventions were created by researchers. The participants only took part in interventions that researchers provided. Consequently, the participants lacked a sense of belonging which could make the project or intervention unsustainable.

Many different theories have been applied to interventions, most have an overall similarity in that the researchers try to use models or concepts that they favour or believe in to design their interventions without first finding out the characteristics of their subjects, whether they have any specific needs, or problems in following advice. Most of this research lacks qualitative data as an important aspect for understanding the participants.

This literature review shows that Thailand still lacks a systematic review on the guidelines of food consumption behaviour-change for the control of blood sugar in people with diabetes. As food consumption behaviour is a vital part of diabetic treatment, this makes it difficult for practitioners to decide on which of the many behaviour models to use, because their outcomes, their pros and cons are unknown. Several theories related to health behaviours have been applied to induce the change of diabetes patients' eating behaviours. This is because theories human behaviours, including self-care behaviours in people with diabetes play a key role in controlling diabetes treatment (Davis et al., 2015).

Food consumption behaviour is health behaviour for blood sugar control of people with diabetes because food consumption is a daily routine. If people with diabetes consume too much carbohydrate and sugar, a high level of blood sugar will be found. If it is overconsumed then it may lead to diabetic complications (Charoenchit, 2013). Therefore, it is necessary for health professionals to look for appropriate techniques to change the food consumption behaviour of this group of patients in order to help patients have a better quality of life, safe from various complications due to uncontrollable blood sugar level. Some of the best-known and popular contemporary behavioural science theories applied in behavioural modification programmes in Thailand are as follows:

1. **Health Belief Model.** In order to change behaviour, the person must perceive that he or she is susceptible to that particular disease, and that the disease will be serious enough

to have an adverse impact on their life while a change in behaviour will lower their susceptibility and the severity of the disease (Dehghani-Taft et al., 2015).

2. **Protection Motivation Theory.** This theory states that the patients will perceive the seriousness of their disease only when the information they receive arouse fear in their mind of the consequences of the disease. Non-fear arousing media will not be enough to motivate them to change their behaviour. Other factors will influence the patient's decision-making as to whether to follow advice, such as the severity of the symptoms at the time (Ali et al., 2018).
3. **Self-Efficacy Theory.** This theory believes that each person will have a different perception of their own ability, i.e. self-efficacy, to act in each different situation. Such a perception is individualised and is dynamic rather than fixed. It will vary according to each circumstance, which may change in future (Mohebi et al., 2013).

2.11 The burden and knowledge gap of diabetes care in hill tribespersons in Thailand.

From the literature review as mentioned previously, it has been shown that many previous research studies have found that health promotion strategies in diabetes mellitus can improve health and change the behaviour of patients. In terms of studies in Thailand, of the 296 studies in diabetes mellitus randomly chosen from 525, 96 studies were survey designs with around 80% studied in rural areas. 200 studies were quasi-experimental with about 90% studied in rural areas. The key theories and concepts applied in their health promotion programmes were: self-efficacy, social support, empowerment, social marketing, locus of control, health belief model, motivation, counselling, self-esteem, self-help groups and participation.

According to the literature reviewed, most diabetes mellitus research in Thailand focussed on health promotion behaviour such as diet, exercise and medication in diabetes mellitus patients who live in both rural and urban areas. There are few research studies about T2DM among hill tribespersons who are a vulnerable group (Thai Library Integrated System, 2015) due to their residence in remote mountain areas, inability to access the health service, communication barrier and poverty which is dependent on agriculture (Fujioka, 2002; Lorga et al., 2012; Panya, 2005). There are a total of 514 research studies focusing on hill tribe populations in Thailand. Most of these examined education in school and social issues. None of them studied issues such as beliefs, experiences and self-management of diabetes mellitus in hill tribespersons and important basic data to develop health promotion programmes for them (Thai Library Integrated System, 2015). However, Lorga et al (2012) studied the knowledge of diabetes in the Karen ethnic group in

Thasongyang district, Tak province, Thailand. A total of 299 Karen adults participated in this study. The questionnaires consisted of general knowledge of diabetes including risk factors, symptoms, diagnosis signs and complications. This study revealed that the Karen have little knowledge in all aspects of diabetes mellitus. It was found that 51.84% of the participants answered that diabetes was a communicable disease and 49.50% did not know that diabetes cannot be cured. Most of the participants did not know that ageing, genetics, being overweight, lack of exercise, pregnancy and fatty diets are the risk factors of diabetes. Only a few of the participants could correctly answer questions about knowledge and complications of the disease. This inadequate knowledge of diabetes in the Karen may be the result of communication problems.

This chapter has provided the evidence that there are many studies which aimed to promote and support people with diabetes mellitus to be able to control their own blood sugar level. However, it was found that many patients could not manage this. There are many factors which affect blood sugar level, such as: lifestyles, beliefs, values, as well as social and cultural factors including the self-care behaviour of diabetes patients. Therefore, the study of beliefs and experiences of people with diabetes mellitus may not help to understand those who cannot control their blood sugar level in all dimensions, but it can be used as a guideline for designing the services related to problems and patients' needs. Diabetes mellitus is as much of a public health problem for hill tribespersons as it is for the general Thai population but the main differences among the hill tribespersons are the lifestyle including language, education, culture, and beliefs. A previous study showed that hill tribespersons face more cultural barriers in accessing health care services than the general Thai population. They often need interpreters because of language problems including difficulty reading prescription instructions for medicines (Apidechkul, 2018; Lorga et al., 2012; Chaveepojnkamjorn et al., 2008).

The hill tribespersons with T2DM like any other people with diabetes need to learn to manage their condition and deal with long term complications by adjusting their dietary intake, improving physical exercise, learning to monitor glucose level, taking care of their feet and taking their medication regularly. As there has only been a small number of studies about T2DM in hill tribespersons, more research is required in order to improve and promote the health of those who have T2DM and in response to the Twelfth National Economic and Social Development Plan of Thailand (2017-2020) (National Economic and Social Development Board Office of Prime Minister Bangkok, Thailand, 2016). Diabetes education programmes should shift to applying special methods which increase knowledge and behaviour change (Chaveepojnkamjorn, 2008; Taylor et al., 2014). To develop a T2DM health promotion programme that is most suitable and practicable for hill tribespersons with T2DM, it is necessary to understand the views of hill tribespersons in relation to their life styles, health beliefs and experiences, self-management behaviour, needs, essential requirements and any possible barriers. Therefore, the aim of the study is detailed here:

2.12 Aim of the study

The study aims to understand the experiences and beliefs of diabetes mellitus among hill tribespersons with T2DM in Chiang Rai, Thailand.

This research project address the following objectives:

1. To explore the health beliefs and current knowledge of T2DM among this group.
2. To explore the experiences and self-management behaviours of people with T2DM in this group.
3. To explore the needs, essential requirements and barriers to health promotion for T2DM patients in this group from both the hill tribespersons and the health professionals' perspectives.

Chapter 3 – Methodology

3.1 Introduction

The aim of this chapter is to describe, discuss, and critically justify the methodological approach I chose to undertake in this study. There are ten sections; the first section (3.2) explains the choice of the qualitative research by critically discussing the rationale and reasons for using qualitative methodology, followed by the justification of using the ethnographic approach as a research methodology (3.3). It then provides the details of the research setting, population, sampling strategy, and criteria of the participants (3.4). It further describes the instruments and methods of data collection, which include in-depth interviews, a semi-structured interview schedule, a focus group of health professionals and observations (3.5), followed by a discussion of the ethical issues and their processes (3.6). This chapter also explains the method and analytical process from the qualitative data (3.7), content analysis (3.8) and thematic analysis (3.9). The last two sections (3.10, 3.11) describe the trustworthiness and credibility of the research process where reflexivity is explained, to reflect the researchers' experiences which can be made transparent.

3.2 Rationale for Qualitative Methodology

The research question in this study is "What are the beliefs and experiences of hill tribespersons living with type 2 diabetes mellitus in Chiang Rai, Thailand?" The research design is the main consideration for obtaining the best answer to a research question (Robson, 2011). Debates have been ongoing over the last few decades on what the best design for the exploration of the "truth" is (Clark, 2013; Creswell, 2007; Denzin & Lincoln, 2005). There are two main paradigms of research design: quantitative and qualitative. The term "paradigm" is "a basic set of beliefs that guides action" (Guba, 1990, p.17) and is a way of viewing the "truth". These principal beliefs consist of ontology, epistemology and methodology (Bryman, 2008; Denzin & Lincoln, 2008). Therefore, the identification of the research design needs to be examined by assumptions underlying both two main paradigms. When investigating the research question, the nature of study is the key to selecting an appropriate methodology (Chapman, 2017). Using the research question as a focus, my research aims to explore an in-depth understanding of the beliefs that hill tribes patients held regarding T2DM and their experiences, including self- management of this chronic disease. I realised that using a qualitative method would suit my research due to the philosophical concepts I had examined.

In terms of ontology, which refers to belief of the nature of the 'truth'. The quantitative paradigm views the truth as universal, which can be directly investigated and confirmed through the process of verification (Bryman, 2008). It proceeds to analyse, justify and predict events by testing variables and relationships. Therefore, it can be used for a research question which requires testing hypotheses and generalisation of the results by gaining quantitative data from random sampling (Bryman, 2008). From the research question, the answer lies in finding out the facts of the subject's personal beliefs and experiences. There is no hypothesis in my proposed research to prove, therefore the quantitative paradigm is not appropriate for my study, while the qualitative paradigm is, because it views the truth as subjective, and having multiple viewpoints. In addition, the aim of this paradigm is to explore and understand the essence of the truth, which can be interpreted in different ways according to individual experiences and the complexity of human behaviour (Creswell, 2013; Potter, 2000). My research project intends to understand how hill tribespersons with T2DM view, perceive and deal with their chronic condition. In this sense, the perception and experiences are subjective and different in each person. When investigating a research approach, I realised that qualitative methods would be a more appropriate fit than quantitative methods. In terms of the epistemology, it addresses the relationship between the researcher and the known, which is very important to the approach and methods of the research (Russell, 2004). In quantitative research, the relationship of the researcher and the participants is independent because the truth or the knowledge is separate from the researcher (Santankos, 2005). It focuses on the purity of the study and therefore takes actions or technical methods to avoid or rectify bias that may be the result of the relationship between the researcher and his subject (Holloway, 1997). Conversely, qualitative researchers believe that the truth is constructed by the participants and context, hence the relationship between the researcher and the participants cannot be separated and can influence each other (Lincoln & Guba, 2008). As this research aims to explore a specific social group of people's beliefs and experiences that they have actually lived through in the context of their cultural and social background, a qualitative approach is more appropriate than a quantitative one (MacLachlan, 2006). Qualitative research is based on 'the interpretive approach to social reality and in the description of the experience of the human being' (Holloway and wheeler, 2013). Curry et al (2009) recommended that qualitative research methods enable the researcher to understand the background problem of the target group in all aspects. Patel et al (2016) viewed the qualitative study as an appropriate inquiry method to explore the beliefs and health behaviour of people with diabetes mellitus. In addition, to understand how the patients with diabetes perceive and deal with their conditions, Kohinor et al (2011) advocated a qualitative approach. Many researchers in health and social care have adopted qualitative research as their preferred method because they have found that it is concerned with explaining social phenomena. Qualitative research uses non-numerical data which is eminently useful for achieving a deep understanding of a phenomenon which is heavily influenced by psychological and social factors (Denzin & Lincoln, 2005; Karlsson et al., 2008; Kneck et al., 2012; Li et al., 2013; Lundberg & Thrakul, 2012).

3.3 Justification of using the Ethnographic Approach as a Research Methodology

Within qualitative research, there were many approaches which could be used, it was crucial to determine which approach would suit the aim of the study. There are three main approaches which fall under the umbrella of ''qualitative research''. Three of these are, the phenomenological approach, grounded theory and ethnological approach. These approaches may use similar data collection, however, the types of questions, the specific techniques to answer the questions and overall goals are different (Lowenberg, 1993; Roper & Shapira, 2000; Teherani et al., 2015). A phenomenological approach is usually used by the researcher who wishes to understand a specific phenomenon or the life world of the participants through interviewing them (Hollyway & Galvin, 2017). It is a form of qualitative research which is appropriate for the study of lived experiences (Alasade, 2000; Delagy, 2002; Grbich, 2007) and focuses on the study and understanding of a phenomenon (participants' lived experiences) in order to clarify the truth (Creswell, 2007; Grbich, 2007). The purpose of grounded theory is to develop or build theories grounded directly from the data to explain process, action, or interaction on a topic (Hollyway & Galvin, 2017; Strauss & Corbin, 1998). The researcher primarily uses interviews, participation observation and documents to identify themes and generate theory through the process of open and axial coding techniques (Corbin & Strauss, 2008; Hollyway & Galvin, 2017). When I analysed the use of the phenomenological and grounded theory approach, I found that neither of them would suit my study. This is because the aim of my study is not to capture the essence of hill tribespersons experiences nor generate concepts leading to theoretical development. Moreover, the type and nature of my research question focuses on the beliefs and experiences in relation to diabetes mellitus among the hill tribespersons with T2DM who are a specific group and have their own specific culture which impacts directly on their health behaviours. Therefore, an ethnological approach which differ from other qualitative approaches through its focus on culture is more appropriate.

What is Ethnography?

The term ethnography is derived from ''ethnos,'' the Greek term which means folks or cultures combined with ''grapho'', meaning writing. From this it simply means ''writing about culture'' (Lander, 2014, 2016). However, the meaning of ethnography can vary depending on the research's perspective. Ethnography has been defined by many authors in different ways, for example Brewer, (2000, p.6) described:

> *''Ethnography is the study of people in natural occurring setting or fields by methods of data collection which capture their social meanings and ordinary activities, involving the researcher participating directly in the setting, if not also the activities, in order to collect data in a systematic manner but without meaning being imposed on them externally''*

From this definition, ethnography is synonymous with qualitative research in general and focuses on the research style rather than a single method. Moreover, Muecke (1994), suggested that ''there is no single standard from of ethnography'' (p.188). According to Spreadly (1980, p.3), ''ethnography is the work of describing culture,'' so the principle of this is concerned with the meaning of behaviours and events to the people seeking to understand from the native's point of view (Speziale & Carpenter, 2007). Moreover, Fetterman (1998), defines ethnography as the art and science of explaining a culture group and concentrating on people's behaviour and thoughts from which their pattern can be predicted. To understand people's thoughts and behaviours, researchers spend time in the field to observe events in their natural setting, participating themselves in the ongoing action as members of the group or community (Wood, 1986). Hammersley and Atkinson (1983, p.1) added more by explaining:

> *''The ethnographer participates, overtly and covertly, in people's lives for an extended period of time, watching what happens, listening to what it said, asking questions; in fact, collecting whatever data are available to throw light on the issues with which he or she is concerned''.*

This also means the researcher has to spend time in the field in which they are studying. In 2007 Hammersley and Atkinson stated that the bias from the researcher affects the data collection and interpretation. This is because social research is a part of the social world which they study. In addition, the purpose of participating is to obtain a holistic view of people's behaviour, hence the researcher can interview, observe and share some of the participants' experiences (Parahoo, 1997). More simply, Creswell (2007) defined ethnography as a methodology of inquiring in which the researcher studies the whole cultural group in a natural setting over a long period by observing, interviewing and collecting data from the many different definitions as mentioned above, it can be concluded that ethnography is a method of studying people's behaviour in the context of culture and how they experienced their cultural groups. Data collection is conducted mainly through observations and interviews when the researcher participates and spends time in their natural setting. An ethnographic approach is chosen when the researcher wants to study the behaviours of a culture-sharing group, for example the American Indian (Carson et al., 2015) and homeless Romanian Roma in Copenhagen (AVNBOL, 2017).

In terms of the development of ethnography, Sanday (1983), proposed that it began with Herodotus. Ethnography emerged in the 1920s and 1930s when famous anthropologists, for example, Malinowski (1992) and Mead (1935) discovered a diversity of non-Western cultures and different ways of life. In the 20th century, there are two phases of the development of ethnography which were identified by Atkinson and Hammersley (1994). These are firstly, ''the work of founders of modern anthropology'' in which at the beginning the researcher focused only primitive culture. Secondly, '' the Chicago school of sociology'' which affects later ethnographic methods in which the researcher studied marginal culture and sub-cultures in people's groups. Boas, Malinowski and Radcliffe-Brown, the founders of modern anthropology were committed to anthropology as a science and now ethnography is used widely in many fields of social sciences (Holloway & Galvin, 2017). Muecke (1994), categorised the types of ethnography, these include classical, systematic, interpretive and critical. The aim of classical ethnography is to describe the entire culture from the native's point of view (Grbich, 2012). Systematic ethnography focuses on the structure of the culture rather than the participants' social interaction. Conversely, interpretive ethnography studies the meanings of social interaction and the basis of critical ethnography is critical theory and social macro factors (Muecke, 1994; Holloway & Galvin, 2017). With regards to the ethnography in healthcare, Holloway (2017), stated that critical ethnography provides an understanding of the differences and inequalities in the health of people. Moreover, Cook (2005) explained that the ethnographic approach is useful for health promotion because it offers the social context and discovers the social conditions which influence the participants' behaviours and their everyday lives. In healthcare issues, ethnography is applied research which allows the researcher to capture the complexity of human responses to health and illness. Rice and Ezzy (1999) stated that using ethnographic methods help the health researcher to understand the meaning of patients' health behaviours and their needs which are different across groups. Adopting the ethnological approach as the choice of methodology and procedure of my study depends on the following considerations (Holloway & Galvin, 2017);

1. The epistemological stance of the researcher

The epistemology addresses the relationship between the researcher and the known, which is very important to the approach and methods of the research. The ethnographic approach is a qualitative study in which the researcher believes that the truth is constructed by the participants and context, hence the relationship between the researcher and the participants cannot be separated and can influence each other (Lincoln & Guba, 2008). Conversely, in quantitative research, the relationship between the researcher and the participants is independent, because the truth or the knowledge is separate from the researcher. It focuses on the purity of the study and therefore takes actions or technical methods to avoid or rectify bias that may be the result of the relationship between the researcher and their subject (Holloway, 1997). Unlike the other qualitative approaches, the relationship between the researcher and their data is the highlight of ethnographical study. This includes the researcher spending time in the field which allows them to participate in the natural context as researcher and participant and collect data by observing behaviour, listening and asking for the data at first hand (Ellison, 2010). This means understanding participants' thoughts, feelings and behaviour, so the researcher has to be part of their context and become an insider. The goal of participating is to try to explore the participants or insiders' point of view. Therefore, participant observation is a crucial method in ethnographical studies. According to Halcolm's Methodology Chronical, quoted in Patton (1990, p.199)

'' To understand a world you must become part of that world while at the same time remaining separate, a part of and apart from''

This can confirm that the relationship between the researcher and the participants cannot be separate from each other. Practically, participant observation allows the researcher to directly see and understand the meaning of the phenomena in a real live situation. By participating and sharing in life activities, it is necessary involves learn the language, rules and behaviours, responsibilities and become a part of the participants' community (Woods, 1986). The nature and degree of the participation might vary according to the aims of the study, the researcher, and the culture concerned. In health care research, for example the study of Porqueddu (2017) aimed to explored the understanding and experiences of using herbal medicines to control diabetes among Indian and Pakistani migrants with diabetes in Edinburgh. Participant observation was used for collecting data over 16 months as it is one of the main methods to investigate and understand participants' behaviour in their home environment and natural setting such as in a community centre or in a retail store. Moreover, Logsdon and Smith-Morris (2017) illustrated the movement between roles in their study of perception of women's pain during childbirth in the Netherlands. When they viewed a birthing, they were the observers but after the birth they were more participant-as-observer as they attended the nurses' shift and helped with some simple tasks. Therefore, participant observation was a dual role, the information could be learned as researcher became a participant in the field and the researcher were more involved in the culture and could see the phenomena and behaviours from an insider's point of view. The role of the researcher as ''participant as observer'' or ''observer as participant is most used for collecting data (Rooer & Shapira, 2000).

Layder (1993) described the advantage that the researcher derives from the participant observation

*''The method of ''participant observation'' allows the closest approximation to a state of affairs wherein the sociologist enters into the everyday world of those being studied so that he or she may describe and analyse this world as accurately as possible. Participant observation represents the ideal form of research strategy because this method requires that the sociologist for all intent and purposes become a member of the group being studied.''*Weigl et al (1995) explains that *''the use of full-shift observations allows for a detailed insight into activity patterns throughout the entire daily working time*.''

This allows for a deeper understanding of what is being studied, so the ethnographic approach is used to answer the questions regarding why people behave the way they do and clarify inconsistencies that arise between what people say and do (Parahoo, 1997).

In this study, the data on the subjects' beliefs, their experiences, their own understanding and its impact on their life, is collected and interpreted in a way which is appropriate to the subject groups' natural environment, cultural, and educational backgrounds. In this sense, how the subjects believe, experience and deal with their daily life is therefore subjective rather than objective. Furthermore, Matthews and Ross (2010, p.28) explained interpretivism in the context of social research as ''An epistemological position that prioritises people's subjective interpretations and understandings of social phenomena and their own actions.'' Moreover, ''the researcher as the instrument'' is one of the characteristics of ethnography, this means the researcher's reflections are also a part of the data for deeper understanding of people's behaviour and culture (Ellison, 2010). To understand the hill tribesperson with T2DM, one of the role of the researcher is emic which means attempting to understand the meanings of events from an insider's perspective (Hoare et al., 2013; Yin, 2010), so the relationship between the researcher and the participants cannot be avoided and the audience should be aware of the position of the researcher (Pascal et al., 2010). In conclusion, the ethnographical approach is most suitable for my research problem and the advantage here, is that I would gain insights about the participants and their behaviours that could not be obtained in any other way.

2. The type and nature of research problem or question

Although this research aimed to explore the beliefs and experiences of living with T2DM, it was carried out with a particular group of people with specific characteristics, the results of which cannot be generalised to subjects belonging to different social and ethnic groups. The ethnographical approach was adopted in this study to depict and analyse the social and cultural aspects of hill tribespersons' lifestyle. In the context of the hill tribespersons, ethnography which has origins in anthropology and requires the researcher to spend time in the field, observing the routine, and everyday life, is used to understand the behaviour and experiences of cultural groups (Cresswell, 1994; De Chesnay, 2014; LeCompte and Schensul, 1999; Roberts et al., 2010). This approach focuses on exploring the culture in depth, the reasons for people's behaviours and why they react in certain ways to their disease. Ethnography inquiry can be a combination of information on people's thoughts gathered through interviews with information collected by observing their behaviour and social interactions (Crabtree, 1999; Makenzie, 2010). According to Spradley (1980), an ethnographical approach is generally used to generate cultural inferences which consist of cultural behaviour (what people do; cultural artefacts (the things people make and use); and speech (what people say). Moreover, ethnography can produce detail of the "way of life" of this ethnic group in their social and cultural context, which is very useful for in-depth understanding of people from different cultures. In this study, the research question aims to understand the patients' beliefs and their experiences. Therefore, this research method is used to explore and understand other aspects of their cultures in this community, in terms of their background, culture, social rules, values and style of interaction, which are related to their behaviours. These can include interviewing and observing health professionals and patients to explore the ways in which they believe, experience and understand diabetes mellitus, for example the barriers to diabetes care, which is not only related to the health care service system but involves their culture and lifestyle. As mentioned in chapter 2, there is a knowledge gap regarding blood sugar control among hill tribespersons with T2DM in Thailand. This limited knowledge shows the necessity of using an ethnographical approach to explore the information including social and cultural beliefs among this group in Thailand. It is therefore clear that an ethnographical approach is suitable for this study as the participants' beliefs, and experiences are being explored.

3.4 Population and sample selection

3.4.1 Population and setting

Chiang Rai province, which is the second largest region in Thailand, is where the hill tribespersons populations have settled. The participants in this study were recruited from a health promotion hospital in Chiang Rai. The hospital is a primary health care centre in the area, which serves a population almost exclusively of hill tribespersons. T2DM comes under the care of the hospital. The patients have been observed to have difficulty in achieving good control of their blood sugar (Health promotion hospital, 2016).

3.4.2 Sample selection

The chosen sampling method was convenience sampling.

The sampling selection approach falls into two distinct categories: the probability samplings broadly for quantitative research and non-probability for a qualitative study (Bowling, 2014). In probability sampling, each member of the population has an equal chance of being entered to the sample, which must be representative of the population (Henry, 1990). The sampling is random to avoid bias, which is characteristic of quantitative data collection (Hennick et al., 2011; Metthews & Ross, 2010). In contrast, qualitative research explores and understands in-depth the way people with specific characteristics make sense of their experiences in certain circumstances, hence participants with specified characteristics of interest are needed as only they can give the best answer (Catania et al., 2015; Clarke & Braun; 2013, Henry, 1990; Holloway & Wheeler, 2010). Random selection is inappropriate for this qualitative research (Given, 2008; Henry, 1990). The sampling therefore is non-random, and subject to my judgement, which was guided by clear selection criteria.

Several techniques of non-probability sampling are used by qualitative researchers. (Bryman, 2012; Henn et al., 2009). The following are some examples and their operating principles. (1) Snowball sampling is a technique that relies on previous participants helping to recruit new ones. The researcher starts with a small group of participants who are then asked to suggest other potential participants whom they think meet the inclusion criteria. The number is thus gradually enlarged like a snowball until it reaches the target (Bryman, 2012; Henry, 1996; Sarantakos, 2005). This technique is useful when samples are difficult to access, for example, people who are stigmatised, or have rare diseases. (2) Quota sampling is a technique of which the researcher sets the number of samples, which are subgroups with specified characteristics such as sex, age range, nationality, or economic status. The sampling is non-random and the researcher has to control the size of the sample to ensure that the subgroup is representative and maintains the true proportion or ratio to the population (Blackstone, 2012; Sarantakos, 2005). Such a sampling method would not be suitable for this research because the sample are recruited if they have the required characteristics. Moreover, the size of sample does not have to represent the true proportion of the population (Holloway and Wheeler, 2010). (3) Purposive sampling is frequently used in qualitative research and the researcher deliberately judges who should be recruited. The selection is based on the required characteristics of interest (Draper & Swift, 20011; Sarantakos, 2005). This selection method is used as the starting process to identify the key informant participants by setting the criteria as the main sample unit (see inclusion and exclusion criteria). (4) Convenience sampling is self-explanation. It gathers information from the target group or location which is most reachable to the researcher. A qualitative research can use this type of sampling. It is convenient, cheap, and data can be gathered in a short time (Lochmiller & Lester, 2017; Robson & McCartan, 2016; Sarantakos, 2005). I adopted this method as the main selection process because I used opportunities to ask hill tribespersons from the inclusion criteria who would be useful for my study and easy to access. Moreover, the aim of my study is to explore the individual's beliefs and experiences of T2DM in hill tribespersons, which is subjective, therefore the generalisation to population is not aimed for with this sampling technique.

Sample size

The sample size was determined by the number of T2DM cases on the medical records of the local hospital's diabetes clinic. Sixteen out of fifty-one participants were convenience selected and approached for their informed consent to be included in the research, based on application of the inclusion and exclusion criteria.

Sample characteristics

The inclusion and exclusion criteria are presented below:

Inclusion criteria

- Hill tribespersons, confirmed by the patient by his or her personal and family history, mother tongue, and living in a hill tribe village in Chiang Rai province.
- Aged over 18 years old
- Has T2DM
- Understands spoken Thai
- Can provide independent consent
- Receiving care at a clinic/hospital within the province of Chiang Rai

Exclusion criteria

- Non - hill tribesperson
- Under 18 years old
- Has type 1 diabetes mellitus
- Inability to understand and sign independent consent

Collaborators

Collaborative data was collected from local health care professionals who were the key persons in delivering care, support, information and health education, to the participants.

Data collection methods

Data collection was by the following means:

- Medical records for clinical information such as diagnosis, tests, plan of treatment, and clinical progress.
- In-depth interviews for information on participants' beliefs, experiences, knowledge, self-management, barriers and needs or essential requirements.
- In-depth interviews and a focus group session for additional data from the health care professionals involved in the patients care.
- Informal naturalistic observation of community living to be integrated as auxiliary or confirmatory data

The purpose of qualitative research is to understand the beliefs and experiences which is concerned with the 'how' and 'why' of the population that the researcher studies along with the in-depth interview and focus group discussion for collecting data (Chadwick et al., 2008). In addition, the principle of qualitative study does not focus on hypothesis examining and generalisation to the larger population so the sample size is often smaller than that of quantitative research. (Denzin and Lincoln, 2005; Dworkin, 2012) However, there is no rule that can set the actual number needed for qualitative research (Clarke and Braun, 2013; Saunders et al., 2012). According to the guidelines of Bertaux (Cited in Brink, 1984), fifteen participants is an adequate sample in all qualitative research. Creswell (2007) suggested the sample size in qualitative research should be between five and twenty-five, while Morse (2000) advised at least six. Moreover, Namey et al., (2016), reported that the qualitative research was achieved when interviewing between eight to sixteen participants. Due to this study being carried out with hill tribespersons who are a rare and unique group, the number of participants was not set at the beginning.

In this study, the data was collected not only from sixteen hill tribespersons with T2DM, but also from healthcare professionals. These professionals played an important role as the key informants due to having direct contact with the patients with responsibility for treatment, care, support and health promotion, via the diabetes mellitus clinic. The third objective of this study was to explore the needs, essential requirements and barriers to health promotion for T2DM in the hill tribespersons and the health professionals. Participants were invited by the researcher through visiting and providing information about the study at the diabetes mellitus clinic in a hospital in Chiang Rai, which ran weekly. The places for the in-depth interviews depended on the participant's choice. Most took place at the participant's house or a private room in the hospital.

Health Professionals Sample

The researcher provided information about the study to three health professionals who work in the diabetes mellitus clinic in this health promotion hospital and invited them to participate in the research by taking part in an in-depth interview. The community hospital and health promotion hospital were collaborating to deal with the T2DM patients, five health professionals in the community hospital who had been working in the diabetes mellitus section also volunteered to take part in a focus group for this study. The in-depth interviews took place in a private room in the health promotion hospital due to the selection of the participants. The focus group was conducted by the researcher in a meeting room at the community hospital for the convenience of the health professionals.

In summary, this study collected data from sixteen hill tribespersons with T2DM and eight health professionals who had been working in the diabetes mellitus clinic in the health promotion hospital and the community hospital.

3.5 Research Instruments and methods of data collection

The characteristics of an ethnographic approach in this study justified the use of the in-depth interview, focus group and observation as the research tools and methods of data collection. The qualitative research in-depth interview was divided into two forms; the unstructured and semi-structured. In this section, the in-depth interview is presented, as it is the main method to collect data from both hill tribespersons with type 2 diabetes mellitus and the health professionals; to be followed by the development of a semi-structured interview schedule, health professional focus group, then the observation is the final sub-section.

Several research instruments can be used to collect data in a qualitative study. The most valuable instruments are the in-depth interview and focus group (Chadwick et al., 2008). Both have been used in this study. In addition, a naturalistic observation is also used to increase the understanding of the beliefs and experiences of the participants.

3.5.1 In-depth interview

The primary means of communication between human beings is language. People use language to understand each other by speaking (Matthews & Ross, 2010). A conversation can produce knowledge through information exchange between two or more people. A type of which, an interview, enables an expression of experiences, feelings and attitude (Matthew & Ross, 2010). The in-depth interview is the most popular and generally used method in qualitative research, particularly in the field of health and social sciences (Creswell, 2009; Flick, 2009; Fryer, 2012; Hollyway & Wheeler, 2002; Jamshed, 2014). Streubert and Carpenter (2011) described the in-depth interview as qualitative, unstructured interviews which are recorded and the data transcribed verbatim. A common feature is the use of open-ended questions to allow the participants wider scope in their responses. The advantage of this is in allowing the researcher greater understanding of the experiences and emotional responses the participant is describing. Moreover, in-depth interviews allow the participant time to formulate their answer and complex topics and sensitive information can be explored (Seidman, 2006). As an example, Amarasekara et al (2014) conducted in-depth interviews among 14 adults with T2DM in Sri Lanka to explore their health beliefs and experiences. In-depth interviews helped to obtain rich information, including cultural beliefs and practices which affect participants' health behaviour. There are disadvantages with this, in that large amounts of data often result from this type of interview which can be time consuming to gather and difficult to analyse accurately (Streubert &Carpenter 2011). The goal of an in-depth interview is to explore people's experiences, reactions and opinions on a specific issue or topic (Cridland et al., 2016; Hennink et al., 2011; Kvale, 1996). With an ethnographical approach, the in-depth interview is used to validate observations made during ethnographical participant observation and to provide for future observation. It is also used to collect data which the researcher cannot observe, such as the participants' perception and their experiences (Roper & Shapira, 2010). In this study, this method allows the researcher to determine the cultures, patterns, values including perceptions of people, through the researcher's interpretation (Weiss, 1994). Furthermore, an in-depth interview through purposive informal conversation allows the researcher to develop an understanding of the meaning behind people's daily behaviour and activities (Kleiman, 2004; Kvale, 1994; Marshall and Roseman,1999). A face to face in-depth interview makes people feel more relaxed than a focus group and is more effective in obtaining clear and deep understanding (Koch & Kralik, 2006). The face-to-face in-depth interview with a semi-structured guideline schedule was used to explore the results from sixteen hill tribespersons with T2DM, while the unstructured face-to-face in-depth interview was used with three health professionals. The semi-structured schedule guideline is explained below.

3.5.2 The semi-structured interview schedule.

The semi-structured interview is the most utilised tool for qualitative research interviews (Dicicco-Bloom & Crab-tree, 2006; Kallio et al., 2016; Wengraf, 2001) including within the healthcare context (Brown et al., 2015; Gill et al., 2008; Mazaheriet al., 2013). The researchers create the semi-structured interview by applying wide predisposing aspects that are believed to be significant, through the questions (Reid & Mash, 2014). Peter and Halcomb (2015) stated that semi-structured interviews generate powerful and forceful qualitative data on the participants' attitudes, beliefs and experiences due to the special characteristics of the questions, which although predetermined are open-ended, hence flexible. In this study, open-ended questions allowed the researcher flexibility to re-organise the questions as the interviews progressed, according to cues from the participant's feedback.

This semi-structured interview schedule was practical for this ethnic group because it not only allowed the researcher to insert questions that were specific to the objectives, but also to enable participants to express their concern (Clarke & Braun, 2013). Furthermore, the semi-structured interview assists the researcher to direct the process of interview to reach the objectives with the cooperation between the researcher and participants (Irvine & Sainsbury, 2013). In this study, a semi-structured interview schedule was adopted as a tool for collecting data from the hill tribespersons.

This semi-structured interview schedule was developed by the researcher in accordance with the literature review, previous research, related concepts and theories (Health Belief Model), and research objectives. Holly and Wheeler (2010) concluded that the onus is on the researcher to validate the theoretical framework which is appropriate to the aim of the research topic in any research approach. Furthermore, Sorsa et al (2015) reported that the researcher's background has an overall influence on the research process including the study's focus and methodology. To meet the aim of this research, the Health Belief Model (HBM) was adopted as the theoretical framework and developed the semi-structured interview in this study for the following reasons;

1. A good deal of research in Thailand and worldwide has shown that the Health Belief Model (HBM), one of the widest individual health behaviour theories is popular in public health education (Edberg, 2015; Glanz et al., 2015; Hallgren et al., 2015; Pinto et al., 2006; Thalacker, 2011). Romano and Scott (2014 p.75) state that

''The Health Belief Model became one of the most widely recognised conceptual frameworks for creating healthy behaviours''.

The four original constructs of the Health Belief Model (HBM) were created by social psychologists who worked in the U. S. Public Health Service (USPHS). This model was further developed by Rosenstock in 1974. The six variables include:

- **Perceived susceptibility**. This refers to beliefs of individuals regarding the chance of their getting a health problem. In this study, this variable was used to understand how individuals perceived the developing problems of diabetes mellitus.
- **Perceived severity**. This refers to beliefs of individuals about the consequences of the disease and how serious it is (For example, it may result in disability or death). In this study, this variable was used to understand the perception of diabetes mellitus as a serious disease and diabetes complications in this group.

- **Perceived benefits.** This refers to beliefs of individuals about positive outcomes which result from positive behaviours. In this study, this variable was used to understand how individuals perceive the diabetes mellitus regimen.
- **Perceived barriers.** This refers to beliefs of individuals about the barriers to taking action. In this study, this variable was used to understand the perception of any obstacles to the treatment regimen.
- **Cues to action.** This refers to the other factors that motivate people to act. In this study, this variable was used to understand the stimulus affecting the participants to take action regarding their condition.
- **Self-efficacy.** This refers to beliefs of individuals in their ability to take action successfully (Edberg, 2015). In this study, this variable was used to understand the confidence of the participants' ability to perform their positive behaviours successfully.

The main concepts of the Health Belief Model (HBM) focus on the individual's perception which leads to his/her health behaviour. The perception of the individual in his/her health problem is associated with health behaviour and can guide health interventions to reduce the risk of disease (Chin et al., 2013; Fischetti, 2015). Furthermore, the beliefs and experiences are related to perceptions and are subjective in each person, so the Health Belief Model (HBM) was used in this study.

2. Effective exploration of the beliefs and experiences of people depends on the most appropriate concept for application. The appropriate concept should depend on the objectives of the study and the Health Belief Model (HBM) was used due to the first and second objectives (to explore the health beliefs and current knowledge of diabetes mellitus and to explore the experiences and self-management behaviours of people with type 2 diabetes mellitus in this group.)
3. The Health Belief Model (HBM) has been found to have heuristic value among different cultural and linguistic groups in understanding behaviour underpinning many chronic illnesses (Glanze et al., 2002; Lyutha et al., 2015; Noar & Mehrota, 2011)

After creating the semi-structured interview schedule, the researcher continued to develop this by examining the construction and types of questions to ensure that they adequately covered the purpose of this study. The researcher also conducted a trial run (pilot) of interviews, in order to ascertain feasibility, with two people who have T2DM in Thailand (who were not part of the main sample). Subsequently, the supervisor team provided critical feedback regarding this guideline in terms of the structure of the open-ended questions to avoid one-word answers. The researcher improved and resent it to them until the semi-structured interview schedule was completed. The interview guide consisted of five parts as follows:

Part 1 Demographic information.

The demographic data were collected from each participant.

Part 2 Health beliefs and attitude about diabetes mellitus.

Part 3 Knowledge about diabetes mellitus.

Part 4 Experiences and current approach to dealing with diabetes mellitus.

Part 5 Needs, barriers and essential requirements of a diabetic health promotion programme.

(For the semi-structured interview schedule, see Appendix A).

For health professionals who participated in this study, unstructured in-depth interviews and focus groups were employed as the method of gathering data. Reid and Mash (2014) argued that the unstructured interview should be independent from any assumptions of the theories and generally begin with a common opening question for example ‘Could you please explain about your experiences of …?’ and be proceeded by the response of the participant by reflecting through active facilitation.

Participants were invited to meet the researcher at the diabetic clinic which is run weekly. The researcher provided information about the study and asked them to consider becoming a participant. One week was given for them to return with a decision of whether or not to take part and to ask questions about the study. Those who were interested and willing to participate were asked to complete the consent form and contact details. Interviews were audio recorded with verbatim transcription in Thai which was translated into English before, during and after data analysis by the researcher. The translation steps were:

1. Before the data was analysed, the researcher translated from the Thai northern local language to standard Thai language and then to English.
2. During data analysis, the researcher rechecked the vocabulary to confirm accuracy of meaning.
3. After data analysis, the researcher once again rechecked the accuracy of the vocabulary to confirm the findings.

The English translation was checked by the English teachers from the post graduate research support of the University of Huddersfield and a Thai doctor who has worked in the UK for 30 years. Pseudonyms were used on all documents in accordance with ethical governance.

For the data collection in this study, the researcher left the UK to collect data from the hill tribespersons with T2DM in Thailand twice during November-December 2015 and October-December 2016, due to concern regarding data completion. After reading the transcription of the first round several times to get a sense of the whole of each participant, I found that the interview was limited in terms of the depth of responses, due to the nature of hill tribespersons being shy and not wanting to talk too much with a stranger. Therefore, a second interview round was completed with the participants (the total number of interviews was 32).

The timetable and research process for completion of the second round of interviews will show as table 3.1.

Task	Time											
	October				November				December			
	Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 1**	**Week 2**	**Week 3**	**Week 4**
1. Visit the diabetes clinic and invite the new participants.	—	—	—	→								
2. Contact the old participants and set an appointment for in-depth interview.	—	—	—	→								
3. Contact the new participants who are willing to take part in this	—	—	—	→								

Task	Time											
	October				November				December			
	Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 1**	**Week 2**	**Week 3**	**Week 4**
research and set an appointment for in-depth interview.	→	→	→	→								
4. Collect data from the participants			→	→	→	→	→	→	→	→	→	→
5.Observation of participants in their community							→	→	→	→		
6.Analysis of the data			→	→	→	→	→	→	→	→	→	→
7. Meet supervisor team by Skype.			→				→			→		→

Table 3.1 the timetable and research process for completion of the second round of interviews.

3.5.3 Health Professionals Focus group.

Qualitative research with focus groups has in recent times contributed a greater understanding and insight into a variety of issues including health care services (Brown, 2015; Broyles, 2012; Daley; 2013 Rosenthal; 2016; Tausch & Menold, 2016). It is frequently employed to explore in depth information of people's thoughts, views, feeling and experiences regarding a diversity of pragmatic and theoretical concepts (Brown, 2015; Gustafsso et al., 2012; Patton, 1990, Tausch & Menold, 2016).

According to Sim (1998, p.346)

'A focus group is a group interview centred on specific topic ('focus') and facilitated and co-ordinated by a moderator or facilitator which seek to generate primarily data, by capitalising on the interaction that occur within the group setting.'

A focus group is not the model for gathering personal-level data, due to the fact that the outcome of this technique derives from the interaction among members of the group and may therefore, not completely represent the personal aspects of each member (Crabtree & Miller, 1999; Hennink et al., 2011; Krueger & Casey, 2009). This is unlike an in-depth interview which is the direct product of personal viewpoints (Cridland et al., 2016). A focus group is a group discussion on a particular topic organised for research purposes. This discussion is guided, monitored and recorded by a researcher, (sometimes called a moderator or facilitator) and the members in the group discuss the issue from different viewpoints which means there are interactions among group members (Krueger & Casey, 2009; Langford & Mcdonagh, 2003). It concerns the understanding of the participant's framework and contributes the understanding through the articulation of their perception (Cridland et al., 2016; Krueger & Casey, 2009). The researcher can determine the scope of the issue and also understand the way the group will communicate (Crabtree et al., 1999; Hennink et al., 2011). Between five to ten participants is the norm, but it depends on the participants and the topic of study (Hennie, 2010). Crabtree et al (1999) suggested that if the number of participants were fewer than five, the group dynamic and the interaction would be too restricted. Moreover, the number of people in the group depends on the researcher, who has to reconsider what the best number is, from issues of interest and the background of the participants (Doody et al., 2013). This method is especially appropriate to discover people's perceptions and experiences, or to understand the perspectives of the group of people in the field of assessment in health care services (Carlsen & Glenton, 2011).Participants for these group interviews are generally chosen as they share common features and characteristics with the research topic (Morgan, 1995). Focus groups allow participants to discuss experiences and opinions whilst enabling the researcher to explore these immediately.

When collecting data, there is an assumption that the individual participants have valuable information to offer and are capable of expressing their own feelings in relation to the topic discussed (Clark, 1993). The advantages of the focus group are data's cumulative effect, enabling data recall within the group which allows the researcher to obtain valuable data. Also, they are relatively inexpensive and the structure is flexible (Hennink et al., 2011). A major disadvantage can occur though, if stronger group members are allowed to monopolise the discussion and override the ideas and opinions of others. They require an effective moderator to manage this in order to allow useful and positive data collection (Streubert & Carpenter, 2011).

In this study, the health professionals focus group provided a valuable supplement to the in-depth interview of the health professionals in terms of their team work. I started the focus group process by reflecting on the purpose of the study, which was to explore the problems and barriers of the health professionals who have been working with the hill tribe patients and concluded by using purposive sampling which identified eight health professional participants. Kruege (1998), Krueger and Casey (2014) advised that a planned systematic questioning during a focus group discussion would help the researcher to obtain better information. The questions were categorised into five sequenced steps as follows, which also explains their purpose. Firstly, the opening questions to establish a familiarity among the group including the researcher, to make the participants feel comfortable and relaxed enough to talk. An example of the question used is “Please tell us your name and your duties in the diabetes mellitus clinic?” Secondly, the introductory question, the purpose of which was to initiate and stimulate the participants to think about the association between them and the issues. An example of this question is “When you hear the words ‘hill tribespersons patients’, what are the first things that come to your mind?” Thirdly, transition questions; the purpose of these is to transfer the discussion from introductory to key questions by asking deeper ones, for instance “What are the strategies of working with hill tribespersons patients at the moment?” Fourthly, key questions; the purpose of these is to achieve in-depth information of the main issues, an example of which is. “Tell me about the problems of working with the hill tribespersons patients that you have been facing?” In this study I spent forty minutes, which was half of the focus group discussion time, to cover all the above four categories of questions. Lastly, the final questions; the purpose of these are to conclude the discussion and end the session. An example of one of these questions is “I would like to support others to become successful in health promotion. What advice do you have for me?”

In this study, the focus group lasted approximately one and a half hours, to avoid taking too much of the valuable time the busy health professionals were sacrificing to join the focus group. Tang et al (1995) acknowledged that if the focus group process lasted longer than two hours, both facilitator and participants might become bored and exhausted (Tang et al., 1995). The location for the focus group was in a medium-sized meeting room in the hospital, which was convenient for the participants.

3.5.4 Observation

As described in topic 3.3 this topic will expand the details in this study. Observation is a technique of collecting data in qualitative research (Walshe et al., 2012). It is broadly used in various research fields, especially in the anthropological approach, which is used as an important traditional method in ethnography (Hammersley & Atkinsons, 2007). Murphy and Dingwall (1998) explained that the observation in qualitative research is “the closest to a gold standard”. This is because it allows the researcher to compare the findings between a participants’ statement and their actual behaviours. Therefore, participant observation was used in this study to see directly what the hill tribespersons with T2DM actually do and how they live with their conditions in their social, cultural and environmental context. Moreover, this means that the researcher could explore and understand participants’ beliefs and experiences including their historically and cultural context in their “natural” setting. The participants and their behaviours as well as the ways in which they interact with each other were observed.

In this study, I used participative observation as a method of data collection by staying in the village for approximately one month. The participants and villagers perceived that I was a student who studied diabetes mellitus, so I stayed at the accommodation in the health promotion hospital, which is located in the community because of the transportation barrier. Permission was granted to take photo of villagers in their daily life and they allowed me to participate in their day-to-day activities such as cooking and working on the farm. I also visited participants’ houses and met their family members many times to observe their routine, including how they manage their life with diabetes mellitus. This included what they ate, how they cooked, portion sizes of main meals and their snacks. Moreover, I observed their health behaviours in terms of exercise, taking medicines as prescribed and other treatment they used to control their conditions. I had opportunities to build closer relationships than before with hill tribespersons and participate in their festivals and ceremonies, such as “Kin-Khaow-Mai” and the New Year party. I observed the food and how participants dealt with these special events. Furthermore, I observed the overview of the village and the people’s lifestyle. Participative observation helped me to increase the understanding of the social interaction, culture and environment that might influence participants’ behaviours and perceptions. Gradually, I accessed the ‘’emic’’ view. Field notes are the notations ethnographers generally make to document observation (Streaubert & Carpenter, 2011) and these supplemented the data that I could not capture by audio recorder. Field notes were written during and/or after in-

depth interviews and observations.
(For the observation guideline, see Appendix B)

3.6 Ethical issue

Research in a social care context has direct connection with a person's social status and culture. Although a social study generally does not apply any direct bodily contact to the subjects, for example, medical sciences research, it is still possible that some impact to the subject's life may occur. The researcher has duty of care to his/her subject, therefore ethical issues have to be scrutinised to ensure that the participants receive protection from potential risks and harm that may occur from the study (Roberts & Priest, 2010; Ryan et al., 2007).

There are currently no formal research ethics governance in Thailand at a national /regional level, equivalent of the Health Research Authority in the United Kingdom. Research ethics are approved locally by individual institutions, hospitals, or universities. For this study, I ensured that all forms and procedures were approved by the Committee for the Protection of Human Subjects of the participants' hospital, and by The School Research and Ethics Panel (SREP) of the School of Human and Health Sciences, The University of Huddersfield. I presented the ethical issues relevant to the project to the director of the hospital, initially on April 2015, for which written approval and permission was received. In July 2016, I requested some changes and additions to the project methodology to comply with the recommendations of my supervisors and examiners following the presentation of my second-year initial research results (second patient participation interview). The changes were made in order to explore the problems and barriers of health professionals who worked with the hill tribespersons in the location. The hospital director was presented with the full details of the changes and the implications on ethical issues by Skype on 30 August 2016. After the hospital ethical team had considered the researcher's request, they granted permission to continue the research with the proposed changes. Verbal approval was sent by Skype on 7 September 2016, followed by a letter of permission signed by the director of the hospital. By 20 September 2016 the ethics procedure to approve this study was completed (see appendicle B for copies of ethical approval).

The key principles for ethics consideration in this study were conducted by the School Research and Ethics Panel (SREP) of the School of Human and Health Sciences, the University of Huddersfield. The practical information of the ethical concerns is presented as following.

3.6.1 Consent

Informed consent was sought from the participants, who signed the consent form if they agreed to take part. Those who could not write their names would suffix their fingerprints instead. I personally explained the nature and aims of the research, together with reading out the consent forms and information sheets which were a Thai translation, and had been checked by the researcher. Questions and discussion were encouraged and a week was also allowed for the participant to return with the agreement, or further questions.

3.6.2 Confidentiality

The information collected from the participants in this research will be kept in secured conditions for a period of 10 years at the University of Huddersfield and no person other than myself and the supervisory team will have access to the data. A private room for in-depth interviews and the focus group was available at the hospital. If any participants preferred to be interviewed in their own home, I was readily available to comply, indeed this provided the opportunity to observe people living with the condition.

3.6.3 Anonymity

The identity of the participants in this research was protected by the anonymity of using pseudonyms instead of real names.

3.6.4 Safety and security of data

The handling of the data was conducted with care to ensure the strictest security. All notes taken and audio recording devices were placed in a lockable briefcase when transported to and from locations. All data collected were transcribed electronically. Data were stored on a password secured encrypted computer and storage devices and could be accessed only by the researcher and supervisory team.

3.6.5 Right to withdraw

Due to the nature of the research, the participants were extensively briefed before the study to ensure that they understood that they were able to withdraw from the study at any time without having to give any reason.

(For the information given to SREP see Appendix C, D, E, F and G)

3.7 Analysis

Qualitative data analysis is an important step in the research process, the main purpose is to create conclusions from the data (Schreier, 2012). The qualitative data from the ethnographical approach in this study has been analysed by content analysis and thematic analysis. Both methods are widely used in qualitative research and represent a systematic explanation of the research phenomena (Graneheim and Lundman, 2004; Marshall and Rossman, 1999; Schreier, 2012). In this study, after the data were transcribed from in-depth interviews and focus groups, the files of transcription were imported to Nvivo10 qualitative software, which was used to help the researcher to analyse, manage and shape the qualitative data systematically. Generally, this programme is used to refer to any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings (QSR International, 2014). The 20 transcriptions (document files) from 19 interviewees and a group discussion were imported into the 'sources' of data and were then coded to gather material based on topics (nodes). Following initial coding, the transcripts were re-read for specific focus and meaning which was incorporated into the transcribed text. This was in order to find the possible data related to final themes and sub-themes (Neuman, 2006). It helped the researcher to analyse, manage and shape the qualitative data with systematic management.

3.8 Content Analysis

In order to explore the beliefs and experiences among hill tribespersons withT2DM, content analysis was chosen because of its systematic coding and categorising approach, which are the principles of analysis in qualitative study (Creswell, 2013; Grbich, 2013). Content analysis is a technique for examining the textual information and other forms of data, such as graphics or pictures (Powers & Knapp, 2006; Stemler, 2001). This technique is used to explore the existence of words from the content and to attempt to understand their meanings and connection to each other by analysing word patterns and their relationship (Gbrich, 2007; Matthew & Ross, 2010). In addition to word count and word association, the coding and categorising of data are also of substantial importance to the analysis (Matthew & Ross, 2010). The variables of interest in my interview data were guided by the Health Belief Model (HBM), which is the theoretical framework utilised in the analysis.

The constructs of the Health Belief Model (HBM) guided the researcher to analyse and explain the patterns and consequent behaviours at the beginning stage of analysis (Cohen et al., 2011). The coding was developed from several readings of the data from the interview transcripts (inductive codes) and applying the theoretical framework (HBM) and literature review themes (deductive codes). Categorising was the process of grouping these codes into general category findings, to empower me to obtain a more conceptual understanding of the data and then I formed conceptual frameworks to explain events (Hennink et al., 2011). This allowed new categories to be inserted, expanded and adjusted from the framework (Cohen et al., 2011). These processes proceeded until no more data could be categorised and each category could be explained clearly (Hennink et al., 2011). The steps of content analysis in this study were to identify: 1. meaning unit, 2. condensed-meaning unit, 3. codes, and 4. sub-categories (Adolffson et al., 2008; Kneck et al., 2012). For example, see table 3.2.

Step 1 meaning unit	Step 2 condensed meaning unit	Step 3 codes	Step 4 Sub-categories
‘I eat as same as my family member, but I try to eat lam yai, mangoes, desserts less than ever.’	Trying to eat less lam yai, mangoes, and desserts.	Eat everything not too much	Dealing with the food
‘I put it in 3in1 coffee, three times a day; in a cup of coffee I used two bags with hot boil. Moreover, I add sweetened condensed milk (Mali brand). But now I cannot eat too much like that because of DM.’	Cannot drink too many sweet beverages because of DM.	Eat everything but not too much	Dealing with the food
‘I know if I eat Khao- nom (desserts and snacks) too much my body will be sick. I have to drink a lot of water because I think it can be dilute sugar in my body and it makes me urinate, so this is the method I always use to deal with the disease.’	Drinking a lot of water can dilute sugar in the body	Drink water after sweet foods	Dealing with the food
‘Drinking 1-2 bottles of water after eating the desserts. I have heard the benefits of drinking water from the television, so I use this method for control my blood sugar level.’	Drinking 1-2 bottles of water after eating desserts and using this method for control blood sugar level	Drink water after desserts	Dealing with the food

Table 3.2 the example of the process of analysis in each step

3.9 Thematic Analysis

Thematic analysis is a concept of the qualitative analysis method which identifies, analyses and interprets themes or patterns of meaning from the data, through examining rich detail (Clarke & Braun, 2017; Guest et al., 2012; Smith & Sparkes, 2009). This method is widely used in the health study area, particularly in descriptive research, which has the purpose of interpreting key issues of a specific group or individual (Esmaeili et al., 2014). Asfaw & Jones (2016) considered that the flexibility, inductive approach, and data-driven nature of thematic analysis makes it a suitable tool to identify themes from the analysis of people's experience. Quiroga and Hamilton-Giachritsis (2017) believed that thematic analysis is particularly useful when the participants' own views are wanted. For the aforementioned reasons, the researcher has chosen thematic analysis for the health professionals' interview and focus group. A six-phase thematic analysis created by Clarke and Braun (2016) was then followed. The phases are data familiarisation, data coding, searching for theme, reviewing theme, defining and naming themes, and writing up. From these guidelines, the data transcriptions were read several times and the primary concepts or ideas made the researcher familiar with the data. After that, the researcher coded the interesting items from the data and inserted them into the themes which were possible. The themes and subthemes were specified, compared to the data, and a thematic map was established. The last step was continuing the analysis until the researcher identified every theme and could explain the complete story.

For the information given to analysis, see Appendix H

3.10 Trustworthiness and Credibility

The trustworthiness of a study represents the value of the research. The guidelines for creating trustworthiness consists of the following four criteria: (Guba and Linconh, 1985; Shenton, 2004, Polit and Beck, 2006):

1. **Credibility**

   Credibility refers to the confidence of the results from the research and research methodology. The researcher can use many methods for credibility, such as triangulation and member checking by offering feedback from the interview to the participants in order to check what has been recorded (Farrelly, 2013).

2. **Dependability**

   Lincoln and Guba (1985, p. 299) explain dependability as

   'Seeking the means for taking into account both factors of instability and factors of phenomenal or design induced changes'

Hence, dependability refers to showing that the findings are consistent and could be repeated even though time and conditions change. One of the popular techniques is inquiry audit, whereby external qualitative research experts examine the research documents (Polit and Beck, 2006).

3. **Confirmability**

   Confirmability refers to the level of the results that can be examined and accepted by others. In this criterion of trustworthiness, the researcher has to answer the question 'Does the data collected support the result?' because the researcher's subjectivity during the study can occur as the nature of qualitative research allows the researcher to bring his/her own unique perspective to the study (Farrelly, 2013; Shenton, 2004).

To enhance confirmability, I gathered as proof all the documents such as raw data, data reduction and analysis product, process notes and data reconstruction products for proof (Polit and Beck, 2006; Shenton, 2004).

4. **Transferability**

   Transferability refers to the result which can be transferred to similar contexts or groups. To enhance transferability, the researchers should describe the scope, criteria of participants and research method as much as they can (thick description) in order to judge how feasible, the transfer is (Shenton, 2004).

In this study, I have followed the techniques recommended in each criterion above. All anonymised raw data and research documents have been carefully catalogued and preserved for external inspection as much as possible.

Benchmarks or reference	What this research did to meet the standards
1. Credibility	- Reflexivity - The researcher originates from Chiang Rai and Thai is the native language.
2. Dependability	- Interview framework was screened and evaluated for accuracy and understanding by the supervisory team.
3. Confirmability	- Documents such as raw data, data reduction and analysis product were examined by the research supervisory team, and the examiners, according to the protocol of the University.
4. Transferability	- The research described the scope, criteria of participants and research method in a way that can support the assumption that they are representative of the target group of the study.

Table 3.3 shows the research trustworthiness by checking steps taken to comply with guidelines.

The data collection was made in 2 rounds with the same participants, the second round with greater depth than the first, therefore the data from the participants which matched in both rounds was trustworthy.

3.11 Reflexivity

The trustworthiness of the study represents the value of the research as discussed. Additionally, this study accepted reflexivity as the researcher's process which can be made transparent and used as part of the credibility (Berger, 2015; Bulpitt and Martin, 2010; Finlay and Gough, 2003; Shenton, 2004). It is one of the strategies to ensure trustworthiness (Hadi and Closs, 2016). Reflexivity is defined as 'showing awareness of the importance of the research on the researcher and vice versa; recognising how values, assumptions and presence of the researcher may impact on data' (Spencer et al., 2003). It is concerned with the researcher's reflexivity in terms of values, assumptions, training, interests, and how the researcher constructs the knowledge in each step of the research procedure (Bradbury and Jones, 2007).

Furthermore, the reflexive process can be used to explain and to justify the reasons for the research methodology, and the results of data analysis (McGhee et al., 2007). The actions which were used to increase the trustworthiness of this study are;

1. Research supervision with the supervisory team and the examiners according to the protocol of the University.
2. Self-reflexivity, which represents the values, assumptions, training and interests of the researcher and may impact on the research (Jootun et al., 2009).

My self-reflexivity is presented below;

3.11.1 From university lecturer to field-researcher

When I started this research project, I was changing the emphasis of my role from that of a university lecturer, to one of a field researcher. The process of preparation for my new role took me at least five years, during which I gathered several essential work-experiences from my academic duties of reading, teaching, organising, researching small-scale projects and writing up papers for example. However, in carrying out this research project, I have learned different aspects that are quite different from my previous work. In order to make it clearer, I would like to explain the thinking and learning behind my research theme of how local or tribal cultural ways of life may influence the risk to people's health. I shall use the epidemiological study and health education, which is my background as my example.

"Epidemiology" studies the distribution of diseases through the analysis of to whom, where, and when a disease occurs. It also studies the determinants, or health risk factors, which favour or deter a disease (Beaglehol et al., 2006). Epidemiology analyses data collected from a sample group, which by statistical techniques is deemed to be representative of the population under study (Stroup et al., 2004). Prevalence rate and Incidence rate are the two most commonly used descriptions of how widely spread a disease is over a certain point or period of time. The frequency of a disease occurrence or the number of ill or deceased persons is derived from statistical calculations of different kinds of averages or means (Stroup, 2004). The characteristics of the affected or unaffected people, such as their age group, sex, education, religion, and income, can also be identified and calculated to show their trend or relationship to a disease occurrence. Cause and effect relationship may be shown by a statistical probability. In short, this type of study belongs to a mathematical model of research. It is scientific, countable, and can be made clearly visible to aid understanding by displaying numbers and graphic presentations. MacLachlan (2006) stated that quantitative research may simplify the causes of health problems to only measurable ones and prediction is done by statistical methodology at the cost of neglecting data which are not readily quantifiable statistically, but may be of equal or more influence to a population's health.

Examples of such data are: people's perceptions and experiences of an illness, suffering, social inequality, or violence in their daily life. These are not included in the statistical equations of an epidemiological study. In addition, it has been said that quantitative epidemiology stigmatises, or even increases the suffering of patients in the community by repeating the recognition that they are a risk group, a source of disease, and need to be managed or controlled (Peterson & Luton, 1996). Moreover, social and cultural factors or conditions are often considered last as factors related to causes of illness or health risk, due to the viewpoint that they are "social facts" rather than "scientific facts" as they cannot be measured into quantitative data.

The absence of cultural factors in health risk assessments leads to a lack of understanding in the different patterns of health behaviour in different cultures. It explains why many public health education programmes and campaigns continue to fail (Trostle, 2005). Therefore, in order to understand and explain health behaviours of people in each society thoroughly, one cannot ignore health-related culture as a risk factor. Culture influences belief, perception, interpretation, and social actions of people in each community. It must be taken into account when assessing health risk factors and planning measures to control and prevent ill health (MacLachlan, 2006). Understanding cultural ways will help public health policy formulation to be more effective by being relevant and harmonious with people's way of life. It will also encourage community participation to help with controlling and preventing health risk factors, reducing social discrimination, stigmatisation, and stereotyping of the ''at risk'' group of people in some social classes such as ethnic groups (Dutta, 2007; Sanchez-Birkhead et al., 2011; Shah, 2007).

Cultural ways and Epidemiology

Participant observation of village life shows that each local community has its own culture in managing a health problem before seeking a physician's advice. Local tradition regularly offers advice on cure, control, and prevention of all kinds of symptoms and illnesses; a medical pluralism. In addition, the range of local wisdom extends to cover syndromes, differential diagnosis, who is or is not at risk of contracting which illness and who is the best local person to go to for help and advice (Foster & Anderson 1978; Kleinman 1980; Helman 2000). Medical science may know about the aetiology of a disease but people have their own perception of how it affects them and how serious it is, based on the cultural beliefs of their community. One example of the influence of local culture is the lack of attention being given to the higher death rates of female infants compared to male infants in South Asia where boys are more valued than girls (Sen 1992).

Epidemiology is the study of disease prevalence, incidence, and its risk factors, through the analysis of the relationships between humans, places, and times of the disease occurrences. However, the cultural way of life is not part of the data, in spite of it being an ever-present influence over most of the variables and relationships in epidemiological studies. The explanation underneath shows that culture is woven into all human decisions and behaviour, regardless of time and place where health and disease are concerned.

1. Human

There are varieties of different values that "human" members of any society are subject to in accordance with their occupation, gender, age group, social taboos or restrictions designed to control people's behaviour to fall in line with acceptable norms of that society (Weiss, 2001). In addition, society also has its own standard of identifying those who are considered to be at risk, fragile, or prone to misbehave. They are singled out for special protection or extra interest within that society (Hersch-Martínez, 2013).

Occupation

In each culture, occupations are often divided between males and females. For example, traditionally male, hill tribespersons are responsible for work outside, and females inside the home. Some types of occupations are inherited through family or social groups. Some occupations are related to risk factors predisposing workers to some diseases, for instance, pneumoconiosis among coal miners and byssinosis among textile factory workers (Blackley et al., 2014; Er et al., 2016).

Religion

Religion plays a role in both preventing and bringing health risk to people. For example, in some hill tribes who believe in spirits, alcohol consumption is controlled by a tradition, which permits heavy drinking only during community festivals such as the festival of "Kin-Khaow-Mai" or the new season of rice celebration. Other religious festivals or observations related to Buddhism and Bramanism in Thailand, for example, practicing veganism, or walking on the fire pit, may cause health risks. Strict veganism can even cause nutritional deficiency.

Food Consumptions

Local tradition and culture have great influence on all aspects of food in every society. Food culture is extremely varied all over the world from the meaning and classification. For example, the meanings of "food" and "non-food", good food and taboo food, food that is good and bad for your health, food for specific groups of people and diseases; for children's growth, for pregnant women, for male and female, for the elderly, for illness prevention and recovery, and ritual food. Food preparation, selection, preservation, time and ways of serving and eating food are different in each area. Female hill tribespersons in this study believe that drinking locally brewed spirits causes no harm to their health because the ancient herbs added to the alcohol production process have protective properties.

Classification of People by Group and Age Group

Cultural beliefs differentiate people into age groups with different restrictions or permissions relating to food consumption. To violate the restriction may not only bring adverse effects on the person but to the community as a whole. Progression from one age group to the next may be marked by certain behaviours or allowances, such as smoking or visiting a prostitute, the latter once being accepted in hill tribespersons' society when a boy had grown into manhood, this is presently deemed less acceptable in the hill tribespersons' society (Kantree, 2017).

Gender and Sexuality

Male and female gender have different social rights and expectations in different societies. For example, in tribal cultures, drinking alcohol and smoking among males is accepted as normal behaviour, while in females it is judged as being against tribal custom or anti-social. Hill tribespersons female roles are in the home and they have restrictions on their movement outside this environment.

Concept of the Body

The perceptions of an ideal body change with time and social group. For example, in the past, hill tribespersons believed that body shape was related to wealth, so persons who were overweight were considered to be rich because they could afford to eat more food. At present, their perceptions have changed, due to the fact that some people in the village who are poor are still overweight.

2. Place or Area

"Place" is concerned not only with geographical characteristics or physical environment, but has some social functions and meanings, due to the adjustment between people and the cultural ecosystem of the community. Understanding physical characteristics of the area that have overlapping meanings with social areas (for everyone in the village and used for ceremonies), special areas (for either males or females to have activities) or specific social areas (for the elderly or religious leaders who perform important spiritual tasks of the community). These helped me to understand health risk behaviours and risk models specifically related to some places or areas within the community.

Special Areas or Holy Areas

In the tribe's village, there are holy places or areas which have special meaning for villagers. For example, the village shrine, which is recognised as the house of the ancestors' spirit that protects the village. Every year, villagers will have a ceremony to pay respect to the village ancestors' spirit. The social meanings of some special areas are found in local ceremonies where specific areas are arranged for males and females to eat separately and appropriate social behaviours of the different genders are expected. Moreover, women are responsible for preparing the food, serving and washing the dishes. To recognise such social customs helped me to understand the hidden power of gender values in this hill tribespersons' society where men are dominant.

Areas for Males, Females, Adolescents, and Elderly

Some places or physical areas in the community have social meanings as being exclusive to certain groups of people. For example, motorcycle repair shops in the village are where village adolescents gather to have their motorbikes decorated for racing. These repair shops serve as a social area for adolescents where there are higher risks of accidents than other areas.

3. Time

"Time" has a cultural meaning, which is not necessarily the same as the clock time. In traditional village life, certain periods of time are set for certain social activities which occur throughout the year and the cycle then repeats itself. Time seems to be more circular than linear as we usually view it. Time is set for activities such as working on the land, festivities, weddings, important religious days, feast days, fasting days, and days of rest and recreation. These have an influence on people's behaviour on certain days, weeks or months, for example. A study of epidemiology, which does not take into account cultural factors relating to time, may miss a true understanding of people's behaviour and health risk factors. Understanding the rhythm of life, cycle of work, and community's ways was helpful for me to understand their way of living in relation to health.

Community Calendar

In each community, there are different lifestyles. This hill tribespersons community is a coffee agricultural community. The village life activities revolve around agriculture and the cycle starts with the rainy season and ends at the harvesting. After the agricultural period, villagers continue to be occupied by various other activities. Learning the general lifestyles of villagers in each year, each month or each day, in regard to what activities they do helped me to understand their life rhythm and work cycle which may have an impact on their health risks. Understanding the community calendar helped me to be aware of the work and cultural activity cycles, including planning to collect the data. Moreover, it helped health professionals to investigate the health risk behaviour that may occur with some occupational activities at certain times of the year.

Special Time, Traditional Ceremony of Community

Each community has a special time of cultural importance for traditional ceremonies which have been followed from past to present. These activities are socially meaningful for they maintain the relationship structure of people within the community, as well as the social networks with other communities. Understanding the special periods of community ceremony was useful to me for analysing the relationship between the epidemiology of health risk and time dimension; for example, in diabetes mellitus, patients are at increased risk of failure to control their blood sugar during "Kin-Khaow-Mai" festivals because of lapses in their dietary control. During such special times, health professionals should pay closer attention to what their patients eat and how they behave.

In conclusion, becoming a qualitative researcher in a unique area made me keen to understand hill tribespersons with T2DM in their real context. Staying in the community for one month gave me a greater understanding of the different aspects of participants' behaviour. As the researcher-participant relationship was closer, this enable me to increase the trustworthiness of this study due to my participants observation and reflexivity.

Chapter 4 – Findings

4.1 Introduction

Due to using an ethnographical approach, this chapter reveals the findings in terms of context of the community and the participants' data. It divided into three parts. Part one presents the context of this community area such as the community history, social and cultural beliefs and people's lifestyle. Part two describes the health services for people with diabetes mellitus in community hospital and health promotion hospital. Part three reveals demographic data of the participants including the summary of their background, casual beliefs and their experiences regarding diabetes mellitus.

4.2 The context of the community

'Elephant mountain village' is so called because the shape of the mountain which is close to this village resembles an elephant's head. The village rises to a height of 1,800 metres above sea level and is 50 kilometres from Chiang Rai Province. It a jungle/rural farming area and the weather is chilly throughout the year with an average temperature of 18 degrees Celsius (Highland Research and Development Institute, 2016). There are two main ethnic groups who reside in this village, the Lisu and Akha and a minority group, Ho. The total population is 5,360 consisting of 2,664 men and 2,696 women (Highland Research and Development Institute, 2016).

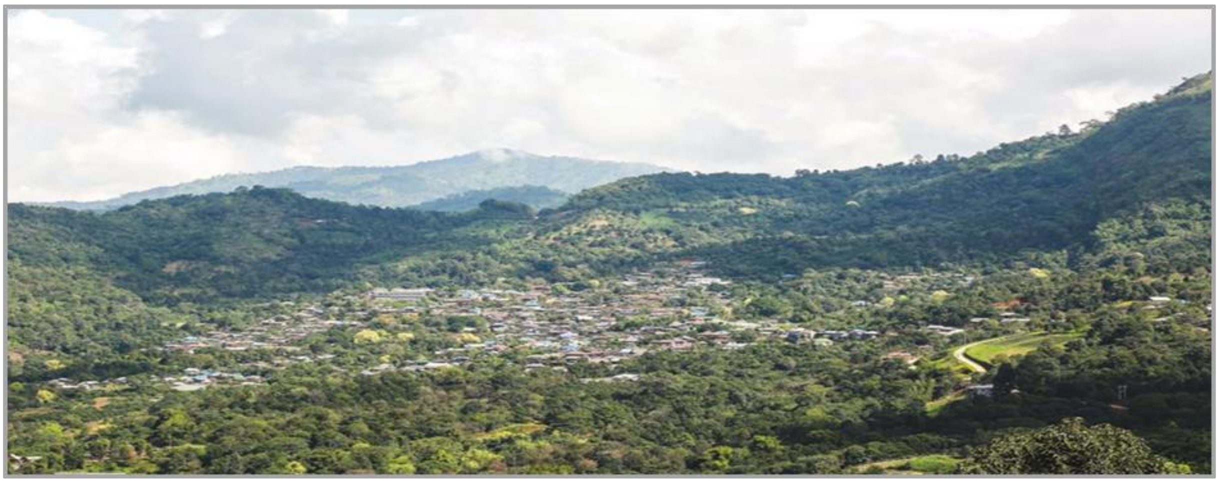

Figure 3 shows the overview landscape of the village.

Figure 4 shows a route from Chiang Rai to the village.

The village was established more than 100 years ago and was the original residence of the Hmong and Lahu hill tribes who moved out later because they found land for a new workplace. In 1915, the Lisu migrated to this village due to a battle between tribes, a minimum seven families were required to join together in order to minimise the risk of intermarriage (Srisawat, 2000).

In 1983, the Akha and Ho groups moved to this village because of the political problems in Myanmar. There are still two zones in this village which separate the houses of the Akha and Lisu groups. The Akha constructed their houses around 1-3 kilometres away from the Lisu. The characteristics of the houses in each zone are a combination of styles and located as a group of relatives together. On the other hand, the Ho set up their houses inside the boundary of the Lisu zone, due to the similarity of cultures and traditions, such as New Year celebration and the worship of the village guardian ghost.

Figure 5 shows Akha's zone area.

In the past, the slash and burn cultivation was practiced by the hill tribespersons in this village as was the case in other highland areas. They planted some dry crops, in particular opium poppies. The consequences of this nomadic farming were the elimination of forest and the illegal growing of opium. Fortunately, His Majesty King Bhumibol Adulyadej (King Rama IX), was aware of these problems and desired to help the hill tribespersons out of poverty and also to stop the opium trade in Thailand. Consequently, this area was changed by the Alternative Winter Economic Crops Project, which is under the Royal Initiative of His Majesty the King with the help of the United Nations (Subchoketanakul et al., 2016).

Figure 6 shows His Majesty King Bhumibol Adulyadej (King Rama IX) at work. (Erabica.com,2018)

As a result of these projects, the hill tribespersons have been helped to transform their agricultural practices by planting winter crops such as coffee and tea instead of opium poppies. Arabica coffee came to be the most important industrial crop and at present, the total area of the coffee farms in this area is approximately 30,000 Rai (48,000,000 square metres). The coffee farming helped to restore the forest and has become the major occupation to generate income for the hill tribespersons. Moreover, coffee from this area has become known as the top premium coffee in the world (Department of International Trade Promotion, 2014; Subchoketanakul et al., 2015).

Figure 7 shows a coffee farm in this village.

Occupation and business

The main occupation of hill tribespersons in this village is agriculture, which consists of coffee farming, planting of winter crops and pig and chicken farming. A part of the population makes a commercial business comprising of many industrial types. There is one coffee factory, one macadamia nut processing group, thirteen coffee farmer business community groups, four accommodation business groups and twenty-three retail shops (Annual Report of the health promotion hospital, 2015).

Figure 8 shows the coffee factory in this village.

Language and education

Hill tribespersons in this community still use their own language for communication. Both the Lisu and Akha have no traditional written language. Most of the men are multi-lingual, which include Thai because of the need to trade with outsiders. Most middle-aged and elderly women however, understand only their own language because they do not have the opportunity to communicate with outsiders due to the attitude that women must do only household and field tasks. In the past, hill tribespersons did not attend school due to poverty and difficulty in accessing schools and at the same time it was not easy for government officials to visit them. In addition, they did not possess Thai citizenship. Nowadays, the government has solved this problem by providing these people with Thai citizenship. As a consequence, children now have to attend school in their village, free of charge according to the constitutional rights of Thailand. There are four educational institutions in this village; one school under the Office of the Basic Education Commission, one school under the Border Patrol Police, one Child Development Centre and nne Non-Formal Education Centre (The office of Primary Educational Service Area, 2015).

Recreation

Hill tribespersons do not have holidays because they are farmers, so they stop work for the ceremony days such as New Year ceremony, worship of the spirits and Kin-Khaow-Mai festival. Nowadays, electricity is provided to the village and this means every household has a television and radio. They receive entertainment and information by watching television and also listening to the radio, where a channel in their own language is available.

Religion and Tradition

There is a house of priest for Buddhists and a church for Christians in the village.

Figure 9 shows an activity in the church among the Akha.

The Lisu

Most Lisu worship the spirits ('Neh' in local language), along with Christianity or Buddhism. The most important of these is the ancestoral spirit which is believed to be good because it protects the family from calamity and harm. Besides this, the spirits which they respect or are scared of, are the spirit ghosts in nature such as the hill, soil, water and farm ghosts. To give peace of mind when the people get sick or are injured, the soul retrieval ceremony is arranged for the patient by the shaman, whereas the fortune-telling will be read from chicken bones to predict their fate. Regarding the selection of a spouse, young Lisu meet with each other on New Year's Day and they dress up with a full set of silver jewellery. They will dance all day and night until the dawn of the following day. People who come from the same family are not allowed to hold hands or dance together; this is considered the tribal tradition and has existed for a long time. On the first day, this dancing will take place at the village shaman's house (called "Nee-Pah" in Lisu language). On the second day, it will be set up at the village headman's house and on subsequent days, it depends on who agrees to be the host. For dancing, every family will bring liquour, desserts and flowers to share at the ritual yard. Whoever brings something to share must walk and dance around the ritual yard for three rounds, then the patriarch performs the praying ritual. After completing the ritual, everyone eats and dances together. In addition, there are many ceremonies throughout the year, for example Kin-Khaow-Mai or the "eating new rice" ceremony, which is very important to them in terms of showing respect to the ancestral spirits (Srisawat, 2000). Clearly this has an important effect on how this group with diabetes mellitus have difficulty in controlling their blood sugar level during these periods of festivities.

The Akha

The word 'Religious' does not exist in the Akha language, however, there is a phrase, "Akha Rules" which covers all customs, traditions and ceremonies in their life. They also believe in spirits, ghosts, superstition and fortune-telling. 'Naeh' or spirits play an important role in the Akha's way of life. Additionally, it is found that many Akha profess Christianity, but they still give precedence to worshiping the ancestral spirit. All households have an ancestral altar in order to worship this spirit nine times a year. They also worship the spirit master (Pee-Yai) who is the head of all ghosts and spirits and stays in heaven, being responsible for the happiness and sorrow of the Akha. The Akha still preserve their traditions, such as the swing ceremony, new rice eating ceremony, egg yolk eating ceremony and whirligig ceremony. Akha families stay together in the extended family style and young Akha people have freedom to select their spouses. After marriage, a wife will be a member of her husband's family and turn to respect or worship the spirits of the family. Both the Lisu and Akha in this village still preserve their original traditions and cultures such as the New Year's Ceremony, and Kin-Khaow-Mai ceremony, while the Christians organise Christmas activities simultaneously with their original ceremonies of hill tribespersons (Srisawat, 2000).

Illness beliefs

The Lisu believe that illness is caused by spirits or ghosts, so a shaman is an important person who can judge the symptoms and heal patients of their diseases. There are many methods of treatment, such as a sacrifice to the spirits and treating with black magic. Herbal medicines are applied in some cases. Presently, most cases of sickness and illness are treated within the health care services by physicians in modern medicine via the basic rights of Thai citizenship.

The Akha believe that illness is caused by spirits or ghosts taking people's soul (Kwan in Akha language), because it is believed that everyone has twelve Kwan, if the ghost takes a Kwan of any person, they will be sick. If all twelve Kwan are moved from the body, that person will die immediately. The shaman will cure the patients by checking the kind of ghost and what the ghost wants, then a worship ceremony will be arranged to respond to the needs of the ghost, which is the cause of the illness. After the government improved the quality of life among hill tribesperson by providing Thai nationality, the hill tribesperson has the right to education and health care services. Most of them are treated by modern medicine, which is organised by the ministry of public health of Thailand (Annual Report of the health promotion hospital, 2015).

Hill tribespersons' lifestyle

With their cultural background and small communities, the hill tribesperson's have held to their traditional way of living, however, highland development by the government has given later generations the opportunities to adopt a new lifestyle. Improvements in infrastructure have opened the way for younger hill tribespersons to have contact with the town to study, trade and seek employment as described in chapter one. The traditional occupation of the hill tribesperson is farming; typically, with pigs and chickens for livestock and the planting of rice, coffee, cabbage and corn as their main source of income.

Most of hill tribespersons are farmers and, therefore their lifestyle depends both on the weather and the timing of their agriculture, as shown in the community calendar below. This highlights not only the timing of the agriculture, but also their cultural activities, the festivals which are integral to their beliefs and celebrated throughout the year.

Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Activities												
Plant coffee										→	→	→
Plant bean		→	→									
Plant corn		→	→	→								
Plant Cabbage , tomato									→	→		
Plant rice	→	→					→	→				
Harvest time				→	→					→	→	→

Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Activities												
Collect coffee bean	▨	▨										
Find forest products		▨	▨	▨	▨							
Trade	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Cultural Activities												
New Year Ceremony	▨	▨										
Worship Ancient Ghosts				▨								
Kin-Khaow-Mai Festivals											▨	▨

Table 4.1 shows the community calendar.

Health Care Facilities

A health promotion hospital is located in this village and plays an important role as a primary health care unit. Hill tribespersons receive health care services from this hospital and community hospital which is the secondary health care service in town. For this health service, hill tribespersons who have an income of less than 2,000 baht per month do not have to pay, while the general public have to pay 30 baht per time as a basic right with the universal coverage scheme of health insurance (Annual Report of the health promotion hospital, 2015).

Figure 3 shows the health promotion hospital in the village.

4.3 Health Services for people with diabetes mellitus in community hospital and health promotion hospital.

The hill tribesperson patients who lived in the area, in which the target health promotion hospital was located, received health care services provided by the diabetes clinics from both the community and health promotion hospitals. This pattern of service provision was introduced in 2008, to reduce the density of service for diabetes patients in governmental hospitals. This was due to the diabetes patient group being among the largest patient groups, second only to patients with hypertension.

In the past, patients only received health care services from the community hospital but now they can receive it in the diabetes clinic of the health promotion hospital. The only criterion for patients is that they have no complications and are able to control their blood sugar level. The health promotion hospital also has a system of online consultation. This computerised system allows cooperation between health care professionals of the community hospital and the health promotion hospital in terms of dispensing standard medication from the same source and providing follow-up services using one and the same patient registration database. Sharing patients care between hospitals is particularly important. The system can also save travelling costs for persons with diabetes receiving health care services. This is necessary because patients who are unable to control their blood sugar levels are required to receive primary care from the community hospital as well as follow-up care from the health promoting hospital too.

1) Method of health care service provision for diabetes patients in the diabetes clinic.

This section provides an overview of health care provision for persons with diabetes in the diabetes clinics of both the community and health promotion hospitals. The clinics in both kinds of hospitals focus on controlling blood sugar levels and on continuous follow-up treatment. The health professionals record data for each patient, including date of service provision, weight, blood pressure, blood sugar level, other examination results, treatments, counselling, next appointment date, and signature of the recording health professional. The health professional will inform the patient of their blood sugar level and advise them whether it is normal or not. Each time the patient attends the clinic, the health professional asks each one individually about behaviours which might affect their blood sugar levels. In addition, knowledge on diabetes and advice on individual practice will be given to those who have complications and the importance of attending further appointments emphasised. In terms of health education for groups, it would ideally be provided to the patients while they are waiting for the services. In practice however, hill tribespersons belong to various groups each having its own language which creates a language barrier and more time is needed to provide health education to each group separately because of time constraints on the services.

a) Health care services for diabetes patients.

i) Health Assessment with the following services.

ii) Physical Assessment

The persons with diabetes who receive health care services at the diabetes clinic have an initial assessment by means of a physical examination, weighing, and blood pressure measurement at the first point of the services. If any irregularities are shown by this examination, the patient must be re-examined by a physician and proper treatment provided.

b) Assessment of the progression of diabetes mellitus.

All persons with diabetes have their blood sugar level tested every time they come to the clinic. Patients must have no food or water after midnight (Nothing Per Oral or NPO) until their blood samples are taken. Patients with a blood sugar level of 60-180 mg% receive prescribed diabetes medication from professional nurses at the diabetes clinic. Patients with blood sugar levels below 60 mg% and above 180 mg%, will be referred to a physician for further diagnosis.

2) Treatment for diabetes patients.

a) Treatment.

Diabetes patients who arrive for the first time will receive a medical examination and medicines from the pharmacist, which are prescribed by the physician. On their next appointment, if the results of the physical examination and the blood sugar level test are normal, they will be re-examined and treated with the same diabetes medications as previously prescribed. The professional nurses at the diabetes clinic manage this due to the shortage of medical doctors in public hospitals nationwide. If, however, abnormalities are shown, the physician will adjust their diabetes medications accordingly.

b) Health Education for the promotion of health.

i) Education on diabetes mellitus and proper health behaviour.

The health education for this group focuses on providing knowledge of health behaviours including eating habits, exercise, and taking medicines regularly as ordered by the doctor. This knowledge was provided individually by the nurses and the pharmacists who are working in the diabetes clinic. If the hill tribe patients cannot speak or understand the Thai language they need to be accompanied by a relative who can interpret for them. If they do not have a relative who can interpret for them, volunteers from relatives of other hill tribes people are asked for help. Nevertheless, due to the workload of the health professionals in terms of the number of patients, the health professionals are unable to provide knowledge that cover all aspects of health education. However, the health professionals make every effort to educate patients on their individual needs as much as possible in the limited time available.

ii) Suggestions and demonstrations by use of food models.

Health professionals use food models to demonstrate suggested types of food and portion sizes in the diabetes clinic. However, this does not work for this group due to the shortage of staff and some of the foods that appear in the model are foods that hill tribe patients do not eat. The health professionals search for samples of foods they would eat to demonstrate and recommend but again this is unrealistic because of the language barrier, limited number of health professionals and shortage of time and equipment for the demonstration.

3) Thai traditional medical service.

To provide health care services for diabetes patients, Thai traditional medicine has been integrated into the diabetic care provided by the clinic, for example, the use of herbal medicine in order to provide patients with comprehensive and varied treatment services. There are Thai traditional medical remedies and services for instant herbal steam baths, teaching and demonstration of massage to alleviate hand or foot numbness and making herbal medicine to drink. At present, there are no clear guidelines or procedures about Thai traditional treatments.

They are used only temporarily help depending on the patient's willingness. Most of the patients are unwilling to use this provision because they are keen to return home as soon as possible and do not want to keep a relative waiting for them. There are also constraints on time and the number of health professionals, including the lack of a concrete and systematic plan to introduce Thai traditional medicine for patients with diabetes mellitus.

4) *Coordination between the health promotion hospital and the community hospital.*

The diabetes clinic usually runs one day per week, however the work of the health professionals looking after the diabetes patients does not finish at the clinic. Because diabetes mellitus is a chronic disease, other important services are follow-up visits to the patient's home. The diabetes clinic of the community hospital coordinate with the diabetes clinic of the health promotion hospital in the area in which a diabetes patient lives and receives health care services. They visit the patient's house together twice a year.

5) *Other services.*

The budget from the government does not cover other services such as the provision of food in the diabetes clinic. The department of nutrition in the hospital provides the porridge for diabetes patients after their blood test. This service aims to alleviate patient’s hunger and fatigue due to the NPO (Nothing Per Oral or fasting beforehand) which is a requirement not to eat or drink anything before checking the blood test from the night before the appointment.

It is crucial to ensure that the test results are accurate. Most of the patients have a low-income and are elderly, some of them depend on relatives to pay for expenses, so this kind of service is free of charge. The budget for this comes from other hospital funds and donations through the donation box.

6) *Classification of the health status of diabetes patients by means of the perception of the health care services team.*

a) Diabetes patients with a good health status.

This refers to diabetes patients who have good blood sugar levels and are able to carry out their daily activities. Therefore, the health promotion activities focus on providing consultation on specific issues that the patient requires and encouragement for them to continue controlling their blood sugar levels.

b) Diabetes patients with a moderate health status.

This refers to diabetes patients with unstable blood sugar levels. They are still able to work but sometimes show signs of fatigue. Therefore, the health promotion activities provided for these patients focuses on reminding them to be careful in their food consumption, suggestions on how to relax, providing additional knowledge on diabetes and on appropriate practice and observation of their own symptoms.

c) Diabetes patients who have to improve health status.

This refers to diabetes patients who cannot control their blood sugar levels. Mostly, they come to the hospital unexpectedly because of complications from the disease. They rely on the health professionals and have close monitoring at the hospital where inpatient staff will coordinate with the diabetes clinic for treatment cooperation. After discharge from the hospital these patients will receive follow-up care either by telephone or through home visits.

4.4 The participant's demographic data

There were sixteen participants (hill tribespersons with type 2 diabetes mellitus) who took part in this study; eleven were female and five were male. There were twelve Lisu and four Akha. From their identity card, the minimum age was 30 years, the maximum was 68 years and the average age was 51.7 years. Most were Buddhist (twelve) and the remainder, Christian. There were only six participants who received a primary school education and the remainder did not attend school. The maximum length of having diabetes was nine years, the minimum was two years and the average was 6.8 years. Ten of the participants were farmers, two were cooks in their own noodle cafe, two were employees, one was unemployed, and one was a driver. The maximum family income was 120,000 baht, the minimum, 3,000 baht and the average, 95,312 baht (2,217 pounds sterling) per year; the currency rate at the time of this study was 42.99 bath per 1.00 pounds sterling. The maximum fasting blood sugar level, which is a standard test of the effectiveness of different medication or dietary changes on diabetes patients was 247 milligrams per decilitre (mg/dl.) of blood, the minimum was 100 mg/dl. This follows the criteria of the American Diabetes Association (see Chapter 2). All participants were recruited using the convenience sampling strategy. The characteristics of the participants are presented below;

1. **Somrit**, is a 64 year-old married man who lives in a big family, consisting of seven members. He is Lisu and his religion is Christian. He works as an agriculturist in his own area which is far from his house about 3 kilometres from his house. He helps his son-in- law plant coffee and corn which they sell to a factory and his family income is around 120,000 baht per year. He was diagnosed with T2DM five years ago through a routine diabetes screening and his diabetes is tablet-controlled. He described the feeling of his initial diagnosisas a normal thing that can happen to everyone. His words were that *"OK, I have diabetes and that's it,"* he also stated that *"everyone gets one disease when they were born"* so he felt it is the nomal

thing that can happen to everyone. He did not attend school but, he knows the Thai language because of his business, from which he has to contact with general Thai people.

He believes that overuse of chemicals is the main cause of diabetes as he used a lot of chemicals on his farm for 15 years. His latest fasting blood sugar recorded at the clinic was 150mg/dl. When asked how he felt having diabetes he replied ''*I feel OK*'' and he indicated himself that he has “dry diabetes”. He is puzzled because although he controls his food, his blood sugar level is still high level. His daughter is the main cook for family members and he is not interesting in knowing about how much the seasoning powder and some fat or sugar that she puts in his meal. He stated that ''*Food is food, what ever my daughter cook I don’t want to comments. She knows my conditions and she told me that she puts less seasoning powder just special for me*''.

He strongly believes that taking only medication as prescribed is the best way to control his disease, so he does not do exercise. He admits that he forgot to take medicine as prescribed when he went to the town last week and stated “*I’m still OK”*. However, he tries not to forget by putting his spare medicine in his bag. He used to take some supplementary food products and found that to be a waste of money. He had experiences with short term complication such as feeling tired, so he solved this problem by finding something to eat immediately. Somrit perceived that he might get the complications, so he tries to look after himself properly by taking medicine regularly.

When he went to participate the festival in the community, I noticed he could not control his foods, which mainly consisted of fat and sugar. He really enjoyed having foods while talking to people in that festival. Somrit also reported that he was not going to worry about his conditions due to the fact that he felt that diabetes did not affect his work. Somrit has a good sense of humour, as every time we meet he always smiles and also talks to other people who walked past his house. When speaking with him, he said he would listen to recommendations regarding T2DM, but he would not do so if he felt they were too difficult for him such as taking exercise. He has never missed an appointment at diabetes clinic and is happy to get the medicine and health services free. Somrit does not have any problems with the language at the hospital, as his Thai is very good. He has good support from his family, especially from his daughter who cooks and takes him to the doctor’s appointment. I realised by talking to him and reading through his transcript that having diabetes did not affect on his life. He also stated that *“I was not going to worry about ''Bao-Wan*”.

2. **Natee**, is a 44 year-old married man who lives with his wife and two children. The older child is studying at boarding school in Phayao province and the younger one lives at home. He is Lisu and his religion is Buddhist. He has his own land for planting coffee, corn, cabbage and ginger and has been working in the coffee factory in the village for eight years. His family income is around 120,000 baht per year. He was diagnosed with T2DM three years ago and before diagnosis he had symptoms of diabetes at the onset, such as feeling thirsty and going to the toilet often more than usual. His wife suggested that he should go to the health promotion hospital and now his diabetes is tablet-controlled.

   His feeling after his diagnosed was shock because he perceived that only obese people could have diabetes and no one in his family has this disease. He stated that *"at that time I questioned how I can get this disease because I'm not fat and don't eat too much some fat food, Can I live with this disease? I questioned whether I could still work like normal people".* He graduated from primary school and believes that over consumption of sugar is the main cause of diabetes because his work place provides soft drinks and three in one coffee, which contains plenty of sugar. He used to drink about three to six packs per day as the weather was very hot and he felt it make him have more energy to work. Nowadays, he controls his blood sugar level by reducing soft drinks and coffee in the work place. However, he still drinks energy drinks sometimes. He also expressed *"I know myself and my conditions so sometimes I can't drink like other normal people then I have tried to reduce these beverages even if I want to drink like before*". He informed me that his wife cooks for him, so sometimes it is not his fault he cannot control his diet.

   He had experience of hypoglycaemia, so he solved this problem by taking medicine on time. However, he still drinks alcohol when he participates in Kin-Khaow-Mai festival. He personally thinks he can drink unlimited spirits because local spirits contain of some herbs and stated that he *"would not stop drinking local spirit and not at his age*". He did not exercise because he perceives that working on a farm and in a factory is a kind of exercise due to him being sweaty and feeling tired, the same as doing exercise. He has expressed that *"I am too tired after work to exercise*". His latest fasting blood sugar recorded at the clinic was 100mg/dl. He also indicated that he felt his health is as good as general people and acknowledged that he has "diabetes" but he is "not a patients". He does not worry about having diabetes but is aware of being bed-ridden which is a burden on his family. He stated that *"my children are still young, and my wife can't work hard like me so if anything happens to me, I don't think my family can be survived and I don't want to be a burden in my family*".

Natee articulated that his condition is not severe due to the fact that he felt he was not displaying any signs or symptoms of the disease. He mentioned that he could control his blood sugar level by taking medicines as prescribed regularly. He told me that access to health services nowadays was easy because he has a car. Natee was easy to talk and I was introduced to his wife whilst I went to his large house for the interview. During the interview, he showed me his medicines and garden. At the end of the session, I asked him if there was anything else he would like me to know, he stated that *"I have diabetes but I'm not a patient"*.

3. **Nongnuch**, is a 30 year-old married woman who lives with five members of her family, consisting of her husband, young son, step-daughter and mother-in-law. She is Akha and her religion is Christian. She is a farmer, works in her small coffee farm and is an employee of a coffee shop near her house. Her family income is around 80,000 baht per year. She was diagnosed seven years ago and her diabetes is tablet-controlled. Before the diagnosis, she felt dizzy and went to the toilet often more than usual, so she went to see the doctor at the health promotion hospital for a check up. She stated that *"I decided to go to see the doctor as my mum had the same symptoms before she was diagnosed diabetes and I think I might have this disease too*".

   She attended school until grade seven and left to get married. She believes that the cause of diabetes is hereditary because her mother has had this disease for nine years. She expressed *"I've been looking after my mum for many years and took her to the hospital many times so I have knowledge about this as the doctor told me, it's heredity*". Her latest fasting blood sugar recorded at the clinic was 130mg/dl. When asked how she felt having diabetes, she replied *"I'm normal, I can eat and sleep well*". However, she fears becoming blind and disabled due to seeing other diabetes patients with serious complications at the hospital.

   She also believes having sex can increase blood sugars levels even though she controls her diet before seeing the doctor. She stated that *"I don't know why but every time I sleep with my husband before my appointment, my blood sugar level usually high*". She is the main cook in her family, so she does not want to separate foods as it wastes time and money. She also expressed that *"I have to cook for everyone and if I had special food, it takes times and it* *means I have to pay more money for the meal*". She had difficulty like other diabetes patients in controlling diet when going to join the festivals. I noticed that she still drank alcohols and ate a lot of food as she stated that *"it rarely happens and it just only one day*".

Nongnuch did not exercise due to diet control and though that taking medicine was easier than exercise, in fact taking medicine as prescribed was the most important way to control the disease. She manages the short-term complications by having sugar or soft drinks immediately, which she had learned from looking after her mother. Nongnuch is a kind person, she told me the stories of the village and invited me to have snacks, which consisted of sticky rice, sugar and pumpkins. On my second visit, she introduced her husband, showed me around her house and gave me some cabbages from her farm. She also told me about working hard on the farm while she was collecting cucumbers *"see?...walking to the farm and working there makes me feel so tired so what do you think about exercise for me?*".

4. **Wila,** is a 38 year-old married woman who lives with her husband and three small children, eight, six and four years old. She is a Lisu and her religion is Buddhist. She and her husband earn their living by planting coffee, cabbage and rice on their small area of land, which brings a family income of around 80,000 baht per year. She was diagnosed two and a half years ago, and her diabetes is tablet-controlled. Before the diagnosis, she felt exhausted for a week and went to the toilet often more than usual. Next, she asked her sister in-law who had had diabetes about the signs and symptoms and then she went to check at the hospital. After diagnosis, she felt shock because she did not expect to have diabetes at 36 years old. She expressed that *"I was too young to have this disease*".

   She graduated from primary school and left school because she did not have money. She believes the cause of diabetes is genetic due to her mother having had diabetes for 7 years. Her latest fasting blood sugar recorded at the clinic was 127 mg/dl. She also stated that she fears becoming blind because it will be a big problem and burden to her husband. She explained that she felt different to other people. This is because she easily tired since she was diagnosed and diabetes limited her ability to work. She stated that "*people with diabetes cannot eat like general people because we have to be careful of our blood sugar level and we cannot work hard*". Consequently, she did not exercise and she viewed exercise as a potential cause of weakness. She expressed that "*exercise makes me tired and I just want to rest all the time so this is not good for me, if I exercised, I would become weakness because I am diabetes patient*".

She controls her condition by trying to reduce her food portions before seeing the doctor. She mentioned that *"I try to eat my food less before going to see the doctor about a week and I think it works for me"*. She has been taking medicine as prescribed and also using herbal "Jeaw-Gu-Lun" simultaneously for 2 years. She stated that she felt better when she drinks it and it is free due to her planting it around her house. She strongly believes that this herb is good for her and has never had any ill effects.

Wila admitted that she forgets to go to see the doctor sometimes because she has a lot of work to do especially in the harvest season, however she has tries to see the doctor after she realises that the medicine would run out soon. She expressed that "*It extremely busy in harvest season and yes, I forgot my appointment, but I still went to see the doctor even if it was not my appointment day because I wanted the medicine*". Since my first interview, Wila had tried to control her blood sugar level and get information from the doctor. At the end of the interview she stated that "*I realised that I should more strict of controlling my blood sugar level, this is not only for myself but also my three young children"*.

5. **Busaba**, is a 51 year-old married woman who lives with her alcoholic husband. Her children have all married and have their own homes. She is Akha and her religion is Christian. She works in the department of package sealing at the Research and Development of Agriculture Centre. Her health insurance is social security for healthcare services and her family income is 90,000 baht per year. She was diagnosed nine years ago through a routine diabetes screening and her diabetes is tablet-controlled. She did not attend school and believes the cause of diabetes is hereditary because her mother and sister also have the disease.

Her latest fasting blood sugar recorded at the clinic was 205mg/dl. When asked how she felt having diabetes she replied "*It's unlike other people*". She realised that she could not work hard since she was diagnosed due feeling weak and dizzy. She was also very fearful of kidney disease because there was an example of someone in the village who has diabetes and later had kidney disease. She believes that taking too much medicine is the main cause of kidney disease, therefore she adjusts the dose of medicine by herself. She understands that activities such as looking after grandchildren and housework are exercise so when I asked her about this she replied *"I exercise everyday*". She reported that eating everything as usual but with a reduction in portion size is her main method of diabetes control. However, she confessed that during "Kin-Khaow-Mai" and "New Year" festival, she could not control her diet because *"there are all yummy food*".

Busaba stated that her arms feel numb, but feels it is not a problem as she can manage by using balm and is not sure this ymptom is connection to her disease. She mentioned throughout the interview "*I can solve it and I am not sure this is related to diabetes as I think there are many causes of arm numb. Maybe it is because of working in the farm"*. Like other women in the village, Busaba still drinks alcohol on some occasions such as Kin-Khaow-Mai and New-Year festival. She does not worry about her conditions, as she believes that local spirits have added some herbs, and these are good for health. At the end of the interview, I'm glad to see that she looked more concerned about her health and she also thanked me for interviewing her.

6. **Decha**, is a 63 year-old married man who lives with his wife. He has four children and they moved to live with family in a different area. He is Lisu and his religion is Christian. He works as a farmer by planting rice, coffee and rubber trees. He is also a health volunteer in his village and his family income is around 120,000 baht per year. He was diagnosed nine years ago with the main symptoms of diabetes, such as going to the toilet more than usual, weakness and losing weight even when eating plenty of food and his diabetes is tablet-controlled. He stated that "*Oh…it was strange, I had never been like this before. I had more appetite and even though I ate a lot, I still lost my weight. I went to the toilet often more than usual, you know? Around 3-4 times each night and I thought I had problem with health, so I went to see the doctor and found I had diabetes*''.

   Decha did not attend school but can speak and read the Thai language which he learned at church. He believes that over-consumption of sugar is the main cause of diabetes due to eating a lot of sweet foods before his diagnosis, especially honey which was he always put in his coffee. He articulated that being a health volunteer enabled him to gain the correct diabetes knowledge and can manage his condition effectively. He expressed that "*I'm so lucky to be a health voulunteer in this village because I have opportunities to get a lot of knowledge about diabetes. The doctor gave a special training session for health volunteers. I know more than other patients do and I can manage my disease better than them*". He also wants to be a good role model for diabetes patients. He expressed that "*being a health volunteer, the most important is you have to be a good example, if you could control your condition, people would accept and believed your advices*". He defined himself as being the same as people who do not have diabetes mellitus as he can work as usual and does not have any problems with living with this disease.

Decha controls his diet by avoiding some sweets and fatty foods, including alcohol and soft drinks. He has been exercising by running 30 minutes in the morning every day since 2011. He mentioned that exercise makes him feel fresh and is good for his health due to hishealthy blood sugar levels; his latest fasting blood sugar, recorded at the clinic was 100 mg/dl. Although his level is good, he still takes medication as prescribed due to believing that the most important aspect of diabetes treatment is to take medication regularly. When asked about the requirement for people with T2DM in this village, he explained that health care services from the hospital are very good and everyone can easily access them due to the development of the country, therefore he thought there was nothing special for this group. He stated that "*It's very good services for us, we can go to the hospital whenever we want to, look at the good road and the health services that the government provide us for free*". During the interview, Decha was very friendly and interested in this research. He commented "*this is very interesting, no one interested in hill tribesperson's health because we are minority group, I'm so glad to participate in your study"*.

7. **Manee**, is a 59 year-old widowed woman whose husband died nine months ago from heart failure. Currently she lives in a big family; there are seven people consisting of her eldest and youngest sons, and their family. She is Lisu and her religion is Buddhism. She does not work because she perceives that she was very sick with diabetes, and her son also did not want her to work. She stated, "*I feel sick and can't do anything so my son worries about me, he told me stop working and stay home*". She was diagnosed seven years ago with the main symptoms of diabetes, for example, using the toilet more frequently, bodily weakness and losing weight, similar to Decha whose diabetes is now tablet-controlled. She sometimes gets money from her sons and her family income is around 120,000 baht per year. She worries about her disease because it has made her become more dependent on others. She expressed that*, "I don't want to be his burden…if I could work, I would have my own money to buy things but now I depend on my sons and worry sometimes that his wife might be annoyed with me."*

   Manee did not attend school and believes that the cause of diabetes is 'Lom-Pid-Duan,' sickness which is the consequence of not adhering to traditional postpartum beliefs and practices. She believes the illness developed because she did not wear warm clothing and ate "bamboo soup" or "Kang-Nor-Som" which is believed to be an injurious food after giving birth and are the causes of Lom-Pid-Duan sickness. She defined having diabetes as "having bad blood" because she perceived that Lom-Pid-Duan sickness was related to the blood system. She mentioned that "*having bad blood affects my body, I can't be healthy like other people since I have had Lom-Pid-Duan. I feel get sick easily and this sickness is incurable*". Her latest fasting blood sugar recorded at the clinic was 247 mg/dl. I asked her what she thought about this number and she replied "*well…I don't know how to say, I know it's extremely high, but I don't know what I have to do, I've tried to lower the blood sugar level, maybe because of bad blood*".

Manee has had a problem with her vision for two years due to being unable to control the disease properly. She stated that "*I'm so scared of being blind, but I don't know how to stop it, only one thing I can do now is trying to control my blood sugar level but it is still high anyway*". Manee controls her diet by eating the same meals as her family members but tries to reduce the portion size on some desserts and sweet fruits, such as longans and ripe mangoes. However, she believes that drinking water after eating too much sweet or fatty food helps to dilute the sugar from her blood. She expressed that "*I think water can clean some sugar from my body and when we go to the toilet, the sugar will flush away"*.

She takes only the medicine prescribed for her vision problem and is afraid that if she were to take another food supplement it might cause more health problems. She admitted that she had missed medical appointments sometimes because her son was very busy. She mentioned "*I won't blame him as he has to work and has a life and I still have the medicine, that's enough"*. When I asked if she could suggest health care services in the hospital which might be of benefit to her, she replied "*the services are brilliant I don't have to pay for anything and the staff are very kind, this is too good to me*". Manee was very frustrated throughout the interview and said that her life was controlled by diabetes. At her request she was interviewed at the hospital, she explained that she did not want to speak in her house as her daughter in-law might hear our conversation.

8. **Phaka,** is a 47 year-old married woman who lives with her husband and young daughter. Her eldest son works in Bangkok and another son studies in Chiang Rai town centre. She is Akha and her religion is Christian. She works as a farmer by planting coffee, rice, tea, and corn on her land. Her family income is around 80,000 baht per year and she expressed that "*I have to spend a lot of money this year because my son is studying, and this is his final year so he spends extra money for his tuition fee*". This made her frustrated with the financial issues.

Phaka was diagnosed four years ago through a routine diabetes screening and her diabetes is tablet-controlled. She stated that "*one day a health volunteer came to my house, told me that I have to go to the health promotion hospital for checking my blood in next 2 days, she said I missed this for several times and this time I had to go then I checked and the result was ..yes I have diabetes*". She has also had hypertension since she was twenty years old. This did not surprise her, and she believes that the cause of diabetes is heredity because her two sisters also have diabetes. Consequently, she is aware that her children are at risk of developing this disease too.

Phaka graduated from primary school and she viewed diabetes as an incurable disease and mentioned that she has to live with it until she dies. She stated that she has 'dry diabetes,' which people with diabetes in this area categorise by wound and this type is less severe than 'wet diabetes'. She also self-tested by stabbing a small bamboo pin in her arm and noticed the duration of healing to give her peace of mind that she definitely has 'dry diabetes' as it healed quickly. She expressed that "*I feel relief when I tested it by myself and my wound heal quickly so I told myself at least I have 'dry diabetes' not 'wet diabetes' which I was very scared of*". She described her current health status as 'fair' because she can help her husband work on the farm even though she has tired easily since she was diagnosed with this disease. She admits she has poor diet sometimes, as she would finish her daughter's dessert. Due to the harvest season, Phaka stated that she does not keep her check-up appointments with the doctor because she has no time. She does not want to be told to restrict her diet, as this would not fit in with her lifestyle, as she needs more energy for working.

Phaka controls the disease by eating everything as usual but with a reduction in portion size for example eating only one mango instead of four mangoes as she used to. She takes medication as prescribed and uses 'Jeaw-Gu-Lan' simultaneously. She felt unsure of the benefit of drinking this herb, but she believes that *"using this herb is better than nothing is*". Her latest fasting blood sugar recorded at the clinic was 110 mg/dl. She did not exercise as she thought working on a farm is an exercise. She still drinks alcohol like other female patients who perceived that local spirits contained of herbs which were good for health.

9. **Somsri,** is a 45 year-old married woman who lives with her husband, son and daughter. She is Lisu and her religion is Buddhism. She works as an employee collecting coffee beans and tea leaves. Her family income is 70,000 baht per year which is not enough to live on and so

she has stress from being short of money. She expressed that “*unlike other people, I have financial problem as my son and daughter will go to study in town soon at the same time, I’m stressing and trying to work harder*”. She was diagnosed four years ago through a campaign of diabetes screening and her diabetes is tablet-controlled. She stated that “*a health volunteer came to see me in an evening, she told me that I had to stop drinking or eating food after midnight and at 6.30 am. the doctor would come and check my blood at the hospital and I have had diabetes since then*”.

Somsri graduated from primary school and believes that having diabetes is a fate, which she has to accept, and the main cause of her is over-consumption of food containing too much sugar. She mentioned “*it’s my fate and I don’t know who to blame about this*”. Her latest fasting blood sugar recorded at the clinic was 127 mg/dl. She described her current health status as ‘weak’ because of her diabetes. She views having diabetes as meaning she was different from other people because she could not work hard, felt weak and had to rest during the collecting of the coffee beans. She mentioned “*collecting coffee beans is my main income and now I can’t work against time anymore as I have to rest during working hour, the effect is I collect less coffee beans and it means less money*”.

Somsri acknowledge that she was overweight and she aware that Lactasoy (sweet soy milk UHT) is the beverage she should avoid due to the sweet taste, however she still drinks Ovaltine with condensed milk which is she understands is better than sugar. She confessed that she could not control her diet because she has to think of the other family members, as they want to have delicious food so she could not avoid foods containing fat and sugar. Somsri did not take her medication as prescribed. She adjusted the medication’s dosage by taking a double dose, which happened when she forgot to take it. She did not realise she did wrong until I told her during interviewing.

Somsri did not exercise because she thought working on the farm and cleaning the house were exercise. She went to the hospital for her appointment by scooter and told me that the health service nowadays is good. She reported “*if I had diabetes 20 years ago, I did not know I would survive until now and the best thing for me is it’s free for everything*”. However, she would love to have a member of staff who could speak her language, as sometimes she does not understand what the doctors have told her. Somsri’s interview was a little challenging to me at first because she had a very strong hill tribe’s accent and I asked her to speak slowly so I could understand what she told me clearly.

10. **Malinee**, is a 59-year-old single woman who lives alone in a house which doubles as a noodle café and retail shop. She is Lisu and her religion is Buddhism. Her income is around 80,000 baht per year, which she reported was enough for a single woman like her in this village. She was diagnosed six years ago from the main symptoms of diabetes which were bodily weakness and itchy vagina. She stated that "*The first diagnosis was around 6 years ago, I felt weakness and very tired, I've never been tired like this before and felt itchy on my vagina, then I decided to close the shop and went to the hospital*". She believed that the cause of diabetes is heredity and her diabetes is tablet-controlled. She also has hypertension after having diabetes for 1 year. She did not attend school and stated that she felt her health is 'weak'.

    Malinee believes eating pork to be related to the fasting blood sugar level. Her latest fasting blood sugar recorded at the clinic was 200 mg/dl. She reported "*I know it's quite high and it's difficult to control tobe honest*". She admitted that she is obese and could not lose weight due to her occupation, being in the kitchen and around food. She expressed "*I know that diabetes patients have to lose weight but it's difficult, look!! I am a cook and sell working in a noodle bar so how can I manage it?*" She views having diabetes as being different to other people because she has the limitations in her life such as having avoid sweets and fatty food and she is unable to be work hard. However, when she ate a lot of food she should avoid such as Roum-Mit (Thai dessert with coconut milk and sugar syrup), she believed that drinking a lot of water could diluted the sugar in her body which would be eliminated in the urine. She told me "*If I ate Ka-Nom (desserts) more than a cup or felt I ate too much pork, I would drink a lot of water because I think it would flush by urine. I noticed that the ants would come around my toilet*".

    Malinee did not exercise because she viewed this as a possible cause of illness or weakness, as after walking she felt very tired. She had experience of hyperglycaemia, such as blurred vision and she solved it by drinking plenty of water and trying to relax. She believes that diabetes medicine can cause kidney disease, so she reduces the dose without the doctor's advice. When she participated in the festivals in the community, such as 'New Year' and 'Kin-Khaow-Mai', she could not control her diet and beverage. She gave the main reason for this as she had paid for these ceremonies, so it was the right thing to eat as much food as she wanted.

I interviewed Malinee at her house and during the conversation she drank two glasses of Coke and offered me a drink with her. She was very kind and provided me with some desserts and snacks, but I declined, so I bought her noodles instead. I was not surprised if she could not control her diet because the noodles were very tasty. She accepted that she has to live with diabetes until the next life comes, she also informed me that she had not changed her lifestyle in any way. She commented, “it’s my life, and I cannot change it in anyway, I’ve tried but it’s difficult and I accept everything that will happen to me”.

11. **Paboo**, is a 45 year-old married woman who lives with her husband, while their children live in Mae Srouy where they study and work. She is Akha and her religion is Christianity. She works as a farmer by planting cabbage, corn, coffee and rice, which bring a family income of around 85,000 baht per year. She was diagnosed with T2DM eight years ago as she had the main symptoms of diabetes, for example bodily weakness and losing weight. She stated *“I ate a lot of rice, but my weight gradually loses and I felt my body is weak, I couldn’t work, I only wanted to rest all day then my husband forced me to go to see the doctor*’’. Her diabetes is currently tablet-controlled.

    Paboo did not attend school and believes the cause of diabetes is ‘Lom-Pid-Duan’ sickness, as the same as Manee’s belief. She believes eating pork, believe to be an injurious food after giving birth, to be the causes of Lom-Pid-Duan sickness. She also defined having diabetes as “having bad blood,” as she believed that Lom-Pid-Duan sickness related to a malfunction of the blood system. She expressed *“Lom-Pid-Duan sickness is a serious condition for women’s health once you’ve got it, you would get any disease because of you have bad blood permanently*”. At present, she does not see diabetes mellitus as a serious disease in comparison to HIV and cancer. She commented *“it’s diabetes and it’s not severe, if we compare to Aids and cancer, I think I still have life longer than those patients with cancer*”.

    Her latest fasting blood sugar recorded at the clinic was 192 mg/dl. She strongly believes that taking too much diabetes medicine will destroy her kidneys. However, she indicated that she has “dry diabetes” and stated that she still has to be careful about her wound even it easily heals. She has the confidence to control her diet by eating everything as usual but reducing the portion size when she is at home. However, she confessed that she could not control her diet at evenrs such as wedding parties, due to there being many good foods which she had paid for by putting money in an envelope for the host, as this was the culture of participation. She did not exercise due to perceiving that her body was too weak for exercise, therefore she regularly takes only medication as prescribed. When I asked about the aspect of health care services Paboo informed me that ''*I have a good health services. In diabetic clinic, the doctors look after me very well, but they always blame me about my weight. Anyway, I'm happy to get the services for free.''*

Paboo was very opend during the interview, she talked about her children and how they had left home and now studied in the town centre. She mentioned to her husband who had another woman and how she managed with him. At the end of the interview, she asked me to come and visit her if I came to the village again and she would prepare traditional food for me.

12. **Aree**, is a 56 year-old married woman who lives with her husband and two daughters in the house which is also a retail shop and noodle bar. She is Lisu and her religion is Christianity. Her family income is around 100,000 baht per year. She was diagnosed two years ago through diabetes screening campaign and her condition is tablet-controlled. She did not attend school and believes that over consumption of sugar is the main cause of her diabetes. She expressed "I haven't known about this disease and didn't think I could have it but the doctor showed the blood result and told me I have diabetes so what can I say". Her latest fasting blood sugar recorded at the clinic was 180 mg/dl. She indicated her health status as 'fine' and commented *"It's high, isn't it? But I feel I'm fine. I feel tired because I work and it's normal*''. She has been trying control her blood sugar levels by following the doctor's advice, however, it seems to be difficult for her as she needs energy to work hard. She stated *"I've tried to control the rice portion follow the doctor advice but it didn't make me full, I need some more rice because I have to work hard each day, it's so difficult and you know when I really tired and hungry I can't stop eating some sweet foods and three in one coffee*".

    Aree viewed having diabetes as being normal like other people, she explained that to be tired when she has many customers is a normal part of working and it does not relate to the disease. However, she believed that taking too much diabetes medicine affects to malfunction of the kidneys and she could not avoid the results. Therefore, she stops taking the medicine when she feels fine and restarts it when symptoms of hypoglycaemia occur. At Kin-Khaow-Mai festival, I noticed she did not avoid sweets and fatty food and still drank Coke. She did not drink alcohol because she does not like the taste. She explained *"most of female in our village drink local spirit in this festival as it makes them feel more funny, we don't think it's harm our health because it was added some herbs*". Aree did not exercise because she could not see how exercise could improve her health, moreover, it is not usual for women in the village to be seen exercising. She informed me that *"people might look at me and think I'm crazy, no women in this village run or do aerobic dancing, it's strange*."

She had experiences of short term complications such as feeling very hungry and her body shook, so she solved this problem by eating any foods which were available at that time. She thinks the health care services nowadays are very good and easily access, however she still faces to the language problem due to sometimes she could not understand what the doctor has told her.

13. **Santi,** is a 68 year-old married man who lives with his wife and son's family. There are seven people in his house. He is Lisu and his religion is Buddhism. When asked how often he goes to the temple he replied "*I haven't go to the temple for a long time, I still worship our ancient ghosts. In my identity card showed Buddhism because I had to declare in my identity card when I first registered, I chose Buddhism as it is the main religion in Thailand*". He works as a farmer by planting corn and coffee, which bring a family income of around 70,000 baht per year. He was diagnosed three years ago through a routine diabetes screening and his condition is tablet-controlled. He believes that the cause of his diabetes is the over-use of chemicals due to using a lot of pesticides to increase the quality of his produce such as cabbage, beasn and corn in the past.

    Santi attended non-formal education in Chiang Mai for two years when he was working there, so his Thai language is excellent. He perceived that diabetes is a normal disease which anyone can have, due to seeing many diabetes patients while waiting his appointment in the hospital. His latest fasting blood sugar recorded at the clinic was 216 mg/dl. He indicated his current health status as 'fair'. He expressed "*eventhough my blood sugar level is very high, I don't think I have problem with this and I think my health status is fair because I don't have any severe symptoms*". Santi understands that one of the causes of high blood sugar level is 'does not control diet,' therefore he deals with his conditions by very strictly controlling his diets before the doctor's appointment. He stated "*I have to prepare myself by controlling my diet very strictly about 1-2 weeks before the appointment day. I think this is the most important to lower blood sugar levels. I told my wife and daughter in-law that please don't cook and buy some fatty and sweet foods*".

    When asked how he deals with eating foods that he should avoid, he informed me that he eats Sa-dao (Neem) which is bitter-taste vegetable and according to folk medicine, it erases the sugar from his body. He also uses ‘Jeaw-Gu-Lun’ by collecting its leaves then drying, boiling and drinking them like tea, due to hearing the benefits from radio advertisements. Santi did not exercise because he understands that working on the farm is an exercise. He explained “*I think my exercise is working hard in the farm because I have lots of sweat and feel tired as same as running and I think it’s unnecessary for me*”. When asked about the health care services for diabetes, he mentioned that he was satisfied with these due to accessibility and the fact that it was free, including the medicines.

14. **Werapan**, is a 53 year-old married man who lives with his 35-year-old wife. His former wife died nine months ago from asthma. He is Lisu and his religion is Buddhism. He works as a driver for tourists and also on the coffee farm. His family income is around 120,000 baht per year. He was diagnosed three and a half years ago through a routine diabetes screening and his diabetes is tablet-controlled. He mentioned “*I missed this screening many times because I work as a driver and start in the early morning. I didn’t have time to screen but that day I stopped working and went to check because my wife forced me*”. He did not attend school and believes that controlling diet is the most important thing for people with diabetes. His latest fasting blood sugar recorded at the clinic was 123 mg/dl.

Werapan rated his health status as ‘good’ and he has stopped smoking since his new marriage. He viewed having diabetes as being normal like others, because he felt fit and perceived that it was not only him who has this disease. He expressed “*look I looked normal and feel fit, my body is stronger than those who doesn’t have diabetes. I can work in the farm harder than the*m”. He stated that he did not fear diabetes but was aware of blindness and kidney disease as they lead to a burden on the family. He controls his disease by avoiding sweets and fatty foods. He mentioned “*I think controlling diet is very important for people like me, we have to know the conditions, yes I can eat like normal people, I can eat everything but just aware that I should put less sugar and avoid fatty food*”. Werapan still drinks spirits because he believes that spirits are less harmful than beer, he reported that locally brewed spirits such as corn whisky have benefits due to added some herbs. He told me “*I usually drink corn whisky in Kin-Khaow-Mai, I can’t avoid drink alcohol because it’s our social but at least I don’t drink beer which more harmful than spirits and our local spirit added some herbs*”.

Werapan exercises regularly by jogging at least 30 minutes in the morning three days per week. The main reason is not because of he has diabetes, but he worries regarding sexual dysfunction as he got married to a woman who is 18 years old younger than him. He had experiences of hyperglycaemia, so he solved this problem by taking medicine on time, if he still had the symptoms he would go to see the doctor. He has never missed an appointment at the diabetes clinic because his wife forces him to go while she can go with him and shops in town while he is in the hospital. He takes medicines as prescribed regularly and does not use any food supplements or herbs. He commented, "*medicine from the hospital is the best thing that doctor give me to control my blood sugar level so no need to waste money to buy some food supplements which is very cheap and can't see the result*".

Werapan is a quiet man, his voice is soft, and he never raises his. He showed me some photos of his wedding ceremony and talked with happiness. He introduced his wife and invited me to have dinner with them. I noticed the healthiness of that meal which consists of vegetable soup, boiled fish and boiled vegetable. It was such a nice meal for them and me.

15. **Varapone**, is a 49 year-old married woman who lives in a big family. There are nine people in her family which consists of her husband, three daughters, her son and his family. She is Lisu and her religion is Buddhism. She is a farmer and also works as an employee in the coffee farm. Her family income is around 90,000 baht per year. She was diagnosed two years ago with the symptoms of diabetes such as dizziness and itching around her vagina and her diabetes is tablet-controlled. She stated "*I went to hospital for chescking because it was itchy around my vagina. My first thinking was maybe I got Aids. I also felt dizzy, so I decided to check*". She believes that eating too much sugar in some sweet foods is the main cause of her disease.

    Varapone viewed having diabetes as having an incurable disease which she has to live with until she dies. She did not attend school and believes that lemons and some sour fruits can dilute the sugar in her body. She mentioned "*sour taste is opposite to sweet taste so after eating Khong-Wan (dessert), I usually eat lemon or orange. I think it can be diluted sugar in my body*". She knew the unhealthy food she should avoid, such as fatty food, but still lacks knowledge regarding appropriate portion size. She explained "*yes I know I should not eat Moo-Sam-Chun (belly pork) or too much rice but how much I can eat, I really don't know the portion size that I can eat*". When the harvest season arrives, she cannot control her diet as she has to work very hard and needs to eat a lot of rice. Varapone's latest fasting blood sugar recorded at the clinic was 112 mg/dl.

Varapone did not exercise because there is no word for exercise in her language, moreover she did not dare to exercise as she was afraid that other people would look at her and think she was crazy. When she goes to the parties or any festivals, she would not control diet due to enjoying foods and talking to other people. She believes that taking medicine as prescribed is the most important aspect of controlling her condition, so she regularly takes her pills on time. Varapone stated that the most satisfying part of receiving health care service is the provision of porridge with minced pork for the patients after blood testing and getting everything from the hospital for free. However, language is a problem because she does not understand everytime sometimes and she wish her son could come with her every time she goes to see the doctor for better understanding with regards to diabetes mellitus.

16. **Pimpa,** is a 56 year-old married woman who lives in a big family with her husband, daughter, son, son in-law and nephew. She is Lisu and her religion is Buddhism. She attended primary school for three years and left school to get married when she was 17 years old. She works as a farmer by planting coffee. She also makes rice whisky to sell in her village and her family income is around 120,000 baht per year. She was diagnosed seven years ago with the main symptoms of diabetes, for example, feeling thirsty and drinking water through the day and night. She went to see the doctor and on the second visit was told she had diabetes. She mentioned "*I went to see the doctor two times and the second time he tested my blood and told me that I have diabetes, I really don't like this situation*." Currently, her diabetes is controlled by tablet.

    Pimpa believed that eating too much food containing sugar was the main cause of having diabetes due to before being diagnosed, noticing ants around her urine so she deduced that her urine had a sweet taste. She perceived that diabetes is a normal disease, which anyone could have, as she saw many patients with T2DM while waiting for the doctor at diabetes clinic. Her latest fasting blood sugar was recorded at the clinic as 184 mg/dl. She stated "*the doctor said it was too high, and I needed to control my diet, he wanted to see the good blood test result next time. It's really difficult I can tell, not just for me but for all patients with diabetes*". She did not worry about her disease because she indicated herself that she has 'dry diabetes' as she noticed that her wound healed easily which would mean she would not be a risk of complications. When she saw the patients with amputations, she perceived susceptibility and told herself *"I'm not like those patients because I have dry diabetes*".

Pimpa tries to take medicine on time as she perceived that medicine is the most important part of controlling the disease. However, she sometimes forgot to take them due to being very busy working on the coffee farm. Pimpa did not exercise as she thought working on the farm and looking after her grandchildren were exercise. She had experiences of hypoglycaemia, since then she always carries spares candies in her pockets while working on the farm. She also controls her disease by avoiding some sweet and fatty foods. However, she found it was very difficult because she lives in a big family and does not want to make it difficult when they have food together.

Pimpa struggled at the beginning of the interview with the language as she could not explain in Thai then I turned to talk to her in the Thai-local northern language. In addition, she would love to have a translator in her language at the diabetes clinic because sometimes her son cannot come with her to help when seeing the doctor. She mentioned, "*I'm ok with the services from the hospital but if there is someone translates from Thai to Lisu, it would be great*".

The demographic information of the participants is summarised in the table below.

Name	Ethnicity	Age/ year	Religion	Marital status	Education	Occupation	Family income/year (Baht)	Duration of diagnosis (Years)	Fasting blood Sugar levels (Mg/dl)	Used medications type
1.Somrit (Male)	Lisu	64	Christian	Married	Not Attend	Farmer	120,000	5	150	Tablet
2.Natee (Male)	Lisu	44	Buddhist	Married	Primary school	Farmer and employee	120,000	3	100	Tablet
3.Nongnuch (Female)	Akha	30	Christian	Married	Primary school	Farmer and employee	80,000	7	130	Tablet
4.Wila (Female)	Lisu	38	Buddhist	Married	Primary school	Farmer	80,000	2.5	127	Tablet
5. Busaba (Female)	Akha	51	Christian	Married	Not Attend	Employee	90,000	9	205	Tablet
6.Decha (Male)	Lisu	63	Christian	Married	Not attend	Farmer	120,000	9	100	Tablet
7.Manee (Female)	Lisu	59	Buddhism	Widow	Not attend	Unemployed	3,000	7	247	Tablet
8.Phaka (Female)	Akha	47	Christian	Married	Primary school	Farmer	80,000	4	110	Tablet
9.Somsri (Female)	Lisu	45	Buddhism	Married	Primary school	Farmer	70,000	4	127	Tablet

Name	Ethnicity	Age/ year	Religion	Marital status	Education	Occupation	Family income/year (Baht)	Duration of diagnosis (Years)	Fasting blood Sugar levels (Mg/dl)	Used medications type
10.Malinee (Female)	Lisu	59	Buddhism	Single	Not attend	Cook	80,000	6	200	Tablet
11.Paboo (Female)	Akha	45	Christian	Married	Not attend	Farmer	85,000	8	192	Tablet
12. Aree (Female)	Lisu	56	Christian	Married	Not attend	Cook	100,000	2	180	Tablet
13. Santi (Male)	Lisu	68	Buddhism	Married	Not attend	Farmer	70,000	3	216	Tablet
14.Werapan (Male)	Lisu	53	Buddhism	Married	Not attend	Driver	120,000	3.5	123	Tablet
15.Varapone (Female)	Lisu	49	Buddhism	Married	Not attend	Farmer	90,000	2	112	tablet
16.Pimpa (Female)	Lisu	56	Buddhism	Married	Primary school	Farmer	120,000	7	184	Tablet

Table 4.2 Demographic characteristics of 16 hill tribespersons with type 2 diabetes mellitus who participated in in-depth interviews

In conclusion, there were eleven females and five males participating in this study. The average age was 51.7 years which is typical of diabetes patients in Thailand and worldwide. Females are more likely to suffer from diabetes mellitus than males and this study reflects that. Also, the risk of developing type 2 diabetes mellitus increases with age (Department of Public Health Thailand, 2016; WHO, 2017). Most participants did not attend school, only six graduated from primary school. This is because of poverty, remote residence, and the fact they were not Thai citizens, so they lacked access to basic social services including education. In addition, their traditional social belief was not to support females to study. This is due to the hill tribesperson's way of life as women are expected to carry out (domestic tasks at home) and be a good wife so, consequently, they rarely leave the village. The average family income of 96,312 bath or 2,217 pounds sterling per year caused some families to have problems of low income, as the average family income in Chiang Rai and Thailand was 161,964 bath (3,766.60 pounds sterling) and 26,915 bath (7,511.16 pounds sterling) respectively (National Statistical Office, 2016). Ethnic groups on average have a lower socioeconomic status than the majority of the population (National Statistical Office, 2016). Therefore, many of them pay more attention to their work than their health. Furthermore, the average length of having diabetes of 6.8 years made them familiar with their disease and affected their self-management behaviour (Espelt et al., 2008; Chourdakis et al., 2014; Victor et al., 2017).

Chapter 5 – Discussion and integration of findings

5.1 Introduction

This chapter presents the discussion and integration of findings. This study aims to understand the beliefs and experiences of diabetes mellitus among hill tribespersons who have T2DM. Three objectives were addressed in order to define the specific aims that are examined. To meet the objectives, data from the observation, in-depth interviews and focus group discussion in the Thai language with audio recordings were conducted, transcribed verbatim, then translated and analysed by the researcher. The findings obtained from both sixteen hill tribespersons with T2DM and eight health professionals. This chapter is presented in three parts, the first section presents the beliefs and current knowledge of diabetes mellitus in hill tribespersons with T2DM. Section 2 reveals the experiences and self-management among this group and finally section 3 identifies the barriers and needs or essential requirements of this group including the additional findings from health professionals. The emergent themes are presented in the table 5.1.

Objectives	Themes	Sub-themes
1. To explore the health beliefs and current knowledge of T2DM among this group	The causes of diabetes mellitus	Over-consumption of food containing too much sugar 'Bao-Wan is related to sweet food'
		Over-use of chemicals 'It must be from chemicals'
		Heredity 'It runs in my family'
		'Lom-Pid-Duan' sickness
	The beliefs and knowledge of having diabetes mellitus	Being different to other people 'We have the limitations in our life'
		Being normal like other people 'If I didn't go to check, I wouldn't have diabetes'
		Having bad blood 'It means we have bad blood'
		Incurable disease 'If I died, it would die with me'
	The beliefs and knowledge of the complications	Perceived severity 'I fear becoming blind and disabled'
		Perceived susceptibility 'I'm not like those people because I have 'dry' diabetes'
2.To explore the experiences and self-managementbehaviours of people with T2DM in this group	Experiences of being diagnosed	The experience of the patient pre-diagnosis
		The feeling after first diagnosed 'indifferent, shocked, upset'
	Dealing with diet and beverages	Eating everything as normal but with a reduction in portion size
		Eating sour or bitter foods after eating too many sweet foods
		Drinking a lot of water after eating too many sweet or fatty foods
	Compliance with prescribe diabetes medication	The participants who took their medication as prescribed.
		The participants who were not taking their medication as prescribed.
	Exercise behaviour	Patients who exercise regularly
		Patients who do not exercise
	Dealing with complications	Dealing with short-term complications

Objectives	Themes	Sub-themes
2. To explore the experiences and self-managementbehaviours of people with T2DM in this group	Dealing with complications	Dealing with long-term complications
3. To explore the needs, essential requirements and barriers to health promotion for T2DM patients in this group from both the hill tribespersons and the health professionals' perspectives	Health care services of diabetes patients	Health services at diabetes clinic 'these are too good for me…except language'
	Additional findings from in-depth interviews and focus groups with the health professionals.	The barriers from the health care services system.
		The social and cultural barriers.

Table 5.1 shows the emergent themes from in-depth interview.

5.2 Objective 1: To explore the beliefs and current knowledge of T2DM among this group.

In-depth interview findings showed that cultural and personal experiences influence participants' beliefs and understanding of diabetes mellitus. Three common themes were identified; the beliefs and knowledge of the causes of diabetes mellitus, the beliefs of having this disease and the beliefs and knowledge of the complications of diabetes mellitus.

5.2.1 The beliefs and knowledge of the cause of diabetes mellitus in hill tribespersons who have T2DM.

The participants have their own perceptions of the causes of diabetes mellitus. The results show that participants perceived that there are many causes of diabetes mellitus. Most of them believe that life style factors such as food consumption and the use of chemicals are the major contributors to diabetes mellitus. However, some participants believe that their experiences of sickness in the past can cause the disease and some participants who have a close family member with diabetes mellitus believe that heredity is the main cause. This theme includes over consumption of food containing too much sugar, over-use of chemicals, heredity and Lom-Pid-Duan sickness which affects postpartum women.

1) Over-consumption of food containing too much sugar 'Bao-Wan is related to sweet food'

Most of the participants believe eating food containing too much sugar, such as Thai desserts and some sweet fruits are the major cause of diabetes mellitus. This is partly from the language used to explain this disease. In Thai language, diabetes mellitus is replaced by the word 'Bao Wan'. The word 'Bao' means urinate and 'Wan' means sweet taste so 'Bao Wan' implies the disease is related to sweet urine. The patients noticed that ants were attracted to their urine and so believed it to be the cause of disease. Many participants mentioned that eating some sweet foods such as 'Kha-nom-wan' (Thai desserts) and their habit of enjoying desserts is related to the causes of diabetes mellitus.

'I don't know how it happened to me but I think……I eat too many sweet tasting foods, Khong Wan (Thai dessert) and Nam som (soft drink). I usually put sugar in noodle and side dishes. I like to eat some sweet food. These can cause diabetes.' (Varapone)

'I don't know. But I think it's about sweet foods and sugar because it's called 'Bao Wan. I personally think it is caused by eating too much sugar for sure and I noticed that the ants went round my wee and it means my wee has sweet taste so this disease must be cause by eating sweet food' (Pimpa)

'Deep inside, I personally think because of my eating behaviour, in my house I am the only one who likes sweet food. I love everything about sweet taste. Since I can remember, beginning with fruits such as longan, papaya and lychee, I also like honey, soft drink. In the past I used to go to Mae Hong Son provinces to work so I bought more than twelve bottles of honey to add to my coffee.' (Decha)

Even though the participants were told there are several factors which can cause the disease, one of them strongly believed that only the food itself was to blame. He lacked information about his parent's health and didn't believe it to be important. This is because in the past hill tribespersons did not go to the hospital to receive health care services due to the remoteness of the villages and the cost barriers.

'The doctor said heredity can cause this disease but in my case I really don't know because I don't know about the disease of my parents and they already died. They didn't go to see the doctor. I think some sweet food must be the cause of diabetes.' (Santi)

A participant mentioned that drinking soft drinks and three in one coffee which consists of coffee, artificial cream and sugar is the main cause of diabetes due to the quantity and duration of drinking. Additionally, the sweet taste of them makes him feel fresh after working hard and he can access these beverages easily because they are available in the factory for free.

'When I work in the factory I drink three in one coffee, three to six packs a day. I drink it because I like the smell and the sweet taste and everybody drinks it. I think I have DM because of coffee and Nam Dang (soft drink). I like both of them the most. I have drunk them for 8-9 years because they are free for all employees. When we work hard and the weather is very hot the factory will give us Coke, Nam Dang and three in one coffee for free.' (Natee)

The consumption of sweet foods and drinks was identified as a cause of diabetes mellitus in this group due to the language used and the observation of their urine, especially in a participant who lacked information of their parent's health. Participants also indicated the foods which contain sugar such as desserts, soft drinks and three in one coffee as the causes of their conditions.

2) Over-use of chemicals, 'It must be from chemicals'

Chemicals are known as hazardous substances in daily life, especially in tribes, which have a large area for planting industrial crops, such as cabbage, corn, coffee, and tea. The government has been trying to reduce the chemicals used among hill tribespersons by education through the leaders and health volunteers in the village. The participants who have experience of using chemicals on their farm in order to increase the quality and quantity of products, believe that over-use of chemicals is the main cause of diabetes. They perceive that the chemicals can contaminate and be absorbed into the body through the skin and orally.

'I don't know what the real cause is but I personally think it is chemicals. In the past when I am a man…mmm….not too old like now I planted bean, rice, corn and cabbage. I used a lot of pesticide to make my products beautiful and got a good price. I really used a lot so this is the main cause of my disease. I think you already know that the chemical is not good for our health, it can make us sick. I need to use it because I have to make money. If my products were not beautiful, no one would buy them.' (Weerapone)

'I think there are many causes of diabetes, but I don't know about the causes too much. In my case I think it's must be from chemicals, I used chemicals in my cabbage farm and I used insecticide for a long time….mmm…around 15 years. It can absorb and errrrr…I sometimes felt it on my food and my hand…and … I think I ate it a little sometimes' (Somrit)

These participants perceived that the over-use of chemicals on their farms was the cause of diabetes mellitus. This is because they mistakenly linked the information regarding harmful chemical agriculture from government campaigns to their disease. This belief is found in the participants who have been using many chemicals on their farms.

3) Heredity 'It runs in my family'

Many participants who have a family history of diabetes were concerned and strongly believed that heredity is actually the main cause of their disease. This is because they received the information from health professionals and have experience of looking after or talking to their relatives who have diabetes. This belief was strengthened further by the fact they do not like nor eat some sweet foods.

'Because my mother and sister have this disease so it's a genetic disease that I cannot avoid. It runs in my family.' (Busaba)

'The doctor told me it's hereditary. My older sister and my younger sister have diabetes so I did not wonder why I have diabetes and I think my sons and daughters are at risk too.' (Phaka)

'If we eat too much sugar I think it will accumulate in our body and can cause diabetes but for me I didn't eat some sweets food because I don't like this kind of food so I got this disease from heredity. (Malinee)

Heredity was perceived to cause diabetes mellitus, this hill tribespersons' perception emerged as a significant direct link to the onset of diabetes due to them having experience of looking after people with this disease.

4) 'Lom-Pid-Duan' sickness

The symptoms of 'Lom-Pid-Duan' are believed to be the consequence of not behaving according to traditional postpartum beliefs and practices which are called 'Yu-Duan.' During 'Yu-Duan' period, the new mother has to stay at her house, keep her body warm by wearing a jacket, taking hot baths, drinking hot drinks and lying by the fire. This is due to the cultural belief that the childbirth process places the body in a state of being cold. The new mother who has to 'Yu-Duan' also has food restrictions and sexual abstinence. The symptoms of 'Lom-Pid-Duan' such as feeling dizzy and headaches vary in each person and hill tribespersons believe that the effects impact on the blood circulation and continue for the rest of their lives. The consequence of this belief is if women got sick and they cannot find the causes of any symptoms, they would be accused of 'Lom-Pid-Duan'. Two participants who have experiences of 'Lom-Pid-Duan' sickness believed that it was the main cause of their diabetes.

'I had Lom-Pid-Duan when I gave birth to my youngest son. After giving birth, for three days I didn't wear warm clothes and I wanted to eat Kang-Nor-Som. My mother told me not to eat because it is injurious food but I really wanted to eat it. I secretly ate it and after that I felt dizzy without reason. Now, I also have had diabetes and I wonder why it happened to me because I didn't do anything…mm.. I didn't like Khong Wan and no one in my family has diabetes. I personally think it because of Lom-Pid-Duan.' (Manee)

'My mother doesn't have diabetes. I really don't know about the causes of the disease but I think I have it because I had 'Lom-Pid-Duan. At that time I didn't know pork was forbidden to eat.' (Paboo)

It is important to note that cultural beliefs of postpartum directly affect the perception regarding diabetes mellitus in some female participants who cannot find the causes of their symptoms and had experiences of not following traditional conventions of behaviour after giving birth. Therefore, they blame themselves for the onset of the disease.

These beliefs reflect the understanding of their disease in hill tribespersons with T2DM. The findings show that some still misunderstand, despite education from health professionals whilst receiving health care services at the diabetes clinic. The general beliefs of the participants revealed a variation in the accuracy of their knowledge about diabetes mellitus. Some thought correctly, that the cause of the disease is hereditary which is supported by extensive research from South Asia and worldwide (Fleming & Gillibrand, 2009; Nakakasien et al., 2014, Patel et al., 2015; Simonka &

Schnepp, 2015) However, this causal belief appears to be based on their experiences of close family members who have diabetes mellitus rather than on the basis of medical knowledge. This bears similarities to some ethnic groups in other parts of the world, for example the immigrant ‘Lumbee Indians’ of rural south eastern North Carolina (Jacobs et al., 2014). The research found that most of the participants believed genetics to be one of the main causal factors because diabetes mellitus had affected their first-generation ancestors.

Other findings show that participants often believe, incorrectly, that over consumption of foods which contain too much sugar is the main cause of their disease. This is due to the terminology in the Thai language where diabetes mellitus is called ‘Bao Wan’ or ‘sweet urine’. This name fosters the misunderstanding that consumption of large amounts of sugar from a variety of food and fruits is the actual cause of diabetes mellitus. It is a belief commonly expressed by Thai people in general as well as those of South East Asia, for example Cambodia, Indonesia and Vietnam (Jantaveemueng & Sungkachat, 2014; Lundberg & Thrakul, 2011; Megan et al., 2013; Nguyen & Piyabunditkul, 2014; Pujilestari et al., 2014;Tran, 2013). Moreover, this belief is supported by the fact that participants have received recommendations from health professionals that they should limit their consumption of sweet foods and sugar in order to control their blood sugar levels. The effect of this has been that the participants directly connect high consumption of sugar with the cause of their disease (Pujilestari et al., 2014). These findings also reveal how local terminology and the way in which health professionals phrase their recommendations can affect the beliefs of the hill tribespersons’ and their interpretations of diabetes. Other incorrect beliefs surrounding the main causes of diabetes mellitus are ‘over-use of chemicals’ and ‘Lom-Pid-Duan sickness’. These arise from differing conceptual beliefs among the patients. Some participants believed their diabetes to be a consequence of using chemicals and their individual belief was informed by reports in the mass media as well as advice from health professionals about the hazards of using chemicals in their homes and gardens. Other participants however, those who held the belief that “Lom-Pid-Duan” sickness had been the cause of their disease, used their experiences and cultural belief of postpartum as an explanation.

The findings show that despite the efforts of health professionals, more than half the participants still misunderstand the causes of diabetes mellitus. When health professionals attempted to gauge their level of understanding, the study revealed a tendency for participants to respond by saying ‘yes’ in order to finish the conversation. Consequently, health professionals did not know for certain whether their patients really understood the information given to them. Moreover, the demographic data of the participants showed that less than half of them graduated from primary school and the remainder did not receive a formal education at all. In addition, the average age of the participants was 51.7 years. All of the above characteristics highlight the difficulties that underprivileged people face in accessing and understanding health information because of a lack of education, with the added problem that the ability to learn decreases with age (Abubakari et al., 2013; Hassan et al., 2013, Lee et al., 2015).

The findings in this study also support the idea that among hill tribespersons, their beliefs and perceptions of the causes of diabetes appeared to be based on experience and culture. This is revealed by the fact that none of them spoke about the causes of diabetes mellitus being based on biomedical principles. Furthermore, many previous studies indicated that the causal beliefs of ethnic groups came from their experiences and cultural beliefs (Concha et al., 2016; Espinoza et al., 2016; Majeed-Ariss et al., 2015; Noel, 2010; Patel & Iliffe, 2017). In terms of religion, even though nine of the sixteen hill tribespersons in this current study are Buddhists, the study revealed no relationship between their religious beliefs and their disease. The reason for this is that minority or immigrant groups such as the hill tribespersons have to apply for Thai citizenship in order to receive benefits, for example access to education, services and infrastructure. In order to do so, it is a requirement when completing the forms, to state religious belief and as Buddhism is the majority religion in Thailand, many hill tribespersons have 'converted' from Animism to Buddhism. In contrast, studies amongst 'genuine' or long-standing people of the Buddhist religion reveal a belief that, 'Karma' controlled their diabetes mellitus (Amarasekara et al., 2014; Kalra et al., 2017; Lundberg & Trakul, 2011; Nakagasien et al., 2008; Patel et al., 2015; Thomas, 2014; Sowattanangoon et al., 2009). In addition, the findings from these participants did not reveal stress or inactivity as their causal beliefs, reasons which have been found in other studies (Concha et al., 2016; Espinoza Giacinto et al., 2016) this difference may be due to their lack of education and/or to language barriers.

5.2.2 The beliefs of having diabetes mellitus in hill tribespersons with type 2 diabetes mellitus.

Although the participants could adjust to living with diabetes mellitus, the illness continued to affect their physical and mental well-being and also their lifestyle. The participants described their beliefs of having diabetes and what it meant to them personally after living with the disease for more than one year. The meaning of having diabetes mellitus depends on the cultural beliefs, current health status and experiences of having this disease. Most participants reacted with negativity while some participants defined themselves as the same as general people. Four sub-themes of the beliefs of having diabetes mellitus were being different to other people, being normal like other people, having 'bad blood,' and an incurable disease.

1) *Being different to other people 'we have the limitation in our life'*

Most participants explained that having diabetes mellitus meant they were different from other people in terms of the limitations of their lives. These limitations are both physical and food related. The participants stated that they are physically different from people who do not have diabetes mellitus because they are weak and easily tired so they cannot work hard and also need to rest during the working period. This is because some participants experienced working while they had hypoglycaemia. Some also perceived that having diabetes limits them in the foods they eat and they cannot have food like other people because they are afraid that it will affect their health. Being diagnosed with diabetes mellitus has been connected to losing good health in these participants.

'I feel different from my friend. I wish I could work hard or work until 6 pm without rest like other people but ...I can't …you know …being sick with diabetes makes me weak and I'm tired easily and yes…I can't work hard anymore…. I used to collect the coffee beans and the payment depends on how much I can collect. I have to rest many times and I can't work like that anymore.'(Somsri)

'It's unlike other people. One day I went to the farm and felt dizzy. I realized that my body is different and I can't work hard anymore.'(Busaba)

'Having diabetes is unlike other people. I can't eat the foods that I want to eat. Sometimes I want to eat pork or snack in the house blessing ceremony but I can't…(deep breath)..If I had Khong Wan (dessert) then I knocked (lost consciousness) who will respond ?!!' (Manee)

'What's the disease!!... can't eat those…..can't eat these…can't work hard…. We have limitations in our life'(Malinee)

Diabetes mellitus was viewed as a barrier to daily life. The majority of hill tribespersons with type 2 diabetes mellitus felt that they had lost their good health, work capacity and were unable to eat some foods that they enjoyed.

2) *Being normal like other people 'if I didn't go to check, I wouldn't have diabetes'*

Some participants defined themselves as the same as people who do not have diabetes mellitus. They perceived that they are not the patients, they just 'only have diabetes'. This is because they can work as usual, and do not have the problems of living with this disease. They noticed that they can walk to their farm which is very far from their house, and are able to work the same as before they had diabetes mellitus. Some participants additionally explained that to be tired when they work hard is a normal part of working but it is not because of having diabetes mellitus. They also believed that if they did not go to check their health in the hospital, they would not have been diagnosed with diabetes mellitus by the health professional. It appears that the patients may sometimes deny their condition by attempting to use their intuition or sense more than the evidence from the medical information.

'No, it is usual. I have diabetes but I'm not a patient. I can walk by myself to the farm, work like normal people and when I am walk back home I still can carry some stuffs like before having diabetes.'(Natee)

'I'm fine. If I didn't go to check, I wouldn't have diabetes. I was tired when there are lots of customers ordering the noodles. It is not related to diabetes it is because of numbers of customer.'(Aree)

Besides, one of them believed that everybody was born with at least one disease, so it is normal to have diabetes. Many participants perceived that they are fine because they feel fit and no one can notice that they have diabetes unlike people who have cancer or HIV which is more severe or cannot be treated, people who have these diseases may have a shorter life expectancy and symptoms may be more easily noticeable.

'We are alright. I feel ok. I feel fit enough to work and do everything like other people. You know everyone gets at least one disease when they were born, and I've got diabetes. You already got one but you just don't know now.' (Somrit)

'I don't think I'm different from other people. I'm normal. I can eat well and sleep well. I think the most severity disease at present is cancer and Aids (HIV) because if you have it you will die recently,… no medicine for them ….cancer and Aids patients can't work, can't eat, can't go anywhere and people will know and disgust. I'm not like that.'(Nongnuch)

In addition, several participants have the experiences of talking to their family, friends and other people with diabetes about the disease while waiting in the queue at the hospital. They perceived that diabetes mellitus is a normal disease which everyone can have, due to the number of patients who come to the diabetes clinic in each time.

'I talked to a patient at the diabetes clinic and he thought the same as me that everyone can have this disease. I looked around myself and …. yes… not only me who have this but also many people.'(Pimpa)

'It's not only me…I looked around the waiting room and found that many people have diabetes so I feel it's normal.'(Werapan)

'Everyone can have this disease, see?!!... when I go to see the doctor I notice that there are a lot of patients and I think it's not only me then I feel relief.'(Santi)

Some hill tribespersons with type 2 diabetes mellitus perceived having diabetes mellitus as being "normal" like other people. This is because of their work capacity, and their personal belief that everyone is born with at least one disease and diabetes mellitus is not as serious a disease compared to cancer and HIV for example. In addition, talking to other people and perceiving a large number of people with diabetes who come to receive health care at the same time and place makes having diabetes appear more commonplace to this group.

3) Having bad blood 'it means we have bad blood'

'Having bad blood' in terms of the hill tribesperson's meaning is not related to the super natural but it is about the women's health. One of the traditional beliefs of hill tribespersons is that an individual's health depends on the blood system. After having experiences of 'Lom-Pid-Duan', two of the participants believe that 'Lom-Pid-Duan' is related to the malfunction of the blood system. They defined 'having diabetes' as 'having bad blood' because they believe that diabetes mellitus is related to their blood. This is because the indicator of diabetes control is the fasting blood sugar level, and the past sickness experiences of 'Lom-Pid-Duan' which they believe is the cause of diabetes mellitus.

'If the doctor diagnosed that we have diabetes, it means we have bad blood in our body. It can't be changed to be a good blood because we had 'Lom-Pid-Duan' that I told you at the beginning.' (Paboo)

'Diabetes is we have bad blood. We have sugar in our blood. When we knew we had diabetes, we checked from the blood and every time we go to see the doctor, we must check the blood, so we still have bad blood because we still have diabetes and it is incurable.' (Manee)

This cultural belief not only directly affects the causal belief of diabetes mellitus, but also the meaning of the disease which some female participants defined. Therefore, it is important to use this finding for diabetes care in this ethnic group.

4) Incurable disease 'if I died, it would die with me'

The meaning of diabetes mellitus as 'an incurable disease' is constructed by health professionals and participants from the first time that the participants were diagnosed to make them understand the implications of their disease. When the health professionals informed the patients that diabetes mellitus is an incurable condition, several participants accepted this and perceived that they had to live with diabetes mellitus until they died. This is how the participants make sense of their conditions.

'It cannot be cured. I remember that the doctor told me when I first diagnosed. I have to take medicine until I die. If I die the disease would disappear because we will die together.'(Varapone)

'Diabetes is incurable disease. I have diabetes in this life so it will be disappeared in the next life.'(Malinee)

'The doctor told me it never disappears from my life. I have to live with diabetes until I die. If I died, it would die with me.'(Phaka)

The participants defined "having diabetes" as having to live with this disease until they died due to chronicity which they perceived from health professionals. They also perceived that diabetes would not follow them into the next life which meant this disease would die with them.

In describing the meaning of having diabetes mellitus participants reported these in various aspects. The participants held a variety of different views when describing what having diabetes mellitus meant to them. Many of these were negative, such as 'being different from other people', 'having bad blood' and 'incurable disease'. Views such as these may be understandable because no individual wants to experience the negative effects of being sick (Pujilestari et al., 2014). The findings, especially in the sense of 'being different' and 'incurable disease' were similar to previous studies that have been discussed in various settings. For example, in the qualitative study of Chiangkhong, Doungchan and Intarakamhang (2018) who reported that the rural patients in Thailand perceive diabetes mellitus as having made their life difficult and to be untreatable. In addition, studies among ethnic groups and majority population in other western and eastern countries showed that the patients viewed their disease negatively (Alzubaidi et al., 2015; Hjelm et al., 2012; Jones & Crowe 2017; Issaka et al.,2016; Lakshmi et al., 2014).

A new finding emerged from this study, relating to the cultural practice of one hill tribe in particular, that of having 'bad blood' because of' 'Lom Pid Duan sickness', as described earlier. The practice maintained that the female, postpartum must sit over a fire for one week to keep warm and that only a basic, rice-based diet was allowed, with many foods being forbidden. The belief, unique to this group and with no evidence amongst their culture to support it, was held among females that if they left the fire before the allotted time and ate these forbidden foods, thus disobeying their culture, the sickness would result. Their perspective of diabetes mellitus also impacted on their health behaviour because they continued to drink local alcohol in the belief that, as it contained herbs, it would not affect their health status of 'having bad blood'.

In addition to the meaning of having this disease, participants reported another view as 'being normal like other people'. This finding indicated that they did not worry about their health as health professionals expected. This is because they perceived the illness from their working capacity and visible symptoms therefore, being diabetes patient was not different from other people as long as their ability of working was the same as before diagnosis. Similarly, many previous studies among minority groups worldwide showed that these groups tend to underestimate the serious consequences of T2DM, especially in people with a low socioeconomic status (Abubakari et al., 2013; Alzubaidi et al., 2015; Arcury et al., 2004; Foss et al., 2016;2015; Yilmas-Aslan et al., 2014). Consequently, this perception of hill tribespersons should be an important factor for tailoring an appropriate intervention to make them aware of the possible consequences of the disease and to make them aware of good self-management especially, when symptoms are not present.

Most of the participants explained that having diabetes does not make them different from ordinary people and that everybody has at least one illness. Consequently, this group of hill tribes people do not realise the importance of blood sugar control because they see it as something inconsequential. This correlates with the studies in other rural areas in Thailand and countries in South East Asia. The female participants who do not understand the cause of their illness, usually believe that having diabetes is due to contaminated blood in the body and connect it with 'Lom Pid Duan sickness'. The thoughts and beliefs of these people are as a result of their observations and experiences, which are then selected and transferred, resulting in changes from the culture experienced by older generations, in comparison to the current one. Living with nature, the hill tribes perceive the deterioration of human organs as something natural and which happens all the time without knowledge or science being able to prevent it. The concept on this thought and belief is the idea of an acceptance of the deterioration of human organs and only considering solving problems they currently have. Kluckhohn (2001) states that the approach of Eastern cultures is towards harmonisation and an acceptance of the decline of human bodies and organs, as well as the idea of time being oriented towards the present. In contrast, Western culture denies illness and ageing by adopting the concept of being future-oriented. As a result, the hill tribes do not see the importance of preventative measures for the future stages of their illness until the symptoms occur and have an effect on their daily lives. The basis of this can be seen in their belief that diabetes mellitus occurs from natural causes and not from pathogens.

As a medical concept, diabetes mellitus has a direct impact on the health of the patient, leading to future complications and costly economic impact. On the contrary, the hill tribespersons often do not recognise diabetes mellitus as a disease that they have to monitor. They perceive their illness to be insignificant because they are more likely to give meaning to their illnesses in the context of their ability or inability to perform their daily tasks rather than suffer anxiety regarding possible future implication of the conditions. Thus, in people with diabetes without severe effects of the disease, the patient recognises minor symptoms as nothing more than a routine illness, not sickness or disease. This is because individuals are still able to live their usual lifestyle (Cockerham, 1978). Moreover, Gordon (1966) suggested that illness is also a view of social dimension; Non-violent diseases, and the causes of the disease, as well as their treatment, are classified as "Not sick but not comfortable", so these patients might give their symptoms differing medical importance, depending on their social and economic status. Low social status groups have more barriers to treatment due to their financial constraints and refuse preventative measures because of economic pressures. In addition, this group requires more treatment services than those in higher social status groups (Abrams et al., 2009; Alzubaidi et al., 2015).

5.2.3 The beliefs and knowledge of diabetes mellitus related complications in hill tribespersons with types 2 diabetes mellitus.

This theme is related to the perceptions of severity and susceptibility of diabetes mellitus complications. All participants did not know the word ‘complications’, they only knew uncontrolled diabetes mellitus leads to blindness, limb amputation and kidney disease. Unexpectedly, most of them believed that kidney disease is not the result of uncontrolled diabetes mellitus, but it the consequence of overtaking diabetes medication.

‘I don’t want to lose my feet or my eyes and moreover..you know I think taking too much of diabetes medicines affect to our kidneys but how can I avoid ?! …it is because diabetes patients have to take tablets every day.’(Aree)

‘Taking too much of diabetes tablets will destroy our kidneys…look!! I have to take all of these (show her tablets) each meal.’(Paboo)

The findings show that participant’s perception of the severity is not congruent with their perception of susceptibility. However, a participant with an existing complication has a high-risk perception of diabetes complications. Two sub-themes are presented below.

1) Perceived severity ‘I fear becoming blind and disabled’

The findings reveal that participants have a high perception of the severity of diabetes complications. From the Health Beliefs Model point of view, participants articulated their beliefs of how serious diabetes is and its’ complications, based on receiving information from health professionals and their experiences. All participants receive health care services at the diabetes clinic, so they can see people with diabetes with serious complications, such as those with limb amputation and blindness in the waiting room. Some participants perceived severity by word of mouth about other people with diabetes who are severely ill with kidney failure in this community. Many of them stated that they were fearful that this would make them blind, disabled and bed-ridden. In addition, these complications would affect not only them but also their family members who would have to look after them and who they have to look after.

'I fear becoming blind and disabled. If you go to the clinic, you would see many patients are waiting for the queue and you would see one or two patients with a leg amputated or a blind…..errrrr….I can't imagine if I had to be like them.'(Nongnuch)

'For me I think I fear about the eye problem because it can make me blind and I won't be only a diabetes patient but also the disability. That's the fear and it's awful.'(Wila)

'Yes…, I'm very fearful of kidney disease. There is an example in our village from word of mouth, people talked about a person with diabetes and later she had kidney disease so she had to go to Chiang Rai hospital for cleaning her kidneys. Now, she can't go anywhere, can't eat anything except rice soup and her children have to look after her….mm(deep breath) poor her…I don't want to be like her.'(Busaba)

Several participants offered the explanation that they do not fear diabetes but are aware of being bed-ridden which they perceived to be worse than death due to being a burden on their family members.

'….the worst thing is the thought of being severely sick in the bed all day and all night. I'm also scared this will happen to me. My wife has to look after me and also my son. I don't want to bother them.'(Natee)

I'm not scared of death but before death I'm scared of blindness and kidney disease because it's incurable and one day if I had to lay on the bed …like… paralysis….I think I will be the problem of my family.'(Werapan)

To be a burden on their family is the aspect that these participants are most afraid of. This is because most of them have a low socio-economic status. Having a bed-ridden or disabled person in the family means the family members have to look after them which may also have financial implications.

The findings highlight that the participants have perceived a high severity of the condition, in terms of disability which means being a burden on their family member is worse than death. This finding indicates that this perception of these participants is not only about medical but also social consequences which have a greater effect on them. The present finding seems to be consistent with other research which found people with diabetes would rather be dead than disabled (Phrompayak et al., 2017; Wiriya et al., 2018). This is because of the value of hill tribespersons, people who do not work are deemed to be useless (Dusanee, 2001) Furthermore, most of them have a low-economic status therefore, being dependent people in a poor family makes them feel guilty and useless.

2) *Perceived susceptibility 'I'm not like those patients because I have dry diabetes'*

Although all participants perceived the seriousness of diabetes complications, most of them (n=15) were unconcerned about what would happen to them in the future. This was because they perceived that there was 'a chance', not 'a certainty' that if they took care of themselves, they would not get complications. The participants categorised themselves into two kinds, which were not based on medical fact but their own perception. The two kinds consisted of 'wet and dry' diabetes by the characteristics of their wounds. 'Wet' diabetes patients referred to those who take more time to heal or have a slow healing wound that leads to infection. As a result, they may have an amputation. Participants believed that patients with wet diabetes also have a high risk of other complications. Conversely, 'dry' diabetes patients referred to those whose wounds can heal easily so they did not have the risk of amputation and other complications. All participants indicated that they had 'dry' diabetes by noticing the healing duration of their wounds after an accident or injury. However, they still had to be cautious about taking care of simple cuts and wounds even if they believed that they had the 'dry' type of diabetes. This was because it affected their work, for example they could not water their farm plants due to it exacerbating their condition. Moreover, two participations self-tested by stabbing a small bamboo pin in their body and took note of the wound and duration of healing. If it healed easily, they identified that they had 'dry' diabetes. This would mean that they would not be at risk of amputation and had a low risk of complications. This approach was not based on medical fact.

'The doctor didn't say that I have 100 % to be blind or I will have kidney disease so I think if I take care of myself well, I won't have any disease from diabetes.'(Somrit)

'I'm not worry about these. I'm not like those patients because I have dry diabetes. You know….it's not bad. I noticed that my wound is normal….it's heal like normal people…It means I won't have disease from diabetes'(Pimpa)

'I still have to be careful of my wound, I didn't ignore but the wound still easily heal by itself that make me feel relax… '(Paboo)

'I put bamboo pin in my arm and it was bleeding then I noticed that it's dry wound. No need to put Betadine (Antiseptic solution)…yes!! I have dry diabetes. I don't have wet diabetes like other patients. I'm so happy.'(Phaka)

Only one participant was aware of the developing diabetes complications and viewed herself as being at high risk for blindness because she had had the vision problem for two years.

'I don't know what happened to me. First time, I think it's because of my age that make me can't see properly. The doctor told me that I can't control my sugar levels so this is the result. I nearly am being blind in everyday… I need to be careful in everything that can make me blind from this disease.'(Manee)

The self-classified concept of "wet" and "dry" diabetes is completely incorrect. However, they try to rationalise their illness in this way to make themselves feel better. This is because having 'dry' diabetes is perceived to be less serious than "wet" diabetes. This influences their health behaviour because they perceive themselves to have a low risk of amputation and other complications.

The participants classified their diabetes mellitus according to their belief and understanding of the disease into two types as mentioned above. This is obviously different to the medical classification used by healthcare professionals which is based on scientific training. In medical terms, diabetes mellitus is classified into four types according to the World Health Organisation (2016), the first is type one or insulin dependent diabetes, secondly type two or insulin non-dependent diabetes, thirdly Gestational diabetes and lastly impaired glucose tolerance and impaired fasting glycaemia (see last chapter for explanation of each type). However, from the point of view of the hill tribespersons, diabetes mellitus is classified by the severity of the disease which is observable and visible to the eyes, into 'wet' and 'dry' types. Those patients who do not have a wound or wounds which can be quickly cured consider themselves to have type one or the 'dry' type of diabetes which is mild. Those who have wounds which are slow to heal, or severely inflamed possibly leading to amputation and the loss of a limb, deem themselves to have type two or 'wet diabetes'. The classification takes shape according to the experience and beliefs of the patients' themselves, as well as their diabetic friends they talk to at the hospital and other people in the community. Such beliefs and classification of disease severity affects the way patients take care of themselves.

In other words, patients who have type one or 'dry' diabetes may believe that they have a mild form of the disease. They fail to realise the importance of self-care advice given by health professionals and also fail to understand that their diabetes can worsen, leading to future serious complications of which they wrongly believe they are not at risk from. At the same time, patients who have symptoms which they believe are those of type two or a more severe type of diabetes may be discouraged because they think their disease is serious. Their loss of hope can lead them to neglect to follow self-care advice. The classification of diabetes in modern medicine is entirely based on scientific principles of the disease without any reference to its context of society or culture. Such principles are beyond the understanding of most, if not all, hill tribes' patients.

The elderly patients, and those with limited language and other communication skills, can only base their understanding of the disease on what they have seen, experienced, or been told by their family and friends. They adapt their health behaviour and care for themselves or their relatives according to their belief and understanding. Once patients believe that they have type one or the dry or mild disease, they may not understand the fact that all diabetics run the risk of suffering serious complications if the blood sugar is sustained at high levels for too long. They may neglect to follow a diabetic diet recommended to them, ignoring regular blood tests, eye, blood pressure and other health checks. The participants may not feel the need to attend the diabetic clinic or hospital check-ups. They may feel well for some years and only seek medical attention when they become symptomatic with acute or chronic complications which may by then be quite severe.

This group may be shocked when they experience severe effects of diabetes mellitus, such as an infected foot ulcer or loss of their sight. Similarly, these findings conform to the studies of Naemiratch and Manderson (2007) and Phawasuthipaisan et al (2011) which stated that their patients in Thailand also classify the type of diabetes mellitus according to the wound condition they experience.

Although the participants have a high perceived severity, they have a low perceived susceptibility. This sub-theme indicated that participants were unaware of the risk of complications, as a participant reported ‘I’m not like those patients because I have dry diabetes’. They refused to believe that they would get complications due to their own perception which classified diabetes mellitus into two types, namely ‘wet and dry’ diabetes mellitus. This sub-theme was supported by the findings from health professionals which reported that a problem of working with this group is the patients have low awareness of the complications. This classification has direct impact to the perception of susceptibility and their self-care behaviour. Those who perceive that they have wet diabetes mellitus tend to control their disease better than the other type. In accordance with the present result, previous studies have demonstrated that both Thai and some South East Asia diabetes patients define this disease based on the characteristic of wounds (Bith, 2004; Choowattanapakorn & Suriyawong, 2012; Phawasuthipaisit et al., 2012; Naemiratch & Manderson, 2007).

These findings also support by the results from health professionals’ focus group discussions which stated that ’’the awareness of patients’ disease is low.’’ The health professionals perceived that awareness about diabetes in the hill tribesperson patients is essential for them in controlling their blood sugar levels and in the prevention of complications. Importantly, the health professionals indicated that the patients are unaware or have low awareness. The period of having the disease might impact on their awareness as well as their desire and hunger.

'The patients are unaware of their health. It depends on the period they have had diabetes too. From my experience, in the first three years they are driven to look after themselves, after three years they will be familiar with the disease, then the awareness is lower. They are still taking medicines and going to see the doctors but if we talk about the health behaviour, it's no way.' (Staff 6)

'They are familiar with DM and stop controlling their food because they don't see anything changing too much. They think that the blood sugar levels is just a number, yes it's high … it is in the red colour but they still work like general people so they think it's ok for them. In the fifth year they will have the complications especially in the Lisu group, I noticed that they will have a problem with the kidney in this ethnic group.'(Staff 5)

'Some people know the things they shouldn't eat but ignore it. From my experience the patients just come to see the doctor and get medicines and after that they will mmm Hooray !! they can eat anything they want to eat.' (Staff2)

'Somebody know that Khao Lam (Sticky rice with coconut milk and sugar) can increase blood sugar levels but he didn't bring any food from home. After blood testing he was hungry so what can he do?...Ok Khao Lam !! Even though there were many foods which are better for them than Khao Lam and it was free, they still chose Khao Lam. (Staff8)

'For example, when we suggest the foods they can't eat too much of, such as Khao Lam, Klouy Thod (banana fried with coconut) and Thai dessert. Or that they should avoid these foods, mmmm you know after they leave the room, while they are waiting for the medicines, they buy these foods from a female vendor. How can I explain this phenomenon, it's only a few minutes after I told them?'(Staff3)

Furthermore, the patients do not have the awareness of the complications from diabetes mellitus. They think the health professionals give the examples to them because they want to scare them. Surprisingly, they think 'it's just dying at the most' if they face up to the complications. Some health professionals mentioned:

'For example, the patients get sick or have disease or they know something abnormal is happening to them but they don't come to the hospital because they are unaware of their health, unaware that is the complications of diabetes. Finally, they come to see us but the prognosis of the disease is worse and we can't help so we have to refer to Chiang Rai hospital. This is the outcome of unawareness of their health.'(Staff1)

'All the patients are unaware of the danger from the complications if they don't look after themselves. Even though there is an example of a patient who had to have to his leg cut off and have complications in the kidney in this community. When they knew about this case, they felt scared at the beginning but later they were unconcerned about the complications. They always think 'I'm not the same like him and if I have to die, I will just die'. But they forget before they die, they have to face the suffering from the complications.'(Staff2)

'The DM patients thought we tell them because just want to make them scared but actually we intend to increase the awareness. We showed them this case to explain why he became like this and that because he didn't look after himself and change his behaviour. However, the patients don't change their behaviour. They just think at the end they will die but they don't think about the route before they die.'(Staff3)

Health professionals perceived a low awareness of the disease as a significant barrier. Proper diabetes care requires an awareness of the nature and complications of the disease (Nazar et al., 2016). Previous studies have demonstrated that low awareness regarding diabetes mellitus among patients affects their ability to self-manage their disease and increases the risk of a poor clinical outcome (Deepa et al., 2014; Nazar et al., 2016; Khapre et al., 2011; Rujul et al., 2012).

Diabetes mellitus treatment and management is the focal point to a huge extent for the health services by health professionals because patients frequently neglect to follow self-care instructions. This means the patients may develop complications which could be avoided. The question of why this group are not accessing the health care available to them as thoroughly as they could be still remains. The findings of the study discuss some aspects of the 'Health Belief Model'. Gochman (1982, 1997) defined health behaviour as

''those personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behaviour patterns, actions, and habits that relate to health maintenance, to health restoration, and to health improvement'' (Gochman, 1982, 1997).

This definition proposes that individuals continually attempt to be healthy and prevent themselves from developing any negative symptoms.

The findings demonstrated that the participants reported that they were fearful that diabetes mellitus would make them blind, disabled and bed-ridden (perceived susceptibility). Furthermore, they were concerned with the complications and severity of the disease (perceived severity) at a low-level, and they also recognised that diet could play an important part in improving their health.

Moreover, they were also aware that in the case of developed disease, the family and their financial affairs would be affected in a negative way (perceived benefit of self-care behaviour). In terms of perceived barriers, they thought that they could not control their consumption behaviour when they had large village festivals at certain times of the year. These perceptions from the Health Belief Model are powerful in influencing patient experience and their definition of health and illnesses (Albrecht et al., 2003; Glanze et al., 2006). The culture might be playing an important role to defining their health, particularly in the cause of disease and participants' health behaviour (Brathwaite & Lemonde, 2016). These findings revealed that participants perceive their disease based on their perceptions of the symptoms experienced.

From the Health Belief Model perspective, participants revealed their strong beliefs regarding diabetes mellitus and some participants distrust of advice given by health professionals. From the participants' point of view, they articulated their beliefs of how serious diabetes mellitus is and its complications based on receiving information from health professionals and their own social circle of close family members, distant relatives, friends, and other acquaintances with diabetes mellitus as well as their own personal experiences. Moreover, the findings of this study revealed that diabetes mellitus is perceived as a serious disease that passes from generation to generation and is a consequence of negative behaviour including, 'unbehave' after giving birth, which is a cultural belief in some females of this group. Participants have a good perception of the severity and realise that terrible complications can develop with the disease. However, the perception of susceptibility is low due to them having their own perception about the characteristics of wounds, called 'Wet' and 'Dry" diabetes mellitus which can identify and assess their health status. Balancing their food consumption with a reduction in sweets foods and soft drinks and eating sour or bitter foods or drinking a lot of water after over eating foods they should avoid, are believed to control their blood sugar level.

In referring to the Health Belief Model, Jans and Becker (1984) state that preventive health behaviour is predicted by the following three sets of beliefs: perceived susceptibility, perceived severity, and perceived benefits or barriers (Bury & Gabe, 2004; Glanz et al., 2008). In this study, the participants believed that they would not develop the disease unless they had 'wet diabetes' (perceived susceptibility), they were scared of the disease, and its complications that would make them disabled or blind (perceived severity) and they believed that reducing some sweets foods would improve their health and were aware that if they developed the disease, it would be a burden on their family (perceived benefits). These three constructs of beliefs in the Health Belief Model are powerfully influenced by how people define and experience health and illnesses (Albrecht et al., 2003). Culture may play a role in determining a community's health by means of either improving health or causing disease (REMacLachlan, 2006; Napier, 2015).

In hill tribe culture, disease is only perceived if people feel or see the effect of the disease on the body and if it impacts on their ability to work. This is confirmed by the fact that participants explained “having diabetes mellitus” from their feeling and work capacity. This might explain why most participants have an unrealistic optimism about their own risk, because most of them stated that they did not feel or see the symptoms of the disease. Lay theories about the cause of illness usually suppose that illnesses can be caused by the individual, the natural world, the social world, the supernatural world, or a combination thereof (Helman, 2007). The experience of illnesses is affected not only by the individual’s perceptions but also by society’s perceptions (Albrecht et al., 2003). This study reveals that the participants believe that the origin of diabetes mellitus lies within the individual. They believe that diabetes mellitus is caused by individual choices, for instance heredity, food consumption, over-used chemicals or postpartum behaviour. Therefore, the responsibility falls on the ill individuals themselves.

5.3 Objective 2: To explore the experiences and self-management of people with T2DM in this group.

Living with a chronic condition, diabetes mellitus is challenging as health behaviour must be adjusted to daily life and individual health. There are several factors which affect methods of self-management in this ethnic group, such as knowledge, experiences and socio-cultural aspects. The analysis of transcriptions yielded six themes relevant to the experiences and self-management of hill tribespersons with type 2 diabetes mellitus: (1) experience of being diagnosed (2) dealing with food and beverages (3) compliance with prescribed diabetes medication (4) exercise behaviour and (5) dealing with complications.

5.3.1 Experience of being diagnosed.

This theme relates to the experiences of the participants’ symptoms before they decided to see the doctor and their perceptions from the first time they knew they had diabetes. The sub-themes comprise of the experiences of the patient pre-diagnosis and their feelings after first being diagnosed.

1) Experience of the patient pre-diagnosis

A majority (n=8) of participants reported that they experienced symptoms of diabetes at the onset, such as urinating more often than usual, excessive thirst and feeling fatigued. Three participants reported that they had itching around their vagina. Five participants were first diagnosed through a routine diabetes screening. Before making the decision to ask for a physical check-up, the participants noticed the changes which were occurring in their bodies. Some participants suspected that they had diabetes due to a family member or acquaintance already having the disease, while some participants had no idea about their sickness. The participants reported they consulted their relatives or friends who have diabetes mellitus, however, they also went to the hospital for check-ups to get peace of mind for themselves and their families.

' Ahh…. My apologies for the next thing I will tell you. I was very itchy in my vagina and usually felt dizzy, then I thought it was strange because I've never had them before. For peace of mind, a few days later I went to the hospital. The doctor also asked me the reason why I wanted to have the diabetes test. After that, I was diagnosed with diabetes.'(Varapone)

'I felt exhausted so I asked my sister in-law what were the signs and symptoms of diabetes. She told me that it's different for each person, some have to go to the toilet more than usual, some often feel thirsty. In my case I went to the toilet more than usual and a week later I went to check because I wanted to know what was happening to me and because my daughter urged me to go.' (Wila)

'A health volunteer came to see me and told me about the campaign of screening for diabetes and hypertension at the hall of the village in the next few days. I went there and found that I had diabetes' (Somsri)

The participants had experiences of varied symptoms before diabetes mellitus was diagnosed. The majority of them had symptoms of diabetes at the onset. In addition, it is important to note that a routine diabetes screening in high risk groups, such as people who have diabetes patients in their family is a useful method to screen and identify patients for effective diabetes care.

2) The feeling when first diagnosed 'indifferent, shocked, upset'

The participants were diagnosed with diabetes mellitus by the health professionals and three groups of these patients were categorised based on their feelings after first diagnosis. The first group were the participants who felt 'indifferent' about their disease. Even though diabetes is incurable, most of them believed that the doctor could treat them by providing diabetes tablets which would enable them to work the same as usual. Before their first diagnosis, participants in this group knew about the condition from family members or relatives and friends who themselves had diabetes mellitus. Because these people did not experience problems living with the disease, the participants perceived that it was not serious. Conversely, the second group was 'shocked' because they did not expect to have the disease and worried that their life would change from now on. The last group were 'upset' after being diagnosed because one of their parents had diabetes and therefore they perceived the main cause as being genetic. In addition, they were suspicious of why they and other siblings had developed the disease while other siblings had not. Furthermore, the participants who were under 45 years old felt more upset because they thought they were too young to have diabetes. Nevertheless, all participants accepted the diagnosis.

'I recognised that I felt indifferent. I just accepted that I have diabetes. I believe that the doctors can treat me by giving me some medicine. I can work the same and go to the farm as always.'(Busaba)

'I was a little shocked because I've never thought I could have this disease and I was worried about it. I questioned how I can get this disease because I'm not fat and don't eat too much sugar, Can I live with this disease? I questioned whether I can still work like normal people. I felt I am going to be weak. But I had these feelings only when first diagnosed.'(Natee)

'I prepared myself to get the result but was still shocked at first, I am only 36 years old so how can I have diabetes….it's too early to get diabetes. Later I thought that one day I would have diabetes because my mum has it and it's genetic. I can't avoid this but I have two brothers and two sisters so why I am the only one who has this disease.'(Wila)

The experiences regarding diabetes mellitus before diagnosis is a factor that affects the reaction of the participants. Therefore, correct information from various resources is necessary for the newly diagnosed patients.

5.3.2 Dealing with food and beverages

All participants reported their basic understanding that one of the causes of high blood sugar levels was eating 'foods they should avoid'. Therefore, they have made changes to their lifestyle since being diagnosed with diabetes, especially in terms of food and beverages. However, two participants described that sometimes they are confused about the true cause because their blood sugar levels were high even though they controlled their diet. Unexpectedly, one participant also believed 'having sex with her husband' could increase blood sugar levels because she noticed that her blood test results were usually high after that activity. Nevertheless, all of them controlled their diets very strictly for a week or so before their appointment to see the doctor. Afterwards, when they knew the result of their blood test they usually increased their consumption of sweet foods.

'I wonder sometimes I didn't eat fat food and sweet food but why my sugar level still high?!'(Somrit)

'I noticed that when I had sex with my husband before going to see the doctor, the result of my blood was not good. It was high and higher than usua.l'(Nongnuch)

'I have to control my diet before the appointment day at least a week before the day and very strictly before checking my blood errr…and I feel release when it finishes because this means can eat some sweet foods.' (Santi)

Generally, the participants did not appear to eat snacks but consumed local hill tribe food for three meals per day. Each meal consisted of boiled rice as the main food and two dishes including chilli paste and stir-fried vegetables or vegetable soup or curry with meat such as chicken or pork. Their side dishes were normally a large amount of raw or boiled home-grown vegetables. However, meal times were variable according to their daily lifestyle, for example, in the harvest season they had breakfast in the early morning before going to work on their farm, had lunch very late or when they were very hungry or experienced symptoms such as shaking hands and dizziness. This was because they had to work against time or wanted to work as much as they could. As a result, they forgot to take their medicine and consumed a lot of food which caused their diet to become erratic. Moreover, the participants who were farmers needed more energy to be able to work effectively. Therefore, they added seasoning to their rice in order to make it more appetizing so they could eat larger portions. Most of them knew the food and beverages they should avoid, for example Thai desserts, durian and soft drinks. Nevertheless, they still didn't understand that some vegetables and fruit contain high levels of carbohydrate, such as pumpkin and yam bean and should not be consumed in unlimited amounts. They also lacked knowledge regarding appropriate portion sizes.

'the doctor said 'don't eat too much rice and some sweet foods but I don't know what is too much or what is too less. I just know I have to eat because I have to work, as you now can see I work very hard in the farms, so I need to eat a lot.'(Varapone)

'Sometimes I forget to take my tablet because I have a lot of work to do for example when I collect coffee bean I have to collect as much as I can because it's a lot of money and the coffee bean does not wait for me.'(Pimpa)

'I avoid some sweet foods such as Khong Wan (Thai desserts). I eat pumpkins instead because it's vegetable and I put just a little bit of sugar on them.'(Werapan)

Figure 4 Local hill tribe's food

When drinking beverages, most of them were aware that they should avoid Lactasoy (sweet soy milk UHT) and soft drinks but understood, from television advertisements, that Ovaltine contains some nutrients. Therefore, several participants sometimes drank Ovaltine and also added condensed milk and sugar. Some participants who drank coffee would add sugar while those who drank three in one coffee (coffee, artificial cream and sugar) did not add it. Participants who worked in the coffee factory usually consumed energy drinks provided by the owner. Those participants who drank coffee or energy drinks ignored the potential for negative effects on their health. This is because they had to work hard on the farm or coffee factory and believed they were necessary in order to maintain their energy levels. These same participants however, were aware they should avoid soft drinks and were able to control their consumption when they did not have to work.

'I don't drink Lactasoy because it's too sweet for me and I don't drink Nam Som (soft drink) either. I only drink Ovaltine because it's good for me. I can see the benefits of Ovaltine from the advertisement in television. I put just a little bit of sugar and put some condense milk. I think condensed milk is better than sugar.'(Somsri)

'I drink three in one coffee without adding some sugar, it's ok for me but when I drink coffee I will add just a little bit of sugar.'(Aree)

'My work place provides some energy drinks that's very good for me because I have to work very hard and I need to maintain my power… but I don't drink when I am at home. I know all energy drinks are not good to my health but if I work I have no choice.'(Natee)

Figure 5 Three in one coffee.

Figure 6 Energy drinks.

In addition, male participants were informed they should avoid alcohol but were unaware of how these beverages might affect their disease. They believed that spirits are less harmful than beer and continued to drink them, although only during festivals or ceremonies. They normally drank all types of spirits including locally brewed ones, such as rice or corn whisky. Female participants believed they should drink only local spirits because they were made from plants with some herbs added. The assumption was, therefore, that they provided some health benefits hence they did not avoid them when they took part in their festivals or parties. At all events, males and females would separate from each other because of their culture which creates a hierarchy and attaches importance to the male but not the female. The added consequence of this separation is that they also do not mix their food and beverages, but each group consumes the ones they believe are less harmful or contain benefits for their health.

'I know I should avoid alcohol drinking, the doctor told me it's not good for people with diabetes so I only drink during Kin-Khaow Mai festivals or our ceremonies. I personally think spirits are less harmful than beer because beer can make me fat and our local spirits contains of some herbs.'(Natee)

'I only drink spirits…I mean only rice or corn whisky which we made by ourselves because we added some herbs in our spirits.'(Werapan)

Figure 7 Males in a party with food and beverage.

Figure 15 Females in a party.

Figure 16 Food and beverages in a party.

In their daily life, the participants used a variety of methods to deal with their diet. These can be divided into two, as presented below.

1) *Eating everything as usual but with a reduction in portion size.*

After being diagnosed with diabetes mellitus, all participants adjusted their food and beverage consumption by reducing the proportion of certain sweets foods and fruit containing high levels of sugar, for example Roum-Mit (flour with syrup and coconut milk), longan and ripe mangoes as well as high fat foods such as belly pork. Although they reported a reduction in the amount of sugar and seasonings, such as soy sauce and monosodium glutamate they were using, the actual amounts they added to their food is still unclear. Furthermore, they ate breakfast and dinner with their families both for economic and social reasons and this made it difficult to control some of the ingredients being added to their foods.

Most participants believed that monosodium glutamate made the food tastier but knew it might increase their blood sugar levels. As a result, they attempted to add less but were unable to eradicate it completely. The participants who worked as agriculturists prepared rice from home and made dishes which they cooked at their work place. Those who worked in or around their homes or didn't work at all would make lunch from the leftover food from breakfast.

'I eat the same as my family members but I try to eat fewer longans, mangoes and desserts.'(Manee)

'Since I have had diabetes. I still eat everything I want to eat but I eat less than ever. For example, previously I ate three to four mangoes but now I eat only one mango. At present I drink one bag of coffee with less sugar daily.' (Phaka)

'We eat breakfast and dinner with my family so it's hard to control our diet because we have to think about the other members. I won't complain about the food that my daughter cooks for everyone.'(Somsri)

'I don't know how much seasoning powder my daughter put in the food, she just said I put in less for you. I don't want to cut it out because it makes the food more delicious.'(Somrit)

Figure 17 Roum-Mit (Dessert).

Figure 18 The hill tribespersons share their food with each other when they go to work on their farm.

Moreover, control of diet in these participants is related to their self-efficacy, which is a sense of people’s confidence in their ability to self-manage on a daily basis. All participants believed in their capacity to control their food and beverage intake on a daily basis because their locally grown food does not contain high levels of sugar. However, they occasionally reported that they did not have confidence when they had to work hard and during festival periods or ceremonies. All participants, except for a health volunteer, explained that they could not control their diet while at a party or festival. The reason for this was that there were many ‘good foods’ such as Larb (Mince pork with some seasonings), Kha-moo (pork legs soup) and desserts such as cake and other Thai desserts, as well as alcohol and soft drinks. All participants perceived ‘good foods’ as foods which they rarely ate except during these events because of a lack of opportunity, the cost involved and the difficulty in cooking them. Most of them tried to eat less only when they had an appointment at the hospital that week. However, some of them did not care about food consumption because they wanted to ‘get the most out of it’. This refers to their culture of participating in any ceremonies, such as weddings and house warming ceremonies when all guests are required to put money in an envelope for the host so the participants can then eat as much as they like. Furthermore, all participants reported that they had high blood sugar levels during festivals such as Kin-Khaow-Mai and New Year because they had to participate and could not control their diet.

'I've confidence to control my diet when I'm home but at the party I can't do that because there are many of good foods and we pay for them.'(Paboo)

'We paid for the ceremony didn't we, so why do we have to starve? But if we had to go to see the doctor in that week, we would need to be careful what we eat.'(Aree)

'No doubt, if my blood sugar is high during Kin-Khaow-Mai festival it's because I really can't control it.'(Busaba)

Figure 19 Food in the Kin-Khao-Mai festival.

All participants had difficulty in controlling their diet. They found dealing with this the most difficult aspect of managing their blood sugar levels as they were often hungry and craved sweet foods. They described the foods they were advised to eat by the healthcare professionals as smelling and tasting very bad and therefore they continued to eat the food they always had but reduced their portion sizes.

2) Eating sour or bitter foods after too many sweet foods.

A commonly held belief in all the participants was that they should eat sour or bitter foods after consuming sweet foods, such as desserts or other foods containing high levels of sugar. Because of their belief in folk medicine it was thought that foods that were the opposite to sweet, such as sour or bitter, could erase the sugar from their bodies. Most participants therefore, would eat sour fruits like raw mango, tamarind and lemon as well as raw and cooked bitter vegetables such as Neem leaves.

'I am Bao Wan (diabetic) and wan (sweet) is opposite to som (sour) so I always eat lemon juice or raw mangoes after eating too much sweet food. I think it will erase the sugar.' (Varapone)

'Our local folk wisdom tells us that bitter is opposite to sweet so I eat Sa-dao (Neem) to fight the sugar in my body.'(Santi)

This finding indicates that hill tribespersons with type 2 diabetes mellitus have been influenced by their folk medicine. Although they receive information about diet for people with diabetes from health professionals, they still apply folk medicine to their own lives.

3) Drinking a lot of water after eating too many sweet or fatty foods.

When asked how they managed their blood sugar levels after eating too many sweet or fatty foods, most participants reported they would drink a lot of water. They believed that water could clean their blood of the sugar and that it would be eliminated in their urine. In addition, they had heard about the benefits of drinking water from television and therefore it seemed logical to them that water would dilute the sugar in their bodies and in this way, they could manage their disease.

'I drink two to three glasses of water after eating Khong-Wan (dessert) or belly pork. I have heard 'drinking water is good' from the television so I think it's good for persons with diabetes too because I think it can clean my blood and dilute my sugar.'(Manee)

'I know if I eat too many Khao- nom (desserts and snacks) my body will be sick. I must drink a lot of water because I think it can dilute the sugar in my body and it makes me urinate. This is the method I always use to deal with the disease.'(Malinee)

This finding reveals that these participants believed that sugar in the human body can be diluted by water. Therefore, they try to link the benefits of water to their disease to make them feel less guilty after consuming some foods they should avoid.

5.3.3 Compliance with prescribed diabetes medication.

All participants received health care services from the health promotion and community hospitals and most attended follow-up appointments when asked to do so. They believed that the objective of follow-up appointments with the health professional was to examine their blood sugar levels and to receive diabetes medication. As well as providing a health assessment, the health professional could also examine aspects of the patients' self-management and also follow-up on diabetes care from previous visits in order to provide appropriate treatment and encourage good self-care. It was not clear what the participants' expectations of the treatments were, but mostly they were able to recognise their blood test results by the number and colour highlight which appeared on their personal record book.

The olive-green colour meant a very good blood sugar level, green meant a good level and yellow a poor level. A pink colour indicated a very poor level and highlighted the patient as being at risk. All participants reported that if they managed their diabetes according to the health professional's advice, they could control their blood sugar levels. However, all participants believed that taking too much medicine would harm their kidneys. They reported that they often heard the phrase 'don't take too much medicine, it will destroy your kidneys' from people such as other patients, friends, neighbours and relatives. This made them conscious of the quantity of medicine they had taken.

Figure 8 Personal record book for diabetes patients.

In terms of taking medication, there were two types of participant behaviour. These consisted of those who took their medication as prescribed and those who did not.

1) *The participants who took their medication as prescribed.*
   a) Taking only medication as prescribed.

This type of participant perceived that the most important aspect of diabetes treatment was to take their medication regularly and not seek alternative medicine. Some of them (n=4) only used the conventional medicine from the diabetes clinic and took it correctly; at least ten to fifteen minutes before a meal or fifteen to thirty minutes after, according to the health professionals' instructions. When they forgot to take their medicine, which was seldom, they would do nothing and start their next meal without any dosage adjustments. Moreover, these participants, especially those who had lived with diabetes for more than three years had experience of seeking other choices of treatment, such as herbs and dietary supplements. However, whilst trying out these options, they did not abandon the tablets prescribed by the health professionals but took both together because they trusted in the hospital. Ultimately, they thought that the alternative choices were useless and a waste of money and stopped using them.

'..tablets from the hospital are the best, if we take only these we will be fine. I used to try and look for many ways to treat diabetes and I lost some money. I took capsules and fresh herbs but these were rubbish.'(Somrit)

'..I've never not taken my tablet from the hospital even if I was taking food supplements because I still trusted in the medicine from the hospital.'(Manee)

'*The medicine from the hospital is very important. Even though you might have heard about many benefits of herbs from the radio, you can't stop taking the medicines from the doctor.'(Decha)*

These participants took their medication as prescribed which is most important in basic diabetes care. Although some participants had experiences of seeking alternative choices, they did not neglect the medication from the diabetes clinic.

b) Taking medication as prescribed and using herbal or dietary supplements.

Although all participants were told by the health professionals that this disease could not be completely cured, most still hoped it could happen eventually. Only one participant used herbs and dietary supplements which her daughter had sent from Bangkok. She felt guilty for not taking them as they had cost a lot of money but reported she did not notice any benefits from using them and had asked her daughter not to buy any more.

Some participants had experience of using the herb 'Jiao-Gu-Lun' because they had heard about the benefits from an advertisement on the local radio and through recommendation from friends and their family members had bought it for them. Six participants took their medicine as prescribed and simultaneously used 'Jiao-Gu-Lun' by drying it out and infusing it in hot water before drinking, like tea. They reported they were unsure about its benefits, however they believed that 'using this herb is better than nothing' because it was easy and inexpensive to plant and they did not experience any side-effects from it.

'I'm not sure that 'Jeaw-Gu-Lun' can reduce my sugar levels but using it is better than doing nothing. I can grow it by myself and don't have to pay for it.'(Phaka)

'I ate 'Jeaw-Gu-Lun' after I heard the advertisement on the radio and I still use it. I collect 'Jeaw-Gu-Lun' leaves then dry them and boil and drink like tea'.(Santi)

'I feel it is better to drink 'Jeaw-Gu-Lun' and have been doing so for around 1-2years because it's free of charge and I haven't noticed any ill effects.' (Wila)

Figure 9 Jeaw-Gu-Lun leaves.

From the study, the use of conventional medicine alongside herbal or dietary supplements was directly related to the participants' social network. They were influenced by other patients, friends, family and relatives and moreover, the advertisements from television and radio affected their decisions on whether or not to use them.

2) The participants who were not taking their medication as prescribed.

This type of participant did not take their medication as prescribed, adjusted the dosage without the health professionals' instruction and discontinued the medicine.

a) Dose adjustment 'I think I should have the medicine completely'

Two participants adjusted the medication's dosage by themselves. This occurred when they forgot to take the medicine before dinner and believed they should take the full amount prescribed by the doctor. They attempted to rectify the omission by taking a double dose the next time. One did not experience or notice any adverse effects and did not see the result of forgetting because it happened so rarely. When the other was asked if he experienced symptoms of Hypoglycaemia after forgetting, he stated that he had felt unwell and decided to adjust the dose by reducing it from two pills to one the next time.

'When I forgot (to take my medicine), I kept my medicine and took them together at the next meal because I thought I should have all the medicine to get a good result…….I didn't have any ill effects from this.'(Santi)

'Sometimes I didn't feel good because of taking all the medicine together so I reduced the medicine of the next time from two to one and it was ok.'(Busaba)

Taking the medication on schedule was a challenge for these participants because they perceived that they had to take medication correctly each day. However, the misunderstanding and lack of knowledge about this by adjusting the dose themselves can be very harmful. Patient education is very important to implement in this group.

b) Discontinuing the medicine 'Taking medicine will destroy our kidneys'

Two participants discontinued the medicine because they believed that taking diabetes tablets would make their body accumulate too much medicine and destroy their kidneys. Both of them started to slowly reduce their tablets from three to two times a day, then once a day then on alternate days. They realised, however, that they must maintain good blood sugar levels and that these would be recorded by the health professional at the clinic. If they then experienced symptoms of hypoglycaemia they would increase their use of medication again until these improved. Both continued with this cycle but did not tell the health professionals as they were afraid of being blamed.

"...I used to reduce the medicine because the blood sugar level had decreased. I got better so I reduce from three times to two times then to 1 time a day. However, I took the medicine as normal if my sugar was high.'(Malinee)

' I know if I still take a lot of tablets, it will accumulate in my body and destroy my kidneys so I stop when I feel ok and restart to take my tablets when I feel not ok.'(Aree)

The belief that taking diabetes medicine can destroy the kidneys is incorrect. These participants relied on oral medication to control their blood sugar levels. If they did not adhere to their medication schedule, it led to a high risk of complications, again patient education is crucial for this group.

5.3.4 Exercise behaviour.

Participants were asked to explain their exercise behaviour including what kind of exercise, how long and how often. Some participants viewed any activities as exercise because they misunderstood exercise in terms of intensity, duration and frequency. Most participants did not exercise, and few participants exercised regularly. Although a majority of them acknowledged that exercise is good for health, there were some factors, such as the perception of its benefits, health perceptions and sociocultural influence that impacted on their exercise behaviour. The results from in-depth interviews showed that there are two sub-themes which comprise of patients who exercised regularly and patients who did not exercise.

1) *Patient who exercise regularly.*

Two participants perceived the benefits of exercise and regularly went jogging due to the convenience and lack of any sport equipment. However, the reasons for exercise between these participants were different. One of them was a village health volunteer who had attended health training directly from the health professionals particularly on the topic of 'diabetes mellitus' and wished to be a good role model in this village, therefore he jogged for around 30 minutes every day. The other participant explained that the main reason for jogging at least 30 minutes three days a week was not diabetes mellitus but his concern regarding sexual dysfunction. This was because he got married to a woman who was 18 years younger than him recently and his friends told him that exercise could improve sexual health. He also mentioned that the added benefit of exercise is feeling refreshed and healthy. However, both of them perceived that exercise could reduce blood sugar levels because of the diabetes regimen and their blood test results as recorded.

'I wake up around 4.30 am. I wash my face and brush my teeth, after that I warm up by walking around 10 minutes and start to run slowly from my house through the route in the village. I run around half an hour then I go home to take a bath. I have been running since 2011 which was the year I got diabetes and applied to be a health volunteer. I got a lot of knowledge about health and diabetes as well, it makes me feel refreshed and exercise is good for me. I noticed my blood results are always good.'(Decha)

'I exercise to keep fit and the main point is I don't want to have problem ….while I… sleep with my wife. I also feel refreshed. I think exercise is good for diabetes patients too because the doctor usually suggests us to exercise.' (Werapan)

These findings indicate the social status of the village health volunteer in the community and his personal motive for exercising, which was to have good sexual health.

2) *Patient who do not exercise.*

According to the definition of exercise by the World Health Organisation (WHO, 2014), most participants did not exercise, including those who reported that they exercised by lifting their arms and legs two to four times a day or stretching their body in bed before getting up. Additionally, several participants understood that activities in daily life such as housework, looking after grandchildren and working on the farm were exercise because they had sweated during these activities. They also perceived that exercise is not necessary due to already having enough work to do.

Perceived benefits of exercise; the majority of these participants had inadequate knowledge about controlling blood sugar levels which could be achieved by exercise, therefore they did not perceive the benefits of exercise and did not exercise at all. Moreover, controlling diabetes by other methods such as diet control and taking medication is easier than exercise and good results could be seen within a short period. They also mentioned that if they could control food and beverage intake, there was no need for exercise.

'I'm not sure that exercise can control my disease….it's not like taking medicine or controlling the foods which I can see the result suddenly and do not feel tired like when I exercise.'(Nongnuch)

'I really don't know how exercise can reduce my sugar level. I think if I can reduce some desserts and Num –Wan (soft drink). It's enough.'(Manee)

Perceptions of their health status; several participants believed that their ability to exercise was limited by diabetes and other health conditions. Four participants viewed exercise as a potential cause of illness or their weakness. They described feeling exhausted and weak after exercise, their muscles were 'in pain' and therefore believed that exercise was not good for their health. Moreover, there is no word for exercise in their language and they were cautious due to their fears that others would regard them as abnormal because it is not usual for women to be seen exercising.

There were two participants who had experience of surgery many years ago, so they believed that they could not exercise according to the doctor's advice when they were discharged and were afraid of its impact on the surgical wound. Moreover, female participants viewed exercise as a potential cause of illness or their weakness. For these reasons the participants did not dare to exercise.

'I'm weak and I feel very tired when I exercise. I'm afraid that if I continue to exercise my diabetes will be worse.'(Malinee)

'I have many diseases in my body, so I have to take care of myself. I cannot work hard so don't talk about the exercise.'(paboo)

'I'm afraid that people will look at me and think 'she's crazy' because only men exercise.'(Varapone)

The factors influencing the lack of exercise in hill tribespersons with type 2 diabetes mellitus are the perceptions of its benefits and perceptions of their health status.

5.3.5 Dealing with complications.

All participants had had experience of dealing with short-term complications as a result of their condition. While less than half of the participants had had experience of long-term complications and one participant was facing a vision problem. They obtained the information of self-management from direct and indirect experience including from the health professionals in the hospital. The following sub-theme is composed of dealing with short-term (hypoglycaemia) and long-term complications.

1) Dealing with short term complications.

The short-term condition in this group is Hypoglycaemia and Hyperglycaemia. When the participants had a low blood sugar level, they perceived that something negative was happening to them. They experienced mild symptoms such as extreme hunger, tiredness, hand tremors, headaches, sweating, feeling cold, dizziness, numbness in fingers or feets and feeling faint. In some cases, symptoms were more serious, for example visual disturbances, heart palpitations and unconsciousness in the most severe cases. None of them knew the word 'Hypoglycaemia' or even what this meant but they acknowledged their symptoms of diabetes by saying 'diabetes went high'. Most of them had experienced these complications and could manage them by themselves and get better within five to ten minutes. Some participants also reported that the causes of this condition were skipping meals or not eating regular meals and taking medication incorrectly.

Participants stated that they received recommendations for how to manage these symptoms from health professionals, other people with diabetes, family members, and friends. Therefore, they were able to take care of themselves when the symptoms developed, for example, they would eat sugar, candy or a sweetened beverage if they were not hungry. In addition, if they were hungry, the participants would eat any food available to them in large portions, especially rice to fill their stomachs. Furthermore, when the symptoms developed to extreme tiredness, paralysis, difficulty in speaking and unconsciousness, their family members would help by feeding them sugar or soft drinks immediately. If the severity of the symptoms continued, the patients would be transferred to hospital. Participants were asked about the prevention of these symptoms and several stated they did not know because they were unaware of the causes.

Participants who had had experience of facing these symptoms were able to prevent them by eating sweet foods and rice in smaller than normal portions. Surprisingly, most participants did not bring candies or sugar with them and stated the reason was that they had confidence that they could take care of themselves. They also believed they could deal with any incident immediately and had never been faced with this problem. However, they knew that persons with diabetes should carry spare candies in case of emergency.

'When diabetes went high, I will be tired, dizzy and faint. I can feel that my legs fatigue and my body is light. At this time, I will find something to eat immediately.' (Somrit)

'...When diabetes went high, I will feel faint and dizzy. Sometimes, I was so tired. Then, I will eat candies. One time, it happened when I was taking a shower, I ate candies suddenly and laid on the bed to rest. I went back to take a shower again when I got better.'(Pimpa)

'...I have no idea what it was. It was like I was hungry. My body was shaking like the alcoholic. However, it disappeared when I had food.' (Aree)

'It's from my experience that my mum has the diabetes and goes to the hospital. Moreover, I can ask other patients who have this disease as well.'(Nongnuch)

Likewise, in terms of hyperglycaemia, participants did not know this term. They described all of their symptoms as 'diabetes went high', regardless of whether they were experiencing hypoglycaemia or hyperglycaemia. These symptoms were increased thirst, passing urine often, especially at night, feeling tired and experiencing blurred vision. They described them as being the same as when they were in the first stages of the disease, before they were diagnosed. However, they were able to separate and deal with these symptoms from experience and most of them perceived that the cause was due to incorrect blood sugar control. Six participants found abnormalities when they urinated such as frequency and turbidity which helped them realise they had the condition. They reported that they could solve it temporarily by drinking a lot of water and taking their medicine correctly. If the symptoms did not improve, they would go to see the doctors.

'When it happened, I knew from feeling tired and going to the toilet frequently. I hardly slept because it happened in the night so I fixed this by taking medicine on time and not forgetting to take them.'(Natee)

'I know by observation of myself how often I went to the toilet and took the medicine as the doctor had told me. If I still had the symptoms, I would go to the hospital.'(Werapan)

These participants were not aware of the short-term complications, and when these complications occurred, they would solve the problems with simple and quick solutions.

2) *Dealing with long term complication.*

From the in-depth interviews, it was found that some participants had several long-term complications such as hypertension, peripheral neuropathy and eye complications. They tended not to know about prevention of these complications because they did not know their causes. When they noticed they had complications, they would behave as instructed by health professionals or follow their own beliefs and understanding. For example, the participants, who had hypertension would relax and try to avoid stress. Those who experienced arm and leg weakness or numbness, used balms to rub themselves with regularly and if the symptoms were relieved as expected, they would discontinue their use. For those with peripheral neuropathy, only a few exercised their feet and hands or massaged them to improve blood circulation. Most of the patients would rather ignore the symptoms. Those who experienced a burning sensation when applying balm to their feet would soak them in cold water. The symptoms would then reoccur when they stopped soaking their feet so they would repeat the application of the balm. One participant, who experienced problems with her vision, dealt with this by going to the doctor and receiving a basic examination by use of radioscopy. She was then referred for health care services at the hospital in Chiang Rai, where she received a more expert and advanced examination using modern instruments.

'I also have high blood pressure disease, so I try not to feel stress. I don't know what happen to my body, sometimes my arms feel numb and I use balm to rub it until it's ok. These things work for me.'(Busaba)

'I have to go to see other doctor in Chiang Rai hospital because the doctor told me that the instruments in Chiang Rai hospital are better than here and the doctor in Chiang Rai is better than here too.' (Manee)

The severity of the complications influences the participants' reaction. Most of them were not aware of negative effects if they did not look after themselves. Moreover, when the symptoms occurred, they solved the problems in a way that was quick and convenient.

As a medical concept, diabetes mellitus has a direct impact on the health of the patient, leading to future complications and costly economic impact. On the contrary, the hill tribespersons often do not recognise diabetes mellitus as a disease that they have to monitor. They perceive their illness to be insignificant because they are more likely to give meaning to their illnesses in the context of their ability or inability to perform their daily tasks rather than suffer anxiety regarding possible future implication of the conditions. Thus, in people with diabetes without severe effects of the disease, the patient recognises minor symptoms as nothing more than a routine illness, not sickness or disease. This is because individuals are still able to live their usual lifestyle (Cockerham, 1978). Moreover, Gordon (1966) suggested that illness is also a view of social dimension; Non-violent diseases, and the causes of the disease, as well as their treatment, are classified as "Not sick but not comfortable", so these patients might give their symptoms differing medical importance, depending on their social and economic status. Low social status groups have more barriers to treatment due to their financial constraints and refuse preventative measures because of economic pressures. In addition, this group requires more treatment services than those in higher social status groups (Abrams et al., 2009; Alzubaidi et al., 2015). As health professionals and patients have different understandings regarding health conditions, this leads to differing frameworks and explanations for the different systems of thought in each group. Therefore, the expectation of treatment and the effect of self-care of patients will be different. Patients only want to be able to work normally or to relieve the symptoms and to return to normal life as quickly as possible. As a result, they still use herbs and dietary supplements without health professionals' approval.

5.3.6 Discussion of the experiences and self-management of Hill tribespersons with T2DM

The research findings demonstrate the complexity and dynamics of health behaviours in this group of hill tribespersons which correspond to other factors, including personal beliefs and the socio-cultural environment. Diabetes is therefore, not only a problem of biomedical science, but also one connected to social, cultural, economic and environmental factors. In particular, these include changes in the financial system, marketing strategies boosting consumption rates, new technology, labour mobility, the growth of the tourism industry, advances in the development in public utilities such as transportation, education and public health, as well as in cultural influences. In the past 30 years, the simple lifestyles and living conditions of the hill tribespersons have changed, causing their way of life to be undeniably impacted. In turn, this has affected the self-management of those with diabetes mellitus in terms of their ability to control their blood sugars effectively.

Being able to adopt and sustain effective health behaviours is associated with the patient being a member of a society which holds social and cultural beliefs (Crisp, 2016; REMacLachlan, 2006). Therefore, the changes in causes and factors which bring about these health behaviours are dependent on both macro and micro modifications. On a macro-level, the complex structure of society at organisational, institutional and family levels should be understood. On a micro-level however, it is important to appreciate an individual's behaviour and beliefs, their perceptions of diabetes, and what it means to them, for example in the way their disease is self-managed. In the discussion below, I illustrate the effects of modern development on the village's social and cultural structures at a macro-level. This can be looked at in terms of culture, population, economy, globalisation, communication technology and public health systems. The findings appear to show significant effects on the health behaviours of hill tribespersons as well as on their perceptions and beliefs surrounding diabetes.

From the study, it was found that after 1982, the government set a goal and carried out a policy for development of ethnic minorities. This resulted in the lives of hill tribes' communities being dramatically altered with regard to population, economy, society and culture. The government at that time appointed a committee which aimed to use the following means to stabilise national security in light of the problem of hill tribes' communities and their cultivation of opium.

i. In terms of administration, the sense of nationality in being Thai or a part of Thai society was encouraged among hill tribespersons. The arrangement of occupations on the mountain was set according to public administration. Government offices in districts and provinces considered granting hill tribes Thai nationality, according to the Ministry of Interior's order in 1974. This concerned the granting of citizenship and new house registration documents for hill tribespersons in order to prevent them from wandering between districts and provinces or moving from other neighbouring countries into Thailand.

ii. It was expected that hill tribespersons would reduce the growth of narcotic plants and would no longer be under the control of drug dealers.

iii. The development of economic and social standards amongst the hill tribespersons aimed to establish a basic equality with the general Thai population by means of increasing their income, improving quality of life and controlling their numbers.

Also, the Highland Agricultural Development Project at Doi Chang, which was established in mid-1987, was very successful in helping to improve the villages. The project's objective was to eliminate the planting of poppies used to create opium, an illegal narcotic drug and to restore forests so that people and nature could co-exist in harmony. The vision was to improve the environment and also the quality of life of the hill tribespersons in the area, both in terms of social and economic aspects, for example in creating jobs which paid an income throughout the year as well as boosting revenue so that the hill tribes could support themselves by promoting the planting of coffee instead of poppies. Other things included the expansion of government offices and the provision of infrastructure development in the villages, such as enhanced public utility development and transportation, allowing easier access to other villages and outlying towns. As a result, there were more connections between hill tribes and outsiders such as public health officers, teachers, government officials from different units, sellers, tourists, and mass media. This brought in a flow of different cultures into the community and led to cultural assimilation. REMaclachlan (2006) states that cultural contact is a cultural phenomenon because when people from two different cultures come into contact, each group may influence the other. The connection takes place in various ways, such as in migration, labour mobility, trade, technology exchange, tourism and mass media. Therefore, when two different cultures remain in contact, cultural change is the inevitable consequence.

For this particular group of hill tribespersons, the process is taking place gradually. A new culture is being adopted and adapted to suit their lives, allowing them to become more aware and able to adjust themselves to production planning, living, and to new lifestyles. At the same time, they have a chance to gain access to, possess and consume new technology, which can be bought easily from markets and shops. The villagers' simpler, older way of life is being altered in terms of lifestyle, clothes and food consumption. In this tide of change, the community of hill tribes is seen as or is expected to be, a pillar of traditional culture, representative of ancient history and a guardian of customs. The hill tribespersons can think, express and define themselves according to the opportunities and limitations they have. Each of them can create an identity and meaning in their own life (Wattana & Sugunnasil, 2001).

The village where the participants in this study live is no exception and they also have been through this process of development and change. They do not live in a closed and outdated society but in an open one which is moving, complex and unstoppable. Their life is then a result of social interactions between the world outside the village and the old traditions. Under this new socio-economic structure, the resolution within the community is neither to seek wholly for development and destroy the culture, nor to choose culture and ignore progress. Most importantly, it is to adjust their traditional culture by integrating the force of new cultures which correlate to the lifestyles of hill tribes at present. In this current study, the hill tribes with type 2 diabetes mellitus also adopted and integrated the new lifestyle, such as the influence on food consumption which makes them unable to control their blood sugar levels. Furthermore, household gadgets have been introduced, for example washing machines, which mean they are less active than their old lifestyle.

Not that these adjustments have been achieved without difficulty, the effects are both positive and negative. On one hand, the economic growth allows development into the hill tribe society and in turn, the advancement of materials and technology. On the other hand, the development is also having an unfavourable impact on health. The effect on diabetes patients' health behaviours is both beneficial and unhelpful which can have reflected by the notion and beliefs about their illness and self-management.

The notions and beliefs of hill tribespersons correspond both to their way of life, environment and health behaviour. Traditional culture produces this pattern of belief and behaviour because it is an ethnic community with a long history of striving to solve problems. It has gradually yielded to local wisdom which is synthesised from experiences, observations and selection, then translated into traditional culture. Moreover, it is integrated with a new culture, which is specifically selected to be in harmony with previous experiences. The selection depends on the environment and on influences from other people. Certain thoughts and beliefs do not seem to be scientifically proven but rather are a social value practiced for many years having been collected and transferred from older generations. This also involves the explanation or definition of diabetes mellitus, which is different from that of modern medicine because the recipients of the treatment and those giving it, hold different beliefs on the reality of illness (Kleinman, 1980). Kleinman (1980) explained that each person has a different thought and belief or explanatory model of illness, subject to socio-cultural contexts. In this case, hill tribespersons and health professionals do not have the same explanatory model of illness therefore, hill tribespersons with T2DM have their own pattern of self-management, which is not follow the health professionals' suggestion.

The social and cultural beliefs or the patterns of explanation of causal disease are important factors in determining how the individual chooses the method of maintaining his/her health (Napier, 2015). It is also a crucial determinant of individuals' management of their health in terms of their promotion, treatment, and recovery. This is because when an individual believes in the cause of a disease, he/she will consider the methods of treatment and manages these according to his/her beliefs. Consequently, for the individual who has diabetes mellitus, the severity, as well as their awareness and self-care of their disease is dependent on the value and meaning they attach to it (Arcury et al., 2004; Hjelm et al., 2012; Jones & Crowe, 2017).

According to the findings, participants who believed genetics to be the main cause of the disease, therefore making it unavoidable, had high blood sugar levels. Those who believed eating too much sugar to be the main cause had moderate and low blood sugar levels. In addition, some hill tribespersons' hold the cultural belief that all people are born with an illness and will inevitably die from it eventually. This belief can be aligned to the fact they may not necessarily experience severe symptoms as might be expected with an acute illness such as cancer or an infectious disease like HIV. The result is that they attach less importance to the chronic disease they are 'born' with than to an acute illness they might develop later.

In terms of controlling their blood sugar levels, participants reported several methods for achieving this, which does not correspond to advice given by health professionals. This is partly due to historic difficulties in accessing health care services due to economic and transportation barriers. In addition, participants struggled to find ways of solving the problem of everyday survival, including the management of disease. Thus, the social networks of families and their relatives are important structures for relaying the knowledge and experiences, which has been passed down through generations, and this creates a natural barrier against health promotion from the healthcare professional. The local wisdom, knowledge and information in hill tribespersons' society are believed, practiced and maintained for the following reasons:

1. Knowledge and beliefs passed down over many generations continue to remain the stable base of the hill tribespersons communities. Their methods of living and surviving have

adapted over the years with the inclusion of more modern methods, but their basic lifestyle has changed relatively little. Their reality is that the means of treating illnesses, wounds and diseases lies all around them in their environment, the plants, trees, and wildlife, not in the hands of a healthcare professional whom they see as an outsider to their community.

2. According to hill tribespersons, it is socially accepted that knowledge and information are considered to be the processes of treating illnesses, unlike conventional medical procedures which appears in textbooks. However, this knowledge is often expressed as advice and even persuasion, towards people who are experiencing similar problems. This can make it appear to be a dynamic, naturally occurring marketing process, in particular when the advice or the treatment comes from first-hand experience of the person giving the advice. Therefore, the recommendation appears to be a strong one, instilling confidence in the recipient of the advice and a curiosity or wish to try it.
3. The giving of practical advice is the primary reason that hill tribespersons trust in their information. This is because their methods of controlling blood sugar level, for example, have been synthesised from the social context and culture of their community. Therefore, they can be used directly, for example the use of nearby food that can be picked conveniently, by drinking plenty of water, or eating vegetables which taste sour or bitter in order to reduce their blood sugar levels after consuming sweet foods.
4. It is a process that goes against the monopoly of professional medicine. The characteristic of the knowledge is its natural transfer across generations for the benefit of those within the hill tribes' communities without seeking to gain money or prestige by the marketing of this knowledge.
5. It is a dynamic process which is lively and unrestricted. There are no specific characteristics of treatment and they are not stated in any textbook. There might be no theory underlying the synthesis, but it stems from deduction, past experience, trial and error, dreaming (ghost medicine) or coincidence.

Furthermore, when the process is tested, and it proves effective, news of this would spread by word of mouth even though the source of its success cannot be clearly identified (Chuengsatiensap, 1990).

The decisions of hill tribespersons with diabetes to reduce the dosage of their prescribed medication and use herbs and supplements instead, stems from a belief that high doses of medication can cause kidney disease. They will use self-directed learning experiences to find solutions, such as self-monitoring for two to three days. If symptoms are relieved they may continue the reduced dose or stop it altogether but if they reoccur, they will return to the prescribed medicines. Furthermore, if this discontinuation of medicines results in a serious decline in their diabetes mellitus they would then go to hospital for treatment. The hill tribes' methods in managing other diseases are no different in that they will diagnose and assess the severity of symptoms and then select what they believe to be the surest ways of self-healing.

These will be chosen by using their own experiences and advice from family. They will incorporate knowledge passed down by their ancestors and take counsel from neighbours who have experienced the same symptoms. If their assessment reveals no illness, they will do nothing, except monitor the symptoms until they return to normal. Moreover, as health professionals and patients have different understandings regarding health conditions, this leads to differing frameworks and explanations for the different systems of thought in each group. Therefore, the expectation of treatment and the effect of self-care of patients will be different. Patients only want to be able to work normally or to relieve the symptoms and to return to normal life as quickly as possible. As a result, they still use herbs and dietary supplements without health professionals' approval.

In terms of how to deal with physical illness, Suwan et al. (1993) stated that patients would not always seek methods of treatment. The time from the point where a person realised their abnormalities to any action, is long-term, complex, and it is strongly influenced by perceptual and social components. Furthermore, Freidson (1971) considered that society is a factor which strongly influences the pattern of an individual's behaviour. He found that illness was determined not only by the physical condition of the patient, but it also depended on the lay referral system, i.e. the person's relationships with relatives, family members and neighbours who played a role in patient visits and provided assurances.

This might help to determine the diagnosis of the illness and include suggested treatments they believed would have the most curative effects. To clarify, it was up to those closest to the patient, who would have previous knowledge and experiences of treating the disease to recommend treatment methods. Hence, the behavioural responses of patients to illness is variable, being dependent on what advice the patient might receive from the lay referral system (Peiris et al., 2016;2015).

In addition, some of the hill tribes' beliefs affect the health behaviours with diabetes and are linked to socio-cultural contexts. For example, this group is unable to control their blood sugar levels during festivals, particularly elderly people who cannot refuse food because this would demonstrate a lack of respect towards the host. In addition, attendance at parties, social, and cultural contexts have changed. Previously, attendees may have brought food or beverages but nowadays, this way of life has changed. Most people have to work and do not have enough time to cook, but as an alternative, give a gift in the form of money in an envelope to the host in order to demonstrate their gratitude. In consequence, this instils the idea that the guest must eat food at least to the value of the money given or the money will be wasted.

Furthermore, the foods provided at the parties or festivals have changed from traditional foods which were not processed, to foods which contain high levels of sugar and fat. This is because of modernisation of the hill tribespersons life style. In addition, the beverage provided is often a home-made liquour and as it is produced from herbal plants, this engenders the belief that drinking this 'folk' alcohol does not affect their disease.

As mentioned above, the thoughts and beliefs about health are cultivated to become a part of the way of life until they become a cultural succession. At the same time, they have altered in line with changes in society, culture, economy, politics, and the environment. Therefore, solving the problems and adjusting the hill tribes' behaviours in relation to their health, will take time and require appropriate strategies which take into account the importance of realising that health behaviours are influenced by many factors. Health professionals should not only be knowledgeable in the medical treatment process, it is important they are able to consider other factors as well. It should be realised that the patient is a person who lives in a community which has their own beliefs and culture, they also have a lifestyle and systemic thinking which differs from the health professional. Any development or operation should be based on a harmonious relationship, respect for dignity, and trust in equality in human beings.

Ultimately, although each person might choose a different solution, this should be arrived at without the need to force ones' opinions on the other. Management of health problems and illness should therefore begin with the recognition that people in society have a variety of belief systems and ideas. Comprehension of cultural beliefs, definition of health and illness should be based on the principles of local people's ideas and way of life (Concha et al., 2016; Patel et al., 2015).

Perception of thinking or understanding of the nature of illness, what it means to the patient, its impact and belief in therapeutic effect, including social and cultural contexts, are important conditions for the health behaviour of the patients (Tuohy et al. 2008). These should be carefully considered as they will help determine the behaviour of hill tribes in following the direction recommended by health professionals. Therefore, it is not only necessary to try and solve the problem by advising the hill tribes on the causes, methods of prevention and treatment of the diabetes. It is essential that consideration is given as to whether or not the advice is consistent with their beliefs and culture. In order to harmonise the behaviours and attitudes of the hill tribes toward their illness, it is essential that local public health services demonstrate knowledge, understanding and systemic thinking. If this can be achieved it should enable effective promoting, protecting, and continuous treating of the disease for the future (Amarasekara et al., 2014; Dwivedi et al.,1996).

5.4 Objective 3: To explore the needs, essential requirements and barriers to health promotion for T2DM patients in this group from both the hill tribespersons and the health professionals' perspectives.

To complete this research objective, it is necessary to gain data from both patients and health professionals in order to understand what the barriers are and the needs or essential requirements from the perspective of each. The first part begins with the findings from the hill tribespersons as described below.

5.4.1 Health service at diabetes clinic 'I don't want anything, these are too good for me'…except the language

'I don't want anything, it's too good for me' was the phrase most frequently expressed by participants when they were asked about their requirement of health care services in addition to those already being provided. The comparison of the accessibility of health care services between the past and present was the main indicator of satisfaction in this group. In the past, the poverty, remoteness of residence and not being Thai, meant these people were unable to access the infrastructure, especially education and health care services which were provided by the Thai government. At present, all participants have access to diabetes health care services under the universal coverage scheme. This means all health care services are free, including diabetes medication when received from the public, not private hospital. In addition, their standard of living has improved since the introduction of the universal coverage scheme. Good transportation such as motorcycles, private car or rod-song-thaw (a pick up or large truck with two long, inward facing bench seats fitted in the back), makes access to hospital easier than in the past. All participants reported that they were very satisfied with the convenience of transportation and with health and other hospital services, in particular the rice porridge with minced pork which was provided by the hospital staff. The only remaining obstacle is the language which most participants identified as the main thing that made them feel nervous when going to see the doctor. Most explained that although they have some understanding of the Thai language, they could not always comprehend what the health professionals were telling them. Six participants mentioned that they would have more confidence if a family member with a better understanding of Thai could go with them to clarify what they were being told. Four participants stated that they did not want anyone to stay with them while talking to the health professionals and would prefer privacy. One participant mentioned that it would be good if the health professionals had more time and clearly explained how to decrease stress because they usually said 'don't be stress' to him. However, the remaining participants had no problems with this issue.

'I don't want anything….these are too good to me. If I had this disease 10 years ago, I might have died already. In the past we had no money, the road was not like this….going to hospital was impossible but now it's easy to go and I don't have to pay for anything.'(Santi)

'I go to the hospital by motorcycle if my husband is free and sometimes go by Song-Thaw, I pay a total of 90 baht for the round trip…….the hospital is very good, I can have Khao-Tom (Porridge with mince pork) after blood testing. You know, it was very good because we were very hungry and everything is free. it's free.'(Varapone)

'I think I still have a language problem because sometimes I don't know what the doctor is saying. My daughter sometimes doesn't come with me so I did not dare to talk. I was afraid I would say something wrong.'(Aree)

All of the participants were satisfied with the overall level diabetes care, due to accessibility and being free of charge. However, the most significant barrier remaining is the language, as they sometimes do not understand when communicating with health professionals. It is important to note that the language problem should be prioritised for managing appropriate diabetes care in this ethnic group.

Hill tribe patients in this study were satisfied with the health care services that they received from the hospital. This could be due to having a better quality of life from the universal coverage scheme, which provides good health care services at affordable prices or without paying per visit, the transportation being more convenient than in the past, and better income from planting coffee and employment. This finding related to previous studies in many areas of Thailand which revealed that patients had a high level of satisfaction towards the universal coverage system. In addition, people with a low socio-economic status expected a lower quality of services than those with a higher socio-economic status (Kerdklai et al., 2015; Kongthong, 2014; Munkong et al., 2013; Puangnham et al., 2014).

This is because of the previous experiences of hill tribespersons; they lacked access to basic social services including education and health due to their poverty, non-Thai citizenship, physical access, communication, and stigma from their hill tribesperson status (not being Thai). A previous study by Soontaraviratana et al. (2011) indicated that hill tribespersons had scores of health equity and the expectation of health care services was lower than the general Thai population. Therefore, the quote ‘it’s too good to me’ regarding health care services nowadays was expressed by the participants. Furthermore, the study of Tay and Diener (2011) also indicated that fulfilling basic needs was the main factor of satisfaction with life.

Although participants reported the experiences of receiving health care in the diabetes clinic as positive and helpful, they also stated that the Thai language was a major barrier to communication between them and the health professionals. This finding was also supported by existing research which indicated that language was the most important barrier to health care access and use among hill tribespersons (Cobb, 2010; Soontaraviratana et al., 2011; Mitchell-Brown et al., 2017). Not reading and speaking Thai makes accessing healthcare services difficult, for example, the participants had low confidence if they had to see health professionals without a family member who had a better understanding of Thai. They sometimes did not understand the health education which was provided by health professionals and could not comprehend health information in brochures. Another problem related to the language is that their own language does not include many medical terminologies, for example there is no word for “pancreas” in hill tribes’ language. Moreover, some meaning can be lost or changed from translation. For instance, the word “iron” would likely get translated to “steel”. It is not difficult to understand why a patient puts a nail into water and drinks that water for the purpose of getting a mineral. This finding was consistent with previous studies of other minority ethnic population, such as Indian, Chinese and Arabic-speaking groups who indicated that language was a significant cultural barrier regarding diabetes education when living in the United Kingdom, the United States, and Australia (Alzubaidi et al., 2015; Cobb, 2010; Patel et al., 2017; Hallgren et al. 2015; Leung et al. 2014). The participants in this study explained how they tried to seek the diabetes knowledge from various sources, such as friends and relatives, including speaking to other patients. This reflected their lack of accessible culturally appropriate information and support in Thailand.

At present, there are no national guidelines for providing culturally and linguistically appropriate diabetes care to patients with limited Thai proficiency to ensure health care services proceed to meet patient needs. Therefore, one of the public health policies should be addressing this issue to develop specific diabetes guidelines for the ethnic groups. These findings suggest that health care services should consider providing language services and educational materials which translate diabetes information from Thai to ethnic groups’ language.

These findings were supported by the health professionals’ transcriptions as they stated that ‘’Language and communication are the most important problems’’ to provide health care services. All health professionals agreed that the language and the communication between them and the hill tribespersons with T2DM are the major problem in diabetes treatment. The problem is that the health professionals only use and deliver health care services in Thai language while the hill tribespersons have their own languages and often do not understand Thai. Several participants indicated:

'The language is the most important for communication. We don't use the same language, they speak their language and I just know Thai. It makes me have headache and I don't know how to sort it out' (Staff3)

'The language makes me and the patients misunderstand. It's the basic but it's the most important. Some patients can speak Thai but just can speak and understand the basic Thai language such as taking tablets. They don't understand the message or knowledge that I want them to know and be aware about their disease.' (staff5)

'They don't dare to ask so we have language problem or communication problem because the patients don't understand and can't ask us and we don't know how to explain to them properly.' (Staff7)

'For me, the language problems appear in terms of how to suggest to them and how to make them understand what we said.' (Staff8)

The language difficulties make providing the treatment, giving health education and sharing the knowledge about the disease unsuccessful. There are difficult words and technical terms. Two health professionals stated:

'The communication, the communication is very important even when we talk to Thai people, it's hard to make them understand, to be aware about the disease and the medicines, so speaking to hill tribes is much harder. They don't speak Thai and I can't speak their language so giving health education and making them change their behaviour is very, very difficult more than Thai people 100 times!' (staff6)

'Surely the main problem is language and communication. I understand that they don't understand about diabetes so it's difficult to communicate and it's hard to explain to a person that diabetes is a disease. That it is caused by the body which can't use the sugar properly and the sugar can't be synthesized by our body but we have to receive from food and we have the energy …mmm… you know even the word 'energy' we can't explain to them to make them understand the meaning, we can't explain things with difficult words. It's the limitation that we don't know how to explain to them.' (Staff2)

For hill tribespersons with some knowledge of the Thai language, the health professionals are still unsure that the hill tribes really understand the message that the health professionals are trying to deliver. The consequence of this is that the health professionals are unsuccessful in their work and need more time to explain and they need more time allocated per patient in order to ensure that their explanations are understood. Three of the health professionals explained:

'I have to say this is one of the important needs to work with this group because the staff are not people from this area. There is a limit of the culture and language because it's very difficult for the staff, the staffs have knowledge and skills to give treatment but all the patients are tribespersons…. yes ….somebody can speak and understand Thai but when we have to give or translate the knowledge to them and then….mmm… the vocabs ….. It's very hard and difficult to do it. This affects the action and working that we can't make the patients control their blood sugar levels.' (staff1)

'The problem is the language and time limit and I think we have to spend more time with the hill tribes patients because I have to talk to them for several times in one sentence.' (staff4)

'We have to explain many times to make sure that the patients understand what we talk about, it will take less time if we can understand the language of each other. However, I'm not sure that the patients understand it correctly.' (staff5)

Consequently, health professionals can get frustrated even sometimes lose their temper due to difficulty in communication. This is how the health professionals expressed this point:

'We spend a lot of time to explain everything to the patients but they still can't understand, you know… When I look at their face, they look like they don't perceive anything from us and this make me get annoyed with them sometimes.' (Staff2)'

'I talk and talk and talk, try very hard to explain and give health education but the response from the patients is nothing so you don't have to wonder if I sometimes look stressed and I lose my temper.' (Staff6)

'When we explain to them they will smile and say yes, yes and yes then I ask them to explain what I said, they can't tell me. This can make me moody because I have to tell them again and again.' (Staff 7)

The general method of working with patients who do not understand the Thai language is to use a relative or someone who can act as an interpreter. Additionally, a difficulty in using an interpreter is that the patients do not ask about the disease even though they are keen to know, due to privacy issues. Another problem in using an interpreter is the level of skill that person has, which is questionable, according to some health professionals. Four health professionals recounted:

'It's the language. For the hill tribes we don't know if they understand the things we say to them or not. We don't know if the interpreter interprets the message that we want the patients to understand. The patients are not daring to ask because they don't know how to ask in Thai language and sometimes they want to ask something very private but the interpreter still sits beside them.' (Staff4)

'A female diabetes patient also has the problem about her vagina, it is usually itchy and she'd scratched it for 3 months. I asked her why she didn't tell me at the beginning and she said that she can't tell me because at that time the interpreter, who is a neighbour sat there but today she can't stand the itching so she asked her daughter to come as her personal interpreter.' (Staff 5)

'They are ashamed to tell us the truth because they have to send a message through Tawat, who is an interpreter. They really don't want to...'(Staff1)

'When patients come, we always tell the things that they need to know about the disease. For general Thai person, they always ask things and they want to know if the information about their disease they learn from other sources is correct. The hill tribes are different, they just answer the questions we ask them about the food they ate before going to see us. In addition, we don't know from their answers whether they really understand or not. We don't know whether they understand our questions or not. This is why the language is an important problem.' (Staff8)

Sometimes, the interpreter would not repeat the message several times. Two health professionals explained:

'I have been working with this group for more than fifteen years so I know that sometimes the interpreter sends an inaccurate message to the patients because he can't remember what I said then I have to ask him to tell them again.'(Staff1)

'The problem is the communication from the interpreter to the first person (first case) and second person (second case) and then the third person (third case) is not accurate. For example, he/she will translate the knowledge and the suggestions from the health professional to the first patient and they won't translate to the second and third patient. He/she just tells them 'the doctor wants to tell you the same as the first person and the patients need to say ok...ok… because of the time limit and wanting to finish the process in the clinic in a short time. This is not good because each patient has different conditions which impact on the patient's health behaviour.'(Staff4)

Language is the most significant problem to the effective delivery of health care services to hill tribe patients. This result is consistent with those of other studies and suggests that language should be cautiously considered prior to the launching of the additional standard guidelines (Chaufan et al., 2015; Chimeddamba et al., 2015; Jones et al., 2014; Joo et al., 2016; Okrainec et al., 2015). Having health professionals who are local to the area may help solve the language problem. One option for governments could be the provision of contracts for local secondary-school students into health science subjects on the condition that upon graduation they must work in hospitals close to where they live for an agreed length of time. This strategy has been used in Thailand to increase and distribute physicians to rural areas. During the period 2000-2014, 5,927 physicians from this special policy were added to health care services system (Sundararaman, 2018).

5.4.2 Additional findings from in-depth interviews and focus groups with the health professionals.

The findings of research carried out by health professionals working in the diabetes mellitus clinic to explore the needs, essential requirements and barriers to health promotion for the hill tribes who have type 2 diabetes mellitus from the health professional perspective. Eight of the health professionals who took part in this study are female and one was male. Their ages at the time of the study were between 27- 48 years, all were Buddhist, and all had a bachelor’s degree. One of the health professionals was a pharmacist, two were public health officers, and five were nurses. Five of the participants had been working in this area for more than ten years and three have been working for three years and all participants are Thai. There are three main categories of barriers and needs from the qualitative findings: the barriers from the health care services system, social and cultural barriers and the needs of health professionals.

1) *The barriers from the health care services system.*

a) Human resource for health: ‘too much work’, too many patients and not enough health professionals.

All of the participants stated that one of the barriers in their work place was the inadequate number of health professionals when compared to the duties and responsibilities, as the number of diabetes patients continues to grow and the obligations increase. The following data were recorded.

‘It’s limited by the human resources allocated, the government has many problems with the frame for the number of staff. In my health promotion hospital, there are only six staff members. This number is not enough to look after the patients in our area. In fact, one health promotion hospital must consist of one position of director, one public health officer, one public health technician officer,

one nurse, one dental technician, two to three administrators or supporters, but now we have only six staff members.' (Staff1)

'The number of positions for health professional is not complete now and lack of staff is an acute problem while the community is expanding. It means the number of patients will increase and we need more health professionals to look after the people in our area.' (staff2)

'…..more than one hundred cases a day…No….it's not enough, in our clinic we have to manage all persons with diabetes in four hours with only a few staff …look … when you compare with the number of patients, it's very hard work.' (Staff3)

'In the past, we used to have a limit of only fifty patients but now it's more than doubled, persons with diabetes one hundred cases and hypertension one hundred and fifty cases for half day, it's really hard for us.' (staff4)

'…. only me and her who are the nurses and only one public health officer and we have to respond to all the patients in this area. It is hard for looking after more than 5,000 people with a limited number of staff members.'(Staff5)

Many health professionals recited that they have plenty of work to do both in the diabetes clinic and in other departments.

'Moreover, we have much work to do such as EKG, laboratory work, treatment, health education for new and old cases, the tablets, finance and register. It's a one stop service clinic.' (Staff5)

'This is only the workload in the diabetes clinic, what about other work we have to do? You know we have to do a lot of work in another department too and I didn't tell you yet about the duties in the hospital quality assurance. I would be happy if we had more staff.' (Staff6)

'When you come to the clinic, you just see us working there but actually I have to undertake my other job which people outside don't know about. I have to work both in the diabetes clinic and in the other clinic.' (Staff7)

The shortage of health professionals is the most significant problem in the health care unit particularly in rural areas, according to the new generation of health professionals, especially the nurses. They do not want to work in rural areas due to the lower salary and lack of amenities. Three health professionals told the researcher the following:

'At present, even though there are many nurses who have graduated from many universities, the number of staff is still not enough. These new generations want to work in town because they can work in the private hospitals and get more money.'(Staff1)

'They don't want to work in the remote areas like this because there is no entertainment and it is uncomfortable. So, it's a big problem because we have to do much work as you can see.' (Staff3)

'Not only the big hospital in the town centre but also the small hospital, we also have the same problem and I think it's the principle problem in our hospital. I understand if the new generation doesn't want to work here. I am only one staff and just have to work, work and work.' (Staff4)

The lack of specialist doctors is also a significant problem in diabetes care services. The patients do not receive essential care from specialists such as, eye examinations from the ophthalmologist. However, the public health officer and a nurse would be responsible for this examination by following the guideline.

'…… as you know in our country we still want the eye doctors both in this area and Chiang Rai. There is no eye doctor in the community hospital. This is the limitation. The health professionals who will be in charge are the public health officers and the nurse who work in the health promotion and community hospital system but it's just the screening. After the screening test, followed by the evaluation form which is the standard guideline, if we find that the patients have any problems, we will refer them to the bigger hospital for recheck and treatment with specialist.' (Staff1)

'The nurses have to work as a doctor because we don't have enough general practice doctors. Don't mention about the specialist doctor, there's no way that we can have them.' (staff5)

b) The limitation of time: 'We have to work against the time'

The time to provide the health care services to patients in diabetes clinic is limited by the system in the hospital which runs only half a day, twice a week, and by the characteristics of the disease. The health professionals have to work against time to finish before the afternoon clinic. This is because all diabetes patients have to come to the hospital in the early morning for a blood test and have been NPO (Nothing Per Oral) from midnight. Some health professionals expressed:

'The problem is time limit too, patients have to be NPO before going to see us at the hospital for blood testing, so this is why we can work in this clinic only in the morning and we have to finish before the afternoon. We normally start from 7.00 am. and finish around 12-1 pm.' (Staff4)

'I agree with staff4 that we work against the time. The patients come to the clinic to reserve a place in the queue about 5 am. We have to come to the clinic before 7 am. to set everything up and give the services to a lot of people on time.' (Staff 7)

'Actually, we have to start at 8 am. but if we started at this time we wouldn't finish in the morning. The diabetes mellitus is different from other diseases. We need to check the blood sugar level and the patients have to be NPO from midnight too.' (Staff5)

Staff 7 and Staff 6 explained more about this problem. They said that the health professionals have to work on time because the patients also have to go to work or go home and can become unpleasant when the health professionals spend more than five minutes with the previous patient.

'We have to spend just five minutes for one patient on average. If we spend more than five minutes, the next patients have to wait, and they don't want to wait, the consequence is they will lean out their head to show their discontent head and try to force the staff and patient in the room to hurry. This is because the patients have to go to work and their relatives who come with them have to go to work or do their business.' (Staff 7)

'The next patients get moody as well because they are annoyed with the previous patient and frustrated because they believe the staff speak too much and make them delay going home, even though we want to help them.' (Staff 6)

'It's about the time, they complained why the staff work very slow? They thought they came to the clinic very early ...mmmm...about 3 am. to reserve the queue but we started around 7 am. so the total period looked very long for them.' (Staff3)

In addition, a health professional reported that language is a part of the timing problem in the mobile which is a small clinic on a bus that they use to provide the health services in remote areas unit and also the hospitals.

'We need more time to communicate and explain to hill tribesperson. To translate our Thai to hill tribe language is quite hard and we have to tell the interpreter to explain to the patient what we have said as much as we can. We have to tell everything to the patients, we have to speak more than two times.' (staff4)

'We have mobile unit once a year, but we don't have time and the main problem is the same as we have in the hospital. This problem is the language, it takes a long time to ask and communicate with people.' (Staff 1)

The time limit also makes the health professionals attempt to solve this problem by changing the method of checking the risk of complication from diabetes. A health professional gave the example below

'We can do the screening of visual checking completely in each patient. However, for the evaluation of feet, we sometimes can't do everything in a short time, so we used the inspection and then evaluate the patients from the guideline.' (Staff 8)

c) Universal coverage scheme: 'Free of charge but…'

Currently, the main health care service system in Thailand is the Universal Coverage (UC) programme. Thai people also know this as the '30 baht (£0.67) treats all diseases project'. Under this programme, the patients paid a total cost of 30 baht per visit to receive the health care services at the hospital where they register. This cost covers the drugs prescribed on a national list, which includes diabetes drugs. The main benefit for the hill tribespersons patients is that the health care is free of charge, due to a special condition for certain groups as follows; elderly, children and those who have a low income. The health professionals mentioned this issue as below:

'Nowadays it's free so people come to receive the health services more and more. There are many problems such as people don't look after himself because they think if they get sick they can go to see the doctor anytime without paying money.' (Staff1)

'Somebody phones the staff before they come. I think it's too much and they think it's their right to go to see the primary care unit at any time. We already have the appointment patients in that day but many patients prefer to walk in with insignificant symptoms such as sore throat. Even keeping warm and drinking warm water can help and there is no need to see the doctor or ask for medicine.' (Staff2)

'I notice since the free of charge system has been used, more patients go to the hospital, the people don't look after themselves. They think going to see the doctor is easier, just go and ask for the medicine.' (Staff 5)

'In the past the patients have to pay for receiving the health services, every time they went to the hospital they would bring the remainder of their medicines because they spend their money for this medicine. We will count and deduct the medicines before giving them a new round. Nowadays everything is free so the patients don't care and ignore the value of the medicines.'(Staff7)

Besides, one of the problems of the UC programme are that the patients pretend to be ill to hoard the drugs, even though they may not have the opportunity to use them in the future. The patients become drug resistant because they can get the drugs easily. Another problem is that medicines are wasted unreasonably.

'The one of important problem is patients bring the medicines to take and they get better in one to two days then they stop taking the medicines and leave it somewhere or throw it away. They don't

care because they know they will get the medicines from the doctor next time and yes it's free. Moreover, it's the cause of the antibiotic resistance problem in this area too.' (Staff 2)

'For example, when we have mobile medical units to solve the problem that people can't access the health care services, we thought the patients who came to receive the services are real patients but no…..it's only 30-40%, others were fake patients ...mmm… I mean the people who pretended to be ill because they want to get medicines for the future. ' (Staff 3)

'If it was a normal sickness such as stomach ache or headache, we couldn't easily prove if it is real or fake. The only thing we could do is work hard with many fake and real patients then gave the tablets to them even they might not take it.'(Staff4)

'Did you pay for treatment and medicine?" I asked her. She said no, so I told her that if she threw the medicine away it would waste lots of money costing 2,000 baht per week, whereas this medicine could help many people who really need it but don't have the chance to get it. Then she got upset.' (Staff 6)

d) Financial: 'The budget from the government is not enough'

A fixed budget of the health care services from the government per person per year is 3,109.87 baht (£69.63). With this small amount of money, the health professionals are facing difficulties with money management. This means that some health care services which the patients need from the standard list, especially the screening and examinations to prevent complications in hill tribespersons patients, might be missed. The health professionals have tried to solve this problem by performing examinations they were able to do by themselves, but which would ideally be done by a doctor. Furthermore, a selection criterion of patients to receive some services was used.

'3,109.87 baht is the total budget per head…actually the expense is over budget…what about the medical fee? Medicines? The equipment for their eye checking and their screening for complications? It's very difficult to deal with this problem. Some patients don't have only diabetes and they have to get the services more than one time in a year.'(Staff 3)

'I don't think this money is enough, it's only 3000 baht you know just 3,000 baht which includes everything in a whole year per patient who will get all health care services we have to give them.'(Staff8)

'We don't have the budget which is enough for everyone in this group. We have to manage with the facility-based service which this group receives from the government.'(Staff2)

'Not all of them receive all the examinations they need, just 60% of all the patients. We have followed the indicator which identifies the percentage goal but if any checking doesn't have to use money and we can do it ourselves, we usually do it for our patients. For example, the foot checking and physical examination we can hit the goal at 100%. However, the oral checking and eye checking we can't do 100% because we don't have enough money and specialist doctors.'(Staff5)

'The ideal is for all DM patients to get 100% of the checks needed for DM patients but the limited budget and resources mean we have to choose the patients who have the most serious symptoms to get all the services.' (Staff6)

'We are really worried about this point. The ministry of public health wants us to cover 100% but we have the limited budget, so we can say the budget does not match. We have to choose the patients who have the high risk because the cost for the activities is so expensive. In each screening test for persons with diabetes we can evaluate which case has to be referred. The patients who have low risk we will give suggestions about changing their behaviour and wait to recheck in the next round (next year). The problem is that sometimes the patients who were not referred would get worse because the timing of prognosis for each patient is different. But some patients look after themselves very well, the result from the next round is good and they become the patients who have no risk or low risk.'(staff1)

Due to the limited budget, health professionals have to avoid giving information to the diabetes patients about their right to services, even though they know it is unfair and it makes them feel guilty.

'We won't tell them because if we tell them and later they don't get the services? For example, the eye checking which uses much money, a patient asked me why she didn't get it this year so I told her that because last year you got it already. It's very difficult to work. You know, we feel guilty because we know it's unfair.'(Staff4)

'It's hard, we know it's the patient's right but we need to avoid to tell them because the budget is never enough. We won't tell anything that we can't do it. If we tell them, it makes them hope and later they will disappoint.'(Staff2)

'….so the patients don't know why they don't get this or that services..mmmm…. actually they don't know their right that they can all the services provided for persons with diabetes. I felt guilty as well' (Staff6)

e) Standard guidelines and indicators for working ‘Is that appropriate for this group?’

The diabetes standard guidelines and the indicators for working in the diabetes clinic were created by the ministry of public health. Although these guidelines are valuable for controlling diabetes mellitus and reducing the risk of developing complications, the health professionals perceived that some parts are not suitable for the patients in this special group for example, the recommendations of life style modification particularly in food consumption and the media. Some health professionals stated as below:

‘We use the standard guidelines from the central (ministry of public health) and found it’s difficult to apply in some parts. The food they eat is different from the guideline. Our patients eat peanuts but the guideline’s examples is almond and sometimes we don’t know how to apply. The standard guidelines are too high for our area.’ (Staff2)

‘The guideline from the department of public health is the standard of the country and created from the central office so that why it’s not match in a special context and our area. I will explain in this area, we have the limitations in language so why we can’t use the media from the central. (Staff1)

‘Although we know it’s just guidelines but I think it would be better if we can use those guidelines easily. We won’t deny that our patients is in a special area but just hope that one day the central will create the guideline for this group. (Staff5)

In terms of indicators for working in the diabetes clinic, there are many key performance indicators. This is the policy to evaluate the health professionals’ efficiency and the overall success of the clinic. The health professionals perceived that these make them stressed and frustrated because the score from the indicators refer to the quality of the work. This system forces them to achieve in all indicators without any suggestions on how to solve problems. Many health professionals expressed their stress as follows:

‘We have many indicators, if we can’t hit the target number, it means our work is not good enough or is low quality but in real life it’s not true. We are industrious and devote ourselves to the duties. We are stressed enough with the patients without this also’ (Staff3)

‘I know that the indicators have the benefit for controlling the quality of the clinic but these are not everything. Sometimes, it makes me discouraged to work. I do my best. There are many reasons that can cause the failure.’ (Staff6)

'For example, the target for screening test is 90%, the target for access to the services is 100%. These are our duties to work cover all indicators. We are tired with these. We get the policy and must hit the target number that the government creates. The government gives policy and forces us to do the work but don't tell us how to manage the problems which can occur.' (Staff1)

'I don't like the unreasonable indicators. The central office has to re-think which indicator is good, which one is bad and make it balance. But look! They want everything to be in a good level. There are almost a hundred indicators we have to reach. If we can't do it, does that mean we weren't working? Does this mean we work in low quality'? (Staff8)

'Someday the first patient … omg… highlight red colour for his result, the second patient ...red again and they are always the same person who can't control the sugar blood level and I immediately linked to the indicators of treatment. So we have to ask ourselves...do we work very bad? Even though we explain a lot, highlight the important things they should do, ask question to remind them but why are the patients still being like this?'(Staff5)

'Sometimes, it's not because the staff don't have skill or lack of efficiency but it is caused by many factors so the indicators can't tell the quality of work. We are sometimes already stressed with our work and the indicators make us more stressed.'(Staff1)

Surprisingly, the indicators of working are related to the budget that the hospital will receive from the ministry of public health. It is not only the instrument for the health professional's evaluation but also the indicator for budget.

'The policy now is 60:40%, it means 60% of the total score is the minimum total number of patients who have to get foot examinations, 40% of the total score is the quality of the examination such as what we give the patients after the foot examination and the patients don't have the wound when followed up. These numbers are also related to the budget from the department of public health because if we can't reach this number we won't get the money. All staff have to be responsible for this too so the best way to survive is we must reach all indicators. (Staff7)

Furthermore, staff 4 mentioned that the time line for screening for complications in diabetes patients following the guidelines is not convenient to the community calendar. Consequently, the patients will not come to receive this service.

'The screening will start from January. It's winter so the weather is cold and they have to go to their farm to plant the pea and the corn then people don't want to have the screening. Besides, they have to NPO so if we use mobile car and have a problem with the transportation, the hill tribes won't wait for us.'(Staff4)

2) *The social and cultural barriers.*

According to the health professional's transcriptions, the social and cultural barriers are primary challenges to diabetes services and promoting health in hill tribespersons. This barrier includes the culture of festivals and the lifestyle.

a) Culture of festivals: 'How the Kin-Khaow-Mai festival is related to a high blood sugar level.

The hill tribesperson's way of life is connected with festivals and ceremonies. An important ceremony among hill tribespersons is the Kin-Khaow-Mai festival. 'Kin-Khaow-Mai' means 'eating new rice', this festival is a special occasion for worshiping the ancestors and gods by celebrating with the new rice from their farm. It usually involves a lot of food and drink and happens after the rice harvest. As a result, patients cannot control their blood sugar levels during the festival because it lasts for many days. Some of the health professionals expressed their concern as follows:

'The important thing that we have to face and cannot avoid in this group is the worship and the ceremony activities which impact on controlling their blood sugar levels. For example, if there is a wedding ceremony or Kin-Khaow-Mai ceremony which they organise to worship the ghost of rice in every year, the food in the ceremony usually consists of meat which is cooked with oil and animal fat, the dessert which contains a lot of sugar including alcoholic drink. Most of our hill tribesperson patients will have very high blood sugar levels.' (Staff 1)

'Kin-Khaow-Mai festival is the hardest period to make them control the disease. It's difficult to suggest to the patients not to eat some sweet foods in their favourite festival.' (Staff4)

'If we talk about the tradition and culture, I believe that the festival or ceremony plays an important role in controlling the patients' blood sugar level, especially eating food and soft drink in Kin-Khaow-Mai festival. Our patients have high blood sugar levels and it happens every year. It's hard to avoid because it's the festival of the hill tribes.' (Staff6)

'In the Kin-khaow-Mai festival period, each village will invite many guests from other villages so the patients have to join many times. I am sure they can't avoid the foods in the festival then it becomes my problem because the number of patients who can't control their blood sugar levels increases and impacts on our working indicators.' (Staff7)

'There are many festivals such as Kin Khao Mai, to celebrate the new house and wedding ceremony. There are a lot of foods in each festival. The patients already know they should avoid the fatty and sweet foods in the ceremony but they can't control themselves and eat less of those kind of foods.' (Staff 3)

The health professionals notice that the reason for the higher blood sugar levels among the hill tribes patients is Kin-Khaow-Mai. They do not trust the patients when patients say they control their disease because the result of the blood test shows high blood sugar levels.

'Every year, we all know that the result of blood tests for these patients is highlighted by red colour in this period' (Staff2)

'I know Kin-Khaow-Mai festival is beginning from the blood sugar levels of the patients in this group.'(Staff3)

'Mostly, I didn't believe it when they said they didn't eat anything. If we found that their blood sugar level is higher than the last check because of the way of life for the patients in this village …. You know … in one year, there are many ceremonies and there are some food and desserts which are made from meat, flour, sugar, oil and seasoning in each ceremony. We can understand the patients if they can't control their disease especially in the period of Kin-Khaow-Mai and this ceremony lasts for many days.' (Staff5)

'Our goal is for patients to control their blood sugar levels but one of the problems is the ceremony in the community. For me, this is related to the worship, in this village there are many ceremonies, for example New Year and Kin-Khaow-Mai festival. Mostly people who have this disease are the middle aged and elderly so they are always invited to participate in all ceremonies and they can't control the food in terms of quantity and the kind of food. I have noticed that during Kin-Khaow –Mai festival the blood sugar levels in our patients are very much higher than usual.' (Staff8)

b) Lifestyle: 'The food problem between disease and working'

The lifestyle in the sense of the occupation of the hill tribesperson is one of the most important problems which impacts on them controlling their blood sugar levels. Those who work as agriculturists have to consume a lot of carbohydrates to gain energy for working. Additionally, they always add seasoning, such as monosodium glutamate and fish sauce because these make the food more delicious and they can eat much more rice. Others are employed in the coffee factory, which is a very physically demanding occupation. Their employer will provide them with three-in-one coffee (coffee, artificial cream and sugar) and supply them with energy drinks. For these reasons, neither group, agriculturalist nor employee can change their eating behaviour. Some of the health professionals stated:

'They are agriculturists; they have to use a lot energy like a labour so they have to eat much more rice. I suggest they eat one bowl of rice in each meal and the patients who can control this, most of

them are the elderly who hardly to go to work in the farm but the patients who have to work they can't change their food habit because they want to have energy enough to go to work.' (Staff 4)

'We don't know what to do about this because their body needs to use energy and the main source is rice. They put Rod-Dee (seasoning powder), salt and fish sauce in the food so they can eat more rice. Even though we suggest to them that they eat less rice and eat more vegetables, it is useless because they still have to go to work.' (Staff 3)

'Have you ever seen their rice portion in each meal? Oh My God !!!!!, the portion can separate into 2 meals for us. We can't complain about this because they can't avoid it.' (Staff 6)

'No way….agriculturists like them need energy to do their labour. Like Staff 4 said that they will cook their food to be a little bit salty then they can eat more rice. The main idea is not the taste but the energy.'(Staff2)

Staff 1 and Staff 5 explained more about the hill rice regarding its texture and calories which are similar to sticky rice. So, the hill tribespersons might get more energy from the hill rice than the normal rice.

'The hill rice has more calories than normal rice; the texture of hill rice is similar to sticky rice combined with the normal rice. They eat rice more than side dishes like vegetables, they might eat too many carbohydrates.'(Staff1)

'The hill rice has more calories than the boiled rice. It makes them full enough like when we eat sticky rice but the hill rice is a little bit lighter. When we suggested to them that they eat less rice, they told us they couldn't work because they wouldn't have energy.'(Saff5)

In the same way, the patients who work as employees have problems consuming of too much sugar from the drinks. The three in one coffee and energy drink are the most popular in this patient group due to making them feel refreshed and have more energy. Furthermore, it is easy to drink and buy. Some employers provide these drinks for them.

'The three in one coffee is popular here. The patients feel they have more energy after drinking, just put in the hot water but some people put it into their mouth followed by the water. The problem is it contains too much artificial cream and sugar. Many people are addicted to three in one coffee. They have to drink before work. It's easy to buy now and some employers provided it in the factory.' (Staff3)

'The patients usually drink the energy drink while they are working too. It makes them refreshed and gives energy. I wasn't surprised because it is available for them in the fridge of the factory. I

warned them not to drink it but they told me they can't avoid it because they have to work. They told me they were trying to drink less but I don't believe them.'(Staff4)

c) Social support: 'They depends on their relatives and we have the problem with their relatives too'

Social support from the family is considered to be one of the barriers to the treatment and control of diabetes due to a major part of the care for this disease being done at home. The health professionals found that the relative of the hill tribesperson does not cooperate with them in terms of taking the time to care for patients both at home and in hospital, in addition, their relative sometimes did not support the patient financially for example paying for the transport to the hospital and also ensuring the interpreter would be present.

'Many patients depend on their relative such as spouse, son or daughter to take them to hospital. A patient told me that she didn't come to the clinic because her daughter didn't have time to take her there.'(Staff1)

'Some patients can't come if their relative doesn't have time to bring them. The patients don't have the money for the shuttle car fare. Therefore, they will miss an appointment at the hospital.'(Staff 2)

'We also have the problem with the relative because they don't have time for us. We have the home health care in case the patients can't go to the hospital or the special case that we have to follow-up after. The relative usually complains that we have to go often and they won't stay with us. They leave us to talk to the patient which is not good because most of the patients don't understand us when we talk to them.'(Staff 3)

'We support and do everything that we can, we also have Khao Tom (rice soup) available for the patients after they finish the blood test, for free. We still look after the patients while their relative leaves them to go to work. Moreover, if their relative doesn't come to take them home in time, we have to contribute our money to give them for car fare.' (Staff 7)

'Nowadays, we support the patients very much, for example the elderly patients, their relative drops them at the clinic then goes to work. So we have to take care of them in every step of the services until we finish and their relative comes to take them home. It wouldn't be such a big problem if we had enough staff and if the patient can speak Thai.' (Staff 4)

The health professionals perceived that there is a problem of a lack of interest in obtaining the diabetes mellitus knowledge among some relatives of the hill tribesperson patients. Furthermore, the social support from the relative includes explaining about diet and food preparation.

'The elderly patients rely on their relative, including preparing the food so we need to talk to the caregiver who looks after this patient. Talking to the patient is not enough, we have to talk and give diabetes knowledge to their relative too but sometimes the relative doesn't pay attention to get the diabetes knowledge from us. So the result is that what we want won't happen.'(Staff6)

'For example, this morning a patient, she knows that she should avoid the sticky rice if she can. Before this she tried to reduce it and the blood result was good but this time the result was 180 mg% so I asked her if she still controlled eating sticky rice. She told me that her daughter has to go to work far from home and doesn't have time to cook rice so she has to eat the sticky rice which she already has.'(Staff8)

3) *The needs of the health professionals.*

The requirements for the health professionals working with hills tribesperson in the diabetes clinic are; an adequate workforce, an appropriate media and health programme, a budget for developing diabetes care and also cooperation from all sectors for increasing the quality of this care.

All health professionals need more focus from the government, they mentioned the shortage of staff in terms of the most important barrier. Consequently, they need a sufficient number of health professionals and reasons to work in this rural area. The following data were recorded:

'For me, I need more staff in our area. The more remote the area, the worse we have the staff shortage problem of the shortage staff.' (Staff 2)

'We want the government to solve this problem because if they can't solve it, the health professional who's working at the moment would very tired and leave for the better job in private hospital.' (Staff 3)

'I want to see the balance of human resource and the duties we have to work.' (Staff 4)

'The government has to concern with this. It's the main responsibility. We just want more staff to help our people.' (Staff5)

'I agree with Staff5 that the government should provide enough health workforces. It's their main responsibility. It's about the policy, too. Our main duty is treatment prevention and promoting health.' (Staff6)

The health professionals also required an appropriate media and health programme for the diabetes clinic. Due to the language barrier and the patient's awareness of their health, the media with the hill tribe's language and the suitable health promotion intervention are needed. Besides, the health professionals are concerned with the health promotion programme and want academic support from the University. Some of them shared ideas as followed:

'We also want to create the media or health education programme for this special group. I think it's very important thing, how can we make the health promotion programme which is suit for them and I'm sure that the researcher can help by talking to both health professionals and the hill tribesperson patients.' (Staff2)

'I think the media can make them aware of the disease but not the normal media that we have seen in TV or the media from the ministry of public health. I mean the special media which contains of their own language.'(Staff8)

'Yes yes yes, I agree, we can open this media such as dvd about the knowledge of this disease while they are waiting for blood test.'(Staff 5)

'For me, I also want the health promotion programme for this group. We are the practitioners so we don't have the knowledge enough to create the programme. We hope the University will help us about this.'(Staff 6)

'The intervention and media will help these patients understand and aware of their disease. We want a very special one for this group. It would be great if you who is in the academic field can help us.'(Staff 4)

'I think it's the one that we really want because at present we don't have any media that appropriate and fit to this special group especially in the language that the patients use.' (Staff 3)

Many health professionals indicated that a budget is necessary for developing the diabetes care. Enough budget for health care services can decrease the complications of the disease. The budget in their perception also includes the budget for the media and health promotion programme.

'We want some more budgets. We want some money to use in the diabetic clinic. As you've known that some patients didn't receive all services in particular the eye examination. If we have money enough. We can reduce the complications.' (Staff 3)

'We want the government add some more budget to cover all services. It's their right to receive as same as rich people in town. The ministry should re-examine the budget for patients with special conditions.' (Staff4)

Two health professionals described the experiences of effective media from the non-government organisation and their budget needs as follows:

'In the past, the free media from Thai- Germany Project used to produce the tape cassette in the form of hill tribes' language about the knowledge of diarrhoea, pneumonia, vaccinations and tuberculosis. It was effective to some extent, people had more knowledge and it's infectious disease so they thought it was very dangerous. Nowadays, we don't use cassette, its CD and DVD so that media (cassette) wasn't developed. We ..Mmm… I mean the health professionals or staffs always think about this. We should have the media development but we have many barriers such as knowledge and skill about the media, the responsibility that we have to do many things and ...mmmm…. the most important is budget to do this. We need money for improve our diabetes care including media and health programme which suitable for the patients.' (Staff1)

'We got help from NGOs (Non-Government-Organization) in many formats. For example the Thai-Germany Project produced the media of infectious diseases and gave a lump sum to buy the instruments for this. If we have enough money, I think we don't have to worry about the media or the programme for promoting health.' (Staff 2)

The health professionals need cooperation from all sectors to increase the quality of diabetes care. Several health professionals stated their requirements as below:

'The quality of care depends on everyone, not only the nurse but also the patient and people who get involve. We want everyone to participate in diabetic care. We have to help each other because all we don't know everything.' (Staff5)

'I support Staff5, if we cooperate…mmm.. I mean patients look after themselves, the family understand and help us look after the patients. I believe the quality of care is much better than now.' (Staff7)

'We can't work alone because the diabetes is a chronic disease. We need cooperation from the staff from all department. For example, the media, we want the media can access the target group and we know we can't do it alone. We need the people who have a special knowledge about media to work together because we don't have this skill.' (Staff 8)

'I think we … I mean …all people who related to the patients have to collaborate for better care of these people for example the media, we can't do it alone because we don't know the principles of producing media so we need the staff from IT to help us, and the translator too.' (Staff6)

'We should have more cooperation between the staff in IT department, nutritionists, nurses, pharmacists, doctors, public health officers including patient's family and health volunteers in the village. (Staff2)

Despite the national diabetes guidelines in Thailand, many hill tribespersons with type 2 diabetes still cannot control their disease. Understanding of barriers to the management of diabetes care among health professionals is needed, due to the relationship between them and patients. The findings from health professionals showed several socio-cultural barriers to the hill tribespersons patients accessing health care services. These findings also indicate that the health care service strategies need to improve and focus on the specific context area rather than following generic guidelines.

This is the first study in Thailand to identify barriers perceived by health care professionals when dealing with hill tribes patients. The study found that they identified multiple barriers. In terms of the services system, all participants complained that their performance was affected by inadequate staff, time constraints, demands from other competing tasks and increased workload resulting from the Universal Coverage Scheme (UCS). The latter may stem from overuse of free health care due to the free for service payment, whereby patients prefer to access services even when they have only a mild illness, for example constipation which may not need medical intervention. These prevent them from adhering to the recommendations of the guidelines and remain large barriers for health professionals in rural areas of Thailand. This finding is in agreement with Panpiemras et al. (2011) and Evans et al. (2012) who showed that outpatient demand for health care was increased, particularly among the elderly and the poor. Amongst these participants, inadequate staffing was the most reported barrier and in reality, the situation is worse, with the reported ratio of physician to patient being 1 per 2,035 (Department of Public Health, 2017). Although the proportion of main health professionals consisting of physician, dentist, pharmacist and nurse has been increasing, the misdistribution of these health workers is still a major problem. Previous studies showed that the rural areas of Thailand have been facing a health workforce shortage in all health care units. (Deerochanawong & Ferrario, 2013; Khunthar, 2015; Khaonuan et al., 2018; The National Legislative Assembly, 2017) Moreover, this is supported by Rich et al. (2016) who evaluated the Universal Health Coverage (UHC) from eleven countries comprising of Bangladesh, Brazil, Ethiopia, France, Ghana, Indonesia, Japan, Peru, Turkey, Vietnam and Thailand. They found human resources in the health care sector to be the main issue in achieving the UHC goals and that it is a global challenge. Furthermore, the current study revealed financial difficulties in the capacity to deliver health care services. This is because the healthcare budget is managed per head for people in the Thailand data system, however there are many poor hill tribe patients who are stateless and are not counted within that budget but who still access the services.

In diabetes clinics, health professionals have to deal with this situation by not conducting some of the more expensive tests such as eye screening in patients who are able to control their blood sugar as well as not always informing patients of their right to receive these tests and others like them. Besides, a lack of resources for caring, such as screening equipment, blood testing devices and health educational materials demonstrate the inequality of health services in this ethnic group (Chimeddamba et al., 2015). Consequently, geographic inequality has been a major public health problem in Thailand, especially among hill tribes people who live in remote areas and have low socio-economic status (Noree et al., 2017). This finding matches those observed in earlier studies in East Asia such as China, Indonesia, Philippines, and Vietnam (Aungkulanon et al., 2016; Bredenkamp et al., 2015;2014). The type and location of hospitals are indicators of the level of healthcare, in terms of size and quality in Thailand. Hence, patients in this group who receive services from a health promotion hospital, which is a primary care unit and community hospital, thus providing mostly primary and secondary care, have difficulties in accessing a good standard of care because both hospitals have limited resources for treatment (Anutrakulchai et al., 2016). However, patients with a higher level of need can be sent to secondary and tertiary hospitals which are located in the city centre, as appropriate. This current study indicates that understanding disparities in health care services is crucial for identifying gaps and understanding which groups are vulnerable, in order to implement effective interventions (Hosseinpoor et al., 2014). Another obstacle to effective working is the standard guidelines and indicators from the department of public health. In accordance with the present results, previous studies have demonstrated that the clinical guidelines were created without taking into account the views of primary care physicians and were therefore perceived as a barrier to implementation (Alexander et al., 2016; Chimeddamba et al., 2015; Lugtenberg et al., 2009). All health professionals have to follow the guidelines and report in numeric terms when assessing their effectiveness. From the findings it is apparent that the health professionals viewed the caring of diabetes patients as numeric, placing much importance on blood sugar level and considering how to reduce the number rather than considering the needs or the emotional wellbeing of the patients. The organisers of the guidelines and indicators need to rethink the goals of caring and adjust the guidelines which focus on both quantitative and qualitative measurement.

Another barrier is that hill tribe patients' lifestyle is related to the controlling of their blood sugar levels because most of them are farmers who have to consume a high volume of carbohydrates to provide energy for working, therefore they cannot follow the food recommendations. Moreover, hill rice which is the main food of this group, has a higher Glycaemic Index than normal rice (FDA Thailand, 2014), and as a result, changing the lifestyle of this group is very difficult for health professionals. The culture of festivals is also reported as a barrier to the goals of the health workers in providing effective treatment as the blood sugar results during the festivals 'Kin-Khaow-Mai' period is at high levels. This finding showed a high level of agreement between the barriers identified by hill tribe patients and health professionals alike. However, health professionals highlighted a few barriers that the patients did not report, for example social support from family and patients' awareness of their disease and its complications. Family support among the patients plays an important role in receiving health care services because many elderly and patients who cannot speak Thai rely on their family both in terms of transportation and interpretation as well as financially. Even though the services are free of charge, patients have to pay travel and food expenses. Furthermore, health professionals perceived that the intention from families to look after their relatives, provide healthy meals and take time to care for them both at home and in hospital is low. A possible explanation for this is that most hill tribes people have a low socio-economic status, hence they have to work and pay more attention to their cost of living than to the sickness of a family member. It is suggested therefore, that increasing the awareness of family members appears to be a crucial issue that needs to be considered when designing an intervention for this patient group.

The research results showed that even though the patients expressed their satisfaction of the services provided by the diabetes clinic and did not express any extra needs, after consideration was made about beliefs, experiences and the results of patients' blood sugar control, it was clear that this ethnic group still need assistance in regard to their self-care relating to health behaviours. Health professionals' advice should be compatible and not conflicting with the patients' beliefs, culture and lifestyle. Care support needs to be made available during both acute illnesses and periods of lifestyle modification at home. Therefore, the caring process should emphasise the importance of recognising all these factors; it should be based on collaboration with the primary care system and home-visits. This type of service is congruent with the concept developed by the World Health Organisation that called for the health services worldwide to be an integrated, multidisciplinary, and people-centred service (Warren et al., 2000; WHO, 2015). It was also congruent with the concept of McCormack and McCance (2006) that indicate the importance of the type of person-centred care which recognises that patients continue to interact with society and surrounding people who exert influence and exchange ideas with them. This type of care is different from the patient-centred care that defines an illness as one which affects an individualised patient (Mccance et al., 2011). In case those patients cannot control their disease, the problem may be due to many causes, for instance, environment, beliefs, and culture, but not necessarily due to the lack of patients' efforts to change their behaviours. Therefore, health professionals need to assess all aspect of their practice in order to gain an understanding that can lead to providing effective services.

The findings also reflected the importance of culture, beliefs, residential environment, social trends, dietary change from patients' traditional food, labour movement from rural to urban areas, easy access to cheap cooked foods nowadays, increased consumption of processed food, elderly people living alone and the influence of media advertisements; all of which are social determinants affecting disease management. The findings were compatible with the Ecological Model of health behaviour (Sallis et al., 2015) which puts the emphasis on the complicated interactions of numerous non-clinical factors such as communication, perception, function, information, conflicts between society and people living in that society, during an attempt to serve people's needs or goals. Due to social and cultural changes, the health of people in the society will also be changed especially in the present situation when information can reach people easily, especially via television or radio, as all families own at least one device (Apidechkul et al., 2016). It is difficult for patients to make a decision on which information they should or should not believe. Thus, patients should develop learning skills for choosing the information that they put into practice.

In regard to sharing learning, health professionals need to have good communication skills (Sully & Dallas, 2010;2014; Webb, 2011). Good communication is the key to patients' safety in this context. Communication between health professionals and patients must be clear in order to prevent mistakes that may occur. Besides, the study by Davis et al. (2006) found that the patients who were prescribed more than five types of medicine were statistically at significantly higher risk of misunderstanding the instructions and making dosage mistakes. Communication with patients' needs to be appropriate to the patients' own learning level, Warren et al (2000) suggested that health professionals should use their own health education development strategy to develop their patients' health education. Patients' progress in understanding the messages and instructions need to be regularly checked by health professionals at every follow-up meeting. Mitchell (2008) stated that care quality assessment should not be based on quantity alone, but should emphasise having a process which enables healthcare professionals to differentiate patients according to their self-care management ability, in addition to being able to respond to individual needs. They should be able to give clear and explicit information to patients when training them to learn how to control their diabetes by adopting essential behaviours. They also need to understand and be able to communicate with patients with different languages and cultures (Canadian Public Health Association, 2006). Participants of this study lived in the province where a dialect was used. Even though the Thai language was used as the official language, there are some minority patients who used specific local speech and could not understand Thai. Thus, if health professionals are from the local areas that can understand local language and culture and can communicate with patients by using local or specific language, it will help patients understand information provided. In addition, this issue is an important aspect in assessing service quality and being able to identify patients' health knowledge and self-management behaviours.

Up-to-date knowledge and skills of the health professionals are crucial for providing a high-quality diabetes care (Priharjo, 2010). Health professionals' capacity building regarding communication skills is an important factor of service quality development (Sully & Dallas, 2010;2014; Webb, 2011). The findings from this study showed that the patients need to talk to somebody who understands and empathised with them, understanding that their condition is chronic and that to change their behaviour is not easy. A lack of understanding of this issue led to patients' only changing their behaviours on a short-term basis, aiming to get blood results that would please health professionals on the appointment date, without considering any plan to maintain long-term results and stop adverse effects. This has led to disease complications which are significant public health problems.

The results of the analysis of services in the clinic showed that health education activities were organised for people with diabetes in the clinic during the history taking period, for between two to ten minutes. Most of the activities were targeted at for the patients who clearly had abnormal laboratory blood tests, which indicated their self-management problem in controlling their illness at home, while those with acceptable blood results were assumed that they could manage their self-care adequately, which may not be the case. The health education activities in the diabetes clinic need to aim at individual care and teaching to change behaviours. Cycles of educational activities for self-care related knowledge on various topics can be delivered while the patients are waiting to see the doctor. This concept was congruent with the Health Education Division, Ministry of Public Health (2015) that developed a health behaviour surveillance system by focusing on behaviour modification. For the patients with chronic diseases like diabetes mellitus, they have to effectively control their daily food and diabetic medicine intake, including watching out for symptoms of complications that might occur. Previous studies in Thailand showed that most diabetic health education programmes emphasised the control of food consumption, exercise and medication (Cheulunthod, 2010; Noppadol, 2015; Pattagul, 2016) without paying attention to psychological impacts. These studies showed that depressive disorder is an important problem of patients with chronic diseases. However, in this current study it was found that the participants did not mention depression caused by their illness, which may be due to the fact that they found it difficult to talk about depressive symptoms with their doctor or they would not agree to have the mental health check-up at the Mental Health Department of the hospital, or "Room Number 3". Some patients felt uncomfortable to go to "Room Number3" for fear of what people may think about them and also the stigma that they may be insane. Patients may not answer the questions truthfully on the mental health screening-test for people in the diabetes clinic.

Previous research has found that patients with depression caused by a chronic disease, needed to be treated by taking medicine throughout their lives which will affect their lifestyles and various roles they undertake. The study of Fisher et al found that depressive disorder caused by illness can significantly predict HbAIC level, health behaviours in regard to food consumption, exercise, and taking medicines continuously (Fisher et al., 2010). Therefore, depressive disorder is a factor that health professionals should not ignore; they should recognise the psychological impact that may occur with diabetes patients, in order to get better clinical outcomes. The aforementioned factors are important to set-up as a holistic evaluation and integrate to health care services for people with diabetes mellitus. Understanding patients' problems and supporting them to plan self-care behaviour using these factors to create a learning model can enhance the effectiveness of diabetes care.

In summary, the patients' needs derived from service quality assessment, showed that the patients thought that the service quality was at a "good" level. However, the results from the study of patients' self-management behaviours showed that there were very low numbers of patients who undertook correct regular self-care as they had problems regarding diet control and taking medicines correctly. The problem concerning food management was found among almost all of the patients, which showed that the present services aiming to change behaviours were not effective and some patients could not access quality services, especially those that aimed to assist patients to behave appropriately with their illness at home. In regard to the quality of this service, the people-centred concept should focus on the relationship between environments or social contexts and patients. This may promote or obstruct the patients' abilities to reach the goal (Entwise & Watt, 2013). Therefore, the assessment of characteristics and way of life related to health behaviours will be an important tool for solving the problem.

In general, the support from the community in disease-management of this type 2 diabetes mellitus patients group was found to be at a "low" level. Even though the ministry of public health had the policy on community participation to support the care of patients through the budget of local organisations, as well as promoting integration among various organisations in order to create links for building caring mechanisms for the patients with chronic diseases in the community sustainable. However, political support in the local community was found to be difficult due to the fact that the "People-Centred and Integrated Health Services" system needs the participation of the community in regard to building social streams on health in the community, receiving assistance and care during illness, being able to live in the environment emphasising “well-being” in regard to food consumption, exercise, and the promotion of community activities that need to be developed in the future.

Chapter 6 – Conclusion

This chapter is divided into four parts, starting with an overall summary of the study. The second part presents the strengths and limitations followed by the third part which is the recommendations and implications for clinical or health care professionals. The last part provides ideas for further research.

6.1 Overall findings summary and original contribution to knowledge

The main purpose of this research study was to explore the experiences and beliefs among hill tribespersons living with T2DM in Chiang Rai, Thailand, in order to understand the context and conditions that influence their health behaviours. This study revealed that the cultural and personal experiences influence participants' beliefs and understanding of their disease. They have their own perception of the causes of diabetes related to their lifestyle, such as over- consumption of food containing too much sugar, over-use of chemicals in agriculture, experience of sickness of themselves and their family-heredity, and the cultural belief of "Lom-Pid-Duan" sickness, which is the female participants' cultural belief of postpartum as "having bad blood." In terms of the meaning of having diabetes mellitus, most participants viewed their disease negatively, which meant "being different" and "incurable disease". Another view from the participants was that if they appeared well, they may ignore their condition and not follow recommendations from health professionals. The findings also revealed the beliefs of diabetes-related complications. The results showed that their perception of the severity is incongruent with their perception of susceptibility. However, a participant with an existing complication had a high-risk perception of the complications. They also explained that they were not scared of diabetes but were more concerned about becoming bed-ridden and disabled rather than death, due to being a burden on their family.

There are several factors which affect methods of self-management in this ethnic group, such as existing knowledge, experiences and socio-cultural aspects. Participants adjusted their food and beverage consumption by reducing the proportion of certain sweets foods and fruit containing high levels of sugar, eating sour or bitter foods after eating too many sweet foods and drinking a lot of water after eating the foods that they should avoid. A significant barrier for limiting their control of diabetes was their culture of participating in any ceremonies and festivals such as "Kin-Khaow-Mai" and New Year. Moreover, this study found that male participants believed that spirits are less harmful than beer and continued to drink them while female participants believed they should drink only local spirits because they were made from plants with herbs added.

In terms of compliance with prescribed diabetes medication, there were two types of participants, those who took only medication as prescribed and those who did not. The first type had experiences of using herbs and diet supplements simultaneously as the medication prescribed. 'Jiao-Gu-Lun', a local herb which hill tribespersons believed could reduce their sugar levels was used by drying it out and infusing in hot water before drinking. The second type comprised of those who adjusted the dose and those who discontinued the medicine as prescribed by health professionals. This group believed that taking too much diabetes medication could destroy their kidneys. Moreover, they did not tell the health professionals, as they were afraid of being blamed.

An important finding for exercise behaviour was that only two participants exercised regularly. One of them was a village health volunteer who had attended health training directly from health professionals and another one was a man who got married to a woman significantly younger than him recently so his reason for exercise was too improve his sexual health. This study found that the participants who did not exercise perceived that if they could control their eating behaviour, there was no need for exercise. They also believed that their ability to exercise was limited by diabetes and other health conditions. Moreover, they understood that activities in daily life such as housework, looking after their grandchildren and working on the farm were sufficient exercise.

The participants who had experiences with short-term complications, which they perceived as "diabetes went high," dealt with this by eating sweet foods or rice in smaller than normal portions. Surprisingly, most participants in this study did not bring candies or sugar with them and stated that the reason was they had confidence that they could take care of themselves. In cases of dealing with long-term diabetes complications such as hypertension, peripheral neuropathy and eye complications, they would behave as instructed by health professionals or follow their own beliefs and understanding. For instance, those who experienced peripheral neuropathy would exercise their feet and hands or massage them to improve blood circulation. However, many of them would rather ignore the symptoms. Only one participant had experienced problems with her vision, so she went to the doctor and was then referred to the bigger hospital in Chiang Rai.

This study showed the barriers and needs or essential requirements of both patients and health professionals. The only remaining obstacle to the patients is the language. Most explained that although they have some understanding of the Thai language, they could not always comprehend what the health professionals were telling them. The barriers from the health professionals' perspective are divided into two main categories. Firstly, the barriers from the health care service system include: staff shortage, financial constraints and the national standard guidelines and indicators which are unfit for this area. Secondly, the social and cultural barriers such as the culture of festivals especially, "Kin-Khaow-Mai" festival which celebrates the rice harvest, lifestyle, which meant that patients had difficulty controlling the disease, and social support from family. The needs that health professionals require for working with hill tribespersons in diabetes clinic care are; an adequate workforce, an appropriate media and health programme, and a budget for developing diabetes services as well as collaboration from all sectors.

The hill tribespersons are a group vulnerable to T2DM and a literature review reveals few studies in relation to this. In addition, there is none at all which shed light on their views, health beliefs and experiences in terms of self-management, essential requirements and barriers they may encounter. As this is the first research to explore the aspect described above, it has contributed and expanded the knowledge of T2DM within this group. This is from the perspective of both hill tribespersons themselves and the health professionals attempting to treat, and at the same time, educate them. A further benefit of this research is that is useful as a basis for designing more effective services and health promotion programmes to better serve the communities who have to deal, on a daily basis, with the difficulties of managing their disease.

6.2 Strengths and Limitations of the study.

This is the first study to explore the beliefs and experiences among hill tribespersons with T2DM in Thailand. It shows the perceptions and self-management of this vulnerable group in primary care settings in rural areas. This particular study of diabetes patients at primary care setting in rural areas is important because it is the first gateway to accessing health services and plays an important role in improving equity in health (Prakongsai et al., 2009). Moreover, the study also shows results received from health professionals who have been working with this ethnic group, therefore the findings are very useful for developing diabetes care guidelines. However, some limitations can be identified within this research study.

Firstly, a convenience sampling technique was used to select the study sample from a health promotion hospital population. Bornstein et al (2013) stated that results that derive from this sampling method can be generalised only to the sample studied. Thus, any research question addressed by this strategy is limited to the sample itself. In this study, the hill tribespersons with T2DM who took part in this study were volunteers and one of the criteria was to understand the spoken Thai language, so their perspectives may not be representative of all recently diagnosed hill tribespersons patients. Furthermore, the participants are drawn from the same cultural background as they have the same ethnicity and community context, so it could be assumed that they might have had similar health beliefs and experiences regarding diabetes mellitus as each other. This might affect the potential richness of the data because it might represent of only one group who shared the same aspects, and not of the wider hill tribes population.

Secondly, more females participated than males, and although women may hold different views, stark differences were not apparent in this study. The possibility remains that further barriers may be elucidated given further exploration of this topic; many other interrelated factors that affect a patient's ability to self-manage their disease such as psychological well-being (Peyrot et al., 2005) and depression (Vickers et al., 2006) were also not explored in this study.

Lastly, the small number of health professionals interviewed may also affect transferability of the results; however, care was taken to include a variety of health professionals who were involved in the care of patients with T2DM. In this study, the health care professionals' skills and self-efficacy in managing the diabetes clinic, which are important factors that influence adherence were not explored. This study was carried out in one Thai province and may not be transferable to other hill tribespersons' areas. However, the barriers of working with this group, reported by health care professionals, such as the need for better support from the government are likely not unique to the area.

6.3 The situation and recommendations from the study.

The management of diabetes mellitus in Thailand has been taken seriously by the government and recognised by the World Health Organisation, which has grouped Thailand as a country that utilises universal standard health care (Wanichkul et al., 2015). The outcome of the programme on universal health insurance in Thailand has helped hill tribes 'patients access essential health services without worrying about medical expenses that may be incurred.' However, they have to pay for transportation and also spend time accessing treatment at the community hospital which is often overcrowded. This situation has led to the expansion of health services of many hospitals to outside areas in order to reduce the overcrowding. This includes developing active innovative services where people participate and self-manage in accordance with the contexts of communities.

Therefore, self-management support should be integrated into normal care while people with diabetes are receiving health care services at the clinic or at home, with the aim of not adding additional burden to patients' lifestyles. The findings from this study showed that health professionals were mostly providing recommendations, teaching, giving information or demonstrating of various skills, such as food selection and foot care skills, instead of opening opportunities for patients to think and select what behaviour needed to be changed by themselves. Moreover, according to the results from this study, it was found that the reasons for participants being unable to participate in activities at the health care centre were: lack of time, the belief that when people age, the organs will degenerate according to age, transportation problems, and being a burden on the family.

There have been changes in the social situation of hill tribespersons in regard to working away from home, leaving the elderly at home, adopting urban food habits such as an increase in using fat, salt and artificial seasonings. There has also been an increase in accessing cooked food from fast food venders or the market which may be easier and cheaper than cooking at home. This situation means a low sugar, fat and salt diet can be very difficult. Some patients have tried very hard to change but they could not adjust to fit with their own lifestyles which caused low self-confidence in their own ability, so they gave up. However, in the cases of the patients who could control their diseases, their physical and mental health improved, which led to a lower rate of hospitalisation and mortality (Keeratiyouthwong, 2014). The patients who failed in changing their behaviour many times, had more difficulty in adjusting their behaviour than those who failed fewer times. Thus, helping patients to have a positive experience in controlling their illness is very important.

Health professionals should have passive and active caring systems for people with diabetes (at home and in the community) by reducing the working procedures, work organisation, materials and reports, time allotment used for diagnosis, treatment, and follow-up, and enhancing skills in managing the symptoms in accordance with the stages of illness by the patients themselves.

The analysis of self-management components showed that patients in this study could not comply with health professionals' recommendations due to many reasons, for example, the foods recommended to patients are not those that they consume in their daily life, for example, consumption of plain rice to replace the local rice of the ethnic group which is gluttonous and the suggestion about the quantity of raw foods for example red meat and fresh tofu. Moreover, patients' morale needs to be high, they do not want to feel guilty and be blamed by health professionals. Therefore, they may prepare themselves in order to get a good result from the blood test by strictly controlling their diet for at least two to three days before the appointment date. In addition, after receiving care services, they may self-reward by consuming inappropriate foods.

From the aforementioned information, it reflects that implementation of various aspects of public health has not been efficient enough to deal with diabetes mellitus problems as being one of the prime issues of the hill tribes group. The support of integrated self-management in accordance with the lifestyle and cultural context is necessary. Thus, the new alternative for effective management of this disease is the integration of cooperation between patients, family, community, and health professionals in regard to defining the problems, priority setting, goal-setting, assessing motivation and also obstacles that may occur. Also, skills-training in problem solving and cooperation in developing guidelines for caring for patients in order to solve problems based on needs and their cultural context. In order to self-manage effectively, the patient needs to obtain adequate information for decision-making, while the health professionals motivate and support patients to have self-confidence to manage their own conditions, develop communication with other people and to exchange information effectively (Lorig, 2002). Providing counselling and emphasising patient-centred care can change behaviours in the long-run (Anderson, 2008; Devenhornrun, 2007). The result of the meta-analysis from 47 survey studies showed that participants have different levels of intention of changing behaviour (Webb & Sheeran, 2006). Therefore, counselling should be emphasised on developing practices and behaviour in order to gain learning rather than teaching contents (Anderson, 2008).

In regard to services, health professionals should prepare people with diabetes mellitus to understand their roles in the treatment process, to cooperate in setting valuable goals which can be reached and to develop necessary skills in accordance with their needs. People-centred care will help to lower the inequity of accessing health services, to build a good relationship in medical care, to increase value of services and to produce better outcomes for patients, for instance increasing quality of life, service satisfaction and trustworthiness, and also to get good physical and mental health (Khraim & Carey, 2008;2009). The change of the health service model from focusing on the importance of physicians and nurses or other members of the health team to giving more autonomy to patients, is one of the indicators of health service quality. These have been prioritised as one of the principal visions of providing health care for people in the 12th National Public Health Plan, B.E. 2560-2564 (2017-2021), focusing on people participation, developing patient health, and having a health service system that serves the needs and real problems of patients. It was found that in providing care for patients from various disease groups, emphasis had been put on patient-centred care more than any other type (de Boer et al., 2013). Having relationships with patients by using people-centred care principles, will encourage the patients' potential for seeking health information and help them make decisions in order to form self-management behaviour in accordance with their goals set (De Boer et al., 2013).

Furthermore, health professionals should have an efficient team work system and adequate data for planning the care. They should have methodical working procedures, utilising the participatory planning process of the health team (health professionals in the local area), community team (village health volunteers and local administrator), patients and families, in caring for people with diabetes.

Data from this current study showed that the support provided should allow patients to have freedom and in providing information, patients should not be pushed to change behaviours. Opportunity should be provided for patients to choose and to decide in accordance with their needs and develop autonomy (Karjalainen et al., 2003). It is very important for health professionals to assess patients' ability to understand health information and to promote them in using it, based on the integration of knowledge with an ethnic group's culture and lifestyle in order to make it appropriate with self-care and to increase diabetic management skills of the patients. Health professionals should have the necessary information system for planning programmes for persons with diabetes and will be able to follow-up the outcomes continuously and systematically.

Presently, the assessment of patients from standard guidelines has focused on clinical outcomes, which means the data regarding lifestyles, identity, disease-management experiences, changing behaviours and living conditions has been neglected. Consequently, health professionals cannot understand their patients in all aspects and lack the data to promote patients' ability to manage their illness. Meyer and O'Brien-Pallas (2010) described a "Patient Care System Model" composed of three factors. Firstly, "input" which refers to characteristics of persons involved in caring, such as patients, health professionals, family and community members. Secondly, "process" refers to physical characteristics of caring, the caring culture, and social determinant; through the process in which the composition of various processes occurred during service provision. Lastly, "outcome" refers to the result from the process of proving services to patients, as well as from health professionals and the service system in regard to patients' and health professionals' satisfaction.

The model mentioned must be developed basically on the concept of inter-linkage within the system and the relationship of various sections of the system, sharing information within it, with the aim of helping every section utilise the information for efficient services. In implementing programmes of health service system in accordance with the concept mentioned and the findings from this study, it was found that the communication, either through verbal means, sign language, pictures, food models and short films are the key components of the service. The development of data for patients' care should be done by looking at the needs of two groups of people, patients and health professionals, and the measurement tool should be developed to assess the characteristics of the service system, process and output by applying the research concept of "A whole system approach". This development recommendation is based on the viewpoint of social ecology. According to its process focuses on beliefs, culture and experiences related to health behaviour of the patients, this helps health professionals and patients understand each other, which affects the interpretation of the services (Kennedy & Rogers, 2001).

From this study, the concept from the World Health Organisation (2015) can be applied which suggests five interdependent strategic goals in order to organise a people-centred and integrated health service for hill tribespersons as follows:

1. Empowering and engaging people by encouraging hill tribespersons and their families to participate in the process of disease management, including the community and health team and increasing equity of service provision, especially for the group that is disadvantaged or marginalised. The implementation of the programme should include enhancing knowledge systematically, assessing individual patients holistically and sharing information among health teams and the patients. Relatives and care givers should be included with the aim of all involved members having adequate data for clinical decision-making. In order to make informed decisions, patients and health team members should listen to and understand the patients deeply. All levels of service delivery, from specialised hospital to community primary care, patients and relatives should have opportunities to learn the facts regarding diabetes mellitus and understand cultural contexts and living conditions related to illness.
2. Strengthening governance and accountability should be done by using the participatory process of all stakeholders, starting from determining publicity that serves community needs with the aim of developing the hill tribe's quality of life. The implementation of activities should not be limited to the public health sector but should include other government and non-governmental departments. The other participatory activities included developing the plan and programme activities to manage the disease, provision of the common budget and evaluation/follow-up in order to modify and develop the quality of services, for example, local administration organisations, various foundations, and other local organisations.
3. Reorienting the model of care in order to have people receive efficient care by designing the services based on the needs assessment of hill tribespersons in the area, so the services given are sensitive to the difference of culture, living conditions, and the recognition of the importance of the primary care-based system. Since most of the patients' time is used for disease-management at home, surveillance systems and disease-management should be organised outside hospitals. Village health volunteers play roles as the link between patient care with family and the patients at home. Therefore, the plan to make a continuous link between the care of health service organisations and in the community is very important. The patients have to be evaluated not only the clinical changes but also the holistic changes with regard to physiological and psychological changes, affecting illness and daily living including social determinants of health that can be used for designing a treatment plan.
4. Service Coordination should be carried out with the cooperation of all involved sectors caring for individual hill tribespersons in order to provide continuous care and to serve the needs and preference of the patients. This type of care is based on the respect of individuality under the cooperation of related sectors in order to make the data flow to

responsible persons better and to promote the relationship and credibility between health professionals and patients.

5. Creating an enabling environment. The accomplishment of the implementation of all four aspects presented will be due to the creation of an enabling environment. The strength of the leaders, budget, capacity development of workers and the skills of reorganising the standard guidelines by an integrated people-centred focus, are the keys factors that make stakeholders from various sectors work together to transform the concept into practice.

From the aforementioned information, at present, patient care in this ethnic group is not appropriate for them and their family. This leads to the difficulty of applying health knowledge for disease-management in their daily lives and inequity in receiving care. Moreover, medical treatment is not the only method for solving chronic diseases, understanding social risk factors, health behaviours and living conditions are very important and should be taken into consideration.

Policy and Practitioner Recommendations.

1. A policy should be formulated by integrating various aspects in order to strengthen it and improve the care quality without adding any extra burden to health professionals. In organising a people-centred and integrated health service, the policies concerning the district health system, the family doctor, primary care system, and chronic disease management need to be utilised. The people-centred and integrated health service is one part that needs to collaborate with the policies of family doctor and primary care system. The care provided at the clinic is the component that can transfer understanding about patient care between doctors, nurses and other stakeholders with patients regarding diabetes management.
2. In driving the policy concerning the development of clinical baseline data for developing patients' health education in ethnic groups, the policy director should recognise the importance of this, compiling and analysing data systematically in order to utilise the data for patients' care. The development of baseline data is a process that needs a long period of time. Its implementation emphasises developing the model for the development of patients' health education and health literacy in this unique group. Therefore, the evaluation and compilation of health data should differ from the data system used in other general diabetes clinics. A systematic conceptual framework, adult learning and people-centred care should be put in place with the aim of developing patients' health education and self-management which leads to better health behaviours.

3. In organising services, health professionals need a data system that shows the situation regarding complex illness in order to use this as the baseline data in giving services and following-up the treatment. Therefore, the practice guidelines for caring for patients with diabetes should emphasise promoting patients' quality of life rather than evaluation of clinical indicators.
4. The quality assessment should be focused on fair health services with similar standards but adaptable in various contexts.
5. Assessment of the patients is an important skill in providing care during the beginning of the treatment programme and in the follow-up period. The holistic assessment is one important part in a comprehensive approach where four aspects are assessed: physical, mental, social, spiritual, as the individual's interrelated components, not separately. The data should be systematised to show the whole picture of the patient which has an interrelationship with environment, society and culture (Berman, 2014). Health professionals should integrate patients' self-care ability, responsibility for their health, cultural beliefs, and the reflection of livelihood as related to physical, mental and social roles, in order to understand patients' individualism that will make decision to perform health behaviours in different patterns. These understandings will lead to the provision of assistance and an efficient and effective treatment and care plan (Bolster et al., 2010).
6. A person-centred care service needs the collaboration of related organisations, both public health and non-public health, in order to help patients cope with the hurdles of their disease-control through the management of social determinants of health (ADA, 2015; Weaver et al., 2014), such as lifestyles, religious practices, living conditions, types of food availability, food culture, and access to healthy food locally. Health professionals must understand such factors in order to look for new strategies or modify standard guidelines that are appropriate for each individual patient's lifestyle. This is the concept of care for lifestyle diseases such as diabetes. The management of lifestyle diseases also needs strong support from the patients' family and community.
7. In organising a "Person-Centred and Integrated Health Service" in accordance with local cultures and way of life, health professionals must understand the importance of developing listening skills, the ability to reflect on what they hear, and at the same time maintain eye contact during conversation with patients (Zoffman et al., 2008). However, for the hill tribe patients whose communication language is a significant barrier, it will be more difficult than communicating with the general patients. Therefore, availability of an interpreter or hill-tribe staff is important for providing services for this ethnic group.

8. Services for diabetes management should be organised by aiming to develop a service consisting of a learning process between patients, health professionals and family including community with an understanding of each patient's living conditions, lifestyle, culture, and believes. It is necessary that health professionals must have data about patients' living conditions, particularly various factors affecting health behaviours.
9. In terms of human resource development, training programmes for health professionals regarding patients' assessment is needed. The theories and practicum in the real situation should be applied to enhance their knowledge and understanding of pathology of disease which can be used for providing information to patients. Hence the health professionals will be aware of the progression of the illness which may lead to a modification of the patients' behaviours. The contents of the training programme will also be used to adjust their behaviour. Besides, the utilisation of a data recording form or the patient's notebook and care plan that links the clinical data from a computer concerned with patients' assessment, including providing knowledge and counselling, will be useful for continuous care from health care centre to home, with the emphasis on being "People-Centred" in making decisions to change behaviours.

6.4 Future Research Projects.

The development of a toolkit or a special health promotion programme using the integrated cultural sensitivity of hill tribespersons' context for diabetes mellitus management, should be studied as a pilot intervention programme. This future study should focus on the support of self-management in accordance with the current findings and through synthesising the perspectives of all sectors involved. This includes the Department of Public Health, policy formulators and local administrative organisations that are very useful for helping these patients to access the correct information. In addition, the emphasis should be put on the assessment of patients individually in regard to physical, mental, and spiritual well-being, as well as their living conditions which will be helpful in planning the follow-up programme for the linked care to home.

This type of programme should focus on the respect for individuality and the linked care of all related sectors in order to provide continuous care and the evaluation of the outcomes of the care provided. The evaluation should be assessed in regard to the data utilisation process, quality of the integrated health services and facilities, ease of use, and ability to respond to the patients' different learning needs.

In order to assist health professionals to care and support the patients, the study of communication skills development would be useful for them. If this ethnic group receives appropriate suggestions in accordance with the patients’ context and if assistance and follow-up have been done continuously and systematically, it will change behaviours permanently to positive lifestyle behaviours. Finally, it will help to reduce diabetes problems effectively.

References

- Abdelaziz, S. B., Galal, Y. S., Sedrak, A. S., & Shaheen, D. S. (2016). Association of hepatitis C virus infection and type 2 diabetes in Egypt: A hospital-based study. *Journal of Diabetes Mellitus, 6*(1), 77-89. doi:10.4236/jdm.2016.61009
- Abdulrehman, M. S., Woith, W., Jenkins, S., Kossman, S., & Hunter, G. L. (2016). Exploring Cultural Influences of Self-Management of Diabetes in Coastal Kenya: An Ethnography. *Global qualitative nursing research*, *3*, 2333393616641825. doi:10.1177/2333393616641825
- Abebe, S. M., Berhane, Y., Worku, A., & Alemu, S. (2013). Increasing trends of diabetes mellitus and body weight: a ten year observation at gondar university teaching referral hospital, northwest Ethiopia. *PLoS One*, *8*(3), e60081
- Abrams, L. S., Dornig, K., & Curran, L. (2009). Barriers to service use for postpartum depression symptoms among low-income ethnic minority mothers in the united states. *Qualitative Health Research, 19*(4), 535-551. doi:10.1177/1049732309332794
- Abubakari, A., Jones, M. C., Lauder, W., Kirk, A., Anderson, J., Devendra, D., & Naderali, E. K. (2013). Ethnic differences and socio-demographic predictors of illness perceptions, self-management, and metabolic control of type 2 diabetes. *International Journal of General Medicine, 6*, 617-629. doi:10.2147/IJGM.S46649
- Ahola, A. J., & Groop, P. -. (2013). Barriers to self-management of diabetes. *Diabetic Medicine, 30*(4), 413-420. doi:10.1111/dme.12105
- Alberti, K. G. M. M., & Zimmet, P. Z. (1998). Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. Provisional report of a WHO consultation. *Diabetic medicine*, *15*(7), 539-553.
- Alexander, P. E., PhD, Li, S., MSc, Tonelli, M., MD, & Guyatt, G., MD. (2016). Canadian primary care physicians' attitudes toward understanding clinical practice guidelines for diabetes screening. *Canadian Journal of Diabetes, 40*(6), 580-585. doi:10.1016/j.jcjd.2016.05.018
- Alzubaidi, H., McNamara, K., Browning, C., & Marriott, J. (2015). Barriers and enablers to healthcare access and use among Arabic-speaking and Caucasian English-speaking patients with type 2 diabetes mellitus: A qualitative comparative study. *BMJ Open, 5*(11), e008687-e008687. doi:10.1136/bmjopen-2015-008687
- Alzubaidi, H., Mc Mamara, K., Chapman, C., Stevenson, V., & Marriott, J. (2015). Medicine-taking experiences and associated factors: Comparison between Arabic-speaking and

caucasian English-speaking patients with Type 2 diabetes. *Diabetic Medicine, 32*(12), 1625-1633. doi:10.1111/dme.12751

- Amadi, K. U., Uwakwe, R., Odinka, P. C., Ndukuba, A. C., Muomah, C. R., & Ohaeri, J. U. (2016). Religion, coping and outcome in out-patients with depression or diabetes mellitus. *Acta Psychiatrica Scandinavica, 133*(6), 489-496.
- Amarasekara, A. A. T. D., Fongkaew, W., Turale, S., Wimalasekara, S. W., & Chanprasit, C. (2014). An ethnographic study of diabetes health beliefs and practices in sri lankan adults: Beliefs and practices among adults with diabetes. *International Nursing Review, 61*(4), 507-514. doi:10.1111/inr.12136
- American Diabetes Association. (2010). Diagnosis and classification of diabetes mellitus. *Diabetes care*, *33*(Supplement 1), S62-S69.
- American Diabetes Association. (2013). Diagnosis and classification of diabetes mellitus. *Diabetes Care, 36*(1), S67-S74. doi:10.2337/dc13-S067
- Anderson, D., & Christison-Lagay, J. (2008). Diabetes self-management in a community health center: Improving health behaviours and clinical outcomes for underserved patients. *Clinical Diabetes, 26*(1), 22-27. doi:10.2337/diaclin.26.1.22
- Annual report of the health promotion hospital. (2015). *Annual report year 2015*. Retrieved2July2018,fromhttps://www.nhso.go.th/eng/files/userfiles/file/2018/001/Annual%20report%202015.pdf
- Anutrakulchai, S., Mairiang, P., Pongskul, C., Thepsuthammarat, K. and Chitranon CHAN-ONNDIT Thinkamporn, (2016) Mortality and treatment costs of hospitalized chronic kidney disease patients between the three major health insurance schemes in Thailand. *BMC Health Services Research, 16*(1), 31-38.
- Apidechkul, T. (2018). *Factors associated with hand foot mouth disease among children in day care center, Chiang Rai, Thailand*. Retrieved 7 May, 2018, from https://www.tci-thaijo.org/index.php/jmhs/article/view/121041/92357
- Arcury, T. A., Skelly, A. H., Gesler, W. M., & Dougherty, M. C. (2004). Diabetes meanings among those without diabetes: Explanatory models of immigrant Latinos in rural north Carolina. *Social Science & Medicine (1982), 59*(11), 2183.
- Ar-yuwat, S. (2017). *Screening for Hypertension and Diabetes among Thai Teenagers and adults in Muang District of Phitsanulok Province*. Retrieved 17 December, 207, from https://www.tci-thaijo.org/index.php/scnet/article/view/84867/67586
- Ashur, S. T., Shah, S. A., Bosseri, S., Morisky, D. E., & Shamsuddin, K. (2015). Illness perceptions of libyans with t2dm and their influence on medication adherence: A study in a

diabetes center in tripoli. *Libyan Journal of Medicine, 10*(1), 29797-10. doi:10.3402/ljm.v10.29797

- Assaad-Khalil, S. H., Al Arouj, M., AlMaatouq, M., Amod, A., Assaad, S. N., Azar, S. T., . . . Alberti, K. G. M. M. (2013). Barriers to the delivery of diabetes care in the middle east and south africa: A survey of 1,082 practising physicians in five countries. *International Journal of Clinical Practice, 67*(11), 1144-1150. doi:10.1111/ijcp.12205
- Auemaneekul, N., Chandanasotthi, P., Rawiworrakul, T., Sowattanangoon, N., & Boonsatean, W. (2016). Community Partnership, Context-basedIntervention and Diabetes Control in Thailand. *Journal of Public Health, 46*(3), 236-247.
- Aungkulanon, S., Tangcharoensathien, V., Shibuya, K., Bundhamcharoen, K., & Chongsuvivatwong, V. (2016). Post universal health coverage trend and geographical inequalities of mortality in thailand. *International Journal for Equity in Health, 15*(1) doi:10.1186/s12939-016-0479-5
- AVNBOL, C. I. (2017). Doubling syndemics: Ethnographic accounts of the health situation of homeless romanian roma in copenhagen. *Health and Human Rights, 19*(2), 73-88.
- Azami, Y., Funakoshi, M., Matsumoto, H., Ikota, A., Ito, K., Okimoto, H., . . . Miura, J. (2019). Long working hours and skipping breakfast concomitant with late evening meals are associated with suboptimal glycemic control among young male japanese patients with type 2 diabetes. *Journal of Diabetes Investigation, 10*(1), 73-83. doi:10.1111/jdi.12852
- Azar, F. E., Solhi, M., Darabi, F., Rohban, A., Abolfathi, M., & Nejhaddadgar, N. (2018). Effect of educational intervention based on PRECEDE-PROCEED model combined with self-management theory on self-care behaviours in type 2 diabetic patients. *Diabetes & Metabolic Syndrome*, doi:10.1016/j.dsx.2018.06.028
- Babazadeh, T., Dianatinasab, M., Daemi, A., Nikbakht, H. A., Moradi, F., & Ghaffari-fam, S. (2017). Association of self-care behaviors and quality of life among patients with type 2 diabetes mellitus: Chaldoran County, Iran. *Diabetes & metabolism journal, 41*(6), 449-456.
- Baghbanian, A., & Tol, A. (2012). The introduction of self-management in type 2 diabetes care: A narrative review. *Journal of education and health promotion, 1*
- Baig, A. A., Benitez, A., Quinn, M. T., & Burnet, D. L. (2015). Family interventions to improve diabetes outcomes for adults. *Annals of the New York Academy of Sciences, 1353*(1), 89-112
- Baker, M. K., Simpson, K., Lloyd, B., Bauman, A. E., & Singh, M. A. F. (2011). Behavioral strategies in diabetes prevention programs: a systematic review of randomized controlled trials. *Diabetes research and clinical practice, 91*(1), 1-12.

- Basak Cinar, A., & Schou, L. (2014). Health promotion for patients with diabetes: health coaching or formal health education?. *International dental journal*, *64*(1), 20-28.
- Bassuk, S. S., Berkman, L. F., & Amick III, B. C. (2002). Socioeconomic status and mortality among the elderly: Findings from four US communities. *American Journal of Epidemiology, 155*(6), 520-533. doi:10.1093/aje/155.6.520
- Baum, F., & Fisher, M. (2014). Why behavioural health promotion endures despite its failure to reduce health inequities. *Sociology of Health & Illness, 36*(2), 213-225. doi:10.1111/1467-9566.12112
- Beaglehole, R., Bonita, R., Horton, R., Adams, C., Alleyne, G., Asaria, P., ... & Cecchini, M. (2011). Priority actions for the non-communicable disease crisis. *The Lancet*, *377*(9775), 1438-1447.
- Bech, L. K., Borch Jacobsen, C., Mathiesen, A. S., & Thomsen, T. (2019). Preferring to manage by myself: A qualitative study of the perspectives of hardly reached people with type 2 diabetes on social support for diabetes management. *Journal of Clinical Nursing,* doi:10.1111/jocn.14783
- Benavides-Vaello, S., & Brown, S. A. (2016). Sociocultural construction of food ways in low-income Mexican-American women with diabetes: A qualitative study. *Journal of Clinical Nursing, 25*(15-16), 2367-2377. doi:10.1111/jocn.13291
- Beran, D. (2015). The impact of health systems on diabetes care in low and lower middle income countries. *Current diabetes reports*, *15*(4), 20.
- Berardi, V., Bellettiere, J., Nativ, O., Ladislav, S., Hovell, M. F., & Baron-Epel, O. (2016). Fatalism, diabetes management outcomes, and the role of religiosity. *Journal of religion and health, 55*(2), 602-617.
- Berman, A., Snyder, S. J., Kozier, B., Erb, G. L., Levett-Jones, T., Dwyer, T., ... & Parker, B. (2014). Kozier & Erb's Fundamentals of Nursing Australian Edition (Vol. 3). Pearson Higher Education
- Bernhard, G., Ose, D., Baudendistel, I., Seidling, H. M., Stützle, M., Szecsenyi, J., . . . Mahler, C. (2017). Understanding challenges, strategies, and the role of support networks in medication self-management among patients with type 2 diabetes: A qualitative study. The Diabetes Educator, 43(2), 190-205. doi:10.1177/0145721717697243
- Bertran, E. A., Pinelli, N. R., Sills, S. J., & Jaber, L. A. (2016;2017;). The arab american experience with diabetes: Perceptions, myths and implications for culturally-specific interventions. *Primary Care Diabetes, 11*(1), 13-19. doi:10.1016/j.pcd.2016.07.004

- Betancourt-Albrecht, M., & Cunningham, G. R. (2003). *Hypogonadism and diabetes. International journal of impotence research, 15*(S4), S14.
- Beulens, J. W. J., Stolk, R. P., Yvonne T. van der Schouw, Grobbee, D. E., Hendriks, H. F. J., & Bots, M. L. (2005). Alcohol consumption and risk of type 2 diabetes among older women. Diabetes Care, 28(12), 2933-2938. doi:10.2337/diacare.28.12.2933
- Beverly, E. A., Miller, C. K., & Wray, L. A. (2008). Spousal support and food-related behavior change in middle-aged and older adults living with type 2 diabetes. *Health Education & Behavior, 35*(5), 707-720.
- Bhui, K. (2010). Culture, religion and health care. International Journal of Integrated Care, 10(5) doi:10.5334/ijic.491
- Bi, Y., Wang, T., Xu, M., Xu, Y., Li, M., Lu, J., . . . Ning, G. (2012). Advanced research on risk factors of type 2 diabetes. Diabetes/Metabolism Research and Reviews, 28(2), 32-39. doi:10.1002/dmrr.2352
- Bodenheimer, T., & Laing, B. Y. (2007). The teamlet model of primary care. Annals of Family Medicine, 5(5), 457-461. doi:10.1370/afm.731
- Bolster, D., & Manias, E. (2010). Person-centred interactions between nurses and patients during medication activities in an acute hospital setting: qualitative observation and interview study. International journal of nursing studies, 47(2), 154-165.
- Bornstein, M. H., Jager, J., & Putnick, D. L. (2013). Sampling in Developmental Science: Situations, Shortcomings, Solutions, and Standards. *Developmental review : DR*, *33*(4), 357–370. doi:10.1016/j.dr.2013.08.003
- Bosch, M., Dijkstra, R. F., Wensing, M. J. P., Weijden, G. D. E. M. v. d., & Grol, R. P. T. M. (2008). Organizational culture, team climate and diabetes care in small office-based practices. BMC Health Services Research, 8, 180-1-180.
- Boykin, A., Schoenhofer, S. O., & Valentine, K. L. (2014;2013;). Health care system transformation for nursing and health care leaders: Implementing a culture of caring. New York, NY: Springer Publishing Company, LLC.
- Brathwaite, A. C., & Lemonde, M. (2017). Exploring Health Beliefs and Practices of Caribbean Immigrants in Ontario to Prevent Type 2 Diabetes. *Journal of Transcultural Nursing, 28*(1), 15-23.
- Bredenkamp, C., Evans, T., Lagrada, L., Langenbrunner, J., Nachuk, S., & Palu, T. (2015;2014;). Emerging challenges in implementing universal health coverage in asia. Social Science & Medicine, 145, 243-248. doi:10.1016/j.socscimed.2015.07.025

- Brenner, B. M., Cooper, M. E., De Zeeuw, D., Keane, W. F., Mitch, W. E., Parving, H. H., ... & Shahinfar, S. (2001). Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. *New England Journal of Medicine*, *345*(12), 861-869.
- Broadbent, E., Donkin, L., & Stroh, J. C. (2011). Illness and treatment perceptions are associated with adherence to medications, diet, and exercise in diabetic patients. *Diabetes Care, 34*(2), 338-340. doi:10.2337/dc10-1779
- Brundisini, F., Vanstone, M., Hulan, D., DeJean, D., & Giacomini, M. (2015). Type 2 diabetes patients' and providers' differing perspectives on medication nonadherence: A qualitative meta-synthesis. BMC Health Services Research, 15(1), 516. doi:10.1186/s12913-015-1174-8
- Buasonte, R., Pawanranchakorn J., Sritimongkon R., Tubtim W., Poksir M., (2012). *Health care lifestyle of Thai-Song-Dam from the past toward the Era of sufficiency health.* Retrieved 2 September, 2018, from https://tci-thaijo.org/index.php/edujournal_nu/article/view/9398/8507
- Buban, P. (2015). *The effectiveness of the vegetable consumption promotion program By applying social marketing in the risk group of type 2 diabetes, Muang District, Nakhon Nayok*. Retrieved 13 September, 2018, from http://healthsci.swu.ac.th/node/359
- Buse, J. B., Ginsberg, H. N., Bakris, G. L., Clark, N. G., Costa, F., Eckel, R., . . . American Heart Association. (2007). Primary prevention of cardiovascular diseases in people with diabetes mellitus: A scientific statement from the american heart association and the american diabetes association. Diabetes Care, 30(1), 162-172. doi:10.2337/dc07-9917
- Campbell, I. W., & Lebovitz, H. (1998). *Diabetes mellitus*. Abingdon: Health Press.
- Campbell, D. J. T., Manns, B. J., Hemmelgarn, B. R., Sanmartin, C., Edwards, A., & King-Shier, K. (2017). Understanding financial barriers to care in patients with diabetes: An exploratory qualitative study. The Diabetes Educator, 43(1), 78-86. doi:10.1177/0145721716679276
- Canadian public health association. (2006). *Canadian public health association 2006 annual report*. Retrieved 3 Febuary, 2018, from https://www.cpha.ca/sites/default/files/assets/annual-reports/2006_ar_e.pdf
- Capoccia, K., Odegard, P. S., & Letassy, N. (2016). Medication adherence with diabetes medication: A systematic review of the literature. The Diabetes Educator, 42(1), 34-71. doi:10.1177/0145721715619038
- Caraher, M. (1998). Patient education and health promotion: Clinical health promotion — the conceptual link. *Patient Education and Counseling, 33*(1), 49-58. doi:10.1016/S0738-3991(97)00055-4

- Carbone, E. T., Rosal, M. C., Torres, M. I., Goins, K. V., & Bermudez, O. I. (2007). Diabetes self-management: perspectives of Latino patients and their health care providers. *Patient education and counseling, 66*(2), 202-210.
- Carson, L. D., Henderson, J. N., King, K., Kleszynski, K., Thompson, D. M., & Mayer, P. (2015). American indian diabetes beliefs and practices: Anxiety, fear, and dread in pregnant women with diabetes. *Diabetes Spectrum, 28*(4), 258-263. doi:10.2337/diaspect.28.4.258
- Cassel, E. J. (1976). The Healer's art: a new approach to the doctor-patient relationship.
- Cavanagh, S. J. (1991). Care Study: Living with Diabetes Mellitus. In *Orem's Model in Action* (pp. 57-71). Palgrave, London.
- Centre of Disease Control and Prevention. (2014). *National diabetes fact sheet: National estimates and general information on diabetes and prediabetes in the United States 2014*. Retrieved 21 July, 2018, from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf.
- Chase, H. P., Jackson, W. E., Hoops, S. L., Cockerham, R. S., Archer, P. G., & O'Brien, D. (1989). Glucose control and the renal and retinal complications of insulin-dependent diabetes. *Jama, 261*(8), 1155-1160.
- Chaufan, C., Davis, M., & Constantino, S. (2011). The twin epidemics of poverty and diabetes: understanding diabetes disparities in a low-income Latino and immigrant neighborhood. *J Community Health*, 36(6): 1032–1043.
- Chaufan, C., Fielding, H., Chesla, C., & Fernandez, A. (2015). "it's not the doctor - it's me": How self-blame obscures language and other structural barriers to diabetes care among low-income latinos with limited english proficiency. *Research in the Sociology of Health Care,* 33, 187.
- Chaveepojnkamjorn, W., Pichainarong, N., Schelp, F. P., & Mahaweerawat, U. (2008). Quality of life and compliance among type 2 diabetic patients.
- Chen, J., Jing, X., Liu, X., Volkmann, A., Chen, Y., Liu, Y., . . . Ma, J. (2019). Assessment of factors affecting diabetes management in the city changing diabetes (CCD) study in tianjin.*PloS One, 14*(2), e0209222. doi:10.1371/journal.pone.0209222
- Cheng, L., Leung, D. Y., Sit, J. W., Li, X., Wu, Y., Yang, M., . . . Hui, R. (2016). Factors associated with diet barriers in patients with poorly controlled type 2 diabetes. Patient Preference and Adherence, 10, 37-44. doi:10.2147/PPA.S94275
- Cheng, L., Sit, J. W. H., Leung, D. Y. P., & Li, X. (2016). The association between Self-Management barriers and Self-Efficacy in chinese patients with type 2 diabetes: The mediating role of appraisal. Worldviews on Evidence-Based Nursing, 13(5), 356-362. doi:10.1111/wvn.12159

- Chimeddamba, O., Peeters, A., Ayton, D., Tumenjargal, E., Sodov, S., & Joyce, C. (2015). Implementation of clinical guidelines on diabetes and hypertension in urban mongolia: A qualitative study of primary care providers' perspectives and experiences. Implementation Science, 10(1), 112. doi:10.1186/s13012-015-0307-0
- Chimwong, T. (2005). *Applying the LEAN Concept for Quality Improvement in the Diabetic Clinic of Rayong Hospital _14-0351(121-135)P4indd 1224/26/14 2:34:43 PM*. Retrieved 28 September, 2018, from https://www.tci-thaijo.org/index.php/tnaph/article/view/18336/16132
- Choowattanapakorn, T. & Suriyawong, S. (2012). The View of Illness among Older Persons with Diabetes Mellitus. Thai Journal of Nursing Council, 26(4), 96. Retrieved from https://www.tci-thaijo.org/index.php/TJONC/article/view/2739
- Chourdakis, M., Kontogiannis, V., Malachas, K., Pliakas, T., & Kritis, A. (2014). Self-care behaviors of adults with type 2 diabetes mellitus in Greece. *Journal of community health, 39*(5), 972-979.
- Chuengsatiansup, K. (2002). *Replace an aesthetics to be healthy*. Retrieved 23 August, 2018, from https://www.gotoknow.org/posts/309156
- Chuengsatiansup, K. (2007). *Thai Health: Thai Culture.* (2nd ed., pp. 205-252). Thailand, BKK
- Clark, C. M., Fradkin, J. E., Hiss, R. G., Lorenz, R. A., Vinicor, F., & Warren-Boulton, E. (2000). Promoting early diagnosis and treatment of type 2 diabetes: the National Diabetes Education Program. JAMA, 284(3), 363-365.
- Coates, V. E., & Boore, J. R. P. (1995). Self-management of chronic illness: Implications for nursing. International Journal of Nursing Studies, 32(6), 628-640. doi:10.1016/0020-7489(95)00043-5
- Cobb, T. G. (2010). Strategies for providing cultural competent health care for Hmong Americans. *Journal of Cultural Diversity, 17*(3).
- Cohen, R. V., Pinheiro, J. C., Schiavon, C. A., Salles, J. E., Wajchenberg, B. L., & Cummings, D. E. (2012). Effects of gastric bypass surgery in patients with type 2 diabetes and only mild obesity. *Diabetes care*, *35*(7), 1420-1428.
- Comino, E. J., Tran, D. T., Haas, M., Flack, J., Jalaludin, B., Jorm, L., & Harris, M. F. (2013). Validating self-report of diabetes use by participants in the 45 and up study: a record linkage study. *BMC health services research, 13*(1), 481.
- Concha, J. B., Mayer, S. D., Mezuk, B. R., & Avula, D. (2016). Diabetes causation beliefs among Spanish-speaking patients. *The Diabetes Educator, 42*(1), 116-125. doi:10.1177/0145721715617535

- Conner, M., & Norman, P. (2005). *Predicting health behaviour: Research and practice with social cognition models* (2nd ed.). Maidenhead, England;New York;: Open University Press.
- Cooper Brathwaite, A., & Lemonde, M. (2016). Health beliefs and practices of African immigrants in Canada. *Clinical Nursing Research, 25*(6), 626-645. doi:10.1177/1054773815587486
- Coppell, K. J., Kataoka, M., Williams, S. M., Chisholm, A. W., Vorgers, S. M., & Mann, J. I. (2010). Nutritional intervention in patients with type 2 diabetes who are hyperglycaemic despite optimised drug treatment—Lifestyle over and above drugs in diabetes (LOADD) study: Randomised controlled trial. *Bmj, 341*(7766), 237-237. doi:10.1136/bmj.c3337
- Corbin, J. M., & Strauss, A. L. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Thousand Oaks, CA;London;: SAGE Publications.
- Cranston, I. C., & Thynne, A. (2011). financial impact of a multidisciplinary, stream-based, proactive inpatient diabetes management programme in a 1,000-bedded acute hospital trust: p407. *Diabetic Medicine*, *28*, 155.
- Crisp, M. (2006). Managing diabetes through diet. *NURSING IN PRACTICE*, *27*, 38.
- Crotty, M. M., Henderson, J., Ward, P. R., Fuller, J., Rogers, A., Kralik, D., & Gregory, S. (2015). Analysis of social networks supporting the self-management of type 2 diabetes for people with mental illness. *BMC health services research, 15*(1), 257.
- Dabelea, D., Mayer-Davis, E. J., Lamichhane, A. P., D'agostino, R. B., Liese, A. D., Vehik, K. S., ... & Hamman, R. F. (2008). Association of intrauterine exposure to maternal diabetes and obesity with type 2 diabetes in youth: the SEARCH Case-Control Study. *Diabetes care*.
- Dajani, R., Li, J., Wei, Z., March, M. E., Xia, Q., Khader, Y., . . . Hakonarson, H. (2017). Genome-wide association study identifies novel type II diabetes risk loci in jordan subpopulations. *Peerj, 2017*(8), e3618-e3618. doi:10.7717/peerj.3618
- Dalstra, J. A. A., Kunst, A. E., Borrell, C., Breeze, E., Cambois, E., Costa, G., . . . Mackenbach, J. P. (2005). Socioeconomic differences in the prevalence of common chronic diseases: An overview of eight european countries. *International Journal of Epidemiology, 34*(2), 316-326. doi:10.1093/ije/dyh386
- Dastani, Z., Hivert, M. F., Timpson, N., Perry, J. R., Yuan, X., Scott, R. A., ... & Fuchsberger, C. (2012). Novel loci for adiponectin levels and their influence on type 2 diabetes and metabolic traits: a multi-ethnic meta-analysis of 45,891 individuals. *PLoS genetics*, *8*(3), e1002607.
- Davila, E. P., Florez, H., Trepka, M. J., Fleming, L. E., Niyonsenga, T., Lee, D. J., & Parkash, J. (2011). Long work hours is associated with suboptimal glycemic control among US workers

with diabetes. *American Journal of Industrial Medicine, 54*(5), 375-383. doi:10.1002/ajim.20923

- Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health psychology review, 9*(3), 323-344.
- Davis, W. A., Bruce, D. G., & Davis, T. M. (2006). Is self-monitoring of blood glucose appropriate for all type 2 diabetic patients?: The Fremantle Diabetes Study. *Diabetes Care, 29*(8), 1764-1770.
- De Boer, D., Delnoij, D., & Rademakers, J. (2011;2013;). The importance of patient-centered care for various patient groups. Patient Education and Counselling, 90(3), 405-410. doi:10.1016/j.pec.2011.10.002
- Deepa, M., Bhansali, A., Anjana, R. M., Pradeepa, R., Joshi, S. R., Joshi, P. P., … Kaur, T. (2014). Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes Indian Journal of Endocrinology and Metabolism, 18(3), 379–385. http://doi.org/10.4103/2230-8210.131191 doi:10.1016/S0140-6736(15)60229-X
- Deerochanawong, C., & Ferrario, A. (2013). Diabetes management in thailand: A literature review of the burden, costs, and outcomes. Globalization and Health, 9(1), 11-11. doi:10.1186/1744-8603-9-11
- Dehghani-Tafti, A., Mahmoodabad, S. S. M., Morowatisharifabad, M. A., Ardakani, M. A., Rezaeipandari, H., & Lotfi, M. H. (2015). Determinants of self-care in diabetic patients based on health belief model. *Global journal of health science, 7*(5), 33.
- Demakakos, P., Biddulph, J. P., Bobak, M., & Marmot, M. G. (2015;2016;). Wealth and mortality at older ages: A prospective cohort study. *Journal of Epidemiology and Community Health, 70*(4), 346-353. doi:10.1136/jech-2015-206173
- Department of Disease Control. (2015). Fifth Review of the National Health Statistic Reports. Retrieved 16 January , 2016 from http://klb.ddc.moph.go.th/dataentry/handbook?s=&y=&dv=&ds=&t=ikp%27ko
- Department of Disease Control. (2016). The Annual Report. Retrieved 25 September , 2016 from http://thaincd.com/document/file/download/paper-manual/%E0%B8%A3%E0%B8%B2%E0%B8%A2%E0%B8%87%E0%B8%B2%E0%B8%99%E0%B8%9B%E0%B8%A3%E0%B8%B0%E0%B8%88%E0%B8%B3%E0%B8%9B%E0%B8%B5_59_%E0%B8%AA%E0%B8%B3%E0%B8%99%E0%B8%B1%E0%B8%81%E0%B9%82%E0%B8%A3%E0

%B8%84%E0%B9%84%E0%B8%A1%E0%B9%88%E0%B8%95%E0%B8%B4%E0%B8%94%E0%B8%95%E0%B9%88%E0%B8%AD.pdf

- Department of international trade promotion. (2014). Department of International Trade Promotion Annual Report 2014. Retrieved 8 September, 2018, from http://ditp.go.th/download/article/article_20180207163317.pdf
- Department of public health. (2017). *Public Health England Annual Report and Accounts 2016/17*. Retrieved 7 June, 2018, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/629803/PHE_annual_report_2016_2017_web_version.pdf
- De Silva, A. P., De Silva, Sudirikku Hennadige Padmal, Haniffa, R., Liyanage, I. K., Jayasinghe, K. S. A., Katulanda, P., . . . Rajapakse, L. C. (2016). A survey on socioeconomic determinants of diabetes mellitus management in a lower middle income setting. *International Journal for Equity in Health, 15*(1), 74. doi:10.1186/s12939-016-0363-3
- Diabetes UK education and Self-Management award. (2019). *Diabetic Medicine, 36*(S1), 29-31. doi:10.1111/dme.12_13882
- Dines, A., & Cribb, A. (1993). *Health promotion: Concepts and practice*. Oxford [England];Cambridge, Mass., USA;: Blackwell Science.
- Dorman, J. S., Laporte, R. E., Kuller, L. H., Cruickshanks, K. J., Orchard, T. J., Wagener, D. K., ... & Drash, A. L. (1984). The Pittsburgh insulin-dependent diabetes mellitus (IDDM) morbidity and mortality study: mortality results. *Diabetes, 33*(3), 271-276.
- Dunning, T. (2012;2013;). *Diabetes education: Art, science, and evidence* (2nd;1. Aufl.; ed.). Chichester, West Sussex: Wiley-Blackwell. doi:10.1002/9781118702666
- Dupuis J, Langenberg C, Prokopenko I, et al. New genetic loci implicated in fasting glucose homeostasis and their impact on type 2 diabetes risk. Nat Genet2010; 42(2): 105–16.
- Drury, M. I. (1986). *Diabetes mellitus* (2nd ed.). Oxford: Blackwell Scientific.
- Dwivedi, K. N., Varma, V. P., & Dwivedi, K. N. (1996). *Meeting the needs of ethnic minority children: A handbook for professionals*. London: Jessica Kingsley.
- Egede, L.E, Gebregziabher, M., Echols, C., & Lynch, C. (2014). Longitudinal effects of medication nonadherence on glycemic control. *Ann Pharmacother 48*, 562–570.
- El Tayeb, I. M., El Saghier, E. O. A., & Ramadan, B.K. (2014). Impact of shift work on glycemic control in insulin treated diabetics Dar El Chefa Hospital, Egypt 2014. *Int J Diabetes Res*,*3*(1), 15–21.
- Elliott, J. A., Abdulhadi, N. N., Al-Maniri, A. A., Al-Shafaee, M. A., Wahlström, R., Medicinska fakulteten, . . . Allmänmedicin och klinisk epidemiologi. (2013). Diabetes self-management

and education of people living with diabetes: A survey in primary health care in muscat oman.*Plos One, 8*(2), e57400. doi:10.1371/journal.pone.0057400

- Entwistle, V. A., & Watt, I. S. (2013). Treating patients as persons: a capabilities approach to support delivery of person-centered care. The American Journal of Bioethics, 13(8), 29-39.
- Erabica.com. (2018). ในหลวงกับกาแฟ – Erabica. [online] Available at: http://www.erabica.com/?p=510 [Accessed 7 Aug. 2018].
- Espinoza Giacinto, R., Castañeda, S. F., Perez, R. L., Nodora, J. N., Gonzalez, P., Lopez, E. J., & Talavera, G. A. (2016). Diabetes cultural beliefs and traditional medicine use among health center patients in oaxaca, mexico. *Journal of Immigrant and Minority Health, 18*(6), 1413-1422. doi:10.1007/s10903-015-0323-9
- Evans, T.G., Chowdhury, A.M.R., Evans, D.B., Fidler, A.H., Lindelow, M., Mills, A. and Scheil-Adlung, X. (2012), Thailand's Universal Coverage Scheme: Achievements and Challenges – An Independent Assessment of the first 10 years (2001-2010), Health Insurance System Research Office,
- Faculty of nursing, khon kaen. (2011). *Type 2 Diabetes Risk in Middle-Aged Isaan Women: A Case Study of Urban Community*. Retrieved 18 October, 2017, from https://www.tci-thaijo.org/index.php/jnat-ned/article/view/5899/5113
- Fareed, M., Salam, N., Khoja, A. T., Mahmoud, M. A., & Ahamed, M. (2017). Life style related risk factors of type 2 diabetes mellitus and its increased prevalence in saudi arabia: A brief review. International Journal of Medical Research and Health Sciences, 6(3), 125-132.
- Fda thailand. (2014). *Food and nutrition labelling in Thailand: a long march from subsistence producers to international traders*. Retrieved 27 July, 2018, from https://pdfs.semanticscholar.org/2fc4/8616075be7b1035ab85239b74f7c52fd761d.pdf
- Fisher, L., Glasgow, R. E., & Strycker, L. A. (2010). The relationship between diabetes distress and clinical depression with glycemic control among patients with type 2 diabetes.*Diabetes Care, 33*(5), 1034-1036. doi:10.2337/dc09-2175
- Fleming, E., & Gillibrand, W. (2009). An exploration of culture, diabetes, and nursing in the south asian community: A metasynthesis of qualitative studies. Journal of Transcultural Nursing, 20(2), 146-155. doi:10.1177/1043659608330058
- Fortmann, A. L., Roesch, S. C., Penedo, F. J., Isasi, C. R., Carnethon, M. R., Corsino, L., . . . Gallo, L. C. (2014;2015;). Glycemic control among U.S. Hispanics/Latinos with diabetes from the HCHS/SOL sociocultural ancillary study: Do structural and functional social support play a role? *Journal of Behavioral Medicine, 38*(1), 153-159. doi:10.1007/s10865-014-9587-0

- Frank, L. K., Jannasch, F., Kröger, J., Bedu-Addo, G., Mockenhaupt, F. P., Schulze, M. B., & Danquah, I. (2015). A dietary pattern derived by reduced rank regression is associated with type 2 diabetes in an urban ghanaian population. Nutrients, 7(7), 5497-5514. doi:10.3390/nu7075233
- Freidson, E. (2015). Profession of medicine. 1970. *New York: Dodds Mead*.
- Fujioka, K., Seaton, T. B., Rowe, E., Jelinek, C. A., Raskin, P., Lebovitz, H. E., ... & Group, T. S. D. C. S. (2000). Weight loss with sibutramine improves glycaemic control and other metabolic parameters in obese patients with type 2 diabetes mellitus. *Diabetes, Obesity and Metabolism*, *2*(3), 175-187.
- Funakoshi, M., Azami, Y., Matsumoto, H., Ikota, A., Ito, K., Okimoto, H., . . . Miura, J. (2017). Socioeconomic status and type 2 diabetes complications among young adult patients in japan. *PloS One, 12*(4), e0176087. doi:10.1371/journal.pone.0176087
- Gabe, J., Olumide, G., & Bury, M. (2004). 'It takes three to tango': a framework for understanding patient partnership in paediatric clinics. *Social science & medicine, 59*(5), 1071-1079.
- Galobardes, B., Shaw, M., Lawlor, D. A., Lynch, J. W., & Smith, G. D. (2006). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health, 60*(1), 7-12. doi:10.1136/jech.2004.023531
- Gany, F. M., Gill, P. P., Ahmed, A., Acharya, S., & Leng, J. (2013). "Every disease… man can get can start in this cab": focus groups to identify south Asian taxi drivers' knowledge, attitudes and beliefs about cardiovascular disease and its risks. *Journal of immigrant and minority health*, *15*(5), 986-992.
- George, A., Augustine, R., & Sebastian, M. (2014). *Diabetes mellitus and human health care: A holistic approach to diagnosis and treatment*. Toronto: Apple Academic Press.
- Gerharz, E., Uddin, N., & Chakkarath, P. (Eds.). (2017). *Indigeneity on the Move: Varying Manifestations of a Contested Concept*. Berghahn Books.
- Ghazawy, E. R., Kamel, S. M., Gamal, H. M. & Ewis, A. A. (2014). Night shift working and its Impact on development and control of diabetes mellitus in workers of Abo Korkas Sugar Factory, El-Minia. *Egypt. Egypt. J. Occup. Med*, *38*(1), 197–211.
- Glanz, K., Rimer, B. K., Viswanath, K., & Viswanath, K. (2008). *Health behaviour and health education: Theory, research, and practice* (4th;4. Aufl.; ed.). San Francisco, CA: Jossey-Bass
- Glasgow, R. E., Nelson, C. C., Strycker, L. A., & King, D. K. (2006). Using RE-AIM metrics to evaluate diabetes self-management support interventions. *American Journal of Preventive Medicine, 30*(1), 67-73. doi:10.1016/j.amepre.2005.08.037

- Gochman, D. S. (1982). Labels, systems and motives: some perspectives for future research and programs. *Health education quarterly, 9*(2-3), 167-174.
- Gochman, D. S. (1997). Provider determinants of health behavior. In *Handbook of Health Behavior Research II* (pp. 397-417). Springer, Boston, MA.
- Gomes, P. M., Hollanda-Miranda, W. R., Beraldo, R. A., Castro, A. V., Geloneze, B., Foss, M. C., & Foss-Freitas, M. C. (2015). Supplementation of α-linolenic acid improves serum adiponectin levels and insulin sensitivity in patients with type 2 diabetes. *Nutrition, 31*(6), 853-857.
- Gonzalez-Zacarias, A. A., Mavarez-Martinez, A., Arias-Morales, C. E., Stoicea, N., & Rogers, B. (2016). Impact of demographic, socioeconomic, and psychological factors on glycemic self-management in adults with type 2 diabetes mellitus. *Frontiers in public health, 4*, 195.
- Grant, P., Haq, M., & Barnes, D. (2012). Performance management in clinical diabetes: Are the diabetes UK '15 health care essentials' a good enough measure of the standard of diabetes care? *Practical Diabetes, 29*(7), 275-278. doi:10.1002/pdi.1706
- Grant, R., & Greene, D. (2012). The health care home model: Primary health care meeting public health goals. American Journal of Public Health, 102(6), 1096-1103. doi:10.2105/AJPH.2011.300397
- Greenhalgh, T., Helman, C., & Chowdhury, A. M. M. (1998). Health beliefs and folk models of diabetes in British Bangladeshis: a qualitative study. *Bmj, 316*(7136), 978-983.
- Greenhalgh, T., Clinch, M., Afsar, N., Choudhury, Y., Sudra, R., Campbell-Richards, D., . . . Finer, S. (2015). Socio-cultural influences on the behaviour of south asian women with diabetes in pregnancy: Qualitative study using a multi-level theoretical approach. *BMC Medicine, 13*(1), 120. doi:10.1186/s12916-015-0360-1
- Grintsova, O., Maier, W., & Mielck, A. (2014). Inequalities in health care among patients with type 2 diabetes by individual socio-economic status (SES) and regional deprivation: A systematic literature review. *International Journal for Equity in Health, 13*(1), 43-43. doi:10.1186/1475-9276-13-43
- Groom, H. C., Henninger, M. L., Smith, N., Koppolu, P., Cheetham, T. C., Glanz, J. M., ... & McCarthy, N. L. (2016). Influenza vaccination during pregnancy: influenza seasons 2002–2012, Vaccine Safety Datalink. *American journal of preventive medicine, 50*(4), 480-488.
- Hagobian, T. A., Yamashiro, M., Hinkel-Lipsker, J., Streder, K., Evero, N., & Hackney, T. (2012). Effects of acute exercise on appetite hormones and ad libitum energy intake in men and women. *Applied Physiology, Nutrition, and Metabolism*, *38*(999), 66-72.

- Hallgren, E. A., McElfish, P. A., & Rubon-Chutaro, J. (2015). Barriers and opportunities: a community-based participatory research study of health beliefs related to diabetes in a US Marshallese community. *The Diabetes Educator, 41*(1), 86-94
- Hansen, A. K., Ling, F., Kaas, A., Funda, D. P., Farlov, H., & Buschard, K. (2006). Diabetes preventive gluten-free diet decreases the number of caecal bacteria in non-obese diabetic mice. *Diabetes/metabolism research and reviews*, *22*(3), 220-225.
- Hartweg, J., Perera, R., Montori, V. M., Dinneen, S. F., Neil, A. H., & Farmer, A. J. (2008). Omega-3 polyunsaturated fatty acids (PUFA) for type 2 diabetes mellitus. *Cochrane Database of Systematic Reviews*, (1).
- Hassan, H. A., Tohid, H., Amin, R. M., Mohamed Badrulnizam Long Bidin, Muthupalaniappen, L., & Omar, K. (2013). Factors influencing insulin acceptance among type 2 diabetes mellitus patients in a primary care clinic: A qualitative exploration. BMC Family Practice, 14(164), 10 pages-10 pages. doi:10.1186/1471-2296-14-164
- Heidemann, D. L., Joseph, N. A., Kuchipudi, A., Perkins, D. W., & Drake, S. (2016). Racial and economic disparities in diabetes in a large primary care patient population. *Ethnicity & disease, 26*(1), 85.
- Helman, A. (2007). Chromium and diabetes. *Arb Clin Nutr Upd, 283*, 1-3.
- Helman, C. G. (2007). *Culture, health and illness*. CRC press.
- Herbozo, S., Flynn, P. M., Stevens, S. D., & Betancourt, H. (2015). Dietary adherence, glycemic control, and psychological factors associated with binge eating among indigenous and non-indigenous chileans with type 2 diabetes. International Journal of Behavioural Medicine, 22(6), 792-798. doi:10.1007/s12529-015-9478-y
- Hiéronimus, S., Cupelli, C., Durand-Réville, M., Bongain, A., & Fénichel, P. (2004). Pregnancy and type 2 diabetes: Which fetal prognosis? Gynecologie, Obstetrique & Fertilite, 32(1), 23.
- Hill-Briggs, F., Lazo, M., Peyrot, M., Doswell, A., Chang, Y., Hill, M. N., . . . Brancati, F. L. (2011). Effect of problem-solving-based diabetes self-management training on diabetes control in a low income patient sample. *Journal of General Internal Medicine, 26*(9), 972-978. doi:10.1007/s11606-011-1689-6
- Hjelm, K., Berntorp, K., & Apelqvist, J. (2012). Beliefs about health and illness in Swedish and African-born women with gestational diabetes living in Sweden. *Journal of clinical nursing, 21*(9-10), 1374-1386.
- Ho, P.M., Rumsfeld, J.S., Masoudi, F.A., McClure, D.L., Plomondon, M.E., & Steiner, J.F. (2006). Effect of medication nonadherence on hospitalization and mortality among patients with diabetes mellitus. *Arch Intern Med ,166*: 1836–1841.

- Højlund, K., & Boström, P. (2013). Irisin in obesity and type 2 diabetes. Journal of Diabetes and its Complications, 27(4), 303-304. doi:10.1016/j.jdiacomp.2013.04.002
- Holt, R. I. G., Nicolucci, A., Kovacs Burns, K., Escalante, M., Forbes, A., Hermanns, N., . . . the DAWN2 Study Group. (2013). Diabetes attitudes, wishes and needs second study (DAWN2™): Cross-national comparisons on barriers and resources for optimal care—healthcare professional perspective. *Diabetic Medicine, 30*(7), 789-798. doi:10.1111/dme.12242
- Hosseinpoor AR, Bergen N, Koller T, Prasad A, Schlotheuber A, Valentine N, Lynch J, Vega J. Equity-oriented monitoring in the context of universal health coverage. PLoS Med. 2014;11:e1001727.
- Hsu, C., Lee, C., Wahlqvist, M. L., Huang, H., Chang, H., Chen, L., . . . Cheng, J. (2012). Poverty increases type 2 diabetes incidence and inequality of care despite universal health coverage. *Diabetes Care, 35*(11), 2286-2292. doi:10.2337/dc11-2052
- Hu, J., Amirehsani, K., Wallace, D. C., & Letvak, S. (2013). Perceptions of barriers in managing diabetes: perspectives of Hispanic immigrant patients and family members. *The Diabetes Educator, 39*(4), 494-503.
- Huang, M., Zhao, R., Li, S., & Jiang, X. (2014). Self-management behavior in patients with type 2 diabetes: A cross-sectional survey in western urban china. *Plos One, 9*(4), e95138. doi:10.1371/journal.pone.0095138
- Huayanay-Espinoza, I. E., Guerra-Castañon, F., Lazo-Porras, M., Castaneda-Guarderas, A., Thomas, N. J., Garcia-Guarniz, A. L., ... & Málaga, G. (2016). Metabolic control in patients with type 2 diabetes mellitus in a public hospital in Peru: a cross-sectional study in a low-middle income country. *PeerJ, 4*, e2577.
- Hwang, J. L., & Weiss, R. E. (2014). Steroid-induced diabetes: A clinical and molecular approach to understanding and treatment. Diabetes/Metabolism Research and Reviews, 30(2), 96-102. doi:10.1002/dmrr.2486
- Ippolito, M. M., Lyles, C. R., Prendergast, K., Marshall, M. B., Waxman, E., & Seligman, H. K. (2017). Food insecurity and diabetes self-management among food pantry clients. *Public Health Nutrition, 20*(1), 183-189. doi:10.1017/S1368980016001786
- Islam, S. M. S., Biswas, T., Bhuiyan, F. A., Mustafa, K., & Islam, A. (2017). Patients' perspective of disease and medication adherence for type 2 diabetes in an urban area in bangladesh: A qualitative study. *BMC Research Notes, 10(1)*, 131. doi:10.1186/s13104-017-2454-7

- Issaka, A., Lamaro, G., & Renzaho, A. (2016). Sociocultural factors and perceptions associated with type 2 diabetes among sub-Saharan African migrants in Melbourne, Victoria. *Nutrition & dietetics, 73(1)*, 28-35.
- Jacobs, A., Kemppainen, J. K., Taylor, J. S., & Hadsell, C. (2014). Beliefs about diabetes and medication adherence among lumbee indians living in rural southeastern north carolina.*Journal of Transcultural Nursing, 25(2)*, 167-175. doi:10.1177/1043659613515718
- Jaikhamwang, N. (2015). Modification of high risk behavior for diabetes mellitus in Ban Kaeng district Sukhothai Province. Retrieved 16 September, 2018, from http://stdb.most.go.th/research_detail.aspx?ResearchId=70871
- Jaklang , T., Phosing, P.,& Cgareonsiri, W. (2017). The policy of health behavioural modification village and diabetes prevention and control in case of Chum Phae district, Khonkean province. *Dhammathas Academic Journal, 17*(3), 155-164.
- Jaruwat, L. (2009). Risk Factors and Factors Related to Risk Behaviors Regarding to Hypertensionand Diabetes Mellitus of People in Kamphaeng Phet Province. *Disease Control Journal, 35(2)*, 79-88.
- Jayashree, B., Bibin, Y. S., Prabhu, D., Shanthirani, C. S., Gokulakrishnan, K., Lakshmi, B. S., ... & Balasubramanyam, M. (2014). Increased circulatory levels of lipopolysaccharide (LPS) and zonulin signify novel biomarkers of proinflammation in patients with type 2 diabetes. *Molecular and cellular biochemistry, 388*(1-2), 203-210.
- Jones L, Crabb S, Turnbull D, Oxlad M. (2014) Barriers and facilitators to effective type 2 diabetes management in a rural context: a qualitative study with diabetic patients and health professionals. J Health Psychol. 2014;19:441–453. doi: 10.1177/1359105312473786. [PubMed] [Cross Ref]
- Jones, V., & Crowe, M. (2017). How people from ethnic minorities describe their experiences of managing type-2 diabetes mellitus: A qualitative meta-synthesis. *International journal of nursing studies.*
- Joo, J. Y., & Lee, H. (2016). Barriers to and facilitators of diabetes self-management with elderly Korean-American immigrants. International Nursing Review, 63(2), 277-284. doi:10.1111/inr.12260
- Juárez-Ramírez, C., Théodore, F. L., Villalobos, A., Jiménez-Corona, A., Lerin, S., Nigenda, G., & Lewis, S. (2015). Social support of patients with type 2 diabetes in marginalized contexts in mexico and its relation to compliance with treatment: A sociocultural approach.*Plos One, 10*(11), e0141766. doi:10.1371/journal.pone.0141766

- Juntaveemueng,, V. (2014). *Integrated Self-Care of Diabetes Patients: A Case Study in the Southern Thai Socio-Cultural Context (Songkhla Province)*. Retrieved 5 September, 2017, from https://www.tci-thaijo.org/index.php/scnet/article/view/52565/43623
- Kacharat, S. (2017). *From "Health" to "Well-being": The Health System Reform of Thailand Public Health*. Retrieved 7 September, 2018, from https://www.tci-thaijo.org/index.php/Veridian-E-Journal/article/view/109759/86190
- Kalra, S., Unnikrishnan, A., Khandelwal, D., Kalra, B., Gupta, Y., & Baruah, M. (2017). Transgenerational karma. Indian Journal of Endocrinology and Metabolism, 21(2), 265-267. doi:10.4103/ijem.IJEM_7_17
- Karjalainen, K., Malmivaara, A., van Tulder, M., Roine, R., Jauhiainen, M., Hurri, H., & Koes, B. (2003). Multidisciplinary biopsychosocial rehabilitation for subacute low back pain among working age adults. The Cochrane Database of Systematic Reviews, (2), CD002193.
- Kassahun, T., Gesesew, H., Mwanri, L., & Eshetie, T. (2016). Diabetes related knowledge, self-care behaviours and adherence to medications among diabetic patients in southwest ethiopia: A cross-sectional survey. *BMC Endocrine Disorders, 16*(1), 28. doi:10.1186/s12902-016-0114-x
- Keeratiyutiwong, P. (2018). *Effect of self - management program on knowledge, self-care activities, and HbA1c in persons with type 2 diabetes mellitus*. Retrieved 27 September, 2018, from https://www.tci-thaijo.org/index.php/jnat-ned/article/view/2696/2064
- Kendzerska, T., Gershon, A. S., Hawker, G., Tomlinson, G., & Leung, R. S. (2014). Obstructive sleep apnea and incident diabetes. A historical cohort study. *American journal of respiratory and critical care medicine, 190*(2), 218-225.
- Kengkard, P. (2016). Risk Factors of Diabetes Mellitus in Chiang Mai Boarder Petrol Police. *Lanna Public Health Journal, 12*(1), 161-167
- Kennedy, A., & Rogers, A. (2001). Improving self-management skills: A whole systems approach. British Journal of Nursing, 10(11), 734-737. doi:10.12968/bjon.2001.10.11.10435
- Kennedy-Martin, T., Boye, K., & Peng, X. (2016). PDB35 - A review of the cost of medication nonadherence in type 2 diabetes mellitus. Value in Health, 19(7), A671-A671. doi:10.1016/j.jval.2016.09.1865
- Khan, C. M., Stephens, M. A. P., Franks, M. M., Rook, K. S., & Salem, J. K. (2013). Influences of spousal support and control on diabetes management through physical activity. *Health Psychology, 32*(7), 739.

- Khantigaro, P. (2015). *Preventive Behaviors: Perceptions and Experience of People at Risk for Diabetes Mellitus (DM)*. Retrieved 28 June, 2017, from https://www.tci-thaijo.org/index.php/scnet/article/view/52550/43608
- Khaonuan, B. (2012). *Quality of Life and Daily Activity Ability among Elderly People in Laem Tanot Sub-district, Khuan Khanun District, Phatthalung Province*. Retrieved 27 May, 2018, from https://www.tci-thaijo.org/index.php/jph/article/view/8066/6986
- Khraim, F. M., & Carey, M. G. (2008;2009;). Predictors of pre-hospital delay among patients with acute myocardial infarction. Patient Education and Counselling, 75(2), 155-161. doi:10.1016/j.pec.2008.09.019
- Khunluek , K. (2017). *The Constitution of the Kingdom of Thailand 2017 with the Reform of the Health Service System.* Retrieved 10 August, 2018, from https://www.tci-thaijo.org/index.php/gjournal-ksu/article/view/98228
- Khunthar, A. (2014). *The Impacts and Solutions to Nursing Workforce Shortage in Thailand*. Retrieved 3 October, 2017, from https://www.tci-thaijo.org/index.php/ns/article/view/26524/22523
- Kim, H., Haluzik, M., Asghar, Z., Yau, D., Joseph, J. W., Fernandez, A. M., ... & Wheeler, M. B. (2003). Peroxisome proliferator–activated receptor-α agonist treatment in a transgenic model of type 2 diabetes reverses the lipotoxic state and improves glucose homeostasis. *Diabetes*, *52*(7), 1770-1778.
- Kleinman, A. (1980). *Patients and healers in the context of culture: An exploration of the borderland between anthropology, medicine, and psychiatry* (Vol. 3*).* Univ of California Press
- Kleinman, A., Eisenberg, L., & Good, B. (1978). Culture, illness, and care: clinical lessons from anthropologic and cross-cultural research. *Annals of internal medicine, 88*(2), 251-258.

- Kleinman, A., Eisenberg, L., & Good, B. (1978). Culture, illness, and care: clinical lessons from anthropologic and cross-cultural research. *Annals of internal medicine, 88*(2), 251-258.

- Koetsenruijter, J., Lieshout, J. v., Lionis, C., Portillo, M. C., Vassilev, I., Todorova, E., . . . Wensing, M. (2015). Social support and health in diabetes patients: An observational study in six European countries in an era of austerity. *Plos One, 10*(8), e0135079. doi:10.1371/journal.pone.0135079
- Koetsenruijter, J., van Eikelenboom, N., van Lieshout, J., Vassilev, I., Lionis, C., Todorova, E., ... & Angelaki, A. (2016). Social support and self-management capabilities in diabetes patients: an international observational study. *Patient education and counseling, 99*(4), 638-643.

- Kong A, Steinthorsdottir V, Masson G, et al. Parental origin of sequence variants associated with complex diseases. *Nature2009; 462*(7275): 868–74.
- Koo, B. K., Kim, S. W., Yi, K. H., & Moon, M. K. (2015). Low economic status is identified as an emerging risk factor for diabetes mellitus in korean men aged 30 to 59 years in korean national health and nutrition examination survey 2008 to 2010. *Diabetes & Metabolism Journal, 39*(2), 137-146. doi:10.4093/dmj.2015.39.2.137
- Krairach, T., & Thammawat, J. (2006). The Dynamics of Health Care of the Thai-Khmer Ethnic Group in Northeast Thailand. *Journal of Public Health*, *4*(3), 76.
- Kramkrai, P. (2015). *Relationship between self-perception and behavior in blood glucose control in type 2 diabetic patients in the house of Phra Prachan, A Ongkarak, Nakhon Nayok*. Retrieved 18 June, 2018, from http://healthsci.swu.ac.th/node/365
- Kriska, A., El ghormli, L., Copeland, K. C., Higgins, J., Ievers-Landis, C. E., Levitt Katz, L. E., . . . TODAY Study Group. (2018). Impact of lifestyle behavior change on glycemic control in youth with type 2 diabetes. *Pediatric Diabetes, 19*(1), 36-44. doi:10.1111/pedi.12526
- Kugbey, N., Atindanbila, S., Nyarko, K., & Atefoe, EA. (2015). T2DM patients’ demographic characteristics as moderators of the relationship between diabetes perception and psychological distress. *Int J App Psychol, 5(*3):59–63. 9.
- Kuntisiwanon, S. (2013). *Effectiveness of participation program on health promotion for hilltribe in Ban Maeram, Taopun subdistrict, Song district, Phare provice*. Retrieved 11 August, 2018, from https://www.tci-thaijo.org/index.php/banditvijai/article/view/96632/75399
- Ladner, S. (2014;2016;). *Practical ethnography: A guide to doing ethnography in the private sector*. Walnut Creek, California: Left Coast Press. doi:10.4324/9781315422251
- Lambert, V. A., Lambert, C. E., Daly, J., Davidson, P. M., Kunaviktikul, W., & Shin, K. R. (2004). Nursing education on women’s health care in Australia, Japan, South Korea, and Thailand. *Journal of Transcultural Nursing*, *15*(1), 44-53.
- Lapolla, A., Dalfrà, M. G., & Fedele, D. (2007;2008;). Pregnancy complicated by type 2 diabetes: An emerging problem. Diabetes Research and Clinical Practice, 80(1), 2-7. doi:10.1016/j.diabres.2007.11.009
- Laursen, U. H., Pihakaski-Maunsbach, K., Kwon, T. H., Jensen, E. Ø., Nielsen, S., & Maunsbach, A. B. (2004). Changes of rat kidney AQP2 and Na, K-ATPase mRNA expression in lithium-induced nephrogenic diabetes insipidus. *Nephron Experimental Nephrology*, *97*(1), e1-e16.

- Lawton, J., Waugh, N., Barnard, K. D., Noyes, K., Harden, J., Stephen, J., ... & Rankin, D. (2015). Challenges of optimizing glycaemic control in children with Type 1 diabetes: a qualitative study of parents' experiences and views. *Diabetic Medicine*, *32*(8), 1063-1070.
- Lee, E., Van Der Bijl, J., Shortridge-Baggett, L. M., Han, S. J., & Moon, S. H. (2015). Psychometric properties of the diabetes management self-efficacy scale in korean patients with type 2 diabetes. *International Journal of Endocrinology, 2015*, 780701-9. doi:10.1155/2015/780701
- Leone, T., Coast, E., Narayanan, S., & de Graft Aikins, A. (2012). Diabetes and depression comorbidity and socio-economic status in low and middle income countries (LMICs): A mapping of the evidence. *Globalization and Health, 8*(1), 39-39. doi:10.1186/1744-8603-8-39
- LeRoith, D., Taylor, S. I., Olefsky, J. M., Brown, B., McMullan, E., Martin, S. P., . . . Abel, E. D. (2004). *Diabetes mellitus: A fundamental and clinical text* (Third ed.). Philadelphia, Pennsylvania: Lippincott Williams & Wilkins.
- LeRoith, D., & Nissley, P. (2005). Knock your SOCS off!. *The Journal of clinical investigation*, *115*(2), 233-236.
- Leslie, D., Lansang, C., Coppack, S., & Kennedy, L. (2012). *Diabetes: Clinician's desk reference*. CRC Press.
- Leung, G., Ho, E. Y., Chi, H., Huang, S., Ting, I. K., Chan, D., . . . Seligman, H. K. (2018). "we (tong) chinese": Contemporary identity positioning through health management among cantonese chinese americans. *Journal of International and Intercultural Communication, 11*(4), 271-285. doi:10.1080/17513057.2018.1487071
- Liang, K., Wang, C., Yan, F., Wang, L., He, T., Zhang, X., . . . Chen, L. (2018). HbA1c cutoff point of 5.9% better identifies high risk of progression to diabetes among chinese adults: Results from a retrospective cohort study. Journal of Diabetes Research, 2018, 1-6. doi:10.1155/2018/7486493
- Limwattananon, C. (2014). Prescribing Pattern of Medicines for the Prevention of Diabetic Complications in District Hospitals. Retrieved 28 September, 2017, from https://www.tci-thaijo.org/index.php/IJPS/article/view/16324/15082
- Liu, Y., Wang, K., Maisonet, M., Wang, L., & Zheng, S. (2017). Associations of lifestyle factors (smoking, alcohol consumption, diet and physical activity) with type 2 diabetes among American adults from national health and nutrition examination survey (NHANES) 2005–2014. Journal of Diabetes, 9(9), 846-854. doi:10.1111/1753-0407.12492

- Lloyd, C. E., Wilson, A., Holt, R. I. G., Whicher, C., Kar, P., Kar, P., . . . the Language Matters Group. (2018). Language matters: A UK perspective. *Diabetic Medicine, 35*(12), 1635-1641. doi:10.1111/dme.13801
- Lockwood, C. J., & Magriples, M. U. (2017). Prenatal care: Initial assessment. *UpToDate®[S Ramin and V Barss, editors]. https://www. uptodate. com/contents/prenatal-care-initialassessment*, 3-150.
- Logsdon, K., & Smith-Morris, C. (2017). An ethnography on perceptions of pain in dutch “Natural” childbirth. *Midwifery, 55*, 67-74. doi:10.1016/j.midw.2017.09.004
- Lorga, T., Srithong, K., Manokulanan, P., Aung, T. N. N., & Aung, M. N. (2012). Public knowledge of diabetes in Karen Ethnic rural residents: a community-based questionnaires study in the far north-west of Thailand. *International journal of general medicine*, *5*, 799.
- Lorig, K. (2002). Partnerships between expert patients and physicians. The Lancet, 359(9309), 814-815. doi:10.1016/S0140-6736(02)07959-X
- Lorig, K. R., & Holman, H. R. (2003). Self-management education: History, definition, outcomes, and mechanisms. Annals of Behavioural Medicine, 26(1), 1-7. doi:10.1207/S15324796ABM2601_01
- Lorig, K. R., Sobel, D. S., Ritter, P. L., Laurent, D., & Hobbs, M. (2001). Effect of a self-management program on patients with chronic disease. Effective clinical practice: ECP, 4(6), 256-262.
- Lorig, K. R., Sobel, D. S., Stewart, A. L., Brown, B. W., Bandura, A., Ritter, P., . . . Holman, H. R. (1999). Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: A randomized trial. Medical Care, 37(1), 5-14. doi:10.1097/00005650-199901000-00003
- Lu, J., Hou, X., Tu, H., Tang, Z., Xiang, Y., Bao, Y., . . . Jia, W. (2017). Chronic hepatitis B virus infection status is more prevalent in patients with type 2 diabetes. Journal of Diabetes Investigation, 8(4), 619-625. doi:10.1111/jdi.12609
- Luckanajantachote, P. (2017). *Antihyperglycemic Drug Use Patterns and the Toward Clinical Excellence Network’s Diabetes Indicators (TCEN DM) in Patients with Type 2 Diabetes Mellitus atSamutsakhon Hospita*. Retrieved 4 Fabuary, 2018, from https://www.tci-thaijo.org/index.php/VESTSU/article/view/89685/70528
- Lundberg, P. C., Thrakul, S., Medicinska fakulteten, Vårdvetenskap, Medicinska och farmaceutiska vetenskapsområdet, Uppsala universitet, & Institutionen för folkhälso- och vårdvetenskap. (2013). Religion and self-management of thai buddhist and muslim women

with type 2 diabetes. Journal of Clinical Nursing, 22(13-14), 1907-1916. doi:10.1111/jocn.12130

- M. Lugtenberg, J.M. Zegers-van Schaick, G.P.Westert, J.S. Burgers (2009) Why don't physicians adhere to guideline recommendations in practice? An analysis of barriers among Dutch general practitioners Implement Sci, 4 (2009), p. 54
- MacLachlan, M. (1997). Culture and health. New York;Chichester;: Wiley.
- MacLachlan, M. (2006). Culture and health: A critical perspective towards global health (2nd ed.). Chichester, England;Hoboken, NJ;: John Wiley & Sons
- Mahantussanapong, C. (2019). Five Verbal Screening Predicting Type 2 Diabetes Mellitus in General Population of 15 Years Old and Older of Surin Hospital’s Primary Care Network. *Medical Journal of Srisaket Surin Buriram Hospitals, 34*(1), 23-45
- Majeed-Ariss, R., Jackson, C., Knapp, P., & Cheater, F. M. (2015). British-Pakistani women's perspectives of diabetes self-management: The role of identity. Journal of Clinical Nursing, 24(17-18), 2571-2580. doi:10.1111/jocn.12865
- Malik, V. S., & Hu, F. B. (2012). Sweeteners and risk of obesity and type 2 diabetes: The role of sugar-sweetened beverages. Current Diabetes Reports, 12(2), 195-203. doi:10.1007/s11892-012-0259-6
- Mannion, R., Davies, H. T. O., Marshall, M., Marshall, M. N., & Davies, H. T. O. (2005;2004;). Cultures for performance in health care. Maidenhead, Berkshire, England;New York, NY;: Open University Press.
- Manodpitipong, A., Saetung, S., Nimitphong, H., Siwasaranond, N., Wongphan, T., Sornsiriwong, C., . . . Reutrakul, S. (2017). Night-shift work is associated with poorer glycaemic control in patients with type 2 diabetes. *Journal of Sleep Research, 26*(6), 764-772. doi:10.1111/jsr.12554
- Marquez, B., Anderson, A., Wing, R. R., West, D. S., Newton, R. L., Meacham, M., ... & Walker, M. (2016). The relationship of social support with treatment adherence and weight loss in Latinos with type 2 diabetes. *Obesity, 24*(3), 568-575.
- Martin, J. B., & Kleinman, G. M. (1980). Case 17-1980: A 60-Year-Old Man with Hypothyroidism, Sterile Meningitis, and Diabetes Insipidus. *New England Journal of Medicine, 302*(18), 1015-1023
- Masingboon, K. (2017). *Factors Related to Diabetes Prevention Behaviours of Persons with Pre-Diabetes*. Retrieved 11 July, 2018, from https://www.tci-thaijo.org/index.php/tnaph/article/view/97735/76138

- Marathe, P. H., Gao, H. X., & Close, K. L. (2017). American diabetes association standards of medical care in diabetes 2017. *Journal of Diabetes, 9*(4), 320-324. doi:10.1111/1753-0407.12524
- McCance, T., McCormack, B., & Dewing, J. (2011). An exploration of person-centredness in practice. *Online Journal of Issues in Nursing, 16*(2), 1-1.
- McCormack, B., & McCance, T. V. (2006). Development of a framework for person-centred nursing. *Journal of advanced Nursing, 56*(5), 472-479.
- McCormack, B., McCance, T., & Klopper, H. (2017;2016;). *Person-centred practice in nursing and health care: Theory and practice* (2nd ed.). West Sussex, England: Wiley Blackwell.
- McEwen, M. M., Pasvogel, A., Gallegos, G., & Barrera, L. (2010). Type 2 diabetes Self-Management social support intervention at the US-Mexico border. *Public Health Nursing*, *27*(4), 310-319.
- Mc Sharry, J., Moss-Morris, R., & Kendrick, T. (2011). Illness perceptions and glycaemic control in diabetes: A systematic review with meta-analysis: Illness perceptions and glycaemic control - systematic review. *Diabetic Medicine, 28*(11), 1300-1310. doi:10.1111/j.1464-5491.2011.03298.x
- McSharry, J., McGowan, L., Farmer, A. J., & French, D. P. (2016). Perceptions and experiences of taking oral medications for the treatment of type 2 diabetes mellitus: A systematic review and meta-synthesis of qualitative studies. *Diabetic Medicine, 33*(10), 1330-1338. doi:10.1111/dme.13152
- Medagama, A., & Galgomuwa, M. (2018). Lack of infrastructure, social and cultural factors limit physical activity among patients with type 2 diabetes in rural sri lanka, a qualitative study.*Plos One, 13*(2), e0192679-e0192679. doi:10.1371/journal.pone.0192679
- Mendenhall, E., Shivashankar, R., Tandon, N., Ali, M. K., Venkat Narayan, K. M., & Prabhakaran, D. (2012). Stress and diabetes in socioeconomic context: A qualitative study of urban indians. *Social Science & Medicine, 75*(12), 2522-2529. doi:10.1016/j.socscimed.2012.09.040
- Mertig, R. G. (2012). *Nurses' guide to teaching diabetes self-management* (2nd;2; ed.). New York: Springer Pub.
- Meuter, F., Thomas, W., Grüneklee, D., Gries, F. A., & Lohmann, R. (1980). Psychometric evaluation of performance in diabetes mellitus. *Hormone and metabolic research. Supplement series*, *9*, 9-17.

- Meyer, R. M., & O'Brien-Pallas, L. L. (2010). Nursing services delivery theory: An open system approach: Nursing services delivery theory. *Journal of Advanced Nursing, 66*(12), 2828-2838. doi:10.1111/j.1365-2648.2010.05449.x
- Miller, C. K., Headings, A., Peyrot, M., & Nagaraja, H. (2011). A behavioural intervention incorporating specific glycaemic index goals improves dietary quality, weight control and glycaemic control in adults with type 2 diabetes. *Public Health Nutrition, 14*(7), 1303-1311. doi:10.1017/S1368980011000085
- Misra-Hebert, A. D., Pantalone, K. M., Ji, X., Milinovich, A., Dey, T., Chagin, K. M., . . . Zimmerman, R. S. (2018). Patient characteristics associated with severe hypoglycemia in a type 2 diabetes cohort in a large, integrated health care system from 2006 to 2015. *Diabetes Care, 41*(6), 1164-1171. doi:10.2337/dc17-1834
- Mitchell PH. Defining Patient Safety and Quality Care. In: Hughes RG, editor. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Apr. Chapter 1. Available from: https://www.ncbi.nlm.nih.gov/books/NBK2681/
- Mitchell-Brown, F., Nemeth, L., Cartmell, K., Newman, S., & Goto, K. (2017). A study of Hmong immigrants' experience with diabetes education: A community-engaged qualitative study. *Journal of Transcultural Nursing, 28*(6), 540-549.
- Mogre, V., Abanga, Z. O., Tzelepis, F., Johnson, N. A., & Paul, C. (2017). Adherence to and factors associated with self-care behaviours in type 2 diabetes patients in Ghana. *BMC endocrine disorders, 17*(1), 20.
- Mohamed, H. G., Mustafa, K., Ibrahim, S. O., & Åstrøm, A. N. (2017). Dietary habits, oral impact on daily performance and type 2 diabetes: A matched case-control study from Sudan. *Health and Quality of Life Outcomes, 15*(1), 111. doi:10.1186/s12955-017-0686-9
- Mohebi, S., Azadbakht, L., Feizi, A., Sharifirad, G., & Kargar, M. (2013). Review the key role of self-efficacy in diabetes care. *Journal of education and health promotion, 2*.
- Morowatisharifabad, M. A., Abdolkarimi, M., Asadpour, M., Fathollahi, M. S., & Balaee, P. (2018). The Predictive Effects of Protection Motivation Theory on Intention and Behaviour of Physical Activity in Patients with Type 2 Diabetes. *Open access Macedonian journal of medical sciences, 6*(4), 709
- Muchiri, J. W., Gericke, G. J., & Rheeder, P. (2016). Effect of a nutrition education programme on clinical status and dietary behaviours of adults with type 2 diabetes in a resource-limited setting in South Africa: a randomised controlled trial. *Public health nutrition*, *19*(1), 142-155.

- Mudd-Martin, G., Martinez, M. C., Rayens, M. K. a., Gokun, Y., & Meininger, J. C. (2013). Sociocultural tailoring of a healthy lifestyle intervention to reduce cardiovascular disease and type 2 diabetes risk among latinos. *Preventing Chronic Disease, 10*, E200. doi:10.5888/pcd10.130137
- Muecke, Marjorie A. (1994). On the evaluation of ethnographies. In Janice M. Morse (Ed.), *Critical issues in qualitative research methods* (pp.187-209). Thousand Oaks, CA: Sage.
- Muktabhant, B., Sanchaisuriya, P., Trakulwong, M., Mingchai, R., & Schelp, F. P. (2015). A first-degree relative with diabetes mellitus is an important risk factor for rural thai villagers to develop type 2 diabetes mellitus. *Asia Pacific Journal of Public Health*, *27*(4), 385-393.
- Nadendla, R. (2015). PDB45 - cost of medication nonadherence in patients with diabetes mellitus. *Value in Health, 18*(7), A605-A605. doi:10.1016/j.jval.2015.09.2085
- Nadler, S. T., Stoehr, J. P., Schueler, K. L., Tanimoto, G., Yandell, B. S., & Attie, A. D. (2000). The expression of adipogenic genes is decreased in obesity and diabetes mellitus. *Proceedings of the National Academy of Sciences*, *97*(21), 11371-11376.
- Naemiratch B, Manderson L. (2007) Lay explanations of type 2 diabetes in Bangkok, Thailand. *Anthrop Med 2007; 14*(1): 83-94.
- Naemiratch, B., & Manderson, L. (2006). Control and adherence: living with diabetes in Bangkok, Thailand. *Social Science & Medicine, 63*(5), 1147-1157.
- Nakagasien, P. (2012, March). Diabetes mellitusknowledge management in the rural community: an ethnographic study in Thailand. In *Conference Proceedings of the 1st International Seminar on Population and Development* (pp. 19-31).

- Nakagasien, P. (2012, March). Diabetes mellitusknowledge management in the rural community: an ethnographic study in Thailand. In *Conference Proceedings of the 1st International Seminar on Population and Development* (pp. 19-31).

- Nakagasien, P., Nuntaboot, K., & Sangchart, B. (2008). Cultural Care for Persons with diabetes in the community: An ethnographic study in Thailand. *Pacific Rim International Journal of Nursing Research, 12*(2), 121-130.
- Nam, S., Chesla, C., Stotts, N.A., Kroon, L., & Janson, S.L. (2011) Barriers to diabetes management; patients and provider factors. *Diabetes Research practice, 93*(1), 1-9.
- Naowaboot, J., Piyabhan, P., Munkong, N., Parklak, W., & Pannangpetch, P. (2016). Ferulic acid improves lipid and glucose homeostasis in high-fat diet-induced obese mice. *Clinical and Experimental Pharmacology and Physiology, 43*(2), 242-250.
- Napier, A. D. (2015). Culture and health–Author's reply. *Lancet, the, 385*(9968), 602-602.

- Napolitano, A., Miller, S., Nicholls, A. W., Baker, D., Van Horn, S., Thomas, E., & Nunez, D. J. (2014). Novel gut-based pharmacology of metformin in patients with type 2 diabetes mellitus. *PloS one, 9*(7), e100778
- National Statistical Office (2016). *Key Statistic of Thailand 2016*. Retrieve from:http://service.nso.go.th/nso/nsopublish/pubs/pubsfiles/Key55_T.pdf
- Nazar, C. M. J., Bojerenu, M. M., Safdar, M., & Marwat, J. (2016). Effectiveness of diabetes education and awareness of diabetes mellitus in combating diabetes in the United Kigdom; a literature review. *Journal of Nephropharmacology, 5*(2), 110–115.
- Newman, S. P., Steed, E., Mulligan, K., Newman, S., Newman, S., & Newman, S. P. (2009;2007;). *Chronic physical illness: Self-management and behavioural interventions.* Maidenhead: Open University Press.
- Nguyen D. C., & Piyabunditkul, L. (2014). Factors related to diabetes self-care behaviours of diabetes patients in Hue city, Thua Hue province, Vietnam. *Journal of nursing science and health, 37*(1), 103-112
- Nicolucci, A., Kovacs Burns, K., Holt, R. I. G., Comaschi, M., Hermanns, N., Ishii, H., . . . the DAWN2 Study Group. (2013). Diabetes attitudes, wishes and needs second study (DAWN2™): Cross-national benchmarking of diabetes-related psychosocial outcomes for people with diabetes. *Diabetic Medicine: Journal of Diabetes UK, 30*(7), 767-777. doi:10.1111/dme.12245
- Nitiyanan, S. (2011). *Quality of Care for Diabetic Patients in Diabetes Clinic of Ratchaphiphat Hospital According to the Clinical Practice Guideline*. Retrieved 28 September, 2018, from https://www.tci-thaijo.org/index.php/VMED/article/view/1762/1460
- Noimuenwa, P. (2017). *Effectiveness of Case Management in Patients With Diabetic Mellitus at Pak Phli Hospital, Nakhon Nayok Province*. Retrieved 8 June, 2018, from https://www.tci-thaijo.org/index.php/cmunursing/article/view/91117/71565
- Nugent, L. E., & Wallston, K. A. (2016). Modified social learning theory re-examined: Correlates of self-management behaviours of persons with type 2 diabetes. *Journal of Behavioural Medicine, 39*(6), 947-956. doi:10.1007/s10865-016-9753-7
- Okrainec, K., Booth, G. L., Hollands, S., & Bell, C. M. (2015). Impact of language barriers on complications and mortality among immigrants with diabetes: A population-based cohort study. *Diabetes Care, 38*(2), 189-195. doi:10.2337/dc14-0801
- Opler, M. K., Hallowell, A. I., Opler, M. K., Sullivan, H. S., Hallowell, A. I., Hallowell, A. I., ... & Sarason, S. B. (2007). Diabetes mellitus in the urbanized Johannesburg African,”. In *Culture & Social Psychiatry* (Vol. 2, No. 2, pp. 3-166). New York: International Universities Press.

- OSullivan, J. B., & Gordon, T. (1966). Childbearing and diabetes mellitus. *Vital and Health Statistics. Series 11: Data From the National Health Survey*, (21), 1-19.
- Oyewole, O. O., Odusan, O., Oritogun, K. S., & Idowu, A. O. (2015). Predictability of physical activity and bodyweight on health-related quality of life amongst nigerian type 2 diabetes mellitus. *International Journal of Diabetes in Developing Countries, 35*(S2), 194-200. doi:10.1007/s13410-015-0335-y
- Pal, K., Dack, C., & Michie, S. (2015). *Integrating theory and data to create an online self-management programme for adults with type 2 diabetes*: HeLP-diabetes. Frontiers in Public Health, 4 doi:10.3389/conf.FPUBH.2016.01.00005
- Palmer, S. C., Mavridis, D., Nicolucci, A., Johnson, D. W., Tonelli, M., Craig, J. C., ... & Natale, P. (2016). Comparison of clinical outcomes and adverse events associated with glucose-lowering drugs in patients with type 2 diabetes: a meta-analysis. *Jama*, *316*(3), 313-324.
- Pan, B., Wu, Y., Yang, Q., Ge, L., Gao, C., Xun, Y., . . . Ding, G. (2018). The impact of major dietary patterns on glycemic control, cardiovascular risk factors, and weight loss in patients with type 2 diabetes: A network meta-analysis. *Journal of Evidence-Based Medicine*, doi:10.1111/jebm.12312
- Panpiemras, J., Puttitanun, T., Samphantharak, K., & Thampanishvong, K. (2011). Impact of universal health care coverage on patient demand for health care services in Thailand. *Health Policy, 103*(2), 228-235. doi:10.1016/j.healthpol.2011.08.008
- Papier, K., Jordan, S., Catherine, D. E., Bain, C., Peungson, J., Banwell, C., ... & Sleigh, A. (2016). Incidence and risk factors for type 2 diabetes mellitus in transitional Thailand: results from the Thai cohort study. *BMJ open*, *6*(12), e014102.
- Papier, K., D'Este, C., Bain, C., Banwell, C., Seubsman, S. A., Sleigh, A., & Jordan, S. (2017). Body mass index and type 2 diabetes in Thai adults: defining risk thresholds and population impacts. *BMC public health*, *17*(1), 707.
- Patel, N. R., Chew-Graham, C., Bundy, C., Kennedy, A., Blickem, C., & Reeves, D. (2015). Illness beliefs and the sociocultural context of diabetes self-management in british south asians: A mixed methods study. *BMC Family Practice, 16*(1), 58. doi:10.1186/s12875-015-0269-y
- Patel, N. R., Chew-Graham, C., Bundy, C., Kennedy, A., Blickem, C., & Reeves, D. (2015). Illness beliefs and the sociocultural context of diabetes self-management in British South Asians: a mixed methods study. *BMC family practice, 16*(1), 58.
- Patel, N., Stone, M. A., Hadjiconstantinou, M., Hiles, S., Troughton, J., Martin-Stacey, L., . . . Khunti, K. (2015). Using an interactive DVD about type 2 diabetes and insulin therapy in a UK

south asian community and in patient education and healthcare provider training. *Patient Education and Counselling, 98*(9), 1123-1130. doi:10.1016/j.pec.2015.04.018

- Patel, V., & Iliffe, S. (2017). An exploratory study into the health beliefs and behaviours of british indians with type II diabetes. *Primary Health Care Research and Development, 18*(1), 97-103. doi:10.1017/S1463423616000232
- Pearson, T. (2015). Poverty: The other risk factor for diabetes and its complications. *AADE in Practice, 3*(2), 8-10. doi:10.1177/2325160315572597
- Peiris, D., Sun, L., Patel, A., Tian, M., Essue, B., Jan, S., & Zhang, P. (2016;2015;). Systematic medical assessment, referral and treatment for diabetes care in china using lay family health promoters: Protocol for the SMARTDiabetes cluster randomised controlled trial.Implementation Science, 11(1), 116. doi:10.1186/s13012-016-0481-8
- Peters, D. H., Peters, D. H., Bank al-Dawlī lil-Inshā’ wa-al-Taʻmīr, بنك الدولي, Världsbanken, Sekai Ginkō, . . . BIRF. (2009). Improving health service delivery in developing countries: From evidence to action. Washington, DC: World Bank
- Peyrot, M., Rubin, R. R., Lauritzen, T., Snoek, F. J., Matthews, D. R., & Skovlund, S. E. (2005). Psychosocial problems and barriers to improved diabetes management: results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) Study. Diabetic medicine, 22(10), 1379-1385.
- Phipps, M. S., Jastreboff, A. M., Furie, K., & Kernan, W. N. (2012). The diagnosis and management of cerebrovascular disease in diabetes. Current Diabetes Reports, 12(3), 314-323. doi:10.1007/s11892-012-0271-x
- Phokhwang-just, W. (2017). *Diet Consumption Behavior Modification Patterns to Control Blood Sugar Levels of Patients with Diabetes in Thailand: A Systematic Review*. Retrieved 5 June, 2017, from https://tci-thaijo.org/index.php/EAUHJSci/article/view/89812/75816
- Phrompayak, D. (2017). *Patient Experiences using Complementary and Alternative Medicine for Type 2 Diabetes Mellitus in Thailand*. Retrieved 27 January, 2018, from https://www.tci-thaijo.org/index.php/PRIJNR/article/view/73147/74538
- Pichardo-Lowden, A., Farbaniec, M., & Haidet, P. (2018). Overcoming barriers to diabetes care in the hospital: The power of qualitative observations to promote positive change .*Journal of Evaluation in Clinical Practice,* doi:10.1111/jep.13057
- Pornprayut, C. (2017). *Effects of Coaching Program on Diabetes Behavioral Control and HbA1C among Persons with Type 2 Diabetes Mellitus*. Retrieved 27 January, 2018, from https://www.tci-thaijo.org/index.php/Nubuu/article/view/103925/82973

- Porqueddu, T. (2017). Herbal medicines for diabetes control among indian and pakistani migrants with diabetes. *Anthropology & Medicine, 24*(1), 17-31. doi:10.1080/13648470.2016.1249338
- Prakongsai, P., Srivanichakorn, S., & Yana, T. (2009). Enhancing the Primary Care System in Thailand to Improve Equitable Access to Quality Health Care.
- Priharjo, R., & Birdsall, T. (2010). Improving the diabetes knowledge of nurses and unregistered. Journal of Diabetes Nursing, 14(1).
- Promthet, S. (2013). *Coffee or Tea Consumption with Diabetes Death: A Prospective Cohort Study in Khon Kaen* . Retrieved 28 NOvember, 2017, from https://www.tci-thaijo.org/index.php/kkujphr/article/view/117986/90537
- Puangkham, S., Poapolathep, A., Jermnak, U., Imsilp, K., Tanhan, P., Chokejaroenrat, C., & Poapolathep, S. (2017). Monitoring and health risk of mycotoxins in imported wines and beers consumed in Thailand. *World Mycotoxin Journal, 10*(4), 401-409.
- Public health England. (2015). *Public Health England Annual Report and Accounts 2015/16.* Retrieved 17 September, 2016, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/539768/PHE_annual_report_2015_2016_web.pdf
- Pujilestari, C. U., Ng, N., Hakimi, M., & Eriksson, M. (2014). "It is not possible for me to have diabetes"–Community Perceptions on Diabetes and Its Risk Factors in Rural Purworejo District, Central Java, Indonesia. Global Journal of Health Science, 6(5), 204–218. http://doi.org/10.5539/gjhs.v6n5p204
- Punyakaew, S. (2005). *Learning process on health care of Karen people*. Retrieved 3 September, 2018, from
- Qsr international. (2011). *NVIVO 9 Getting Started.* Retrieved 28 September, 2018, from http://download.qsrinternational.com/Document/NVivo9/NVivo9-GettingStarted-Guide.pdf
- Raaijmakers, L. G., Hamers, F. J., Martens, M. K., Bagchus, C., de Vries, N. K., & Kremers, S. P. (2013). Perceived facilitators and barriers in diabetes care: A qualitative study among health care professionals in the netherlands. *BMC Family Practice, 14*(1), 114-114. doi:10.1186/1471-2296-14-114
- Rasouli, B., Ahlbom, A., Andersson, T., Grill, V., Midthjell, K., Olsson, L., & Carlsson, S. (2013). Alcohol consumption is associated with reduced risk of type 2 diabetes and autoimmune diabetes in adults: Results from the nord-trøndelag health study: Alcohol consumption, type 2 diabetes and autoimmune diabetes. Diabetic Medicine, 30(1), 56-64. doi:10.1111/j.1464-5491.2012.03713.x

- Rasouli, B., Grill, V., Midthjell, K., Ahlbom, A., Andersson, T., & Carlsson, S. (2013). Smoking is associated with reduced risk of autoimmune diabetes in adults contrasting with increased risk in overweight men with type 2 diabetes: A 22-year follow-up of the HUNT study. Diabetes Care, 36(3), 604-610. doi:10.2337/dc12-0913
- Reeves, N. D., Najafi, B., Crews, R. T., & Bowling, F. L. (2013). Aging and type 2 diabetes: Consequences for motor control, musculoskeletal function, and whole-body movement.Journal of Aging Research, 2013, 1-2. doi:10.1155/2013/508756
- REMacLachlan, M. (2006). Culture and health: A critical perspective towards global health (2nd ed.). Chichester, England;Hoboken, NJ;: John Wiley & Sons.
- Ricci-Cabello, I., Ruiz-Pérez, I., De Labry-Lima, A. O., & Márquez-Calderón, S. (2010). Do social inequalities exist in terms of the prevention, diagnosis, treatment, control and monitoring of diabetes? A systematic review: Social inequalities in health-care. *Health & Social Care in the Community, 18*(6), 572-587. doi:10.1111/j.1365-2524.2010.00960.x
- Rice, P.L., & Ezzy, D. (1999). *Qualitative research methods: a health focus*. Oxford: Oxford University Press; 1999. p. 291
- Rich, S. S. (2016). Diabetes: still a geneticist's nightmare. *Nature, 536*(7614), 37.
- Roopnarinesingh, N., Brennan, N., Khan, C., Ladenson, P. W., Hill-Briggs, F., & Kalyani, R. R. (2015). Barriers to optimal diabetes care in trinidad and tobago: A health care professionals' perspective. *BMC Health Services Research, 15*(1), 396. doi:10.1186/s12913-015-1066-y
- Roper, J. M., & Shapira, J. (2000). *Ethnography in nursing research*. Thousand Oaks, Calif;London;: Sage.
- Rosenstock, J., Chuck, L., González-Ortiz, M., Merton, K., Craig, J., Capuano, G., & Qiu, R. (2016). Initial combination therapy with canagliflozin plus metformin versus each component as monotherapy for drug-naive type 2 diabetes. *Diabetes Care, dc151736*.
- Rovira-Llopis, S., Bañuls, C., Diaz-Morales, N., Hernandez-Mijares, A., Rocha, M., & Victor, V. M. (2017). Mitochondrial dynamics in type 2 diabetes: pathophysiological implications. *Redox biology, 11*, 637-645.
- Rovner, B. W., Casten, R. J., & Harris, L. F. (2013). Sociocultural influences on diabetes self-management behaviors in older african americans. *Diabetes Spectrum, 26*(1), 29-33. doi:10.2337/diaspect.26.1.29
- Rujul, D., Vadgama, P., & Parth, D. (2012). Effect of Awareness of diabetes on clinical outcomes of diabetes: An observational study at a private hospital in Gujarat. *Education, 60*(6), 7-5.

- Sacks, D. B., Bruns, D. E., Goldstein, D. E., Maclaren, N. K., McDonald, J. M., & Parrott, M. (2002). Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus. *Clinical chemistry*, *48*(3), 436-472.
- Sahaworakulsak, R. (2013). *To study the level of risk in developing diabetic foot ulce.* Retrieved 5March,2018,fromhttps://www.tcithaijo.org/index.php/ppkjournal/article/view/68505/55784
- Sakurai, M., Nakamura, K., Miura, K., Takamura, T., Yoshita, K., Nagasawa, S., . . . Nakagawa, H. (2016). Dietary carbohydrate intake, presence of obesity and the incident risk of type 2 diabetes in japanese men. Journal of Diabetes Investigation, 7(3), 343-351. doi:10.1111/jdi.12433
- Sallis, J. F., Owen, N., & Fisher, E. (2015). Ecological models of health behaviour. Health behaviour: Theory, research, and practice, 5, 43-64.
- Sangtongpanichakul, P. (2012). Quality of Care for Diabetic Patients in Diabetes Clinic of Ratchaphiphat Hospital According to the Clinical Practice Guideline. Retrieved 28 September, 2018,from https://www.tci-thaijo.org/index.php/VMED/article/view/1762
- Sanguanprasit, B., Leerapan, P., & Taechaboonsermsak, P. (2016). Village health volunteers as peer supports for glycemic control amoing type 2 diabetes patients in Thailand. *Journal of Publuc health and development, 14*(2), 49-60.
- Sapchoktanakul , N. (2014). *The study of Doi Chang coffee runs the business under a good brand of the equal trade*. Retrieved 29 May, 2018, from https://www.tci-thaijo.org/index.php/Veridian-E-Journal/article/view/27378/23346
- Schellenberg, E. S., Dryden, D. M., Vandermeer, B., Ha, C., & Korownyk, C. (2013). Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. *Annals of internal medicine, 159*(8), 543-551.
- Scobie, I. N., & Samaras, K. (2012). *Fast facts: Diabetes mellitus* (4th;4; ed.). Oxford: Health Press.
- Seidel, A. J., Franks, M. M., Stephens, M. A. P., & Rook, K. S. (2012). Spouse control and type 2 diabetes management: moderating effects of dyadic expectations for spouse involvement. *Family relations, 61*(4), 698-709.
- Serra-Majem, L. (2016). Head and neck cancer: Smoking, drinking, eating and.sexual practices. *European Journal of Epidemiology, 31*(4), 333. doi:10.1007/s10654-016-0143-9
- Shaya, F. T., Chirikov, V. V., Howard, D., Foster, C., Costas, J., Snitker, S., . . . Kucharski, K. (2014). Effect of social networks intervention in type 2 diabetes: A partial randomised study.

Journal of Epidemiology and Community Health (1979-), 68(4), 326-332. doi:10.1136/jech-2013-203274

- Sherwani, S. I., Khan, H. A., Ekhzaimy, A., Masood, A., & Sakharkar, M. K. (2016). Significance of HbA1c test in diagnosis and prognosis of diabetic patients. *Biomarker Insights*, 11, 95.
- Shrestha, A., Karmacharya, B. M., Khudyakov, P., Weber, M. B., & Spiegelman, D. (2018). Dietary interventions to prevent and manage diabetes in worksite settings: a meta-analysis. *Journal of Occupational Health, 60*(1), 31–45. http://doi.org/10.1539/joh.17-0121-RA
- Shrivastava, S. R., Shrivastava, P. S., & Ramasamy, J. (2013). Role of self-care in management of diabetes mellitus. *Journal of Diabetes & Metabolic Disorders, 12*(1), 14.
- Simolka, S., & Schnepp, W. (2017). SUBJECTIVE PERSPECTIVES OF DIABETES MELLITUS AMONG IMMIGRANTS ON THE FORMER SOVIET UNION. *Central European Journal of Nursing and Midwifery, 8*(1), 596-608.
- Sina, M., Graffy, J., & Simmons, D. (2018). Associations between barriers to self-care and diabetes complications among patients with type 2 diabetes. *Diabetes Research and Clinical Practice, 141*, 126-131. doi:10.1016/j.diabres.2018.04.031
- Sirikamonsatien, B. & Tossanoot, S. (2016). *A situation study of using Chronic Care model in caringfor diabetes type 2 patients*. Retrieved 2 August, 2017, from https://www.tci-thaijo.org/index.php/JHR/article/view/73967/59717
- Sirikensai, S. (2017). Health belief related to blood glucose control among patients with type 2 diabetes mellitus in Kut Chik sub-district, Muang district, Nong Bua Lamphu province. *Southeast Bangkok Journal, 5*(1), 55-68.
- Smith-Miller, C. A., Berry, D. C., DeWalt, D., & Miller, C. T. (2016). Type 2 diabetes self-management among spanish-speaking Hispanic immigrants. *Journal of immigrant and minority health, 18*(6), 1392-1403
- Soisong, S., Reunkon, A., Apichantorn, K., Nunta, N., & Sukkasem,J. (2017). Perceived self-care behaviours among patients with type 2 diabetes mellitus and poor glycemic control. *Journal of Prapokklau Nursing College, 28*(2), 93-103.
- Somrarnyart, M. (2016). *Effects of Self-management Promotion Through Diabetic Camp Participation on Glycemic Control Behaviors and Hemoglobin A1C Level Among Persons with Type 2 Diabetes.* Retrieved 18 April, 2018, from https://www.tci-thaijo.org/index.php/cmunursing/article/view/77531/62189
- Soontaraviratana, B. (2016). *The Mental Health of Chronic aily ill Elderly : The Civil Societal Perspective*. Retrieved 5 October, 2017, from http://www.thaiscience.info/Journals/Article/JSMU/10986624.pdf

- Soontrapa, P., Larbcharoensub, N., Luxameechanporn, T., Cheewaruangroj, W., Prakunhungsit, S., Sathapatayavong, B., ... & Leopairut, J. (2010). Fungal rhinosinusitis: a retrospective analysis of clinicopathologic features and treatment outcomes at ramathibodi hospital. *Southeast Asian J Trop Med Public Health, 41*(2), 442-9.
- Speziale, H. S., & Carpenter, D. R. (2007). *Qualitative research in nursing: Advancing the humanistic imperative* (4th ed.). London;Philadelphia, Pa;: Lippincott Williams & Wilkins.
- Srisawat, B. (2004). *30 nationals in Chiang Rai. (3rd ed.). Thailand: Bangkok*
- Steinman, K. (2017;2016;). *poverty*. Philadelphia, [Pennsylvania]: Mason Crest.
- Stewart, D. W., DePue, J., Rosen, R. K., Bereolos, N., Goldstein, M. G., Tuitele, J., . . . McGarvey, S. T. (2013). Medication-taking beliefs and diabetes in american samoa: A qualitative inquiry. *Translational Behavioral Medicine, 3*(1), 30-38. doi:10.1007/s13142-012-0114-y
- Steinsbekk, A., Rygg, L., Lisulo, M., Rise, M. B., & Fretheim, A. (2012). Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. A systematic review with meta-analysis. *BMC Health Services Research, 12*(1), 213-213. doi:10.1186/1472-6963-12-213
- Strauss, K., MacLean, C., Troy, A., & Littenberg, B. (2006). Driving distance as a barrier to glycemic control in diabetes. *Journal of General Internal Medicine, 21*(4), 378-380. doi:10.1111/j.1525-1497.2006.00386.x
- Suanpakdee, C. (2004). Hill Tribes and Thai Nationality. *Journal of Language and culture, 23*(2), 32-45.
- Suksan, N. & Ketpichawattana, J. (2018). *Effects of self-directed promotion programs on consumption behavior and waist circumference of obese diabetic patients with obesity*. Retrieved 21 July, 2018, from https://tci-thaijo.org/index.php/nmdjournal/article/view/115952
- Sully, P., & Dallas, J. (2010;2014;). *Essential communication skills for nursing and midwifery* (2nd;2; ed.). New York;Edinburgh;: Mosby/Elsevier.
- Sundararaman T. (2018). *Lessons from Thailand: for universal health coverage, invest in public systems and human resources*. Scroll.in, 19 Feb. Available from scroll.in/pulse/869170/lessons-from-thailand-for-universal-health-coverage-invest-in-public-systems-and-human-resources
- Sungkachat, B. (2014). *The Southern College Network Journal of Nursing and Public Health*. Retrieved 6 September, 2017, from https://www.tci-thaijo.org/index.php/scnet/article/view/52563/43621

- Suphawatanakul , D. (2001). *Development of Volunteer Health Potential (IDA) in Food Care for Diabetes Mellitus in Tha Dinam District Chai Badan Lopburi*. Retrieved 8 March, 2017, from https://www.tci-thaijo.org/index.php/AIHD-MU/article/view/74803
- Suphannakul, P., Sirinual, S., Chayodom, V., & Singhadech, O. (2017). A casual relationship model of factor influencing glycemic control among the elderly with type 2 diabetes mellitus in Sukhothai province, Thailand. *Journal of Public health and Development, 15*(2), 31-42.
- Suvarnaraksha, T. (2017). *Healthy Diet Innovation for Elderly*. Retrieved 25 September, 2017, from https://www.tci-thaijo.org/index.php/EAUHJSci/article/view/105292/84413
- Suvarnaraksha, T. (2017). *Healthy Diet Innovation for Elderly*. Retrieved 25 September, 2017, from https://www.tci-thaijo.org/index.php/EAUHJSci/article/view/105292/8441
- Suwanwong, S. & Pakorn, C. (2017). *Effects of individual and family self management programs on cumulative glucose tolerance of type 2 diabetic patients*. Retrieved 26 August, 2018, from https://www.tci-thaijo.org/index.php/CUNS/article/view/87585
- Tabur, S., Torun, A. N., Sabuncu, T., Turan, M. N., Celik, H., Ocak, A. R., & Aksoy, N. (2010). Non-diabetic metabolic syndrome and obesity do not affect serum paraoxonase and arylesterase activities but do affect oxidative stress and inflammation. *European journal of endocrinology*, *162*(3), 535-541.
- Takahashi, E., Moriyama, K., Yamakado, M., & Ningen Dock Database Group. (2014). Lifestyle and glycemic control in japanese adults receiving diabetes treatment: An analysis of the 2009 japan society of ningen dock database. *Diabetes Research and Clinical Practice, 104*(2), e50-e53. doi:10.1016/j.diabres.2014.01.025
- Tatsumi, T., Matoba, S., Kobara, M., Keira, N., Kawahara, A., Tsuruyama, K., ... & Yamahara, Y. (1998). Energy metabolism after ischemic preconditioning in streptozotocin-induced diabetic rat hearts. *Journal of the American College of Cardiology*, *31*(3), 707-715.
- Tay, L., Tan, K., Diener, E., & Gonzalez, E. (2013). Social relations, health behaviors, and health outcomes: A survey and synthesis. *Applied Psychology: Health and Well-Being, 5*(1), 28-78.
- Teherani, A., Martimianakis, T., Stenfors-Hayes, T., Wadhwa, A., & Varpio, L. (2015). Choosing a qualitative research approach. *Journal of Graduate Medical Education, 7*(4), 669-670. doi:10.4300/JGME-D-15-00414.1
- Temelkova-Kurktschiev, T., Stefanov, T., Koehler, C., Henkel, E., Schaper, F., & Hanefeld, M. (2013). Physical activity is strongly inversely related to post-challenge plasma glucose and glycemic spikes in a risk population for type 2 diabetes. *Folia Medica, 55*(2), 33-42. doi:10.2478/folmed-2013-0015

- Tervaert, T. W. C., Mooyaart, A. L., Amann, K., Cohen, A. H., Cook, H. T., Drachenberg, C. B., ... & Joh, K. (2010). Pathologic classification of diabetic nephropathy. *Journal of the American Society of Nephrology*, ASN-2010010010.
- Thanathakornkul, R., Amrumpai, Y., & Treesak, C. (2016). The Outcomes of Pharmaceutical Care for Burmese at a Drugstore in Thongphapum District, Kanchanaburi Province. *Thai Pharmaceutical and Health Science Journal* (2), 78-86.
- Thinkhamrop, W., Sawaengdee, K., Tangcharoensathien, V., Theerawit, T., Laohasiriwong, W., Saengsuwan, J., & Hurst, C. P. (2017). Burden of musculoskeletal disorders among registered nurses: evidence from the Thai nurse cohort study. *BMC nursing*, *16*(1), 68.
- Tieampet, D. (2016). *Development of Diabetes Millitus (DM) Care System Continued Seamlessly to Communities, Muang District, Srakaew Province*. Retrieved 6 September, 2017, from https://www.tci-thaijo.org/index.php/tnaph/article/view/47287/39180
- Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. *Diabetes care, 23*(7), 943-950.
- Toplak, H., Hoppichler, F., Wascher, T. C., Schindler, K., & Ludvik, B. (2016). Obesity and type 2 diabetes. *Wiener Klinische Wochenschrift,* 128 Suppl 2, S196.
- Treeson, S., Seangsuwan, J., Amatachaya, S., & Mato, L. (2016). Effect of social support and physical environment factors on physical acitivity among patients with type 2 diabetes mellitus among age between 40-65 years and >65 years. *Journal of medical technology and physical therapy, 28*(1), 48-59.
- Tuei, V. C., Maiyoh, G. K., & Ha, C. E. (2010). Type 2 diabetes mellitus and obesity in sub-Saharan Africa. *Diabetes/metabolism research and reviews*, *26*(6), 433-445.
- Tuitama, L. T., Young-soo, S., Clark, H., Tukuitonga, C., & Beaglehole, R. (2014). Acting on the Pacific crisis in non-communicable diseases. *The Lancet*, *384*(9957), 1823-1824.
- Tuohy, D., McCarthy, J., Cassidy, I., & Graham, M. M. (2008). Educational needs of nurses when nursing people of a different culture in Ireland. *International Nursing Review, 55*(2), 164-170. doi:10.1111/j.1466-7657.2007.00600.x
- Turner, B. S. (2003). The History of the Changing Concepts of Health and Illness: Outline of a General. *The handbook of social studies in health and medicine, 9.*
- Uttamawatin, P. (2010). *The Administration Model of Basic Education Focusing on an Integration of Various Cultures and Local Wisdoms for Peaceful Coexistence of the Minorities in Eastern Thailand.* Retrieved from 7 August, 2018, from https://www.tci-thaijo.org/index.php/EAUHJSocSci/article/view/28338/24365

- Van Rooijen, A. J., Rheeder, P., Eales, C. J., & Becker, P. J. (2004). Effect of exercise versus relaxation on haemoglobin A1C in Black females with type 2 diabetes mellitus. *Qjm, 97*(6), 343-351.
- van Zuuren, E. J., Fedorowicz, Z., Kuijpers, T., & Pijl, H. (2018). Effects of low-carbohydrate- compared with low-fat-diet interventions on metabolic control in people with type 2 diabetes: A systematic review including GRADE assessments. *The American Journal of Clinical Nutrition, 108*(2), 300-331. doi:10.1093/ajcn/nqy096
- Vassilev, I., Rogers, A., Sanders, C., Kennedy, A., Blickem, C., Protheroe, J., . . . Morris, R. (2011). Social networks, social capital and chronic illness self-management: A realist review (chronic illness (2011) 7, (60-86)). *Chronic Illness, 7*(1), 99. doi:10.1177/1742395310391609
- Verrotti, A., Prezioso, G., Scattoni, R., & Chiarelli, F. (2014). Autonomic neuropathy in diabetes mellitus. *Frontiers in Endocrinology, 5*, 205. doi:10.3389/fendo.2014.00205
- Vibulchai, N. (2017). *Pain Assessment of Diabetic Neuropathy among Diabetic Patients*. Retrieved 7 January, 2018, from https://www.tci-thaijo.org/index.php/scnet/article/view/84879/67597
- Vickers, K. S., Nies, M. A., Patten, C. A., Dierkhising, R., & Smith, S. A. (2006). Patients with diabetes and depression may need additional support for exercise. *American Journal of Health Behavior, 30*(4), 353-362.
- Viidas, U., Norée, L. O., Ahlmén, J., Theodorsson, E., & Sylvén, C. (1995). Ambulatory 24-hour blood pressure and peptide balance in hemodialysis patients. *Scandinavian journal of urology and nephrology, 29*(3), 259-263.
- Vijan, S., Stuart, N. S., Fitzgerald, J. T., Ronis, D. L., Hayward, R. A., Slater, S., & Hofer, T. P. (2005). Barriers to following dietary recommendations in type 2 diabetes. *Diabetic Medicine, 22*(1), 32-38. doi:10.1111/j.1464-5491.2004.01342.x
- Villegas, R., Delahanty, R., Gao, Y., Long, J., Williams, S. M., Xiang, Y., . . . Shu, X. (2012). Joint effect of genetic and lifestyle risk factors on type 2 diabetes risk among Chinese men and women. *Plos One, 7*(11), e49464. doi:10.1371/journal.pone.0049464
- Waber, S., Meister, V., Rossi, G. L., Mordasini, R. C., & Riesen, W. F. (1981). Studies on retinal microangiopathy and coronary macroangiopathy in rats with streptozotocin-induced diabetes. *Virchows Archiv B*, *37*(1), 1-10.
- Wagner, E. H. (2001). Meeting the needs of chronically ill people. *Bmj, 323*(7319), 945-946. doi:10.1136/bmj.323.7319.945

- Wagner, E. H., Austin, B. T., Davis, C., Hindmarsh, M., Schaefer, J., & Bonomi, A. (2001). Improving chronic illness care: Translating evidence into action. *Health Affairs, 20*(6), 64-78. doi:10.1377/hlthaff.20.6.64
- Wanichakul, W. (2014). *A diabetes treatment in kidney patients*. Retrieved 29 January, 2018, fromhttp://www.rajavithi.go.th/rj/wp-content/uploads/2017/02/00-Title-Cont-Diabetic1.pdf
- Wang, C., & Chan, S. M. A. (2005). Culturally tailored diabetes education program for Chinese Americans: A pilot study. *Nursing Research, 54*(5), 347-353. doi:10.1097/00006199-200509000-00009
- WASHINGTON, G., & WANG-LETZKUS, M. F. (2009). self-care practices, health beliefs, and attitudes of older diabetic chinese americans. *Journal of Health and Human Services Administration, 32*(3), 305-323.
- Weaver, R. G., Hemmelgarn, B. R., Rabi, D. M., Sargious, P. M., Edwards, A. L., Manns, B. J., ... & James, M. T. (2014). Association between participation in a brief diabetes education programme and glycaemic control in adults with newly diagnosed diabetes*. Diabetic Medicine, 31*(12), 1610-1614.
- Weaver, R. R., Lemonde, M., Payman, N., & Goodman, W. M. (2014). Health capabilities and diabetes self-management: the impact of economic, social, and cultural resources. *Social Science & Medicine, 102*, 58-68.
- Webb, L. (2011). Nursing: Communication skills in practice. Oxford: Oxford University Press.
- Webb, T. L., & Sheeran, P. (2006). Does changing behavioural intentions engender behaviour change? A meta-analysis of the experimental evidence. Psychological Bulletin, 132(2), 249-268. doi:10.1037/0033-2909.132.2.249
- Weigl, M., Müller, A., Zupanc, A., & Angerer, P. (2009). Participant observation of time allocation, direct patient contact and simultaneous activities in hospital physicians. *BMC Health Services Research, 9*(1), 110-110. doi:10.1186/1472-6963-9-110
- Weerarathna, T. P., Weerarathna, M. K., Senadheera, V., Meththananda Herath, H. M., & Liyanage, G. (2018). Association of self-reported dietary and drug compliance with optimal metabolic control in patients with type 2 diabetes: Clinic-based single-center study in a developing country. *Journal of Nutrition and Metabolism, 2018*, 1-5. doi:10.1155/2018/3421476
- Wessel, J., Chu, A. Y., Willems, S. M., Wang, S., Yaghootkar, H., Brody, J. A., ... & Hidalgo, B. (2015). Low-frequency and rare exome chip variants associate with fasting glucose and type 2 diabetes susceptibility. *Nature communications*, *6*, 5897.

- Wild, S. H., McKnight, J. A., McConnachie, A., Lindsay, R. S., Glasgow and Lothian Diabetes Register Data Group, & on behalf of the Glasgow and Lothian Diabetes Register Data Group. (2010). Socioeconomic status and diabetes-related hospital admissions: A cross-sectional study of people with diagnosed diabetes. *Journal of Epidemiology and Community Health, 64*(11), 1022-1024. doi:10.1136/jech.2009.094664
- Wilkinson, R.G., & Pickett, K.E. (2006). Income inequality and population health: a review and explanation of the evidence. *Social science & medicine, 62 7*, 1768-84.
- Wimontham, P. (2013). *Factors Associated with Diabetic Retinopathy among Patients with Type 2 Diabetes Mellitus in Pak Thong Chai Nakhon Ratchasima*. Retrieved 27 September, 2016, from https://www.tci-thaijo.org/index.php/kkujphr/article/view/117983/90535
- Winkley, K., Evwierhoma, C., Amiel, S. A., Lempp, H. K., Ismail, K., & Forbes, A. (2015;2014;). Patient explanations for non-attendance at structured diabetes education sessions for newly diagnosed type 2 diabetes: A qualitative study. *Diabetic Medicine, 32*(1), 120-128. doi:10.1111/dme.12556
- Woolf, S. H., & Braveman, P. (2011). Where health disparities begin: the role of social and economic determinants—and why current policies may make matters worse. *Health affairs*, *30*(10), 1852-1859.
- World Health Organization (WHO) (2014). *Diabetes Mellitus: Fact sheet*. Retrieved from http://www.who.int/mediacentre/factsheets/fs138/en/.
- World Health Organization (WHO) (2014). Diabetes: *The cost of diabetes.* Retrieved fromhttp://www.who.int/mediacentre/factsheets/fs236/en/
- World Health Organization (WHO) (2015*). Country and regional data on diabetes*. Retrieved from http://www.who.int/diabetes/facts/world_figures/en/index4.html.
- World Health Organization (WHO) (2016). *World Health Statistics 2016: Monitoring health for the SDGs Sustainable Development Goals*. Retrieved from http://www.who.int/gho/publications/world_health_statistics/en/
- World health organization. (2017). *World health statistics 2017: monitoring health for the SDGs, Sustainable Development Goals*. Retrieved 14 July, 2018, from http://www.who.int/gho/publications/world_health_statistics/2017/EN_WHS2017_TOC.pdf
- Yang, Z., Scott, C. A., Mao, C., Tang, J., & Farmer, A. J. (2014). Resistance exercise versus aerobic exercise for type 2 diabetes: a systematic review and meta-analysis. *Sports medicine, 44*(4), 487-499.
- Yilmaz-Aslan, Y., Brzoska, P., Bluhm, M., Aslan, A., & Razum, O. (2014). Illness perceptions in Turkish migrants with diabetes: a qualitative study. *Chronic Illness, 10*(2), 107-121.

- Yodrungroaj, K. (2018). *The Government Development Projects and Karen Culture*. Retrieved 29 July, 2018, from https://www.tci-thaijo.org/index.php/pikanasan/article/view/131620
- Yongsat, S. (2016). *Effects of the program on promoting awareness and health behavior Perceived change in perception and behavioral health behaviors The blood glucose level of type 2 diabetics*. Retrieved 6 September, 2018, from http://www.tnrr.in.th/?page=result_search
- Younger, L. R., King, J., & Steiner, D. F. (1966). Hepatic proliferative response to insulin in severe alloxan diabetes. *Cancer research*, *26*(7 Part 1), 1408-1414.
- Zhaokang, Y., Yuxi, L., Yong, L., Yunchang, X., Yuanjun, G., & Harris, M. (2012). A model for community health service development in depressed rural areas in china. *BMC Health Services Research, 12*(1), 465-465. doi:10.1186/1472-6963-12-465
- Zoffmann, V., Harder, I., & Kirkevold, M. (2008). A person-centered communication and reflection model: sharing decision-making in chronic care. *Qualitative health research, 18*(5), 670-685.

Appendices

Appendix A

The beliefs and experiences among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand: a qualitative exploratory study

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The interview guide consists of 5 parts

1. Demographic information
2. Beliefs about diabetes mellitus
3. Knowledge about diabetes mellitus
4. Experiences and current approach to deal with diabetes mellitus
5. Needs, barriers and essentials requirements of a diabetes mellitus health promotion.

1) Demographic information

Demographic information will be collected from each participant.

Demographic information consists of ethnicity, age, education, religion, marital status, occupation and income.

2) beliefs about diabetes mellitus

a. How long have you had with diabetes mellitus?
b. Could you please to explain how do you think about having diabetes mellitus?
c. What stops you following dietary control and doing exercise?
d. What strategies can motivate you to control diabetes mellitus?

3) The `current knowledge about diabetes mellitus

a. What do you understand about diabetes mellitus?

4) Experiences and current approach to deal with diabetes mellitus

a. At present, how do you deal with living with disease mellitus?

5) Needs, barriers and essentials requirements of a diabetes mellitus health promotion

a. What are your needs, barriers for the diabetes mellitus health promotion?
b. What are your essentials requirements for the diabetes mellitus health promotion?

Appendix B

OBSERVATION GUIDELINE

Activity:

Date/Time:

Place	**People**	**Environment**	**Action**	**Thoughts/Comments**

Appendix C

Copies of ethical approval

From: Dawn Leeming

Sent: 14 October 2016 09:14

To: Siwarak Kitchanapaibul U1467865; Kirsty Thomson; Warren Gillibrand

Cc: Rob Burton

Subject: RE: Proposed Revisions to SREP Application - Siwarak Kitchanapaibul (PhD) (Phase 1 application approved 06-May-15 - The development of a health promotion programme for hill tribespersons with diabetes mellitus in Chiang Rai (SREP/2015/32_Rev1_300916)

Hi Siwarak,

You now have SREP approval for the revisions to the above study that you submitted on 13th October.

It would be worth proof reading your documents one further time though. For example, the inserted phrase should be cannot be completely guaranteed. No need to resubmit your documents to SREP - the final proof reading can be checked with your supervisors.

All the best with a very interesting piece of research.

Dawn

Dr Dawn Leeming
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Appendix D

The beliefs and experiences among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand: a qualitative exploratory study

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INFORMATION SHEET

You are being invited to take part in an interview about your health beliefs, current knowledge, needs, barriers, essential requirements of a diabetes mellitus health promotion and current approaches to dealing with the diabetes mellitus. In this study related to the beliefs and experiences among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand: a qualitative exploratory study. Before you decide to take part it is important that you understand why the research is being conducted and what it will involve. Please take time to read the following information carefully and discuss it me if you wish. Please do not hesitate to ask if there is anything that is not clear or if you would like more information.

What is the study about?

The purpose of this study is to understand the beliefs and experiences of diabetes mellitus among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand.

Why I have been approached?

You have been asked to participate because you are a hill tribesperson with type 2 diabetes mellitus in Chiang Rai, Thailand.

Do I have to take part?

It is fully your decision whether or not you take part. If you decide to take part you will be asked to sign a consent form, and you will be free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect you or your health services.

What will I need to do?

If you agree to take part in the research you will be asked to take part in a one to one interview which will be audio recorded. During this you will be asked questions about your health beliefs, current knowledge, needs, barriers, essential requirements of a diabetes mellitus health promotion and current approaches to dealing with the diabetes mellitus. The process of research will be a maximum of 1 hour interview.

Will my identity be disclosed?

All information disclosed within the interview will be kept totally confidential, except where legal obligations would necessitate disclosure by the researchers to appropriate personnel. Your information will remain anonymous in any written report or presentation.

What will happen to the information?

All information collected from you during this research will be kept secure and any identifying material, such as names will be removed in order to ensure anonymity. It is anticipated that the research may, at some point, be published in a journal or report. However, should this happen, your anonymity will be ensured, although it may be necessary to use your words in the presentation of the findings and your permission for this is included in the consent form.

Who can I contact for further information?

If you require any further information about the research, please contact me on:

Name Siwarak Kitchanapaibul

E-mail u1467565@hud.ac.uk

Telephone:07543618027

Appendix E

CONSENT FORM

Title of Research Project: The beliefs and experiences among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand: a qualitative exploratory study

It is important that you read, understand and sign the consent form. Your contribution to this research is entirely voluntary and you are not obliged in any way to participate, if you require any further details please contact your researcher.

I have been fully informed of the nature and aims of this research ☐

I consent to taking part in it ☐

I understand that I have the right to withdraw from the research at any time ☐

without giving any reason

I give permission for my words to be quoted (by use of pseudonym) ☐

I understand that the information collected will be kept in secure conditions ☐

for a period of five years at the University of Huddersfield

I understand that no person other than the researcher/s and supervisory team will ☐

have access to the information provided.

I understand that my identity will be protected by the use of pseudonym in the ☐

report and that no written information that could lead to my being identified will

be included in any report. ☐

If you are satisfied that you understand the information and are happy to take part in this project please put a tick in the box aligned to each sentence and print and sign below.

Signature of Participant:	**Signature of Researcher:**
Print:	**Print:** Siwarak Kitchanapaibul
Date:	**Date:**

(one copy to be retained by Participant / one copy to be retained by Researcher)

Appendix F

THE UNIVERSITY OF HUDDERSFIELD: RISK ANALYSIS & MANAGEMENT

ACTIVITY: In-depth interview			**Name:** Siwarak Kitchanapaibul	
LOCATION: In a hospital in Chiang rai, Thailand			**Date: 15 October 2015**	**Review Date:**
Hazard(s) Identified	**Details of Risk(s)**	**People at Risk**	**Risk management measures**	**Other comments**
Interviewing in a private room at the hospital	Personal safety	Researcher	Log times and date of interviews with colleagues / administrator Phone call into the colleagues on leaving visit**.** If out of office hours or at the weekend I will inform a responsible friend/family member of where I am going and arrange to text them on leaving interview.	Specific interview arrangements and location will be identified with administrator/colleagues in advance of meeting.
Loss/ theft of data	Security of data	Interviewees	Electronic data to be stored only on password secured computer equipment and storage devices. Digital cameras and dictaphones with audio recordings to be transported in a lockable case.	Laptops and other electronic data storage devices to be transported in the boot of a car.
Manual handling	Personal wellbeing	Researcher	To move and carry equipment with consideration of personal health and well-being.	

Appendix G

The background and rationale **Suggestion:** Present the evidence base highlighting the issues with type 2 diabetes the unique context of the tribes people of Thailand.	Present the evidence base highlighting the issues the unique context of the tribes people of Thailand with type 2 diabetes by the literature review about the history of hill tribespersons in Thailand and research that related to this unique group. Page 7 - 9
Research methodology **Suggestion:** Demonstrate the philosophical approach to the study with a clear understanding if the role of the researcher in the methodology of choice.	Rewrite the methodology with a clear understand of philosophical approach including the ontology, the epistemology and the methodology and change the title from 'The beliefs and lived experiences among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand: a phenomenology approach' to the beliefs and experiences among hill tribespersons with type 2 diabetes mellitus in Chiang Rai, Thailand: a qualitative exploratory study. Page 9 - 11
Data collection Suggestion: Provide a clear time-line for completion of the second round of interviews. If the data remains inadequate discuss alternative data sources e.g. health professionals that will inform the research aims.	Provide a clear time-line for completion of the second round of interviews on page 24 and address the alternative data sources by collecting data from the health professionals and inform in the third of research objective on page 5 and page 14.
Trustworthiness Suggestion: explore alternative approaches to increase transparency of research including reflexivity.	Present the reflexivity to increase trustworthiness. Page 12
Translation Suggestion: Clarify the translation process.	Explain the translation process which translated before, during and after data analysis. Page 14-15
Data analysis Suggestion: Cleary present a transparent strategy for data analysis.	Present the steps of data analysis and give example Page 15-16

Appendix H

The example of analysis using thematic analysis

Braun & Clarke (2016) provide a six-phase guide, which is a useful framework for conducting thematic analysis. The phases are detailed:

phase 1: data familiarization,

The first step is reading, and re-reading the transcripts. After this, I became familiar with my entire body of data before I continue to the next step. At this phase, I make a note.

“The health professionals do seem to think that the problems of diabetes control in hill tribespersons are very important to them but still continue to work as a routine without trying to solve this problem. There is a sense of boredom. Language seems to be the most significant barrier to care these patients. However, the health professionals are not only deal with the patients but also the context of the community such as festival culture, moreover the budget and the administration in the hospital are the barrier to work as well”

phase 2: data coding

In this step I started to manage the data in a meaningful and systematic way. Coding reduces the data into small meaning followed the research objective regard to the barriers and requirement of the health professionals who have been working with hill tribespersons with type 2 diabetes mellitus. Given this, I coded each segment of data, which was related to or highlighted something interesting about my research objective. I used open coding, developed and modified the codes as I worked through the coding process. I got the initial ideas about codes. This is an example of the health professional

Researcher: in your opinion why the diabetes patients can’t control blood sugar level?

Staff1: I think the factor is related to the worship, in this village there are many ceremonies for example New Year ceremony and eating new rice. The people who have the disease mainly are the middle age group and elderly group so they are always invited to participate all ceremonies by the host and they can’t control the foods

Festival,
worship
barrier

phase 3: search for themes,

A theme is categorised by its significance. This phase I had identified the preliminary themes. I examined the codes and some of them clearly fitted together into a theme. The examples are showed:

Theme: Social and cultural barrier	**Theme: Health care service system barrier**
Codes	**Codes**
The village has many festivals	Shortage staffs
There are ceremonies in the village	Guidelines is not fit
Language is a problems	Many works to do
	Budget is not enough
Patients can't control the disease at Kin-Khaow-Mai festivals	

In these examples, all of the codes fit into one theme.

phase 4: Review themes,

I used these questions to review the themes.

1. Do the themes make sense?
2. Does the data support the themes?
3. Am I trying to fit too much into a theme?
4. Are there themes within themes?
5. Are there other themes within the data?

I found all the data related to each theme.

phase 5: Define themes,

In this study, “to explore the barriers of the health professional who have been working with hill tribespersons with type 2 diabetes mellitus” is the objective of the research. The final thematic is showed as below.

Health services system

- ☐ Shortage staffs
- ☐ Limit of time
- ☐ Fianacial
- ☐ Universal Coverage Scheme
- ☐ standard Guidelines

Social and Cultural

- ☐ Festiaval
- ☐ Lifestyle
- ☐ Social support

phase 6: Write-up.

This is the final phase of thematic analysis of this study.