CHAPTER II

LITERATURE REVIEW

The study was conducted to investigate factors related to utilization behavior of noninsulin dependent diabetes mellitus patients at Ban Khaoro Health Center, Thung Song District Nakhon-Si-Thammarat Province. The theory and literature reviewed in this study would cover the following aspects:

1. General knowledge about diabetes mellitus
2. Approaches and activities in diabetes treatment at Ban Khaoro health center
3. Opinions on satisfaction
4. Opinions on social supports
5. Opinions on health beliefs
6. Opinions on health perception
7. Relationships of selected factors and behaviors in accessing health services at the health center or other types of public health centers

1. General Knowledge about Diabetes Mellitus (D.M.)

1.1 Diabetes (Diabetes Mellitus: D.M.) refers to the abnormal body conditions that the blood glucose levels before having breakfast are higher than or equivalent to 126 mg/dl at least two times of blood examinations; the blood glucose levels are higher than 200 mg/dl when examined at any time

together with the diabetes symptoms (excessive urination, a large amount of water intake, and weight loss with unknown reasons); or the blood glucose levels after 2 hours of glucose intake are higher than or equivalent to 200 mg/dl at least two times of blood examinations (WHO, 1998 cited in Apichat Wichayanarat, 2000).

1.1.1 Types of Diabetes

Diabetes mellitus can be classified into two main types:

1. **Insulin-dependent diabetes mellitus** (IDDM) is diabetes that occurs from the damaged –cells of pancreas that it cannot produce insulin at the required amount of the body. Human body needs insulin to control the amount of glucose in blood. Most cases have been found in youngsters. Normally, this is a genetic disease that reflects the abnormality of immunology and ketonichitosis. The patients may be died of other infections and acute complication diseases.
2. **Non-insulin dependent Diabetes Mellitus** (NIDDM) is diabetes mellitus resulting from insulin-resistant conditions together with abnormality of β-cells of pancreas that cannot produce normal levels of insulin or produce excessive levels of insulin but the insulin performs malfunctions. Most cases have found in the obesity. The disease also tends to be related with inheritance and environment.

1.1.2 Causes of Diabetes

The diabetes mellitus is typically caused by the malfunctions of pancreas that cannot produce or can produce only a small amount of insulin or the insulin that is produced appears to perform abnormally. Insulin plays an important role in the metabolism of glucose as energy. When the actions of insulin are malfunctioned, a small amount of water will be utilized leading to the accumulation of glucose in blood and other organs. The excessive amount of blood glucose will be discharged with urine and since the urine attracts the ants, it is called "diabetes" (sweet urine).

It is clear that this disease is closely related with the parental genetics records. In other words, if any members of the family become diabetics, it can be easily inherited to the offspring. Other causes include obesity (no exercises), steroid drug taking and uragogue drug taking. In addition, it can be observed with other chronic diseases such as hepatocirrhosis, goiter, and hepato-carcinogenesis.

1.1.3 Signs and Symptoms of Diabetes

Diabetes mellitus has impacts on various systems of body due to the elevated blood glucose levels. Important symptoms include:

1. Polyuria. When the excessive blood glucose level presents, the glucose will be discharged with the urine causing the higher pressure of urination. The water, therefore, cannot be absorbed by the body. As a result, higher amount of urine and more frequent urination take place.
2. Polydipsia. Since the diabetics lose a large amount of water, they feel thirsty and have to drink a lot of water more frequently.

3. Weight loss. When the glucose cannot be metabolized as energy, the stored lipid and protein will be utilized as energy instead. Thus there are tissue loss and water deficiency, leading to the rapid weight loss.
4. Polyphagia. As the reserved energy is utilized, the diabetics feel hungry more frequently and need to have very big meals. In addition, it is noticed that the patients can be sick of diabetes mellitus if they go to the hospital with the following signs:
   - the urine attracts a lot of ants
   - blisters or moulds on the skin
   - chronic wounds or abscess on arms or legs
   - poor eyesight
   - numbs at the edges of fingers and feet, usually occurs at the feet first, in some case may have sexual impotency
   - arteriostenosis in various organs e.g. feet, causing necrobiosis, myocardiohyphemia and pains in the breast

1.1.4 Complicating Diabetes

Acute complicating diabetes

Acute complicating diabetes mellitus are diseases occur when becoming diabetics and can occur at any time due to the lack of blood glucose control or the uncontrolled blood glucose levels. This can be easily found in non-insulin dependent diabetics. The symptoms include

1. Unconsciousness because of high blood glucose levels. This is due to high amount of carbohydrate consumption, a small amount of water intake or unknown reasons.
2. Hypoglycemia. The blood glucose level will found below 40 mg/dl due to a small amount of daily diet intake, irregular meal times, and too much exercise.
3. Excessive ketone concentration in blood. The blood glucose level is observed higher than 270 mg/dl and the glucose level in urine is higher than or equivalent to 2% of ketone in urine. The patients will be thirsty, have frequent urination, water deficiency, dry lips, vomit, difficulty in breathing, abnormal heart beats with floral sweet odor or nail polish odor, in severe cases, they can be unconscious.

Chronic Complicating Diabetes

Chronic complication diabetes mellitus will be observed after being diabetics for more than 10 years. This will happen so slowly that the patients do not realize that they become diabetics. The treatment, therefore, is hardly possible. At present, more than 50% of this group are found to have the following symptoms:

1. Cardioarterial systems. The abnormal arteries found in the diabetics show significant impact on all body systems. The changes of blood vessels bring about the degeneration of cornea and renal systems, coronary heart disease, and

2. Nervous systems. The most frequent symptoms found are the degeneration of the terminal nerves, i.e. the inefficiency of signal transformation.
3. Degeneration of cornea. The degree of severity depends on the length of sickness. The abnormal blood vessels at the cornea cause the lack of oxygen in the tissue, leading to blindness.
4. Vescicorenal system. The kidneys and urinal organs can be easily infected.
5. Vascular system. The degeneration of arteries and white blood corpuscles results in higher susceptibility of the diabetics.

Risk Factors Promoting Complication Diabetes Mellitus

1. Inappropriate diets
2. Obesity
3. Lack of exercises
4. Stress
5. Smoking
6. Alcoholic drinking
7. Behaviors in drug-taking
8. Hypertension
9. High cholesterol
10. Hypergylcemia
11. Anti-insulin condition
12. Albumin protein in urine

1.2 Objectives in Diabetes Mellitus Control

The objectives in diabetes treatment are

1. To help the diabetics to recover from the symptoms caused by hyperglycemia e.g. tired, frequent thirsty and urination, as well as to control the blood glucose level to be back to normal.
2. To prevent and cure the diabetics from acute complication diabetes mellitus
3. To prevent or delay complicating diabetes
4. To upgrade the standard of living of the diabetes to be closed to that of normal people.
5. To encourage the normal growth of children and juveniles.

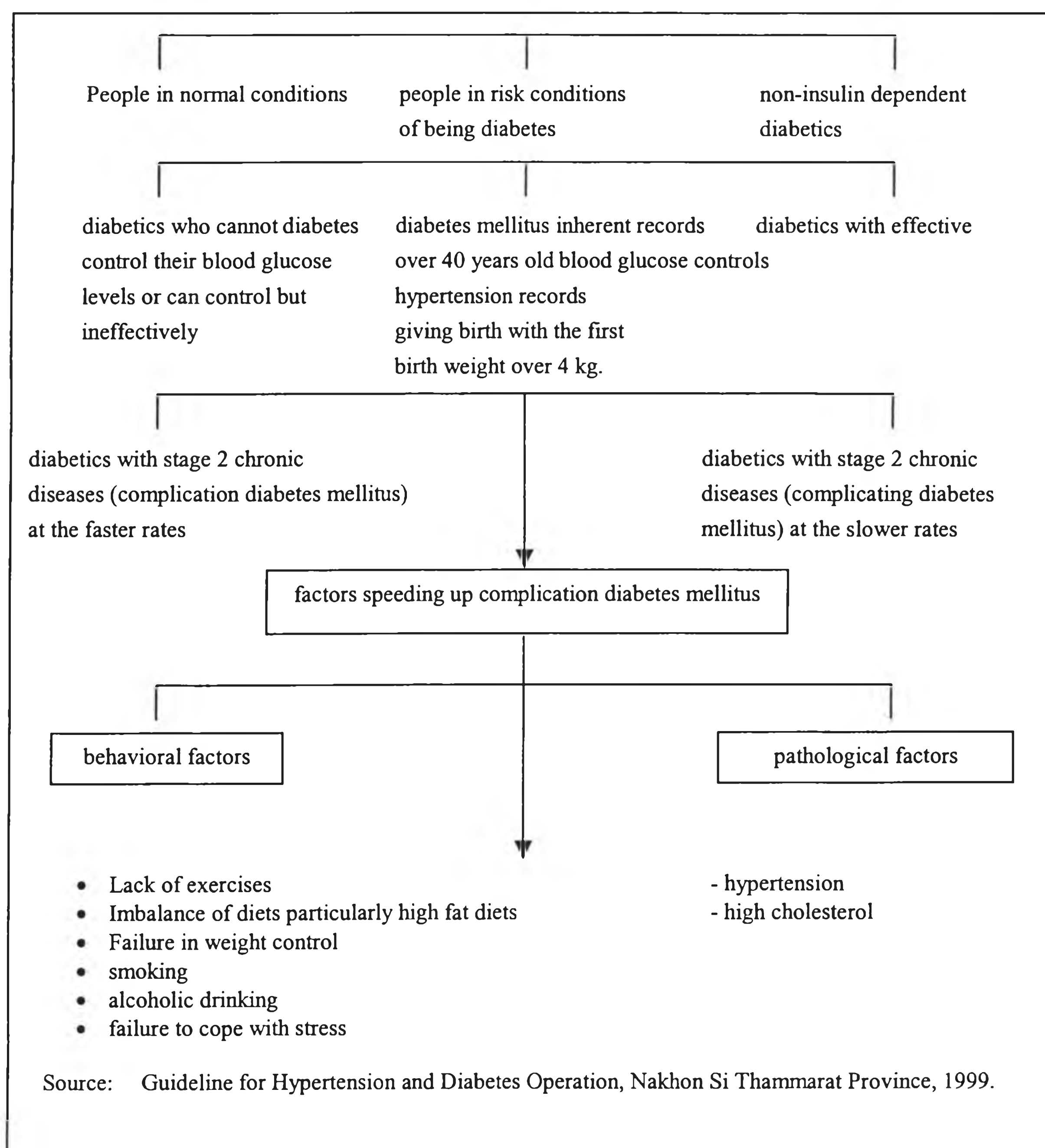

Figure 2.1: Procedures of being (non-insulin dependent) diabetics to achieve the goals, five principles need to be practiced.

Diet – control. The most important thing in controlling diets is having the adequate amount and proportion of intake that meet the body demand. The diabetics should have a limited amount of energy food, the proportion of carbohydrate at 50%,

and the increase amount of protein to replace carbohydrate. Moreover, they should have a limited amount of fat but increase the amount of vegetable oils (except coconut oil), protein and vegetables. Having punctual meals and weight control are also important. The diabetics should realize that although both rice and sugar belong to the carbohydrate group, rice is digested, converted into glucose and absorbed to the blood system much more slowly than sugar. This prevents the instant condition of hyperglycemia. In other words, the glucose will not be produced higher than the capacity of kidneys to remove, so no glucosuria exists. The diabetics should, therefore, avoid desserts and sweets.

Examples, types, and amount of nutrition for the diabetes include:

- Rice, cereal and starch should be consumed at an adequate amount.
- Beans (groundnuts, soy beans, kidney beans, mug beans) can be replaced rice but desserts should be avoided.
- Green leaf vegetables and fresh beans (long beans, peas, green peas) can be eaten ad libitum.
- An adequate amount of fruits should be eaten.
- Real sugar (i.e. caster sugar, syrup, thin syrup, condensed milk, desserts, honey, soft drinks, tonic drinks and candies) should be taken less than 5 % of total energy per meal or should be taken when having hypoglycemia.
- Artificial sugar without calories (saccharides, aspertum, etc) can be eaten at unlimited amount.
- In practice, the diabetics should avoid pork fat and any animal fats.

- Deep-fried foods should be avoided.
- Alcohol should be avoided, particularly the diabetics with hypertension and obesity and high fat.
- If the diabetics drink alcohol, greasy, oily foods should be avoided.
- Alcoholic drinks must not be drunk when hungry.
- Milk has advantages, about 1-2 glasses of milk (240-280 mg.) a day should be drunk.
- For the one with obesity, 1-2 spoons of rice should be reduced if milk is included within that meal.
- If all types of food are consumed, it is not necessary to take supplementary food e.g. concentrated chicken soup, honey, pellet algae.

Meals for the diabetics

- The non-insulin dependent diabetics should have 3 main meals a day with the calories at 20-30% and 30-40 %, respectively.
- Snacks during meals should be avoided. If a few suppers per day are required, the calories should be calculated from the three main meals.
- The diabetics should have each meal punctually and at the same amount. They should have 3 meals a day and may have 1-2 suppers if necessary, but the calories of each supper should be calculated from the three meals. The calories of each meal; breakfast, lunch, and dinner, should be 10-30%, and 20-40%, respectively with the calories of each supper at 10% of the energy required in a day.

1. **The change of food for the non insulin-dependent diabetics or those taking drugs for blood glucose reduction**

- When feeling tremble and sweat, drink fruit juice, soft drinks or have candy. If having these symptoms 2 days continuously, reduce drug. If feeling unappetite, change to the kinds that can make (s)he feel more appetite including fruits, desserts, or soft drinks without reducing the dose of drugs (this is because it may cause the unbalance with the food).
- When having heavy or moderate exercises that is not the routine activity, have food half of the usual amount before having exercise without stopping drugs or injection.
- For the one with the excessive body weight, if (s)he would like to have exercise, don't take more food but take drugs as usual or reduce one-third of the normal dose depending on the blood glucose level.

1. **Exercises** have several advantages, for example,
    - reduce stress and anxiety
    - reducing cholesterol and improving body conditions
    - losing weight
    - facilitating the metabolism due to the utilization of glucose during the metabolism.

The diabetics should have exercises that are suitable for their normal life regularly such as speed walk. The exercises should begin from the warm up stage and when feel tired, they should stop their exercises immediately. (Chit Jiraratsatit, 1991). The type of exercises appropriate for the second diabetics should be the aerobic exercise so that the oxygen can be used while the energy is metabolized. They should have at least 30 minutes a day every week.

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2. **Drug Treatment**. If the diabetics need to be treated by drugs, they have to look after themselves carefully, see the doctor regularly, and follow the doctor's advice strictly so that the changes of their health conditions and the severity of the disease will be examined continuously. Thus, the diabetics will be given the right drugs depending on their health conditions and the examination can be done easily by checking their body weights and blood glucose levels.

Treatment by Injection. There is only one kind of drug, insulin. It can be subdivided into 2 types:

- Short Acting Insulin is insulin solution applied by intrasubcutaneous injection and is absorbed to the blood system rapidly within 1-2 hours. This kind of insulin, regular insulin, is suitable for an immediate treatment and can be applied by intravenous injection.
- Intermediate Acting Insulin is insulin that can last for about 24 hours after intrasubcutaneous injection. It cannot be applied by intravenous injection but is suitable for long-term treatment or in the case that is not required the immediate reduction of the blood glucose level.
- Long Acting Insulin is insulin that can last for 36 hours after intrasubcutaneous injection. The activation starts within 8-14 hours after application. It cannot be applied by intravenous injection.

3. **Oral Hypoglycemic Agents**

- The sulonilurea group is drugs that activate the β–cells of pancreas to secrete insulin for the non-insulin dependent diabetics. This kind of drugs is more effective in the diabetics ages over 40 years old, being diabetics for less than 10 years and the insulin requirement is less than 40 units/day. It will decrease the secretion of glucacol, the production of glucose in pancreas and increase the insulin receptors at the cell walls. It also has activation on various kinds of tissues and membranes, for example, muscles, lipid and livers.
- The phenethyl biguanides are suitable for young diabetics. They will inhibit the regulation of cholesterol and triglyceride in the blood by absorbing glucose from the digestive system and inhibiting glucose production in livers.

4. **General Care and Methods of Foot Care**

4.1 **Self-care on physical** conditions are considerably important since the diabetics always have high susceptibility and can be easily contaminated with pathogens e.g. moulds at the joints of the body. To avoid these problems, the diabetics should keep their whole body clean (Walla and Adisai, 1993). For instance, the diabetics should carefully clean their joints and always keep the joints dry.

4.2 **Self-care on Eye Conditions**. The diabetics can easily have cataract and poor eyesight so they should have their eyes checked at least once a year, particularly, for those with hyperglycemia. If they have poor eyesight or abnormal optic vision, they should not have new eyeglasses immediately. This is because when their blood glucose levels are back to normal, their eye condition may be improved. However, they should consult the optometrist before making decision.

4.3 **Self-care on Dental Conditions**. The diabetics should have their teeth cleaned at least twice a day and always rinse their mouths after their meals to remove the residues. In addition, they should see the dentist to have their teeth and oral condition checked every 6 months.

4.4 **Self-care on Mental Conditions**. Mental conditions are also equally important. Peyrot and McMurry (cited in Powana, 1994) indicated that stress and anxiety have adverse effect on the blood glucose levels since cortisone and catelamine will be elevated, leading to hyperglycemia. The diabetics need to know how to control their stress and anxiety such having exercises and participating in some social activities.

4.5 **Self-care on Foot**. The diabetics should pay special care on their feet because feet are the most sensitive area for having wounds and inflammation. This is normally caused by less amount of blood circulated at legs and feet, the abnormality of

the arteries and the degeneration of nervous system. The diabetics will feel painful more slowly. Cleaning the feet regularly and avoiding wet and dam feet are, therefore, necessary.

5. **Self-care on Prevention and Remedies of Complicating Diabetes.**

The diabetes is the important cause for the degradation of the vascular systems. This can result in the possibility of having complicating diabetes such as the shrinkage of the arteries. The diabetics should quit smoking, have their blood pressure checked regularly, and have cholesterol checked once a year. In addition, it is likely that the diabetics can be more susceptible so it is easier for them to have the urinal system infection (Walla and Adisai, 1994).

Significant Measures in Diabetes Mellitus Control

1. **Measures to reduce the risk of being diabetics**. This aims to prevent and reduce the risk of being diabetics. These measures are emphasized on all population and the high risky groups. Measures consist of health promotion and risk reduction, especially provisions of sufficient physical activities, nutritional diet consumption, weight control, and the healthy way of life.
2. **Measures to decrease the number of uncontrolled diabetics**. This aimed to identify the diabetes suspects at the initial stage when there are

no signs of the disease by screening the risk group and providing measures in blood glucose controls.

3. **Measures to reduce and control the severity of complication diabetes mellitus.**
   - evaluate and control risk factors of heart diseases and some important arteries diseases particularly hypertension, non-smoking, and abnormal levels of cholesterol
   - Watch out the complicating diabetes to find the symptoms at the initial stage and provide the appropriate preventive measures e.g. special foot care, eye examination, and complication diseases of eyes.

Objectives and Key Indicators for Diabetes Prevention by the End of the National Economic and Social Plan Issue 9

1. Lower proportion of the diabetics at the working ages (between 15-59 years old) to be less than 4%
2. Lower proportion of diabetics having body mass index (BMI) (BMI >25 kg/m^2) to be less than 25% and obesity less than 4% (BMI < 30 kg/m^2).
3. Lower percentages of adults in communities realizing that they are diabetes to 70%.
4. Lower the proportion of the diabetics with the successful diabetes control to 50%.

Follow-up and Evaluation of the Treatment

Follow-up of treatment depends on the severity of the symptoms and methods of treatment. In the initial period, the diabetics may have to see the doctor every week to find out the proper drugs for controlling blood glucose levels. After that, they may see the doctor every few months to assess whether the treatment is effective and achieve the goals. The patients will be followed up regularly to determine their problems and check the progress of their treatment.

Models Approaches, and Activities in Health Care Provision for the Diabetics at Ban Khaoro Health Center

According to the previous studies concerning the diabetics in Thailand, most interest had been paid on supporting the diabetics to have self-care at their homes (Kesorn Taewnonnew, 1994) and provisions on effective health education at health centers (especially at hospitals) (Wanida Chuklin, 1991). Nevertheless, the focus on development of the roles of health centers in diabetes treatment as the links between the hospitals and the patients has been limited.

For instance, in Thung Song District, the official numbers of diabetics receiving health care services at Thung Song Hospital between 1999-2001 are 2117, 2123 and 2772 people, respectively. This has brought about the ineffective services, crowded patients, inappropriate number of doctors and nurses, waste of time for the patients, higher expenses and poor relationships between the patients and the health service staff. In addition, the patients who live in the rural area have to spend a lot of time in travelling to the hospital, and because of the inconvenience, some patients intentionally missed the appointment and stop taking drugs.

As mentioned, Thung Song Hospital initiated an action plan to improve the curing system for the diabetics with the aims of upgrading their services, and extending their services to cover the requirements of not only the patients but also all family members of the diabetics at the subdistrict level (Tambon). This plan will be focused on the higher effective services provided by the health centers as well as the health examination at these health centers.

By the end of 2000, the Committee of Thung Song Public Health Cooperation (Thung Song PHC) initiated health services for the diabetics at all health centers. The pioneers were large health centers including Ban Khaoro health center, Thung Song District, Nakhon –Si- Thammarat Province. The services were emphasized on the second type diabetics that can control their blood glucose levels at the satisfactory level (less than 126 mg/dl) (WHO, 1988 cited in Apichart Wichayanarat, 2000) and no complication diabetes mellitus observed. There were 21 diabetics voluntarily joined the first phase of the program in 2000. The health center staff undertook the process to identify the diabetics and registered these people before starting the treatment program. The doctors at Thung Song Hospital would come to provide the treatment services for all patients at the health center including the diabetics once a month (every Wednesday of the fourth week of the month) during 08.00-12.00 a.m. The operation was set up only one day a week as it is perceived appropriate for the number of the patients and not to overburden the health center staff. In other words, the high quality of health services was the considerable factor.

It is found that all diabetics (21 person; 100%) had been transferred from Thung Song Hospital to Ban Khaoro health center accessed health services regularly. The diabetics could control their blood glucose levels at the satisfactory levels and there were no complication diabetes mellitus found. The result was quite different from when they accessed services from the hospital. During 2 years of the program, no diabetics at Ban Khaoro health center were found complication diabetes mellitus or died. The dead diabetics died of other diseases that were not associated with diabetes mellitus such as oldness.

2. Approaches and Activities in Diabetes Treatment at Ban Khaoro Health Center

2.1 Activities for Taking Care of the Diabetics at Ban Khaoro Health Center

At present, there are 84 non-insulin dependent diabetics under the responsibility of Ban Khaoro health center. They were identified and confirmed the examination results as non-insulin dependent diabetics. They can be classified into 2 main groups:

1. The diabetics receiving health services at Ban Khaoro health center can be divided into
   - 1.1 The diabetics who were transferred from Thung Song Hospital and voluntarily to have the treatment at the health center
   - 1.2 The diabetics who were identified by the health center as the diabetics and registered to receive health services at Ban Khaoro health center. They will have the examination and treatment at the health center from doctors of Thung Song Hospital.

2. The diabetics refusing health services at the health center can be classified into

2.1 The diabetics accessing health services at other types of health center e.g. hospitals.

2.2 The diabetics refusing any treatment the diabetics receiving discontinuous treatment at Ban Khaoro health center

2.2 Ban Khaoro health center provides the following health services for these diabetics:

1. At Ban Khaoro health center. Health services offered will be both disease prevention risk factor and health promotion by emphasizing on the continuous high quality services. These activities consist of diet control, exercise practices, public health education, hypoglycemia control drugs, and treatment follow-up.

2. At home. The aim of home visit is to follow up the treatment or help the diabetics in case they cannot take care of themselves in terms of health, social and economics aspects.

3. In the community. Various activities, for example, health care education and health care information distribution, meetings of volunteers on community health care, and participation of local people have been strongly campaigned in the communities and villages.

Table 2.1: Strategies in Diabetes Control and Prevention

Levels of control	Duration of diabetes	Strategies	Objectives	Impact
Primary	- before getting the diabetes mellitus - no signs of the diabetes	- health promotion	- prevention of diabetes millitus or symptoms of the diseases	- diabetes millitus reduction
Secondary	- signs of diabetes millitus - may or may not be the diabetics	- diabetics screening - confirming by diagnosis at the initial stage - immediate treatment	- delay or stop the pathological conditions of diabetes millitus	- reduction of the number of diabetics
Tertiary	- getting 1 disease - getting more than 1 diseases or having complication diabetes millitus	- effective treatment - complication diabetes mellitus control - recovery	- control to maintain the disease conditions - lameness prevention - lameness control	- reduction of the number of diabetics - reduction of complicatio n diabetes mellitus

Source: Office of Medical Academic Development, Department of Medication, Ministry of Public Health

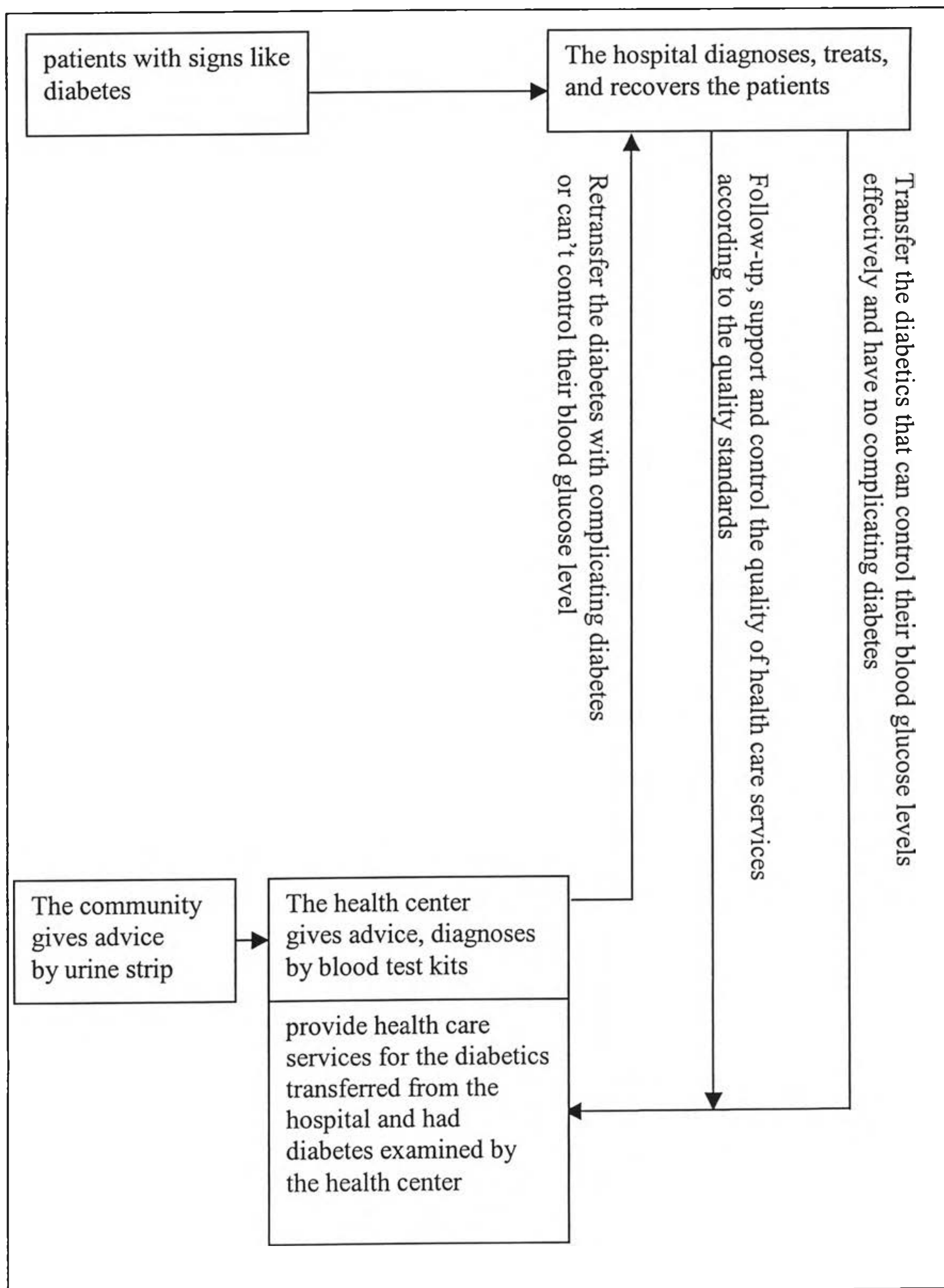

Figure 2.2: A Model of Health Services for the Diabetics at the Health Cent

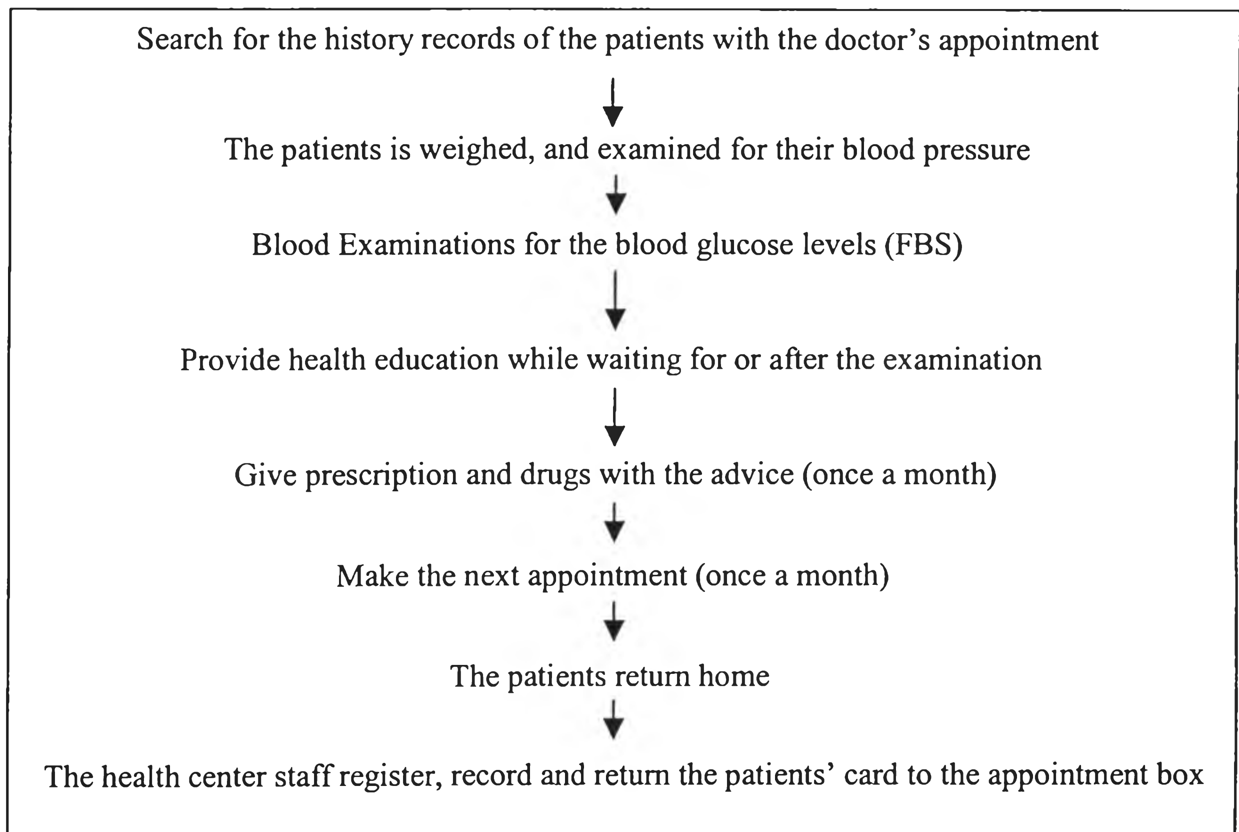

Figure 2.3: Procedures of Health Care services of the Diabetics at the Health Center

3. Opinions on Satisfaction

Satisfaction is reactions of any one on any events or actions that will lead to the prediction or interpretation of those events or actions. These views may be agreed or disagreed with the others'. Satisfaction on the health services of the health center staff is the opinions of people on services and potentiality on service provision of the health center staff.

Amporn Chareonchai (1993) defined 'satisfaction' as anything that can be served the basic needs of human to reduce mental and physical stress or any conditions

that make human feel comfortable, happy and satisfied as well as positive attitudes toward people, things and actions.

Morse (1953) referred satisfaction as anything that can reduce stress. If anyone have too much stress, they would feel dissatisfaction. This is because stress stems from human needs, and if these needs have been fulfilled, they would feel satisfaction.

Aday and Andersen (1975) stated that satisfaction can be defined as feelings or opinions on attitudes resulting from experiences of customers at any service providers and the services received meet the customers' expectation while the levels of satisfaction depend on factors involved.

Satisfaction Towards Health Care Services

Aday and Andersen (1975) pointed out six fundamental factors associated with health care customers and feelings of the patients.

1. Satisfaction towards convenience of health care services

   1.1 time in queuing for services

   1.2 treatment upon demands

   1.3 convenience of the service access

2. Satisfaction towards service provision

   2.1 one-stop service upon patients' demands

   2.2 physical and mental treatment by doctors

   2.3 treatment follow-up by doctors

3. Satisfaction towards care offered by health care staff including hospitality, generosity, politeness, and friendliness.

4. Satisfaction towards service information
   4.1 information on causes of illness
   4.2 information on health care service provision e.g. drugs, and self-care practices

5. Satisfaction towards health care expenses

6. Satisfaction towards the quality of services, e.g. quality of hospital services based on the attitude of the patients

As mentioned it can be concluded that satisfaction of non-insulin dependent diabetics towards health care services can be defined as feelings or opinions towards various services at health care centers, for instance, satisfaction on behaviors of the health care staff (hospitality and politeness), quality of treatment and advice for the patients. This can be evaluated by questionnaires designed by the researcher.

4. Opinions on Social Supports

Human beings are living things that their livings are essentially depended on each other. They need to trust each other, exchange their feelings and opinions and require recognition. This will make them happy and feel somebody. These interrelationships among each other are strong social support. Jintana Yuniphan (1986)

stated that there are several theories about social forces and supports, however, the overall consequence is the support that aims to upgrade the quality of life, as well as, healthy life.

There are various definitions of 'social support', some are similar but some are different. Nevertheless, these definitions share some common concept, for example,

Cobb (1976) referred social support as information that has been received and made anyone believe that they are loved, cared, recognized, and admired; and they belong to the social communities.

Thois (1982) pointed out that social support is the support that any members of the society provide to each other in terms of emotion and feelings, participation, information or things that will assist someone to confront and cope with their stress, and pains more rapidly.

In sum, social supports can be referred as support or assistance offered by someone around the diabetics such as their couples, children, relatives, friends, health care staff, etc. The supports can come in forms of emotion, recognition, admiration, participation, encouragement, information, finance, things, labors and services. These supports are expected to change some behavior problems of the diabetics so that this group of people will perform their life in the healthier ways.

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5. Opinions on Health Beliefs

The health belief model is a social psychological model that was developed to understand practical behaviors about healthy life based on several factors associated with internal and external factors, as well as, co-factors in sociology that reveal human behaviors. Rosenstock, Kegeles, and Leventhal were the first group that proposed the health belief model to explain the health care problems. Rosenstock's concept was influenced by Kurt Lewin's that expressed the perception as the health belief indicators. The health belief model has been developed to analyze health behaviors by explaining behaviors and decision making of people who are endangered and under risk situations. Rosenstock (1974) concluded that fundamental components of the health belief model are perception and motivation. Anyone who try to keep themselves healthy should believe that they have high risk to be sick of any diseases and the sickness would affect their ways of life. This will lead to the health practices that have advantages for the their health or reduce the risk of sickness and there would not be any problems opposed to these practices such as expenses and convenience.

According to Becker and Maiman (1975), the health belief model can be used to explain behaviors in disease prevention and sickness behaviors. Behaviors in disease prevention have been widely studied by sociologists and social psychologists. The interested factors concern social psychology, attitude, perception, belief and interaction of humans and other factors. Later on, Becker et. al. (1975) noted additional factors in the model. These include concerns on health conditions, determination in pursuing proper disease treatment and the main components of the health belief model in order to explain behaviors in disease prevention and other behaviors related to disease

treatment. This contributes to better understanding and more accuracy in behavior prediction. Nevertheless, there are some variables that cannot accurately measured. The components and research results of the publish literatures were detailed as follows:

1. **Perceived susceptibility** refers to opinions of diabetics on the likelihood of complicating diabetes and belief directly influencing health practices both in normal and sick conditions. Diseases, therefore, can be prevented in various ways depending on one's belief. Many studies revealed the positive relationship between belief and practices based on health staff's advice (Becker et. al., 1974). According to the health belief model regarding perceived susceptibility as the crucial factors on health practices (Hochbuam, 1958 cited in Rungkarn Soralum, 1987), Becker et al. (1974) concluded that the one who perceive susceptibility always stay in the healthy conditions and follow the advice strictly in order to avoid sickness. Perceived susceptibility is, therefore, the crucial factors in disease prediction (Becker et. al., 1977) as it encourages the people to be aware of disease prevention practices.

2. **Perceived severity of diseases and its complicating diseases** can be defined as perception towards the severity of diseases affecting the body conditions, for example, paralysis, complicating diseases, physical difficulties and eventually death. It can also affect the social status. One should not follow the medical instructions even though they perceive the risk of infection but still ignore the severity of diseases. However, too much anxiety about diseases may also result in the inappropriate practices. Janz and Becker (1984) concluded the studies on health belief model during 1974-1984 that the perceived severity of diseases was a reliable tool in predicting the

patients' behaviors (85% accuracy) but was an ineffective tool in predicting disease prevention behaviors (36% accuracy).

3. **Perceived benefits** refer to the belief that any good practices have advantages on disease prevention. The decisions in following medical instructions, therefore, depend on the comparison of advantages and disadvantages of any practices. In other words, on should choose to carry on any actions considered beneficial to them. Moreover, the understanding in medical advice as well as the trust in health staff significantly influence the decision-making in health practices (Donobelian and Rosenfeld, 1964; Gabrielson et.al., 1967 cited in Sukanya Narongwit, 1989). Janz and Becker, 1984 noted that the perceived benefits of disease treatment considerably affect behaviors in treatment practices, and disease prevention practices similar to perceived severity of diseases.

4. **Perceived Barriers** are the prediction of behaviors associated with positive health practices including expenses or consequences from some activities such as blood examination, examination that can cause pains, service access, and behaviors that are against their routines. Perceived barriers are, therefore, one crucial factors affecting behaviors in disease prevention and disease treatment.

5. **Health motivation** refers to emotions and feelings resulting from internal and external stimuli. Internal stimuli include interests on healthy life, satisfaction in medical advice, and cooperation in following medical advice. External stimuli include health information, and health advice from family members. For those

who want to reduce the risk of diseases, health motivation like perception factors is considerably important in conducting any health activities. Motivation can be evaluated in forms of levels of satisfaction, cooperation and enthusiasm in following the medical advice.

6. **Modifying factors** are defined as factors other than the ones mentioned above. It includes any factors that will encourage people to follow the instructions, for instance, population factor, social status, attitudes and interactions and supports among social members. Several studies have been done on disease prevention behaviors, psychological factors, attitudes, perception, relationships and responses of individuals. Becker et.al. (1975-1977) developed the health belief model and Becker (1974) used it to explain disease prevention behaviors.

6. Opinions on Health Perception

6.1 Perception Theory

Perception is an important fundament psychological process since if there is no perception process, memory, thought and learning process will not take place (Prapapen Suwan, 1991). **Perception** is a latin word, meaning knowledge and understanding stemmed from knowledge, experience, concept and impression that are systemically patterned. King (1984 cited in Kobkul Phanchareonworakul, 1985) defined the term '**perception**' as opinion and mental process that is underlined by certain targets. Forces and perception, therefore, are performances expressing awareness and realization of individuals in certain actions. These processes will collect and interpret any information received from sensory perceptions and memory. The perception procedures can be listed as follows (Bunting, 1988):

1. **Sensation** is the nervous system for memorizing and retrieving the external stimuli.
2. **Selection** is an alternative for selecting one of several stimuli. In other words, man cannot understand everything surrounding us in one time but we have to learn one by one. Thus, perception depends on the level of interest of each individual. If there is, the individual will bridge new experience to the previous ones; that is, they would make comparison between new and old experiences. This is known as assimilation.
3. **Interpretation** is the final stage of perception. Each individual will try to understand the meanings of stimuli by retrieving the stored information. If the events or actions confronted are new, they will be memorized, stored and subsequently retrieved when facing them later on.

6.2 Meanings of the Health Perception

Siriporn Kampalikit (1990) defined the term 'health perception' as opinions, feelings, understanding and belief of individuals on their own health conditions. These are created from perception on reality of each individual, activities and practices in their health care, and health care staff. Health care measures involve knowledge on self-care, activities in disease prevention, activities in health promotion and activities associated with the risk of illness both in healthy and unhealthy conditions. These knowledge and activities influence both positive and negative health care behaviors and performance.

Becker (1975) studied the perception or the belief models of people when becoming sick. The models were modified as health care perception evaluation forms comprising of 5 aspects: perception on the risks of complicating diseases, perception on severity of diseases, perception on behavioral advantages under the treatment program, perception on difficulties in health care practices and health motivation. Health motivation and health perception refer to opinions, understanding, feelings and beliefs of individuals on the overall physical, mental and social conditions under a certain time.

- **Factors Influencing Health Perception**

1. **Development Status**. Perception and opinion on our own health are strongly associated with the development status. This may be due to the significant dependence on ages of the ability in realization on health conditions and the ability in responding with the changes of health conditions.

2. **Social and Culture Influences**. Social and cultural interactions can have great influence on feelings, opinions and understandings about health. Different cultures contribute to different health concepts.

3. **Previous Experiences**. Healthy and sickness experiences have impact on individual's health perception. Each individual can diagnose or recognize their abnormal health conditions or sickness by retrieving their previous experience. Previous experience also provides the definitions of 'health' for each individual.

4. **Self-expectation**. Some people expect high levels of physical and mental actions when they are healthy. In this situation, the abnormal physical and mental conditions can hardly been recognized. Health perception, therefore, depends strongly on the expectation level. In addition, there are factors that influence health perception, for instance, images, roles, capability and the recognition of the inside value

- **Evaluation of Health Perception**

Health perception can be defined as feelings or opinions of patients on their own health. In the past, health perception had been evaluated by one single sentence. Nowadays, however, the evaluation tool widely used is a 4-rating scale questionnaire (excellent, good, fair and poor). Later on, the tool has been developed due to the initiation of the Health Insurance Development Project in U.S.A. (Brook et. al., 1979 9-27 cute ube Huraoraoa Oawukaum 1992). The questionnaire usually consists of questions on health perception in past, present and future, perception on disease resistance and risks of sickness, anxiety and interest about their health, and understanding about sickness. This can be summed up as follows:

1. **Perception on Previous Health Records**. To evaluate opinions on individual's previous health records, factors involving beliefs, attitudes and experiences need to be taken into account. For example, if one has been seriously sick, having an operation, surgery or chronic diseases, they will have negative perception, and if these experiences are combined with the present health conditions, it may contribute to stress and anxiety, probably leading to the inaccurate perception of their own health conditions. If one, however, has positive health perception, together with positive

sickness experience, their stress and anxiety about their present illness will be kept normal and they would confront the situations better than the former.

2. **Perception on Present Health Conditions**. The frequency of health evaluation for each individual depends on opinions on their present health conditions. That is, it depends on the meaning of health that is given by each person (Orem, 1985: 173). Factors affecting perception on present health conditions include previous health records, physical performance and health information from medical staff. Nevertheless, information obtained may contradict to their opinions on their health conditions due to the simultaneous change of health perception.

3. **Perception on Future Health Conditions**. Illness causes adverse effect on physical performance and functions of some organs and may eventually lead to complicating diseases and paralysis. One can evaluate their health conditions by guessing from their previous and present health conditions. Information about illness obtained from friends can influence their expectation and desperation of their sickness. That is, if anyone gets supports and encouragement, they will have hope and positive attitude on their health conditions. This may contribute to the health activities that can help them remain healthy. On the other hand, if they feel desperate, it will cause negative health perception and ignorance of health service access.

4. **Perception on Susceptibility/Risks of Sickness**. Health prediction on susceptibility and risks of sickness depends on attitudes toward diagnosis and treatment of diseases. The lack of trust in diagnosis and treatment, as well as, the wrong

beliefs in health practices can bring about the misperception on the risks of sickness. Moreover, it also depends on the prediction of their health conditions and the risks of reoccurrence of the old disease. If any one realize that the probability of reoccurrence of the old disease and the risks of complicating diseases is high, they will pay high attention on their health, having disease prevention practices and following the medical advice strictly.

5. **Anxiety and Interest in Health Conditions**. The realization of sickness can have adverse effect on physical performance and economical and social status, resulting in stress and anxiety. This may contribute to negative health perception regarding to mental processes, e.g. emotion and attitude. In addition, they may perceive their health conditions opposed to the fact, avoid health practices, and shift their interests to some other things away from their health conditions. In fact, the patients should confront the reality and understand that their health conditions can be controlled and this would help them successfully control their stress and anxiety.

6. **Sickness Understanding**. The well understanding that one can be healthy and then becomes sick back and forth throughout their lives can make them be aware of the sickness and conduct the good practices in their ways of life. They will, therefore, be ready for any diseases and their impact and eventually they will access the appropriate medical care and treatment.

Consequently, I am interested in the modification of the health belief model and the application of the modified model regarding to the factors affecting the health service access. The study was also conducted to determine behaviors of non-insulin dependent diabetics at Ban Khaoro health center and to encourage the diabetics to perceive the probability of being diabetes, the severity of diabetes and the advantages of continuous treatment.

7. Relationships of Selected Factors and Behaviors in Accessing Health Services at the Health Center or Other Types of Public Health Centers

7.1 Fundamental Factors

- **Ages**. The study of Chanida Luntinak (1987) demonstrated that regarding to health care access, women at all aging groups preferred to buy drugs at the pharmacist's but the patients aging between 15-24 years old preferred the health service at the state-owned health centers. This may be due to the lack of self-care experience, so they could not decide the appropriate drugs for their sickness. Moreover, they may have more confidence in the health services of the state-own health centers. Intraporn Promprakarn (1998) studied the elder diabetics in Angthong province and found that most of the patients (95.56%) were at the ages of 60-74 years old

- **Sex**. Krisna Nadee (1998) stated that women usually access health care at public hospitals or private clinics while men choose self-care to cure their sudden or unserious sickness before access health care at private hospitals or well-known doctors. This is similar to the study of Suteerat Kaewpralom (1995) who examined the

relationship between self-value and social support and behaviors in self-care of the elder diabetics in Utaratdit province. He found the most of the diabetics were female consistent to the fact that diabetes is usually found in females more than in males. Kusol Sunthontada and Worachai Thongthai (1996) investigated characteristics of the health service customers and factors affecting health service access in private hospitals and found that more females accessed health service at the higher proportion than males. This may be because women are more sensitive to the sickness than men and have higher probability to be sick of some certain diseases than men.

- **Marital Status**. Marital status is one factor affecting life styles of individuals. The married always have support and assistance including advice on health service access from their couples. As a result, most researches revealed that people with different marital status have different habits in health service selection. Watinee Boonchaluksami (1986) found that patients with marital status as single, widow, divorced and separated preferred to buy drugs at the pharmacist's. Sakaorat Chaisunthorn (2000) noted that the married accessed the continuous treatment at the higher number than the patients with different marital status.

- **Educational Qualification**. Educational qualification is one of the key economics indicators. The people with the higher educational qualification tend to obtain more information and have a wide selection on health care services. This group prefers to access health service where there are doctors on duty. Watinee Boonchaluksami (1986) found that the people with the low education levels lack the knowledge of health care. When they become sick, they are scared to see the doctor or

medical staff as they cannot describe the symptoms and find the proper words to talk to the doctor. Alternatively, they see the illegal doctor or buy drugs at the pharmacist's. This may be because the expenses are cheaper and it is more convenient.

- **Occupations**. Channipa Tanpoomipradesh (2000) studied factors affecting health service access at Ban Wanghin health center, Muang district, Tak province and found that the government officials accessed the health service at the health center least.

- **Income**. Several studies showed that income is one crucial factor affecting health service access. Channipa Tanpoomipradesh (2000) studied factors affecting health service access at Ban Wanghin health center, Muang district, Tak province and found that people with the lower income preferred to access health services at the health center compared to those with higher income. On the other hand, less number of higher income people accessed health services at the health center. Suntat Sermsri conducted a study in Suphanburi province and found that the key factor influencing selection of health services from various sources was economics status. Kusol Sunthontada and Worachai Thongthai (1996) examined characteristics of the health service customers and factors affecting health service access in private hospitals and found that factor promoting health service access and attitude on health and sickness was economics status. Wanla Tanyothai (1997) investigated potential model in improving self-care of the non-insulin dependent diabetics and found that economics problems and financial insecurity caused the family members to ignore the diabetics.

7.2 Health Perception Factors and Health Service Access or Refusal at the Health Center and Other Types of Health Care Service Centers

Kaesinee Kainin (1994) investigated the relationship between health perception and behaviors in self-care of the pregnant diabetics receiving health services at Siriraj Hospital. The study revealed the significant positive relationship between behaviors in health service access and health perception. Kung Kittiwat et.al. (1996) studied effect of using blood glucose graph records in non-insulin dependent diabetics. The total samples were 201 diabetics at Potharam Hospital, Ratchaburi province. The result indicated that the blood glucose levels in the diabetics with good control in their diets, exercises, and drugs were significantly reduced more effectively than in those with uncontrolled health practices. In addition, Somchai Winitkul (1998) examined behaviors of the elder diabetics in drug taking at the diabetes clinic, Wachira Hospital and found that about half of the diabetics had experiences in having traditional medicines. This is consistent to the study of Chandra Borisudh (1997) which investigated behaviors in drug taking of the diabetics and found that some diabetics preferred to have diabetes treatment both by herbal medicines and modern medicines. However, most of the samples stopped herbal medicines and decided to take only drugs of the hospital due to more convenience, easier preparation, and more safety. Generally most patients who had herbal medicines did not inform this to the doctors.

7.3 Satisfaction Factors and Health Service Access or Refusal at the Health Center and Other Types of Health Care Service Centers

Panida Damapong et.al. (1998) examined satisfaction and requirement of in-patients on quality of state-owned public health centers and found that the

requirement of the patients was that the health service centers should provide knowledge and information on appropriate health practices for each disease. Moreover, the medical staff should act as their health consultants. Saisamon Boonyasathit et.al. (1996) studied factors related to satisfaction on health care services of Maharaj Nakhon Chiengmai Hospital. They found the strong positive attitude towards health care services of the hospital in areas of service quality and health care quality. Panee Saenchareon (1996) carried out a study on medical and health care services of 44 projects in Bangkok. The study revealed that people had high confidence in quality and standard of health care services only at the large hospitals, for example, regional hospitals, provincial hospital and medical school hospitals. Community hospitals and local health centers were believed in lack of standard equipment and qualified medical staff. However, they were dissatisfied with the medical staff in terms of hospitality, friendliness, politeness, and limited time for the patients. Sayan Kaewkate (1994) conducted an investigation on discontinuous treatment of tuberculosis patients at Lung Diseases Medical Care Center in Bangkok during 1 October, 1991 to 30 September 1992 and found that to prevent the patients from discontinuous treatment, the patients should have been educated with health care information, followed up immediately whey they missed the appointments, and provided any economical support if necessary. Furthermore, good relationships between doctors, medical staff and the patients need to be built up for the achievement of treatment. Wipa Durongpisitkul (1999) reported the patients' satisfaction on services of health care units at Ramathibodee Hospital. She stated that waiting time for the doctors was significantly influenced decision making in selecting the health care centers. Urai Chamnanka (1996) studied service satisfaction at Yasothon Hospital and found that service satisfaction at the high level was observed in

the areas of convenience, public relations, equipment, service quality, and information provided. Prakong Warutamnagkul et.al. (1998) surveyed the satisfaction of out-patients and found that the highest expectation was to get good care from the medical staff, followed by good treatment. Sununtha Ampawanon & Chongthanom Soomkurt (1998) conducted a study on satisfaction and requirements of the patients on the quality of Utaradit Hospital. The most required aspect was good-tempered, friendly medical staff. The patients also mentioned that they felt happy when getting good advice from the staff. Suwanachai Watanayingchareonchai et.al. (1997) carried out a study on a service model for the diabetics at the health centers in Khon Khaen province and found that the patients were satisfied with the service systems at the high level due to convenience and fast services, friendliness and hospitality of health center staff, sufficient time for consulting sessions, uncrowded area, and short waiting time. Sakaodee Duangden (1996) conducted a qualitative research on requirements of the patients on quality of state-own and private hospitals and found that The patients chose to access the health services of the hospitals because the hospitals are well-known and have specialists.

7.4 Factors Related to Service Access and Health Service Access or Refusal at the Health Center and Other Types of Health Care Service Centers

Benjawan Kamthonwachira (1995) applied the concept of the foreign theorists to study health behaviors in Nakhon Pathom province, Thailand. She found that the selection of health centers is one factor affecting health service receiving. This factor involves service expenses, convenience in travelling to the health center, time for travelling, waiting time, and service hours. Tassnee Silpbutra (1995) studied service

models to improve patient transferring systems of health care centers and public health organizations in rural areas. She found that the patients selected the health care organizations based on the convenience in travelling. Similarly, Orachon Archarit (1998) investigated the reasons for receiving health services of the people in the southern part of Thailand and found that convenience in accessing the services plays the important role. Sakaodee Duangden (1996) explored opinions on services of state-owned and private hospitals in Surin provinces and found that for the state-owned hospitals, faster service was the most urgent aspect for improvement. Arunya Manit (1990) examined behaviors in selecting health care organizations and found that convenience in travelling and transportation was the key factor. Patcharee Thongpae (1997) studied service quality of the community hospitals and found that convenience in transportation was the important factor.

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Tara Onchomchan et.al. (1995) studied alternatives in broken bone treatment in Phraya Mengrai district, Chiengrai province and found that reimbursement of health expenses, and types of health assurance card holding were the important factors. Yothin Kunsonyut et.al. (1999) found that the diabetics were suffered from the application of public health assurance cards due to the belief that they would be treated with low quality or cheap drugs. Kusol Sunthontada and Worachai Thongthai (1996) revealed that one motivation affecting decision on accessing health care services at the health centers was benefits receiving from the health assurance systems, for example, reimbursement of health expenses (e.g. government officials, state-owned enterprise or company employees), reimbursement from Social Security Assurance Fund (e.g.

company workers). Krisna Nadee et.al. (1999) studied behaviors in the first health service receiving of the elders at Rama IV (Phra Chomklao) Hospital, Petchaburi province and found that health service access was depended on factors related to services such as service accessibility and sufficient services. Somsakul Sirichai (1998) investigated drug services for out-patients at Lertsin Hospital and found that in terms of prices of drugs, most of the samples preferred expensive but high quality drugs that could cure the disease within the short time. On the other hand, a few preferred cheap drugs but could cure the disease effectively even though it took longer time. In addition, Yothin Kunsonyut et.al. (1999) stated that the diabetics were suffered from state-owned public health assurance. That is, they had no choice that they had to receive cheap and low quality drugs that could not cure the disease effectively.

According to the previous research and literature, it can be concluded that there were several factors influencing behaviors in service receiving or refusal at health service centers. These include fundamental factors including sex, ages, marital status, occupations, income, educational qualification, duration of diabetes and complicating diabetes, factors related to knowledge about diabetes, health perception factors, social support factors and factors related to satisfaction on services and factors affecting service access.