OCCURRENCE COMPLICATIONS OF DIABETIC PATIENTS DURING THE GREAT FLOOD IN 2011 IN PHRANAKORN SI AYUTHAYA PROVINCE

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OCCURRENCE COMPLICATIONS OF DIABETIC PATIENTS DURING THE GREAT FLOOD IN 2011 IN PHRA NAKHON SI AYUTTHAYA PROVINCE

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ABSTRACT

This descriptive cross sectional study is to describe characteristics of occurrence complications and independent variable, to study the relationships between occurrence complications and factors affecting complications of diabetic patients, and to study of the predicting factors of the occurrence complication of diabetic patients during the great flood in 2011 in Phra Nakhon Si Ayutthaya Province. Population in the study were 19,443 diabetic patients who were registered for treatment at hospitals in Phra Nakhon Si Ayutthaya Province, during the great flood in 2011 from October, 2011 to December,2011. Total sample size of 278 was taken by stratified random sampling method. The data were collected by means of questionnaire developed by the researcher. The study factors were divided into two groups, internal factors and external factors. The data were analyzed by descriptive statistic, chi-square and binary logistic regression analysis.

The study revealed that diabetic patients had the average blood sugar level 153.89 ± SD 48.66, and 51 patients (18.65%) developed occurrence complications during the great flood. i.e. hyperglycemia, 26 patients (9.35 %), and hypoglycemia, 25 patients (8.99 %). The significant factors that could predict the occurrence complications were flood stress level , FBS level , LDL level. The forecasting equation of the complications is $w = 0.78 - 1.216$ (flood stress level) + 0.01(FBS level) + 0.021(LDL level), and the regression logistic predicting equation of probability of occurrence complications is $P(\text{occurrence complications}) = 1/1 + e^{-w}$

KEY WORDS: COMPLICATIONS / DIABETIC PATIENTS / GREAT FLOOD

102 pages

การเกิดภาวะแทรกซ้อนในผู้ป่วยเบาหวาน ช่วงวิกฤตมหาอุทกภัยปี 2554 จังหวัดพระนครศรีอยุธยา
OCCURRENCE COMPLICATIONS OF DIABETIC PATIENTS DURING THE GREAT FLOOD IN 2011 IN PHRA NAKHON SI AYUTTHAYA PROVINCE

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บทคัดย่อ

การศึกษานี้เป็นการวิจัยแบบพรรณนาแบบตัดขวาง มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีความสัมพันธ์ต่อการเกิดภาวะแทรกซ้อนและปัจจัยทำนายโอกาสเกิดภาวะแทรกซ้อนในผู้ป่วยเบาหวานในช่วงวิกฤตมหาอุทกภัย ปี 2554 จังหวัดพระนครศรีอยุธยา ประชากรที่ใช้ในการวิจัยคือ ผู้ป่วยเบาหวานที่ขึ้นทะเบียนการตรวจรักษาที่โรงพยาบาลในจังหวัดพระนครศรีอยุธยาในช่วงเกิดมหาอุทกภัย ปี 2554 ตั้งแต่ ตุลาคม2554 - ธันวาคม 2554 จำนวน 19, 443 คน คำนวณขนาดกลุ่มตัวอย่างได้ 278 คน จากนั้นสุ่มตัวอย่างด้วยวิธี Stratified random sampling เก็บข้อมูลด้วยแบบสัมภาษณ์ที่ผู้วิจัยพัฒนาขึ้น ปัจจัยที่ศึกษาแบ่งเป็นปัจจัยภายในและปัจจัยภายนอก วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา chi-square และวิเคราะห์ปัจจัยทำนายโดยการหาความถดถอยโลจิสติก (binary logistic regression analysis)

ผลการวิจัยพบว่าผู้ป่วยเบาหวานมีระดับน้ำตาลในเลือดเฉลี่ย 153.89 ± SD 48.66 เกิดภาวะแทรกซ้อนในช่วงเกิดวิกฤตมหาอุทกภัย 51 ราย (ร้อยละ18.65) เป็นภาวะน้ำตาลในเลือดสูง 26 ราย (ร้อยละ9.35) ภาวะน้ำตาลในเลือดต่ำ 25 ราย (ร้อยละ8.99) ปัจจัยที่สามารถพยากรณ์การเกิดภาวะแทรกซ้อนได้อย่างมีนัยสำคัญทางสถิติ คือ ความเครียดต่อสถานการณ์อุทกภัย ระดับน้ำตาลในเลือดหลังอดอาหาร (FBS level) และระดับไขมันที่มีความหนาแน่นต่ำในเลือด (LDL level) สมการพยากรณ์การเกิดภาวะแทรกซ้อน คือ w = 0.78 - 1.216 (ความเครียดต่อสถานการณ์อุทกภัย) + 0.01(ระดับน้ำตาลในเลือดหลังอดอาหาร) +0.021 (ระดับไขมันที่มีความหนาแน่นต่ำในเลือด) และ สมการการถดถอยโลจิสติกทำนายโอกาสของการเกิดภาวะแทรกซ้อนที่เหมาะสม คือ P (เกิดภาวะแทรกซ้อน) = $1/1+e^{-w}$

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CHAPTER I
INTRODUCTION

Background and significance of the study

In the past 10 years, the world has faced with many natural disasters such as earthquakes , tsunamis , storm, flood. And potentially more serious the country faced with many natural disasters, especially flooding, windstorms, landslides, and mud, which trend to increase, by the areas and people affected preparing for natural disasters therefore becomes a role of the combination of all sectors. The effectiveness of prevention and mitigation of natural disasters requires a good management system since natural disasters are a major catastrophe, covering a wide area and severely affecting the lives and property of people in the disaster zone, coping with the natural disasters should be coordinated and agencies are required to understand in detail the events, to get the resources needed for help. Getting help from various agencies can be decided to take action quickly to limit the impact of the disaster. Coordination can be done to reverse the organization in a timely manner.

The effects of disasters, both floods, wind storms and mudslides, are scarcity of clean drinking water, unhygienic toilets, garbage disposal , and animal pathogens are brought closer to the human community. These pose a risk for disease, causing outbreak in broadly intended victims, as well as people with chronic diseases such as diabetics, hypertension, renal disease, and heart disease. These people are truly at risk because patients with chronic diseases require continuous, treatment and need to be follow up closely. Routine medical administration is another important factors, the lack of these drugs is highly dangerous which mainly results from the lack of medical treatment or the loss of follow-up appointments during this time due to logistic problems. Especially with the elderly with underlying diseases, there is no one to take them to leave the house because most people evacuate, and the elderly mostly insists to stay at home. Some of them can stay with relatives in other provinces, but they still have limited access to health service.

Phra Nakhon Si Ayutthaya is the one of the provinces that is widely affected from the great flood of 2011 , both in the public and private sectors. Especially hospitals like Phra Nakhon Si Ayutthaya Hospital which has 522 beds, taking care of people throughout Phra Nakhon Si Ayutthaya Province and neighboring provinces that were severely affected by the flood. The statistics of the chronic diseases was found in Phra Nakhon Si Ayutthaya Province were: patients with diabetes in 2008 to 2010 were 7,849, 10,094, and 9,007 respectively. The flood would affect the daily lives of these people in many aspects. This study will reveal how during the flood chronic disease patients, especially diabetic patients, experienced complications. Chronic disease patient are mostly found within the elderly population, who have a limited ability to take care of themselves. Some of them need family members, to help them make medical appointments and for medical administration . Some elderly patients have to take care of themselves, maintain their own supply of medication, and meet with doctors on their own. These patients have at a high risks concerning their of health care since they may do so incorrectly. Especially in a flood situation ,issue about logistics , living in evacuation centers : a lack of security, stress from health problems ,and damaged properties , these factors lead to increase stress about medical treatment fees are one of these factors because during evacuation patients are forced to change health care centers to the nearest one which may lead to have to pay medical treatment fees. Moving to evacuation centers may also cause difficulty in monitoring treatment, and charged medical treatment fees. These are important factors for chronic disease medical care. Another problem for patients apart from uncontinuous medical administration or loss of medical appointments is taking care of themselves during the flood situation that has become more difficult than before the flood. Whether it is eating, resting, or exercise, these routines have changed. Eating is very important for patients with chronic diseases. Uncontrolled eating will directly affect the patient’s health such as the consumption of canned food will directly affect diabetic patients. Patients do not have many choices in dining which leads to difficulties in controlling the chronic diseases, even though drugs are taken regularly. In additions difficulties about exercise, resting in a unfamiliar place can cause the chronic diseases to worsen. In this study factors that have an effect on complications on diabetic flood victims.

This research is to study occurrence complications of diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province. The study populations are the patients who have Type II diabetes that registered at the hospital in Phra Nakhon Si Ayutthaya Province and stayed in Phra Nakhon Si Ayutthaya Province during the great flood 2011. The objective is to study factors related to the health outcomes of flood victims in order to help those with health problems in the future.

Research questions

1. What are the occurrence complications of diabetic patients of flood victims during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya province?.

2. Which factors affect the occurrence complications in diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province?.

3. Which factors affect the prediction of complication of diabetic patient during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province?.

Objective of the study

General objective

To study the factors affecting the occurrence complications among diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province

Specific objective

1. To describe the characteristics of the occurrence complications and the independence variables

2. To identify the relationships between the occurrence complications and the independence variables

3. To study of the predicting factors of the occurrence complication among diabetic patients.

Conceptual framework

The aim of this study is to identify the health impacts of disasters and the underlying factors that were associated with occurrence complications among diabetic patients during the great floods. A conceptual framework is developed that may assist with the development of a rational and comprehensive approach to prevention and management. This study involved an extensive literature review that located > 20 references, which were analyzed to identify common themes, findings, and expert views. The findings then were distilled into common themes. The health impacts of the great floods are wide ranging, and depend on a number of factors. However, the health impacts of a particular flood are specific to the particular context. The immediate health impacts of floods include acute complication in diabetic patients. The occurrence complications in diabetic patients during the great floods also are associated with the personal factor, internal factors and external factors. The researcher use criteria to select factors that association with acute complications among diabetic patients, using document of reference for data sources and giving the importance to variation related to complication during disaster and selected as the variation in this study From above reasons, the researcher categorizes and conclude factors effect to complication among diabetic patient into some aspects as the tables

Table 1.1 Factors effect complications in diabetic patients from review literature

ตารางวิเคราะห์ปัจจัยที่มีผลต่อภาวะแทรกซ้อนในผู้ป่วยเบาหวาน

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	รวม
การจัดการตนเอง	1	1	1	1															1		1					6
ความรู้	1		1										1	1										1		5
การออกกำลังกาย	1		1							1				1							1					5
อาหาร	1													1												2
ยา	1													1												2
ปัจจัยส่วนบุคคล			1															1								2
ปัจจัยด้านสังคม			1															1								2
ภาวะสุขภาพ			1																							1
เพศ			1	1	1			1																		4
อายุ			1					1										1							1	4
สถานภาพ				1																					1	2
ระดับการศึกษา			1	1	1			1												1						5
รายได้			1	1	1			1										1					1			6
อาชีพ																		1								1
สัญชาติ			1																							1
สิทธิ์การรักษา			1		1																	1				3
ระดับความรุนแรงของโรค			1	1	1	1																				4
ระยะเวลาการเป็นโรค				1					1		1															3
ภูมิลำเนา					1																					1
ลักษณะครอบครัว						1																				1
ความสามารถในการควบคุมโรค							1		1																	2
พันธุกรรม										1																1
โรคร่วม					1					1	1															3
ความดันโลหิต										1	1															2
ไขมันในเลือด										1	1															2
การสูบบุหรี่										1																1
ความอ้วน										1																1
ความร่วมมือระหว่างแพทย์กับเภสัชกร												1														1
ความเครียด													1				1									2
การควบคุมความเครียด	1													1												2
เรงจูงใจ															1		1						1			3
เรงสนับสนุนทางสังคม															1	1								1		3
พฤติกรรมเพื่อลดภาวะแทรกซ้อน															1		1									2
การมีส่วนร่วมของครอบครัว																1										1
การรับรู้ความรุนแรงของโรค																	1									1
การรับรู้ความสามารถในการดูแลตนเอง																	1									1
การรับรู้ประโยชน์ในการปฏิบัติตัว																	1						1			1
จิตสังคม																									1	1
การปรับตัว/การเผชิญปัญหา	1																								1	2

Table 1.2 Factors effect complications in diabetic patients in this study

Main factors	**Minor factors**		
Internal factors	Personal factors : - Gender (4) Age (4) Marital (2) Educational ,Income Treatment right	Health status (1) Severity of disease (4) duration of disease (3) Blood pressure (2) Serum lipid level (2) Emotional status/ Stress (2)	Behavior of taking care of themselves : - Exercises,(5) foods, behavior related to treatment plan , taking medication, ability to control of disease , behavior to reduce complication stress management.
	Self – management Attitude Awareness of severity of disease (1) Awareness of ability to taking care of themselves (2) Perceived benefits of patient behavior (1)	Motivation Adaptation/ Confronting the problem	Knowledge
External factors	Social factors (1) Social supporting (3)	Participation of family (1) Family characteristic	Participation between patient and cousins (1) Cooperation between doctor and pharmacist
	Severity of disaster	Physical environment	

After review literature found that there are some variables that are defined similarly. Therefore, the researcher selected only the variables that comprehensive of the component variables. Finally, it can be summarized a research conceptual framework as follows:

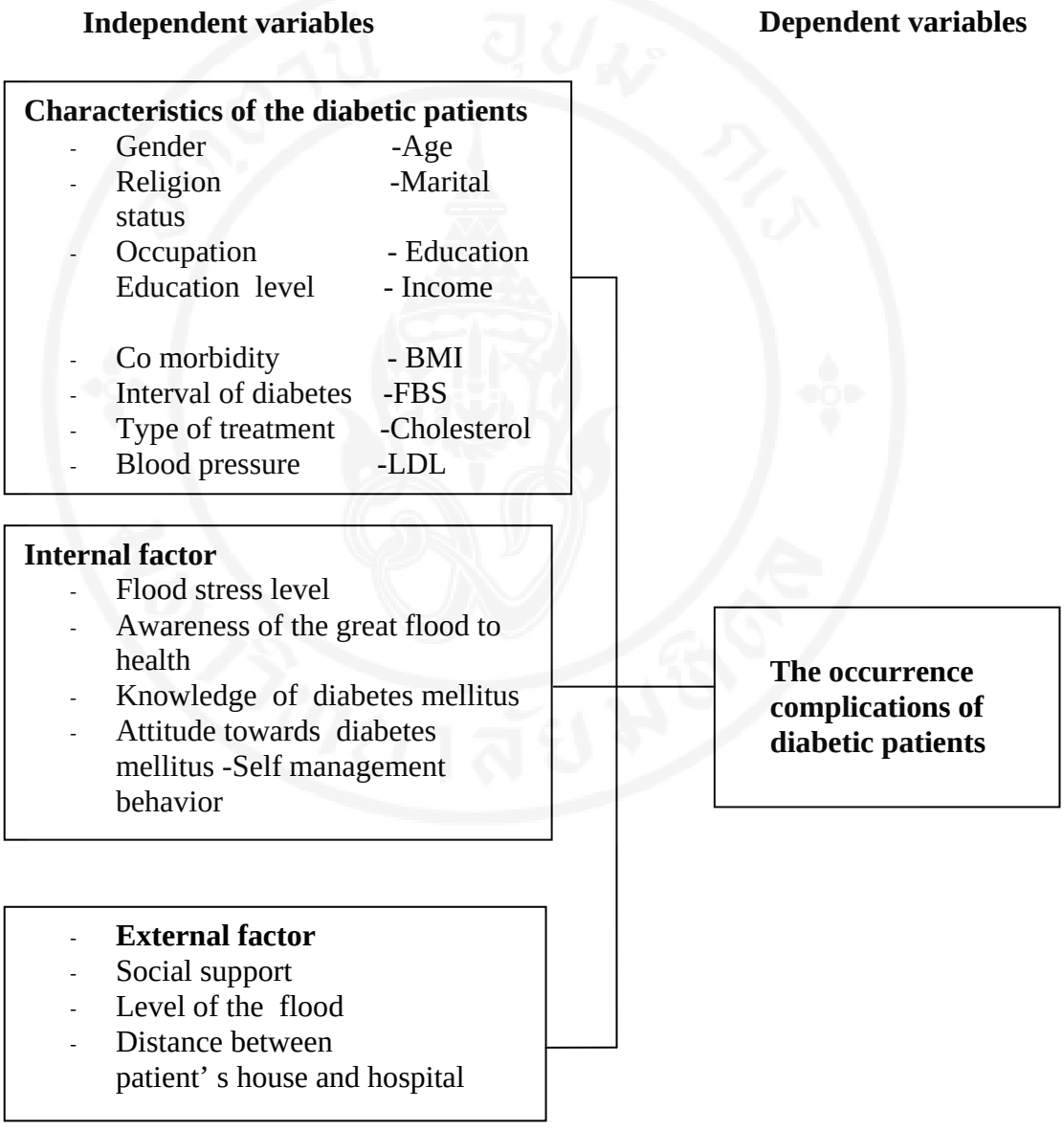

Figure 1.1 A conceptual framework that demonstrates the relationships between the factors and the occurrence complications in diabetic patients during the great flood. (personal factors, internal factors and external factors)

Definition of terms

1. Diabetic patients refers to patients who have been diagnosed by a physician as type 2 diabetes and registered in Phra Nakhon Si Ayutthaya Province.

2. Occurrence complications of diabetic patients refer to the acute complications of diabetes, including hyperglycemia and hypoglycemia.

3. Hyperglycemia refers to the acute complications of diabetes with blood glucose levels higher than 130 mg% or more. The results were tested by monitoring the glucose level by finger test or FBS of the laboratory.

4. Hypoglycemia refers to the acute complication of diabetes with blood glucose levels of less than 60 mg%, where the results are tested by monitoring the glucose level finger or FBS of the laboratory.

5. The great flood refers to the flood crisis in the year 2011 flooding in Phra Nakhon Si Ayutthaya Province from October, 2011 to December, 2011.

6. Factors refer to personal factors, internal factors and external factors. Personal factors mean factors within the patient's gender, age, religion, marital status, occupational, education level , monthly income, co morbidity, interval of diabetes, preferential treatment, health status that assessed by level of BMI, blood pressure, FBS, Cholesterol, LDL, Triglyceride and complication. Internal factors mean factors within the patient's flood stress level , awareness of the great flood to health , knowledge of diabetes mellitus, attitude towards diabetes mellitus and self-management behaviors. External factors are social support , physical environment that assess by the level of flood and the distance between patient’s house and hospital.

7. The perceived severity of flood conditions that affect health factor refer to the patient’s attitudes factor means disease control, drug administration, social and adaptation).The self-management behaviors factor means the behavior of diet control, behavior of exercise, behavior of health, behavior of drug administration, behavior of follow up of treatment, behavior of prevent complication and behavior of mental health and management of stress. The social support factor means the social support from family, social support from community and social support from health provider.

Research hypothesis

1. Health outcomes of diabetic patients tend to be worsened and may causes of the occurrence complications during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province.

2. Internal factors affect the occurrence complications in diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province.

3. External factors affect the occurrence complications in diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province.

CHAPTER II
LITERATURE REVIEW

This study focused on factors affecting the occurrence complications of diabetic patients during the great flood in the year 2011 Phra Nakhon Si Ayutthaya Province, which the researcher has studied and researched the various texts and related researches. This study was grouped into following topics.

1. Diabetes and diabetic complications
2. Factors affecting the occurrence complications of diabetic patients
3. Prevention of type 2 diabetes mellitus complications
4. Behavior self-management to prevent diabetes
5. The great flood in the year 2011 crisis in Phra Nakhon Si Ayutthaya
6. Concepts of health behavior
7. Related study

2.1 Diabetes and diabetic complication

From review of literatures, the meaning of diabetes is as follows;

Diabetes is a disease caused by insulin function disorder, resulting in abnormal carbohydrate metabolism, leading to high blood glucose level exceed the retaining capacity of kidneys. So blood glucose is filtered out through urine, known as “diabetes” Apart from abnormal carbohydrate metabolism , it also leading to protein and lipid metabolism disorder. Normally, the kidney is responsible for sugar storage, which not exceed 180 – 200 mg%, the excess is filtered from blood and excreted through urine. The result of long time high blood glucose, cause of glucose accumulated in body tissue. Leading to glucose congestion in the organ, causing of symptoms and complications both acute and chronic conditions. (Siritrugsri, 1995) Patient who has at least hour fasting blood glucose greater than or equal to 126 mg/dl, 2 times will be diagnosed Diabetes. (Tantayothai, & Songdi, 1995)

2.1.1 Type of diabetes

American Diabetes Association, 2002 and World Health Organization, 2002 Classified diabetic patients into 4 types, which each type has following signs and symptoms

2.1.1.1 Type 1 Diabetes Mellitus were approximately 5-10% of diabetic patients (American Diabetes Association , 2002) Greater in whites than Asians or Blacks. Also found in people under the age of 20, about 80% of this diabetic type patients (Tantayothai, & Songdi, 1995). Resulting from the body lack of insulin since the pancreas cannot produce insulin. Lacking of insulin, the body cannot take sugar into body tissue to metabolise for energy, leading to high blood glucose, resulting polyuria ,polydipsia and polyphagia. When the body was unable to metabolize sugar as energy, protein and fat will be catalysed as energy, which fat process will release ketone, acidic and toxic to the body, leading to unconsciousness from acid congestion in blood. The symptoms usually acute and severe. This condition can be avoided by daily insulin injection as prescribed and taking care of themselves strictly as instructions (Himatongkham, et.al,2000)

2.1.1.2 Type 2 Diabetes Mellitus, commonly found about 90-95% of entirely diabetic patients (Deck, et al. 2000; American Diabetes Association , 2002) in Thailand, about 4 – 6% of population (Sutthijamroon, 2001), mostly over 40 years of age, majority in women and the obese. There is also genetic contributing factor. The symptoms can range from asymptomatic but accidentally found or gradual onset to severe case. The pancreas can produce insulin in normal, more, or less than usual but insulin is not very active so it does not refer to a lack of insulin, the diabetic ketoacidosis will does not exist. In obese, insulin was less active, resulting obese is the majority of this type diabetes (Black,1993). Another risk factor of Type 2 Diabetes Mellitus was coronary heart disease before diagnosed this type diabetes.

2.1.1.3 Other specific types of diabetes, rarely found diabetic type, about 1-2% (American Diabetes Association, 2004) might be found with pancreatic disease, endocrine disease, diseases caused by chemicals and drugs, abnormal of insulin, and some genetic diseases.

2.1.1.4 Gestational Diabetes Mellitus : GDM, found during gestation, about 4% of pregnancy in America (American Diabetes Association, 2004)

In Thailand, found about 2.1% (Suthijamroon, 2001) after delivery the disease might be relieved or asymptomatic, but some case the disease will be persist. Resulting from hormonal change against insulin, causing high blood glucose, found in 20-24 gestational week, which can be harm the baby.

2.1.2 Causes of diabetes

Diabetes was resulting from two factors, which was genetic and non-genetic. (Siritrungsri, 1995)

2.1.2.1 Genetic factor, can cause type 1 and type 2 diabetes, the difference is as follows

2.1.2.1.1 Type 1 Diabetes associated with Human Leukocyte Antigen : HLA, mostly found in diabetic patients is HLA – D , indicates malfunction of immune system, which is genetic risk factor especially Type 1 Diabetes Mellitus. Patients with the mentioned above HLA tends to have pancreatic inflammation after some of viral infection, it will destroy beta cells, causing degeneration until cannot produce insulin.

2.1.2.1.2 Type 2 diabetes is not associate to HLA – D but related with obesity and increasing age.

2.1.2.2 Non – genetic causes

2.1.2.2.1 Obesity ; Obese people often have high blood insulin, but decreased insulin receptor in fat and muscle cells or abnormal of post receptor resulting in reduced insulin action, cells will have to produce more insulin, loading to cells, leading to pancreatic degeneration, finally cannot produce sufficient insulin, the result is diabetes. Losing weight will increase insulin receptors, insulin action, leading to normal condition.

2.1.2.2.2 Stress; Stress increase catecholamine hormone secretion, increasing blood glucose.

2.1.2.2.3 Viruses ; Mumps causing virus, Rubella, which causes German measles, and coxsackie B virus, might resulting in chronic pancreatic inflammation, and destroying beta cells until it cannot produce insulin.

2.1.2.2.4 Growth hormone Abnormality in Growth hormone production leading to increased metabolism of glycogen to glucose.

Corticosteroid will accelerate gluconeogenesis reaction from catecholamine protein, which causes increased glycogen breakdown to glucose.

2.1.2.2.5 Lacking of or less Beta cells; Result from Pancreatic surgery, alcoholic consumption, protein malnutrition, losing of calories, leading to pancreatitis and destroyed beta cells.

2.1.2.2.6 Liver diseases; Liver cannot store glucose in glycogen form, leading to high blood glucose.

2.1.2.2.7 Some medications such as contraceptives, diuretics, prednisolone will act against insulin action. Whenever discontinued these medications, insulin action will return to normal condition.

2.1.2.2.8 Lacking of exercises will decrease insulin rcceptors.

2.1.3 The symptoms of diabetes

There are four major symptoms as following (Tantayothai, & Songdi, 1995)

2.1.3.1 Lots of urine (Polyuria). When high blood glucose exceed the limit of kidney (normally about 180 mg%), the body will excrete glucose through urine, causing high urinc osmotic prcssure, ureter cannot suck water back into the body, so patients will have many and frequent urination.

2.1.3.2 Frequently drinking of water (Polydipsia) from body loss of water through urine, causing severe dehydration, thirsty , drinking large water amount frequently.

2.1.3.3 Weight loss, when cells cannot use glucose as energy, the body will catalyze reserved fat and protein instead, leading to loss of body tissue associated with dehydration, losing weight will be the result. It can also cause nitrogen imbalaned and ketosis condition.

2.1.3.4 Large amount of food intake (Polyphagia) from using of body tissue as energy, leading to malnutrition. To compensate this condition, the patients will have symptoms of appetite and food intake capacity.

2.1.4 The Diagnosis of Diabetes

The clinical diagnosis of Diabetes is blood glucose level, which the criteria for diagnosis of diabetes (American Diabetes Association, 2004) are as followings.

2.1.4.1 Blood glucose level after fasting for at least 8 hours (Fasting Blood glucose : FBS), from whole blood, is equal to or greater than 126 mg/dl, or from plasma, is higher than 140 mg/dl, 2 times on different date.

2.1.4.2 Blood glucose level at anytime (random blood glucose) , is equal to or greater than 200 mg/dl from whole blood, or glucose tolerant test found the 2^{nd} hour and somewhere between 0-2^{nd} hour blood glucose are equal to or greater than 200 mg/dl (National Diabetes Data Group, 1979)

In this study, Diabetes diagnosed by blood sampling for blood glucose level of patient with 8 hours fasting, if it was greater than 126 mg/dl, 2 times, the patient will be diagnosed Diabetes

2.1.5 Diabetic complications

Classified into 2 types: acute and chronic complications (Chantaraprasert , 1995)

2.1.5.1 Acute diabetic complications, there are three common types as following

2.1.5.1.1 Ketone acid congestion in blood condition (diabetic Ketoacidosis) is an active complication, mostly found with type I diabetes, this must be corrected as soon as possible to save the patients life. Diabetic ketoacidosis is the condition mostly found in type I diabetic patient, this condition need emergency treatment to save the patient's life. The condition which ketoacidosis means there is more ketone produced due to lipolysis, leading to acidic condition from catabolism due to lack of insulin or inadequate insulin. Now, behaved that because of 2 factors : lacking of insulin and increasing of stress hormone, which inhibit insulin action, Another one important factor contributes to ketosis condition is discontinued insulin injection in type - 1 diabetic patient and the condition that like body need more insulin due to physical and mental stress such as infection, injuries, operation and emotional stress. The symptoms of diabetic ketoacidosis are those from dehydrated condition from osmotic diuresis condition increased urine, thirsty, heavy

drinking, dry oral mucosa at early stage, dry lips, redness and decrease tinctures fatigue, weaken of limb, nausea and vomiting, abdominal pain due to electrolyte imbalance, if sever dehydration condition : decreased of blood pressure, hypovolemic shock, unconsciousness, and death. Respiratory symptoms are deep and rapid wheezing breath with smell of acetone (Pengjad, 1995) Treatment is insulin, and when relieved from crisis, the patent should be instructed about taking care of themselves properly.

2.1.5.1.2 Diabetic non ketotic coma, is acute complication mostly found in type 2 diabetic patient, which is major in women and elderly, 80% of patients are obesed, which have high blood insulin level with inhibited insulin action at target tissue : muscles, liver, fatty tissues due to decease insulin action of insulin receptors (Sherwin, & Felig, 1978). Therefore type 2 diabetic patients will have sufficient insulin, lipolysis will not occurs so doesn't have diabetic ketoacidesis condition, but it is insufficient insulin to burn carbohydrate, leading to why high blood glucose followed by unconsciousness from high level of glucose in blood circulation which is emergency condition and needed urgent correction. The unconscious condition due to high blood glucose is the symptoms of severe dehydration results from high blood glucose, leading to excrete glucose through urine, causing loss of water as well, the patient cannot drink water to catch up amount of water loss, leading to severe dehydration and nervous system disorders (Bhanbhakdi, 1995) Dehydration makes skin wrinkles, dry epithelium, sunken eye ball, fever, dizziness, abdominal distention and unconsciousness (Tantayothai, & Songdi, 1995) and also found that drowsiness and unconsciousness of patient related with unconsciousness from high blood glucose, might be causing from dehydrated brain cells. Treatment is intravenous fluid to catch up dehydration, small amount of insulin and potassium replacement, including correct factors that cause unconsciousness from high blood glucose (Bhanbhakdi, 1995)

2.1.5.1.3 Hypoglycemia is the condition that blood glucose below 60 mg% (Bhanbhakdi, 1995) associated with low blood glucose symptoms, which can be relived with glucose replacement (Sridama, 1996), causing from insulin overdose, malnutrition or less of food intake or overexercise without food replacement. If this condition was left persist and frequently, it will be resulted brain

damaged. When low blood glucose level, the body will response by increased several hormonal secretion and deceased insulin secretion leading to symptoms from sympathetic nervous system stimulation including palpitation, sweating, tremor, hungry, irritability, numbness around mouth, limb ending, fatique and fainting might be found headache emotional change unconsciousness, and seizure (Sridama, 1996) Treatment is glucose replacement, if the patient was with low blood glucose but still conscious, give syrup or candy, if the patient was unconscious, give 50% glucose 20-50 ml. slowly . Intra venous injections when the patient was awaked, drinking of syrup fruit juice or carbohydrate food intake such as biscuit, cookies to increase and persist of blood glucose level (Bhanbhakdi, 1995)

2.1.5.2 Chronic complications, occurred gradually and almost all of body systems, associated with duration and controlled condition of disease, if the disease was persisted for a long time or poor controlled condition, it will causes those complication (Tautayothai, & Sounded, 1995). Major of chronic complications including.

2.1.5.2.1 Changes of arteries in diabetic patients were important and effect all of body system, changes of arterioles called degeneration of arterioles in nephron and retina were caused by lack of tissue oxygen. From the study of blood oxygen transportation in diabetic found that there was increased HbA1C which was strongly binded with oxygen than normal condition, makes oxygen releasing from red blood cell harder than normal leading to body tissue lack of oxygen and changes of artery, in early stage there was enlargement of arteriole and increased of blood supply, to compensate the lacking of tissue oxygen condition, called autoregulation. From those changes of blood vessels, makes diabetic patients suffer with hypertension, myocardial infarction, paralysis from strokes, changes of blood vessels of limbs makes cramps in severe cases, then was changes in lacking of blood supply area such as in necrosis (Tantananta, & Inthrumpan, 1989).

2.1.5.2.2 Nervous system : Diabetes makes various disorder in function of nervous system, commonly found was degeneration of peripheral nervous system, which was more than one, clinically found decreased of conduction rate, leading to loss of sensation. If persists, muscle weakness will be the result. Abnormal of nerve function was related with diabetic control condition, Porte et

al. 1981 study found that patient with hyphen's ceria and HbA1C will have decreased of nerve conduction signal, the patient will have numbness, early at the end of feet up to both of legs .In the patient with nerve inflammation, will have burning sensation needlestick sensation, or cramps, which commonly found at night and insensitive to hot or cold exposure.

2.1.5.2.3 Pathological of eyes: Degeneration of eyes from diabetes is cause of blindness in patient with diabetes for over 30 years (Angsusingha, 1990), results from changes of arterioles in retina from lacking of oxygen, this problem is often found in conjunction with degeneration of nephrons. From the study, diabetic patients with uremia will have degeneration of retina for 97% (Friedman,

& Esperance,1980). Normally degeneration of retina form diabetes was bilaterally. Apart from degeneration of retina, patients with poorly controlled of blood glucose mostly found visual changes, myopia from increased of glucose in lens, relieved by decreased of blood glucose (Tantayothai, Songdi, 1995). In US, diabetic patients tend to be blindness 25 times of normal (Duisburg, et al., 1978)

2.1.5.2.4 Kidneys and urinary system: Degeneration of diabetes is caused of nephritis (Deckert, et al. 1981) dignosed with protein leakage in urine all the time, greater than 5 g in 24 hours, 4 times continuously, at least 1 month interval each time. Changes in circulation of arterioles were leading to pathology of renal pelvis, this mall be progress faster with poorly controlled diabetes, and if persists, it will increase pathological condition. About renal function in early stage, filtration rate of renal pelvis was 20-40% higher than normal condition increasing with poorly controlled disease, and protein leakage in urine, but might not be found in laboratory investigation. Alter protein leakage in urine, filtration rate will be decreased to 4 ml./min/mouth high blood creatinine, and finally renal failure (Friedman & Esperana,1980; Maurer, & Brom, 1981). At end stage of renal failure there was to congestion leading to unconsciousness, mostly found in over 10 year type 2 diabetic patients, might be occurred in short term if poorly controlled disease (Tantananta, 1989)

In addition to nephron degeneration, diabetic patients also have urinary tract infection because urine easily and because of sugared

urine makes bacteria growing well, bacteria entering bladder, leading to cystitis, if left untreated or inadequate treatment, bacteria will involve to ureter , into nephron , making inflammation of kidney and pelvis.

2.1.5.2.5 Blood Circulating system : In poor controlled diabetic condition, high blood glucose or congested ketone in blood, there were several of abnormal blood circulating system such as shorted life of red blood cells, easily aggregated of platelets, this abnormal of platelet might leading to aggravate the degeneration of vessels , moreover polymorphonuclear white blood cells will be poorly acted against pathogens by reduced the ability of movement of white blood cells to the infected area and the ability of adherence of white blood cells to the infected surface , and also the ability of phagocytosis . Lymphocyte , which destroy foreign bodies, both in blood stream and associated with alls , also degenerated , making impairment of immune system, leading to infections such as tuberculosis , fungal infection (Jones, & Peterson ,1981), especially vaginal inflammation due to infections , mostly found in poor controlled diabetic female skin inflammation with rapidly spread , finauy found necrosis , most common at feet.

Diabetes is caused from pancreas cannot produce sufficient insulin , or cannot produce insulin at all, or insulin cannot function as well , risk factors might be genetics or not, it might be from obesity , elderly , injury of pancreas , some medication during pregnancy , or some viral infections , especially type 2 diabetes which is unknown risk factors , both internal and external factors , especially two characters of this type of diabetes insulin resistance and impairment of insulin secretion, which makes the patients have high blood glucose , in Thailand found type 2 diabetes up to 90% (Himatongkham, et.al,2000). So in this study focused on type 2 diabetic patients)

2.1.6 Principles of diabetic treatment

2.1.6.1 Diabetes is a chronic disease that cannot be cured, so the important principles of treatment including.

2.1.6.1.1 Diet controlled

2.1.6.1.2 Exercises

2.1.6.1.3 Health education about diabetes to relatives and the relevants

2.1.6.1.4 Antihyperglycemic durgs or Insulin

2.1.6.1.5 Health service provider

2.1.6.2 Purposes of treatment

2.1.6.2.1 Relief symptoms from hyperglycemic condition

2.1.6.2.2 Preventing acute complications

2.1.6.2.3 Promoting normal growth, especially in children

2.1.6.2.4 Promoting the quality of life, happiness, long life

To achieve the treatment goals, biochemical changes, about lack of insulin or insulin resistance, must be controlled to normal condition, avoiding of risk factors that stimulate complication. Treatment of diabetic individuals should be aimed to which level controlled according to age and condition of the patients

2.1.7 Diabetic controlled

Diabetic controlled refers to metabolic disorder correction back to normal condition and free from complications, so the patients recover from the symptoms and live a normal life. The goal of diabetic controlled is lowering blood glucose to near or normal range (Rattasarn, 1997). To assess the control of diabetes, can be evaluated from (Sarinnapakorn, in Sridama, 1998)

2.1.7.1 History: Symptoms of low or high blood glucose, frequently thirst, urinate, weight loss might be indicated hyperglycemic condition If there are symptoms of appetite, palpitation, sweating, dizziness might be indicated hyperglycemic condition. History of past diabetic treatment, past medical treatment / illness, or some of medications that might affect diabetic controlled.

2.1.7.2 Physical examination: body weight and body mass index

2.1.7.2.1 Body weight indicates nutritional status, patients should be weighted and recorded regularly, if possible it should be done at the same time. The interpretation of body weight will be related to height, body structure, and age (Bergstrom, 1988). All of diabetic patients should have body weight in normal range. But type 2 diabetic patents are mostly overweight, which is the supporting factor that cause insulin resistance, make it difficult to control of blood glucose into normal range, because of overweight patients need large amount of insulin to catabolise food intake (Prando, et al. 1998). Patients with low body weight indicates lack of essential nutrients, protein, which might be related to poored diabetic controlled, moreover, everytime monitoring of patents body weight will be indicated behavior and diabetic controlled.

2.1.7.2.2 Body mass index (BMI) , is the assessment of body weight in 20 years of age and above individuals, because of BMI is related to quantity of body fat and indicates health hazards, can be calculated from body weight (kg) divided by Height (m) in squared (BMI = Body weight (kg) / Height (m^2) , normal range is 20-24.9 kg/m^2

2.1.7.2.3 Laboratory investigations, refers to the examination that indicates level of glucose controlled at anytime, long term, and other metabolic examination that might be related to diabetic complications which will be altered in case of poor diabetic controlled such as alteration of lipid level.

In this study, using the criteria of blood glucose controlled of diabetic patients as a criteria of diabetic controlled (Endocrine society of Thailand, 2003; WHO,2002) Categories of blood glucose controlled are as following

1) Blood glucose level before breakfast time 80-120 mg/dl is indicated well controlled diabetes.

2) Blood glucose level before breakfast time 121-140 mg/dl is indicated fairly controlled diabetes.

3) Blood glucose lever before breakfast time higher than 140 mg/dl is indicated poorly controlled, must be corrected

For this study, there are two levels of blood glucose controlled. If blood glucose was between 80-140 mg/dl, it will be assumed

controlled blood glucose, and if blood glucose was higher than 140 mg/dl it will be assumed uncontrolled blood glucose.

Body Mass Index (BMI) indicated the patient body weight by Thai's criteria of wannee Nirthiyanat (1980), which has three levels as following

1. BMI 18.50-22.9 kg/m^2 indicated well body weight controlled

2. BMI 23.0 – 24.9 kg/m^2 indicated fairly body weight controlled

3. BMI higher than 25.0 or lower than 18.5 kg/m^2 , indicated poorly body weight controlled

For this research, will be classified BMI criteria into three levels: BMI between 18.50-22.9 kg/m^2 kg/m^2 indicated well body weight controlled and BMI higher than 25 or lower than 18.5 kg/m^2 indicated poorly body weight controlled

Although Diabetes cannot be absolutely relieved but can be treated and controlled to normal condition, the patients should be accepted that Diabetes will be last forever and find the way to live with it happily by well disease controlled, refers to blood glucose controlled near or normal range and appropriate adaptation, the patients will have good quality of life and mental health (Boonsiti, 1981) Important factors that effect the controlling of diabetes will be both intrinsic and extrinsic factors that related to blood glucose controlled in diabetic patients.

2.2 Factors affecting the occurrence complications in diabetic patients.

Review of the literature on the factors affecting the occurrence complications in diabetic patients.

2.2.1 Age.

Glucose tolerance decreases with age. When used intravenously Tony Le France test conventional standards (GTT) to find that more than half of those aged 70

years and above will have the normal 1-2 hours Andres and Tobin (Tobin, & Reynold , 1986) states that at the age of over 50 years, it is found that the plasma glucose at 1 or 2 hours will be increased from 6 to 12 mg % of 10-year-old will be tested. Glucose tolerance by feeding or intravenous glucose injection. But it is not clear that the effect of age on glucose tolerance of this as a result of the aging-only or not.

2.2.2 Weight

Weight is a key to diabetes control situations. Those who are overweight. Will require a lot of insulin. Metabolism to nutrient intake.

They also found that these individuals have insulin Mary Shep's. In various tissues and less of action of insulin in glucose metabolism movement La ¼. The cells are abnormal with. Weight loss in patients with diabetes who are overweight. Makes it easy to control the disease and better. However, if the patient has diabetes, weight gain. Control situations, it's even worse. And if the weight is not too bad. Because the risk of health deterioration easy. Appropriate weight. Should not be greater than or less than the standard 10 percent (Tantayothai,& Songdi, 1995).

2.2.3 The duration of Diabetes.

Complications associated with the disease duration. The disease is controlled circumstances. The long duration of the disease. Circumstances and whether or not the disease can not control blood glucose levels to normal or near-normal levels. Even more complications arise. On the other hand, if you have been diagnosed with diabetes shortly, and able to control it better. Will have little or complications occur complications exists, it will be a better (Tantayothai, & Songdi, 1995).

On the other hand, although longer duration of diabetes. However, if the patient can be treated in the control of diabetes. It will have the effect of reducing the level of blood glucose and delay the occurrence complications with diabetic patient.

2.2.4 The practice of diabetic patients, in the diet, exercise, and medication.

2.2.4.1 Diet.

Diet is important, and necessary for the treatment of diabetes. Eating nutritious foods in the right proportions. It allows patients to control glucose levels and lipid levels in the blood. The patient should be induced to see the importance, and to cooperate in the diet, although not a cure for diabetes already. The aim of the diet is to keep blood glucose levels as close to normal levels, prevention of hypercholesterolemia, and weight in a satisfactory manner. Delay the occurrence of various complications of diabetic patients receive adequate nutrients as their body needs, and encourage the patient to the right eating habits, appropriate to the disease

2.2.4.1.1 Principles of the diabetic diet. Will be considered (Tantayothai, & Songdi, 1995).

1. Energy.

1.1 Power requirements of diabetic patients. Depending on the size of the body. Individual events, such as age, body size, or weight of the patient, is important in determining the energy of the patient, which necessary to note that the patient's body weight in lean or obese, which is determined by calculating the body mass index. For energy use in the activities of the individual. To calculate the amount of energy that should have been, should be calculated from the weight of the patient and type of activity such as heavy, medium, light, if the patient weight more than normal and labor used in the work or exercise less, patients should lose weight. Energy was set to 20 KB each day calories per 1 kg of body weight per day. In terms of age, diabetes in childhood, need to get enough energy to grow., activities related to insulin and caloric intake must be adequate. Otherwise, your body will not grow as expected.

1.2 The amount of energy that people with diabetes should be under adult nutritional status. BMI is used as a basis for determining nutritional status. The energy used to perform each activity levels. (Yambrisute, & Tantisirine, 1993).

Table 2.1 Amount of energy of diabetic patient should be given by health nutritionist.

Nutrition condition	**Nutrition activities per energy (Kcal/ Kg/ day)**		
	Less Working	**Normal working**	**Hard working**
Less than Normal	35	40	45-50
Normal Weight	30	35	40
Weight more than the normal	15-20	30	35

2.Types and quantities of each food type. (Vitchayarurat, 1994).

2.1 Carbohydrates

People should get carbohydrates about 50-60 percent of the total energy in each day. Approximately 40-50 percent of energy derived from carbohydrates unsweetened form, including rice, unsweetened corn bread, potato vermicelli noodles. About 10-15 percent of energy derived from carbohydrates sweet form. Types of carbohydrates, such as sweet fruits, milk, a natural sugar. Therefore, it should be limited to the amount received. Carbohydrates sweet form will increase of levels of insulin and blood glucose more than carbohydrates unsweetened.

2.2 Fat and cholesterol

A lot of patients with diabetes have abnormalities of lipid metabolism. It will cause of hypercholesterolemia and increased risk of ischemic heart disease. Diabetic patients should be receive fat no more than 30 percent of the energy. And should be 10 percent saturated fats (Saturated fatty acid) and 20 percent polyunsaturated fat (Unsaturated fatty acid) . The diet should have less than 300 mg of cholesterol per day.

2.3 Protein

Protein is an essential nutrient in the growth and repair of body cells. Patients with diabetes should be receiving protein 15-20 percent of the energy. Protein should come from lean meats, eggs, milk, tofu, nuts, seeds, dried beans, such as green beans and red beans.

2.4 Vitamins and minerals

Diabetic patients need to receive adequate vitamins and minerals to help their health. Patient would be receive all of 5 food groups in adequate amounts every day. Diabetic patients to eat normally will not lack the essential vitamins and minerals. For patients who are overweight and have limited energy foods with less than 1000 calories per day, found that they are lacking of vitamins and minerals. So they should have been added vitamins and minerals.

2.5 Fiber

Dietary fiber is a carbohydrate (or a polysaccharide) that is incompletely absorbed in humans and in some animals. Like all carbohydrates, when it is metabolized it can produce four calories (kilocalories) of energy per gram. However, in most circumstances it accounts for less than that because of its limited absorption and digestibility. Dietary fiber consists mainly of cellulose, a large carbohydrate polymer that is indigestible because humans do not have the required enzymes to disassemble it. There are two subcategories: soluble and insoluble fiber. Whole grains, fruits (especially plums, prunes, and figs), and vegetables are good sources of dietary fiber. There are many health benefits of a high-fiber diet. Dietary fiber helps reduce the chance of gastrointestinal problems

2.4.1.2 The diet of patients with type 2 diabetes are as follows (American Diabetes Association, 2011)

Maintaining a healthy diet is important for everyone, but it is especially important for people with diabetes. Type 2 diabetes diet and following the right meal plan can make all the difference to a person struggling to keep their blood glucose under control. But what is the right meal plan? How much of which food group should you eat?

Carbohydrates and Fiber in a Type 2 Diabetes Diet

Carbohydrates are one of the major food categories (the others include proteins and fats) in a type 2 diabetes diet. They provide fuel for the body in the form of glucose. Glucose is a sugar that is the primary source of energy for all of the body's cells.

There are two ways to classify carbohydrates: simple and complex. Simple carbohydrates are sugars, like glucose, sucrose, lactose, and fructose.

They are found in refined sugar and in fruits. Complex carbohydrates are the starches, which are the simple sugars bonded together chemically. They are found in beans, nuts, vegetables, and whole grains. Complex carbohydrates are considered healthier mostly because they are digested by the body slowly, providing a steady source of energy. They also contain valuable amounts of fiber.

Carbohydrates, rather than fats or proteins, have the most immediate effect on your blood glucose since carbohydrates are broken down directly into sugar early during digestion.

Carbohydrates are mainly found in the following food groups:

- Fruit
- Milk and yogurt
- Bread, cereal, rice, pasta
- Starchy vegetables like potatoes, corn, and beans

Carbohydrate counting is a method of meal planning that is a simple way to keep track of the amount of total carbohydrates you eat each day. It helps allow you to eat what you want. Counting grams of carbohydrate and evenly distributing them at meals will help you control your blood glucose.

Instead of following an exchange list, with carbohydrate counting you monitor how much carbohydrates (sugar and starch) you eat daily. One carbohydrate serving is equal to 15 grams of carbohydrates.

With carbohydrate counting, you plan your carbohydrate intake based on what your pre-meal sugar is and your intake or insulin dose can be adjusted. Carbohydrate counting can be used by anyone and not just by people with diabetes that are taking insulin. If you eat more carbohydrates than your insulin supply can handle, your blood glucose level goes up. If you eat too little, your blood glucose level may fall too low. These fluctuations can be managed by knowing how to count your carbohydrate intake.

A registered dietitian will help you figure out a carbohydrate counting plan that meets your specific needs. For adults, a typical plan generally includes three to four carbohydrates at each meal, and one to two carbohydrate servings as snacks.

With carbohydrate counting, you can pick almost any food product off the shelf, read the label, and use the information about grams of carbohydrates to fit the food into your type 2 diabetes meal plan.

2.2.4.2. Exercise

Exercise is useful for the development of physical and mental health and is a key component in the treatment of diabetes in both of type1 diabetes and type2 diabetes . For type2 diabetes who controlled only on diet. Normally, insulin is released from the pancreas when the amount of glucose in the blood increases, such as after eating. Insulin stimulates the liver and muscles to take in excess glucose. This results in a lowering of the blood glucose level.

When exercising, the body needs extra energy or fuel (in the form of glucose) for the exercising muscles. For short bursts of exercise, such as a quick sprint to catch the bus, the muscles and the liver can release stores of glucose for fuel. With continued moderate exercising, however, your muscles take up glucose at almost 20 times the normal rate. This helps lowers blood glucose levels. At the same time insulin levels may drop in anyone not taking insulin so the risks of hypoglycemia or low blood glucose is minimized.

But intense exercise can have the opposite effect and actually temporarily increase your blood glucose levels right after you stop exercising. This is especially true for many people with diabetes. The body recognizes intense exercise as a stress and releases stress hormones that tell your body to increase available blood glucose to fuel your muscles.

2.2.4.2.1 The benefits of exercise are as follows: (Banchern, 1992; Siritrungsri, 1996).

Exercise helps control type 2 diabetes by:

- Improving your body's use of insulin
- Burning excess body fat, helping to decrease and control weight (decreased body fat results in improved insulin sensitivity)
- Improving muscle strengthening
- Increasing bone density and strengthening
- Lowering blood pressure

- Helping to protect against heart and blood vessel disease by lowering LDL cholesterol

- Improving blood circulation and reducing your risk of heart disease

- Increasing energy level and enhancing work capacity

- Reducing stress, promoting relaxation, and releasing tension and anxiety

2.2.4.3 Medication Therapy

A third group of drugs is oral drugs, insulin and GLP-1 analog. In type 1 diabetes use only insulin. In type 2 diabetes may begin with the behavior changes in diet and exercise first. If glycemic control is not the goal, then began the drug. The medication therapy such as, oral hypoglycemic drugs , insulin and. GLP-1 Analog. Choosing treatment for individual patients.

1) Oral hypoglycemic Drugs

Oral hypoglycemic drugs received approval from the Food and Drug Administration divided into three groups, including the mechanism of action.

1. Groups to stimulate insulin secretion from the pancreas (insulin secretagogue), including. (sulfonylurea) and (non-sulfonylurea or glinide) and drugs that inhibit the glucagon like polypeptide-1 (GLP-1), including drug DPP-4 inhibitor (or gliptin).

2. Groups decreas insulin resistance is a biguanide and a thiazolidinedione or glitazone.

3. Groups that inhibit the enzyme alpha - glucosidase. (alpha-glucosidase inhibitor) on the mucosa decrease glucose absorption the intestinal.

2) Insulin

Insulin synthesized by genetic engineering process structures as well as (human insulin) This adaptation is called insulin analog is divided into four types according to the duration of insulin action.

1. (Short acting or regular human insulin, RI).

2. (Intermediate acting insulin, NPH).

3. (Rapid acting insulin analog, RAA), a new generation of insulin and amino-acid modification of the Human Insulin.

4. A long-acting insulin analog is a new version of the modified insulin, amino acids of the Human Insulin.

There is a premixed insulin to facilitate the use of insulin, that short acting mixed with intermediate acting insulin. And fast-acting insulin analog, mixed with intermediate insulin analog. Limitations of mixed insulin is not adjust doses of insulin because the proportion of the amount of injected insulin are fixed. Availability insulin concentration of 100 units per ml, In general used insulin is RI, and Human Insulin.

3.GLP-1 Analog.

A synthetic insulin that mimics the action of GLP-1 to make it longer duration. These drugs act by stimulating insulin secretion and inhibiting the secretion of glucagon Then decrease function of stomach. And decreases appetite by acting on the appetite center of the hypothalamus. Drugs in this group is eventide.

The usage of diabetic drugs

1. Patients with type 2 diabetes begin with lifestyle behavior modification prior to or simultaneously with the drug. Patients with type 1 diabetes to start insulin injections along with knowledge about diabetes should be emphasized that the behavior that is appropriate for all patients in all stages of the treatment.

2. Their initial treatment depends.

2.1 Blood glucose level.

2.2 The symptoms or severity of disease.

2.3 The patient's physical condition, such as obesity. The liver and kidney functions.

3. Duration of the treatment. At the beginning of the treatment should be monitored every 1-4 weeks until the target blood glucose monitoring every 2-6 months or every three months.

4. Patients with type 2 diabetes initiating treatment. If the patient has a deficiency of insulin to begin with sulfonylurea or metformin.

5. If the treatment not achieved goal, Add the combination therapy than the original drug. May consider adding a second drug as the first drug to have reached its maximum size.

6. Insulin in patients with type 2 diabetes may be associated with basal insulin treatment or in combination with insulin before each meal.

2.3 Prevention of type 2 diabetes mellitus complications

For people who have not experienced complications, the possibility of developing them is a relevant point of discussion in counseling. Clients should be educated about potential complications and helped to develop realistic ways of coping with this possibility. Many people mistakenly fear that complications are inevitable; therefore, counselors should emphasize that while glucose control is fundamental, prevention does not require blood glucoses to be "perfect." It should also be noted that some people appear to be genetically protected from complications regardless of their success in controlling their diabetes.

For instance, only 40% of people with diabetes are prone to nephropathy, and diabetic complications affect individuals of different ethnic and racial groups unequally. There is currently no way to predict who is prone to complications, but if people do not have a complication after 15 to 20 years of having diabetes they are unlikely to develop it. Ways of preventing complications are low protein intake and carbohydrate intake European guidelines advise protein intake at the low end of the range (about 0.8 g/kg body weight) for diabetic patients with evidence of nephropathy, with a minimum daily intake of 0.6 g/kg body weight because of risk for malnutrition at lower levels.

Central to preventing these complications is not only good glucose control, which depends on day to day and even hour to hour self care, but also behaviors such as frequent glucose self-monitoring, regular exercise, and eating healthfully. This self-care regimen does not come easily to most people.

Family based behavioral procedures such as goal-setting, self-monitoring, positive reinforcement, behavioral contracts, supportive parental communications, and appropriately shared responsibility for diabetes management have improved regimen

adherence and glycemic control. In addition to self-monitoring, average blood glucose level is monitored by the health care team with a glycosylated hemoglobin test (HbAlC; reported as a percentage), which indicates the average glucose level over the previous three months.

Self management and coping strategies: Home management of diabetes seems the most important part of diabetes management, diabetic patients without serious complications spend more time at home rather than hospital. This calls for essential diabetes education that can be useful at home. Diabetes educators implementing self-management programs must assess levels of health literacy for their target population. This assessment will enable them to develop strategies for communicating more effectively with patients. However, goals are usually considered more specific and change more frequently than values, which also applies to those related to self-regulation behavior concerning exercise and diet. The diabetes is the only disease in which an individual or other family member is taught how to regulate a medication, sometimes on a dose to dose basis. Education and supportive guidance is necessary and recognition of a person's capability to do this is an important consideration. Below are the home management measures.

a) For patients who are on insulin, insulin should be made available by the health care officers. Insulin administration may include a pen choice devices with various length needles, sizes of the needles or syringe are pre-determined by the healthcare officers. Other supplies expected with insulin are alcohol swap, continuous glucose monitoring machine and strips. How to use glucose monitor and appropriate strips must be known by the patients or people around him or her and strips must be kept fresh and clean.

b) Taking of medication at the right time, most of the time it is advisable to decrease or avoid the previous medications. During sudden health crises, higher doses may be needed immediately but the maximum one can use must have been instructed by the healthcare officer.

Alarm clock can be used to remind the client of the time to take the medication or people living with him or her can remind him.

c) Regular measuring of blood pressure is advisable. Blood pressure machine can be purchased or one can be visiting the health centers and the readings

are taken down on a regular basis. Normal blood pressure is 120/80 mmHg or slightly lower.

In case of continuous sleep apnea, inability to sleep properly at night, one is encouraged to report to the healthcare officers because lack of sleep at night can trigger hypoglycemic episodes

e) Blood and urine should be monitored at all time. A meter for this may be purchased or acquired from the hospitals. Ketone test strips for testing are available in a bottle or in individually foil-wrapped units. Results of these tests help in controlling the amount of insulin needed or the amount needed to be administered.

f) Sudden illness at home may occur, ordinarily, if glucose level is controlled illness should be minimal. Vomiting and diarrhea are normally accompanied lowered blood glucose level. Fluid increase is the first line of action but if it is nausea and vomiting, teaspoon of small amount of sugar containing fluid should be taken. If the nausea is off, then soft food, cracker and soups can be taken.

g) Food, hygiene and adequate exercises play an important role in managing diabetes, According to the research carried out by five components of lifestyle intervention good to be observed

- Weight reduction of ≥ 5%
- Reduction of dietary fat to ≤ 30% of calorie intake
- Reduction of saturated fat to ≤ 10% of calorie intake
- Increased intake of dietary fiber
- Moderate-intensity exercise for ≥ 30 minutes per day.

h) In case of hypoglycemic crises or low sugar, having a glucagon kits at home, school or work place is a must. Other treatments for hypoglycemic must also be available whether in a tablet, gel or juice form.

i) Hyperglycemia is the opposite of hypoglycemia. This is when the fasting blood glucose is persistently increasing even when on adequate doses or insulin. This define hyperglycemia as a result from improper insulin administration or it might be due to therapeutic or pharmacokinetic action.

2.4 Behavior self-management to prevent diabetes

2.4.1. A definition of health behavior.

Health is defined as an expression of a person's knowledge and understanding of the nature of the emotions. Likely values, and act or not act in relation to health. Or affect their health.

2.4.2. Behavior self-management of diabetes.

In this study, the researcher reviewed the literature relevant to what people with diabetes to manage their own health are as follows:

- Diet
- Exercise
- Health care body

- General health care.

- Specialized health care such as self-care on wound care, eye care, dental health care, skin care and foot care.

- Mental health care and stress management
- Medical administration
- Maintain continuity
- Prevent complications

2.5 The great flood in the year 2011 crisis in Phra Nakhon Si Ayutthaya

Phra Nakhon Si Ayutthaya Province located in the central region of Thailand with an area of approximately 2,556 square kilometres, is located in the flat river plain of the Chao Phraya river valley. The presence of the Lop Buri and Pa Sak rivers makes the province a major rice farming area. The province is subdivided into sixteen districts (*amphoe*), 209 sub-districts (*tambon*), 1445 villages (*muban*) ,and 793,509 populations.

From August 1st, 2011 Phra Nakhon Si Ayutthaya Province influenced by the mass of water from the three main rivers; Chao Phraya river , Lop Buri river and Pa Sak river. Provinces were declared disaster areas in 16 districts have been affected

by the 1378 houses, 16 districts ,194 sub district , 271,718 households, and 798,830 populations.

Impact in health sector

Since a lot of number of populations have affected from flood. The immediate health impacts of floods include animal bites , injuries, conjunctivitis, diarrhea , drowning, hypothermia, and. Health risks also are associated with the evacuation of patients, loss of health workers, and loss of health infrastructure including essential drugs and supplies. In Phra Nakhon Si Ayutthaya , some hospital have affected from flood during that period . There are two hospitals that could not provide health care services ; Phra Nakhon Si Ayutthaya hospital and Bang Pahan hospital. So that two hospitals were closed and the evacuation of the patient to other hospitals. The hospital that was flooded in some parts of the hospital, but that hospital still open were Ban Phraek Hospital, MahaRat hospital, Utai hospital . In November 2011 , 16 hospitals is open service in both of out- patient department and in-patient department.

During the flood Phra Nakhon Si Ayutthaya province was opened the contingency hospital about 9 contingency hospital. Health personals set up the medical mobile unit to services patient during the flood crisis. In addition, the mental health team has moved to the screening, treatment , rehabilitation including counseling and follow-up patients for victims.

The evacuation center

The evacuation center for immigrants to the support of the immigrants included 11,100 people, with space for a large immigrants example.

1. Buildings across government office supporting up to 3,700 people.

2. Bou Pong housing supporting accommodate for 1,000 people.

3. *Mahachulalongkorn rajavidyalai* university supporting accommodate for 2,000 people.

4. Bangsai Arts and Crafts Center supporting accommodate for 1,900 people

2.6 Concepts of health behavior.

The concept is to develop healthy habits is the key concept of Precede-Proceed model which develop by Green , et al (1999), which are summarized below;

The Precede-Proceed model is a framework that helps health program planners, policy makers, and evaluators analyze the situation and design a health program efficiently. This planning model was initiated as a cost-benefit evaluation framework by Dr. Lawrence W. Green. It provides a comprehensive structure for assessing health and quality of life needs and for designing, implementing, and evaluating health promotion and other public health programs to meet those needs. One purpose and guiding principle of the Precede-Proceed model is to direct initial attention to outcomes rather than inputs. It guides planners through a process that starts with desired outcomes and works backwards in the causal chain to identify a mix of strategies for achieving objectives. The most fundamental assumption of the model is the active participation of its intended audience that is, the participants will take an active part in defining their own problems, establishing their goals, and developing their solutions.

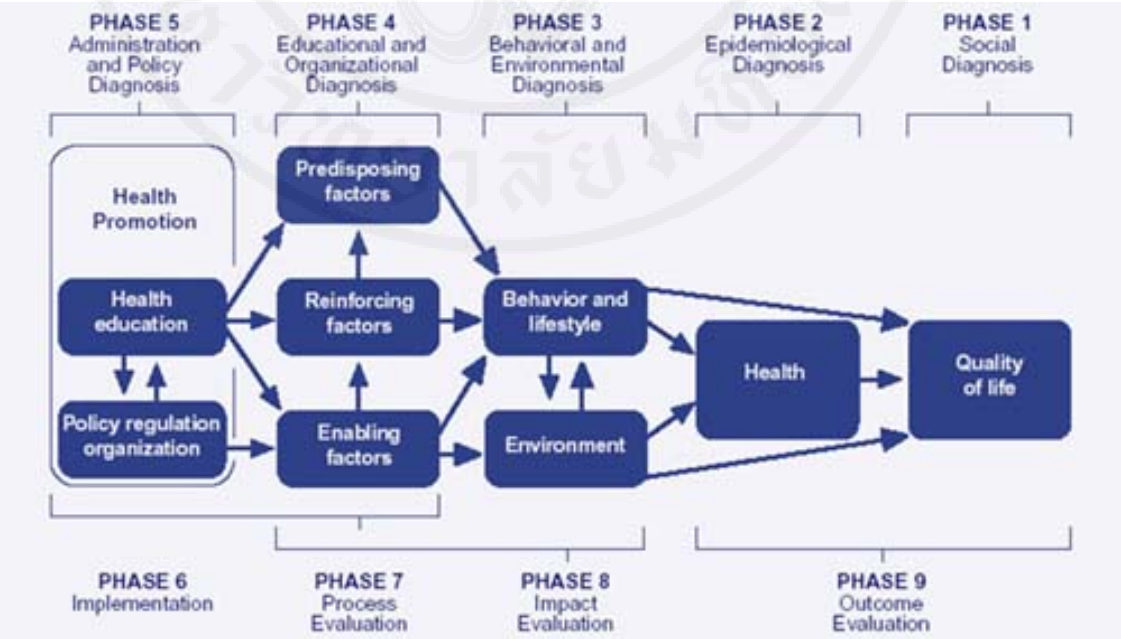

Figure 2.1 The Precede-Proceed framework

PHASE 1 - SOCIAL DIAGNOSIS

The first stage in the program planning phase deals with identifying and evaluating the social problems that have an impact on the quality of life of a population of interest. Social assessment is the "application, through broad participation, of multiple sources of information, both objective and subjective, designed to expand the mutual understanding of people regarding their aspirations for the common good". During this stage, the program planners try to gain an understanding of the social problems that affects the quality of life of the community and its members, their strengths, weaknesses, and resources; and their readiness to change. This is done through various activities such as developing a planning committee, holding community forums, and conducting focus groups, surveys, and/or interviews. These activities will engage the audience in the planning process and the planners will be able to see the issues just as the community sees those problems.

PHASE 2 – EPIDEMIOLOGICAL, BEHAVIORAL, AND ENVIRONMENTAL DIAGNOSIS

Epidemiological diagnosis – Epidemiological assessment deals with determining and focusing on specific health issue(s) of the community, and the behavioral and environmental factors related to prioritized health needs of the community. Based on these priorities, achievable program goals and objectives for the program being developed are then established. Epidemiological assessment may include secondary data analysis or original data collection. Examples of epidemiological data include vital statistics, state and national health surveys, medical and administrative records etc. Genetic factors, although not directly changeable through a health promotion program, are becoming increasingly important in understanding health problems and counseling people with genetic risks. They may be useful in identifying high-risk groups for intervention.

Behavioral diagnosis – This is the analysis of behavioral links to the goals or problems that are identified in the social or epidemiological diagnosis. The behavioral ascertainment of a health issue is understood firstly through those behaviors that exemplify the severity of the disease (e.g. tobacco use among teenagers). Secondly, through the behavior of the individuals who directly affect the

individual at risk (e.g. parents of the teenagers who keep cigarettes at home), and thirdly, through the actions of the decision-makers that affects the environment of the individuals at risk (e.g. law enforcement actions that restrict the teen's access to cigarettes). Once behavioral diagnosis is completed for each health problem identified, the planner is able to develop more specific and effective interventions.

Environmental diagnosis – This is a parallel analysis of social and physical environmental factors other than specific actions that could be linked to behaviors. In this assessment, environmental factors beyond the control of the individual are modified to influence the health outcome. For example, poor nutritional status among school children may be due to the availability of unhealthful foods in school. This may require not only educational interventions, but also additional strategies like influencing the behaviors of the school's food service managers.

Phase 3 - EDUCATIONAL AND ECOLOGICAL DIAGNOSIS

Once the behavioral and environmental factors are identified and interventions are selected, the planners start to work on selecting factors that if modified, will be most likely to result in behavior change and sustain this change process. These factors are classified as predisposing factors, enabling factors, and reinforcing factors. Predisposing factors are any characteristics of a person or population that motivates behavior prior to or during the occurrence of that behavior. They include an individual's knowledge, beliefs, values, and attitudes. Enabling factors are those characteristics of the environment that facilitate action and any skill or resource required to attain specific behavior. They include programs, services, availability and accessibility of resources, or new skills required to enable behavior change. Reinforcing factors are rewards or punishments following or anticipated as a consequence of a behavior. They serve to strengthen the motivation for behavior. Some of the reinforcing factors include social support, peer support, etc.

Phase 4 - ADMINISTRATIVE AND POLICY DIAGNOSIS

This phase focuses on the administrative and organizational concerns, which must be addressed prior to program implementation. This includes assessment of resources, development and allocation of budget, looking at organizational barriers,

and coordination of the program with all other departments, including external organizations and the community.

Administrative Diagnosis - to assess policies, resources, circumstances, prevailing organizational situations that could hinder or facilitate the development of the health program.*Policy Diagnosis* - to assess the compatibility of the program goals and objectives with those of the organization and its administration; does it fit into the mission statements, rules and regulations that are needed for the implementation and sustainability of the program.

Phase 5 - IMPLEMENTATION OF THE PROGRAM

Phase 6 - PROCESS EVALUATION is used to evaluate the process by which the program is being implemented. That is this phase determines whether the program being implemented according to the protocol.

Phase 7 - IMPACT EVALUATION measures the effectiveness of the program with regards to the intermediate objectives as well as the changes in predisposing, enabling, and reinforcing factors.

Phase 8 - OUTCOME EVALUATION measures change in terms of overall objectives and changes in health and social benefits or the quality of life. That is, it determines the effect the program had in the health and quality of life of the community.

2.7 Related study

The research which related to factors affecting complications in diabetic patients, complications associated with diabetes, hyperglycemia and hypoglycemia both directly and indirectly as follows:

Jintana Tongpetch (2003), studied effect of self management promotion on perception and prevention behavior and quality of life in diabetic patients of Phrachomklao hospital. The purposed of this quasi - experimental research were 1) to

compare the number of patients who could control blood glucose and quality of life of diabetic mellitus patients in the experimental group before and after received the program, and 2) to compare the number of patients who could control blood glucose and quality of life of diabetic patients in the experimental group and control group. Thirty type 2 diabetic patients in the diabetic clinic at in patient department, Prachomklao hospital were assigned by matched pair into either experimental or control group. There were 15 patients in each group. The experimental instrument was the self management program tested for validity. The instrument for collecting data was Quality of Life Questionnaire tested for both validity and reliability with alpha of .08 . Data were analyzed by using mean, standard deviation, McNemar test, chi - square test and t- test. The major findings were as follow; 1) The number diabetic mellitus patients who could control blood glucose after received the program larger than those before received the program at p <.05, 2) The quality oflife of diabetic mellitus patients after received the program was significantly higher than those before received the program at p<. 05, 3) The number diabetic patients who could control blood glucose between the experimental group and control group after experimental was not significant difference at p<.05, 4) The quality of life of diaberic mellitus patints in the experimental group higher than those control group at p <.05

Seksan Heebkaew and Wongsa Laohasiriwongse (2011), study quality of life in patients with type II diabetes mellitus in Kuchinarai district, Kalasin province This cross-sectional analytical research aims to identify the quality of life and factor associated with the quality of life of Type II diabetes mellitus (DM) patients in Kuchinarai District, Kalasin Province. The total of 404 samples were systematically randomly selected to respond to the questionnaires. The questionnaire was tested for validity and reliability (Cronbach alpha coefficient =0.89). Both descriptive and inferential statistics (multiple linear regression analysis) were used to analyze the data and present the mean difference with a 95% confidence interval.

Miller, & Arquilla (2010), which is a study of the assessment of patients with chronic diseases such as cardiovascular disease, diabetes, and chronic renal failure during disaster. The results showed that patients with diabetes mostly have poor blood glucose control which leads to diabetes complications both acute complications such as diabetic ketone acidosis (DKA), or hypoglycemic coma, and

chronic complications such as diabetic nephropathy, stroke, or the deterioration of retinopathy. Apart from blood glucose control, another problem that arises regards medical treatment. This is due to the lack of medical history which results in the medical treatment being mainly limited to primary drugs. For hypertension, there are factors associated with increased morbidity and mortality in cardiovascular disease patients. These factors are essentially psychological and physical stress. The recommended solutions to help patients to resolve these issues suggests that patients carry their medical history in a waterproof bag, medical staff should educate patients about their diseases (especially diabetic patients), and a diabetic emergency kit should be prepared in case of disaster. As for patients with chronic renal failure, they may encounter difficulties with dialysis, which are mainly due to technical problems such as damaged dialysis machines.

Daniels, et.al. (2009) ,which is a stratified cluster survey study that focused on earthquake victims in Peru in determining the changes in health behavior after the earthquake in Peru, in 2007, through a sampling of that was taken six months after disaster, the results found that 38% of the samples seek treatment within 2 weeks after the earthquakes occurred for earthquake related injuries and chronic medical conditions. This study also revealed that people living in rescue shelters sought treatment in hospitals more than those residing in their homes.

Marie, et. al. (2010) is a research study which focused on victims of Hurricane Katrina in the United States, from November, 2005 to September, 2006. The sampling was collected from 210 hypertension patients affected by the disaster; the participants were asked to complete a questionnaire about their to adherence hypertension treatment by taking their medication on regular basis. From a survey of Hill-Bone medication compliance subscale, the findings revealed that 76% of the respondents had experienced major hurricane damage to their houses and 46% consumed less hypertension medication. The multivariate analysis of data found that the majority of the population was African-Americans who were less than 65 years of age. It also showed that 7% of respondents did not possess any antihypertensive drugs during their relocation, 28% ran out of antihypertensive drugs, 16% couldn't find additional refills of antihypertensive drugs, and 28% changed their prescription on their own without medical consultation after the disaster occurred. This research

demonstrates the need for disaster preparations through increased drug prescriptions and a meticulous monitoring of the patient's medical treatment.

Lawler, & Winkler (2010), which conducted a health survey in order to monitor changes in health behaviors through the use of a cluster randomized trial of 434 people with underlying diseases, such as diabetes or hypertension, from 10 government hospitals. The researchers used phone surveys to determine how the participants take care of their chronic diseases of diabetes and hypertension.

The result showed improved health behaviors such as an increased consumption of fruits and vegetables, more exercise, and smoking cessation.

Weiwei, et.al (2007) which is a study of health impacts of flood. The aim of this study is to identify the health impacts of disasters and the underlying causes of health impacts associated with floods. A conceptual framework is developed that may assist with the development of a rational and comprehensive approach to prevention, mitigation, and management. This study involved an extensive literature review that located >500 references, which were analyzed to identify common themes, findings, and expert views. The findings then were distilled into common themes. The health impacts of floods are wide ranging, and depend on a number of factors. However, the health impacts of a particular flood are specific to the particular context. The immediate health impacts of floods include drowning, injuries, hypothermia, and animal bites. Health risks also are associated with the evacuation of patients, loss of health workers, and loss of health infrastructure including essential drugs and supplies. In the medium term, infected wounds, complications of injury, poisoning, poor mental health, communicable diseases, and starvation are indirect effects of flooding. In the long-term, chronic disease, disability, poor mental health, and poverty-related diseases including malnutrition are the potential legacy. This article proposes a structured approach to the classification of the health impacts of floods and a conceptual framework that demonstrates the relationships between floods and the direct and indirect health consequences.

CHAPTER III
METHODOLOGY

In this chapter, it can be divided into 3 parts. Those are study design, population and sampling and research methodology

3.1 Study design

This research is descriptive cross sectional study to study the factors that influence complications of diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province. The data were analyzed by descriptive statistic, chi-square and binary logistic regression analysis.

3.2 Population and Sampling

Populations in this study are the patients who diagnosed with diabetes mellitus and registered at the hospital in Phra Nakhon Si Ayutthaya Province during the great flood in the year 2011 between October 2011– December 2011 total 19,443 patients

3.2.1 Sample group

This research choose a stratified random sampling in 2 stages. The first group is from district in Phra Nakhon Si Ayutthaya Province which was determined through quota sampling from a population consisting of diagnosed diabetic patients living in Phra Nakhon Si Ayutthaya Province during the great flood in the year 2011. The sample size is calculated using the proportional–to-size method to find a ratio from each hospital. This process was employ so that each group can be validated through statistics. This is done by classifying each group according to the hospital then

the sample was selected by systematic random sampling from the list of diabetic patients from each district hospital.

3.2.2 The sample size

This study was conducted in Phra Nakhon Si Ayutthaya Province. The sample size was determined as individuals from the target group that meet the inclusion criteria. Therefore, the sample size is ascertained from the following method:

Defining the sample size was achieved through stratified random sampling (Krejcie, & Morgan, 1970) which uses the following formula:

$$N = \frac{K^2 NP (1-P)}{K^2 P (1-p) + NE^2}$$

Where: n = sample size

N = population

P = proportion of with and without complication in diabetic patients, which was 0.2

E = Statistical Errors which was 0.05

K = constant (IF E=0.05, K=2, if E=0.01, K=3)

The deviation (e) is determined as 5 percent and the proportion of population (π) was 0.2. When the variables were substituted in the above formula, the sample size would be estimated as 380 samples. From the calculated sample size, it can used as a representation of the entire population in this research for academic purposes. However, this research study is an academic study based on possibility. Therefore, if there is an increase in sample size, the study will attain greater accuracy.

This research defined the proper sample size from patients living in Phra Nakhon Si Ayutthaya Province during the great flood to obtain a sampling from the same people. So these values were substituted in the same sample size formula, the calculations are as follows:

$$n = \frac{K^2 NP (1-P)}{K^2 P(1-P) + NE^2}$$

When substituted, it will be

$$n = \frac{K^2 NP(1-P)}{K^2 P(1-P) + NE^2}$$

$$n = \frac{2^2 19{,}442 \times 0.6 \times (1-0.6)}{(2^2 0.6(1-0.6)) + (19{,}443 \times 0.05^2)}$$

$$n = \frac{18{,}664.32}{0.96 + 48.605}$$

$$n = 376.56$$

$$n = 377 \approx 380 \text{ samples}$$

When n = sample size

N = population

P = proportion of with and without complication in diabetic patients, which was 0.2

E = Statistically Error = 0.05

K = constant (If E= 0.05, K = 2, if E = 0.01, K = 3)
However, defined the (e) was 5 percent

Next, the sample size of each group were distributed according to as 95 percent number of population which the distribution was stratified pattern by the proportion calculated from the entire population which related to W.G. Cocharm. By determine the total sample size, the distributed into each hospital sample size in proportion, as the following table

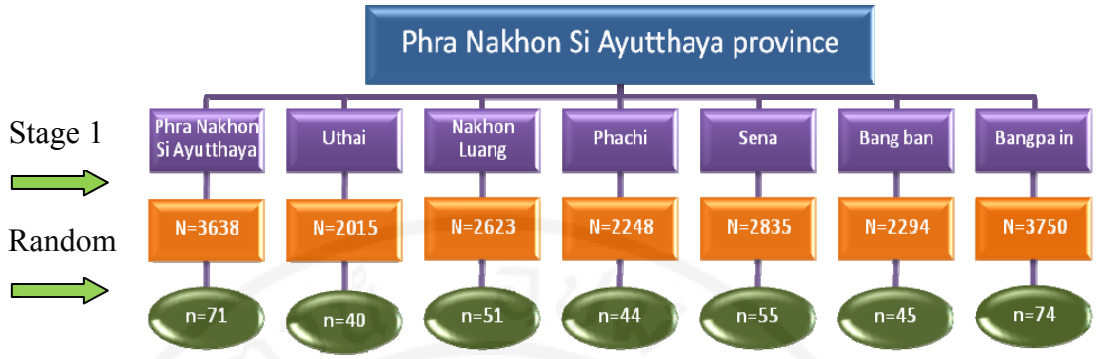

Figure 3.1 Stratified random sampling diagram

The sampling method

Using stratified random sampling as follows

Step.1 : random district in Phra Nakhon Si Ayutthaya Province

By simple random sampling with random drawing of 40 percent of the entire 16 districts in Phra Nakhon Si Ayutthaya Province which were affected by the great flood as the following table.

Table 3.1 Number of sample district in Phra Nakhon Si Ayutthaya Province

Area	No.of entire district	No. of sample district	Sample District	
Phra Nakhon Si Ayutthaya District	16	7	-Phra Nakhon Si Ayutthaya -U-Thai Nakhonluang -Phachi	-Sena -Bang Ban -Bang Pa - in

Step 2 : random hospitals from sample districts

1. Simple random sampling by drawing lots

2. Divide the number of samples using proportional stratify sampling formula for calculate the sample size as follows

$$\text{Sample size} = \frac{\text{total number of samples x diabetic patients in hospital}}{\text{total number of population}}$$

Table 3.2 Number of samples size

Randomized hospital	Population Total	Sample group Total
Phra Nakhon Si Ayutthaya	3,638	**71**
U thai	2,015	**40**
Nakhonluang	2,623	**51**
Phachi	2,248	**44**
Sena	2,835	**55**
Bang ban	2,294	**45**
Bangpa in	3,790	**74**
Total	**19,443**	**380**

Note : Estimated sample numbers in this study from the database of diabetic patients, screening report of diabetic patients of the Phra Nakhon Si Ayutthaya Province.

Step 3: Systematic random sampling from a list of diabetic patient database

In order to decide where to start in a patient list there must have the random interval first, by calculate from total number of population divided by sample number equals random interval as follows'/n = x count range depending on proportion between number of population and sample number.

3.3 Research Methodology

This study was using a questionnaire survey of factors influence complications in diabetic patients during the great flood in 2011, Phra Nakhon Si Ayutthaya Province. The question was divided into 5 sections.

Section I

General information 14 questions and the researcher will collect the data.

Personal information including gender, age, religion, marital status, occupational, education level , monthly income .

Health information includes co morbidity, interval of diabetes, preferential treatment, health status that assessed by level of BMI, blood pressure, FBS, Cholesterol, LDL, Triglyceride

.Physical data includes physical environment that assess by the level of flood and the distance between patient's house and hospital.

The variables, perceived severity of the floods that affect health.

The dependent variable is have complication / no complications.

Section II

Information about diabetes 10 questions, which were developed from the literature and research related complications in diabetic patients during flooding of the endocrine and metabolic by Vanirat Srichana (2005) has 15 items and the knowledge to answer all the questions are YES , NO and NOT SURE.

Criteria for scoring

Answer YES	=	1 point
Answer NO	=	0 point
Answer NOT SURE	=	0 point

The meaning of the score are (Bloom's criteria, 1995)

Score < 60%	=	poor level of knowledge
Score 60-80%	=	fair level of knowledge
Score > 80%	=	good level of knowledge

Section III

Information and attitudes about diabetes 12 questions which researcher developed from study of the documentation and study of the Vanirat Srichana (2005). The attitude of the diabetes control 7 questions, drug using 2 questions, and attitudes about social and self-adaptive 3 questions. It used rating scale 5 level with 5 positive questions (question no.2, 5, 6, 10, 12) and 7 negative questions (question no.1, 3, 4, 7,8, 9, 11)the criteria of the score for the positive and negative aspects as follows.

Comments	**Positive question**	**Negative question**
Strongly agree	5	1
Agree	4	2
Uncertain	3	3
Disagree	2	4
Strongly disagree	1	5

The meaning of the score is (Bloom's criteria, 1995)

12 - 30	Score	=	low level of attitude
31 - 47	Score	=	moderate level of attitude
48 - 60	Score	=	high level of attitude

Section IV

The behavior information of the self-management of diabetes: There are 30 questions, which were developed from documentation that associated and the study of Vanirat Srichana (2005) includes questions; the diet 5questions, the exercise 4questions, the health care 4questions, the use of treatment 4questions, the monitoring of treatment 3 questions ,the preventive of complications 5questions, and the mental health care and the management of stress5questions. This research used rating scale for 5 scales. There are negative 6 questionsin (1,. 2, 4, 5, 10, 16) and positive questions 24 questions. The scoring criteria for the positive and negative questions.

Level of performance	Positive question	Negative question
Regularly	5	1
Frequent	4	2
Sometimes	3	3
Rarely	2	4
Never	1	5

The meaning of the score are (Bloom's criteria, 1995)

30 – 70 Score = low level of self management behavior

71 – 110 Score = moderate level of self management behavior

111 - 150Score = good level of self management behavior

Section V

The data about social support 25 questions ; social support from family consists of 12 questions, 6 questions, social support from health personnel 7 questions, which were developed from documentation and study from research of Rungraong Punnarach (2009). This research used 5 rating scales with have only positive questions. Scoring is as follows.

Comments	Points
Strongly agree	5
Agree	4
Uncertain	3
Disagree	2
Strongly disagree	1

The meaning of the score are (Bloom's criteria, 1995)

25 - 58 Score = low level of social support

59 – 92 Score = moderate level of social support

93 - 125Score = good level of social support

3.4 Reliability and Validity

Researchers sent questionnaires draft to 5 experts : 1. Dr.Chathree Jaroenchaiwatthana,M.D. 2. Dr.Karn Jirathana,M.D. 3. Dr.Boonthorn Thunworasetthee,M.D. 4. Dr.Wutthisak Wiboonsirikul,M.D. 5. Mrs.Onnom Thupaviroj (registed nurse). The experts examined the content validity by checking the coverage and consistency of the five questions in the questionnaire that used in the survey. After that the researcher adjusted the questionnaires follow the experts suggested. The researcher sent questionnaires to trial with a similar group as the sample group at diabetes clinic at Phra Nakhon Si Ayutthaya Hospital. There are 30 peoples of trial questionnaires for reliability. The coefficient alpha as the table 6 and using the formula of Cooper Brothers - Richard Branson's formula KR-20. After the trial, the researcher refine the questions more clearly.

Table 3.3 Reliability of questionnaires

Questionnaire	Reliability
Part 1: Characteristics of the diabetic patients	-
Part 2: Knowledge with diabetes	0.73
Part 3: Attitudes with diabetes	0.51
Part 4: Self management behavior	0.55
Part 5: Social Support	0.90

3.5 Research Procedure

3.5.1 Pre – operational research

1. Literature review
2. Sending the permission form to conduct the study
3. Construct the questionnaire and recording form for collect the data of migration Including

- General information age, gender, address, occupation, education, marital status)

- Information related to factors that effecting diabetic complication

- Information about blood glucose level and incidence of foot ulcers

4. Prepare the letter of consent to be the part of this research and inform the project details as well as the rights of sample group according to human research ethics

3.5.2 The research method

1. The researcher inform participants about details and benefits of the project both for the researcher and the community, before signing the consent form

2. Inform the rights of sample group, by introduce the researcher himself to the patient at first and describe the purposes of this study, asking for cooperation to collect data, and clarify rights of patients, whether accept or reject to be research participants , will not effect the treatment , the answer or data of the patients were considered to be confidential and used for this study only, during the question , if the patients were not satisfied or didn't want to answer the question, they can reject to be research participant before the end of the study, this will not effect the treatment of sample group

3. Construct the questionnaire and recording form and test for validity of the tools in target population

3.6 Data collection

Data obtained from the questionnaires and records will be converted and stored by computer program, recording by the only identity code prepared for this research without name of the participants. The original data will be stored in safe place and confidential, only the researcher can find the actual name list.

3.7 Protection of Human Subject

The rights of the human subject consisted of 3 dimensions, i.e., risk from research, benefit from research, and data confidentiality. The proposal to conduct research in human subject was submitted to the research ethic committee of Mahidol University. After receiving permission, the researcher then started conducting the research. The researcher then introduced their self to the samples and then advised the sample the objective of research as well as about the procedure and duration of data collection. Then, the researcher asked samples for voluntarily participation in research and advised them about the right to participate or quit the research whenever they wanted to without any consequences to health care service quality. This research caused no risk to samples, only taking some time to complete the assessment. The data taken from samples in this research was treated as strictly confidential. The publishing or presentation of research data would be giving a general picture and no sample name would be published or presented. The data was accessed using a code made by researcher. As the samples understood to achieve all research objectives and in order to participate in the research, they had to sign the consent form.

3.8 Data analysis

1. Descriptive statistics

Quantitative data : frequency , percentage , mean , standard variation , and mode for analyze of general information such as age , income , number of patients with chronic diseases, blood glucose level, blood pressure level

2. Inferential statistics

Study of factors influencing complication in diabetic patients during the great flood, including other factors: age, flood level , living in flood situation by logistic Regression Analysis which dependent variable is quantitative variable with two possible values (Dichotomy) , in this case, group 1 variable is diabetic patients with complication and group 2 is diabetic patients without complication the independent variable is 2 or more values (Binary logistic regression) with both qualitative and quantitative variables

CHAPTER IV
RESULTS

The purpose of this descriptive cross sectional study is to find the relationships between internal factors, including gender, age, religion, marital status, occupation, education level, income, co morbidity, interval of diabetes, type of treatment, knowledge of DM, flood stress level , awareness of the great flood to health, knowledge and attitude towards diabetes , and self-management behaviors, FBS levels, and blood lipid profile. This blood lipid profile, consists of cholesterol, triglyceride, LDL, and blood pressure, BMI. The external factors include physical factors (level of flood distance between patient's house and hospital), social support, and complication in diabetic patients. The data were analyzed by using frequency, percentage, mean, standard deviation, chi-square and binary logistic regression analysis.

The results of study were presented in tabulation and discussion following the topics 6 parts.

Part 1: Results of characteristic of variables analysis

Part 2: Result of internal factors variable

Part 3: Result of external factors variable

Part 4: Results of multi-relations between internal factors and complications in diabetic patients during the great flood

Part 5: Results of multi-relations between external factors and complications in diabetic patients during the great flood

Part 6: Results of predicting factors analysis of diabetic patients' complications in the great flood by binary logistic regression.

Part 1 Results of basic variables analysis

1. Demographic characteristics of the diabetic patients.

Table 4.1 Demographic characteristics of the diabetic patients.

Characteristic	Number	Percentage
Gender		
Male	88	31.65
Female	190	68.35
Age(years)		
≤ 30	6	2.16
31-40	13	4.68
41-50	49	17.63
51-60	91	32.73
61-70	67	24.10
71-80	41	14.75
> 80	11	3.96
Religion		
Buddhism	259	93.17
Muslim	15	5.40
Others	1	0.36
No answer	3	1.08
Marital status		
Married	188	67.63
Single	25	8.99
Divorced	11	3.96
Widowed	38	13.67
No answer	16	5.76
Occupation		
No occupation	88	31.65
Government officer	33	11.87

Table 4.1 Demographic characteristics of the diabetic patients. (cont.)

Characteristic	Number	Percentage
Agriculturist	32	11.51
Employee	66	23.74
Merchant	29	10.43
Others	27	9.71
No answer	3	1.08
Education level		
None	10	3.60
Primary school	178	64.03
Secondary school	28	10.07
High school	16	5.76
Certificate/ diploma	12	4.32
Bachelor's degree/ more than	30	10.79
No answer	4	1.44
Income (Baht/month)		
None	80	28.78
≤ 5,000	65	23.38
5,001-10,000	65	23.38
10,001-15,000	27	9.71
15,001-20,000	10	3.60
> 20,000	24	8.63
No answer	7	2.52
Co morbidity		
Hypertension	168	60.43
Coronary artery disease	22	7.91
Dyslipidemia	33	11.87
Chronic kidney disease	22	7.91

Table 4.1 Demographic characteristics of the diabetic patients. (cont.)

Characteristic	**Number**	**Percentage**
Others	3	1.08
No answer	30	10.79
Interval of diabetes (years)		
≤ 10	194	69.78
11-20	55	19.78
21-30	10	3.60
31-40	1	0.36
No answer	18	6.47
Type of treatment in Diabetes		
Oral type		
1 drug before meal	60	21.58
1 drug after meal	64	23.02
2 drug before and after meal	116	41.73
Injection type	26	9.35
No answer	12	4.32
BMI(Mean = 25.38, SD = 5.41)		
Low Range (<18.50 Kg/m^2)	7	2.52
Normal Range(18.50-24.99 Kg/m^2)	99	35.61
Over Range (25.00 Kg/m^2)	172	61.87
Blood Pressure		
Low (< 120/80 mmHg)	9	3.24
Normal (120-129/80-84 mmHg)	113	40.65
Over (>130/85 mmHg)	156	56.11
FBS (Mean = 153.89, SD = 48.66)		
Low (<80 mg%)	4	1.44
Normal (80-130 mg%)	89	32.01

Table 4.1 Demographic characteristics of the diabetic patients. (cont.)

Characteristic	Number	Percentage
Over (>130 mg%)	185	66.55
Cholesterol (Mean = 205.24, SD = 46.96)		
Normal (< 200 mg%)	81	29.14
Over (200-239 mg%)	57	20.50
High Over (> 240 mg%)	38	13.67
LDL(Mean = 121.80, SD = 47.79)		
Normal (< 100 mg%)	50	17.99
More (100-129 mg%)	54	19.42
More Over (130-159 mg%)	26	9.35
High (160-189 mg%)	31	11.15
High Over (>190 mg%)	10	3.60
TG(Mean = 162.17, SD = 113.65)		
Normal (<150 mg%)	93	33.49
Nearly Normal (150-199 mg%)	33	11.87
High (200-499 mg%)	45	16.19
High Over (>500 mg%)	4	1.44
Complication		
Complication	51	18.65
No Complication	227	81.35

From table 4.1, most diabetic patients are female (68.35%) between ages 51-60 years old (32.73%) Buddhists (93.17%) married (67.63%) no occupation (31.65%) and 80 patients with no income (28.78%). Moreover, most of these diabetic patients have other underlying disease, which is hypertension (60.43%) and most with less than 10 years with diabetes (69.78%). These diabetic patients are treated with oral medicine taken before and after meal (41.73%).

Diabetic patients in this study have BMI level higher than standard level of 25 Kg/m^2 (61.87%) with average BMI of 25.38 Kg/m^2 (SD = 5.41), blood pressure at high level (56.11%), FBS level higher than 130 mg% (66.55%) (Mean = 153.89, SD = 48.66), and most has standard cholesterol level with about 13.67% with higher than

normal level of 240 mg% (Mean = 205.24, SD = 46.96). For the most part, LDL level is in the standard range (Mean = 121.80, SD = 47.79) and only about 10 patients with over 190 mg% (3.60%). As for Triglyceride level , about 93 patients are in standard range of 150 mg% (33.49%) with average level of 162.17mg% (SD = 113.65).

In addition, during the great flood 51 diabetic patients had complications such as hyperglycemia and hypoglycemia, which is 18.65%.

Part 2 Internal Factors

This table shows internal factors including stress to major flood, awareness of the great flood to health, knowledge and attitude towards diabetic disease, and self-management behaviors.

Table 4.2 The internal factors.

Factor			Number	Percentage
Flood stress level (Mean 5.39, SD = 2.80)				
	Low	(0-4 score)	57	20.50
	Moderate	(5-6 score)	138	49.64
	High	(7-10 score)	63	22.66
Awareness of the great flood to health (Mean = 4.81, SD = 2.54)				
	Low	(0-4 score)	71	25.54
	Moderate	(5-6 score)	146	52.52
	High	(7-10 score)	37	13.31
Knowledge of DM				
	Low	(< 60%)	101	36.33

Table 4.2 The internal factors. (cont.)

Factor			Number	Percentage
	Moderate	(60-80%)	141	50.72
	High	(< 80%)	30	10.79
Attitude towards DM				
	Low	(12 – 30 score)	0	0.00
	Moderate	(31 – 47 score)	115	41.37
	High	(48 – 60 score)	158	56.83
Self-management behavior				
	Low	(30 – 70 score)	0	0.00
	Moderate	(71 – 110 score)	65	23.38
High	(111 – 150score)		208	74.82

From table 4.2, the sample group of these diabetic patients has moderate level of flood stress (49.64%) and high level of flood stress (22.66%). The most of these patients have moderate awareness of the great flood to health (52.52%) and most have moderate knowledge of diabetes (50.72%), highly positive attitude and self-management behavior towards diabetes (56.83 %) and (74.82 %) respectively.

Part 3 External Factors

This table shows external factors including social support, level of flood, distance between patient's house and hospital.

Table 4.3 The External Factors**.**

Factor	Number	Percentage
Social Support(Mean= 25.37, SD = 3.86)		
Low (25 – 58)	0	0.00
Moderate (59 – 92)	21	7.55
High (93 – 125)	251	90.29
Physical factors		
Level of flood None	62	22.30
0.5-1 m	60	21.58
1-2 m	115	41.37
2-3 m	14	5.04
> 3 m	18	6.47
No answer	9	3.24
Distance between patient's house and hospital (Km)		
< 10	173	62.23
11-20	20	7.19
21-30	8	2.88
31-40	2	0.72
41-50	5	1.80
No answer	70	25.18

From table 4.3, most diabetic patients receive a great social support (90.29%) and when considered a physical factor, it is found that during the great flood, height of flood level of these patients was about 1-2 meters (41.37%), most lived close by the medical center with less than 10 km in distance (62.23%)

Part 4 Relationships between personal factors and complications of diabetic patients during the great flood

Table 4.4 The relationships between personal factors and complications of diabetic patients during the great flood

Factor	Chi- Square	p-value
Personal factor		
Age	14.67	0.00*
Sex	0.07	0.79
Marital status	1.33	0.72
Education	9.43	0.09
Income/month	6.68	0.25
Type of Diabetic drug	0.941	0.82
Hypertension	36.92	0.00*
FBS	2.84	0.24
Cholesterol	1.84	0.40
Triglyceride	1.76	0.62
LDL	7.91	0.10
BMI	0.88	0.64
Other underlying disease with DM	5.16	0.27
Flood stress level	9.33	0.01*
Awareness of great flood to health	4.22	0.12
Attitude with DM	1.20	0.27
Attitude about disease control	0.36	0.55
Attitude about drug use	1.36	0.51
Attitude about adaptation and social Relation	1.64	0.20
Self-management behavior of diabetic patient	1.97	0.16
Food control	1.20	0.27
Exercise	9.11	0.01*

Table 4.4 The relationships between personal factors and complications of diabetic patients during the great flood(cont.)

Factor		Chi- Square	p-value
	Physical health	0.47	0.79
	Drug control	0.24	0.62
	Follow up treatment	0.45	0.50
	Control complication	2.46	0.29
	Mental health	2.35	0.31

p< .01*

This table 4.4 shows that age, hypertension, and flood stress level positively correlate with complications in diabetic patients during great flood. Also, self- management behavior of these patients and exercise negatively correlate with complications in diabetic patients during the great flood with statistically significant level of (p<.01).

Part 5 Relationship between external factors and complications in diabetic patients during the great flood

Table 4.5 The relationship between external factors and complications in diabetic patients during the great flood

Factor		Chi- Square	p-value
Social support		1.37	0.24
	Family	1.69	0.43
	Community	0.61	0.74
	Health care worker	1.23	0.54
Distance between patient's house and hospital		13.03	0.01*

p<.01*

This table (4.5) shows that distance from patient's house to hospital negatively correlate with complications in diabetic patients during the great flood with statistically significant level of (p<.01).

Part 6 Factors that predict complications in diabetic patients during great flood

Table 4.6 The factors that predict complications in diabetic patients during the great flood

Factor	B	Wald	sig
Age	-0.619	1.925	0.165
Distance between patient's house and hospital	**0.575**	1.695	0.193
Flood stress level	**-1.216**	9.642	0.002*
Overall of exercise	-0.103	0.047	0.828
FBS level	**0.01**	4.865	0.027*
Cholesterol	0.01	1.286	0.257
Triglyceride	-0.001	0.162	0.688
LDL level	**0.021**	5.559	0.018*
Average of BMI	0.005	0.014	0.904
Blood pressure		0.83	0.66
Systolic blood pressure	-19.121	0	0.999
Diastolic blood pressure	0.508	0.83	0.362
Constant	0.780	0.068	0.794

P<.05*

This table (4.6) shows factors which predict complications in diabetic patients during great flood. Using enter method of binary logistic regression, it is found that factors that impact predictive factors in diabetic patients during the great flood include flood stress level, FBS level and LDL level. The equation for predicting the complications (W) is as follows:

w = 0.78 – 1.216(flood stress level) + 0.01(FBS level)+ 0.021 (LDL level)

From the equation above can written in logistic regression model for predicting complications in diabetic patients as shown below.

P (occurrence of complications) = $\mathbf{1/1+e^{-w}}$

Table 4.7 Statistics Nagelkerke R Square

Model Summary	**-2 Log likelihood**	**Cox & Snell R Square**	**Nagelkerke R Square**
Step 1	101.974	0.238	0.352

From table 4.7, the value -2 Log likelihood is close to zero, which shows that equation or model is suitable for used. Cox & Snell R2 and Nagelkerke R2 that is for ratio or percentage explanations Logistic Regression model. Nagelkerke R2 = 0.352 explanation variable complication about 35.20 %

CHAPTER V
DISCUSSION

This descriptive cross sectional study was aim to find factors that related to complications in diabetic patients and to study of the predicting factor of the occurrence complications in diabetic patients during the great flood in Phra Nakhon Si Ayutthaya Province in 2011. Population in this study is a group of diabetic patients who were registered at hospitals in Phra Nakhon Si Ayutthaya Province during October, 2011 – December, 2011. Number of population is 19,443. Sample size is 278 patients. Method used to find a sample size is called stratified random sampling. This study has been approved by board of ethics. Data was collected by questionnaire which was specifically developed for this study. Rate of accuracy to details is 0.81. When questionnaire was tested for accuracy, it is found that the rate of accuracy for knowledge about diabetics is 0.73; for attitude about diabetics is 0.51; for patient's behavioral development is 0.55; and for social support is 0.90. Moreover, data was analyzed by using frequency, percentage, mean, standard deviation, chi-square t-test and binary logistic regression analysis was used to predict associated factors. Factors used in this study include internal factors, which are age, sex, religion, education, occupation, financial income, health status. Health status is composed of duration of diabetic disease, blood pressure, Cholesterol, Triglyceride, LDL, Fasting Blood Sugar, underlying disease, type of treatment, stress to flood situation, perceived of health effect to the great flood, knowledge and attitude towards diabetics. External factors include social support , flood level at patient's home, distance from house to hospitals . This study found that 278 diabetic patients have average FBS of 153.89±SD 48.66, found 51 (18.65%) patients with complications during the great flood of which 26 (9.35%) patients with hyperglycemia, 25 (8.99%) patients with hypoglycemia. Factors with statistically significant are flood stress level, FBS level and LDL level. Equation to predict complications is w = 0.78 - 1.216 (flood stress level) + 0.01 (FBS level) +

0.021 (LDL level) and binary logistic regression to predict complications is P(occurrence complications) = $1/1 + e^{-w}$

Data analysis can be discussed as follows:

Objective : To study the factors affecting the occurrence complications among diabetic patients during the great flood in the year 2011 in Phra Nakhon Si Ayutthaya Province.

Result of this study found that diabetic patients male 88 persons (31.65%) female 190 persons (68.35%) Most are in the age of 51-60 years old (32.73%), 259 persons (93.17%) were Buddhists, 188 persons (67.63%) were married, most are primary education (64.03%) no occupation (31.65%) very little or no income. 116 persons (41.73%) received both types of Diabetes medication which is before and after meal, 156 persons (56.11%) have hypertension, and 194 persons (69.78%) patients with less than 10 years of treatment.

Above data correlates to the study of Vichai Rattanapunpanich, (2008),who studied the correlation of diabetic control of diabetic patients at Bangkruay Hospital, result of the study found that most diabetic patients are female (73.1%) with primary education level (70.3%), average years of treatment are 6 years. 77.4% have underlying disease, 56.11% have hypertension. From this information, it can be explained that abnormality of genetics, hormone of kidney, and hemodynamic, hypertension caused by high level of plasma volume and peripheral vascular resistance and reduced level of plasma renin activity and abnormality of renin-angiotensin system. High level of plasma volume caused by osmotic effect of high Fasting Blood Sugar, overload of sodium which can possibly be caused from hormone atrial natriuretic peptide, prostaglandins – which functions to balance sodium level and loss of kidney function that reduces excretion of sodium and water. This finally causes hypertension. (Sitprecha, 2013)

Considering additional internal factors, it is found that sample size has average level of stress towards the great flood in the year 2011 of 5.39, SD=2.80 and perceived effects of the great flood to health of 4.81, SD=2.54, 141 (50.72%) has moderate knowledge about diabetics, 158 (56.83%) has high attitude about diabetics, and 208 (74.82%) has high self-management.

Considering physical external factors such as level of flood and distance between patient house and hospitals, it is found that 115 patients (41.37%) have 1-2 meters height and 173 patients (62.23%) have less than 10 kilometers distance from house to hospital, and most have high social support(90.29%). This result correlates with the study of Wannee Chansawang and Usanee Petchratachart (2005) who studied about the factors that affect health care of diabetic patients at Namom, Songkla Province. This study found that health care such as diet control, exercise, stress management, medication, and treatment to control complications at moderate level showed positive feedback from sample size towards health care, knowledge and good attitude. Consequentially, this resulted in optimistic self-management of patients.

Sample size of diabetic patients in this study has average FBS lever of 153.89±SD 48.66 mg/dL. This number correlates with the study of *Ram Rangsarn, et al.* (2012) which evaluates Type II diabetic patients and hypertension visiting hospitals of Ministry of Public Health and Bangkok Metropolitan Administration of Thailand NHSO in 2012. This study found volunteers with only Type II diabetes with average mean and standard deviation (Mean±SD) of Fasting Blood Sugar (FBS) equal to 152.89±48.66 mg/dL. Furthermore, those volunteers with Type II diabetes and hypertension have average mean and standard deviation equal to 150.3±55.9 mg/dL. When considered dependent variables which are complications in diabetic patients during the great flood in 2011, found that out of 51 (18.65%) of sample size. 26 (9.35%) have hyperglycemia and 25 (8.99%) have hypoglycemia. This finding happens to show dissociation from the study of Srivit Narathornsawasdikul. (2007) who studied controlled blood glucose level in diabetic patients and related factors at Pichit Hospital during 1 year period. He found that majority of diabetic patients cannot control blood glucose level and maintain the average level as much as 90.5%. In addition, incidence of complication in this study is very close to normal situation, which means that in normal situation 52.4-68% of diabetic patients are unable to control blood glucose level to normal level. Furthermore, this can explain that even during the great flood, diabetic patients have access to health service as seen by service locations that are located less than 10 kilometers from patients' home. Together with individual factors of diabetic patients including moderate knowledge about the disease, positive attitude towards diabetes, affect good self-management.

Also, strong and positive social support is a factor that plays a big role in Thailand and this helps keep the incidence during normal situation and the great flood quite similar.

Objective 2 is to study the relationship between complications which is a major reason that causes complications in diabetic patients during the great flood in 2011 at Phra Nakhon Si Ayutthaya Province.

Considering relationships between different independent variables and dependent variable which is complications in patients, the study found that factors that do not relate to complications are sex, marital status, education level, household income, other underlying disease, duration of disease, knowledge about disease, attitude towards disease, self-management behavior, social support, Cholesterol, Triglyceride, and BMI. This finding is dissimilar to the study of Supaluck Janharn (2003) which found that complications in diabetic patients correlate to the number of years with diabetic treatment. This can be easily said that the longer those patients have the disease, the higher chance of complications. As Duangduen Juntasureeyawich (2009) who studied the effect of complications in diabetic patients at Nonghan Hospital, Udonthani Province found that population factors, economic and social factors, overall life quality, household income and occupation correlate with the complications in diabetic patients. However, Ramphaiwal Nakharin (2010) who studied applied program of using motivation method to prevent diabetes and social support to change behavior to reduce chances of complications in diabetic patients at Ban Po Noi Health Center, Khunhan, Srisaket Province. She found that after the sample size has changed behaviors about the acknowledgement, motivation to prevent disease, self-control blood glucose level and opinions about social support in a positive way. The sample size changed in a better way than before and better than the comparison group with statistically significant level at ($p<0.05$). Also, it is found that the blood glucose level after the experiment of the sample size and the comparison group are statistically significant different at ($p<0.05$). In this study, the sample size group has a high level of social support, so the result of this study pays more attention to good management to control blood glucose level and good behavior and self-management to reduce and delay the complication possibility even though patients have been treated with diabetes for a long period of time.

Whether a factor about diabetic knowledge of diabetic patients relates to the complications, Choochart Sangjaroen (2010) ,did a study about it. He studied a group of patients to prevent complications in diabetic patients at Na Khu, Kalasin Province. He found that knowledge and awareness about the disease correlate to the occurrence complications. Therefore, he used this conclusion as a basis for his program to develop prevention of complications in diabetic patients. His study group has moderate to good knowledge about diabetes.

Factors that correlate with complications with statistically significant level (p-value < 0.05) are age, hypertension , flood stress level , exercise and distance between patient's house and hospital .The sample size group with complications has lower age in average. Also this group is less stress about the great flood situation, less likely to know about the effect the great flood, has higher blood pressure and LDL level and higher blood glucose level than those without complications with statistically significant level at (p-value < 0.05).

In reviewing different literatures such as Jintana Tongpetch (2003), Tobin et al (1986), Glasgow (1997), Jeeranutch Somchok (1997), Waraporn Deesieng (2006),and Saowaluck Khunthawee (2007), it's found that self-management in diabetic patients correlate to the occurrence complications and this can be explained that diabetic patients have moderate stress level and are aware of the effect of great flood. As a result, patients have excellent self-management which helps prevent chances of complications. As Orem theory stated about patient's self-care that self-care is essential when health is a problem, especially diet control, exercise, health management, and follow up process in diabetic patients. If patients manage excellent self-care progression effectively, it will ultimately help them with duty framework and health status to the greatest level. Moreover, this self-care will lower the risk of severity of disease and prevent the risk of complications which can be fatal. Self-care is a behavior that occurs from learning and relates to age, beliefs, habit, awareness, anxiety, attention to problem, and life management. (Tantayothai, and Songdi, 1995)

This study found that minor factor about exercise self-care is a major factor that relates to exercise routine. Glasgow (1997) also studied about factor that correlate to diabetic patient's life quality includes individual and social factors. As for health factor, it is found that sex, age, educational level, household income,

nationality, type of health insurance, complications, and rate of illness. Self-care about exercise is a behavioral factor that directly affects the life quality of the patients. Self-care can predict the life quality of the patients. In conclusion, little education to patients and self-care program can cause an important change in life quality of the patients.

This study found that FBS level and LDL level statistically significant correlate to occurrences complications. It also relates to the findings of Thep Himatongkum, et al., (2000), who studied prevalence of complications in diabetic patients. He found that genetics and other risk factors such as dyslipidemia, hypertension, smoking habits, fat, and lack of exercise do influence the possibility of complications. Another study by Apisith Tianchairoj (2005) concentrated on studying risk factors and prevalence of blood vessel complication in diabetic patients at 5 different hospitals. He found that diabetic patients, who also have long-term hypertension or dyslipidemia, have linear correlation with possibility of major blood vessel complications and lack of blood glucose control. The Diabetes Control and Complications Trial (DCCT) attempts to study different methods to assist diabetic patients control their normal blood glucose level so that there will be less likelihood of occurrence complications. DCCT has found that by maintaining blood glucose at a normal level, diabetic patients are less likely to develop following diseases such as severe hypoglycemia, severe hyperglycemia and progression of early vascular complications in patients with Types 1 diabetes mellitus .

Additionally, this study found that LDL level statistically significantly relates to the occurrence complications. This is linked to the findings of Ram Rangsarn, et al. (2012)., who studied the relationship between LDL level and acute complications in diabetic patients. He found that low-density lipoprotein (LDL) level is related to the acute complication possibility without statistically significant level at 0.05. Volunteers with Type II diabetes who have low-density lipoprotein (LDL) ≥100 mg/dL are more likely to have acute complications than those volunteers with Type II diabetes who have LDL < 100 at 1.0 time (95%CI, 0.9 - 1.2). Diabetic patients who sustain hypertension, hyperglycemia and high LDL level are more likely to develop complications. An increase in LDL which is found in Type II diabetic patients and abnormality of LDL is related to insulin resistance and deinsulin. (Sitprecha, 2013)

Objective 3 is to study the influence of prediction of factors that affect complications in diabetic patients during the great flood in 2011 at Phra Nakhon Si Ayutthaya Province. Data analysis in this study is used to find complication possibility in diabetic patients during the great flood in Phra Nakhon Si Ayutthaya in the year 2011. Results of this study incorporate variables that are statistically significant into an equation to predict possibility of complications, which are flood stress level , FBS level , LDL level. Fasting blood glucose level is the most excellent variable used to predict the possibility of complications during the great flood period. Equation to predict possibility of complications is w = 0.78 - 1.216(flood stress level) + 0.01(FBS level) + 0.021 (LDL level). A proper logistic regression equation to predict possibility of complication is (complications) = 1/1+e-w (Chi-square = 6.017 Sig. = 0.645).

This is associated with the study of Jiraporn Dechma (2010) who studied factors to predict complication possibility in Type II diabetic patients with hyperglycemia. She found that the factor that can be used to predict hyperglycemia is the patient's ability to self-care properly. This is shown by a change in blood glucose level is at 3.0% and is related to the study of William, et al (2006), with the study named "The Hurricane Katrina Aftermath and Its Impact on Diabetes Care." He found that a factor that is necessary to prevent complications is to provide information about knowledge and self-care, and stress management. The Disaster Response Task Force (2007) also studied "American Diabetes Association Statement on Emergency and Disaster Preparedness." This study explains the importance of patient's self-care such as preparation for emergency set, and personnel factor such as preparation of staff for emergency case. The result is also similar to the study of Tang,& Gu, (2012). The name of the study is "The association between early blood glucose fluctuation and prognosis in critically ill patients." This study found that early fluctuation of blood glucose is a significant independent risk factor of mortality in critically ill patients. Control the early fluctuation of blood glucose concentration might improve the patients' outcome.' Therefore, in caring for diabetic patients whether in normal situation or in the great flood situation, the goal should be to control blood glucose level so that it does not significantly fluctuate.

As a result of this study, it can be said that the hyperglycemia, the higher chances of complications. The type of complication is called severe hyperglycemia.

Level that diabetic patients should maintain their blood glucose is suggested by Kuppinger, & Hart (2013) that the blood glucose level should be < 200 mg/dL. He did a study and he found "Eight meta-analyses showed that, despite the intensity of glucose control, the frequency of hypoglycemic episodes increased. The residual heterogeneity of individual studies incorporated into the various meta-analyses prevents a valid conclusion regarding potential benefits of a specific glucose target. A glucose concentration < 200 mg/dL appears preferable."

This is related to the finding of International Diabetes Federation and International Society of Nephrology. Diabetes and Kidney Disease: Time to Act (2003) concludes that factor that affect the occurrence complications in diabetic patients include improper blood glucose level, blood pressure, dyslipidemia, albuminurea , duration of disease, and smoking habit. Therefore, prevention of possibility of complications is to control blood glucose level to normal level. In controlling the level of blood glucose, regular follow-up in blood glucose level and LDL level must be done. American Diabetes Association recommends glucose level before meal should be 90-130 mg/dl, plasma glucose level after meal 1-2 hours should be < 180 mg/dl., level of triglyceride < 150 mg/dl., level of Cholesterol < 200 mg/dl., level of LDL-cholesterol < 100 mg/dl., HDL-cholesterol ≥ 40 mg/dl.

Furthermore, another independent variable can also be used to predict the possibility of complications even though the accuracy is low, is blood pressure. However, it is important to follow up systolic blood pressure < 130 mmHg. diastolic blood pressure < 80 mmHg. Because this factor also associates with the complications. Exercise factor that is found to correlate with complication possibility is linked with the study of Virawan Chanthamul (2011) found that this exercise variable can be used to predict hypertension in patient with Transient Ischemic Attack (TIA). Therefore, diabetic patients should be encouraged and supported to exercise properly and accordingly with patient's health situation and flood situation.

Limitations of the study

In this study, the sample size was 380 people and data was calculated using stratified random sampling of seven districts. Moreover, data collected was increased by 10 percent to arrive at the sample size. In the process of data collection,

incomplete information was part of the problems found. For example, some patients relocated to different provinces. Some patients withdrew from the study. Some did not provide sufficient information, making analysis impossible. As a result, the possible sample size was 278, which is distributed in the 7 districts; representing 73.15 percent of the sample is calculated.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

This chapter provides a conclusion and a number of recommendations drawn from the study's findings.

6.1 Conclusion

This descriptive cross sectional study is to describe characteristics of occurrence complications and independent variable, to study the relationships between occurrence complications and factors affecting complications of diabetic patients, and to study of the predicting factors of the occurrence complication of diabetic patients during the great flood in 2011 in Phra Nakhon Si Ayutthaya Province.

Population in the study were 19443 diabetic patients who were registered for treatment at hospitals in Phra Nakhon Si Ayutthaya Province, during the great flood in 2011 from October,2011 – December, 2011, the calculated sample size was 278 patients. After the moral committee accepted, the study was began to collected the data from the questionnaire which developed by the researcher. The accuracy of the diabetic knowledge testing tool = 0.73, the diabetic attitude = 0.51, self - behavior of diabetic patient = 0.55, social support = 0.90. Data analysis was accomplished by frequency analysis, percentage, mean, and standard deviation. Relative analysis using Chi - square - test and factor analysis by binary logistic regression analysis. The factors in this study were internal factors (genders, ages, religion ,marital status, occupation, education level, income, co morbidity , health status which were duration of diabetic, type of treatment in Diabetes , BMI , blood pressure, FBS level,cholesterol, triglyceride, LDL level , flood stress level , perceived of health effect to the great flood, knowledge and attitude towards diabetics.) and external factors (social support , level of flood, distance between patient's house to hospital) .

The study revealed 278 diabetic patients have average FBS = 153.89 ± SD 48.66, with diabetic complications during the great flood 51 patients (18.65%) which was hyperglycemia 26 patients (9.35%), hypoglycemia 25 patients (8.99%). The significant factors that could predict the occurrence complications were flooding stress level, FBS level and LDL level. The forecasting equation of the complications is $w = 0.78 - 1.216$ (flood stress level) + 0.01 (FBS level) + 0.021 (LDL level), and the regression logistic predicting equation of probability of occurrence complications is $P(\text{occurrence complications}) = 1/1 + e^{-w}$

From the data analysis, can be discussed according to the study objectives as follows :

The first objective : To study diabetic complications and factors that determine diabetic complications during the great flood in 2011 in Phra Nakhon Si Ayutthaya Province.

The study reversed, diabetic patients were 88 males (31.65%) 190 females (68.35%), age of 51 – 60 years(32.73%) 259 Buddhists (93.17%), 188 patients were married (67.63%), mostly graduated from primary school, unemployed, low to absents of income, 116 patients were treated by both pre and post meals medications (41.73%), mostly have hypertension with diabetes, 168 patients (60.43%), duration of diabetes less than 10 years, 194 patients (69.78%).

The second objective: To study of the relationships between diabetic complications and factors that cause diabetic complications during the great flood in 2011 in Phra Nakhon Si Ayutthaya Province considering the relationships between independent and dependent factors is incident of diabetic complication

The factors that statistically significant related to incidence of diabetic complications (p-value < .05) were age, flood stress level , awareness of effects from flood, self - behavior of exercise, hypertension , LDL level. Patients with diabetic complication were found younger, less stressful from flood, awareness of flood, exercise, higher of average BP, lower of LDL level, and higher of average FBS than those without diabetic complication, with statistically significant ($p < .05$).

Factors that not related to incidence of diabetic complications were gender, religious, marital status, occupation, education, income (per month), any other disease

with diabetes, knowledge and attitude about diabetes, self - behavior, social support, Cholesterol, Triglyceride level, and BMI.

The third objective : to study of the predicted of factors effected diabetic complications during the great flood in 2011 in Phra Nakhon Si Ayutthaya.

From the analysis of predicted factors of incidence of diabetic complications during the great flood of 2011 in Phra Nakhon Si Ayutthaya, founded that the statistically significant factors which was in the predicted diabetic complications equation were flood stress level , FBS level , LDL level . The FBS level was the best factor to predict the incidence of diabetic complications.

The predicted incidence of diabetic complications was;

W = 0.78 - 1.216 (flood stress level) + 0.01 (FBS level) + 0.021 (LDL level) and the suitable logistic regression equation of predicted occasion of incidence of diabetic complication equation was :

P (incidence of diabetic complications) = $1/1 + e^{-w}$ (chi-square = 6.017, sig. = 0.645)

Beside, the other independent factor that can be predicted the variation of incidence of diabetic complications, even in a small scale, was hypertension.

6.2 Recommendations

From the study " Occurrence Complication of the Diabetic Patients During the great flood in 2011 in Phra Nakhon Si Ayutthaya Province," it is found that factors with statistically significant to predict the occurrence of complication in diabetic patients during great flood include flood stress level ,FBS level , and LDL level. Therefore, strategy for curing diabetic patients in event of major natural disaster in the future should be in place. As a result, this strategy, if planned properly, should be able to reduce complications in diabetic patients which can occur acutely with situations such as hyperglycemia and hypoglycemia, which are very dangerous to patients.

6.2.1 Recommendations for implementation

The recommendation for implementation based on the finding of this study are as follow:

1) National public health policy in preparing to handle with natural disasters which can mean great flood, earthquake, or other incidences, which when it happens will affect the health situations of diabetic patients. The reasons are that these natural disasters might not allow patients to access health services, or the patients will have to relocate during such time which directly affects the health conditions to citizens. Therefore, Ministry of Public Health should plan or come up with a measure that will systematically and exclusively cover all areas in Thailand. There should be exclusive list of diabetic patients consisting of history of past health information, treatments, and medications. This information should be readily available from central government's computer information system.

2) At provincial level, there should be a central unit in the health care system to coordinate and communicate with crucial information during natural disaster to citizens in such province. Moreover, there should be a follow-up team to evaluate health situations of diabetic patients and other disease during natural disaster subsequently. Most importantly, the evaluation should help improve the overall plan continuously.

3) At the level of health service district, there should be disaster relief plan and patient monitoring plan to take care of patients, especially diabetic patients in the network. There should also be a coordination group to link health services and health support and constant evaluation of citizen's health during major disaster.

4) In the provincial level, preparation for disaster should be administered in the province and health team should exist to take care of the patients in the communities and evacuation centers. It is important to have a plan that can be adjusted accordingly with the current natural disaster that people are facing at the moment, so that the health services provided will be in support of the situation.

5) Treatments for diabetic patients other than continuous medication should consider three important points for effective curing process. These points are proper healthy diet, support for regular exercise to control Fasting Blood Sugar, LDL level and mental health team to take care of patient's emotions. This is due to the fact

that diabetic patients tend to be more concerned and worried which affect the sugar level and chances of complications.

6) Furthermore, district, sub-district, or community should use District Health System as a core management of health services. It should coordinate and invite parties such as Sub-district Administrative Organization, Municipal Administrative Organization, and Provincial Administrative Organization to be part in taking care of diabetic patients. Health service team from County Hospital should be chief in creating a system to cure for diabetic patients during natural disaster. Important factors that should pay special attention include flood stress level, FBS level and LDL level. .

6.2.2 Recommendation for further research

This study produced result that identified certain promising variables which influenced the occurrence of diabetic complication. Further research should study factors that influence occurrence of complications in other chronic diseases such as chronic kidney disease, stroke, and heart disease because these chronic diseases need to be controlled by treatments with proper behavior, proper diet, and proper medication from doctors. All these will help prevent complications in chronic disease patients during the great flood tremendously.

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APPENDICES

APPENDIX A

List of experts

The contents of questionnaires were validated by 5 experts as below

1. Dr.Chathree Jaroenchaiwatthana,M.D.
   Internal Medicine, Phranakhon Si Ayutthaya Hospital , Ayutthaya
2. Dr.Karn JiraThana,M.D.
   Internal Medicine, Phranakhon Si Ayutthaya Hospital , Ayutthaya
3. Dr.Boonthorn Thunworasetthee,M.D.
   Internal Medicine, Phranakhon Si Ayutthaya Hospital , Ayutthaya
4. Dr.Wutthisak Wiboonsirikul,M.D.
   Internal Medicine, Phranakhon Si Ayutthaya Hospital , Ayutthaya
5. Mrs.Onnom Thupaviroj (registered nurse)
   Registered nurse, Phranakhon Si Ayutthaya Hospital , Ayutthaya

APPENDIX B

แบบฟอร์มใบยินยอมให้ทำการวิจัย
โดยได้รับการบอกกล่าวและเต็มใจ (Informed Consent Form)

โครงการวิจัยเรื่อง การเกิดภาวะแทรกซ้อนในผู้ป่วยเบาหวาน ช่วงวิกฤตมหาอุทกภัยปี 2554 จังหวัดพระนครศรีอยุธยา

วันที่ให้คำยินยอม วันที่ .....เดือน.....พ.ศ.....

ข้าพเจ้า (นาย/นาง/นางสาว) .....ขอทำหนังสือนี้ไว้ต่อหัวหน้าโครงการเพื่อเป็นหลักฐานแสดงว่า

ข้อ 1. ก่อนลงนามในใบยินยอมตนให้ทำการวิจัยนี้ ข้าพเจ้าได้รับการอธิบายจากผู้วิจัยให้ทราบถึงวัตถุประสงค์ของการวิจัย กิจกรรมการวิจัย ความเสี่ยง รวมทั้งประโยชน์ที่อาจเกิดขึ้นจากการวิจัย อย่างละเอียด และมีความเข้าใจดีแล้ว

ข้อ 2. ผู้วิจัยรับรองว่าจะตอบคำถามต่าง ๆ ที่ข้าพเจ้าสงสัยด้วยความเต็มใจ ไม่ปิดบัง ซ่อนเร้น จนข้าพเจ้าพอใจ

ข้อ 3. ข้าพเจ้าเข้าร่วมโครงการวิจัยนี้โดยสมัครใจ และข้าพเจ้ามีสิทธิที่จะบอกเลิกการเข้าร่วมในโครงการวิจัยนี้เมื่อใดก็ได้ และการบอกเลิกการเข้าร่วมวิจัยนี้จะไม่มีผลกระทบต่อรักษาที่ข้าพเจ้าจะพึงได้รับต่อไป

ข้อ 4. ผู้วิจัยรับรองว่า จะเก็บข้อมูลเฉพาะเกี่ยวกับตัวข้าพเจ้าเป็นความลับ และจะเปิดเผยได้เฉพาะในรูปที่เป็นสรุปผลการวิจัย การเปิดเผยข้อมูลเกี่ยวกับตัวข้าพเจ้าต่อหน่วยงานต่าง ๆ ที่เกี่ยวข้อง กระทำได้เฉพาะกรณีจำเป็นด้วยเหตุผลทางวิชาการเท่านั้น

ข้อ 5. ผู้วิจัยรับรองว่า หากมีข้อมูลเพิ่มเติมที่ส่งผลกระทบต่อการวิจัย ข้าพเจ้าจะได้รับการแจ้งให้ทราบทันทีโดยไม่ปิดบัง ซ่อนเร้น

ข้าพเจ้าได้อ่านข้อความข้างต้นแล้วมีความเข้าใจดีทุกประการ และได้ลงนามในใบยินยอมนี้ด้วยความเต็มใจ

ลงชื่อ.....ผู้ยินยอม
(.....)

ลงชื่อ.....ผู้วิจัย
(.....)

APPENDIX C

Data collective instruments

เลขที่แบบสอบถาม……

คำชี้แจง

แบบสอบถามชุดนี้สร้างขึ้นเพื่อใช้ในการศึกษาเรื่อง การเกิดภาวะแทรกซ้อนในผู้ป่วยเบาหวานช่วงวิกฤตมหาอุทกภัยปี จังหวัดพระนครศรีอยุธยา

1. ผู้วิจัยขอความกรุณาจากท่านช่วย ตอบข้อคิดเห็นตามความเป็นจริงมากที่สุด โดยท่านไม่ต้องลงชื่อตัวท่านเอง และข้อความต่างๆ ที่ท่านตอบในแบบสอบถามนี้ผู้วิจัยจะถือเป็นความลับส่วนบุคคลไม่นำไปเปิดเผย แต่จะนำไปใช้ประโยชน์ในการศึกษาเท่านั้น
2. แบบสอบถามแบ่งออกเป็น 5ตอน

   ตอนที่ 1 ประกอบด้วย ข้อคำถาม จำนวน 15 ข้อ
   - ก. ข้อมูลทั่วไปของผู้ตอบแบบสอบถาม
   - ข. ภาวะสุขภาพ
   - ค. การรับรู้ความรุนแรงของอุทกภัยที่ส่งผลต่อสุขภาพ
   - ง. ปัจจัยทางกายภาพ

   ตอนที่ 2 ข้อมูลด้านความรู้เกี่ยวกับโรคเบาหวาน จำนวน 15 ข้อ

   ตอนที่ 3 ข้อมูลด้านเจตคติเกี่ยวกับโรคเบาหวาน จำนวน 12 ข้อ

   ตอนที่ 4 ข้อมูลด้านพฤติกรรมการจัดการตนเองของผู้ป่วยเบาหวาน จำนวน 30 ข้อ

   ตอนที่ 5 ข้อมูลแรงสนับสนุนทางสังคม จำนวน 25 ข้อ

3. ขอความกรุณาท่านตอบแบบสอบถามให้ครบทุกข้อตามที่กำหนดไว้ และผู้วิจัย ขอขอบคุณที่ให้ความร่วมมือในครั้งนี้

ขอขอบพระคุณอย่างสูง

นายสุรชัย โชคครรชิตไชย

ผู้วิจัย

ตอนที่ 1 ข้อมูลทั่วไป (ข้อความนี้จะไม่มีผลใดๆต่อผู้ตอบแบบสอบถามเพราะจะถือเป็นความลับ)
คำชี้แจง : กรุณาใส่เครื่องหมาย ✓ ลงในช่องที่ตรงกับความเป็นจริงหรือข้อคิดเห็นของท่านมากที่สุด

1. เพศ ☐ ชาย ☐ หญิง

2. อายุ .....ปี

3. ศาสนา ☐ พุทธ ☐ คริสต์ ☐ อิสลาม ☐ อื่นๆ ระบุ.....

4. สถานภาพ ☐สมรส/คู่ ☐ โสด ☐ หย่า ☐ หม้าย

5. อาชีพ ☐ ไม่ได้ทำงาน ☐ รับราชการ/รัฐวิสาหกิจ
☐ เกษตรกรรม ☐ รับจ้าง
☐ ค้าขาย ☐ อื่นๆ ระบุ.....

6.ระดับการศึกษา☐ ไม่ได้ศึกษา ☐ประถมศึกษา
☐ มัธยมศึกษาตอนต้น ☐มัธยมศึกษาตอนปลาย
☐ประกาศนียบัตรวิชาชีพ ☐อุดมศึกษาหรือสูงกว่า

7. รายได้ต่อเดือน☐ ไม่มีรายได้ ☐ ต่ำกว่า 5,000 บาท
☐ 5,001-10,000 บาท ☐ 10,001-15,000 บาท
☐ 15,001-20,000 บาท ☐มากกว่า 20,000 บาทขึ้นไป

8. ยาลดระดับน้ำตาลในเลือดที่ท่านได้รับมีกี่ชนิด อะไรบ้าง
☐ 1 ชนิด แบบกินก่อนอาหาร ☐ 1 ชนิด แบบกินหลังอาหาร
☐ 2 ชนิด แบบกินก่อนอาหาร และแบบกินหลังอาหาร ☐แบบฉีด

9. โรคประจำตัวอื่นๆ ที่ท่านเป็นร่วมด้วยนอกจากโรคเบาหวาน
☐ ความดันโลหิตสูง ☐ หัวใจ ☐ อื่นๆ ระบุ.....
☐ ภาวะไขมันในหลอดเลือดสูง ☐ ไต

10. ระยะเวลาที่ป่วยเป็นโรคเบาหวาน .....ปี

11. ระดับความสูงของน้ำที่ท่วมบ้าน
☐ไม่ท่วม ☐ระดับต่ำกว่าเข่าลงไป 0.5-1 m ☐ระดับเข่า 1-2m
☐ระดับเอว 2-3m ☐สูงกว่าระดับเอวขึ้นไป >3m

12. ระยะทางจากบ้านถึงสถานพยาบาล.....กิโลเมตร

13. ท่านรู้สึกเครียดต่อสถานการณ์น้ำท่วม ปี 2554 มากน้อยเพียงใด

(ใส่เครื่องหมาย ☒ ในช่องตัวเลขที่ตรงกับความรู้สึกของท่าน)

ไม่เครียด					ปานกลาง					เครียดมากที่สุด
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

14. สถานการณ์น้ำท่วม ปี 2554 นั้น ส่งผลกระทบต่อสุขภาพของท่านมากน้อยเพียงใด

(ใส่เครื่องหมาย ☒ ในช่องตัวเลขที่ตรงกับความรู้สึกของท่าน)

น้อยที่สุด					ปานกลาง					มากที่สุด
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

ตอนที่ 1 (สำหรับผู้วิจัย)

- ที่อยู่ของผู้ป่วย.....
- ประเภทสิทธิการรักษาของผู้ป่วย.....
- ระดับน้ำตาลในเลือดหลังอดอาหาร (FBS) .....mg%
- ระดับไขมันในเลือด Chol =.....TG =.....
- LDL=.....
- ค่าความดันโลหิต.....
- ค่า BMI .....
- สรุปการเกิดภาวะแทรกซ้อนของผู้ป่วยในช่วงมหาอุทกภัย ปี 2554 (ต.ค – ธ.ค. 54)

  ☐ เกิดภาวะน้ำตาลในเลือดสูง ☐ เกิดภาวะน้ำตาลในเลือดต่ำ

  ☐ ไม่เกิดภาวะแทรกซ้อน

ตอนที่ 2 ความรู้เกี่ยวกับโรคเบาหวาน

คำชี้แจง: กรุณาใส่เครื่องหมาย ✓ ลงในช่อง “ถูก” “ผิด” “ไม่แน่ใจ” ที่ตรงกับความคิดและความเข้าใจของท่านในแต่ละข้อคำถามดังต่อไปนี้

คำถามด้านความรู้	ถูก	ผิด	ไม่แน่ใจ
1.หากไม่ได้รับประทานอาหาร ไม่ควรหยุดยาเบาหวานเพราะจะทำให้น้ำตาลในเลือดสูงได้			
2.ในภาวะน้ำท่วมหากท่านหาอาหารไม่ได้ ท่านสามารถดื่มน้ำผลไม้ 1 กล่องแทนได้			
3.กรณีที่ยาท่านหมด การยืมยาเพื่อนบ้านที่เป็นเบาหวาน ไม่สามารถแทนยาของท่านได้			
4.อาการคอแห้ง หิวน้ำบ่อย ปัสสาวะบ่อย เป็นอาการของผู้ที่มีน้ำตาลในเลือดสูง			
5.หากมีอาการน้ำตาลในเลือดสูง ในเบื้องต้นควรให้รับประทานน้ำเปล่าให้มากขึ้น			
6.อาการน้ำตาลในเลือดสูงรุนแรง อาจมีอาการคลื่นไส้อาเจียน เหนื่อยซึม สับสน			
7.หากมีอาการน้ำตาลในเลือดสูงรุนแรง ท่านควรปรับเพิ่มขนาดยาให้มากขึ้นก่อนมาพบแพทย์			
8.อาการน้ำตาลในเลือดต่ำ ได้แก่ เหงื่อออก เพลีย หิว เวียนหัว อ่อนแรง ใจสั่นหรือชีพจรเต้นเร็ว ตาพร่ามัว			
9.อาการน้ำตาลในเลือดต่ำแบบรุนแรง ไม่มีผลต่อระดับความรู้สึกตัว หรือไม่สามารถทำให้เกิดอาการซึม หรือหมดสติได้			
10.ถ้าหากมีอาการน้ำตาลในเลือดต่ำ ควรรีบกินน้ำตาลทันที น้ำหวาน หรือของหวานๆ			
11.หากมีอาการรุนแรงจนถึงขั้นหมดสติ ควรรีบกรอกน้ำตาลหรือน้ำหวานเข้าปากผู้ป่วยทันที			
12.การรับประทานอาหารให้ครบทุกมื้อ เป็นวิธีที่ช่วยป้องกันน้ำตาลในเลือดต่ำได้			

คำถามด้านความรู้	ถูก	ผิด	ไม่แน่ใจ
13.ท่านรู้วิธีการจัดเตรียมอุปกรณ์ เพื่อช่วยแก้ไขภาวะแทรกซ้อนของผู้ป่วยเบาหวานในกรณีฉุกเฉิน			
14.การประคบร้อน เป็นวิธีช่วยบรรเทาอาการเท้าชาได้ดีสำหรับผู้ป่วยเบาหวาน			
15.ยาทาฆ่าเชื้อรา ช่วยบรรเทาอาการน้ำกัดเท้าได้			

ตอนที่ 3 เจตคติเกี่ยวกับโรคเบาหวาน

คำชี้แจง : กรุณาใส่เครื่องหมาย ✓ ลงในช่องที่ตรงกับความคิดเห็นของท่าน (เลือกเพียงคำตอบเดียว)

เห็นด้วยอย่างยิ่ง	หมายถึง	ข้อความในประโยคตรงกับความรู้สึกของผู้ตอบมากที่สุด
เห็นด้วย	หมายถึง	ข้อความในประโยคตรงกับความรู้สึกของผู้ตอบค่อนข้างมาก
ไม่แน่ใจ	หมายถึง	ข้อความในประโยคตรงกับความรู้สึกของผู้ตอบปานกลาง
ไม่เห็นด้วย	หมายถึง	ข้อความในประโยคตรงกับความรู้สึกของผู้ตอบน้อยมาก
ไม่เห็นด้วยอย่างยิ่ง	หมายถึง	ข้อความในประโยคไม่ตรงกับความรู้สึกของผู้ตอบเลย

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
เจตคติด้านการควบคุมโรค					
1. โรคเบาหวานเป็นโรคที่ไม่มีอันตรายต่อสุขภาพ					
2. การออกกำลังกายสม่ำเสมอจะช่วยลดระดับน้ำตาลในเลือดได้					
3. การรักษาสุขภาพช่องปากทำให้ระดับน้ำตาลในเลือดลดลง					
4. การควบคุมอาหารมีผลต่อระดับน้ำตาลในเลือด					
5. ผู้ป่วยเบาหวานมีโอกาสเกิดโรคแทรกซ้อนได้ ถ้าควบคุมระดับน้ำตาลในเลือดไม่ดี					
6. การมาตรวจตามแพทย์นัดทุกครั้งมีความสำคัญในการควบคุมระดับน้ำตาลในเลือด					

ข้อความ	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
7. การเป็นโรคเบาหวานทำให้ยุ่งยากในการเตรียมตัวเพิ่มขึ้นเมื่อต้องเดินทางเช่น ต้องเตรียมอาหาร ยา					
เจตคติเกี่ยวกับการใช้ยา 8. ถ้าจะใช้ยาสมุนไพร จะต้องหยุดยาเบาหวานที่ได้รับจากโรงพยาบาล					
9. การกินยาลดระดับน้ำตาลในเลือดทุกวันเป็นภาระสำหรับท่าน					
เจตคติเกี่ยวกับสังคม และการปรับตัว 10. การเป็นโรคเบาหวานก็สามารถดำเนินชีวิตอย่างเป็นปกติสุขได้					
11. การเป็นโรคเบาหวานทำให้ท่านมีส่วนร่วมในกิจกรรมของครอบครัวและชุมชนน้อยลง					
12. ท่านคิดว่ากำลังใจและการดูแลเอาใจใส่จากครอบครัวเป็นสิ่งสำคัญในการดำเนินชีวิตของผู้ป่วยเบาหวาน					

ตอนที่ 4 พฤติกรรมการจัดการตนเองของผู้ป่วยเบาหวาน ในช่วงเกิดภาวะอุทกภัย ปี 2554

คำชี้แจง :กรุณาใส่เครื่องหมาย ✓ ลงในช่องที่ตรงกับการปฏิบัติของท่าน (เลือกเพียงคำตอบเดียว)

ข้อความ	สม่ำเสมอ	บ่อย	บางครั้ง	นานๆ ครั้ง	ไม่เคยเลย
ด้านการควบคุมอาหาร 1. ท่านดื่มชา กาแฟ และเครื่องดื่มที่มีแอลกอฮอล์					
2. ท่านกินผลไม้หรืออาหารที่มีรสหวานจัด เช่น ข้าวเหนียวมะม่วง ลำไย น้ำอัดลม					
3.ท่านรับประทานอาหารตรงเวลา					
4.ท่านหลีกเลี่ยงอาหารที่มีรสเค็ม					
5.ท่านหลีกเลี่ยงอาหารที่มีไขมัน เช่นเนื้อสัตว์ติดมัน กะทิ					
ด้านการออกกำลังกาย 6. ท่านออกกำลังกายอย่างเหมาะสม เช่นเดินติดต่อกันอย่างน้อย15 นาที					
7.ท่านดื่มน้ำเปล่าอย่างเพียงพอเมื่อออกกำลังกาย					
8.ท่านออกกำลังกายในสถานที่ที่ปลอดภัยและมีผู้อื่นอยู่ด้วย					
9.เมื่อมีอาการผิดปกติ เช่น เวียนศีรษะหน้ามืด แน่นหน้าอกท่านจะหยุดออกกำลังกาย					
ด้านการดูแลสุขภาพอนามัย 10.ท่านทำความสะอาดร่างกาย อย่างน้อยวันละ 2 ครั้ง					
11.ท่านดูแลเท้าให้แห้งและสะอาด					
12.ท่านระมัดระวังไม่ให้เกิดแผลที่ผิวหนัง					
13. ท่านปฏิบัติตามคำแนะนำของเจ้าหน้าที่ในโรงพยาบาลเกี่ยวกับการปฏิบัติตัว					

ข้อความ	สม่ำเสมอ	บ่อย	บางครั้ง	นานๆ ครั้ง	ไม่เคยเลย
ด้านการใช้ยา 14.ท่านรับประทานยาเบาหวานตรงเวลาตามที่แพทย์สั่ง					
15.ท่านไม่เคยเพิ่มหรือลดขนาดยาเบาหวานด้วยตนเอง					
16.ท่านไม่เคยยืมยาเบาหวานจากผู้อื่นรับประทานแทน					
17.ท่านไม่ใช้ยาสมุนไพรในการรักษาโดยไม่ปรึกษาแพทย์ก่อนใช้					
ด้านการติดตามการรักษา 18.ท่านไปตรวจระดับน้ำตาลในเลือดและพบแพทย์ตามนัดทุกครั้ง					
19.ท่านซักถามข้อมูลเกี่ยวกับผลการตรวจและผลการรักษาโรคเบาหวานของตนเองทุกครั้งเมื่อรับบริการ					
20. เมื่อท่านออกจากบ้านท่านเตรียมตัวในการเดินทางในเรื่องการเตรียมยา อาหารเครื่องดื่ม					
ด้านป้องกันภาวะแทรกซ้อน 21.ท่านพกน้ำตาล ลูกอมหรือขนมหวานติดตัวไว้เสมอ					
22.หากมีอาการตัวสั่น เหงื่อออก คล้ายจะเป็นลม ท่านจะรับประทานอาหารที่มีน้ำตาลหรือแป้ง					
23.ท่านบอกกล่าวสมาชิกในครอบครัวท่านให้ทราบถึงวิธีช่วยเหลือเมื่อท่านมีอาการน้ำตาลในเลือดต่ำหรือสูง					
24.ท่านพกสมุดประจำตัวผู้ป่วยเบาหวานติดตัวไว้เมื่อไปธุระนอกบ้าน					

ข้อความ	สม่ำเสมอ	บ่อย	บางครั้ง	นานๆ ครั้ง	ไม่เคยเลย
25.ท่านปรึกษาแพทย์ถึงภาวะแทรกซ้อนของท่านเป็นประจำ					
การดูแลสุขภาพจิตและการบริหารความเครียด 26.ท่านปฏิบัติกิจกรรมทางศาสนา					
27.ท่านพักผ่อนนอนหลับอย่างน้อยวันละ 8 ชั่วโมง					
28.ท่านเข้าร่วมกิจกรรมกับเพื่อนบ้าน หรือชุมชน					
29.เมื่อท่านรู้สึกเครียดท่านจะระบายให้ผู้อื่นฟัง					
30.เมื่อท่านรู้สึกโกรธท่านสามารถระงับอารมณ์ได้อย่างถูกวิธี					

ตอนที่ 5 แบบสอบถามแรงสนับสนุนทางสังคม

คำชี้แจง:กรุณาใส่เครื่องหมาย (/) ในข้อความที่ท่านเห็นว่าปฏิบัติตรงกับความเป็นจริง

การสนับสนุนทางสังคม (จากครอบครัว ชุมชน บุคลากรสาธารณสุข)	**เห็นด้วยอย่างยิ่ง**	**เห็นด้วย**	**ไม่แน่ใจ**	**ไม่เห็นด้วย**	**ไม่เห็นด้วยอย่างยิ่ง**
จากครอบครัว 1.คนใกล้ชิดคอยให้กำลังใจท่าน					
2.คนใกล้ชิดทำให้ท่านรู้สึกอบอุ่นมั่นใจ ปลอดภัย					
3.คนใกล้ชิดไม่ทำให้ท่านรู้สึกว่าถูกทอดทิ้งหรืออยู่อย่างโดดเดี่ยว					
4.คนใกล้ชิดทราบปัญหาในการควบคุมระดับน้ำตาลในเลือดของท่าน					
5.บุตรหลานให้ความเคารพนับถือท่าน					
6.คนใกล้ชิดเห็นว่าท่านเป็นคนมีคุณค่าสำหรับครอบครัว					
7.ครอบครัวท่านเปิดโอกาสให้ท่านมีส่วนร่วมแสดงความคิดเห็นในเรื่องต่างๆ					
8.คนใกล้ชิดคอยดูแลที่อยู่อาศัย ที่หลับนอน ในสภาวะน้ำท่วมให้ท่านอยู่อย่างสะดวกสบาย					
9.คนใกล้ชิดในครอบครัวให้เงินท่านเป็นประจำ					
10.คนใกล้ชิดคอยจัดหาอาหารที่เหมาะสมกับสุขภาพท่านเสมอ					
11.คนในครอบครัวคอยดูแลช่วยเหลือท่านเมื่อท่านไม่สบาย					
12.คนในครอบครัว ทำให้ท่านรู้สึกผ่อนคลายเมื่อท่านไม่สบายใจ					
จากชุมชน 13.ชุมชน แจ้งข้อมูลข่าวสารด้านสุขภาพให้ท่านทราบเป็นประจำ					

การสนับสนุนทางสังคม (จากครอบครัว ชุมชน บุคลากรสาธารณสุข)	**เห็นด้วยอย่างยิ่ง**	**เห็นด้วย**	**ไม่แน่ใจ**	**ไม่เห็นด้วย**	**ไม่เห็นด้วยอย่างยิ่ง**
14.ชุมชน นำอาหารและยาที่จำเป็นมาแจกให้ท่านอย่างทั่วถึง					
15.ชุมชนร่วมมือกันดูแลสิ่งแวดล้อมที่ปลอดภัย					
16.เพื่อนบ้านไปมาหาสู่ท่านอย่างสม่ำเสมอ					
17.เพื่อนบ้านคอยดูแลให้ความช่วยเหลือเมื่อท่านต้องการ					
18.ท่านมีโอกาสได้ร่วมกิจกรรมส่งเสริมสุขภาพภายในหมู่บ้านท่าน					
จากบุคลากรสาธารณสุข 19.บุคลากรสาธารณสุขคอยอำนวยความสะดวกในการเข้ารับบริการตรวจรักษาในสภาวะน้ำท่วม					
20.บุคลากรสาธารณสุขคอยให้ข้อมูลการปฏิบัติตัวในภาวะน้ำท่วมสำหรับผู้ป่วยเบาหวานให้แก่ท่าน					
21. ในสภาวะน้ำท่วม บุคลากรสาธารณสุขมาให้บริการถึงบ้านท่าน					
22. ในสภาวะน้ำท่วมบุคลากรสาธารณสุขมีอุปกรณ์การดูแลตรวจรักษาที่พร้อมใช้เหมือนสภาวะปกติ					
23.บุคลากรสาธารณสุขจัดหายาให้ได้ครบถ้วนเพียงพอแม้อยู่ในสภาวะน้ำท่วม					
24.ในภาวะน้ำท่วม ท่านยังคงสามารถไปรับบริการสุขภาพได้สะดวก					
25.เมื่อมีปัญหาหรือข้อสงสัยเกี่ยวกับความเจ็บป่วยท่านยังคงสามารถซักถามบุลากรสาธารณสุขได้สะดวก					

ขอขอบพระคุณอย่างสูง

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