Factors associated with glycemic control level among Type 2
Diabetes Mellitus patients at Public Health Centers in Bangkok,
Thailand

Miss Uraiwan Thamkhuru

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

A Thesis Submitted in Partial Fulfillment of the Requirements
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ปัจจัยที่มีความสัมพันธ์กับการควบคุมระดับน้ำตาลในเลือดของผู้ป่วยเบาหวานชนิดที่ 2 ใน
ศูนย์บริการสาธารณสุข กรุงเทพมหานคร ประเทศไทย

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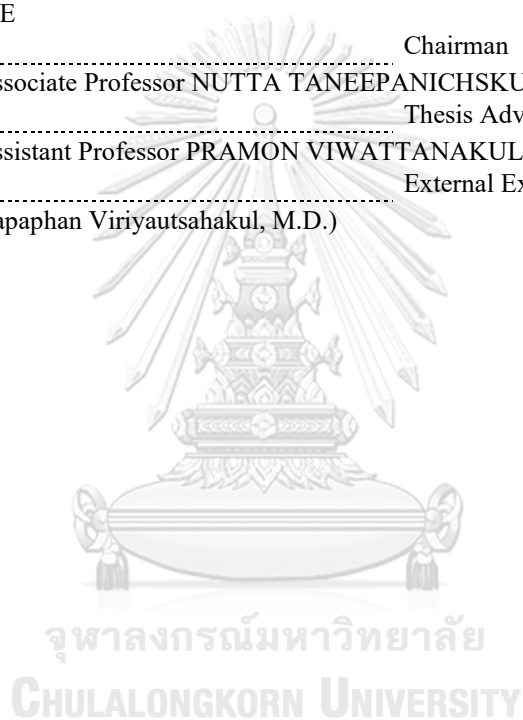
-- Dean of the COLLEGE OF PUBLIC HEALTH SCIENCES
(Professor CHITLADA AREESANTICHAI, Ph.D.)

THESIS COMMITTEE

-- Chairman
(Associate Professor NUTTA TANEEPANICHSKUL, Ph.D.)

-- Thesis Advisor
(Assistant Professor PRAMON VIWATTANAKULVANID, Ph.D.)

-- External Examiner
(Napaphan Viriyautsahakul, M.D.)

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CHULALONGKORN UNIVERSITY

อุไรวรรณ ทำบุร : ปัจจัยที่มีความสัมพันธ์กับการควบคุมระดับน้ำตาลในเลือดของผู้ป่วยเบาหวานชนิดที่ 2 ในศูนย์บริการ
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ความสำคัญและที่มา(Rational and background): โรคเบาหวานชนิดที่ 2 เป็นปัญหาสำคัญของสาธารณสุขในหลายประเทศ เพราะเหตุ
นี้โรคเบาหวานชนิดที่ 2 จึงเป็นปัญหาสาธารณสุขที่สำคัญของประเทศไทย ในปี ค.ศ. 2019 พบว่ามีผู้ป่วยเบาหวานชนิดที่ 2 แบบลงทะเบียน จำนวน 14,025
คน ที่เข้ารับการรักษาที่ศูนย์บริการสาธารณสุข สำนักอนามัย ในเขตพื้นที่กรุงเทพมหานครจำนวน 68 แห่ง ผู้ป่วย จำนวน 7,283 คน (52%) ไม่สามารถควบคุม
ระดับน้ำตาลในเลือดได้ (HbA1C ≥ 7%) และ ผู้ป่วย จำนวน 6,742 คน (48%) สามารถควบคุมระดับน้ำตาลในเลือดได้ HbA1C <7% (BMA,
2019).
วัตถุประสงค์(Objective): งานวิจัยนี้มีวัตถุประสงค์เพื่อหาสัดส่วนของจำนวนผู้ป่วยโรคเบาหวานชนิดที่ 2 ที่สามารถควบคุมระดับน้ำตาลในเลือด
และไม่สามารถควบคุมระดับน้ำตาลในเลือด เพื่อหาระดับของสมรรถนะแห่งตน พฤติกรรมการดูแลตนเอง และ แรงสนับสนุนทางสังคมของผู้ป่วยโรคเบาหวานชนิดที่ 2
เพื่อหาปัจจัยที่มีความสัมพันธ์กับการควบคุมระดับน้ำตาลในเลือดของผู้ป่วยโรคเบาหวานชนิดที่ 2 ในศูนย์บริการสาธารณสุข กรุงเทพมหานคร ประเทศไทย และเพื่อ
สำรวจแรงสนับสนุนทางสังคมที่ผู้ป่วยโรคเบาหวานชนิดที่ 2 ได้รับมากที่สุด
ระเบียบวิธีวิจัย (Methodology): การศึกษาครั้งนี้ใช้การศึกษาภาคตัดขวาง (Cross-sectional Study) การศึกษาครั้งนี้มีผู้เข้าร่วมจำนวน
411 คน จากศูนย์บริการสาธารณสุข สำนักอนามัย กรุงเทพมหานคร จำนวน 5 แห่ง โดยการสัมภาษณ์แบบตัวต่อตัวโดยใช้แบบสอบถาม เทคนิคการสุ่มตัวอย่าง
การศึกษาครั้งนี้ใช้การสุ่มตัวอย่างแบบเจาะจง (purposive sampling) และการสุ่มตัวอย่างอย่างง่าย (Simple random sampling) มีการใช้สถิติเชิง
พรรณนาเพื่ออธิบายลักษณะของผู้เข้าร่วม การวิเคราะห์ bivariate analysis ใช้เพื่อระบุปัจจัยที่เกี่ยวข้อง (Crude Odds Ratio) กับระดับระดับน้ำตาล
สะสมในเลือด (ค่า p-value < 0.2) และใช้การวิเคราะห์พหุตัวแปร (multivariable model (binary logistic regression analysis) ถูก
นำมาใช้เพื่อระบุปัจจัยที่มีความสัมพันธ์ (Adjusted Odds Ratio) กับตัวแปรตาม (ระดับน้ำตาลสะสมในเลือด) อย่างมีนัยสำคัญทางสถิติที่ p-value <0.05
ผลการวิจัย (Result): ผู้เข้าร่วมจำนวน 214 คน (52.1%) สามารถควบคุมระดับน้ำตาลในเลือด (HbA1C<7%) ในขณะที่ผู้เข้าร่วม
197 คน (47.9%) ควบคุมระดับน้ำตาลในเลือดไม่ได้ (HbA1C ³ 7%) ผู้เข้าร่วมส่วนใหญ่มีการรับรู้สมรรถนะแห่งตนในระดับปานกลาง 248 คน
(60.3%) พฤติกรรมการดูแลตนเองระดับปานกลาง 248 คน(60.3%) และแรงสนับสนุนทางสังคมระดับปานกลาง 129 คน (31.4%) Adjusted Odds
Ratio ของการควบคุมระดับน้ำตาลในเลือดไม่ได้จะได้เพิ่มขึ้นตามระดับของสมรรถนะแห่งตน พฤติกรรมการดูแลตนเอง และแรงสนับสนุนทางสังคมในระดับที่สูงขึ้น
ผู้เข้าร่วมงานวิจัยจำนวน 110 คน (55.8%) ได้รับแรงสนับสนุนทางสังคมจากแพทย์ (กลุ่มสนับสนุนทางสังคมรอง) และสามารถควบคุมระดับน้ำตาลในเลือดได้
(HbA1C <7%) ผู้เข้าร่วมงานวิจัยจำนวน 52 คน (44.4%) ที่ได้รับแรงสนับสนุนทางสังคมจากครอบครัว (กลุ่มสนับสนุนทางสังคมหลัก) ที่มีระดับน้ำตาล
สะสมในเกณฑ์เลือดควบคุม (HbA1C <7%)
สรุปผล (Conclusion): ผลจากการศึกษานี้สามารถนำไปใช้ในการพัฒนาโปรแกรมส่งเสริมสุขภาพสำหรับผู้ป่วยโรคเบาหวานชนิดที่ 2 กลุ่มผู้ป่วย
ครอบครัว เพื่อน และอาสาสมัครสาธารณสุขในศูนย์บริการสาธารณสุข สำนักอนามัย กรุงเทพมหานคร เพื่อปรับปรุงระดับการควบคุมระดับน้ำตาลในเลือดให้อยู่ในเกณฑ์
ที่ดีขึ้น

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สาขาวิชา	สาธารณสุขศาสตร์	ลายมือชื่อนิสิต ....
ปีการศึกษา	2566	ลายมือชื่อ อ.ที่ปรึกษาหลัก ....

6178870353 : MAJOR PUBLIC HEALTH

Uraiwan Thamkhuru : Factors associated with glycemic control level among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand. Advisor: Asst. Prof. PRAMON VIWATTANAKULVANID, Ph.D.

Background: Type 2 Diabetes Mellitus becomes a major health problem in many countries. Consequently, Type 2 DM is one of important public health problems in Thailand. In 2019, there are 14,025 registered cases of Type 2 DM that received health care services at 68 Public Health Centers, Bangkok Metropolitans Administration while 7,283(52%) of them were uncontrolled blood sugar; HbA1C $\geq$ 7% , and 6,742 (48%) were control blood sugar level; HbA1C <7% (BMA, 2019).

Objective: This study aims to determine the proportion of uncontrolled and controlled level of glycemic control, to explore levels of self-efficacy, self-care behaviors, and social support, and to identify the influencing factors on Glycemic Control among Type 2 DM patients at Public Health Centers in Bangkok, Thailand. Last, this study aims to describe which social support channels that Type 2 DM patients at Public Health Centers in Bangkok, Thailand acquires.

Method: A Cross-sectional Study was used in this study. 411 participants from 5 Public Health Centers, Bangkok Metropolitan Administration (BMA) was conducted in this study by face-to-face interview based on the questionnaire. Sampling technique, this study used purposive sampling and simple random sampling technique. Descriptive statistics were used to describe the characteristics of participants. The bivariate analysis was used to identify factors associated (a crude odds ratio) with glycemic control level (p-value < 0.2). A multivariable model (binary logistic regression analysis) was used to identify factors associated (an adjusted odds ratio) with the dependent variable (glycemic control level). The association was declared significant at p-value < 0.05.

Result: 214 (52.1%) of participants were controlled glycemic level (HbA1C<7%), while 197(47.9%) of participants were uncontrolled glycemic level (HbA1C ³ 7%). Most of the Participants had medium self-efficacy 248(60.3), medium self-care behavior 248(60.3), and moderate social support 129(31.4). Adjusted Odds Ratio of uncontrol glycemic control increased with higher level of self-efficacy, self-care behavior, and social support. 110(55.8) of participants who acquired social support from the doctor (secondary social support group) with control glycemic level (HbA1C <7%). 52(44.4) of participants who acquired social support from their family (primary social support group) with control glycemic level (HbA1C <7%).

Conclusion: The findings of this study could be used to develop an intervention program for Type 2 DM patients, patient group, family, friends, and public health volunteers at Public Health Centers in Bangkok (BMA)in order to improve the glycemic control level.

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Field of Study:	Public Health	Student's Signature	
Academic Year:	2023	Advisor's Signature	

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CHAPTER I
INTRODUCTION

1.1 Background and Rationale

Diabetes Mellitus (DM) is a chronic non-communicable disease characterized by elevated levels of blood glucose resulting from defects in insulin secretion, insulin action, or both. The disease conditions occur when the body cannot use insulin effectively, or the pancreas cannot produce sufficient insulin. Insulin is the hormone that is responsible for blood sugar control. The common effect of uncontrolled Diabetes is a high blood sugar level called hyperglycemia. There are many types of diabetes, but the most common one is Type 2 Diabetes Mellitus. DM can cause severe illnesses in human organs like the heart, eyes, a n d kidneys (Roglic et al., 2016). Currently, almost 90% of diabetes cases are Type 2, which is rapidly becoming more prevalent due to factors such as obesity, lack of physical activity, hypertension, alcohol intake, smoking, and family history According to a World Health Organization report, diabetes was the direct cause of 1.6 million deaths. Moreover, over 400 million adults worldwide are diagnosed with DM (WHO, 2018).

According to these issues, Diabetes Mellitus (DM) is a prevalent health issue in both low-income and high-income countries (Goyal et al., 2020). Sixty percent of individuals with Type 2 diabetes in the Southeast Asia Region are Asian. In 2019, there were 88 million adults aged 20-79 with Type 2 diabetes in Asia, and 57% were undiagnosed. 1.2 million Asians died from Type 2 diabetes in 2019. The International Diabetes Federation (IDF) estimated that total cases of the disease will increase to 153 million in 2045(IDF, 2019).

In South Asia, the morbidity of Type 2 Diabetes Mellitus is increasing speedily, around 150% between 2000 and 2035. Currently, social contexts such as the elderly, urbanization, and lifestyle have changed. Those social contexts are the major determinants of health among type 2 DM patients. As a result, Type 2 DM impacts on many developing countries. The situation affects not only th e health care system but also social and economic problems. There are many countries in the region

confronted with this problem. Therefore, DM is a burden for national and, certainly, worldwide development (Nanditha et al., 2016)

In Thailand, the DM situation was also consistent with the cross-country survey in the Inter-Asia study, which reported the prevalence of type 2 DM was 9.8 percent, This prevalence was doubling the number compared to the number forecast by WHO (Shen et al., 2016). In Thailand, the incidence of Type 2 DM reported by the Ministry of Social Development and Human Security of Thailand was 1,726.43 per 100,000 population (Khamthana et al., 2019). In Thailand, diabetes is a prevalent health concern, with a prevalence rate of 9.9% among the adult population. Approximately 90% of the cases are type 2 diabetes (T2DM), and it is one of the leading causes of death in the country. Thailand has the seventh-largest diabetic patient population in the Western Pacific region (Tunsuchart et al., 2020).

Thailand is an upper-middle-income country with a population of approximately 67 million. According to the WHO report the prevalence of diabetes among Thai adults aged 30 and over is 9.6%. Consequently, DM is one of the important public health problems in Thailand. According to the prevalence of Type 2 Diabetes Mellitus in Thai people, mostly found in age $\geq$ 30 years old (DAT, 2017) (WHO, 2016a).

The prevalence of the disease increased rapidly from 6.9% in 2009 to 8.9% in 2017. At present, 4 million Type 2 DM patients in Thailand still lack an appropriate treatment that will lead to severe symptoms such as Diabetic Retinopathy, Chronic Kidney Disease, Cardiovascular Disease, Stroke, and Diabetic Foot Ulcer, which affect the quality of life, economic status including patients, their family, and country (DAT, 2017). The Controlling of blood sugar level is one of the Key Performance Indicators (KPI) of the Ministry of Public Health and Bangkok Metropolitans Administration. The goal of this parameter is Type 2 DM patients should control blood sugar level $\geq$ 35%. The formula for this parameter is as follows;

Equation 1: The controlling Blood Sugar KPI Formula

$$\frac{A(\textit{Number of Type 2 DM were control blood sugar level})}{B(\textit{Total number of Type 2 DM patients})} \; x \; 100\%$$

The prevalence of controlled and uncontrolled Type 2 Diabetes Mellitus in Thailand: Out of 2,944,296 patients in the 13th Area Health, only 747,518 (25.39%) were able to achieve their blood sugar level in the 2019 fiscal year (HDC, 2020).

The Department of Non-communicable Disease Control reported the prevalence of Diabetes, which is top 5 of non-communicable diseases in every district health system management. The majority of Type 2 Diabetes Mellitus in Bangkok; there were 75,164 Diabetes cases (1,345.50 per 100,000 population) in 2017, and It increased to 79,362 (1,423.51 per 100,000 population) in 2018 (DNCDs, 2018).

In 2019, a total of 14,025 cases of Type 2 Diabetes Mellitus were registered and received healthcare services across 68 Bangkok Public Health Centers under the Bangkok Metropolitan Administration. Among them, 7,283 cases (52%) had uncontrolled blood sugar with HbA1C levels of $\geq$ 7%, while 8,256 cases (48%) had controlled blood sugar levels with HbA1C levels of < 7% (BMA, 2019).

To address the issues of DM, the concept of self-efficacy, the belief of individuals in their ability for their actions to achieve desired results, has been used for several years. The concept has been applied to assist Type 2 DM patients achieve clinical outcomes, especially in HbA1c control level through medications and treatment, exercise, and healthy food consumption. Self-efficacy also affects the change of self-care behaviors, and patients use their knowledge and skill to practice health behaviors such as eating healthy food, exercising routinely, managing emotions, etc. Both concepts have been used widely to support DM patients to achieve their clinical outcomes and improve their quality of life. Another important factor is social support, a group of people who receive assistance and care from each other through informational, instrumental, appraisal, and emotional support. One study reported that social support in DM is an essential component of mental health promotion, contributing to a person's feelings towards belonging in social

networking. Although all of these concepts and strategies were used in DM patients, Thailand, especially in Bangkok, still has a high number of DM patients, which are more than 64,000 people. Also, the ratio of DM patients is 1,129.25 per hundred thousand population, and there is a high number of DM patients with uncontrolled blood sugar level (DNCDs, 2015). Therefore, this current study aims 1) To find the proportion of uncontrolled and controlled level of blood sugar among Type 2 DM patients at Health Centers in Bangkok 2) To determine the influencing factors such as general characteristics, clinical characteristics, self-efficacy, self-care behaviors and social support on blood sugar level among Type 2 DM patients at Health Centers in Bangkok 3) To explore social support level Type 2 DM patients at Health Center in Bangkok have 4) To describe which channels of social support Type 2 DM patients at Health Centers in Bangkok acquire.

1.2 Research questions

- What are the proportion of uncontrolled and controlled level of glycemic control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand?

- What self-efficacy, self-care behaviors, and social support level do Type 2 Diabetes Mellitus at Public Health Centers in Bangkok, Thailand receive?

- What are the influencing factors (general characteristics, health status, self-efficacy, self-care behaviors, and social support) on glycemic Control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand?

- Which social support ch a n n e l s do Type 2 Diabetes Mellitus at Public Health Centers in Bangkok, Thailand acquire?

1.3 Research Objective

- To determine the proportion of uncontrolled and controlled level of glycemic control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand.

- To explore levels of self-efficacy, self-care behaviors, and social support among Type 2 DM patients at Public Health Centers in Bangkok, Thailand

- To identify the influencing factors (general characteristics, health status, self-efficacy, self-care behaviors, and social support) on Glycemic Control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand.

- To describe which social support channels that Type 2 DM patients at Public Health Centers in Bangkok, Thailand acquires.

1.4 Study Hypothesis

- There is an association between general characteristics and glycemic control at Public Health Centers among Type 2 Diabetes Mellitus patients in Bangkok, Thailand.

- There is an association between health status and glycemic control at Public Health Centers among Type 2 Diabetes Mellitus patients in Bangkok, Thailand.

- There is an association between self-efficacy and glycemic control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand.

- There is an association between self-care behaviors and glycemic control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand.

- There is an association between social support level and glycemic control among Type 2 Diabetes Mellitus patients at Public Health Centers in Bangkok, Thailand

1.5 Conceptual Framework

Independent Variable
General characteristic
- Gender
- Age
- Income
- Education level
- Marital status
- Family history of Diabetes

Health Status
- Body mass index (BMI)
- Blood pressure(mmHg)
- Duration of Diabetes
- Smoking
- Alcohol drinking
- Co-morbidity

Self- efficacy
- Regimen self-efficacy
- Diet management self-efficacy
- Physical activity self-efficacy
- Monitoring self-efficacy

Self-care behaviors
- Healthy diet
- Physical activities
- Medication
- Continuous care
- Emotional

Social Support
- Emotional support
- Information support
- Instrumental support
- Appraisal support

Dependent Variable

Glycemic Control Level (HbA1C)
- **Control** (HbA1c < 7 %)
- **Uncontrol** (HbA1c ≥7%)

Social Support Channel
- Doctor
- Nurse
- Public Health Officer
- Pharmacist
- Health Volunteer
- Support group
- Family
- Friend

Figure 1: Conceptual Framework

1.6 Operational Definitions

Type 2 Diabetes Mellitus is a type of diabetes characterized by high blood sugar, insulin resistance, and a relative lack of insulin. It was formerly known as adult-onset diabetes.

Glycemic control: a medical term mentioned to categorize concentrations of blood sugar or glucose level in individuals with Type 2 Diabetes Mellitus, for example, fasting blood sugar, and hemoglobin (HbA1C). There are two levels of glycemic control levels including control glycemic level **(** HbA1c < 7 % **)** and uncontrol control glycemic level **(**HbA1c ≥7%**)**.

Hemoglobin (HbA1C): is a type of glucose-bound hemoglobin (a blood pigment carrying oxygen). The blood glucose assessment for HbA1c level is regularly composed in Type 2 Diabetes Mellitus. The level of HbA1C is presented of how well of blood sugar control for three months.

HbA1C assessment is useable to determine how healthy Type 2 Diabetes Mellitus planning, for example, medications, physical exercise, and nutritional changes. Measurement and HbA1C assessment depend on the electrical charge on the molecule of HbA1c, which is different from the charges on other components of hemoglobin. Type 2 Diabetes Mellitus patients are categorized into two groups: controlled diabetics with a glycemic level under 7% (HbA1c < 7%) and uncontrolled diabetics with a glycemic level of 7% or higher (HbA1c ≥7%).

Type 2 DM patients test blood sugar level by HbA1c testing every 3 months at the diabetes clinic or non-communicable disease clinic at hospitals or Health Centers. According to the American Diabetes Association, HbA1c values at < 7% are regarded as controlled, while HbA1C at ≥7% are uncontrolled (BMA, 2019). HbA1C assessment results for the updated result (not more than 6 months) were obtained from the patient's medical records or patient profile.

Co-morbidity is the disease or medical condition that occurs in addition to an index disease.

Self-efficacy: the judgment or trust of personalities on their capability for action courses needed to achieve designed performance and expect results. There are 4 dimensions of self-efficacy, including regimen self-efficacy, diet management self-efficacy, physical activity self-efficacy, and monitoring self-efficacy.

Self-care behaviors: the concept that patients use their knowledge and skills to practice health behaviors. Self-care behaviors include healthy food, physical activities, medication, continuous care, and emotions.

Social-Support is defined as a measurement of a personality's perception of how much they obtain social support and it has been tested on different types of people. It consists of two sub-scales, including primary and secondary level.

The primary group of social support is small and characterized by close, personal, and intimate relationships that last a long time, maybe a lifetime. The members typically include family and friends.

The secondary groups of social support are the temporary relationships that are goal- or task-oriented and are often found in health care providers, doctors, public health officers, nurses, health volunteers, and patient groups.

There are four dimensions of social support: emotional support, information support, medication support, instrumental support, and appraisal support.

The social support channel include family, friends, doctors, public health officers, nurses, health volunteers, and patient groups.

1.7 Variable of this research

Independent Variable is gender, age, income, education level, marital status, family history of Type 2 Diabetes Mellitus, body mass index (BMI), blood pressure(mmHg), duration of Type 2 Diabetes Mellitus, smoking, alcohol drinking, complications, self-efficacy, self-care behaviors, and social support.

Dependent Variable is Glycemic Control level (HbA1C) which is categorized into controlled blood sugar level (HbA1c <7%) and uncontrolled blood sugar level (HbA1c ≥7%).

1.8 Expected and benefits of this research

The results of this study will be utilized to create a program for improving glycemic control and reducing the complications of Type 2 Diabetes Mellitus among patients, caregivers, and public health volunteers at Public Health Centers in Bangkok. In the part of social support, we can use the results to evaluate the current performance of Public Health Centers and recommend improvement.

CHAPTER II
LITERATURE REVIEW

This current study aims 1) To find the proportion of uncontrolled and controlled level of blood sugar among Type 2 DM patients at Public Health Centers in Bangkok 2) To determine the influencing factors such as general characteristics, health status, self-efficacy, self-care behaviors and social support on blood sugar level among Type 2 DM patients at Public Health Centers in Bangkok 3) To explore social support level Type 2 DM patients at Public Health Centers in Bangkok have 4) To describe which channels of social support Type 2 DM patients at Public Health Centers in Bangkok In this literature review chapter, there were two major sections as follows.

2.1 Diabetes Mellitus

  2.1.1 Classification of Diabetes Mellitus

  2.1.2 Symptoms

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  2.3.1 Self-efficacy

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  2.3.3 Social support

  2.3.4 Other possible factors (general characteristics and health status)

2.1. Diabetes Mellitus

Diabetes Mellitus is a chronic and non-communicable disease characterized by high blood sugar levels, which can lead to severe damage to vital organs and tissues such as the heart, blood vessels, eyes, kidneys, and nerves. The most common of all

types of the disease is Type 2 Diabetes Mellitus. It happens when the pancreas cannot produce enough insulin, or the body turns out to be insulin resistant. Previous studies presented that the number of the morbidity of type 2 diabetes has speedily increased in many countries in high in low- and high-income countries. Type 1 Diabetes Mellitus has defined diabetes as an insulin-dependent disease that is mostly found in juvenile age. Patients who have Type 2 Diabetes Mellitus should receive an appropriate health care service. World Health Organization report mentioned that this issue is a globally arranged goal to stop the rise of Type 2 Diabetes Mellitus and overweight in 2025 (WHO, 2016b).

2.1.1 Classification of Diabetes Mellitus

2.1.1.1 Type 1 Diabetes Mellitus

The root cause of Type 1 Diabetes Mellitus is an autoimmune response that confidently attacks and destroys insulin-producing cells. Type 1 Diabetes Mellitus may affect individuals of any age, but the disease is regularly found in children and young adults age group. Of course, patients with Type 1 Diabetes Mellitus need insulin injections for their living.

2.1.1.2 Type 2 Diabetes Mellitus

Type 2 Diabetes Mellitus is the most commonly found of all types. It approximately is 90% of all cases. The cause of this type is insulin deficiency and insulin resistance. This type of disease most commonly happens among people aged $\geq$ 30 years old (DAT, 2017). It is associated with being overweight, which contributes to an increase in insulin resistance. Moreover, Type 2 Diabetes Mellitus also affects children age who are overweight, including adolescents and young adults as well.

2.1.1.3 Gestational Diabetes Mellitus (GDM)

Gestational Diabetes Mellitus is defined as one type of diabetes or high blood glucose that is usually found in pregnant women. This type is associated with complications in pregnant women and their children. After delivery, the GDM usually disappears but the disease has increased the possibility of Type 2 DM in the future life of mother and child (ADA, 2019).

2.1.2. Symptoms

The symptoms of Type 2 Diabetes Mellitus are associated with high levels of blood glucose. There are many symptoms of the disease, including extreme urination, hunger, thirst weight loss. Moreover, the disease increases the risk of infections and very high blood sugar levels. It may cause an increasing risk of more severe complications such as hyperosmolar syndrome that include a high concentration of blood, dehydration, and very high blood sugar level. Hyperosmolar syndrome is the first sign of Type 2 Diabetes Mellitus. Moreover, it causes many signs, for example, weakness, seizure, nausea, coma, and confused thinking.

2.1.3. Complications

Type 2 Diabetes Mellitus can cause many severities and complications, usually found among patients who have a long duration of Type 2 DM and patients who do not perceive an early and well treatment. Patients who have steadily high blood glucose levels can affect to other micro-vascular complications in many organs, such as damage to the small blood vessels in the eyes, kidneys, and nerves. Moreover, it may affect the larger blood vessels (atherosclerosis), which can cause dangerous illnesses, for example, coronary heart disease, stroke, and peripheral artery. These complications are called macro-vascular. Type 2 Diabetes Mellitus patients are at a higher risk of developing cancer and depression.

2.1.3.1 Higher risk of stroke

Stroke often occurs in 3 to 4 times among Type 2 Diabetes Mellitus patients compared with people without diabetes, it was found that people aged below 65 years old have a higher risk than others at 15 times. Strokes happen when oxygen flow to the brain is obstructed. Mostly, stroke is caused by blood clotting because it blocks blood vessels in the brain. Type 2 Diabetes Mellitus patients have a high risk of atherosclerosis by clotting of arteries that may lead to the accumulation of plaque. Therefore, patients may have a higher risk of stroke.

2.1.3.2 Vision reducing and eye complications

Diabetic retinopathy is the main cause of blindness among Type 2 DM patients in adults around the world. The previous study found that 1 in 2 people, or 50% of patients who have long-duration of Type 2 DM in Thailand, developed mild to moderate severity of eye complications, for example, blurry vision. 10 % of patients have experience with vision-threatening and eye complications.

2.1.3.3 Cause of kidney failure

Type 2 DM is the main cause and high risk of kidney failure. A previous study found that 7 patients started to access renal therapy every day in Thailand. The cause of kidney failure is that small blood vessels in the kidney are damaged, which may cause kidney ineffective or failure. Kidney failure patients need kidney transplantation or dialysis treatment for their living.

2.1.3.4 Higher risk coronary heart disease

It is crucial to understand that the root cause of atherosclerosis of the heart is the development of plaque in the inner walls of arteries. This accumulation of plaque narrows and restricts the arteries, ultimately affecting the blood flow. Additionally, individuals with Type 2 diabetes are at an increased risk of experiencing a heart attack. Recent studies have revealed that females with Type 2 diabetes are 1.4 times more likely to develop coronary heart disease than males with Type 2 diabetes.

2.1.3.5 Nerve Damage

Type 2 DM may cause damage to the nerves all over the body that occurs when the patient has very high blood glucose and very high blood pressure. Most of Type 2 DM patients have a high risk of developing damage to the nervous system that can cause reduced sensation and body pain. The previous study found that 70 % of Type 2 DM patients have nerve damage complications.

2.1.3.6 Foot ulcers

Nerve damage leads to loss of feeling in their feet, cause injury, and lead to infection. From a previous study, 3 to 4% of Type 2DM patients who have long duration have developing ulcers and 10% of patients have an experience of foot ulcers.

2.1.3.7 Reduce life expectancy

Diabetes Mellitus is associated with a higher risk of mortality. The patient who is diagnosed at age 50 years old with Type 2 DM may reduce their life expectancy by 6-8 years. (Rattarasarn, 2013)

2.2 An assessment for disease

The assessment of diabetes control is evaluated based on the symptoms with the laboratory results. The appropriate treatment of Type 2 Diabetes Mellitus is based on individual characteristics and medical laboratory based on the willingness and potential of that department. An assessment for disease control includes fasting blood sugar testing for at least 8 hours, which cannot be used to indicate long-term control of blood glucose levels. The American Diabetes Association has suggested glycated hemoglobin (HbA1c) use for diagnosis of diabetes type by blood glucose measure. HbA1c is an important indicator for long-term glycemic control with glycemic history of the preceding 3 months (ADA, 2018).

Glycated hemoglobin (HbA1c) is an average glucose level in the blood that is caused by blood glucose binding to hemoglobin which is a protein in red blood cells. HbA1c can be used for diabetes diagnosis and following blood sugar levels because it provides excellent assurance measurements are in place and examines are standardized to criteria associated with the international reference values. American Diabetes Association reported that glycated hemoglobin (HbA1c) < 6-7% in Type 2 Diabetes Mellitus may increase complications of illness, especially microvascular complications. Nonetheless, an effect of low level of HbA1c causes Hypoglycemia among Diabetic type 1 and 2 patients who take polypharmacy related information by The Action to Control Cardiovascular Risk in Diabetes study group (ACCORD trial) found that (HbA1c < 6.5%) or very strict not associated with Microvascular disease, but It increases the mortality of Diabetic Patients more than patients who controls blood sugar level at HbA1c 7.0-7.9% (Buse et al., 2007).

Diabetes diagnosis should be treated continuously with the primary goal of reducing long-term complications from diabetes. Achieved by controlling sugar levels Currently, the target glucose level will have an appropriate value for each patient. Depending on the duration, and complications of illness.

For people who had diabetes for a long time with no complications, sugar levels should be controlled to close to normal values or HbA1C levels <6.5% (if possible) or <7%.

People with long-duration of diabetes, have complications, and co-morbidity. The HbA1C level is around 7-8%.

Older people aged ≥ 65 years

1. If there is no co-morbidity disease should control HbA1C <7%
2. If they have co-morbidity disease but they can help themselves, the target of HbA1C should be 7-7.5%.
3. If the elderly are fragile can achieve up to 8.5% of the target HbA1C (DMTH, 2017).

Type 2 Diabetes Mellitus patients were divided into the level of blood glucose control (glycemic control) into 2 groups as follows;

1. controlled diabetics ((FPG < 130 mg/dL, and HbA1c < 7%) or good control
2. uncontrolled diabetics (FPG > 130 mg/dL and HbA1c ≥ 7%) or poor control

In 2013 Thailand National Health Security Office (NHSO) provide the guideline for assessing the occurrence of complications or multiple complications by glycated hemoglobin (HbA1c)(NSHO, 2016).

There are 3 assessments for Diabetes

1. Fasting blood sugar testing for at least 8 hours is classified as 3 level

   1.1) 80-110 mg/dL is good control

   1.2) 111-140 mg/dL is an acceptable level (medium control)

   1.3) > 140 mg/dL as should improve or change behaviors

2. After a meal for 2 hours

   2.1) 90-130 mg/dL is a good control level

   2.2) 131-150 mg/dL is an acceptable level (medium control)

2.3) > 150 mg/dL as should improve or change behaviors

3. Glycated hemoglobin (HbA1c)

3.1 < 6.5 % is good control

3.2 < 7% is an acceptable level (medium control)

3.3 > 8% as should improve or change behaviors

According to the Ministry of Public Health Thailand's Key Performance Indicator, Type 2 DM control is one of the Key Performance indicators that the Ministry of Public Health of Thailand (MOPH) concerns. This indicator mentioned that the percentage of Type 2 DM should be more than 35% in every physical year. The indicator classifies Type 2 DM patients into 2 groups follow; uncontrol and controlled blood sugar level. Bangkok Metropolitans Adimictrtion defined the indicator assessed by using Glycated hemoglobin (HbA1c). Glycemic Control Level Blood Sugar Test (HbA1C) includes control (HbA1c <7%), and uncontrol (HbA1c ≥7%)(BMA, 2019).

2.3 Factors associated with glycemic control level

2.3.1 Self-efficacy

The definition of self-efficacy is explained by researchers from various institutions below. Fritz

Heider studied subjective attributions in 1944. This study aims to observe and suggest the framework of internal and external. The action that can be observed is caused by the true cause. There are individual (internal factors, individual's responsibility), and external factors. Heider's study influenced causal attributions, and this study became an attribution fundamental to self-efficacy theory (Harter, 2001).

Self-efficacy is defined by Albert Bandura as a psychologist who explains an assessment of t h e level of belief and confidence of people in their ability to do something. The recognition of self-efficacy usually attegins with an expectation of the result, which leads to behaviors. This behavior depends on what people expect (Eskin, 2013).

Bandura defined the definition of self-efficacy as the recognition of people's abilities and beliefs. An ability and belief of people that influence their actions and the level of action. This is a determinant of exercise that affects their living. The belief of self-efficacy or capability is a determinant of impression and support to behave and confront challenging activity. Self-efficiency can be defined as the effectiveness of people's capability to control blood sugar levels. These include healthy diet control, medication adherence, and management. The recognition of self-efficacy is related to achieving the outcome. Bandura supported an assessment about self-efficacy because it is associated with the decision that influences action, for example, appropriate activities in daily life to control blood sugar level and self-care behaviors. (Beckerle & Lavin, 2013)

Self-efficacy is the fundamental of the social cognitive theory by Bandura. This theory defines the effectiveness of learning that occurs when people learn with behaviors and social conditions. It means that people respond to other people about social conditions and behaviors. Moreover, the observations on regimen psychosocial characteristics of Type 2 DM influence the achievement of glycemic control. (Hernandez-Tejada et al., 2012).

The previous study presented the factors associated with self-care behaviors and the outcome of non-communicable disease control. This is based on individual action skills. Moreover, self-efficacy affects health promotion and quality of life among chronic disease patients (Stuifbergen et al., 2000).

2.3.1.1 Self-efficacy assessment

Self-efficacy refers to a person's observations or beliefs in capabilities to do an action. Moreover, it may influence their thoughts, motivation, behaviors, and feelings.

Several studies mentioned the effect of self-efficacy on clinical achievement among Type 2 DM patients. Previous studies demonstrate that self-efficacy confirmations' relationship with regimen includes medication and treatment, consumption, workout, monitoring, and HbA1c control level among patients. The instrument, the Diabetes Management Self-efficacy Scale (DMSES) was initially

created for use in Western citizens and evaluates Diabetic type 2 patients' confidence in their capability to control their consumption, physical activity, and blood glucose monitoring. Up to the present time, DMSES has been widely modified, and translated in many countries that represent an inclusive range of healthcare settings (Sangruangake et al., 2017).

2.3.2. Self-Care behaviors

Orem defined the definition of self-care behaviors in 1985. This is an individual start and behave for taking care of their self for well-being. A healthcare provider is an agent to support self-care behaviors and implies a sense for the patient's action. Self-care behaviors are human energy that is very complex to control life. These influence the development and well-being of people. Therefore, the concept of self-care behaviors has emphasized the controlling of taking care of health or health behaviors. The necessary dimension of knowledge about inspiration to start to act and follow the self-care behaviors planning (Lince, 1997).

Harper defined the dimension of self-care behaviors in 1984 as including routine drug administration, communication and negotiating with health care providers, and remembering to take the drugs. These behaviors are caused by the patient's knowledge and decision-making (Lince, 1997).

Siamak Mohebi defined the definition of self-care behaviors among chronic disease patients as Type 2 DM. The previous study found the associated relationship between disease control and self-care behaviors. This study defined self-care behavior as a concept in which patient use their knowledge and skills to behave well. Self-care behavior includes healthy consumption planning, exercises drug adherence, blood glucose measurement, and foot caring (Mohebi, S, 2018)

Self-care behavior among Type 2 DM patients is an individual action that influences blood glucose. The components of behaviors included consumption, assessment of blood glucose, and maintaining or changing behaviors to reduce risk factors and develop quality of life (Eva et al., 2018).

Jing Yang defined self-care behaviors in terms of DM, this is an action that is done by patients for management and following the treatment planning. Patient's

behaviors are almost done by their skill and knowledge as workouts, and healthy diet planning, usually measure blood glucose. These behaviors are affected by the controlling of blood glucose levels, and It may reduce the risk of more severities or complications (Yang et al., 2020).

2.3.2.1 Self-care behaviors assessment

The Summary of Diabetes Self-Care Activities (SDSCA) The SDSCA scale (Cronbach 0.62) is the measurement of self-care behaviors among Type 2 DM patients that was modified by Toobert in 1994. These instruments collect 11 items for 4 dimensions including diet, foot care, measuring blood glucose, physical activities, and smoking behaviors. The score sums up from 0-77. People who have higher scores presented that they have higher self-care behaviors (Yang et al., 2020).

2.3.3 Social Support

Social support is the psychological factor that focus on taking care of patients, and disease control among NCDs. Social support refers to the psychological sense of belonging, receiving support, and increased aptitude to cope with stress. Moreover, social support in diabetes is determined as a vital component of mental health promotion which causes to person's sensations to belong to social networking, for example, acknowledged social support and social fixation (Mohebi, S., 2018).

2.3.3.1 The components of social support

House defined the concept of social support in 1981. This is an awareness, and reality that people receive help, and care from other people, and they live in in supportive community network. The component of social support is separated into 4 components follows;

1. **Informational support**

   This component is a suggestion about an advantage of information received from others. Theses information is effective in helping other people and solving the problem.

2. **Instrumental support**

   Instrumental support is the provision of tangible goods and services or tangible aid

This is the receiving of material, financial, and services from direct ways to others.

3. **Appraisal support**

This is operationalized as feedback from the provider after the patient follows the plan, monitoring, and activities. The feedback can be awards and praise.

4. **Emotional support**

This included the provision of care, empathy, love, and trust (Langford et al., 1996) and It can be other people who have provided encouragement, active listening, and reflection on what patients are talking about (Munoz-Laboy et al., 2014).

Social support is the availability of a person who can be trusted and valued by a person. The difference generally occurs between social support and social networks; family member, friend, neighbor, or acquaintance for support. Social networks and social support are enough indications of social sharing. Social support has become a powerful concept in epidemiological studies and social psychology. It predicts the difference in mortality and the incidence of the disease and acts as a buffer for a stressful experience.

2.3.3.2 The classification of social support

Thanathammakun defined social support in 2013 as the relationship between people, including Security assistance, and also helps people feel that they are accepted as part of others. Social can be divided into 2 groups, which include

1. **Primary group**

Primary groups have a close relationship between patients with many family members who are in a related social group and are part of a group of people who participate in society. Colleagues and other social groups that are constantly changing. It can be concluded that social support sources have primary and secondary sources of support from primary sources.

2. **Secondary group**

Social support group from secondary sources flows; health service providers include doctors, nurses, and public health officials. The other personnel such as teachers, monks, community leaders, and public health volunteers (PHV) (Thanathammakun, 2013).

2.3.4 Other possible factors (general characteristics and health status)

2.3.4 .1 Health Status

2.3.4.1.1 Body Mass Index

Body Mass Index is an assessment of overweight level for people aged 20 years and over. BMI can be calculated by the formula as follows:

Equation 2: Body Mass Index Formula

$$\frac{person's\ weight\ in\ kilograms\ (Kg)}{the\ square\ of\ height\ in\ meters\ (m^2)}$$

The scientific indication by World Health Organization advised that Asian people have different BMI and health risk from European people. This guideline clearly that the proportion of Type 2 DM and Cardiovascular disease among Asian people is associated with different BMI which are lower than the cut point by WHO (more than 25 Kg. / m^2) (Ho-Pham et al., 2015).

Body mass index level is separated into 4 levels by obesity cataloging according to WHO and Asia-Pacific guidelines including underweight, normal, overweight, and obese (Lim et al., 2017).

Table 1: Body Mass Index Classification by WHO and Asia-Pacific Guidelines

	WHO (BMI)	Asia-Pacific (BMI)
Underweight	<18.5	<18.5
Normal	18.5–24.9	18.5–22.9
Overweight	25–29.9	23–24.9
Obese	≥30	≥25

According to the previous study, the increasing Body mass index (BMI) is associated with the increasing risk of Diabetes mellitus and complications. The increasing risk of illness most happened at higher BMI levels in males than females. Most of complications happen among patients who have a higher level of BMI than a lower level of BMI in both male and female Fields(Gray et al., 2015).

2.3.4.1.2 Blood Pressure

Patients with Hypertension and Diabetes mellitus type 2 have a high risk of complications such as cardiovascular disease, microvascular disease, and kidney failure. Moreover, Diabetes mellitus type 2 and Hypertension affect cardiovascular disease. M any factors increase the high risk of cardiovascular disease such as smoking, and hyperlipidemia. Therefore, the prevention of this disease includes blood sugar level control, hyperlipidemia control, blood pressure control, and stop smoking.

Five blood pressure ranges are categorized by the American Heart Association including:

- **The normal level** is systolic (upper number) less than 120 mmHg and diastolic (lower number) less than 80 mm Hg is classified as the normal range. The recommendation f or this level is following a healthy eating plan and usually working out.
- **The elevated level** ranges from systolic 120 to 129 mmHg and diastolic less than 80 mmHg. People who have blood pressure at an elevated level are likely

to have Hypertension. The recommendation of this level, people in this range should control the disorder.

- **Hypertension Stage 1** is defined as systolic (upper number) ranges from 130-139 or diastolic (lower number) ranges from 80-89 mm Hg. The recommendations for this stage are likely to prescribe behavior changes and consider adding blood pressure control medication based on the risk of atherosclerotic cardiovascular disease (ASCVD) for example heart attack and stroke.

- **Hypertension Stage 2** is blood pressure systolic (upper number) ranges 140 mmHg or higher, and diastolic (lower number) ranges at 90 mm Hg or higher. At this stage of high blood pressure, physicians are likely to prescribe a combination of hypertension medications. Patients should change behaviors to control it.

- **Hypertensive crisis**, this stage of high blood pressure is systolic (upper number) higher than 180 mmHg and diastolic (lower number) higher than 120 mmHg. Patients should require medical attention.

2.3.4.1.3 Duration of Diabetes

The duration of diabetes was significantly associated with glycemic control or higher glycated hemoglobin (HbA1c). Type 2 diabetes patients who have poor glycemic control were regularly on many drugs and longer duration. Diabetes is a non-communicable chronic disease and as blood glucose increases, more medications are essential to achieve control. Furthermore, a longer duration of type 2 is related to increasing impairment of insulin secretion over time because of beta cell failure (Badedi et al., 2016).

Among 72 patients with having duration of diabetes ≥7 years, There are 6.9% of patients have good glycemic control while 6 7 9 3 . 1 % of patients have poor glycemic control (A Kakade et al., 2018).

2.3.4.1.4 Smoking

Smoking may raise blood sugar, and it may make the body more resistant to insulin, which can lead to higher blood sugar levels. Moreover, poor glycemic control can lead to more severity, such as problems with kidneys, and cardiovascular.

According to the 2014 Surgeon General's Report found that smoking increases the risk of Type 2 DM by around 30-40% for smokers when compared to non-smokers. The World Health Organization recognizes that smoking is a risk factor for Type 2 DM. The prevention is to avoid smoking as instructions for life (Maddatu et al., 2017).

2.3.4.1.5 Alcohol drinking

Alcohol is a behavior factor associated with the risk of increasing Type 2 DM. A previous study found the relationship between alcohol consumption and Type 2 DM occurred in recent years. While some studies on this topic suggest that drinking alcohol was associated with a moderate reduction of type 2 diabetes (Kim & Kim, 2012).

2.3.4.1.6 Co-morbidity

Co-morbidity is the disease or medical condition that occurs in addition to an index disease. For example, Type 2 DM patients who got Coronary Artery Heart Disease on the later finding. In this case, Coronary Artery Heart Disease is defined as Co-morbidity (DAT, 2017).

Moreover, Co-morbidity can affect the ability for self-care behaviors of patients such as chronic obstructive pulmonary disease, depression, and chronic low back pain. These comorbidities can affect to patient's health outcome. Although co-morbidity is not directly affected by treatment results, Type 2 DM self-care planning uses more substantial investment, and time. Patients who have co-morbidity that affects their energy to take care of themselves are reduced, and it is related to glycemic control level (Piette & Kerr, 2006).

2.3.4.2 Other related factors

There are several studies related to factors associated with glycemic control levels in different countries including self-efficacy, self-care behaviors, social support, and other related factors.

According to a previous study from (Roche & Wang, 2014), this study found that there are differences associated with late diagnosis of Type 2 DM between

males and females. Females who have a lower education level was diagnosed with Type 2 DM more than female who have a higher education level. Age is one of the most important factors associated that was found among Type 2 DM patients. The most of Type 2 DM patients in the USA are elderly. The highest prevalence (20%) of the age group is 65 years old and over who were diagnosed with Type 2 DM in 2011. While the prevalence of Type 2 DM at age 18-44 years old is 2.4%. Therefore, it can be concluded that the most of age group of Type 2DM is elderly, but the prevalence of the disease increases in younger age every year (Selvin & Parrinello, 2013).

A family history of type 2 diabetes is predictable as a significant risk factor for the disease. People who have a family history of diabetes may have two to six times the risk of type 2 diabetes compared with people who have no family history of the disease (Ann M. Annis, 2005).

The study in Canada found that family income is strongly associated with the Type 2 DM (Bird et al., 2015). The different range of family income is significantly associated with glycemic control level. Patients who have glycemic control at an uncontrol level were 85% (Dumrisilp et al., 2017).

Education level, some studies found that an education level is associated with glycemic control. While as, this study found that level of education is not associated with glycemic control. Type 2 DM patients who have higher education do not have significant adherence medication behaviors (S. & Al-Rasheedi, 2014).

(Omar et al., 2019) found that there is no association between married status with Type 2 DM, but there is an association of widows and divorced had high risk of Type 2 DM. whereas, the recent study found that marital status was not associated among women, who remained single with an increased risk of Type 2 DM.

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

A cross-sectional study was used in this research to find the factors associated with glycemic control level and to assess the level of self-efficacy, self-care behaviors, and social support among DM type 2 patients who visit the district at Public Health Centers in Bangkok, Thailand. This research used the updated HbA1C checkup no longer than 3 months from the laboratory report. Last, this research described which are the most of social support channels that Type 2 DM patients at Public Health Centers acquire.

3.2 Study Area

This study was conducted in Bangkok, Thailand, with Public Health Centers serving as the point of contact for the target population. Bangkok is the capital city of Thailand, covering an area of 1,568.7 square kilometers in the central region. As a Special Administrative Region (SAR), the area is referred to as the 13th Area Health (AH). Health care services in Bangkok are provided by two organizations, namely the Medical Services Department and the Department of Health. Bangkok is divided into 50 districts, and it is grouped into 6 zones. For health care services, BMA distributes and takes responsible for 9 government hospitals, and 68 Public Health Centers.

Five Public Health Centers under the Health Department, Bangkok Metropolitan Administration (BMA) that have the highest prevalence of Type 2 DM were selected to be research sites.

Figure 2: 6 Zones Map of Bangkok Metropolitan Administration (BMA)

3.3 Study Period

This study collected data from May - September 2022.

3.4 Study Population and Sample Size

The study population was the registered cases of Type 2 DM Patients aged 30 years and over at Public Health Centers under The Health Department, Bangkok Metropolitan Administration (BMA). Currently, there were 14,025 registered cases of type 2 diabetes patients receiving healthcare services at 68 Public Health Centers located across six zones under the Health Department of the Bangkok Metropolitan Administration (BMA), as reported by the database of the Key Performance Indicator presentation. 7,283 (52%) patients were uncontrolled blood sugar level while 6,742 (48%) patients were uncontrolled blood sugar level. A Finite Population Proportion formula determined the sample size.

Study Population and Sample Size

The Finite population Proportion Formula determined the sample size determined the sample size.

$$n = \frac{Np(1-p)z^2_{1-\frac{\alpha}{2}}}{d^2\,(N-1) + p(1-p)z^2_{1-\frac{\alpha}{2}}}$$

Equation 3:The Finite Population Proportion Formula

Population Size (N) = 14,025 (Type 2 DM Register cases at PHCs, BMA)

Proportion (p) = 0.48 patients were uncontrolled blood sugar level (BMA, 2019).

Error(d) = 0.05

Sample Size = 373

Increasing the sample size by 10% for missing data resulted in 411 participants required.

3.5 Inclusion Criteria

1. Register cases of patients who are diagnosed with Type 2 DM and received treatment services from Type 2 DM Clinic at Public Health Centers under The Health Department, Bangkok Metropolitan Administration (BMA).

2. Age $\geq$ 30 years old

3. Voluntary to join this research.

4. Ability to read and speak Thai

5. The updated HbA1C checkup is no longer than 3 months from the laboratory report.

3.6 Exclusion Criteria

1. People who had severe illness such as loss of consciousness, bedridden patients, chronic kidney disease stage 4-5 and disabled people were excluded from this study.

2. People with cognitive impairment or mental illness

3.7 Sampling Technique

This study used purposive sampling to select the top 5 Public Health Centers that have the highest prevalence of Type 2 DM patients (registered cases). Then, the quota sampling technique is to reach the minimum required sample sizes. Secondly, this study used the simple random sampling technique from Type 2 DM patients (registration list) who are interested to pinticipating in this research at 5 Public Health Centers to reach the population following the inclusion criteria as shown in figure 2.

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY
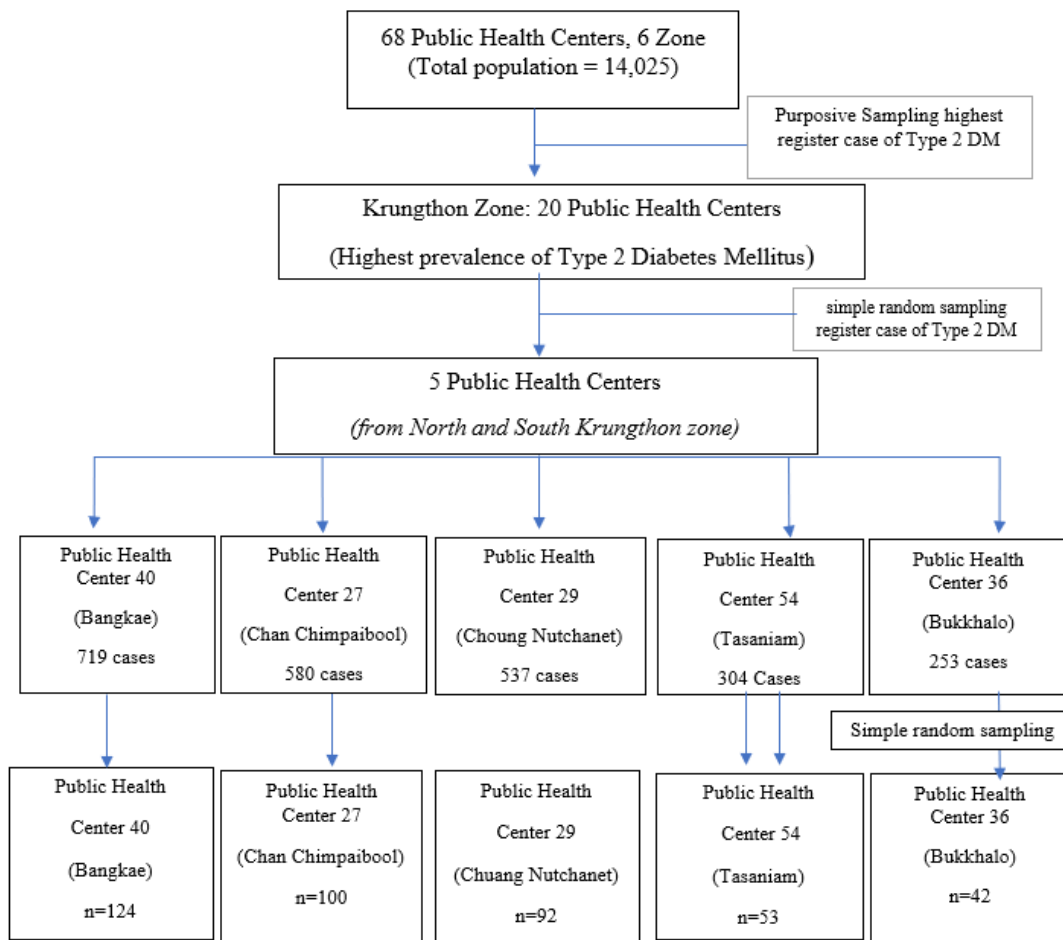
Figure 3: Sampling Flow Diagram

Announcement of the invitation to participate in the research

The researcher posted an announcement on the public relations board at the diabetes clinic, Public Health Centers. Those interested in participating in the research can register their intentions either at the diabetes clinic at Public Health Centers or by scanning the QR code on the placard.

Inform Consent Process

The details of the research were provided by the researcher. Before participating in the research, Type 2 DM patients were given informed consent to collect data by conducting interviews and reviewing their latest HbA1C results from

the laboratory (up to 3 months). The data for this research collected through a one-time face-to-face interview, which typically takes 20-25 minutes and does not require any follow-up. The details of the research were provided by the researcher. Before participating in the research, Type 2 DM patients were given informed consent to collect data by conducting interviews and reviewing their latest HbA1C results from the laboratory (up to 3 months). The data for this research were collected through a one-time face-to-face interview, which typically takes 20-25 minutes and does not require any follow-up.

3.6. Validity and reliability

3.6.1. Validity

The questionnaire was reviewed for content validity by 3 experts (2 experts from the College of Public Health Science, Chulalongkorn University, and the director of the General Administration Subdivision at Public Health Center 21 Wat That Thong (BMA). The Index of Item-Objective Congruence (IOC) was conducted. The questions with scores equal or +1, 0, and -1. After validating the questionnaire, the IOC score were summed up and divided by 3. The Index of Item-Objective Congruence (IOC) in this study is 0.81.

3.6.2. Pretest and reliability

The reliability of the questionnaire was tested by a pre-test pilot. It conducted among Type 2 DM patients at Public Health Centers with age 30 or over. The number of samples (N=30). The Cronbach's alpha was tested the internal consistency of scale data and analyze by SPSS software. Cronbach's alpha coefficient of self-efficacy was 0.89. Cronbach's alpha coefficient of self-care behaviors was 0.7, and Cronbach's alpha coefficient of social support was 0.84.

3.7 Measurement tools

These 4 parts of the questionnaire included

3.7.1 Part I: General characteristic and health status

- General characteristics included gender, age, income, education level, marital status, occupational

- Health status included body mass index (BMI), blood pressure (mmHg), duration of Diabetes, smoking, alcohol drinking, complications, family history of Diabetes, and HbA1C

3.7.2 Part II: Self-efficacy

This current study used The Thai Type 2 DM Patients (The T-DMSES) that translated by (Sangruangake et al., 2017). The DMSES instrument was translated from English to Thai version and backward translation by Brislin Technique Outline. The T-DMSES achieved a good level of internal consistency reliability with Cronbach's alpha (0.89). This questionnaire consists of 20 items that are distributed across 4 factors as follows:

- Diet management self-efficacy 9 items (Q.1-9)
- Physical activity management self-efficacy 4 items (Q.14-17)
- Monitoring self-efficacy 4 items (Q.10-13)
- Regimen self-efficacy 3 items (Q.18-20)

This instrument was measured by 20 questions and the scale used for statements is Likert's scale from "strongly agree to strongly disagree" and scored with 5 points Likert's scale as follows:

- Strongly agree = 5
- Agree = 4
- Neutral = 3
- Disagree = 2
- Strongly disagree = 1

To calculate self-efficacy scores, this study used the mean score and standard deviation as the cut-off point. First, we added up the answer scores for all 20 questions and calculate the mean and standard deviation. The resulting score were ranged from 20 to 100. Based on this score, this study can classify the self-efficacy level as follows:

- Poor self-efficacy is the score ≤ 54
- Medium level of self-efficacy is the score 55-86
- Good level of self-efficacy is the score of more than ≥ 87

3.7.3 Part III: Self-care behaviors

This instrument was measured by 20 questions that modified from (Siangdang, 2017). Cronbach Alpha Coefficient was tested the reliability of the questionnaire, compliant value of .70. Self-care behaviors for Type 2 Diabetes Mellitus questionnaire contains 20 items with 5 dimensions as follows:

- Healthy diet 4 items (Q.1-5)
- Physical activities 2 items (Q.11-12)
- Medication 5 items (Q.6-10)
- Continuous care 4 items (Q.17-20)
- Emotional 4 items (Q.13-16)

For positive self-care behaviors questions

The scale used for statements is Likert's scale from "Regular to Never" and scored with 3 points Likert's scale as follows:

- Always behaves on routine or every time (6-7 days per week) = 2

- Sometimes is behaves for irregularly or sometimes (1-3 days per week) = 1

- Never is never behave on that (0 day per week) = 0

For negative self-care behaviors questions

The scale used for statements is Likert's scale from "Regular to Never" and scored with 3 points Likert's scale as follows:

- Always behaves on routine or every time (6-7 days per week) = 0

- Sometimes is behaves for irregularly or sometimes (1-3 days per week) = 1

- Never is never behave on that (0 day per week) = 2

For calculating Self-care behaviors, the cut-off point was summed up for the total score and vary from 0 to 60. The cut-off point of self-care behaviors level were categorized by the mean scores standard deviation. All respondents' answer score of 20 questions were summed up and calculated mean and standard deviations.

- Low self- care behaviors; the score ≤ 24

- Medium self- care behaviors; the score ≥ 25-33

- Good self- care behaviors; the score more than ≥ 34

3.7.4 Part IV: Social Support

Social Support for Type 2 DM questionnaire contains 17 items with 4 dimensions (emotional support, information support, instrumental support, and appraisal support). This instrument was adapted from the concept of social support by House 1981 and modified from Thai researchers (Sittikarnkaew, 2012) Cronbach Alpha Coefficient was tested the reliability of the questionnaire, compliant value of 0.84 There are 5 dimension follows;

- Emotional support 3 items
- Information support 2 items
- Medication 5 items
- instrumental support 3 items
- appraisal support 2 items

This instrument was measured by 20 questions and scale used for statements is Likert's scale from "strongly agree to strongly disagree" and scored with 5 points Likert's scale as follows:

- Strongly agree = 5
- Agree = 4
- Neutral = 3
- Disagree = 2
- Strongly disagree = 1

For calculating social support scores, the cut-off point was mean scores standard deviation. All respondents' answer score of 20 questions were summed up and calculated mean and standard deviations. The score ranges from 17- 85. The social support level classified as follow;

- Low social support is score ≤ 56
- Moderate social support is the score 57-70
- High social support is the score more ≥ 71
-

3.8 Procedure and Data Collection Process

3.8.1 Literature review

The researcher conducted a comprehensive review of reliable sources, including previous research, books, statistical reports by government organizations, academic journals, theses, and dissertations. This enabled them to study problematic situations, concepts, and theories used to support related research, as well as the statistics used to analyze data and the form of report writing.

3.8.2 Requesting approval to collect data

The researcher asked for permission to collect data by conducting a questionnaire interview and reviewing the latest HbA1C. The most recent results (up to 3 months) were obtained from medical records or patient profiles. These requesting approval to collect data documents were sent to the director of the Health Department and the Director of Public Health Centers in north and south Krungthon Zone, including Public Health Center 40 (Bang Khae), Public Health Center 27 (Chan Chimpaiboon), Public Health Center 29 (Chuang Nutchnet), Public Health Center 54 (Tasaniam), and Public Health Center (36 Bukkalo). This research was a one-time interview, taking about 20-25 minutes and no follow-up.

3.8.3 Requesting an Ethics Review

After obtaining a letter of permission from the Director of the Health Department and 5 Public Health Centers in North and South Krungthon Zones to collect data, the researcher submitted a research outline for ethical review to both Chulalongkorn University Research Ethics Committee and Medical Service Department Ethics Committee for Human Research. After obtaining a letter of permission from the Director of the Health Department and 5 Public Health Centers in North and South Krungthon Zones to collect data, the researcher submitted a research outline for ethical review to both Chulalongkorn University Research Ethics Committee and Bangkok Metropolitan Administration Human Research Ethics Committee (BMAHREC)

3.8.4 Meeting with the director of 5 Public Health Centers and the professional-level nurse of the diabetes clinic at 5 Public Health Centers

The researcher sent the research proposal, ethical document from Chulalongkorn University Research Ethics Committee and Bangkok Metropolitan Administration Human Research Ethics Committee (BMAHREC), and consent form to the director of the Department of Health (Bangkok Metropolitan Administration), and the director of 5 Public Health Centers. After receiving the approval document from 5 Public Health Centers, the researcher made an appointment to clarify the details of the research and announced an invitation to participate in the research at diabetes clinics. The researcher made an appointment to collect data through face-to-face interviews and prepared a place to collect data.

3.8.5 Public Relations Process for data collection

The researcher invited volunteers to participate in this study. The researcher posted an announcement inviting patients who met the inclusion criteria and were interested in participating in this research at Public Health Centers.

3.8.6 Inform Consent in the Data Collection Process

The details of the research were provided by the researcher. Prior to participating in the research, Type 2 DM patients were given informed consent to collect data by conducting interviews and reviewing their latest HbA1C results from the laboratory (up to 3 months). The data for this research collected through a one-time face-to-face interview, which typically takes 20-25 minutes and does not require any follow-up. The details of the research were provided by the researcher. Prior to participating in the research, Type 2 DM patients were given informed consent to collect data by conducting interviews and reviewing their latest HbA1C results from the laboratory (up to 3 months). The data for this research were collected through a one-time face-to-face interview, which typically takes 20-25 minutes and does not require any follow-up. Type 2 DM patients who participate in research can withdraw from the research at any time without penalty or loss of benefits that should be received according to the right to receive treatment.

3.8.7 Interview

This study collected data through face-to-face interviews carried out at five Public Health Centers under the Department of Health in Bangkok, Bangkok Metropolitans Administration (BMA). The research team, consisting of the researcher and assistants, possessed relevant experience in the field of public health. The researcher underwent training in questionnaire data collection and volunteer outreach methods, while two assistants were engaged to gather data at each healthcare center.

At the Type 2 DM Clinic, the researcher and their assistant invited participants to complete a questionnaire after consulting with a doctor and receiving medication. Only those who met the inclusion criteria based on the questionnaire were extended an invitation to participate.

Participants only need to meet the researcher once for a questionnaire interview, without any follow-up required. The researcher or a trained assistant was asked to interview participants about their personal information (hospital number, number of Public Health Centers, and HbA1C from laboratory reports). There were 4 parts of the questionnaire including information about general characteristics, health status, self-efficacy, self-care behaviors, social support, social support, and social

support channel that patients attainted the most. The questionnaire involved 73 questions and takes 20-25 minutes.

In the Covid-19 situation, the researchers are aware and pay attention to social distancing. at an appropriate distance in the data collection process. The researchers wore face masks and face shields throughout the study. They expressed gratitude to participants for completing the questionnaire and provided them with masks and 75% spray alcohol.

3.8.8 Complications Surveillance

Type 2 DM patients with severe illness, such as unconsciousness, patients with stage 4-5 chronic kidney disease, disabled people, and patients with intellectual disabilities or mental illness are criteria for exclusion from this research. The data collection interviews were under the supervision of public health officials and nurses at non-communicable clinics at Public Health Centers. If complications occur, participants can be resolved immediately. Participants can withdraw at any time without penalty, or loss of benefits that should be received according to rights.

Possible risks, side effects, and solutions

1. **Physical risk:** Fatigue of research participants who are interviewed for a long time, such as elderly volunteers.

   Solution: When fatigue occurs, volunteers can take a break for 5-10 minutes or until they feel relaxed and then continue answering the questionnaire.

2. **Psychological Harm**: Participants are worried about providing the information because some question may affect their feelings, for example, income, and social support part.

   Solution: The researcher informed the participants of the research details, and the objectives, including the informed consent of the participants before participating in the study, and the personal data of the participants are retained. The result from this research is not disclosed to the public by an individual information. The result of this research is reported as overview information. The researchers protect and maintain confidentiality by concealing names and

surnames. After the research is completed, the primary data were destroyed at the end of the research project within 3 months. If the patients have abnormal symptoms, feeling sick or an effect on their mind occurred during the data collection process in this research, participants can inform the researcher as soon as possible. Moreover, participants have the right to withdraw from the research at any time without prior notice, not participating or withdrawing from the research. Withdrawing did not affect the service and treatment that it deserves in any way.

3. **Social and Economic Harm:** Some questions may be invasive of the participant's privacy. and reveal secrets such as occupation, income, and social support questions.

   Solutions: The protection and confidentiality of the participants of this research are careful.

   Participant's names, surnames telephone numbers, and addresses were destroyed after the research finished. In the process of obtaining consent from participants, it is specified how to protect and maintain the confidentiality of participants. They can make informed decisions before participating in this research. However, researchers have to protect and maintain confidentiality by concealing names and surnames, data is destroyed at the end of the study within 3 months, and informed consent is obtained from subjects before participating in the research project.

3.9 Data Analysis

Before entering data into a computer, the questionnaire was recorded. The data entry process carried out through a double-entry process. For data analysis, the SPSS software version 22 (received from Chulalongkorn University for Windows) was used.

2 types of statistics were used in this research

1. Descriptive statistics were used to describe the characteristics of participants and illustrate the channels of social support that participants use the most. Mean and

Standard deviation were used for continuous data. Percentage and Frequency were used for categorical data

2. Inferential statistics include

2.1 The bivariate analysis was used to identify factors associated (a crude odds ratio) with the dependent variable (glycemic control level). The variables with p-value < 0.2 from the bivariate analysis were selected into the multivariable model (binary logistic regression).

2.2 A multivariable model (binary logistic regression analysis) was used to identify factors associated (an adjusted odds ratio) with the dependent variable (glycemic control level). The association was declared significant at p-value < 0.05.

3.10 Ethical Consideration

The Ethical was approved by Chulalongkorn University Research Ethics Committee and Bangkok Metropolitan Administration Human Research Ethics Committee (BMAHREC). The main ethical issue was confidentiality. All the participants were informed about the process of studying and voluntarily sign the consent form before participating in this study. They can refuse to join this study without any effects. However, the following steps were taken into consideration to ensure that participants' confidentiality was not breached. Data were used for research purposes only.

3.10.1 Principle of Individual Respectfully

This research respects the participant's individual consent form. The searcher provided complete information and a consent form to the participants to make decisions to join this study. Type 2 DM patients participated in this research without being intimidated or forced. The researcher and researcher assistants asked Type 2 DM patients for consent to participate in this research by interview based on a questionnaire and viewed the updated blood sugar levels (HbA1C) from laboratory reports. The result of this research is reported as overview information. The researchers protect and maintain confidentiality by concealing names and surnames.

The researcher and researcher assistants collected data after approval of the consent form from participants.

3.10.2 Requesting consent form

This research emphasizes the significance of obtaining consent from patients with Type 2 DM to ensure they receive comprehensive information and make informed decisions regarding their participation in the study. Before conducting the interview based on a questionnaire, the researcher obtained consent from volunteers and reviewed their most recent blood sugar level (HbA1C) from medical records. The study was only conducted after receiving the volunteer's consent. This research emphasizes the significance of obtaining consent from patients with Type 2 DM to ensure they receive comprehensive information and make informed decisions regarding their participation in the study. Before conducting the interview based on a questionnaire, the researcher obtained consent from volunteers and reviewed their most recent blood sugar level (HbA1C) from medical records. The study was only conducted after receiving the volunteer's consent. The consent form for participating in the research contained an explanatory information sheet for volunteers and research participants. Participants were required to provide their consent before data collection, including interviews based on questionnaires and medical records of blood sugar levels (the records should not be more than 3 months old). The confidentiality and privacy of the research volunteers were maintained through various measures. Researchers used encrypted codes instead of names or numbers of public health centers to conceal the identities of the participants. After the study is completed, all questionnaire data and electronic files deleted within 3 months.

This research involved the elderly (who are a vulnerable group) because type 2 diabetes is mostly found in the elderly. The researcher attaches importance to being careful of dangers that may occur to the elderly. By arranging the interview seats appropriately. People with severe illnesses, such as unconsciousness, patients with stage 4-5 chronic kidney disease, disabled people, and people with intellectual disabilities or mental illness were excluded from this research. The data collection interviews were under the supervision of public health officials and nurses. Diabetes

Clinic If complications occur, they can be resolved immediately. The participants can withdraw at any time without penalty or loss of benefits that should be received according to their rights.

3.10.3 Beneficial

After assessing the ratio of risks to benefits in this research, it has been determined that the benefits outweigh any potential risks for the volunteers involved. This research has the potential to bring benefits to both the volunteers themselves, as well as the larger community and society as a whole. The researcher hoped that the results of this study could prove to be beneficial in the following ways:

3.10.3.1 Direct benefit for participants

- The participants reviewed and surveyed self-efficacy, self-care behaviors, social support, and what level of blood sugar level they were in.
- Volunteers who participated in the research surveyed the social support that they received and were able to give additional opinions about the social support they needed, such as participating in activities in the group of people with Type 2 DM.
- Research volunteers received a cloth face mask as a thank-you for their time to participate in the research.

The advantages for the communities within the study area

- The result of this research can be applied to develop healthcare services for Type 2 DM patients, their families, caregivers, and health volunteers at public health centers in Bangkok. For example; a health promotion program about self-efficacy, self-care behaviors, and social support guidelines for Type 2 DM patients in the study area (North and South Krungthon Zones) to have the potential for Diabetes management correctly and appropriately in a

sustainable manner and be able to control blood sugar levels. The program can be applied to other groups of chronically patients.

Advantages for social
- The result of this research is an advantage for policymakers to campaigns to raise awareness or educate patients and their family caregivers with type 2 diabetes.

3.10.4 Withdrawing from Research

Research participants have the right to withdraw from this research at any time without prior notice and not participating in the research or withdrawing from this research. It not affected the services and treatment that you deserve in any way.

3.10.5 Principle of justice

The selection of volunteers for this research was carried out at 5 public health centers in Bangkok. There were 411 research participants, selected from the north and south Krungthon zones in Bangkok with the highest prevalence of Type 2 DM patients. There were 5 public health centers with the highest prevalence of Type 2 DM in Bangkok, Thailand. The researchers selected a sample from the research participants who must meet the inclusion criteria, namely people aged 30 years or older with type 2 diabetes and have their names in the diabetes patient registry of the Public Health Center (BMA). Research participants had their blood sugar levels tested (not more than 3 months). Participants in this research were able to speak, read, and write Thai. Type 2 DM patients who participated in this research were not in the stage of serious illness or disability, not a patient with chronic kidney disease (stage 4-5), did not have an intellectual disability, did not have mental health problems, and were willing to participate in the research.

3.13 Limitation

Reaching the target group and collecting data based on questionnaires is quite difficult due to limitations in data collection locations at the Public Health Centers. Due to the large number of patients receiving services at the Public Health Centers, it was not possible to sit for an interview at the Outpatient Doctor (OPD) waiting point.

According to the outbreak of coronavirus disease 2019 (COVID-19) around the world and in Bangkok, Thailand, it may affect the collecting data that difficult to assess. The request of academic documents and the connection with the organization's government is slow.

Problem-solving

1. The researcher prepared an interview room to ensure the privacy of research volunteers.

2. The interview was conducted after the patient had completed his examination and treatment or after seeing a doctor and receiving medication (In the case of not receiving medication, the interview can be completed after seeing the doctor) to prevent the interview from being interrupted and not interfering with the staff's work.
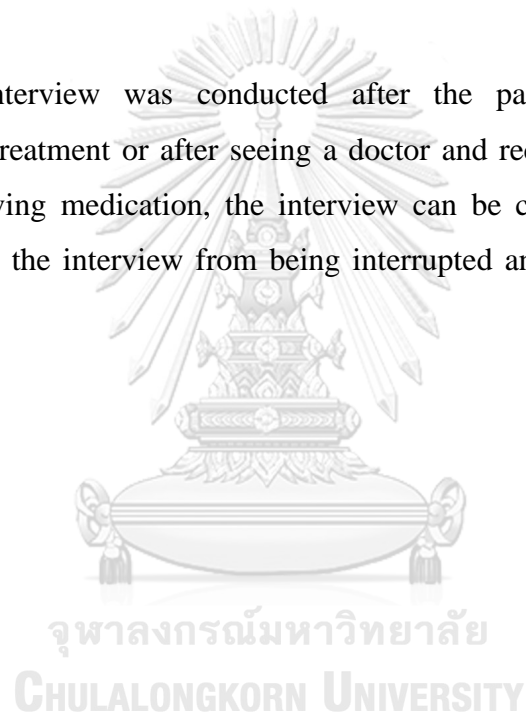
CHAPTER IV
RESULT

The objective of this study aimed to determine the proportion of uncontrolled glycemic level and controlled glycemic level among Type 2 DM patients, to explore the level of self-efficacy, self-care behaviors, and social support among Type 2 DM patients, to identify influencing factors such as general characteristics, health status, self-efficacy, self-care behaviors and social support on glycemic control level among Type 2 DM patients at Public Health Centers in Bangkok. Finally, this study aimed to describe which channels of social support Type 2 DM patients acquire at Public Health Centers in Bangkok, Thailand. The total of participants who fulfilled the inclusion criteria in this study is 411 Type 2 DM patients.

The result of this study is divided into four main parts: 1) General characteristics and health status, 2) The proportion of glycemic control level, 3) Factors associated with glycemic control level, and 4) Channels of social support. The data were collected by face-to-face interviews based on the questionnaire by the researcher and researcher assistants from May to August 2022. The data were analyzed using descriptive statistics to describe the characteristics of participants and illustrate the channels of social support that participants acquire the most. This study used percentage and frequency for categorical data. Mean and Standard deviation (SD) were used to analyze continuous data. Inferential statistics include the bivariate analysis used to find the association of general characteristics, health status, level of self-efficacy, self-care behaviors, and social support (a crude odds ratio) with the dependent variable (glycemic control level). The variables with p-value < 0.2 from the bivariate analysis were selected into the multivariable model (binary logistic regression). Then, a multivariable model (binary logistic regression analysis) was used to identify factors associated (an adjusted odds ratio) with the dependent variable (glycemic control level). The association was declared significant at p-value < 0.05.

4.1 General Characteristics and Health Status in 411 Type 2 DM Patients

In Table 4, the study found 294 (71.5%) Type 2 DM patients aged 60 years old (Mean±SD = 64.67 ± 9.5 Range = 30-91). For education level, 273(66.4%) of the study's population assessed the highest education level at primary school. For marital status, most of the study's population were married at 265 (46.7%). For occupational, 192(46.7%) of them were unemployed. For income, 256 (62.3%) were income less than minimum wage per month (<15,000 Thai baht). Approximately 47% of participant's BMI at Obese (≥ 25), 29.4 % of participants had BMI at Normal weight (18.5-22.9) Mean±SD = 26.01 ± 8.5; Range = 15.51-50.17. For disease duration, 228(55.5%) of Type 2 DM patients lived with Type 2 DM < 9 years, while 183 (44.5 %) of participants lived with Type 2 DM ≥ 9 years (Mean±SD = 9.11 ± 0.38; Range = 1 - 40 years). For co-morbidity, 330 (80.3%) were Type 2 DM with co-morbidity. 290 (70.6%) of Type 2 DM patients had Hypertension. Approximately 57.4% of participants with Type 2 DM patients had Dyslipidemia. For smoking status, 380 (92.5%) of Type 2 DM patients were not smoking. For alcohol drinking, 384(93.4 %) were not drinking alcohol. Approximately 52.3% of participants with Type 2 DM had a family history of Type 2 D, while 196(47.7%) did not have a family history of Type 2 DM.

Table 2: General Characteristics and Health Status of Type 2 DM Patients(n=411)

Characteristic General	Number (Total = 411)	Percentage
Gender		
Male	150	36.5
Female	261	63.5
Age [c]		
Adult: 30-59 years old	116	28.2
Elderly: ≥ 60 years old	295	71.8
Mean±SD = 64.67 ±; 9.5 Range = 30-91 years old		

Education Level			
	No education	36	8.8
	Primary school, High school, and Vocational Certificate	355	86.4
	Bachelor degree and others	20	4.8
Marital Status			
	Single, Divorce, Widow	144	35.0
	Married	267	65.0
Occupational			
	Unemployed	212	51.6
	Employment	199	48.4
Income level [a]			
	< 10,590 Thai baht per month	311	75.7
	≥ 10,590 Thai baht per month	100	24.3

Health Status		Number (Total = 411)	Percentage
Body Mass Index			
	Under weight (<18.5)	16	3.9
	Normal weight (18.5-22.9)	121	29.4
	Overweight (23-24.9)	81	19.7
	Obese (≥ 25)	193	47.0
	Mean±SD = 26.01 ± 8.5; Range = 15.51 - 50.17		
Duration of Type 2 DM			
	≤ 9 years	228	55.5
	> 9 years	183	44.5
	Mean±SD = 9.11 ± 0.38; Range = 1 - 40 years		
Co-morbidity			
	Yes	330	80.3
	No	81	19.7

Hypertension			
	Yes	290	70.6
	No	121	29.4
Dyslipidemia			
	Yes	236	57.4
	No	175	42.6
Smoking			
	Smoking	31	7.5
	No smoking	380	92.5
Alcohol Drinking			
	Drinking alcohol	27	6.6
	No drinking alcohol	384	93.4
Family history of Type 2 DM			
	Yes	215	52.3
	No	196	47.7

[a] The minimum wage in Bangkok: 353 THB per day or 10,590 THB per month by The Ministry of Labour of Thailand, Thai government gazette) (MOL, 2022b)

[b] The classification of age group based on the inclusion criteria of Type 2 DM Patients Register case: Key Performance Indicator of Department of Health (Bangkok Metropolitans Administration), and Ministry of Public Health of Thailand (MOL, 2022a).

4.2 The proportion of glycemic level, level of self-efficacy, self-care behaviors, and social support in 411 Type 2 DM patients

Table 3 reported the proportion of glycemic control level, the level of self-efficacy, self-care behaviors, and social support in 411 Type 2 DM patients. The proportion of glycemic control level among 411 Type 2 DM patients at 5 Public Health Centers (BMA) in Bangkok, Thailand. Approximately 52.1% of participants

were controlled glycemic level (HbA1C<7%), while 197(47.9%) of participants were uncontrolled glycemic level (HbA1C ≥ 7%).

For self-efficacy level, 66(16.1%) of participants were poor self-efficacy (score ≤ 54). 248(60.3%) participants were medium self-efficacy (score 55-86), and 97 (23.6%) participants were good self-efficacy (score ≥ 87).

For self-care behaviors level, 121(29.4%) participants had low self-care behaviors (score ≤ 24). 186(45.3%) of participants were medium self-care behaviors level (score 25-33), and 104 (25.3%) of participants were good self-care behaviors level (score ≥ 34).

For the social Support level, 129(46.7%) participants had low social support (score ≤ 56). 129(31.4%) of participants had moderate social support (score 57 − 70), and 90 (21.9 %) of participants had good social support level (score ≥ 71).
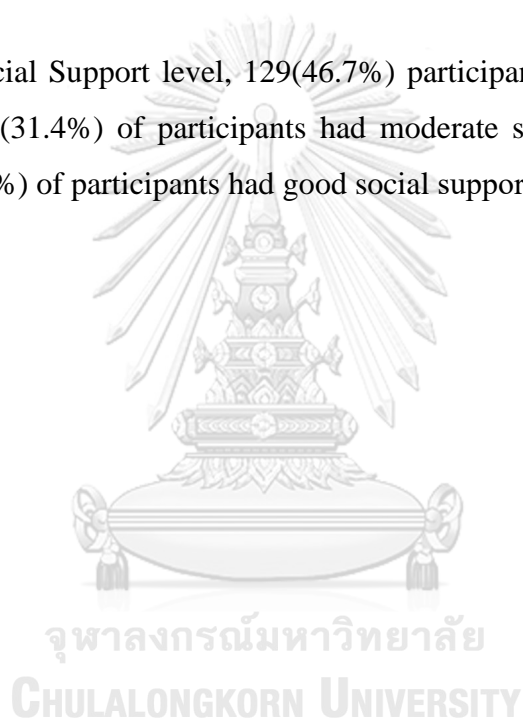
Table 3: The proportion of Glycemic control level, The level of Self-efficacy, Self-care behaviors, and Social support

The Proportion of Glycemic control level, The level of Self-efficacy, Self-care behavior, and social support	Number (Total = 411)	Percentage
The Proportion of glycemic control level		
Controlled glycemic level (HbA1C <7%)	214	52.1
Uncontrolled glycemic level (HbA1C ≥ 7%)	197	47.9
Self-efficacy level		
Poor self-efficacy (score ≤ 54)	66	16.1
Medium self-efficacy (score 55-86)	248	60.3
Good Self-efficacy (score ≥ 87)	97	23.6
Self-care behaviors level		
Low self-care behaviors (score ≤ 24)	121	29.4
Medium self-care behaviors level (score 25-33)	186	45.3
Good self-care behaviors level (score ≥ 34)	104	25.3
Social support level		
Low social support (score ≤ 56)	192	46.7
Moderate social support (score 57−70)	129	31.4
Good social support level (score ≥ 71)	90	21.9

4.3 The association between general characteristics, health status, self-efficacy, self-care behaviors, and social support with glycemic control level among Type 2 DM Patients (n = 411) by the bivariate analysis (p-value ≤ 0.2)

Table 4 reported the general characteristics, health status, self-efficacy, self-care behavior, and social support with glycemic control level regarding HbA1C among 411 Type 2 DM patients.

The bivariate analysis was used to find the crude odds ratio and the association of general characteristics, health status, self-efficacy, self-care behaviors, and social

support with the dependent variable (glycemic control level). The variables with p-value < 0.2 from the bivariate analysis were selected into the multivariable model (binary logistic regression).

The result of bivariate analysis variables in this study showed that there was an association between 6 independent variables, including gender (p-value = 0.146), duration of type 2 DM (p-value = 0.100), alcohol drinking (p-value=0.106), self-efficacy (overall p-value <0.001), self-care behaviors (overall p-value <0.001), social support (overall p-value <0.001) and dependent variable (glycemic control level). The independent variables with p-value <0.2 in bivariate analysis were entered into binary logistic regression.

According to the bivariate analysis found that **gender was associated with glycemic control level (p-value = 0.146).** Most of the participants, 143(54.8.8%) were female with controlled glycemic level (HbA1C <7%), while 71(47.3.3%) of males were controlled glycemic level (HbA1C <7%). The crude odds ratio of males with Type 2 DM patients is higher than females with Type 2 DM. The male was 1.348 times more likely to have an uncontrolled glycemic level (HbA1C $\geq$ 7%) compared to the female Type 2 DM (95% CI; 0.901-2.017).

Duration of Type 2 diabetes mellitus (DM) was associated with glycemic control level (p-value = 0.100). There were 127 (55.7%) participants who lived with Type 2 DM and had controlled glycemic level (HbA1C<7%) for less than 9 years. 101(44.3%) of participants lived with Type 2 DM with uncontrolled glycemic level (HbA1C $\geq$ 7%) for less than 9 years.

In comparison, 96(52.5%) of participants lived with Type 2 DM with uncontrolled glycemic level (HbA1C $\geq$ 7%) for 9 years and over.

The crude odds ratio of uncontrolled glycemic level (HbA1C $\geq$7%) increased with a long duration of Type 2 DM. The crude odds ratio of patients who were Type 2 DM for 9 years and over is higher than patients who were Type 2 DM for less than 9 years. Patients who were Type 2 DM for 9 years and over were 1.388 times more

likely to have uncontrolled glycemic control (HbA1C ≥ 7%) than those who were Type 2 DM for less than 9 years (95% CI; 0.939-2.050) (p-value = 0.100).

Alcohol drinking was associated with glycemic control level (p-value=0.106). Most of the participants, 204(53.1%) were not drinking alcohol with controlled glycemic level (HbA1C <7%). While, 17(63.0%) of participants were drink alcohol with uncontrolled glycemic level (HbA1C ≥ 7%). The odds ratio of patients who drink alcohol is higher than patients who do not drink alcohol. Patients who drink alcohol were 1.927 times more likely to have uncontrolled glycemic level (HbA1C ≥ 7%) compared to patients who do not drink alcohol (95%CI; 0.860-4.315).

Self-efficacy was associated with glycemic control level (p-value < 0.001). There were 128(51.6 %) participants who had medium self-efficacy (score 55-86) with controlled glycemic level (HbA1C <7%). Approximately 65(98.5%) of participants had poor self-efficacy (score ≤ 54) with uncontrol glycemic control (HbA1C ≥ 7%).

Poor self-efficacy (score ≤ 54) was found to be at greater risk of uncontrolled glycemic level (HbA1C ≥ 7%) compared to medium self-efficacy (score 55-86) (crude odds ratio = 0.016; 95%), and good self-efficacy (score ≥ 87) (crude odds ratio = 0.001; 95% CI= 0.000-0.006). The crude odds ratio uncontrolled glycemic level (HbA1C ≥7%) of Type 2 DM patients with good self-efficacy is lower than the odds of uncontrolled glycemic level (HbA1C ≥7%) of Type 2 DM patients with low self-efficacy and medium self-efficacy.

Therefore, the crude odds ratio of uncontrolled glycemic level (HbA1C ≥7%) decreased with a higher level of self-efficacy. Type 2 DM patients with lower level of self-efficacy had a greater risk of uncontrolled glycemic level (HbA1C ≥ 7%) than patients who had higher level of self-efficacy. In other words, the higher level of self-efficacy was a protective factor with uncontrolled glycemic level.

Self-care behaviors were associated with glycemic control level (p-value <0.001). 116(95.9%) of participants had low self-care behaviors (score ≤ 24) with

uncontrolled glycemic level (HbA1C $\geq$ 7%). 79(42.5%) of participants had medium self-care behaviors (score 25-33) with uncontrolled glycemic level (HbA1C $\geq$ 7%). While, 107(57.5%) of participants had medium self-care behaviors (score 25-33) with controlled glycemic level (HbA1C <7%).

Low self-care behaviors (score $\leq$ 24) was found to be at greater risk of uncontrolled glycemic level (HbA1C $\geq$ 7%) compared to medium self-care behaviors (score 25-33) (crude odds ratio = 0.032; 95%CI = 0.012-0.082), and good self-care behaviors (score $\geq$ 34) (crude odds ratio = 0.001; 95%CI = 0.001-0.004).

The crude odds ratio of uncontrolled glycemic level (HbA1C $\geq$7%) among Type 2 DM patients with medium self-care behaviors (score 25-33), and good self-care behaviors (score $\geq$ 34) is lower than the odds of uncontrolled glycemic level (HbA1C $\geq$ 7%) among Type 2 DM patients with low self-care behaviors (score $\leq$ 24).

Type 2 DM patients who had lower level of self-care behaviors had a greater risk of uncontrol glycemic level (HbA1C $\geq$ 7%) than patients who had higher level self-care behaviors.

Therefore, the crude odds ratio of uncontrolled glycemic level (HbA1C $\geq$7%) decreased with the higher level of self-care behaviors. In other words, the higher level of self-care behaviors was a protective factor with uncontrolled glycemic level.

Social support was associated with glycemic control level (p-value <0.001). There were 158(82.3%) of patients who had low social support (score $\leq$ 56) with uncontrolled glycemic level (HbA1C $\geq$ 7%). Approximately 37 (28.7 %) of participants had moderate social support (score $57 - 70$) with uncontrolled glycemic level (HbA1C $\geq$7%).

Low social support (score $\leq$ 56) was found to be at greater risk of uncontrolled glycemic level (HbA1C $\geq$ 7%) compared to moderate social support (score $57 - 70$) (crude odds ratio = 0.087; 95% CI 0.051-0.147), and good social support (score $\geq$ 71) (crude odds ratio = 0.005; 95%CI = 0.001-0.021).

The crude odds ratio uncontrolled glycemic level (HbA1C $\geq$ 7%) among Type 2 DM patients with moderate social support, and good social support is lower than the

odds of Type 2 DM patients with low social support. Type 2 DM patients who had lower level of social support had a greater risk of uncontrol glycemic level (HbA1C ≥ 7%) than patients who had higher level of self-care behaviors.

Therefore, the crude odds ratio of uncontrolled glycemic level (HbA1C ≥7%) decreased with the high level of social support. In other words, the higher level of social support was a protective factor with uncontrolled glycemic level.

Table 4: The association between general characteristics, health status, self-efficacy, self-care behaviors, and social support with glycemic control level among Type 2 DM Patients (n=411) by the bivariate analysis (p-vale ≤ 0.2)

General Characteristics	Poor glycemic control HbA1C ≥ 7% (n=261)	Good glycemic control HbA1C <7% (n=150)	Crude OR	95 % CI		P-value
				Lower	Upper	
Gender						
Male	79(52.7)	71(47.3)	1.348	0.901	2.017	0.146 [b]
Female	118(45.2)	143(54.8)	1			
Age						
30-59 years old (Adult)	60(51.3)	57(48.7)	1			
≥ 60 years old (Elderly)	137(46.6)	157(53.4)	0.829	0.540	1.273	0.391
Mean±SD = 64.67 ± 9.5; Range = 30-91 years old						
Education Level						0.761
No education	17(47.2)	19(52.8)	1.342	0.443	4.066	0.603
Primary school, high school, and vocational certificate	172(48.5)	183(51.5)	1.410	0.563	3.532	0.464
Bachelor	8(40.0)	12(60.0)	1			

degree and

others

	Uncontrolled HbA1C ≥ 7% (n=261)	Controlled HbA1C <7% (n=150)	Crude OR	95 % CI Lower	95 % CI Upper	P-value
Marriage Status						0.532
Single, divorce, and, widow	66(45.8)	78(54.2)	1			
Married	131(49.1)	136(50.9)	1.138	0.758	1.709	
Occupational						0.267
Unemployed	96(45.3)	116(54.7)	1			
Employment	101(50.8)	98(49.2)	1.245	0.845	1.835	
Income level [a]						0.657
< 10,590 Thai baht per month	160(51.4)	160(51.4)	1.108	0.705	1.741	
≥ 10,590 Thai baht per month	151(48.6)	54(54.0)	1			

Health Status	Uncontrolled HbA1C ≥ 7% (n=261)	Controlled HbA1C <7% (n=150)	Crude OR	95 % CI Lower	95 % CI Upper	P-value
Body Mass Index						0.987
Under weight (<18.5)	8(50.0)	8(50.0)	1.053	0.380	2.92	0.921
Normal weight (18.5-22.9)	57(47.1)	64(52.9)	0.938	0.595	1.47	0.783
Overweight (23-24.9)	38(46.9)	43(53.1)	0.931	0.553	1.56	0.787
Obese (≥ 25)	94(48.7)	99(51.3)	1			
Duration of Type 2 DM						0.100[b]
< 9 years	101(44.3)	127(55.7)	1			
≥ 9 years	96(52.5)	87(47.5)	1.388	0.939	2.050	

Co-morbidity						0.431
Yes	155(47.0)	175(53.0)	0.822	0.506	1.338	
No	42(51.9)	42(51.9)	1			
Hypertension						0.386
Yes	135(46.6)	155(53.4)	0.829	0.542	1.267	
No	62(51.2)	59(48.8)	1			
Dyslipidemia						0.565
Yes	116(49.2)	120(50.8)	1.122	0.758	1.660	
No	81(46.3)	94(53.7)	1			
Smoking						0.243
Smoking	18(4.4)	13(41.9)	1.555	0.741	3.263	
No smoking	179(47.1)	201(52.9)	1			
Alcohol Drinking						0.106 [b]
Drinking alcohol	17(63.0)	10(37.0)	1.927	0.860	4.315	
No drinking alcohol	180(46.9)	204(53.1)	1			
Family history of Type 2 DM						0.685
Yes	101(47.0)	114(53.0)	0.923	0.626	1.360	
No	96(49.0)	100(51.0)	1			
Self-efficacy						<0.001 [b]
Poor self-efficacy (Score ≤ 54)	65(98.5)	1(1.5)	1			
Medium self-efficacy (score 55-86)	128(51.6)	120(48.4)	0.016	0.002	0.120	<0.001 [b]
Good Self-efficacy (score ≥ 87)	4(4.1)	93(95.9)	0.001	0.000	0.006	<0.001 [b]
Self-care behaviors						<0.001 [b]
Low self-	116(95.9)	5(4.1)	1			<0.001 [b]

care behaviors (score ≤ 24)						
Medium self-care behaviors (score 25-33)	79(42.5)	107(57.5)	0.032	0.012	0.082	<0.001 [b]
Good self-care behaviors (score ≥ 34)	2(1.9)	102(98.1)	0.001	0.000	0.004	<0.001 [b]
Social Support						<0.001 [b]
Low social support (score ≤ 56)	158(82.3)	34(17.1)	1			
Moderate social support (score 57 − 70)	37(28.7)	92(71.3)	0.087	0.051	0.147	<0.001 [b]
Good social support (score ≥ 71)	2(2.2)	88(97.8)	0.005	0.001	0.021	<0.001 [b]

[b] the independent variable at p-value <0.2 in bivariate analysis entered into binary logistic regression.

4.4 The association between general characteristics, health status, self-efficacy, self-care behaviors, and social support with glycemic control level among Type 2 DM Patients (n = 411) by multivariable model (binary logistic regression) p-value ≤ 0.05

The variables with p-value <0.2 from the bivariate analysis included gender, duration Type 2 DM, alcohol drinking, self-efficacy, self-care behaviors, and social support were selected into the multivariable model (binary logistic regression). Multivariable binary logistic regression analysis was used to identify an association

between the independent variables with glycemic control (dependent variable). The association was declared significant at p-value <0.05.

In Table 4, the study's findings indicated that self-efficacy, self-care behaviors, and social support were significant factors in glycemic control level among Type 2 DM patients.

Self-efficacy was associated with glycemic control level (overall p-value < 0.001). Poor self-efficacy (score ≤ 54) was found to be at greater risk of uncontrolled glycemic level (HbA1C ≥ 7%) compared to medium self-efficacy (score 55-86) (adjusted odds ratio = 0.046; 95% CI= 0.005-0.0.432) (p-value <0.001), and good self-efficacy (score ≥ 87) (adjusted odds ratio = 0.001; 95% CI= 0.001-0.129) (p-value <0.001)**.** Therefore, the adjusted odds ratio of uncontrolled glycemic level (HbA1C ≥7%) decreased with a higher level of self-efficacy. In short, the higher level of self-efficacy was a protective factor with uncontrolled glycemic level.

Self-care behaviors were associated with glycemic control level (overall p-value <0.001). Low self-care behaviors (score ≤ 24) was found to be at greater risk of uncontrolled glycemic level (HbA1C ≥ 7%) compared to medium self-care behaviors (score 25-33) (adjusted odds ratio = 0.119; 95%CI = 0.043-0.328) (p-value <0.001) and good self-care behaviors (score ≥ 34), (adjusted odds ratio = 0.008; 95%CI = 0.001-0.004)) (p-value <0.001).

Therefore, the adjusted odds ratio of uncontrolled glycemic level (HbA1C ≥7%) decreased with a higher level of self-care behaviors. In short, the higher level of self-care behaviors was a protective factor with uncontrolled glycemic level with a strong association.

Good Social support was associated with glycemic control level (overall p-value <0.001). Type 2 DM patients with low social support (score ≤ 56) was found to be a greater risk of uncontrolled glycemic level (HbA1C ≥7%) than moderate social support (score 57 − 70))(adjusted odds ratio = 0.204 95%CI = 0.101-0.411) (p-value <0.001), and good social support (score ≥ 71)(adjusted odds ratio = 0.024

95%CI = 0.004-0.0.128) (p-value <0.001). Therefore, the adjusted odds ratio of uncontrolled glycemic level (HbA1C ≥7%) decreased with a good level of social support. In short, good social support was a protective factor with uncontrolled glycemic level.

In summary, Patients with higher self-efficacy, and self-care behaviors, were less likely to have uncontrolled glycemic levels (HbA1C ≥ 7%). Good Social support was associated with glycemic control level.

Table 5: The association between general characteristics, health status, self-efficacy, self-care behaviors, and social support with glycemic control level among Type 2 DM patients (n=411) by multivariable model (bianary logistic regression) p-value ≤ 0.05

Variables	Glycemic Control					
	B	SE	Adjusted Odd ratio	95% CI		P-value
				Lower	Upper	
Gender						
Male			1			
Female	- 517	0.375	0.596	0.286	1.243	0.168
Alcohol Drinking						
No drinking alcohol			1			
Drinking alcohol	0.243	0.751	1.275	0.292	5.561	0.747
Duration						
< 9 years			1			
≥ 9 years	0.085	0.347	1.089	0.551	2.151	0.806
Self-efficacy						< 0.001
Poor self-efficacy (Score ≤ 54)			1			
Medium self-efficacy (score 55-86)	-3.073	01.140	0.046	0.005	0.432	<0.007*
Good Self-efficacy (score ≥ 87)	-4.513	1.258	0.011	0.001	0.129	<0.001*
Self-care behaviors						< 0.001*
Low self-care behavior (score ≤ 24)			1			
Medium self-care behaviors (score 25-33)	-2.130	0.518	0.119	0.043	0.328	<0.001*
Good self-care behaviors (score ≥ 34)	-4.792	0.891	0.008	0.001	0.004	<0.001*
Social support						<0.001*
Low social support (score ≤ 56)			1			
Moderate social support (score 57 − 70)	-1.590	0.358	0.204	0.101	0.411	<0.001*
Good social support (score ≥ 71)	-3.748	0.865	0.024	0.004	0.128	<0.001*

* is a significant level at p-value < 0.05 in binary logistic regression

4.5 Describe which are the most social support channels that Type 2 DM patients at Public Health Centers acquire

There were 4 dimensions of social support including emotional support, information support, medication support, instrumental support, and appraisal support. Social support consisted of 2 sub-scales. The primary level is small and characterized by close person and intimate relationships that last a long time, or lifetime. The members of the primary level of social support typically include family and friends. Secondary-level temporary relationships. This level of social support can be observed among healthcare providers and support groups. There were 8 multiple choices of social support channels, including doctor, nurse, public health officer, pharmacist, health volunteer, family, friends, and Type 2 DM patient group. The participants selected the social support channels that they acquired the most.

According to the 1st graph, the results showed that the 1st social support channel that participants attained emotional support, information support medication support, instrumental support, and appraisal support.

There were 197 of type 2 DM patients who acquired social support channel from their doctors (secondary group of social support). There were 110(55.8) of participants who acquired social support from the doctor with control glycemic level (HbA1C <7%). While, 87 (44.2) of the participants who acquired social support from the doctor with uncontrol glycemic level (HbA1C ≥7%).

There were 117 of type 2 DM patients who acquired social support channel from their family (primary group of social support). There were 52(44.4) of participants who acquired social support from their family with control glycemic level (HbA1C <7%). While 65 (55.6) of the participants who acquired social support from their family with uncontrol glycemic level (HbA1C ≥7%).

There were 56 of type 2 DM patients who acquired social support channel from the public health officers (secondary group of social support). There were 34(60.7) of participants who acquired social support from the public health officers with control glycemic level (HbA1C <7%). While 22(39.3) of the participants who

acquired social support from the public health officers with uncontrol glycemic level (HbA1C ≥7%).

There were 19 of type 2 DM patients who acquired social support channel from the nurse (secondary group of social support). There were 7(36.8) of participants who acquired social support from the nurse with control glycemic level (HbA1C <7%). While 12(63.2) of the participants who acquired social support from the nurse with uncontrol glycemic level (HbA1C ≥7%).

There were 5 of type 2 DM patients who acquired social support channel from the health volunteer (secondary group of social support). There were 2(40.0) of participants who acquired social support from the health volunteer with control glycemic level (HbA1C <7%). While 3 (60.0) of the participants who acquired social support from the health volunteer with uncontrol glycemic level (HbA1C ≥7%).
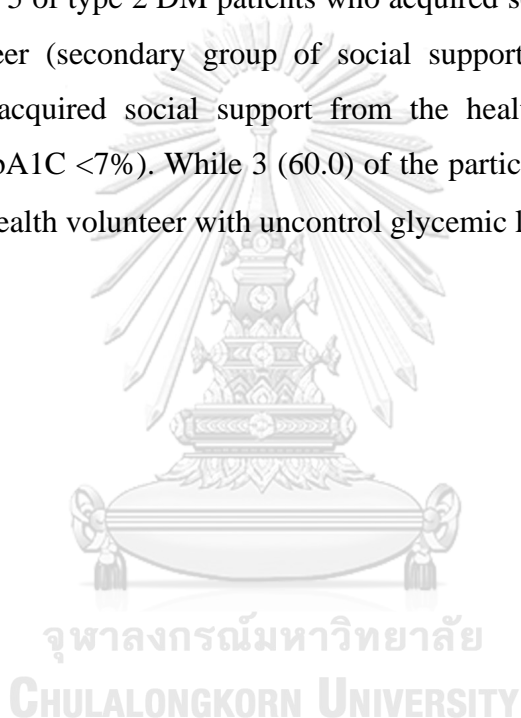
(x= amount of participants who received social support channel)

The most of social support channel that Type 2 DM Patients acquired
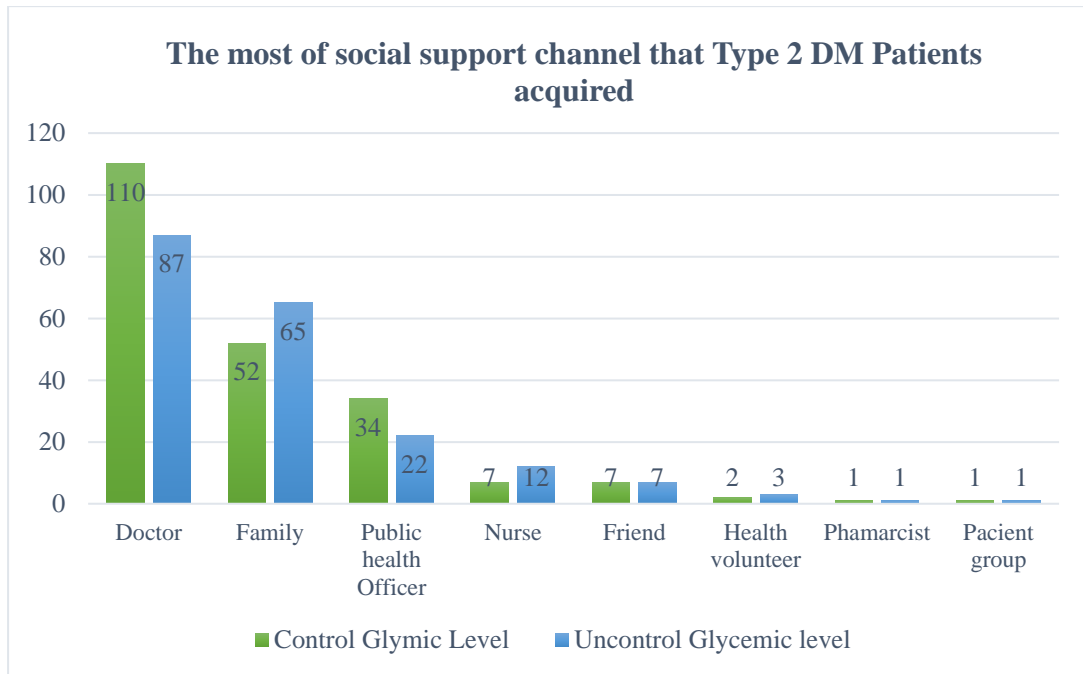
(y = support channel)

Figure 4: The most social support channels that Type 2 DM patients at Public Health Care Centers acquired

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CHULALONGKORN UNIVERSITY

CHAPTER V
DISCUSSION

In the current study, the researcher determined the proportion of uncontrolled glycemic level and controlled glycemic level, to assess the level of self-efficacy, self-care behaviors, and social support among Type 2 DM patients, identified the influencing factors such as general characteristics, health status, self-efficacy, self-care behaviors and social support on glycemic control level among Type 2 DM patients at Public Health Centers in Bangkok. Last, this study described which channels of social support Type 2 DM patients at Public Health Centers in Bangkok, Thailand.

5.1 Discussion

5.1.1 General characteristic, health status and association with glycemic control level

In the findings of the current study, the result of bivariate analysis variables in this study showed that there was an association between 6 independent variables, including gender (p-value = 0.146), duration of type 2 DM (p-value = 0.100), alcohol drinking (p-value=0.106), self-efficacy (overall p-value <0.001), self-care behaviors (overall p-value <0.001), social support (overall p-value <0.001) and dependent variable (glycemic control level). The independent variables with p-value <0.2 in bivariate analysis were entered into binary logistic regression.

Our study found that gender was associated with glycemic control level (p-value = 0.146) in the bivariate analysis. The result from binary logistic regression, that gender was not associated with glycemic control level at p-value <0.005. Most of the participants, 143(54.8.8%) were female with controlled glycemic level (HbA1C <7%), while 71(47.3.3%) of males were controlled glycemic level (HbA1C <7%). The crude odds ratio of males with Type 2 DM patients is higher than females with Type 2 DM. The male was 1.348 times more likely to have an uncontrolled glycemic

level (HbA1C $\geq$ 7%) compared to the female Type 2 DM (95% CI; 0.901-2.017). It different to other studies. The study conducted in Brazil and Venezuela found that the prevalence of inadequate glycemic control was 74.2% in female and 73.0% in male with T2D. The average HbA1c level was higher among women (8.8%) (73 mmol/mol) than in men (8.6%) (70 mmol/mol) (p=0.002). In the adjusted analysis, the average difference between HbA1c levels in women and men was 0.13 (95% CI 0.03 to 0.24; p= 0.015) (F et al., 2019).

The multivariable analysis was female gender from the AOR, being female gender (AOR = 1.59, 95% CI 1.20–2.38, p = 0.041) was positively associated to have poor glycemic control. Gender differences influence access to diabetes therapies and healthcare, resulting in poor treatment, care and education for many women worldwide (Demoz et al., 2019).

The study about type 2 Diabetes Mellitus (DM) registered in the Family Health Strategy (FHS) in Gender differences influences the access to diabetes therapies and healthcare, resulting in poor treatment, care and education for many women worldwide. Pernambuco, Brazil found that there were no significant associations between glycemic control and lifestyle, gender or income (Lima et al., 2016).

Gender is not strongly associated with glycemic control level in this study may affected by the gender equality because males and female were equally to received treatment, join activities, and received knowledge from health educator at diabetes clinic at public health care centers in Bangkok.

Our study found that 101(44.3%) of participants lived with Type 2 DM with uncontrolled glycemic level (HbA1C $\geq$ 7%) for less than 9 years. Moreover, 96(52.5%) of participants lived with Type 2 DM with uncontrolled glycemic level (HbA1C $\geq$ 7%) for 9 years and over. Participants who were Type 2 DM for 9 years and over were 1.388 times more likely to have uncontrolled glycemic control (HbA1C $\geq$ 7%) than those who were Type 2 DM for less than 9 years (95% CI; 0.939-2.050) (p-value = 0.100). The duration of Type 2 diabetes mellitus (DM) was associated with glycemic control level (p-value = 0.100) in binary logistic regression. It similar

to the result from the study conducted in Northwest Ethiopia. These results indicate that tight glycemic control may be beneficial in people and is mostly found in patients who had a short duration of diabetes, whereas a less stringent target may be warranted with longer diabetes exposure. In elderly patients who had long duration of DM, it is difficult to decrease blood glucose too much. It may cause Hypoglycemia (a condition in which your blood sugar (glucose) level is lower than the standard range (Gebermariam et al., 2020).

It is differenced to other studies including the study conducted in a Tertiary Hospital in Saku, Japan. The Multiple logistic regression analysis indicated that a duration of diabetes £ 10 years (adjusted odds ratio [AOR] = 1.87, 95% CI = 1.12–3.14) and having no diabetes complications (AOR = 1.68, 95% CI = 1.03–2.74) were significantly associated with glycemic control (Temma, 2023).

Alcohol drinking was associated with glycemic control level (p-value=0.106). Most of the participants, 204(53.1%) were not drinking alcohol with controlled glycemic level (HbA1C <7%). The odds ratio of patients who drink alcohol is higher than patients who do not drink alcohol. Patients who drink alcohol were 1.927 times more likely to have uncontrolled glycemic level (HbA1C ≥ 7%) compared to patients who do not drink alcohol (95%CI; 0.860-4.315).

Alcohol consumption is inversely associated with glycemic control among diabetes patients. this supports current clinical guidelines for moderate levels of alcohol consumption among diabetes patients. As glycemic control affects incidence of complications of diabetes, the lower A1C levels associated with moderate alcohol consumption may translate into lower risk for complications. (Ahmed et al., 2008) Drinking more than three alcoholic beverages per day can cause higher blood glucose levels (ADA, 2022).

5.1.2 The proportion of poor glycemic control and glycemic control level

The study finding presented that more than half of Type 2 DM were able to control blood glucose. There were 214 (52.1%) Type 2 DM patients with controlled glycemic control level (HbA1C<7%). The result from our study was consistent with the study conducted in Ningbo, China. The HbA1c laboratory report presented that approximately 50.3% of patients at the diabetes center had poor glycemic control. On

the other hand, the findings indicated that less than half of the Type 2 DM patients in Ningbo, China maintained adequate control of their blood glucose level.

This finding aligned with the results of recent studies, including a nationwide population-based study in China. 51% of Type 2 DM Patients in China had poor glycemic control. It w as similar to the study conducted in the community and university hospitals as urban areas in Khon Kaen Province and Bangkok. This study found that over half, 376 (52.4%) of diabetic patients had uncontrolled blood glucose (HbA1C ≥ 7%) (Hurst et al., 2020). The study conducted at community hospitals from 6 districts in Chiang Rai Province found that the prevalence of uncontrol glycemic level was very high (54.8%). The proportion of uncontrol glycemic level was consistent with the study at primary health care in Jakarta, Indonesia. 54.8% of participants were unable to control their blood sugar level. The proportion of uncontrol glycemic level was consistent with the study by (M.Sains et al., 2020; Nigussie et al., 2021) that collected data among Type 2 Diabetes patients at primary health care in Jakarta, Indonesia had poor glycemic control at 54.8%. Moreover, the result of the current study was similar to a study conducted in the southern part of the Peninsular 59.2% (Amsah, 2022) and 59.4% in Southwest Nigeria (Osuji et al., 2018).

Whereas 70.4% of Type 2 DM Patients at an urban hospital in Hanoi, Vietnam had an uncontrolled glycemic level (Thuy et al., 2 0 2 1). It was similar to the study (Nigussie et al., 2021) finding that 73.8% of Type 2 DM patients in Eastern Ethiopia. The result from that study was equal to the survey by (Solomon et al., 2023) conducted in Addis Ababa, Ethiopia. 73.8 % of Type 2 DM patients were unable to control their blood sugar level.

Our study found that 197(47.9%) of participants had uncontrolled glycemic control (HbA1C ≥ 7%). The proportion of uncontrolled glycemic level in Bangkok, Thailand was lower than in many countries, especially in ruler areas, because participants of this study resided in Bangkok, the capital city of Thailand (an urban community). There were many Public Health Care Centers located near patients' homes. Therefore, it is convenient for Type 2 DM patients to access treatment, including health care services. Whenever they have any questions or abnormal

symptoms, they can regularly inquire for information and receive self-care information from healthcare providers. This information could be used to prevent severe symptoms, follow up on their lifestyles, and improve the success of glycemic control.

Although 52.1% of Type 2 DM patients in Bangkok had controlled glycemic level, many still struggle with blood sugar control while receiving treatment at Public Health Centers in North and South Thonburi Zones. There were 47.9% Type 2 DM patients in the study area with uncontrolled glycemic level. It was comparable with related studies, including the study conducted in San Kamphaeng District, Chiang Mai Province. 47.9 % of Type 2 DM patients were unable to control their blood sugar level (Soontornsaratoon, 2021). The outpatient clinic study conducted in Mato Grosso, Brazil discovered a lower prevalence of poor glycemic control (47.34%) compared to other studies in Brazil, particularly in the South (69.08%) (Espinosa et al., 2021). The lower level of poor glycemic control in Type 2 DM patients is likely related to the care and monitoring provided by this type of reference service, in which the therapeutic strategy is based on self-care practices for glycemic control. In addition, as this service integrates continuing professional training are developed with care guided by holistic, global, and multidisciplinary care perspectives, in which creative processes of guidance, monitoring, and intervention are tested, rethought, and transformed into more viable therapeutic projects to maintain adequate blood glucose parameters and prevent complications (Espinosa et al., 2021).

Our study found that many patients with type 2 diabetes have uncontrolled glycemic levels despite the presence of diabetes experts in active service at Public Health Care Centers. This is in contrast to studies conducted in other developed countries, where the prevalence of poor glycemic control is comparatively lower. The high prevalence of poor glycemic control among type 2 diabetes mellitus (T2DM) patients is a significant public health problem and a major cause of the development of diabetic complications. Therefore, it is important to develop a comprehensive approach that encompasses both clinical and community health interventions to achieve glycemic control, minimize complications, and prevent premature mortality.

5.1.3 The level of self-efficacy, self-care behaviors, and social support among Type 2 DM patients and an association between glycemic control level

      5.1.3.1 The level of self-efficacy and association between glycemic control level

Based on the findings of our study, the majority of Type 2 DM patients registered cases who received health care services at the Public Health Care Center in Bangkok, Thailand had moderate (54.5%) and poor (30.4 %) level of self-efficacy. Compared to other studies, the study conducted in Western Ethiopia found that Type 2 DM patients who received health services at public hospitals perceived good self-efficacy (Oluma et al., 2020).

More than haft (55%) of people who lived with Type 2 DM in Ibadan, Southern Nigeria, had a high self-efficacy. Most of the Type 2 DM patients with high self-efficacy lived in the city (Chen et al., 2020). Higher levels of self-efficacy in individuals lead to increased motivation to engage in patient behaviors

, as they believe in their ability to accomplish their ability to control their blood sugar level. A study conducted among diabetes patients in Iranian revealed that a low level of self-efficacy was associated with the glycemic control level (Ong-Artborirak et al., 2023).

It was similar to the study conducted in China. The higher level of self-efficacy was correlated with self-care behaviors. Type 2 DM patients with higher self-efficacy related to higher self-care behaviors and better glycemic control. Consequently, poor self-efficacy was an extreme disadvantage of managing Type 2 DM. Therefore, policymakers and health care providers should concern about the self-efficacy-focused intervention that could encourage for the community and clinicians to improve diabetes self-care behaviors (Kase & Siyoto, 2021).

Although the study area of this research collected data in the capital city of Thailand, most patients had medium and poor levels of self-efficacy because there was a lack of awareness of self-efficacy and health education about Type 2 DM. The level of self-efficacy among patients in Bangkok was lower than in many countries. 30.4 % of type 2 DM patients in our study had poor level of self-efficacy which can cause many disadvantages. For these reasons, it may lead to disadvantages of diabetes

management in this area, for example, the increasing prevalence of poor glycemic control and increasing financial treatment.

The current study found that self-efficacy was an association factor with glycemic control level from the bivariate analysis. Poor self-efficacy was at greater risk of uncontrolled glycemic level than medium self-efficacy (p-value <0.001). Additionally, the result of the Multivariable model (binary logistic regression analysis), self-efficacy was a strongly associated factor with the glycemic control level. Poor self-efficacy was found to be at greater risk of uncontrolled glycemic level (HbA1C $\geq$ 7%) compared to medium self-efficacy (p-value <0.001) and good self-efficacy (p-value <0.001). Consequently, the Crude odds ratio and adjusted odds ratio of uncontrolled glycemic level (HbA1C $\geq$7%) decreased with a higher level of self-efficacy. Instead, patients with lower self-efficacy are more likely to uncontrolled glycemic level than higher self-efficacy. The result from our study was similar to the survey in Khonkaen Province and Bangkok as an urbanization area. That study collected data at community and university hospitals. Self-efficacy remained associated with blood glucose control ($OR_{DMSE\ (adj)}$ = 2.67; 95%CI: 2.20, 3.25). Diabetes management on self-efficacy is shown to be strongly associated with blood glucose control in the Thai Type 2 diabetes population. Patients with high self-efficacy level were 2.67 times more likely to control their glycemic level (Hurst et al., 2020). The study conducted at the outpatient clinic in Jordan found that participants who perceived stronger diet self-efficacy were more likely to able to control glycemic level (OR=0.3, 95% CI: 0.1–0.6). Likewise, patients who perceived stronger blood sugar testing (monitoring self-efficacy) were more likely to control glycemic (OR=0.2,95% CI: 0.05–0.7) (Al-Khawaldeh et al., 2019). The study collected data from the northern region of Thailand; this study explored the relationship between diabetes self-efficacy and glycemic control among men and women with type 2 diabetes. Low self-efficacy has been associated with poor glycemic control. Previous research has emphasized the significance of enhancing diabetes self-efficacy through behavioral interventions, as it can lead to improved glycemic control and better outcomes related to the diabetes management (Ong-Artborirak et al., 2023).

A low level of self-efficacy is an important factor that can be negatively impacted by chronic diseases such as diabetes. Improving the self-confidence of diabetic patients can help improve their ability to manage their blood sugar levels. Therefore, it is recommended to provide interventions for glycemic control in patients who have had diabetes for a longer duration (Dehghan et al., 2017). Therefore, the major findings of all the included studies showed that higher self-efficacy led to better adherence to self-care behaviors and achievement outcomes for blood glucose control for type 2 DM patients (Veena Chindankutty & Devineni, 2022).

5.1.3.2 The level of self-care behaviors and association between glycemic control level

The finding from the current study presented that most of the participants Type 2 DM patients (registered cases) 45.3% in this study had medium self-care behaviors level. It was similar to the study in the Mueang District of Mahasarakham Province, Thailand. This study collected data in Patients with Type 2 Diabetes Mellitus Living. The majority of Type 2 DM patients had a moderate level of self-care behaviors with a value of 71.90% (Mean = 42.69, SD = 5.14) (Wanwisa S., 2022).

The rapid review of the effect of COVID-19 on Type 2 Diabetes self-care behaviors in many countries found that most of Type 2 DM patients had medium and high-level self-care behaviors. It was found that the majority of Type 2 diabetes patients had medium to high levels of self-care behaviors during the COVID-19 pandemic. However, these studies also revealed an increase in diabetes-related stress, changes in dietary intake, and alterations in meal timings. Additionally, physical activity was reported to have decreased. Therefore, healthcare providers should emphasize the importance of self-care behaviors. This will help in reducing the risk of negative health outcomes in individuals with diabetes (Jill M. et al., 2023).

Although the study area of the current research collected data in the capital city of Thailand, our study found that most patients (45.3%) had medium self-care behaviors. It could be attributed to many reasons such as a lack of understanding, lack of awareness, and lack of follow-up about self-care behaviors during the COVID-19

situation in Bangkok, Thailand. Limited social support from family, friends, or healthcare providers can make it challenging for patients to sustain their self-care behaviors.

Our study found that self-care behaviors was an association factor with glycemic control level from the bivariate analysis. Low self-care behaviors was found to be at greater risk of uncontrolled glycemic level compared to medium self-care behavior (p-value <0.001). Moreover, the result of the Multivariable model (binary logistic regression analysis), self-care behavior was an association factor with glycemic control levels low self-care behaviors was found to be at greater risk of uncontrolled glycemic level (HbA1C $\geq 7\%$) compared to medium self-care behavior (p-value <0.001), and good self-care behavior (p-value <0.001). Consequently, the Crude odds ratio and adjusted odds ratio of uncontrolled glycemic level (HbA1C $\geq 7\%$) decreased with the high level of self-care behaviors.

On the other hand, patients with lower level of self-care behaviors are more likely to uncontrolled glycemic level than higher level of self-care behaviors. It was compared to other studies, including the study conducted in Najran, Saudi Arabia. It found that most Type 2 diabetes mellitus (DM) patients (90.1%) in Najran City, Saudi Arabia exhibited inadequate self-care behaviors. Most of the participants had poor diabetes management. The result from this study found that an optimizing glycemic control level heavily relies on the significance of self-care behaviors. Moreover, having a longer duration of Type 2 DM is a significant independent factor associated with poor self-care behaviors (Al-Qahtani, 2020).

The epidemiology research in a Multiethnicity Area, Nakae District, Nakhonphanom Province investigated that self-care behaviors were significantly associated with the level of HbA1c of type 2 diabetic patients (Sasiwan K., 2021). It was similar to the cross-sectional study conducted in Northern Jordan, the researchers investigated the association between self-care behaviors and blood sugar control among Type 2 Diabetes patients aged 18 years and above. The findings revealed an association between inadequate glycemic control and poor adherence to self-care behaviors. Participants with greater adherence to self-care behaviors about Type 2 DM were significantly associated with better blood glucose control (p< 0.001).

Physical activities and a healthy diet were the most important predictors of HbA1c (p< 0.001) (Almomani & Al-Tawalbeh, 2022). It was constant in the cross-sectional study in northern Jordan. A healthy lifestyle with regular physical activities and healthy diet habits in self-care behaviors are essential for achieving and maintaining adequate glycemic control (Almomani & Al-Tawalbeh, 2022).

Patients who receive the knowledge and a positive health perception are more likely to change their behaviors. This affects their concerns and their ability to maintain self-care behaviors and follow a treatment plan. For these reasons, self-care behaviors is associated with glycemic control level. Type 2 DM patients with good self-care behaviors are more likely to have good glycemic control level than lower level of self-care behaviors. Patients with poor self-care behaviors are more likely to have poor glycemic control than higher self-care behaviors. Public health providers should focus on self-care in each aspect, such as eating behavior, physical exercise, medication, stress management, etc. Moreover, many factors can improve patients' behaviors, including motivating, setting goals, setting activities, and monitoring self-care continuously. If they believe in their ability to take care of themselves and see models from other people (Buapom, 2022).

According to the result from previous research, our study highlights the added advantages of regular follow-up in achieving better glycemic control. Therefore, it is essential to implement active, personalized educational, and social support interventions to motivate patients to adopt healthy eating habits and to encourage regular follow-up. Therefore, healthcare providers should play a role in organizing activities to increase health literacy to encourage diabetes patients to possess the knowledge, positive attitudes, and skills to take care of themselves and appropriately modify self-care behaviors. Moreover, motivating, setting goals, setting activities, and monitoring self-care continuously so that patients can take care of themselves in each aspect appropriately. Good self-care behaviors affect patient's ability to take care of themselves and have good self-care behaviors as well It affects the control of blood sugar levels better (Buapom, 2022).

5.1.3.3 The level of social support and association between glycemic control level

According to the result of our study, the majority of Type 2 DM patients (registered cases) in this study 294 (70.8%) of participants had moderate social support. It was compared to other studies, including the result from our study was different from the study conducted in Southwest Nigeria, this study presented that the majority of the patients (137, 43.8%) acquired good social support (family support) (E., 2022).

In southern Ethiopia, half of adult diabetic patients 50.2 % were receiving social support, despite its significant benefits. Social support plays a crucial role in reducing absenteeism from medical follow-ups, enhancing treatment adherence, controlling glycemic levels, and facilitating lifestyle modifications. To promote the health of diabetic individuals and effectively achieve diabetes management goals, it is imperative to ensure that all diabetic patients have access to adequate social support (Jaafaripooyan et al., 2021).

Although the study area of this research collected data in the capital city of Thailand, most patients had moderate social support. Based on face-to-face interviews, the majority of patients lived alone, and difficult to meet the doctor to follow up diabetes treatment plan.

The current study found that good social support was an associated factor with glycemic control level (p-value = 0.042). The adjusted odds ratio of uncontrolled glycemic level (HbA1C $\geq$7%) decreased with a good level of social support. In short, good social support was a protective factor with uncontrolled glycemic level. It was comparable to the study by (Jaafaripooyan et al., 2021). A good perception of family support (P=0.00001, odds ratio 112.51) emerged as a significant independent predictor of achieving good glycemic control (Afroz et al., 2019). Patients who received social support had significantly higher odds of achieving controlled blood glucose levels, maintaining good treatment adherence, and following the prescribed regimen. The likelihood of these positive outcomes was three times greater for patients with social support compared to those without it. Furthermore, the odds ratio of adhering to medical follow-ups was five times higher for patients who had access

to social support, compared to those who did not receive such support. Moreover, the study by (Karimy et al., 2018) confirmed that social support for diabetics was positively associated with blood glucose monitoring, good adherence to healthy diets, and regular physical exercises. Additionally, numerous studies have emphasized the beneficial influence of social support, particularly from family members, specifically spouses, in effectively managing blood sugar levels and HbA1C. The presence of social support has been identified as a predictor of health-promoting behaviors, including self-care behavior, among individuals with diabetes. Consequently, involving family members, particularly spouses, in promoting self-care behaviors becomes crucial for delivering comprehensive healthcare to patients with diabetes (Rad et al., 2018). The presence of social support is crucial in aiding patients with diabetes to cope effectively with the disease and enhance treatment adherence. Healthcare providers should be mindful of the influence of psychosocial factors when designing the patient's treatment plan. Moreover, it is essential to educate family members about diabetes, emphasizing the significance of treatment adherence and the potential long-term complications associated with the disease (Rad et al., 2018) (Ramkisson et al., 2017).

Our study found that only 13.6 % of patients had high social support. In terms of social support, it is essential to provide knowledge for Type 2 DM patients, caregivers, and public health volunteers at Public Health Centers to awareness about social support including emotional support, information support, instrumental support, and appraisal support. Our study highlights the added advantages of regular follow-up in achieving better glycemic control. According to the result of our study, There are 287(69.8.) of participants strongly disagree with social support question No. 15 that I received items or equipment to check or control diabetes, such as Self-testing device for measuring blood sugar levels and insulin syringes from family and friends. Continuous care, 167 (40.6%) answered the self-care behavior question no. 18 that I follow the advice of my doctors and nurses to keep myself healthy and prevent diabetes complications.

Therefore, social support is important for Type 2 DM patients able to control glycemic level and reduce finances for high-severity treatment.

5.4 Social Support Channel

According to the result of our study, the 1st social support channels that participants attained emotional support, information support medication support, instrumental support, and appraisal support. Among the participants, 197(47.9%) reported their primary social support channel to be their doctors as a social support group from secondary sources. The family emerged as the primary social support channel for 117 (28.5%) participants as social support from the primary group and life-long, while 56(13.6%) relied on public health officers.

Our study's findings were similar to a previous study in Singapore confirming that the majority of Type 2 DM patients received support from physicians. Health professionals can help manage diabetes through shared decision-making and communication. (Brew-Sam et al., 2020). *The* study was conducted in Southwest Nigeria. Specifically, our study found that the majority of patients (137, 43.8%) had good social support and received good social support from their families as social support from the primary group (E., 2022).

The study conducted among Type 2 DM patients in Limpopo province in South Africa presented that most of the participants received support from family members concerning food, exercise, and collection of medication. The majority of participants received social support from their partners (Mphasha et al., 2022). The study investigated the social support among diabetes patients and the association between socioeconomic factors in Yangon, Myanmar. The majority of participants were aware of social support about Type 2 DM from family, friends, and healthcare providers. The study aimed to examine social support among diabetes patients in Yangon, Myanmar, and understand the relationship between socioeconomic factors. The findings showed that most participants were informed about the social support available for Type 2 DM from family, friends, and healthcare providers. Additionally, a higher level of social support was associated with certain socioeconomic factors (Khin et al., 2021).

Social support from primary and secondary sources is important for improving the quality of diabetes management. The majority of Type 2 DM patients had poor and moderate social support. Therefore, the intervention program should involve both primary and secondary social support groups.

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study presents that of the majority of patient were unable to control their glucose as uncontrolled glycemic control (HbA1C $\geq$ 7%). Although the study area of this research collected data in the capital city of Thailand, the majority of patients, the most of patients were poor self-efficacy, medium self-care behaviors, and moderate social support between 6 independent variables, including gender, alcohol drinking, duration of type 2 DM, self-efficacy, self-care behaviors, social support and glycemic control level (dependent variable).

Crude odds ratio of glycemic control decreased with higher level of self-efficacy, self-care behaviors, and good social support. On the other hand, Patients who had lower level of self-efficacy, self-care behaviors, and social support more likely to uncontrol glycemic level than patients who had higher level of self-efficacy, self-care behaviors, and social support. Self-efficacy, self-care behavior, and social support were strongly associated with glycemic control level. Patients who had higher level of self-efficacy, self-care behaviors were more likely to decrease risk of uncontrolled glycemic level (HbA1C $\geq$ 7%) as a protective factor. Patients who had good social support was found to be at great control of glycemic level.

For these reasons, the findings of this study could be used to develop an intervention program for Type 2 DM patients, caregivers, and public health volunteers at Public Health Centers in Bangkok in order to improve the glycemic control level. In terms of the importance of social support, Type 2 DM patients are able to control their glycemic level, and reduce finances for high-severity treatment. Moreover, these relate to increasing the control glycemic level proportion for long-term strategy planning based on the Key Performance Indicator (KPI) of Bangkok Metropolitans Administration, and the Ministry of Public Health of Thailand.

Social support channels, there are four types of social support including emotional support, information support medication support, instrumental support, and

appraisal support. The results of our study showed that the 1st social support channel in which participants attained social support is a doctor, family, and public health officer. Therefore, the intervention program should involve both primary and secondary social support groups.

6.2 Recommendation
6.2.1 Recommendation for program implementation

The conclusions of this study could be used to progress an health promotion and intervention program about self-efficacy, self-care behaviors, and social support for Type 2 DM patients, caregivers, and public health volunteers at Public Health Centers in Bangkok to improve awareness, knowledge, and glycemic control level. Moreover, many patients live alone and have a lack of social support which may lead to a loss of follow-up treatment and HbA1C check-ups. Therefore, approached strategies are important nowadays. According to face-to-face interviews based on questionnaires, many participants lose follow-up with high blood glucose which may lead to the severity of the disease. The result of this study, 247 (60.1) of participants strongly disagree **with monitoring self-efficacy (question No.10)** that I can measure my blood sugar, if necessary, for example when hypoglycemia is suspected. It may include dizziness, palpitations, and sweating. 90 (21.9%) of participants strongly disagree with **Physical activity management self-efficacy question No.15** that I am able to exercise and perform adequate formal activities such aerobic exercises walking and stretching. 167 (40.6%) answered the self-care behavior question no. 18 that I follow the advice of my doctors and nurses to keep myself healthy and prevent diabetes complications.

They don't have an instrument for blood glucose measurement (Fasting blood sugar). An approach strategy in public health and health volunteers is important to visit patients' homes, measure blood glucose, follow up on self-care behaviors, and provide knowledge and awareness about Type 2 DM.

6.2.1 Recommendation for future research implementation

Intervention Program Development: Design and implement an intervention program based on the findings of the study. This program should focus on improving self-efficacy, self-care behaviors, and social support among Type 2 diabetes mellitus (DM) patients, caregivers, and public health volunteers in Public Health Centers in Bangkok. Assessing Intervention Effectiveness: Conduct a comprehensive evaluation of the intervention program to determine the effectiveness by using quantitative measures, such as before and after intervention assessments. Long-Term Follow-Up: Extend the evaluation period beyond the duration of the intervention program to assess the long-term impact on participants' self-efficacy, self-care behaviors, and glycemic control. This will help understand whether the program's effects are sustained over time.

Collaboration with Stakeholders: Engage relevant stakeholders, including healthcare providers, policymakers, and community organizations, in the design and implementation of the intervention program. Collaborative efforts can ensure the program's alignment with existing healthcare systems, policies, and community needs.

By implementing these recommendations, future research can contribute to enhancing diabetes management strategies, improving patient outcomes, and reducing the burden of Type 2 diabetes on individuals and the healthcare system in Bangkok.

6.3 Limitation

According to the outbreak of coronavirus disease 2019 (COVID-19) around the world and in Bangkok, Thailand, it may affect to the collecting data that difficult to assess. Public Health Care Center set the appointment schedules for patient, limit the total cases per day. Many patients missed an appointment. Social distancing, there was lack of area sufficient in Public Health Care Center that may lead to difficult to set the private zone to collect data by face-to-face interview. The request of academic documents and the connection with the government organization process is slow.

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จุฬาลงกรณ์มหาวิทยาลัย
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APPENDIX

Self efficacy, self-care behaviors, and social support questionnaires for Type 2 DM patients

แบบสอบถามสมรรถนะแห่งตน พฤติกรรมการดูแลตัวเอง และ แรงสนับสนุนทางสังคม

ของผู้ป่วยเบาหวาน ชนิดที่ 2

การเก็บข้อมูลครั้งนี้เป็นส่วนหนึ่งของวิทยานิพนธ์ ของนิสิตหลักสูตรปริญญาสาธารณสุขศาสตรม

หาบัณฑิต(หลักสูตรนานาชาติ) วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

ส่วนที่ 1: ข้อมูลทั่วไป

1.1 ข้อมูลทางด้านสังคมและประชากร

1. ศูนย์บริการสาธารณสุข .... ลำดับที่ Code: ....

2. ระดับน้ำตาลสะสมในเลือด (HbA1C) .... %

   (จากเวชระเบียน ผลตรวจวันที่.........เดือน................ พ.ศ. ....)

3. เพศ ☐ชาย ☐ หญิง

4. อายุ...............ปี

5. การศึกษาขั้นสูงสุด

   ☐ ไม่ได้รับการศึกษา

   ☐ ประถมศึกษา/มัธยมศึกษา/ปวช/ปวส/อนุปริญญา

   ☐ ปริญญาตรี/ สูงกว่าปริญญาตรี

6. สถานะ ☐ โสด

   ☐ แต่งงาน

   ☐ หย่าร้าง/หม้าย

7. อาชีพ

    ☐ ทำงาน ระบุ ....

    ☐ ว่างงาน/เกษียณอายุ

8. รายได้ ....บาท/เดือน

2.3 สถานะทางสุขภาพ

1. น้ำหนัก ....กิโลกรัม   ส่วนสูง................ เซนติเมตร

2. ความดันโลหิต Systolic......................... mmHg Diastolic......................... mmHg

3. ระยะเวลาที่เป็นโรคเบาหวาน .... ปี

4. โรคร่วม/โรคประจำตัว .... ☐ ไม่มี

5. ท่านสูบบุหรี่หรือไม่ ☐ ไม่สูบบุหรี่   ☐ สูบบุหรี่

6. ท่านดื่มสุราหรือไม่ ☐ ไม่ดื่มสุรา   ☐ ดื่มสุรา

7. มีประวัติครอบครัวเป็นเบาหวาน ☐ ไม่มี   ☐ มี ระบุ...............

ส่วนที่ 2 สมรรถนะแห่งตนผู้ป่วยเบาหวานเกี่ยวกับโรคเบาหวานชนิดที่ 2

คำชี้แจง โปรดทำเครื่องหมาย ✓ ที่ตรงกับระดับความรู้สึกของตนเองมากที่สุด

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
1	ฉันสามารถเลือกรับประทานอาหารที่ดีและมีประโยชน์ต่อสุขภาพของฉัน เช่นทานอาหารครบ 5 หมู่ ลดหวาน มัน เค็ม					
2	ฉันสามารถเลือกรับประทาน<u>อาหารที่หลากหลาย</u>โดยยังคงยึดตามแผนการรับประทานอาหารเพื่อสุขภาพ					
3	ฉันยังคงสามารถรับประทานอาหารได้ตามแผนการรับประทานอาหารเมื่อฉันป่วย					
4	ฉันสามารถปฏิบัติตามแผนการรับประทานอาหารเพื่อสุขภาพอย่างสม่ำเสมอ					
5	ฉันสามารถเลือกรับประทานอาหารที่หลากหลาย โดยยึดตามแผนการรับประทานอาหาร เมื่อฉันไม่ได้อยู่ที่บ้าน					
6	ฉันสามารถปฏิบัติตามแผนการรับประทานอาหารเพื่อสุขภาพในระหว่างช่วงที่มีงานเทศกาลต่างๆได้					
7	ฉันสามารถเลือกอาหารที่หลากหลาย โดยยังคงยึดตามแผนการรับประทานอาหาร					

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
	เพื่อสุขภาพเมื่อฉันต้องไปงานเลี้ยงสังสรรค์					
8	ฉันสามารถยึดตามแผนการรับประทานอาหารของตนเอง เมื่อฉันกำลังรู้สึกเครียดหรือวิตกกังวล					
9	ฉันสามารถปฏิบัติตามแผนการรับประทานอาหารเพื่อสุขภาพได้ เมื่อฉันไม่ได้อยู่ที่บ้าน					
10	ฉันสามารถตรวจวัดระดับน้ำตาลในเลือดของฉันได้ในกรณีที่จำเป็น เช่น เมื่อมีอาการสงสัยว่าเกิดภาวะน้ำตาลในเลือดต่ำ ซึ่งอาจมีอาการ หน้ามืด ใจสั่น เหงื่อแตก					
11	ฉันสามารถ<u>ลด</u>ระดับน้ำตาลในเลือดของฉันได้หากระดับน้ำตาลในเลือดของฉัน<u>สูงเกินไป</u> เช่น เปลี่ยนชนิดของอาหารที่รับประทาน					
12	ฉันสามารถ<u>เพิ่ม</u>ระดับน้ำตาลในเลือดของฉันได้หากระดับน้ำตาลในเลือดของฉัน<u>ต่ำเกิน</u>ไป เช่น เปลี่ยนชนิดของอาหารที่รับประทาน					
13	ฉันสามารถตรวจสอบเท้าของฉันได้ เช่น ตรวจดูว่าควรตัดเล็บเท้าหรือไม่ หรือมีบาดแผลหรือไม่					

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
14	ฉันสามารถควบคุมน้ำหนักตัวและรักษาน้ำหนักให้อยู่ในระดับที่เหมาะสม					
15	ฉันสามารถออกกำลังกายและทำกิจกรรมทางการได้อย่างเพียงพอ การเต้นแอโรบิก เช่น การเดินและการยืดเหยียดกล้ามเนื้อ					
16	ฉันสามารถออกกำลังกายเพิ่มขึ้นได้ หากแพทย์ให้คำแนะนำว่าควรที่จะทำเช่นนั้น					
17	ฉันสามมารถปรับเปลี่ยนแผนการรับประทานอาหารของตนเองได้และได้ออกกำลังกายเพิ่มขึ้น					
18	ฉันสามารถไปพบแพทย์ตามนัดเพื่อตรวจสอบโรคเบาหวานของฉัน					
19	ฉันสามารถทานยาตามที่แพทย์สั่ง					
20	ฉันจะสามารถรับประทานยาของฉันได้ตามปกติแม้เจ็บป่วย					

ส่วนที่ 3 พฤติกรรมการดูแลตนเองของผู้ป่วยเบาหวานชนิดที่ 2

แบบสอบถามเกี่ยวกับพฤติกรรมการดูแลตนเองของผู้ป่วยเบาหวานซึ่งประกอบไปด้วย การปฏิบัติในการดูแลสุขภาพตนเองทั้ง 5 ด้าน จำนวน 20 ข้อ ได้แก่

-	ด้านการรับประทานอาหาร	จำนวน	5 ข้อ
-	ด้านการรับประทานยา	จำนวน	5 ข้อ
-	ด้านการออกกำลังกาย	จำนวน	2 ข้อ
-	ด้าน การจัดการกับความเครียด	จำนวน	4 ข้อ
-	ด้านการดูแลรักษาต่อเนื่อง	จำนวน	4 ข้อ

* หมายเหตุ: ปฏิบัติเป็นประจำ หมายถึงทำเป็นประจำหรือทุกครั้ง (6-7 วันต่อสัปดาห์)

บางครั้งมีพฤติกรรมหมายถึง ทำเป็นบางครั้ง (1-3 วันต่อสัปดาห์)

ไม่เคยไม่ประพฤติตามนั้น (0 วันต่อสัปดาห์)

ข้อ	คำถาม	ปฏิบัติ เป็นประจำ	ปฏิบัติ บางครั้ง	ไม่ปฏิบัติ
ด้านการรับประทานอาหาร				
1	ฉันรับประทานอาหารหลัก วันละ 3 มื้อตรงเวลา			
2	ฉันรับประทานผักใบเขียวทุกชนิด เช่นผักคะน้า ผักบุ้ง กวางตุ้ง กะหล่ำปลี ผักโขม บล็อกโคลี ชะอม			
3	ฉันไม่ดื่มน้ำอัดลม โอเลี้ยง ชา กาแฟ หรือนมข้น			

ข้อ	คำถาม	ปฏิบัติ เป็นประจำ	ปฏิบัติ บางครั้ง	ไม่ปฏิบัติ
	หวาน			
4	ฉันประทานอาหารหลากหลายในปริมาณที่ เหมาะสมถูกสัดส่วน กับความต้องการของ ร่างกายและเน้นอาหารที่มี กากใยสูง เช่น ผักและ ผลไม้จำพวก แอปเปิ้ล ฝรั่ง ชมพู่			
5	ฉันรับประทานของขบเคี้ยว ทอดกรอบขนม หวานและ ผลไม้ที่มี รสหวาน เช่นทุเรียน มะม่วง			
ด้านการรับประทานยา				
6	ฉันรับประทานยาเบาหวานตามคำแนะนำของ แพทย์			
7	ฉันไม่เพิ่มหรือลดขนาดยาเบาหวานด้วยตนเอง			
8	ฉันฉีดยาหรือรับประทานยาเบาหวานตรงตาม เวลา			
9	ฉันไม่ใช้ยาต้มหรือยาสมุนไพร ในการรักษา โรคเบาหวาน			
10	ฉันขอยืมยารักษาโรคเบาหวานของเพื่อนเมื่อยา			

ข้อ	คำถาม	ปฏิบัติ เป็นประจำ	ปฏิบัติ บางครั้ง	ไม่ปฏิบัติ
	ของท่านหมด			
ด้านการออกกำลังกาย				
11	ฉันออกกำลังกายอย่างสม่ำเสมออย่างน้อย สัปดาห์ละ3 ครั้ง ติดต่อกัน ครั้งละอย่างน้อย 30 นาที เช่น การเดิน การขี่จักรยาน แอโรบิคเบา รำมวยจีนกายบริหาร			
12	ฉันออกกำลังกายโดยเริ่มจากการอบอุ่นร่างกาย เช่น การยืดเหยียดกล้ามเนื้อ ออกกำลังกาย ต่อเนื่อง และการผ่อนคลายก่อนหยุด			
ด้านอารมณ์				
13	ฉันสามารถจัดการกับความเครียดด้วยวิธีต่างๆ เช่น การฝึกลมหายใจ การนั่งสมาธิ การละหมาด ดูทีวีฟังเพลง คุยกับเพื่อน			
14	ฉันสามารถเผชิญกับความเครียดได้อย่างมีสติ			
15	ฉันพูดคุยกับผู้ป่วยโรคเบาหวานคนอื่นๆในคลินิก เบาหวานหรือคลินิกโรคไม่ติดต่อเกี่ยวกับการ ดูแลสุขภาพตนเอง			
16	ฉันปรึกษาปัญหาสุขภาพและปัญหาทั่วไปกับ			

ข้อ	คำถาม	ปฏิบัติ เป็นประจำ	ปฏิบัติ บางครั้ง	ไม่ปฏิบัติ
	เพื่อน คู่สมรส บุตรหลานหรือญาติ			
การดูแลรักษาต่อเนื่อง				
17	ฉันติดตามข่าวสารเกี่ยวกับโรคเบาหวานและการดูแลสุขภาพ ตนเองอยู่เสมอ			
18	ฉันปฏิบัติตนตามคำแนะนำของแพทย์และพยาบาลเพื่อให้ตนเองมี สุขภาพที่ดีและป้องกันภาวะแทรกซ้อนจากโรคเบาหวาน			
19	ฉันมาพบแพทย์ตามนัด			
20	ฉันมาพบแพทย์ทันที่เมื่อมีอาการผิดปกติ			

ส่วนที่ 4 แรงสนับสนุนทางสังคมของผู้ป่วยเบาหวานเกี่ยวกับโรคเบาหวานชนิดที่ 2

4.1 ท่านได้รับแรงสนับสนุนทางสังคมช่องทางใดมากที่สุด

☐ แพทย์   ☐ พยาบาล ☐ เจ้าหน้าที่สาธารณสุข ☐ อาสาสมัครสาธารณสุข (อสม.)

☐ สมาชิกในครอบครัว   ☐ กลุ่มผู้ป่วย

☐ ญาติ พี่น้อง เพื่อน

4.2 แบบสอบถามเกี่ยวกับแรงสนับสนุนทางสังคมของผู้ป่วยเบาหวานซึ่งประกอบไปด้วย การสนับสนุนด้านอารมณ์ การสนับสนุนด้านข้อมูลข่าวสาร การสนับสนุนด้านทรัพยากร การสนับสนุนด้านการประเมินการเปรียบเทียบ จำนวน 17 ข้อ ได้แก่

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
1	ฉันได้รับความรักและความห่วงใยจากคนในครอบครัว และเพื่อน					
2	เมื่อฉันมีปัญหา ฉันสามารถปรับทุกข์ หรือระบายความคับข้องใจกับคนในครอบครัว และเพื่อนได้					
3	ฉันได้รับคำแนะนำจากบุคลากรทางการแพทย์ กลุ่มผู้ป่วยเบาหวาน และอาสาสมัครสาธารณสุขในการดูแลสุขภาพของผู้ป่วยโรคเบาหวานเรื่องการรับประทานอาหาร					
4	ฉันได้รับคำแนะนำจาก บุคลากรทางการแพทย์ กลุ่มผู้ป่วยเบาหวาน และอาสาสมัครสาธารณสุขในการดูและสุขภาพของผู้ป่วยโรคเบาหวานเรื่องการออกกำลังกาย					
5	ฉันได้รับคำแนะนำจาก บุคลากรทางการแพทย์ กลุ่มผู้ป่วยเบาหวาน					

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
	และอาสาสมัครสาธารณสุขในการดูและสุขภาพของผู้ป่วยโรคเบาหวานเรื่องการใช้ยา					
6	ฉันได้รับคำแนะนำจาก บุคลากรทางการแพทย์ กลุ่มผู้ป่วยเบาหวานและอาสาสมัครสาธารณสุขในการดูแลสุขภาพของผู้ป่วยโรคเบาหวานเรื่องการตรวจระดับน้ำตาลในเลือดจากการเจาะปลายนิ้ว					
7	ฉันได้รับคำแนะนำจากบุคลากรทางการแพทย์ กลุ่มผู้ป่วยเบาหวานและอาสาสมัครสาธารณสุขในการดูและสุขภาพของผู้ป่วยโรคเบาหวานเรื่องการการจัดการความเครียด					
8	ฉันได้รับคำแนะนำจากครอบครัวและ เพื่อน เรื่องการรับประทานอาหารที่เหมาะสมสำหรับผู้ป่วยเบาหวาน และการควบคุมอาหาร					
9	ฉันได้รับคำแนะนำจากครอบครัวและ เพื่อน เรื่องการออกกำลังกาย					

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
10	ฉันได้รับคำแนะนำจากครอบครัว และ เพื่อน เรื่องการใช้ยา					
11	ฉันได้รับคำแนะนำจากครอบครัว และ เพื่อน เรื่องการการตรวจระดับน้ำตาลในเลือดจากการเจาะปลายนิ้ว					
12	ฉันได้รับคำแนะนำจากครอบครัว และ เพื่อน เรื่องการจัดการความเครียด					
13	ครอบครัว และ เพื่อน ให้ความช่วยเหลือฉันเมื่อท่านมีปัญหาด้านการเงิน					
14	ครอบครัว และ เพื่อน ให้ความช่วยเหลือโดยพาท่านไปรับการรักษาโรคเบาหวานในกรณีที่ท่านไม่สามารถไปรับการรักษาได้ด้วยตนเอง					
15	ฉันได้รับสิ่งของหรืออุปกรณ์ในการตรวจหรือควบคุมเบาหวานเช่นอุปกรณ์เจาะวัดระดับน้ำตาลใน					

ข้อ	คำถาม	เห็นด้วยมากที่สุด	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยมากที่สุด
	เลือดด้วยตนเอง และเข็มฉีดอินซูลินจากครอบครัว และ เพื่อน					
16	ฉันยอมรับฟังความคิดเห็นและข้อเสนอแนะเกี่ยวกับการส่งเสริมสุขภาพอย่างถูกวิธีจากครอบครัว และ เพื่อน					
17	บุคลากรทางการแพทย์ กลุ่มผู้ป่วยเบาหวาน และอาสาสมัครสาธารณสุขให้คำชมเชยและแสดงความพึงพอใจต่อการปฏิบัติตัวของฉันเกี่ยวกับการส่งเสรมสุขภาพอย่างถูกวิธี					

This additional document is used in the data collection process based on face-to-face interviews and used for recording data and viewing blood sugar level from laboratory records.

สัมภาษณ์เก็บข้อมูลวิจัย

โครงการ: ปัจจัยที่มีความสัมพันธ์กับการควบคุมระดับน้ำตาลในเลือด

ของผู้ป่วยเบาหวานชนิดที่ 2 ในศูนย์บริการสาธารณสุข กรุงเทพมหานคร ประเทศไทย

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตร นิสิตหลักสูตรปริญญาสาธารณสุขศาสตร์

สตรมหาบัณฑิต(หลักสูตรนานาชาติ) วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

ศูนย์บริการสาธารณสุข .... วัน/เดือน/ปี

....

Hospital Number .... ลำดับที่

....

ชื่อ – สกุล

Figure 5: The additional document for recording data and viewing blood sugar level from laboratory records

Figure 6: A sign inviting Type 2 Diabetic Patients (Register Cases) to participate in this research

The frequency and percentage of Self-efficacy questionnaire for Type 2 DM patients

The current study used the T-DMSES (The Thai Type 2 DM Patients) questionnaire, which was translated into Thai from English using the Brislin Technique Outline. The DMSES instrument comprises 20 items divided into 4 categories and has achieved a high level of internal consistency reliability with a Cronbach's alpha value of 0.89. The T-DMSES questionnaire was translated by (Sangruangake et al., 2017).

The table 8 present about the frequency and percentage of self-efficacy questionnaire (20 questions) with 5 Likert's scale. This instrument was measured by 20 questions and the scale used for statements is Likert's scale from "strongly agree to strongly disagree" and scored with 5 points Likert's scale as follows: strongly agree, agree, disagree, strongly disagree, and not sure.

Table 6: The frequency and percentage of self-efficacy questionnaire (20 questions) with 5 Likert's scale

No.	Questions	Strongly agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly agree n(%)
Diet management self-efficacy (Q.1-9)						
1	I can choose to eat a balanced diet, including all 5 food groups while limiting sweet, oily, and salty foods for better health.	85(20.7)	161(39.2)	23(5.6)	99(24.1)	43(10.5)
2	I can maintain and choose to eat a healthy eating plan while still	97(23.6)	158(38.4)	17(4.1)	93(22.6)	46(11.2)

No.	Questions	Strongly agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly agree n(%)
	enjoying a variety of foods.					
3	I can still eat according to my meal plan when I'm sick.	95(23.1)	137(33.3)	18(4.4)	111(27.0)	50(12.2)
4	I can follow a healthy eating plan consistently.	94(22.9)	119(29.0)	14(3.4)	134(32.6)	50(12.2)
5	I can choose to eat a variety of foods by adhering to the meal plan when I'm not at home.	105(25.5)	109(26.3)	13(3.2)	112(27.3)	73(17.8)
6	I can follow a healthy eating plan during festivals.	81(19.7)	107(26.)	18(4.4)	105(25.5)	100(24.3)
7	I can choose to eat a variety of food, and still sticking to a healthy eating plan when I have to go to parties.	86(20.9)	106(25.8)	21(5.1)	100(24.3)	98(23.8)
8	I can stick to my own eating plan when I'm feeling stressed or anxious	115(28.0)	107(26.0)	16(3.9)	99(24.1)	74(18.0)

No.	Questions	Strongly agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly agree n(%)
9	I can follow a healthy eating plan when I'm not at home.	94(22.9)	99(24.1)	33(8.0)	120(29.2)	65(15.8)
Monitoring self-efficacy 4 items (Q.10-13)						
10	I can measure my blood sugar, if necessary, for example when hypoglycemia is suspected. It may include dizziness, palpitations, and sweating.	87(21.2)	47(11.4)	18(4.4)	12(29.2)	247(60.1)
11	I can lower my blood sugar if it gets too high, for example by changing the type of food I eat.	181(44.0)	150(36.5)	23(5.6)	28(6.8)	29(7.1)
12	I can raise my blood sugar level if it gets too low, for example by changing the type of food I eat.	210(51.1)	132(32.1)	21(5.1)	21(5.1)	27(6.6)
13	I can inspect my feet, for example to see if my toenails need to be trimmed. Or	300(73.0)	71(17.3)	11(2.7)	11(2.7)	18(4.4)

No.	Questions	Strongly agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly agree n(%)
	are there any wounds.					
Physical activity management self-efficacy 4 items (Q.14-17)						
14	I can control my weight and maintain it at a healthy level.	173(42.1)	106(25.8)	21(5.1)	64(15.6)	47(11.4)
15	I am able to exercise and perform adequate formal activities such aerobic exercises walking and stretching.	133(32.4)	101(24.6)	15(3.6)	72(17.5)	90(21.9)
16	I can exercise more. If your doctor gives you advice that you should do so.	140(34.1)	115(28.0)	42(10.2)	61(14.8)	53(12.9)
17	I am able to change my eating plan and exercise more.	148(36.0)	116(28.2)	42(10.2)	56(13.6)	49(11.9)
Regimen self-efficacy 3 items (Q.18-20)						
18	I can go to see the doctor's appointment to follow up diabetes.	344(83.7)	32(7.8)	2(0.5)	23(5.6)	10(2.4)
19	I can take medicine as	290(70.6)	37(9.0)	3(0.7)	61(14.8)	20(4.9)

No.	Questions	Strongly agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly agree n(%)
	prescribed by doctor.					
20	I am able to take my medicine normally even if I'm sick.	328(79.8)	40(9.7)	1(0.2)	28(6.8)	14(3.4)

The frequency and percentage of Self-care behaviors questionnaire for Type 2 DM patients

This instrument was measured by 20 questions that were modified from (Siangdang, 2017). Cronbach Alpha Coefficient was tested the reliability of the questionnaire, compliant value of .70. Self-care behaviors for Type 2 Diabetes Mellitus questionnaire contains 20 items with 5 dimensions. The scale used for statements is Likert's scale from "Regular to Never" and scored with 3 points Likert's scale as follows: always, sometimes, and never. The table 9 present about the frequency and percentage of self-care behaviors questionnaire by 20 questions with 3 Likert's scale. The table 9 present about the frequency and percentage of self-care behaviors (20 questions) with 5 Likert's scale.

Table 7: The frequency and percentage of self-care behaviors for 20 questions with 3 Likert's scale

No.	Questions	Always n(%)	Sometimes n(%)	Never n(%)
Healthy diet 4 items (Q.1-5)				
1	I eat 3 main meals a day on time.	170(41.4)	130(31.6)	111(27.0)
2	I eat all kinds of green leafy vegetables such as kale, morning glory, bok choy, cabbage, spinach, broccoli, and acacia.	257(62.5)	136(33.1)	18(4.4)

No.	Questions	Always n(%)	Sometimes n(%)	Never n(%)
3	I don't drink soft drinks, tea, coffee, or sweetened condensed milk.	157(38.2)	130(31.6)	124(30.2)
4	I eat a variety of foods in the right amounts and proportions. with the needs of the body and focusing on foods that contain high in fiber, such as vegetables and fruits such as apples, guava, apples.	220(53.5)	164(39.9)	27(6.6)
5	I eat snacks, fried crispy, desserts and sweet fruit such as durian and mango.	94(22.9)	194(47.2)	123(29.9)
Physical activities 2 items (Q.11-12)				
6	I take diabetes medicine as advised by my doctor.	257(62.5)	130(31.6)	24(5.8)
7	I do not increase or decrease the dosage of my diabetes medications by myself.	242(58.9)	128(31.1)	41(10.0)
8	I take my diabetes injections or medication on time.	223(54.3)	144(35.0)	44(10.7)
9	I don't use decoctions or herbal medicines. in the treatment of diabetes	267(65.0)	57(13.9)	87(21.2)
10	I borrowed my friend's diabetes medicine when he ran out of medicine.	27(6.6)	12(2.9)	372(90.5)
Medication 5 items (Q.6-10)				
11	I borrowed my friend's diabetes medicine when they ran out of medicine.	146(35.5)	109(26.5)	156(38.0)
12	I exercise by starting with a warm-	169(41.1)	101(24.6)	141(34.3)

No.	Questions	Always n(%)	Sometimes n(%)	Never n(%)
	up, such as stretching exercise regularly. I stretch and relax my muscles before I stop exercising.			
Emotional 4 items (Q.13-16)				
13	I can deal with stress in various methods, such as breathing exercises, meditation, prayer, watching TV, listening to music, chat with friends.	26(6.3)	36(8.8)	349(84.9)
14	I can face stress mindfully.	19(4.6)	31(7.5)	361(87.8)
15	I talk to other diabetes patients in the diabetes or non-communicable disease clinics about their own health care.	160(38.9)	139(33.8)	112(27)
16	I discuss health and general problems with friends, spouses, children or relatives.	108(26.3)	128(31.1)	175(42.6)
Continuous care 4 items (Q.17-20)				
17	I keep up to date with the news about diabetes and taking care of my health care.	52(12.7)	161(39.2)	198(48.2)
18	I follow the advice of my doctors and nurses to keep myself healthy and prevent diabetes complications.	225(54.7)	167(40.6)	19(4.6)
19	I came to see the doctor follow my appointment.	375(91.2)	33(8.0)	3(0.7)
20	I came to the doctor immediately when I had any abnormal symptoms.	357(86.9)	30(7.3)	24(5.8)

The frequency and percentage of social support questionnaire for Type 2 DM patients

Social Support for Type 2 DM questionnaire contains 17 items with 4 dimensions (emotional support, information support, instrumental support, and appraisal support). This instrument was adapted from the concept of social support by House 1981 and modified from Thai researchers (Sittikarnkaew, 2012) Cronbach Alpha Coefficient was tested the reliability of the questionnaire, compliant value of 0.84 There are 5 dimension follows; Emotional support 3 items,

Information support 2 items, Medication 5 items, instrumental support 3 items, appraisal support 2 items. This instrument was measured by 20 questions and scale used for statements is Likert's scale from "strongly agree to strongly disagree" and scored with 5 points Likert's scale. The table 10 present about the frequency and percentage of social support questionnaire (17 questions) with 5 Likert's scale.

Table 3: The frequency and percentage of social support questionnaire for 17 questions with 5 Likert's scale

No.	Questions	Strongly agree n(%)	Agree n(%)	Not sure n(%)	Disagree n(%)	Strongly agree n(%)
1	I receive love and care from family and friends.	278(67.6)	92(22.4)	5(1.2)	16(3.9)	20(4.9)
2	When I face problems, I am able to share and consult about my frustrations with my family and friends.	271(65.9)	85(20.7)	5(1.2)	16(3.9)	34(8.3)
3	I received advice from medical	278(67.6)	99(24.1)	3(0.7)	9(2.2)	23(5.6)

No.	Questions	Strongly agree n(%)	Agree n(%)	Not sure n(%)	Disagree n(%)	Strongly agree n(%)
	doctors, health care provider, group of diabetic patients and public health volunteers to caring for the health of diabetes patients about eating.					
4	I received advice on health care for diabetics and physical exercise from medical doctor, Type 2 DM patients' group and public health volunteers.	253(61.6)	99(24.1)	3(0.7)	14(3.4)	42(10.2)
5	I received advice on medication use from medical doctor, Type 2 DM patients' group and public health volunteers.	303(73.7)	83(20.2)	0(0.00)	9(2.2)	16(3.9)
6	I received advice on caring for the health of people with diabetes, blood sugar level testing by finger prick from medical doctor,	224(54.5)	87(21.2)	5(1.2)	8(1.9)	87(21.2)

No.	Questions	Strongly agree n(%)	Agree n(%)	Not sure n(%)	Disagree n(%)	Strongly agree n(%)
	Type 2 DM patients' group and public health volunteers.					
7	I received advice on caring for the health of people with diabetes about stress management from medical doctor, Type 2 DM patients' group and public health volunteers.	116(28.2)	54(13.1)	1(0.2)	23(5.6)	217(52.8)
8	I received advice on proper diet for diabetic patients and diet control from family and friends.	165(40.1)	78(19.0)	4(1.0)	38(9.2)	126(30.7)
9	I received advice on physical exercises from family and friends.	143(34.8)	77(18.7)	4(1.0)	52(12.7)	135(32.8)
10	I received advice on medication use from family and friends.	127(30.9)	51(12.4)	3(0.7)	44(10.7)	186(45.3)
11	I received advice on blood sugar level testing by finger	94(22.9)	24(5.8)	5(1.2)	39(9.5)	259(60.6)

No.	Questions	Strongly agree n(%)	Agree n(%)	Not sure n(%)	Disagree n(%)	Strongly agree n(%)
	prick from family and friends.					
12	I received advice on stress management from family and friends.	112(27.3)	61(14.8)	7(1.7)	44(10.7)	187(45.5)
13	Family and friends helped me when I was struggling financially.	217(52.8)	75(18.2)	8(1.9)	21(5.1)	90(21.9)
14	Family and friends provide assistance by taking you to receive treatment for diabetes in cases where you are unable to receive treatment yourself.	248(60.3)	31(7.5)	1(0.2)	28(6.8)	103(25.1)
15	I received items or equipment to check or control diabetes, such as Self-testing device for measuring blood sugar levels and insulin syringes from family and friends	96(23.4)	9(2.2)	2(0.5)	17(4.1)	287(69.8.)
16	I accept opinions and suggestions about promoting	154(37.5)	81(19.7)	12(2.9)	87(21.2)	77(18.7)

No.	Questions	Strongly agree n(%)	Agree n(%)	Not sure n(%)	Disagree n(%)	Strongly agree n(%)
	health in the right way from family and friends.					
17	Health care providers, group of diabetic patients and the health volunteers gave compliments and expressed their satisfaction with my conduct regarding health promotion correctly.	46(11.2)	64(15.6)	57(13.9)	64(15.6)	76(18.5)

Administration & Time schedule

Table 4: Administration & Time Schedule

No.	Administration	2019	2020				2021			
		Nov Dec.	Jan. Feb. Mar.	Apr. May. June	July Aug. Sep.	Oct. Nov. Dec.	Jan. Feb. Mar.	Apr. May June	July Aug. Sep.	Oct. Nov. Dec.
1	Preparation and Literature Review	←→								
2	Proposal Development		←——————→							
3	Questionnaire Development, including validity and reliability		←——————————→							
4	Ethical Consideration by Chulalongkorn University Research Ethics Committee			←————————→						
5	Consent form for data collection process to - The director of 5 Public Health Centers - Department of Health, Bangkok Metropolitans (BMA)				←————————→					
6	Ethical Consideration by Bangkok Metropolitan Administration Human Research Ethics Committee (BMAHREC)				←——————————————————————————→					

No.	Administration	Time schedule (Continue)								
		2022				2023				2024
		Jan. Feb. Mar.	Apr. May. June	July Aug. Sep.	Oct. Nov. Dec.	Jan. Feb. Mar.	Apr. May June	July Aug. Sep.	Oct. Nov. Dec.	Jan. Feb. Mar.
6	Ethical Consideration by Bangkok Metropolitan Administration Human Research Ethics Committee (BMAHREC)	←———————→								
7	Appointment document for data collection to the director of 5 Public Health Centers		←———————→							
8	Preparing questionnaire documents and co-ordinate with head of register nurse at Type 2 DM Clinic		←———————→							
9	Data Collection process		←———————→							
10	Data Analysis, Interpretation, discussion and conclusion report				←———————→					
11	Improve and recheck chapter VI-VI: Interpretation, discussion and conclusion report						←——————————————→			
12	Preparing Final Thesis Examination						←——————————————→			

13	Improve and edited thesis base on committee's comment						←——→		←——→	
14	Submit in I-Thesis						←——→		←——→	
15	**Preparing for** publication								←——→	←——→

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Budget

This research is being generously supported by the following research:

Table 5: Budget

Type of cost	Item Total (THB)	Sub-Total (THB)
A. Direct cost		
Researcher assistants	30,000. -	10,000. -
Total of direct cost		30,000. -
B. Study cost		
Cost of materials and photocopies of documents	10,000. -	
Cost of transportation	6,000. -	
Cost of food	4,000. -	
Cost of a surgical mask and 75% alcohol	10,000. -	
Total cost		60,000. -

Total cost   - Sixty thousand Thai Baht -

VITA

NAME	Uraiwan Thamkhuru
DATE OF BIRTH	26 March 1996
PLACE OF BIRTH	Bangkok
INSTITUTIONS ATTENDED	College of Public Health Science, Chulalongkorn University
HOME ADDRESS	56/7 Kittichit, Ladprao Soi101-46, Klongchan Sub-district, Bangkapi District Bangkok, Thailand
PUBLICATION	การระดมทุนและสิ่งประดิษฐ์เพื่อระบบการจัดการขยะรีไซเคิลในชุมชน ตาบลทุ่งก่อ อาเภอเวียงเชียงรุ้ง จังหวัดเชียงราย Fundraising and an invention for recycle waste management in a community of Thung Kor Sub-district, Wiang Chiang Rung District, Chiang Rai Province
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