The Development of Health-Related Quality of Life Programme among type 2 diabetic patients in Tam binh District Vinh long Province Vietnam

Le Ke Nghiep

A Thesis Submitted in Partial Fulfillment of Requirements for
degree of Doctor of Public Health in Doctor of Public Health
May 2021

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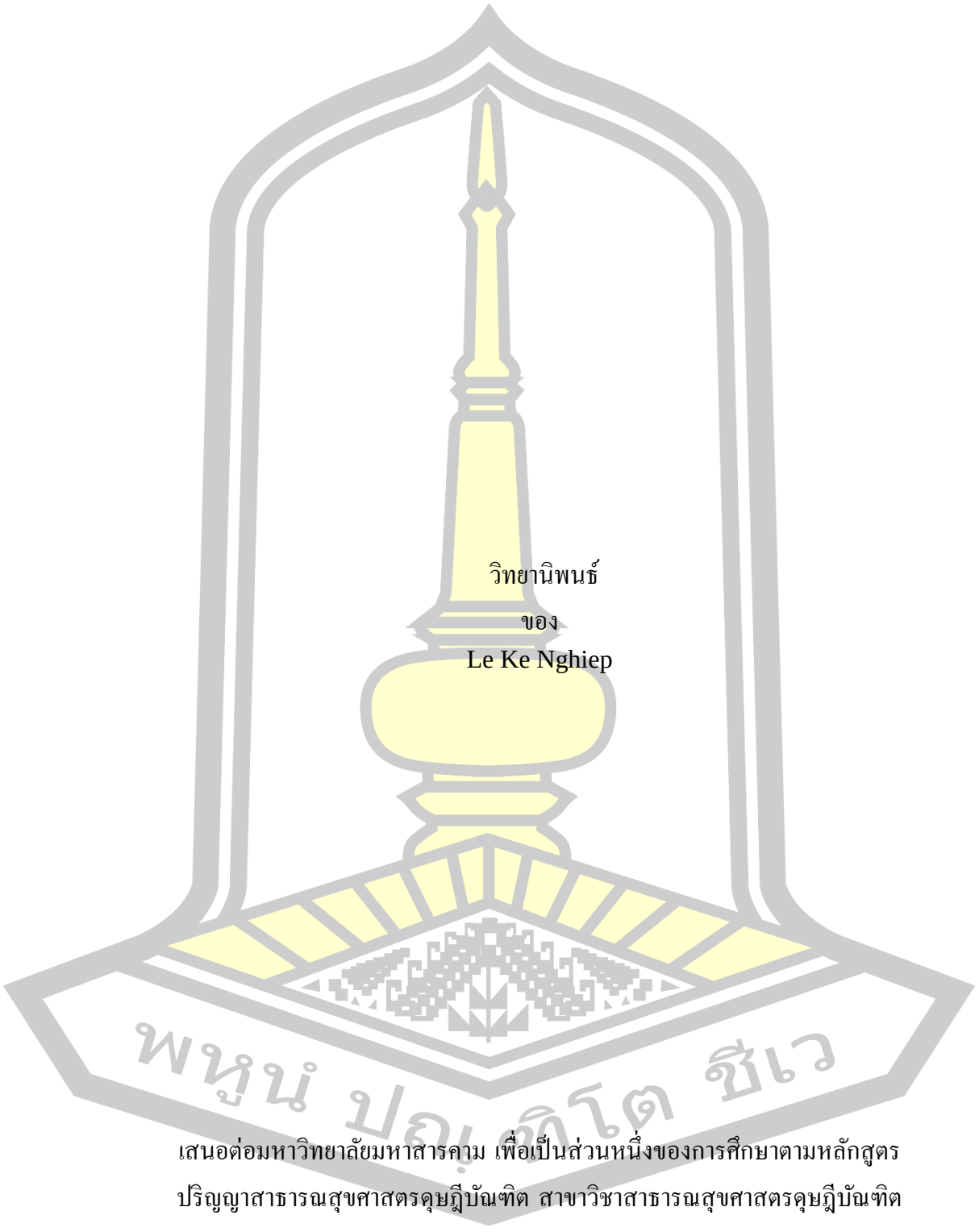

วิทยานิพนธ์

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Le Ke Nghiep

เสนอต่อมหาวิทยาลัยมหาสารคาม เพื่อเป็นส่วนหนึ่งของการศึกษาตามหลักสูตร

ปริญญาสาธารณสุขศาสตรดุษฎีบัณฑิต สาขาวิชาสาธารณสุขศาสตรดุษฎีบัณฑิต

พฤษภาคม 2564

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for Doctor of Public Health (Doctor of Public Health)

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DEGREE Doctor of Public Health **MAJOR** Doctor of Public Health

UNIVERSITY Mahasarakham University **YEAR** 2021

ABSTRACT

Introduction: Diabetes is a complex and most serious chronic disease.

Objectives: This study investigated the development of health-related quality of life programs among type2 diabetic patients in Tam Binh District, Vinh Long Province, Vietnam.

Methods: The research was carried from December 2018 to November 2019. The mixed-methods research was applied within 3 phases. Phase 1: The quantitative method assessed the diabetic's health-related quality of life of 500 types 2 diabetes patients. Phase 2: The implementation program employed the quasi-experimental methods comparing the diabetic's knowledge, attitude, and practice of 85 types 2 diabetes participants. Phase 3: The evaluation phase investigated the implementation program by the Vietnamese diabetes quality of life and knowledge, attitude, and practice questionnaires with 85 types 2 diabetic patients

Results: In 1st phase was shown that the health-related quality of life was moderate 60.15 scores. The inter-personal relationship had the lowest score 40.06 points. The highest score detected for physical endurance 79.48 scores. The statistically significant distinguished in the individual factors like age, marital status, residence place, family type, occupational status, monthly income, diabetic duration, glycemia, HbA_1C, hypoglycemia, treatments, and other medical issues. 2nd phase indicated that the participants had low diabetic knowledge 37.882 scores. Meanwhile, the patient's attitude toward disease was average 65.971 scores. However, the patient's practice was low 52.120 scores. There was different relationship between participant's characteristics, knowledge, and attitude with practices: marital status ($p = 0.007$), age ($p = 0.004$), diabetic duration ($p = 0.005$), hypoglycemia ($p < 0.001$), knowledge ($p = 0.034$) and attitude ($p < 0.001$). 3rd phase: confirmed that after 6 months, the patients had more diabetic information $p < 0.001$. Furthermore, there were better-controlled glycemia and HbA1C ($p < 0.001$). The Vietnamese diabetic

quality of life has improved, and the domain's score increased markedly ($p < 0.001$). The diabetic knowledge, attitude, and practice have significantly changed $p < 0.001$.

Conclusion: The health education program with the knowledge provided in the instructor's materials and explanations has greatly improved the quality of life, knowledge, and attitude toward diabetes, and self-management practices. This should be enhanced by authorities to take the action applying this program for all Vietnamese diabetic patients.

Keyword : Health-related quality of life, VNDQOL, KAP, Type 2 Diabetes Mellitus, Vietnam, health education programme

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank and express my appreciation to wonderful individuals who contributed to the successful completion of this thesis. I would like to express my foremost gratitude to my principal supervisor Assistant Professor Niruwan Turnbull, thank you for your insight, research expertise, enthusiasm, constant support, and feedback throughout my Dr.P.H, it has been greatly appreciated. I am greatly thankful for the thoughtfulness you expressed, your guidance in improving my writing, and your perseverance in helping me to produce high-quality academic research writing. I honestly feel very privileged and honored to have this great opportunity to work with you and have such an exceptional and dedicated supervisor throughout my Dr.P.H journey. Thank you.

I would also like to acknowledge the support given to me by my associate advisors, Associate Professor Cuong Van Dam, Assistant Professor Santisith Khiewkhern, and Doctor Surasak Thiabrithi, thank you for the confidence and encouragement me to complete my Dr.P.H thesis writing. Thank you for your kind words, emotional support to keep me motivated and inspired, especially during challenging times of completing the thesis writing. Your support, guidance, and valuable feedback on my thesis writing were important and highly appreciated.

My deepest gratitude goes to the Mekong 1000 Programme, particularly, Project Management Board of Vinh Long 100 that granted scholarships for my Dr.P.H program. My sincere appreciation goes to all staff of Vinh Long 100 Project, Mekong 1000 program, for your kind help and support for my registration and study process. Specially, Mr. Phung Hoang Nguyen, thank you for your knowledge, support, and thoughtful suggestions during the promotion process of the Mekong 1000 program and register for study at Mahasarakham University.

I would also like to express my deepest appreciation to Mahasarakham University, particularly, Faculty of Public Health for accepting me to study in an advanced academic environment. My appreciation also goes to all staff for kindness and generosity to help make my enrollment, all my other problems and creating the best conditions for me to study.

My appreciation also goes to all the participants in this research. This proposal

would not have been possible without all the participants who volunteered their time and knowledge to take part in the research reported in this thesis. I also would like to extend my gratitude to all the staff members in the commune health centers who directly or indirectly gave assistance in this research. You all have made my Dr.P.H research journey a meaningful experience.

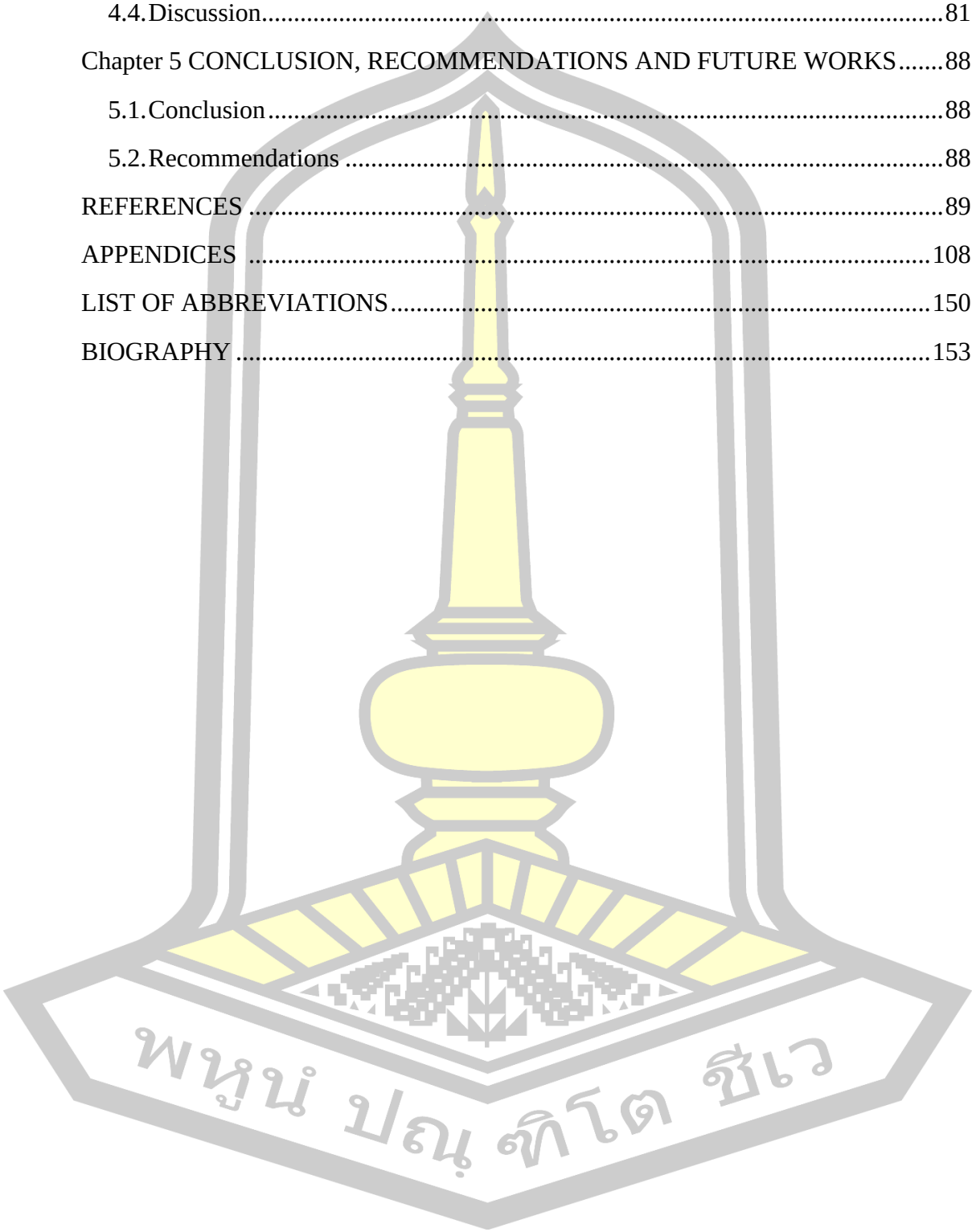
To the most important people in my life are my parents, my beloved wife Chi Kim Ta, my sons Khoi Anh Ta Le, and Khoi Minh Ta Le. There are no words that can describe how blessed and thankful I am to have such a loving and supportive family throughout my Dr.P.H journey at Mahasarakham University. To my beloved parents, thank you for your unceasing prayer for me to complete my study at Mahasarakham University. Chi, I want to particularly thank you for your continuous support, motivation, and inspiration throughout my journey as a Dr.P.H student in Mahasarakham University. Your unfailing love has accompanied me throughout this journey, making it a joyous one. I am thankful for my lovely sons; he has been the most wonderful reward that I received in my Dr.P.H completion.

Last, but not least, my sincere thankfulness also goes to all my friends who have given their constant support and countless prayers in my Dr.P.H. You made my stay in Mahasarakham University a pleasurable and unforgettable experience.

Le Ke Nghiep

TABLE OF CONTENTS

Page



LIST OF TABLES

Page

LIST OF FIGURES

Page

Chapter 1

INTRODUCTION

1.1 Background: The Evolution of Diabetes

Higher longevity of the population, along with changes in lifestyle, especially regarding sedentary lifestyle and alteration in feeding patterns, contribute to the growth of the risk profile to chronic diseases such as diabetes mellitus [1]. Diabetes is a complex and serious chronic disease associated with several potentially preventable complications such as blindness, amputation, neuropathy, nephropathy, and cardiovascular diseases [2]. The incidence of these complications affected patients' quality of life and increases the risk of negative events such as access to emergency department, hospitalization and death, influencing healthcare costs and service sustainability [3]. Therefore, diabetes has been adversely affecting the health of people in the global.

The prevalence of diabetes is dramatically rising worldwide, 171 million people suffered from diabetes in 2000 [4], and it is expected that this figure will increase more than double to 366 million by 2030 [2] [5] [6]. In 2014, the World Health Organization estimated the global prevalence of diabetes at approximately 9% for adults, with type 2 diabetes comprising approximately 90% of these, and projects that diabetes will be the 7th leading cause of death in 2030 [7] [8]. Nearly two-thirds of individuals with diabetes live in developing countries such as Brazil, India, and China, where this number is expected to increase during the next two decades [9]. Thus, the prevalence of this disease is predicted to increase by 69% in developing countries between 2010 and 2030 [10].

The Socialist Republic of Vietnam is located in South-East Asia. Results of with recent economic development, the number of diabetic patients is rapidly increasing. The study in 2001 indicated that the prevalence of diabetes mellitus was approximately 2.5 times higher (6.9%) than what was recorded 8 years ago (2,5%) in Ho Chi Minh City [11]. The 2002 National Survey found that the prevalence of diabetic people on 30-60 years was 2.7% [12]. It is estimated that in 2010, the prevalence of diabetes in the age group of 20 - 79 years was 2.9% (1.65 millions) diabetic people and were projected to increase to 3.42 million people in 2030. In 2010, according to Vietnam's health sector, the rate of disease burden and mortality from diabetes were 1.7% and 1.8% [13]. This indicates that diabetes is increasing in the Vietnamese population.

Vinh Long is a province in the Mekong Delta located in the southwest of Vietnam. In 2018, the population of Vinh Long province is 1,033,600 people. Although there are no specific statistics on diabetes in Vinh Long province, preliminary reports from hospitals are as follows: Vinh Long General Hospital examines and treats about 600 patients with diabetes every day; the district health centers treat an average of 35 patients with diabetes each day. Similarly, Tam Binh district does not have specific statistics on the incidence of diabetes in the community. However, according to diabetes management programme managed by the Department of Disease Control at Tam Binh Health Center in six communes and one town, the number of people with diabetes is 550. At the same time, at the medical department of

Tam Binh Medical Center, about 30 patients were treated for diabetes every day. In addition, according to the department's report, the number of diabetic patients is increasing. This shows that the number of diabetic patients in Tam Binh district is increasing.

Almost two decades ago, noted that diabetes impaired all dimensions of health except mental health and pain. In a more recent multinational study, diabetes was found to have a notable impact on general health [14]. The quality of life has been recognized as an important concept in the management of diabetes. Specifically, the health-related quality of life includes nine domains as general health, activity limitation, physical endurance, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health, inter-personal relationship; which refers to the physical, psychological, and social domains of health that are influenced by a person’s experiences, beliefs, expectations, and perceptions, has been increasingly used as an outcome measure to monitor diabetes burden [15]. Researches have shown that people with diabetes have a worse health-related quality of life compared with people without chronic disease. People with type 2 diabetes reported reduced health-related quality of life compared with the general population [16]. This mean that diabetes is decreased the health-related quality of life of diabetic people.

In addition, some studies have shown that patient education was always considered an essential element of type 2 diabetes mellitus management [17] [18] and health-related quality of life of diabetic patients [19] [20]. In fact, the main goals of the diabetes health education programmes were to permit individuals to avoid short-term and long-term complications associated with the disease as well as uphold and ameliorate the health-related quality of life [21]. Furthermore, accurate apprehension and instruction programmes can upgrade patients' knowledge and fluctuate their attitudes, As a result, they can practice better in managing diabetes themselves and improve HRQOL [22].

Although Vietnam had many researches about diabetes, but these mainly research on the incidence of diabetes and relevant factors. Tran Ngoc Hoang and Nguyen Thi Bich Dao researched the assessment impact of diabetic complications on health-related quality of life in patients with type 2 diabetes mellitus in 2014 [23] and Huong Thi Thu Nguyen et al (2018) published an article about Health-related quality of life in elderly diabetic outpatients in Vietnam [24], however, there is a scarcity of assessing quality of life of type 2 diabetes mellitus in general population in Vietnam. In Vinh Long province, especially Tam Binh district never have the research on this disease. Therefore, the development of health-related quality of life programme among type 2 diabetic patients in Tam Binh District, Vinh Long Province, Vietnam the health-related quality of life programme to support the patients along with the evaluation of the effectiveness of the health-related quality of life programme. In order to understand the health-related quality of life of patients with diabetes how, we implemented the project of the development of health-related quality of life programme among type 2 diabetic patients in Tam Binh district, Vinh Long province, Vietnam.

1.2 Research questions

The aim of this research is to investigate the question of *“How was the health-related quality of life level of type 2 diabetic patients and what is the suitable*

programme of T2DM patients for their self-care management?". The research question was split into three categories:

(Q1) How is the health-related quality of life level of diabetic patients in Tam Binh district, Vinh Long province, Vietnam?

(Q2) What are the relative factors to health-related quality of life of T2DM patients?

(Q3) What is the suitable programme of T2DM for their self-care management?

(Q4) How is the effectiveness of their self-care management programme?

1.3 Objectives

The main aim of the research is to investigate on:

i. Exploration of the relative factors to health-related quality of life of diabetic patients in Tam Binh district, Vinh Long province, Vietnam in 2018 - 2019.

ii. Implementation the health education programme of diabetic patients.

iii. Evaluation of the effectiveness of health education programme of diabetic patients after six months of the health-related quality of life and knowledge, attitude and practices.

1.4 Limitations

Diabetes prevention project was established and approved by the Prime Minister in 2008 (Decision No. 172/2008/QD-TTg), officially launched in 2010. The objectives of this project were that a) 50% of people in the community knew about diabetes and risk factors; b) the incidence of the undiagnosed diabetes in the community decreased to 60%; c) the diabetes management model must be developed, implemented and maintained in the country; d) 50% of people diagnosed with diabetes under the Ministry of Health regulations are required to monitor and treat systematically. Also, this project continued to be included in the National Health Target Program for the period 2012-2015 according to Prime Minister's Decision No. 1208/QĐ-TTg which the targets were that 1) Community screening for early detection of prediabetes and diabetes should be strengthened. Management of 60% of pre-diabetes and 50% of type 2 diabetes was detected through screening; 2) Training and retraining of the staff involved in the project, improving the project implementation capacity of the provincial project staff. By 2015, 100% of provincial staffs must be able to implement the project themselves; 100% of staff participated in the project were trained on prevention, early detection, management and treatment of risk and diabetic patients; 3) the network of treatment was perfected and the striving to 2015, 100% provincial hospitals had endocrinology division. The provincial preventive network was maintained and consolidated, with the number of staff in each unit to participate in the prevention work, contributing to reducing the incidence of disease [13]. However, the results of this project are not reported in detail, as summarized in Table 1.1. This is really a limitation in the implementation, management and reporting in the country.

However, the Centers for Disease Control and Prevention in Vinh Long province have recently implemented pilot activities on statistics, care and management of diabetes in some districts of the province in early 2018. Therefore, there is no accurate report on diabetes status in Vinh Long province. Similarly, the Tam Binh district health center has also piloted a diabetes control project in seven out of 17 communes

that are Tam Binh town, Tuong Loc, Hoa Loc, Hau Loc, My Loc, Binh Ninh and Long Phu. There are 329 diabetic people in this seven communes. For that reason, the exact number of people with diabetes is not known in the district.

Table **1** Evaluating the results of the project implementation according to the objectives of the Diabetes Prevention Project for the period of 2006 - 2010 [13].

Target	The implementation
Strive to reach the target of 50% of people in the community who know about diabetes and risk factors	No evaluation data available.
Reduce the rate of people with diabetes not detected in the community to less than 60%	In 2012, 63.4% of people with diabetes in the community had not been identified
Develop, implement and maintain a diabetes management model across the country	Over 90% of the units in the project had clinics, nutrition counseling and training. 65.4% of provinces/cities had Endocrinology Hospital/ Endocrinology Center or Endocrinology Department at Provincial General Hospital
Systematic monitoring and treatment of 50% of people with diabetes have been diagnosed according to the Ministry of Health regulations	No evaluation data available

Although there are two studies evaluating the quality of life of diabetic patients, they are only performed in hospitals, so they do not reflect the quality of life of the diabetic population in the community. In addition, they used common questionnaires such as SF-36 and EQ-5D-3L to assess the quality of life of patients with diabetes [23] [24]. This does not specifically reflect the quality of life of Vietnamese patients with diabetes. Therefore, a new questionnaire will be required to assess the specific health-related quality of life for patients with diabetes in Vietnam.

1.5 Definitions

This is an important study in the development of health-related quality programme for type 2 diabetic patients in Tam Binh district, Vinh Long province. Clear issues in research are needed. Therefore, we need to clarify some of the definitions in this study that will contribute significantly to the development of this study.

Firstly, health-related quality of life is a multidimensional construct with bearing on a person's physical, cognitive, social, emotional, psychological, role, and spiritual status. It goes beyond direct measures of population health, life expectancy, and causes of death, and focuses on the impact health status has on quality of life [25].

Secondly, type 2 diabetes is a chronic metabolic condition characteristic by insulin resistance and insufficient pancreatic insulin production, resulting in high blood glucose levels. Type 2 diabetes is commonly associated with obesity, physical inactivity, raised blood pressure and disturbed blood lipid level [26].

Next, the associated factors to health-related quality of life of type 2 diabetes in this research are divide to demographic variables: gender, age, ethnicity, education, marital status, economic status; characteristics of diabetes: duration, obesity, treatment; psychosocial factors and complications.

Finally, Tam Binh is a rural district located in the southern part of Vinh Long province. Tam Binh district center is located 32 km south of Vinh Long, 162 km from Ho Chi Minh City and 28 km from downtown Can Tho. The North borders with Long Ho and Mang Thit districts, Binh Minh town and Dong Thap province on the west, Hau River in the south, Vung Liem and Tra On districts in the East (Figure 1.1).

1.6 Report Structure

The research has been inspired by the need to evaluate about health-related quality of life of type 2 diabetic patients by healthcare professionals in Tam Binh district, Vinh Long province, Vietnam. Summaries of the chapters that follow are provided below.

Chapter 2: Overview of literature

- This describes the conceptualization, classification, diagnosis criterions and introduces the epidemiology, demographic factors. This also includes discussion about the risk factors, prevention and treatment of the diabetes mellitus

- This chapter also defines the quality of life and health-related quality of life. Then this explains the role and measurement of HRQoL. In addition, the HRQoL domains will be discussed. Also, it analyses the HRQoL of diabetic people around the world and Vietnam. Also, this describes the relationship of diabetes and HRQoL. In addition, this shows the questionnaire to use for assessing HRQoL of diabetic patients. Moreover, this motivates the new design of questionnaire which analyses HRQoL on the diabetic Vietnamese. Also, in this chapter, the results of a pilot study are presented. Vietnamese diabetes quality of life at work evaluates on diabetic out patients in Tam Binh health center, Tam Binh district, Vinh Long province, Vietnam. Then this questionnaire was assessed by the experts.

- In addition, this describes the framework of this programme, health information. The health information expands the health behaviour model and the self-management.

Chapter 3: Materials and methods

i. This chapter presents the subjects which are residents, selection criteria, exclusion criteria, research location and time; and the study methods that are research design, sample size and research content. Also, this shows the methods of collection data, health empowerment program, error controlled the measurement, data analysis and ethical issues.

Chapter 4: The results and discussion

i. This chapter illustrates the results of the data analysis from the quantitative investigation, as described in Chapter 3. The chapter describes the quantitative findings from the questionnaires and the testing. This includes statistical analysis of the relationships between the variables on the questionnaire. Also, the implementation programme is educated for diabetic patients in the community.

ii. Moreover, this chapter discusses the results after the implementation programme. This is based on data from the similar questionnaire.

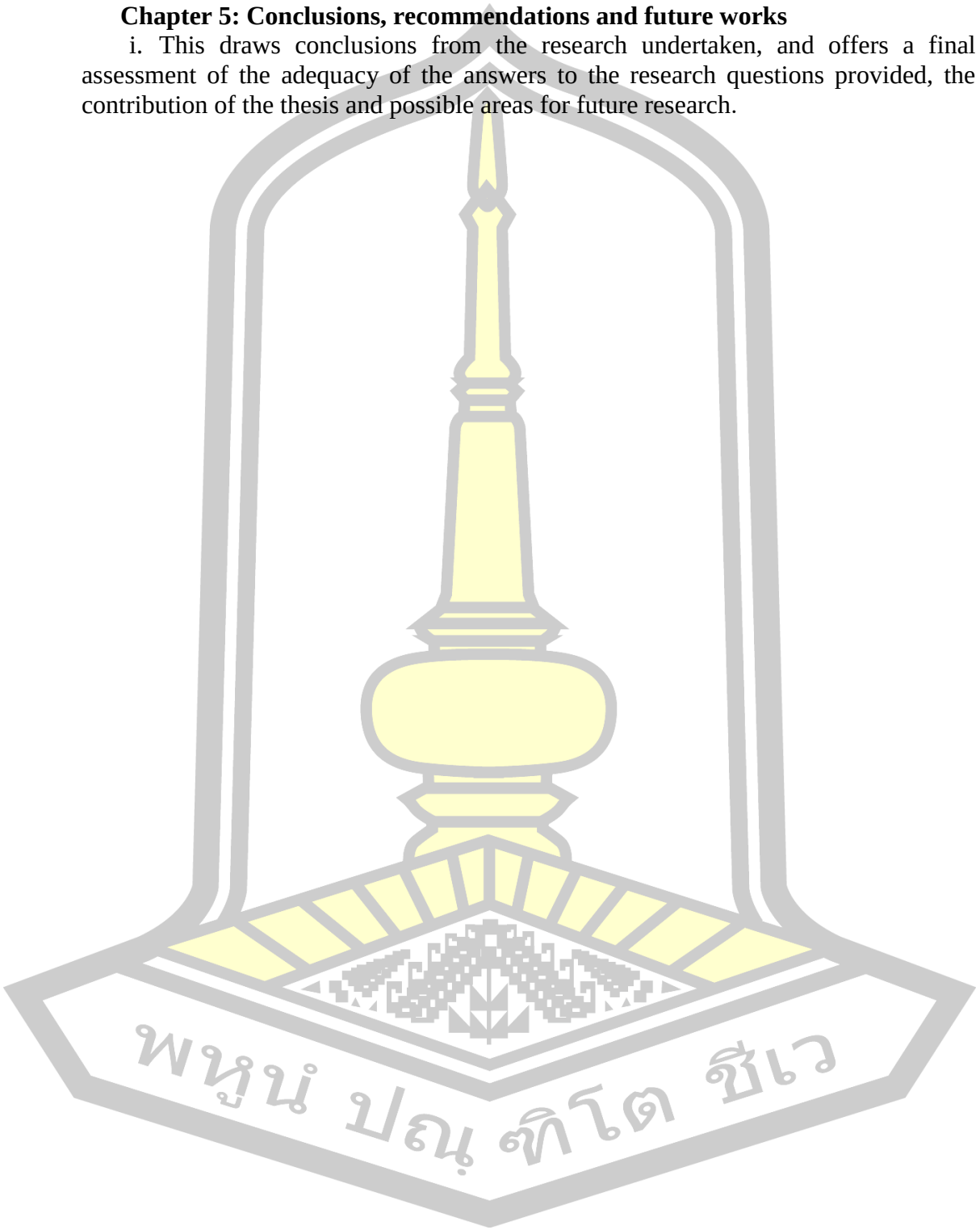
iii. Also, this part evaluates the effectiveness of health-related quality of life programme of diabetic patients after six months of the implementation programme.

iv. In addition, this chapter discusses both the quantitative results in relation to the research questions identified in Chapter 1. It considers the main barriers and

drivers of the management for type 2 diabetic patients in Tam Binh district, Vinh Long province, Vietnam.

Chapter 5: Conclusions, recommendations and future works

i. This draws conclusions from the research undertaken, and offers a final assessment of the adequacy of the answers to the research questions provided, the contribution of the thesis and possible areas for future research.



Chapter 2

OVERVIEW OF LITERATURE

2.1. Diabetes mellitus

2.1.1 Introduction

Diabetes mellitus (DM) was first recognized as a disease around 3000 years ago by the ancient Egyptians and Indians, illustrating some clinical features very similar to what we now knew as diabetes. DM was a combination of two words, “diabetes” Greek word derivative, means siphon - to pass through and the Latin word “mellitus” means honeyed or sweet. In 1776, excess sugar in blood and urine was first confirmed in Great Britain. With the passage of time, a widespread knowledge of diabetes along with detailed etiology and pathogenesis had been achieved. DM was recognized as an important cause of premature death and disability. It was one of four priority non-communicable diseases (NCDs) targeted by world leaders in the 2011 Political Declaration on the Prevention and Control of NCDs [27].

2.1.2 Diabetes mellitus

2.1.2.1 Definition

DM was a heterogeneous group of metabolic disorders with hyperglycemia as the common characteristic, resulting from insulin action and/or secretion defects [28]. It might result from many environmental and genetic factors with disturbances of carbohydrate, fat and protein metabolism. Several pathogenic processes were involved in the development of diabetes including processes that destroy beta-cells of the pancreas and factors resulting in insulin resistance. The long-term effected of diabetes could damage various organs such as kidneys, eyes and the autonomic nervous system [27] [29].

2.1.2.2 Classification

Diabetes was broadly classified into two major types that are type one (T1DM) and type two diabetes mellitus (T2DM). T1DM (previously known as insulin-dependent, juvenile or childhood-onset diabetes) was characterized by deficient insulin production in the body. People with T1DM required daily administration of insulin to regulate the amount of glucose in their blood. If they do not have access to insulin, they cannot survive. The cause of T1DM is not known and it is currently not preventable. Symptoms include excessive urination and thirst, constant hunger, weight loss, vision changes and fatigue. T2DM (formerly called non-insulin-dependent or adult-onset diabetes) results from the body’s ineffective use of insulin. T2DM accounts for the vast majority of people with diabetes around the world. Symptoms might be similar to those of T1DM, but were often less marked or absent. As a result, the disease might go undiagnosed for several years, until complications had already arisen. For many years T2DM was seen only in adults but it has begun to occur in children. There were also other types of diabetes, for example, gestational diabetes was a temporary condition that occurred in pregnancy and carries long-term risk of type 2 diabetes. The condition was present when blood glucose

values were above normal but still below those diagnostic of diabetes. Women with gestational diabetes were at increased risk of some complications during pregnancy and delivery, as were their infants. Gestational diabetes was diagnosed through prenatal screening, rather than reported symptoms [27] [30]. The list of criteria for the diagnosis of diabetes mellitus as follows:

1) Symptoms of diabetes plus random blood glucose concentration >= 11.1mmol/L (200 mg/dl)[a] or
2) Fasting plasma glucose >= 7.0mmol/L (126 mg/dl)[b] or
3) HbA_1C > 6.5%[c] or
4) Two-hour plasma glucose >= 11.1mmol/L (200 mg/dl) during an oral glucose tolerance test[d]

aRandom is defined as without regard to time since the last meal.

bFasting is defined as no caloric intake for at least 8h.

cThe test should be performed in a laboratory certified according to HbA1C standards of the Diabetes Control and Complications Trial.

dThe test should be performed using a glucose load containing the equivalent of 75g anhydrous glucose dissolved in water, not recommended for routine clinical use.

Source: Standards of Medical Care in Diabetes—2015 [31].

Specific types of diabetes due to other caused, e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young), diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced diabetes (such as in the treatment of HIV/AIDS or after organ transplantation) [32].

2.1.2.3 Diagnosis

T2DM was often underdiagnosed. Many people did not know that they have T2DM. The average time between the onset of T2DM and diagnosis was 7 years. The diagnosis of DM had profound implications for an individual from both a medical and a financial standpoint. Thus, abnormalities on screening tests for diabetes should be repeated before making a definitive diagnosis of DM, unless acute metabolic derangements or a markedly elevated plasma glucose are present in table 2.1. These criteria also allowed for the diagnosis of DM to be withdrawn in situations when the glucose intolerance reverts to normal [29] [30].

2.1.3 Epidemiology

Globally, an estimated 422 million adults were living with DM in 2014, compared to 108 million in 1980. The global prevalence (age-standardized) of DM had nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population. This reflected an increase in associated risk factors such as being overweight or obese. Over the past decade, DM prevalence has risen faster in low- and middle-income countries than in high-income countries [27].

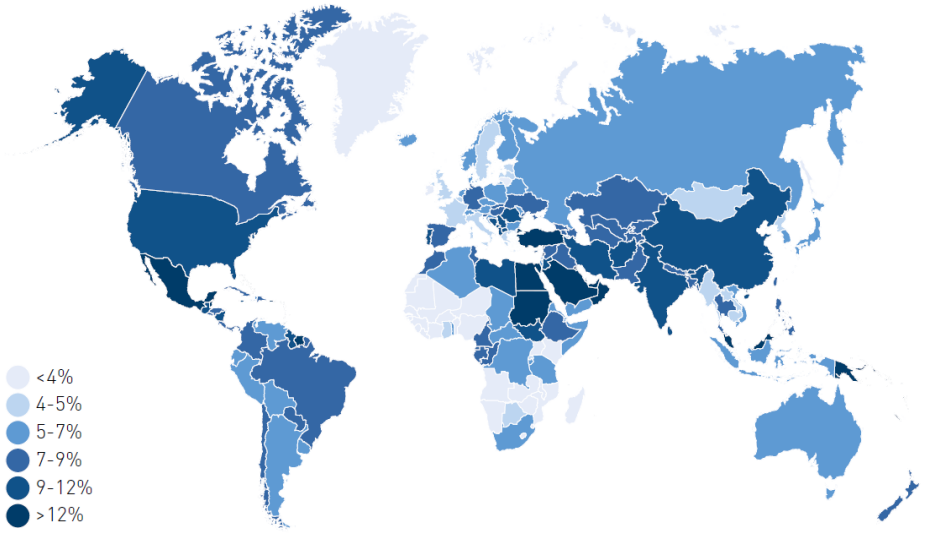


Figure 1 Estimated age-adjusted prevalence of diabetes in adults in 2017 "Source: IDF Diabetes Atlas - 8th Edition" [33].

DM caused 1.5 million deaths in 2012. Higher-than-optimal blood glucose caused an additional 2.2 million deaths, by increasing the risks of cardiovascular and other diseases. Forty-three percent of these 3.7 million deaths occur before the age of 70 years. The percentage of deaths attributable to high blood glucose or DM that occurred prior to age 70 is higher in low- and middle-income countries than in high-income countries [27].

Asia became an epicenter of T2DM and it was believed that by 2030 the five of the world top most countries for DM would be in Asia; namely China, India, Pakistan, Indonesia and Bangladesh. The number of people with DM was steadily increasing in Southeast Asia due to population growth, aging, urbanization, and the increasing prevalence of obesity as well as physical inactivity (WHO and IDF, 2004) [34].

In Vietnam, in 2017, about 3.5 million people with DM accounted for 5.6%. Vietnam ranked among the top five countries with the highest number of DM in the region. There were 53,457 people die of DM, the average cost of treatment is $162,700 per patient (Figure 2.1) [33].

2.1.4 Demographic factors

2.1.4.1 Ethnicity

Studies in past had identified ethnicity as a key factor for prevalence of T2DM. National DM statistics report of USA (2014) showed that the prevalence of T2DM had dramatically increased among different ethnic groups in 2010-2012. T2DM prevalence was reported to be three to four times higher in south Asian adults and the disease might occur a decade earlier than in the white European majority population in the UK [30]. Prevalence of T2DM increased 13% in Hispanics and non-Hispanic blacks and 7% in non-Hispanic whites in 2010-2012. Highest prevalent of diagnosed diabetes was observed in American Indians (15.9%). In addition, burden of diabetic comorbidities also varied by different ethnic background. For example, in a retrospective cohort study among veterans with type 2 diabetes, non-Hispanic blacks

had 35% higher odds of having single comorbidity than non-Hispanic whites. On the other hand, Hispanics had 10% lower odds for single comorbidity than non-Hispanic whites. Ethnic variation in diabetic control had also been observed in another retrospective veteran study in USA. The study showed poor glycemic control among non-Hispanic blacks and Hispanics compared with non-Hispanic whites [35]. In youth over 10 years of age, T2DM was increasingly common, especially in minority populations, representing 46.1% of newly diagnosed cases of diabetes in Hispanics, 57.8% in non-Hispanic blacks (NHBs), 69.7% in Asian/Pacific Islanders, and 86.2% in American Indians (AIs), but 14.9% in non-Hispanic whites (NHWs) [36].

In addition, a study in Malaysia showed there was a noticeable difference with regards to race: patients of Indian parentage incur the highest prevalence (19.9%), followed by Malays (11.9%). The lowest rate was found among Chinese (11.4%), but in a global perspective is still comparatively high [37].

2.1.4.2 Area level differences

Sometimes, the difference in prevalence had been observed within the same population depending upon their living area in a country. In India, prevalence of T2DM was four times higher in urban areas compared with rural areas [38]. The higher percentage of pensioners in the rural population might be a result of hard physical labor, as well as the fact that T2DM impeded the ability to work in farming to a greater degree than the ability to perform other kinds of work, which were usually undertaken in the urban environment. Moreover, lack of the education and advanced age that made vocational retraining difficult, combined with the very limited work available outside agriculture, leave rural diabetics unable to be vocationally active. It could also be assumed that the migration from rural to urban, the urban environment of better educated, people still able to perform work other than farming, was an additional factor that causes the high percentage of pensioners in this group. Similar results were obtained in another study in which there was a larger share of people receiving disability pensions among patients living in rural areas. Other researchers also confirmed that people receiving disability pensions rate their quality of life (QoL) considerably lower. In addition, the higher the patients' education and income levels, the higher they evaluated their health and QoL. According to analysis conducted at another health center in Lublin, health status was evaluated better by professionally active patients with type 2 diabetes, then by the retired, and it was evaluated the worst by persons receiving disability pensions. It was worth noting that only patients treated with diet and oral agents were the subjects of this study. Among the patients in the presented study subjects living in rural areas with a similar mean of age suffered from diabetes significantly less than residents of urban areas. These results should be interpreted with caution, since the analyzed group of patients was not representative of the entire population. This was may also result from late diagnosis of DM in rural areas. This suggested the need for widespread screening to enable earlier diagnosis of diabetes among rural patients. Such an interpretation was supported by the findings of Łopatyński et al, who revealed that in rural areas the proportion of unknown diabetes was estimated at over 70%, and was significantly higher than in the urban population (about 50%) [39].

Moreover, a report in England showed that DM was more likely to occur in areas experiencing greater levels of deprivation. The rate of diabetes complications was 3.5

times higher among people in social class V compared with those in social class I. People in deprived communities were more likely to be overweight or obese and physically inactive [40].

2.1.4.3 Age and gender

The prevalence of T2DM increased markedly with age. The age of onset had moved down into younger adults and even adolescents in recent decades, especially in countries where a major imbalanced between energy intake and expenditure had emerged [41] [27]. T2DM was generally more prevalent in adult (>= 40 years old) population [42]. It was predicted that the prevalence of DM in adults of which T2DM was becoming prominent will increase in the next two decades and much of the increase would occur in developing countries where the majority of patients were aged between 45 and 64 years [43]. Also, a study in Vietnam reported that the prevalence of diabetes and glucose tolerance was highest in the 55 - 64 age group (11.3% and 15.6%) followed by the 45 - 54 age group (5.8% and 13.0%); the lowest in the group < 35 years old (0.5% and 5.6%) [44]. However, a review study claimed that T2DM was nowadays also occurring in children and adolescents with high prevalence rate. Likewise, in US, the prevalence of T2DM had increased among children and adolescents in last few decades. The common caused of early onset of T2DM among the children was increasing obesity (about 8.5 per 100,000 for T2DM) [45].

Many authors had argued that T2DM was not generally depended upon the gender. Literature search had shown that there were few data available on the prevalence of type 2 DM in Africa as a whole. Studies examining data trended within Africa point to evidence of a dramatic increase in prevalence in both rural and urban setting, and affecting both gender equally [43]. However, few studies among US population had found that number of women with DM was two times higher than male, particularly in age group 45 - 64 years [27].

2.1.5 Risk factors

Risk factors for T2DM were broadly categorized under two main groups: modifiable and non-modifiable risk factors [46]. Risk factors such as overweight, sedentary life style, smoking, food habits and hypertension are modifiable or preventable. On the other hand, factors such as age, gender, family history, and ethnicity were non-modifiable risk factors for T2DM on table 2.2 [27] [29] [30].

Table 2 Modifiable and non-modifiable risk factors and associated disorders for type 2 diabetes

Modifiability	**Non-modifiability**
Overweight BMI >= 25 to < 30 kg/m^2 and obesity BMI >= 30 kg/m2	Family history
Sedentary lifestyle	Gender
Metabolic syndrome	History of gestational diabetes
IGT or/and IFG	Polycystic ovary
	Ethnicity

Hypertension
Increased triglycerides, low HDL-cholesterol
Dietary factors

BMI = body mass index, IGT = impaired glucose tolerance, IFG = impaired fasting glucose

Life style factors including diet, overweight, obesity and physical inactivity could be significant risk factors for T2DM. Regular physical activity reduced the risk of diabetes and raised blood glucose, and is an important contributor to overall energy balance, weight control and obesity prevention – all risk exposures linked to future diabetes prevalence. The global target of a 10% relative reduction in physical inactivity was therefore strongly associated with the global target of halting the risk in diabetes [27] [29].

However, the prevalence of physical inactivity globally was of increasing concern. In 2010, the latest year for which data were available, just under a quarter of all adults aged over 18 years did not meet the minimum recommendation for physical activity per week (five hours per week) and were classified as insufficiently physically active [27]. Physical inactivity was serious public health problem and it could be a major risk for many chronic diseases such as T2DM. It was now the fourth causal factor for adult death worldwide. A prospective study had demonstrated that the physical inactivity was a single and modifiable cause for T2DM [27] [29].

Being overweight or obese was strongly linked to diabetes [47] [27]. Really, the obesity rates were increasing there as well and, more importantly, rates of diabetes were increasing even more quickly, particularly in Asian countries [27]. The risks of T2DM in these countries tended to increase sharply at levels of BMI generally classified as acceptable in European and North American white people [48]. Moreover, obesity had been found to contribute to approximately 55% of cases of T2DM. The increased rate of childhood obesity between the 1960s and 2000s was believed to have led to the increase in T2DM in children and adolescents [43] [29].

In addition, a number of difference lifestyle factors were known to be important to the development of T2DM. These were sedentary lifestyle, cigarette smoking and generous consumption of alcohol. One study found that moderate alcohol consumption reduced the risk of diabetes and high alcohol intake increases the risk of obesity, pancreatitis and eventually DM [43]. Some studies had shown that moderate alcohol consumption was associated with lower insulin secretion [29].

Cigarette smoking was associated with the risk of T2DM, with the highest risk among heavy smokers. Cigarette smoking could cause DM by increasing insulin resistance. A meta-analysis showed that smokers had 45% higher risk of T2DM than non-smokers [29]. Risk remains elevated for about 10 years after smoking cessation, falling more quickly for lighter smokers [27].

Depression was seen as a risk factor for T2DM, but diabetes itself could also cause depression. A meta-analysis found that depression was strongly associated with T2DM. Depressed adults had 37% higher risk for T2DM [29]. Besides, the presence of diabetes increased by 2–3 times the risk of having depression [49] [50]. Both diabetes and anxiety/depression were associated with premature morbidity and

mortality, and when these conditioned co-exist, the risk of developing co-morbidities, complications, patient suffering and associated cost, escalates [51].

Diabetes was a complex disease caused by a complex interplay of genetics, epigenetics and environment. Many environmental factors alterred the gene expression by the epigenetic modification. This modification for example, could occur during embryogenesis by exposure to heavy metals or smoking or due to lack of some nutrients (folate, methionine) leading to development of T2DM early in life or sometimes later in adulthood [52].

According to a recent study, about 120 susceptible genes had been identified as substantial contributing factors for T2DM. Genome wide association study was intended to search the genetic variations which were associated with many chronic diseases, such as DM, cancer and asthma. So far, this study had successfully proven the genetic contribution to risk of T2DM [52].

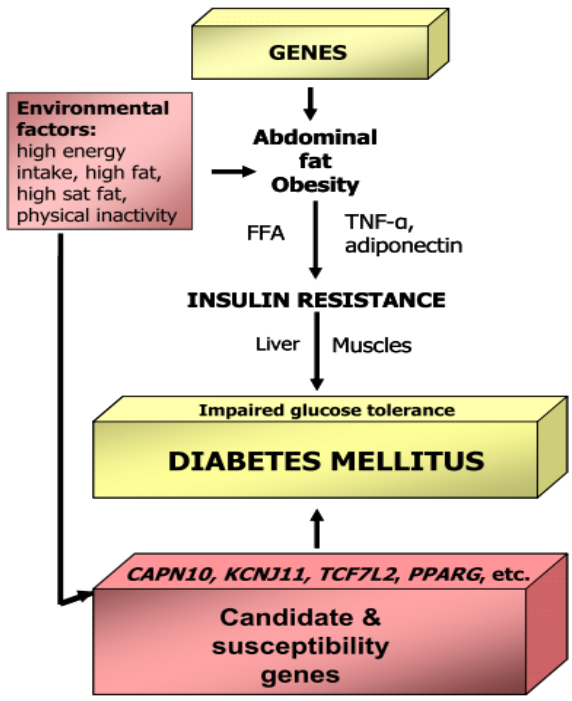


Figure 2 Interrelation between genes and environmental factors in T2DM

(Genes in combination with environmental factors might lead to obesity, insulin resistance and finally diabetes. Environmental factors might also act in concert together with diabetes candidate and susceptibility genes to trigger the pathogenesis of type 2 diabetes directly). Source: “Genes, Diet and Type 2 Diabetes Mellitus: A Review” [52].

Western dietary habits significantly increased the risk of T2DM, but a healthy diet reduced the risk of T2DM. Persons with poor dietary habits were in greater risk for T2DM. Quality of carbohydrates and fats also played a role in the development of diabetes. High dietary glycemic load (GL) and intake of trans-fats increased the risk of DM but dietary fiber and polyunsaturated fatty acids had lower the risk for T2DM [52].

A 12 year follow up study in US men documented that western food (meat, high fat dairy food, junk food) combined with physical inactivity and high BMI increases the risk for T2DM. On the other hand, prudent diet including vegetables, fruits, fish, poultry and whole grain substantially were lower the risk of DM (Figure 2.2) [52].

T2DM develops as part of a wider metabolic syndrome that included central obesity, dyslipidemia (particularly hypertriglyceridemia and low high-density lipoprotein (HDL) cholesterol concentrations), impaired glucose tolerance, coronary artery disease and hyperinsulinemia, collectively termed 'Syndrome-X' or 'metabolic syndrome'. Metabolic syndrome was also associated with risk for T2DM. An 8 year follow-up study found that the subjects previously diagnosed with metabolic syndrome have considerably increased risk for diabetes compared with persons without metabolic syndrome [53].

Gestational diabetes which occurred first time during pregnancy caused glucose intolerance. A systemic review and meta-analysis found that women with gestational diabetes had higher risk of developing T2DM than women with non-diabetic pregnancies [30].

2.1.6 Prevention

The purpose of prevention was to reduce the incidence of the disease, by monitoring the risk facts; this requires knowing how these were rooted in the population and used this knowledge to create a strategy in order to change the risk profile that might be exist in each citizen. T2DM could be prevented by life style modification, such as diet, weight control and physical activity [46]. A study in Vietnam in 2013 showed that 56.7% subjects knew the importance of diet in preventing and treating diabetes [54]. A meta-analysis found that the control of obesity and physical inactivity was observed a single most effective measure in diabetes prevention. Also, author analyzed the various interventions for preventing type 2 diabetes in different communities and suggested that the successful prevention of T2DM required collective approach from the community level to the national political level to promote healthy lifestyles and health education [46].

2.1.7 Treatment

Diabetes was a chronic disease for which there was currently no cure. However, diabetes could be managed with various treatments that were available in most developed countries. In the health system of many countries, there were multidisciplinary diabetes teams that assist people to make changes to healthier lifestyle and other aspects of diabetes management. Diabetes management included weight control, food planning and healthy eating, exercise, monitoring blood glucose, and follow-up screening for other complications [30]. Some people with T2DM could successfully control their blood glucose level with dietary measures, exercise, and weight loss, so they might not require pharmaceutical treatment, at least not for a number of years. Oral medication and injections of insulin were used to control blood glucose level when the diet and exercise diabetes management methods were unsuccessful for people with T2DM [55].

In general, most people with T2DM would eventually require pharmaceutical measures to manage their diabetes. The three main types of medications used for

T2DM treatments were: metformin and thiazolidinediones, which increased insulin sensitivity, sulphonylureas and meglitinides, which increased pancreatic secretion of insulin, and acarbose, which alterred the absorption of carbohydrates from food and reduces rises in blood glucose levels. When the combination of lifestyle measures and oral medication inadequately control T2DM, insulin treatment was commenced with or without oral medication [30] [55].

2.2. Health-related quality of life and type 2 diabetes mellitus

The literature on perceptions of living with T2DM was extensive and had been shown to correlate with quality of life [25]. It implied complex clinical management and increasing health care costs as well as impaired HRQoL. It was known that the presence of co-occuring medical conditions had a negative impact on HRQoL for patients with type 2 diabetes [56]. The aim of this chapter described some details about the HRQoL and type 2 diabetes mellitus, also to identify associated factors to the HRQoL of these patients and to design the equipment to the HRQoL evaluation.

2.2.1 Quality of life, health-related quality of life, its roles and management

2.2.1.1 Quality of life *(*QoL*)*

The research field in QoL had increased enormously since 1990. As QoL represents the effect of an illness on a patient, as perceived by the patient, and yields complementary information to medical or epidemiological data, it is often used as an outcomes measurement. QoL had also been characterized as ‘‘the ultimate goal of all health interventions’’ [57]. QoL was a wide-ranging concept and refers to the general well-being of individuals and societies [29]. The WHO’s definition of QoL which identified it as a multi-dimensional concept and defined it as "individuals' perceptions of their position in life in the context of the culture and value system in which they lived d in relation to their goals, standards, and concerns" [58]. The definition included six broad domains: physical health, psychological state, level of independence, social relationships, environmental features, and spiritual concerns [59] [60]. In addition, QoL was a concept that coverred a broad range of human experience. In the medical domain it denominated aspects of the health from the patient’s or subject’s point of view, and could better be expressed as ‘‘subjective health’’ or ‘‘functional status and well-being’’ [57]. In this research the term ‘‘health-related quality of life’’ would be used.

2.2.1.2 Health-related quality of life *(*HRQoL*)*

There was no consensus regarding a definition of QoL, and when we thinked about it, we usually fell into defining it around itself or into the description of the integrating aspects [61]. However, HRQoL was a useful indicator of overall health because it captures information on the physical and mental health status of individuals, and on the impact of health status on QoL. HRQoL was usually assessed via multiple indicators of self-perceived health status and physical and emotional functioning. Together, these measures provided a comprehensive assessment of the burden of preventable diseases, injuries, and disabilities [62].

On the individual level, this included physical and mental health perceptions and their correlates, including health risks and conditions, functional status, social support, and socioeconomic status [60]. On the community level, HRQoL included resources, conditions, policies, and practices that influence a population's health perceptions and functional status [63].

2.2.1.3 The role of HRQoL

Researchers and practitioners in fields outside public health were actively engaged in quality of life measurement, especially those from sociology, psychology, social work, aging, disability, environmental sustainability, economics, marketing, and urban/rural planning. Moreover, business and community leaders, the media, and the public were interested in community quality of life and appear willing to grant health agencies. Focusing on HRQoL as a national health standard could thereby bridge artificial boundaries between disciplines and between social, mental, and medical services [63].

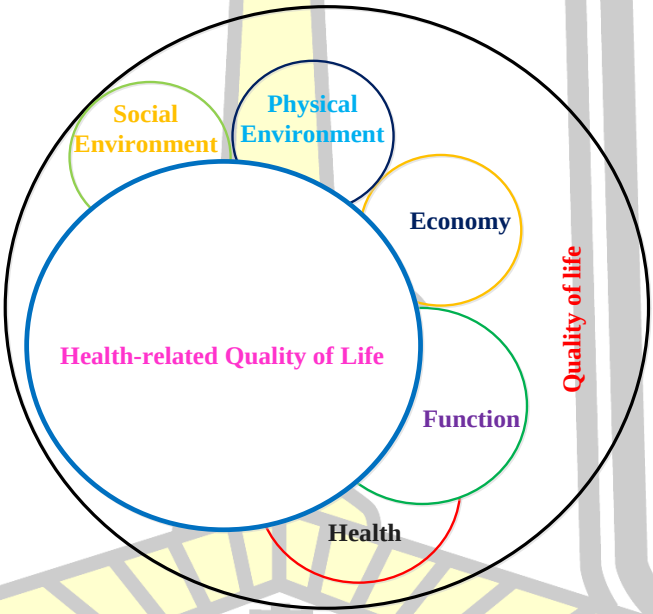


Figure 3 Relationship between the elements of life

"Source: Measuring Healthy Days: Population Assessment of HRQoL" [63]

Several recent federal policy changed underscore the need for measuring HRQoL to supplement public health's traditional measures of morbidity and mortality. In addition, increased awareness of the burden of chronic health conditions and the links between quality of life and prevention led to a revision of the mission of the centers for disease control and prevention (CDC). Further, the CDC chronic disease, disability, and women's health programs had evolved to target quality of life as an important health outcome [63].

HRQoL was related to both self-reported chronic diseases (DM, breast cancer, arthritis, and hypertension), and their risk factors (BMI, physical inactivity, and smoking status). Measuring HRQoL could help determine the burden of preventable

disease, injuries, and disabilities, and it can provide valuable new insights into the relationships between HRQoL and risk factors [63].

Measuring HRQoL would help monitor progress in achieving the nation's health objectives. Analysis of HRQoL surveillance data could identify subgroups with relatively poor perceived health and helped to guide interventions to improve their situations and avert more serious consequences. Interpretation and publication of these data could garner support for health policies and legislation, help to allocate resources based on unmet needs, guide the development of strategic plans, and monitor the effectiveness of broad community interventions. HRQoL assessment wass a particularly important public health tool for the elderly in an era when life expectancy was increasing, with the goal of improving the extra years in spite of the cumulative health effects associated with normal aging and pathological disease processes [63].

2.2.1.4 HRQoL measurement

There were two main approaches to measuring HRQoL: state measures by themselves and those based on giving a "value" to the HRQoL in an orderly manner had resorted to economic theory as a means of development. Although there was no widely dominant or hegemonic model, when we referred to measurement schemes that somehow beyonded a relative order quantify and allowed comparability, was the economic theory that had given an explanatory approach. Thus, depending on the method of collecting HRQoL data, two methodologies were identified: (i) directed measurement of preference choices and (ii) preferenced based on health status classification systems by multidimensional analysis [61].

Direct methods tried to identify an individual´s preference regarding a single attribute. The Visual Analog Scale (VAS), Standard Gamble (SG) and Time Trade-Off (TTO) techniques were identified under this method. Preferences classification systems, based on health status, rely on the measurement of different characteristics called domains which seek an approximate quantification of the QoL. Multidimensional measurement had been developed into two major types: (i) of general purpose, which summarize health states of communities and (ii) the specific for each type of disease [61].

2.2.2 The relation between diabetes and health-related quality of life

It was well-known that diabetes caused a serious deterioration in general QoL mainly affecting the HRQoL. The outcomes were similar worldwide, varying in the grade of influence [60]. In fact, patients with DM had significantly lower HRQoL than those without diabetes [64]. There were multifactorial reasons for lower QoL among diabetics. Diabetics were more likely to be gender, older, overweight, less likely to exercise, and more likely to have comorbidities such as hypertension, coronary artery disease, hypercholesterolemia; and are more likely to have complications such as retinopathy, nephropathy, painful polyneuropathy, upper gastrointestinal symptoms, impotence, amputations, symptomatic hyperglycemia, and hypoglycemia. Lower HRQoL scores were associated with all these aspects. In addition, the cost of managing diabetic patients was twice as costly as managing non-

diabetic patients, mainly due to the high costs associated with management of diabetic complications [65].

2.2.2.1 Demographic variables

- Gender

Over the past decade, differences between men and women with T2DM had been intensively investigated, revealing that the women with diabetes appeared to have worse HRQoL and mental well-being than the men with diabetes [66]. The HRQoL was found to be significantly lower among female on subscale physical functioning, role emotional, energy, emotional, social, and pain than to their counterpart [65] [29]. In fact, in a study in Saudi reported that female with diabetes appeared to have worse HRQoL and mental well-being than their counterpart. The multivariate analysis indicated gender as independent risk factor of HRQoL. Therefore, identifying strategied to improve self-rated health and HRQoL among diabetic patients, especially among Saudi women, was of great importance [65].

- Age

Age had been another parameter which had an effect on the HRQoL of diabetic patients. Hanninen et al. reported that age had no effect on diabetic patient's HRQoL; however, another study reported that patients who were less than 40 years of age had significantly better QoL than other age groups. Younger people generally reported better QoL than older people. Advancing age of people with diabetes had been associated with reduced physical functioning, better mental health, increased resignation to chronic illness, and less tolerance for ambiguities of the disease. A population-based study found that age and number of other chronic conditions were independent predictors of depressive symptoms, particularly for previously diagnosed patients; newly diagnosed patients did not differ from normal individuals [65].

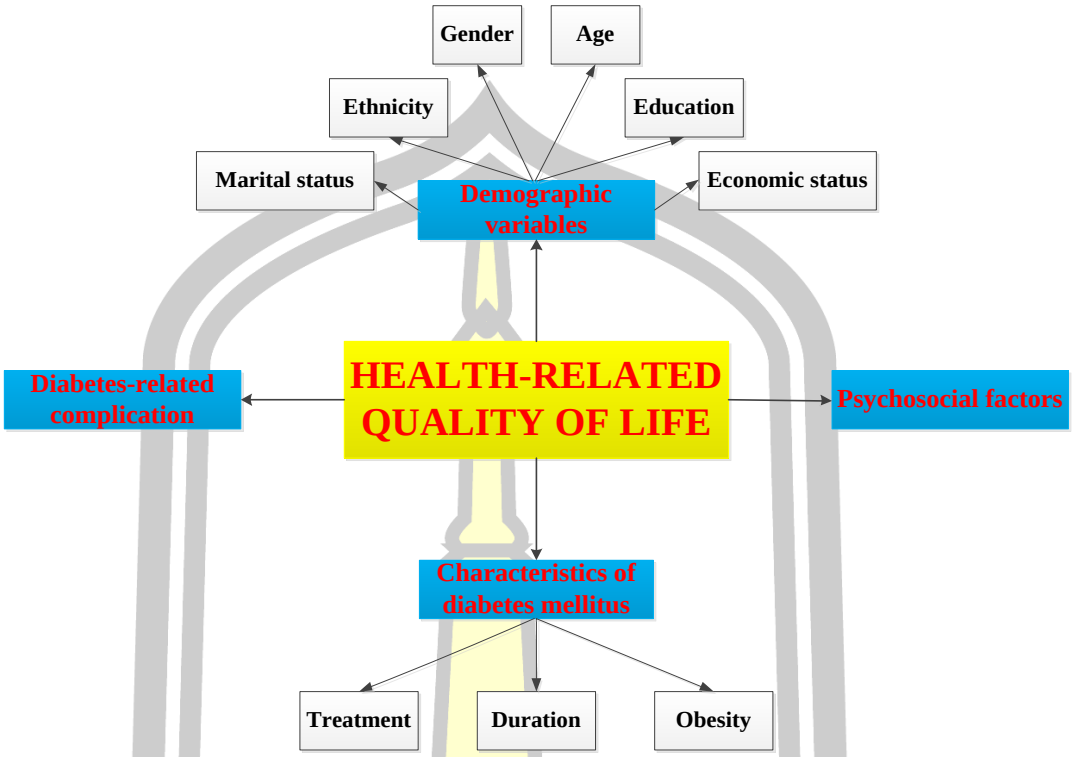


Figure 4 The framework of the relation elements between diabetes and HRQoL

- Ethnicity

There was evidence to suggest that the prevalence, disease progression and treatment outcomes for people with T2DM vary significantly between ethnic groups [67]. In 2005, a study in Singapore showed ethnicity as an important factor influencing QoL in people with diabetes. Also, as shown in a study in three different states in Malaysia there was a statistically important difference in QoL among the three studied populations Malaysian, Indian and Chinese. The Chinese scored significantly lower (21.0 ± 4.3) in the Asian DQoL compared to Malays (81.4 ± 9.0) and Indians (81.5 ± 9.2). Moreover, Chinese scored significantly lower (21.0 ± 4.3) on the Asian DQOL (diet) score compared to Malays (22.8 ± 3.6) and Indians (22.5 ± 3.7) [60].

- Education

Some studies could as well conclude that the minimum level of education associated with better QoL in the dimension of role limitation was primary. Thus, an argument of the minimum education level of patients that registered poor QoL being low was supported. All the same, literature that identified education level of patients as a predictor of QoL of diabetic patients was highly supported. Better QoL among patients with higher education was attributed to the fact that they could easily read and understand the effects of diabetes on their health; thus, they were more likely to adjust to their recommended treatment and diet regimen [68]. The argument in their study was that education was an essential factor in understanding self-care management of diabetes, glycemic control, and perception of self-worth [69].

- Marital status

Single people with type 2 diabetes reported poorer HRQoL than married people [70]. However, risk factors for unsatisfactory QoL in diabetic children and adolescents were one parent family and family conflict. Marital status as a criterion of social support and social and economic status was another important variable positively predicting a patient's HRQoL in social relationships (SR) and environmental health (EH) domains. However, in a study in Iran, married status was not associated with physical health (PH) or psychological health (PSH) domains [71] [72].

- Economic status

Those with more income generally reported better QoL than those with less of either. Chronic complications and problems of diabetes had a great impact on QoL in diabetic patients and this could affect the economic conditions of patients, families and society. In addition, the cost of managing diabetic patients was twice as costly as managing non-diabetic patients, mainly due to the high costs associated with management of diabetic complications [71]. Overall QoL, health satisfaction, and the psychological and social domains were significantly correlated with occupation; patients who scored poor were more likely to have a low occupational status. Since lower occupation implied lower income, these patients needed attention to break the cycle of low occupation status, low income, and poor QoL [73].

2.2.2.2 Characteristics of diabetes mellitus

1) Duration of diabetes mellitus (DM)

This finding were mixed of result of the relationship between duration of DM and QoL. Several study found that increased duration of diabetes was associated with decreased QoL. HRQoL was likely to be affected not only by having diabetes but also by disease duration [74]. Also, duration of disease was also significantly associated with HRQoL and the findings were in line with what was reported by Sepulveda and colleagues from Portugal [75]. On the other hand, some had found no significant association between QoL and diabetic duration [71]. For example, Rubin and Peyrot also noted that the duration and type of diabetes were not consistently associated with QoL [73].

2) Obesity

There was a good reason to believe that obesity might moderate the effects that type 2 diabetes had on HRQoL. Kushner and Foster investigated that dissatisfaction with QoL was one of the major reasons that individuals sought medical treatment for obesity. Fontaine et al reported that the negative effects of obesity on HRQoL were directly related to the magnitude of an individual's BMI, and some data suggested that the psychological consequences of obesity were more serious in women than in men. Moreover, the effects of obesity on psychological outcomes seemed to be stronger for measures that tapped perceptions related to physical, as opposed to emotional, health [76].

Diabetes mellitus and obesity had repeatedly shown as diseases that diminish health status and HRQoL due to the functional consequences that entail, the changes in lifestyle associated with their treatment and the comorbidities and complications that often accompany them [77].

3) Treatment type

The effect of treatment regimens on HRQoL was uncertain. There was some evidence that HRQoL diminishes as treatment moves from diet and exercise to oral agents to combination therapy or insulin alone. Praveen Kumar, Manu Krishna found out about 47% of the patients said they were “very dissatisfied” with the time spent in exercises [78]. It had been suggested that adherence to drug treatment and QoL were linked, although some contradictory results had again appeared in different studies [79]. Insulin treatment had been associated with reduced satisfaction with diabetes and greater impact of the disease on social and personal lives. A study found that patients switched to insulin had lower scores on social function and pain. Treatment with a combination of insulin and oral agents had been associated with impaired mental health [79].

4) Psychosocial factors

Some psychosocial factors, including health-related beliefs, social support, coping style, and personality type might have a potent effect on QoL. These effects might be direct, or they might be indirect, buffering the negative impact of DM or its demands. In fact, these psychosocial factors might be the most powerful predictors of QoL, often outweighing the effects of important disease-related factors, such as complications [64].

Anxious and depressed people with DM were less likely to comply with diabetes self-care recommendations. The diagnosis of diabetes was a life-threatening stressor that demands high mental and physical accommodations due to elevated feelings of fear. Depression among people with DM added an increased burden to patient adherence, compliance and poor prognosis for quality health outcomes. Depression in the DM population had been associated with potential sociodemographic and clinical factors. In fact, a Korean study demonstrated that subjective factors such as depressive symptom and psychological stress affected HRQoL [64].

Moreover, these psychosocial disruptions existed regardless of the severity of the visual impairment and were maintained even after lost vision was regained. It had been estimated that 50% of diabetic men with impotence problems had a significant emotional overlay attributable to depression or anxiety that contributed to erectile dysfunction. Others had found a significant association between sexual problems and depression among diabetic men and women [71]. These psychological factors might both exacerbate and be exacerbated by organic pathology in the development and maintenance of sexual dysfunction [71].

5) Diabetes-related complications

The research addressing this question was consistent in finding that the presence of complications, particularly the presence of two or more complications, was associated with worsened QoL [60]. In fact, this finding was so strong that it suggested that inconsistented findings with regard to the association between other variables and QoL might be explained by the frequent omission of this factor as a possible confounding variable [71]. Presence of diabetes-related complications was associated with a number of the HRQoL items, particularly the healthy/unhealthy day questions. Other studies had demonstrated that the presence and number of complications (e.g., neuropathy, retinopathy, peripheral vascular disease, and coronary artery disease) affected HRQoL [80].

Exactly, among those with T2DM, who had fewer complications, the number of complications was a weak predictor of HRQoL. A similar pattern of findings was

reported for the association between number and severity of complications and HRQoL, with treatment satisfaction and disease impact scales consistently sensitive to severity of complications and less consistently responding to number of complications [60] [71]. Trief and colleagues reported that number of complications was a strong predictor of HRQoL of DM impact and treatment satisfaction scores in a population of insulin-requiring patients [71].

On the other hand, others had found that the presence of neuropathy, cardiovascular disease or end-stage renal disease (ESRD) were associated with decreased HRQoL; the presence of ESRD was associated with markedly increased functional impairment as measured by the Sickness Impact Profile; and the presence of nephropathy was associated with greater health worries and reduced perceived health. Several researchers have found increased depression and negative life experiences during the two years after diagnosis with proliferative diabetic retinopathy [60] [71].

2.2.3 Questionnaire

2.2.3.1 Quality of life questionnaire

Every diabetic patient's life is unique. Many cannot effectively control their disease, but all patients are unanimous in their opinion that diabetes has had a huge impact on their lives. Therefore, assessing the QoL of patients was very difficult, due to the fact that each individual had their own subjective view on their physical, emotional and social well-being [81].

There were different tools for measuring the QoL. A number of studies had analysed the link between QoL and different socio-economic factors such as national health insurance, additional health care services for diabetic patients, tailoring an individual treatment, changes to lifestyle, individual disease specifics (type of diabetes, duration), the presence of short-term or long-term complications, disabilities, psychological, social and demographic factors [81].

Evaluating the QoL associated with health is particularly important for health care professionals; this included general practitioners, pharmacists, nurses and was a vital component in identifying and establishing a suitable way of managing the disease, as well as increasing the overall QoL. There was no direct approach in assessing the QoL. This was why the item-measurement theory was applied when trying to evaluate QoL. It involved asking a category of questions, whose answers were translated into numerical values, after which they were input into statistical programs and QoL was evaluated [81]. Therefore, the QoL questionnaire had an establishment. There were two types of QoL tools which were general and specific questionnaires to evaluate diabetes quality of life [81]. Elizabeth Gibbons, Ray Fitzpatrick (2009) reported that the general of the patient-reported outcome measured in relation to diabetes included SF-36, SF-12, Sickness Impact Scale, Health Utilities Index, Quality of Well-Being Scale and EuroQol- EQ-5D; the specific questionnaires were Appraisal of Diabetes Scale (ADS), Audit of Diabetes-Dependent Quality of Life (ADDQoL), Diabetes 39 (D-39), Diabetes Health Profile (DHP), Diabetes Quality of Life Measure (DQOL), Diabetes Quality of Life Clinical Trial Questionnaire (DQLCTQ), Barriers to Physical Activity in Diabetes (Type 1) (BAPADI), Diabetes Obstacles Questionnaire (DOQ), Diabetes Treatment Satisfaction Questionnaire (DTSQs, DTSQc), Diabetes Treatment

Satisfaction Questionnaire for Inpatients (DTSQ-IP), Diabetes Symptom Checklist-revised (DSC-R), Diabetes-CAT (Computerised Adaptive Testing), Diabetes Impact Survey (DIS), Insulin Treatment Satisfaction Questionnaire (ITSQ), Diabetes Empowerment Scale (DES), Satisfaction with Oral Anti-Diabetic Agent Scale (SOADAS) [82]. In addition, we reviewed the diabetes-related quality of life in ASEAN, which reported at the International Conferences on Medical and Health Science in Lon don in 2018, to have 17 questionnaires for the evaluation the health-related quality of life (HRQoL). This report showed that almost research in ASEAN used six general and eleven specificial questionnaires [83] (Table 2.3).

Health-related quality of life had become an increasingly important topic in patients with type 2 diabetes mellitus (T2DM) because it was a chronic disease that could lead to a multitude of complications associated with significant morbidity and mortality. Furthermore, a large part of the treatment was focused on self-management, which requires constant monitoring, diet change and lifestyle modifications. As such, the impact of T2DM on HRQoL was considerable. Most importantly, the prevalence of T2DM was escalating locally and globally and was a major public health issue [84].

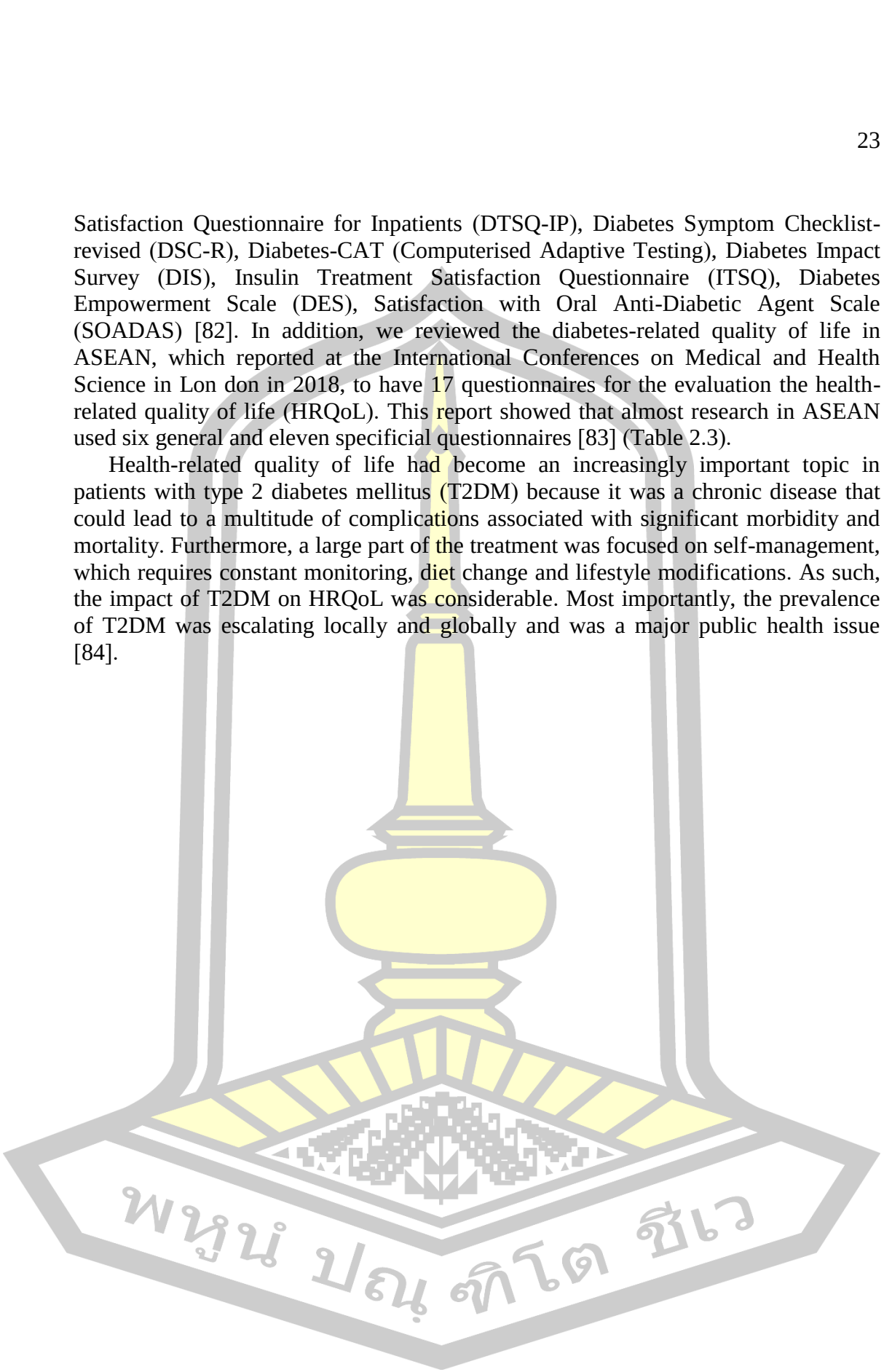


Table 3 The questionnaires used on the evaluation the health-related quality of life in ASEAN

Instrument	Type	Domains/Subscales		Score
15D (15 dimensions instrument)	Generic	15 dimensions		The maximum score is 1 (i.e. no problems on any dimension) and the minimum score is 0 (i.e. dead).
		- Mobility	- Sexual activity	
		- Vision	- Usual activities	
		- Hearing	- Metal function	
		- Breathing	- Discomfort and symptoms	
		- Sleeping	- Depression	
		- Eating	- Distress	
		- Speech	- Vitality	
		- Elimination		
EQ-5D (EuroQOL-5D Health Utility Index)	Generic	EQ-5D - Anxiety/depression (1) - Mobility (1) - Pain/discomfort (1),	- Self-care (1) - Usual activities (1) EQ-thermometer - Global health (1)	EQ-5D Summation: domain profile Utility index (–0.59 to 1.00) Thermometer VAS (0-100)
SF-12 (MOS 12-item Short Form Health Survey)	Generic	- Bodily pain (1) - Energy/Vitality (1) - General health (1) - Mental health (2)	- Physical functioning (2) - Role limitation-emotional (2) - Role limitation-physical (2) - Social functioning (1)	Algorithm Domain profile (0-100, 100 best health) Summary: Physical (PCS), Mental (MCS) (mean 50, SD = 10)
SF-36 (MOS 36-item Short Form Health Survey)	Generic	36 items in 8 domains		Algorithm Domain profile (0-100, 100 best health). Summary: Physical (PCS), Mental (MCS) (mean = 50, SD = 10).
		- Bodily pain (2)	- Vitality (4).	
		- General health (5)	- Role limitation-emotional (3)	
		- Mental health (5)	- Role limitation-physical (4)	
		- Physical functioning (10)	- Social functioning (2)	
SF-6D (MOS 6-item Short Form	Generic	Six dimensions		Algorithm Domain profile (0-100, 100 best health)
		- Bodily pain (1)	- Physical functioning (1)	
		- Energy/Vitality (1)	- Role limitation (1)	

Instrument	Type	Domains/Subscales		Score
Health Survey)		- Mental health (1)	- Social functioning (1)	
WHOQOL-BREF (World Health Organization Quality of Life Brief Questionnaire)	Generic	26 items in 4 domains - Physical health (7) - Psychological (6) - Social relationships (3) - Environment (8)		Item responses are summed within domains to produce a domain score which are then transformed in a scale from 0 to 100 as recommended in the developer's manual. Higher scores indicate better HRQoL.
ADDQoL-18 (Audit of Diabetes-Dependent Quality of Life-18)	Specific	18 items - Freedom to eat - Working life - Living conditions - Family life - Freedom to drink - Finances - Worries about the future - Self-confidence - Motivation	- Physical activity - Holidays/leisure activities - Ease of travelling - Friendships, social life - Sex life - Physical appearance - Reliance on Others - Reaction of society - Enjoyment of food	Impact x importance = weighted score (range -9 to +9). Scores for each item summed, then divided by no. applicable items to give average weighted impact (AWI) score (i.e. N/A items do not contribute to score).
ADDQoL-19 (Audit of Diabetes-Dependent Quality of Life-19)	Specific	19 items - Freedom to eat - Working life - Living conditions - Family life - Freedom to drink - Financial situation - Feelings about the future - Self-confidence	- Physical activities - Holidays - Leisure activities - Personal life - Travel - Social life - Sex life - Physical appearance	Impact x importance = weighted score (range -9 to +9). Scores for each item summed, then divided by no. applicable items to give average weighted impact (AWI) score (i.e. N/A items do not contribute to score).

Instrument	Type	Domains/Subscales	Score
		- Motivation - Reliance on Others - Reaction from others	
AsianDQOL (Asian Diabetes Quality of Life Questionnaire)	Specific	21 items in 5 dimensions - Financial (5) - Energy level (3) - Memory (4) - Relationship (3) - Diet (6)	Each component can be assessed individually or as total score. Based on the total score, the subjects can be classified as having 'excellent QOL,' 'good QOL,' 'moderate QOL' or 'poor QOL.'
D-39 (Diabetes 39)	Specific	39 items - Anxiety and worry (4) - Social and peer burden (5) - Sexual functioning (3) - Energy and mobility (15) - Diabetes control (12)	Scores transformed into 0-100 scores; 0–lowest, 100–highest possible score.
DQLCTQ (Diabetes Quality of Life Clinical Trial Questionnaire)	Specific	57 items in 8 domains - Physical function - Energy/fatigue - Health distress - Mental health - Satisfaction (DQOL) - Treatment satisfaction - Treatment flexibility - Frequency of symptoms - 1 global health question - 1 transition question	Mean scores for each domain converted to a 100-point scale
DQOL (Diabetes Quality of Life)	Specific	- Worries - future effects of diabetes (4) - Worries - social/vocational issues (7) - Impact of treatment (20) - Satisfaction with treatment (15)	No details
DQoL-BCI (Diabetes Quality of Life-Brief Clinical Inventory)	Specific	15 items in 4 dimensions: - Satisfaction - Impact - Social worry - Vocational worry	The total score ranges from 15 (minimum score) to 75 (maximum score); higher DQoL-BCI scores would indicate poorer QoL
IDI	Specific	A deeper understanding of the patients	The in-depth interviews were

Instrument	Type	Domains/Subscales	Score
(In-depth interviews)		- Reaction to diagnosis - Their experiences with the management of T2DM - Perceptions towards T2DM - How these affect their quality of life.	audio-taped and transcribed verbatim with all personal identifiers removed, followed by line-by-line coding. Data management was facilitated by Nvivo 10
IVI (Impact of Visual Impairment questionnaire)	Specific	28 items in three subscales - Mobility and independence (11) - Reading and accessing information (9) - Emotional well-being (8).	No details
MENQOL (menopause-specific quality of life)	Specific	29 items in 4 dimensions - Vasomotor aspects (3) - Psychosocial aspects (7) - Physical aspects (16) - Sexual aspects (3)	Original version, higher scores represent poorer quality of life. For analysis, the total MENQOL score for each participant ranged from 29 (the lowest level) to 232 (the highest level) points.
PAID (Problem Areas in Diabetes Scale)	Specific	20 items	Sum of scores multiplied by 1.25 gives the total PAID score, from 0 to 100, higher scores reflecting greater emotional distress. A score of 40 or above is indicative of severe emotional distress.

2.2.3.2 World Health Organization Quality of Life Brief Questionnaire (WHOQOL-BREF)

Generic HRQOL instruments were useful in that they could be used in cross-cultural, cross-population, and cross-study comparisons. In addition, generic HRQoL instruments were invaluable in population-based surveys allowing for comparison in populations with or without the disease condition and between populations in different countries and tracking this over time. Some commonly used generic HRQoL instruments include the Sickness Impact Profile, Nottingham Health Profile, the Quality of Well-Being Scale, the Medical Outcomes Study 36-Item Short-Form Health Survey, and the World Health Organization Quality of Life (WHOQOL-100) assessment and its short version (WHOQOL-BREF) [84].

The WHOQOL-BREF was an abbreviated 26-item version of the WHOQOL-100 consisting of 2 global items and four domains namely: Physical health (7 items), Psychological (6 items), Social relations (3 items) and Environment (8 items). The response format is a 5-point Likert scale with various sets of wordings. The most commonly used scale was: “Very dissatisfied”, “Dissatisfied”, “Neither satisfied nor dissatisfied”, “Satisfied” and “Very satisfied”. Item responses were summed within domains to produce a domain score which were then transformed in a scale from 0 to 100 as recommended in the developer’s manual. Higher scores indicated better HRQoL. According to the WHOQOL-BREF manual, missing item responses were imputed using the mean of the other items within the domain. Domain scores were calculated if at least 80% of the items had been responded. The only exception was the Social domain, where the domain score should only be calculated if less than 1 item was missing. The WHOQOL-BREF was self-administered by respondents. Our analyses were limited to the WHOQOL-BREF domains (made up of 24 items) because no total or overall scale was available and the 2 global items were generic and not exclusive to WHOQOL-BREF [84].

2.2.3.3 Indian diabetes patients (QOLID)

Pre-existing quality of life questionnaires including WHO-BREF, SF-36 (Short Form-36 questionnaire), DQLCTQ (Diabetes Quality of Life Clinical Trial Questionnaire), ADDQoL (Audit of Diabetes Dependent Quality of Life), and DQOL (Diabetes Quality of Life) were extensively reviewed. Individual items identified by the three parallel approaches namely expert opinion, patient interview and review of existing literature were then formulated into specific questions and screened for duplicate items. All items were rated on Likert scale from 1 to 5 where ‘1’ indicated poorest quality of life for choices like ‘always’ in case of questions like ‘How often do you feel exhausted or tired by your health problems’ or for ‘very dissatisfied’ in case of questions like ‘How satisfied were you with the amount of time it took to manage your diabetes’. The highest rating of ‘5’ denoted the best quality of life standing for ‘never’ or ‘very satisfied’ in case of above two questions. The questionnaire was framed with the intention of reflecting HRQOL and the diabetes specific quality of life (DSQOL). All items were a priority hypothesized to fit into 8 domains namely on the basis of review of existing literature and issue specified as relevant in patient interviews [99].

2.3. The health implementation programme

The WHO health systems Building Blocks framework had become ubiquitous in health systems research. However, it was not developed as a research instrument, but rather to facilitate investments of resources in health systems [100]. In this study, we applied the framework of the health implementation programme. The field of implementation research was growing, but it was not well understood despite the need for better research to inform decisions about health policies, programmes, and practices. We provided a framework for using the research question as the basis for selecting among the wide range of qualitative, quantitative, and mixed methods that could be applied in implementation research, along with brief descriptions of methods specifically suitable for implementation research. Expanding the use of well-designed implementation research should contribute to more effective public health and clinical policies and programmes [101]. In this research, the health implementation programme was conducted in Tam Binh district, Vinh Long province, Vietnam among type 2 diabetic patients with the components as follows:

2.3.1 Six building blocks of health system

In 2007, the WHO published a health systems Building Blocks framework with the aim of promoting a common understanding of what a health system and what constitutes health systems strengthening. In the framework, a health system was conceptualized as consisting of six building blocks: (i) service delivery; (ii) health workforce; (iii) health information; (iv) equipment; (v) financing; and (vi) leadership and governance, as well as process elements (access, coverage, quality and safety) and outcomes (improved health and health equity, responsiveness, social and financial risk protection and improved efficiency) (Figure 4.1) [100].

2.3.1.1 Service delivery

Strengthening service delivery was crucial to the achievement of the health-related Millennium Development Goals. Ensuring availability of health services that met a minimum quality standard and securing access to them were key functions of a health system. Therefore, the researchers should continue to experiment with methods and measures that would allow progress to be assessed over time, along these important dimensions [102].

Good service delivery was a vital element of any health system. Service delivery was a fundamental input to population health status, along with other factors, including social determinants of health. The precise organization and content of health services would differ from one country to another, but in any well-functioning health system, the network of service delivery should have the following key characteristics [102]

- Comprehensiveness: A comprehensive range of health services was provided, appropriate to the needs of the target population, including preventative, curative, palliative and rehabilitative services and health promotion activities [102].
- Accessibility: Services were directly and permanently accessible with no undue barriers of cost, language, culture, or geography. Health services were close to the people, with a routine point of entry to the service network at primary care level

(not at the specialist or hospital level). Services might be provided in the home, the community, the workplace, or health facilities as appropriate [102].

- Coverage: Service delivery was designed so that all people in a defined target population are covered, i.e. the sick and the healthy, all income groups and all social groups [102].

- Continuity: Service delivery was organized to provide an individual with continuity of care across the network of services, health conditions, levels of care, and over the life-cycle [102].

- Person-centredness: Services were organized around the person, not the disease or the financing. Users perceived health services to be responsive and acceptable to them. There was participation from the target population in service delivery design and assessment. People were partners in their own health care [102].

- Coordination: Local area health service networks were actively coordinated, across types of provider, types of care, levels of service delivery, and for both routine and emergency preparedness. The patient's primary care provider facilitates the route through the needed services, and works in collaboration with other levels and types of provider. Coordination also takes place with other sectors (e.g. social services) and partners (e.g. community organizations) [102].

- Accountability and efficiency: Health services were well managed so as to achieve the core elements described above with a minimum wastage of resources. Managers were allocated the necessary authority to achieve planned objectives and held accountable for overall performance and results. Assessment included appropriate mechanisms for the participation of the target population and civil society [102].

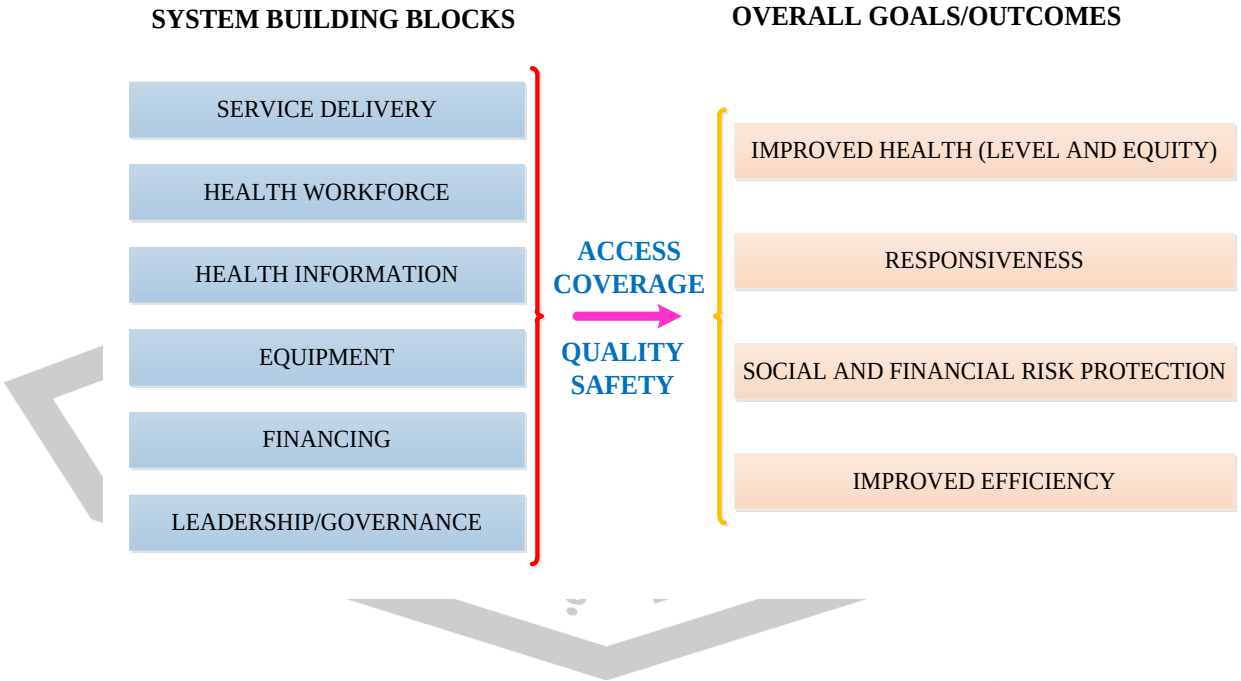


Figure 5 The WHO Health Systems Framework [102]

2.3.1.2 Health workforce

The ability of a country to meet its health goals depended largely on the knowledge, skills, motivation and deployment of the people responsible for organizing and delivering health services. Numerous studies shew evidence of a direct and positive link between the numbers of health workers and population health outcomes. The health workforce could be defined as “all people engaged in actions whose primary intent was to enhance health” [102].

2.3.1.3 Health information

Sound and reliable information was the foundation of decision-making across all health system building blocks. It was essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing. The health information system provided the underpinnings for decision-making and had four key functions: (i) data generation, (ii) compilation, (iii) analysis and synthesis, and (iv) communication and use [102].

2.3.1.4 Equipment

According to the WHO framework for health systems, a well-functioning health system ensured equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness, and their scientifically sound and cost-effective use [102].

2.3.1.5 Financing

Health financing was fundamental to the ability of health systems to maintain and improve human welfare. At the extreme, without the necessary funded no health workers would be employed, no medicines would be available, and no health promotion or prevention would take place. Health financing referred to the “function of a health system concerned with the mobilization, accumulation and allocation of money to cover the health needs of the people, individually and collectively, in the health system the purpose of health financing was to make funding available, as well as to set the right financial incentives to providers, to ensure that all individuals had access to effective public health and personal health care” [102].

2.3.1.6 Leadership/governance

Governance in health was being increasingly regarded as a salient theme on the development agenda. Leadership and governance in building a health system involved ensuring that strategic policy frameworks exist and were combined with effective oversight, coalition-building, regulation, attention to system design and accountability [102].

Since its development the WHO Building Blocks framework had been widely used in health systems research and had arguably become the framework most often used to describe a health system in international forums [102]. Implementation research (IR) was conducted within health systems and community settings, removed

from the controlled settings associated with other types of scientific research. It was an ongoing process that provided continuous feedback of results back to the health system, facilitating adaptation of services and interventions. Consequently, we used WHO Building Blocks for our health implementation programme to improve the health-related quality of life among type 2 diabetic people in Tam Binh district, Vinh Long province, Vietnam.

2.3.2 Application of the building blocks framework in field studies

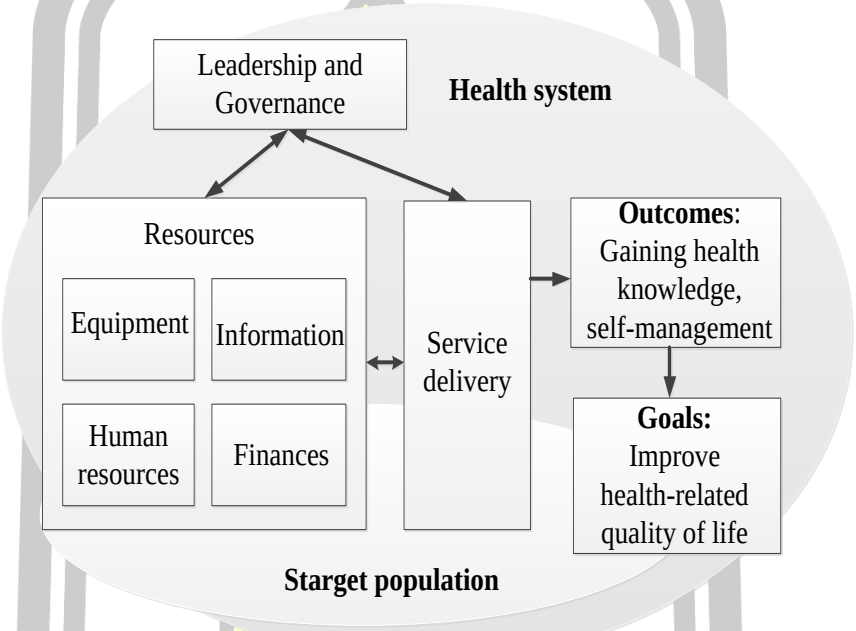


Figure 6 The health system dynamic framework of the implementation programme (Source Olmen et al. (2012))

2.3.2.1 Leadership/governance

This programme applied the Program 100 that sent to train 100 people with postgraduate qualifications abroad of the Provincial Party Committee of Vinh Long province, Vinh Long Provincial Health Department, the committee of Tam Binh district, Tam Binh district Health Centre and the researchers. The leadership and governance committees were produced, controlled and maintained for the resources of the equipment, health in formation, human resources, finances and service delivery.

2.3.2.1 Human resources

This study was managed to emply the participants from the Commune Health Center and the volunteers at Hamlet communities, which aimed to participate of 35 and over years old diabetic patient in Tam Binh district. This indicated that human resources, was an element of the resources, controlled by the leadership and governance to support service delivery.

2.3.2.3 Health information

i. Health information

Information was an ethereal merchandise. Its definition was the data and knowledge that intelligent systems (humans and artificial) used to support their decisions. Health informatics helped health teams to give their decisions and actions, and improve patient outcomes by making better use of information — making more efficient the way patient data and medical knowledge was captured, processed, communicated, and applied [103].

ii. Health behavior model

Parkerson et al (1993) had concluded that health behavior referred to the actions of individuals, groups, and organizations, as well as their determinants, correlates, and consequences, including social change, policy development and implementation, improved coping skills, and enhanced quality of life [104]. Then in 1996, Kasl and Cobb defined three categories of health behavior: i) Preventive health behavior: any activity undertaken by an individual who believed himself (or herself) to be healthy, for the purpose of preventing or detecting illness in an asymptomatic state; ii) Illness behavior: any activity undertaken by an individual who perceived himself to be ill, to define the state of health, and to discover a suitable remedy; iii) Sick-role behavior: any activity undertaken by an individual who considers himself to be ill, for the purpose of getting well. It included receiving treatment from medical providers, generally involved a whole range of dependent behaviors, and led to some degree of exemption from one's usual responsibilities [104]. Also, Vicki Simpson (2008) had divided the health behavior to be three models: socioecological, trans-theoretical, and health belief [105]. Thus, in this thesis, we would conduct the health behavior which was follow the sick-role behavior and health belief model.

❖ Perceived Susceptibility

i. It referred to beliefs concerning risk or susceptibility to a condition or disease [105]. This research educated the individuals about the diabetic knowledge which included:

ii. Diabetic concept: a heterogeneous group of metabolic disorders with hyperglycemia as the common characteristic, resulting from insulin action and/or secretion defects.

iii. Classification of diabetes: There were two type of diabetes: type 1 is characterized by deficient insulin production in the body. It usually developed during childhood or adolescence; type 2 results from the body's ineffective use of insulin. It developed especially in adults.

iv. Symptoms of diabetes: Symptoms included excessive urination and thirst, constant hunger, weight loss, vision changes and fatigue.

v. Diagnose of diabetes: The criteria diagnoses of diabetes mellitus: the symptoms of diabetes plussed random blood glucose concentration >= 11.1 mmol/L (200 mg/dl); or the fasting plasma glucose >= 7.0 mmol/L (126 mg/dl); or HbA_1C > 6.5%; or two-hour plasma glucose >= 11.1 mmol/L (200 mg/dl) during an oral glucose tolerance test.

vi. Treatment of diabetes included to change diet which lows sugar; do exercise; lose weight; took medicine and injected insulin.

vii. Periodic monitoring: the glycemic had to check every month. HbA_1C and kidney function had to test every three months.

viii. Prevention of diabetes and complications: the prevention of diabetes included to eat sugar limited, weight-loss, and the exercises, consume more vegetable. Prevention of diabetic complications included glycemic monitoring with schedule, taking care for hands, foot, checking renal function, checking blood pressure, blood lipid, eye, peripheral neuropathy.

❖ Perceived Severity

i. This referred to beliefs concerning the possible severity of a disease [105]. This research discussed the potential effects of type 2 diabetes on the individual's health-related quality of life. We would discuss about the relation between diabetes and health-related quality of life.

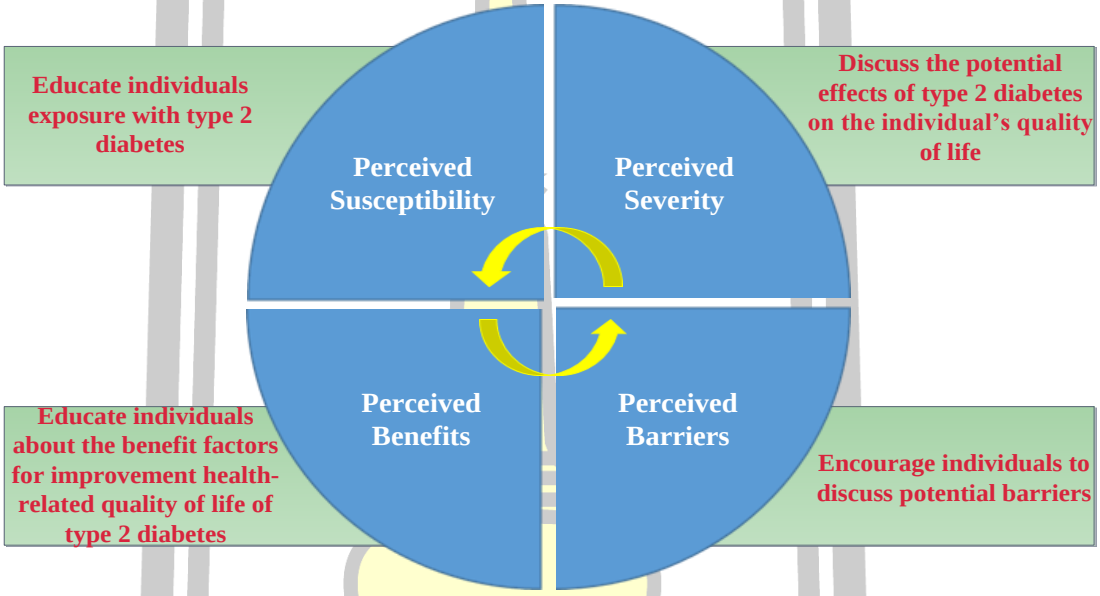


Figure 7 A health belief model approach to addressing diabetes for the improvement of health-related quality of life Sour: Vicki Simpson (2008) [105]

❖ Perceived Barriers

i. It referred to any obstacles or barriers to the behavior changes being considered to decrease risk [105]. We encouraged individuals to discuss potential barriers.

❖ Perceived Benefit

i. This part referred to the perceived value or benefit of behavior changes in reducing the risk of disease [105]. This study educated the individuals about the benefit factors for improvement health-related quality of life of type 2 diabetes.

iii. Self-management

Coons et al. (1989) suggested that interventions using self-care information would change individuals' attitudes and beliefs concerning their responsibility and involvement in the management of their diseases. This idea pointed to self-empowerment approach, which recognized that patients were in control of, and responsible for, the daily self-management of their diabetes [4].

Patients with diabetes demand long-term and continuous self-care and preventive care behaviors where their role was central in the process of treatment. Usually, effective self- management of chronic diseases including diabetes - due to adherence to regimen - requires technical skill together with problem-solving competencied to

make appropriate adjustments to the self-care regimen. By applying problem-solving process, an individual would be able to bring about and maintain behavior change toward a self-improvement goal [4].

Research into diabetes care showed that it was largely founded in self-management education and patients' readiness to learn. Knowledge of diabetes created a basis for informed decisions about diet, exercise, weight control, blood glucose monitoring, use of the medications, foot and eye care, and control of macro vascular risk factors [4]. When self-management education was provided, age, education, knowledge, belief, self-efficacy, and social support should be considered to offer more appropriate intervention and to improve patients' behavior [106].

In this study, T2DM would be produced the knowledge that they had to adherence treatment, check glycemic and HbA_1C with the schedule. They should have the diet with low sugar, more vegetable, and vitamin. Also, they needed to do exercise every day and weight loss. Moreover, they must stop the smoking and drinking alcohol. Regularly, they should take care their hands and feet. In addition, these patients must usually go to doctor for the eye examination and ophthalmoscopy, testing the peripheral neuropathy and renal function.

2.3.2.4 Equipment

The equipment of the Commune Health Center was used for the training as: the meeting rooms, the technique stools and the handout document for the trainee. The meters checked the fast blood glucose and HbA_1C. The equipment was also an element of the resources. It was the tools for the human resources to maintain the service delivery.

2.3.2.5 Financing

The finance was produced by the researcher (by myself). It produced the funds for all program to the activity.

2.3.2.6 Service delivery

The service delivery would be produced by the health teams who were trained. This service would take the outcome and to complete the goals of the implementation programme. Also, it feedbacked the other element of six building blocks to check and update for the programme.

2.4. Conclusion

This rate of type 2 diabetes was increasing rapidly worldwide in general as well as in Vietnam in particular. This disease was a metabolic disorder that could not be completely cured. The process of controlling the disease had been difficult, requiring persistence and compliance of the patients as well as the medical staffs.

To evaluate the therapeutic effect of this disease must be based on the patient's health-related quality of life. There were many tools for assessing the patient's health-related quality of life, but the selection of the right equipment was essential because it needed to be suitable in many aspects from customs, religion, belief, culture, race, gender, country and ethnicity. It was therefore necessary to design a set of

questionnaire to evaluate health-related quality of life for Vietnamese diabetic patients.

In addition, to maintain effective long-term treatment of type 2 diabetes, it was also important to learn knowledge of the patient. Therefore, a health education programme was used to improve the knowledge, right attitude and good self-care practices of patients with type 2 diabetes. Furthermore, this program must also be developed according to WHO framework. However, it must also be consistent with the Vietnamese culture.

2.5. The research framework

This study was conducted according to the following designed research framework

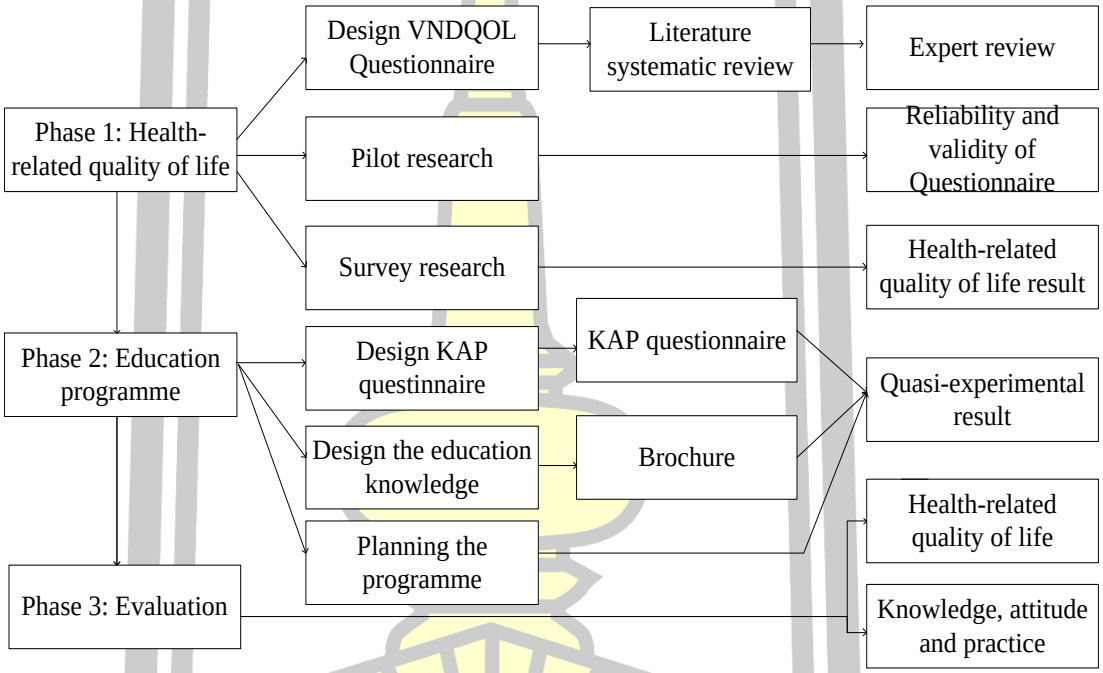


Figure 8 Research framework

Chapter 3

MATERIALS AND METHODS

3.1. Subjects

3.1.1 Study population

3.1.1.1 Phase 1

The target population was diabetic patients age 35 years and over, which diagnosed with T2DM and lived in Tam Binh district, Vinh Long province, Vietnam. The study participants were drawn from all eligible individuals in 16 wards and one town in Tam Binh district. The sample size was calculated with the formula of survey according to proportional formula, as:

$$n = \frac{Z^2 pq}{e^2} \text{ [107]}$$

Which was valid where:

- n was the sample size
- Z^2 was the abscissa of the normal curve that cuts off an area α at the tails (1 - α equals the desired confidence level). We desired a 95% confidence level. Therefore, the value for Z, that was 1.96, was found in statistical tables which contained the area under the normal curve.
- p was the estimated proportion of an attribute that was present in the population. This research was the percentage of health-related quality of life of type 2 diabetes. According to research by Anumol Mathew et al (2014), it was found that the average and poor quality of life in type 2 diabetes was 58% [38]. Thus, we desired the proportion of the health-related quality of life in this research which was p = 0.58.
- q was 1-p = 1 – 0.58 = 0.42.
- e was the desired level of precision. We desired a ±5% precision.

Therefore, when replacing the results with the formula we got the sample size as follows:

$$n = \frac{(1.96)^2(0.58)(0.42)}{(0.05)^2} \approx 374.33$$

With this result, we selected n = 380 diabetic people. However, we needed more than 30% sample size to exclude those who did not agree to continue to participate in the study. Therefore, the minimum sample size of research was n = 380 + 30%*380 = 494 diabetic people.

3.1.1.2 Phase 2 and 3

The target population was 85 diabetic patients aged 35 to 65 years old from the phase 1. These 85 patients were randomly selected from the list of phase 1 patients so that each commune had 5 participants. All participants in phase 1 were divided into 17 groups equivalent to 17 communes. Next, the lists of participants aged 35 to 65 in

each group were filtered and encrypted individually. Then, a random lottery of 5 patients in each group was selected for inclusion in the study.

3.1.2 Selection criteria

All patients who were diagnosed with T2DM more than 6 months, according to the WHO standard with or without treatment. The participants had to be residents and/or live at least 6 months in the Tam Binh district. Also, they had to agree to participate in research and inform written consent. Moreover, these people must not be disabling.

3.1.3 Exclusion criteria

People were less than 35 years old in study time (were born after 1984). Also, diabetic patients had not been or are diagnosed with T2DM under 6 months. Furthermore, the participants had determined the other diabetes types as gestational DM. Besides, the cases did not agree to participate in research or give up halfway who will be excluded. Likewise, there dismiss the individuals with severe disease require hospitalization or referral treatment. Finally, the people with the inability to communicate due to physical or mental disability did not include in the research.

3.1.4 Research time

The research carried out about 12 months from December 2018 to November 2019.

3.1.5 Research location

At the time of the study, patients with T2DM had registered in Tam Binh district - Vinh Long province - Vietnam. Tam Binh had a total natural area of 27,972.1 ha. The administrative unit of the district was Tam Binh town, and 16 communes were: Tuong Loc, My Thanh Trung, Hoa Loc, Hoa Hiep, Hoa Thanh, My Loc, Phu Loc, Hau Loc, Tan Loc, Phu Thinh, Tan Phu, Long Phu, Binh Ninh, Loan My, Ngai Tu; with 132 hamlets. The Tam Binh population was 168,049 people (83,436 men, 84,613 women; 5,599 in urban, 162,450 in rural), accounting for 16.14% of the population in Vinh Long province. The population density was 535 people/km^2 and was divided into urban areas: 3,064 persons/km^2; rural areas: 520 people/km^2.

The Kinh accounted for 96.45%, other ethnic groups made up 3.55% (Khmer 5,309 people, 3.41%, Chinese 176, 0.11% and other ethnic groups 30). Kinh people were distributed everywhere; Khmer people lived in Loan My commune; Hoa concentrated in Tam Binh town. The population in the working age was 100,778 people (52,796 males, 47,982 females). There were five main religions in the district: Buddhism, Catholicism, Protestantism, Caodaism and Hoa Hao. About 36,000 followers believed in 23.28% of the population according to the five main religions.

3.2. Study Methods

3.2.1 Research design

This was mixed-methods research on the diabetic population [108]. Phase 1: The quantitative method was performed to assess the health-related quality of life of patients with diabetes. Phase 2: The quasi-experimental method was designed to compare the health- education programme of diabetic patient groups. Phase 3: The effectiveness of the health education programme of diabetic patients.

3.2.2 Research content

Some characteristics of sample study were assessed as follows: The age was confirmed the mean, ranging from a minimum to a maximum. Also, the participants were divided into two age groups: 35 – 49, 50 – 64 and ≥ 65 years old. Then, the gender of participants in this study included female and male. The diabetic duration was calculated from first diagnosed to study time. It included mean, minimum, maximum and medium of duration of T2DM. Moreover, the marital status included the married, never married, widowed/widower, separated/divorced for analysis. Furthermore, the literacy of subjects in this study was separated to illiterate, primary school, secondary school, high school and more than high school.

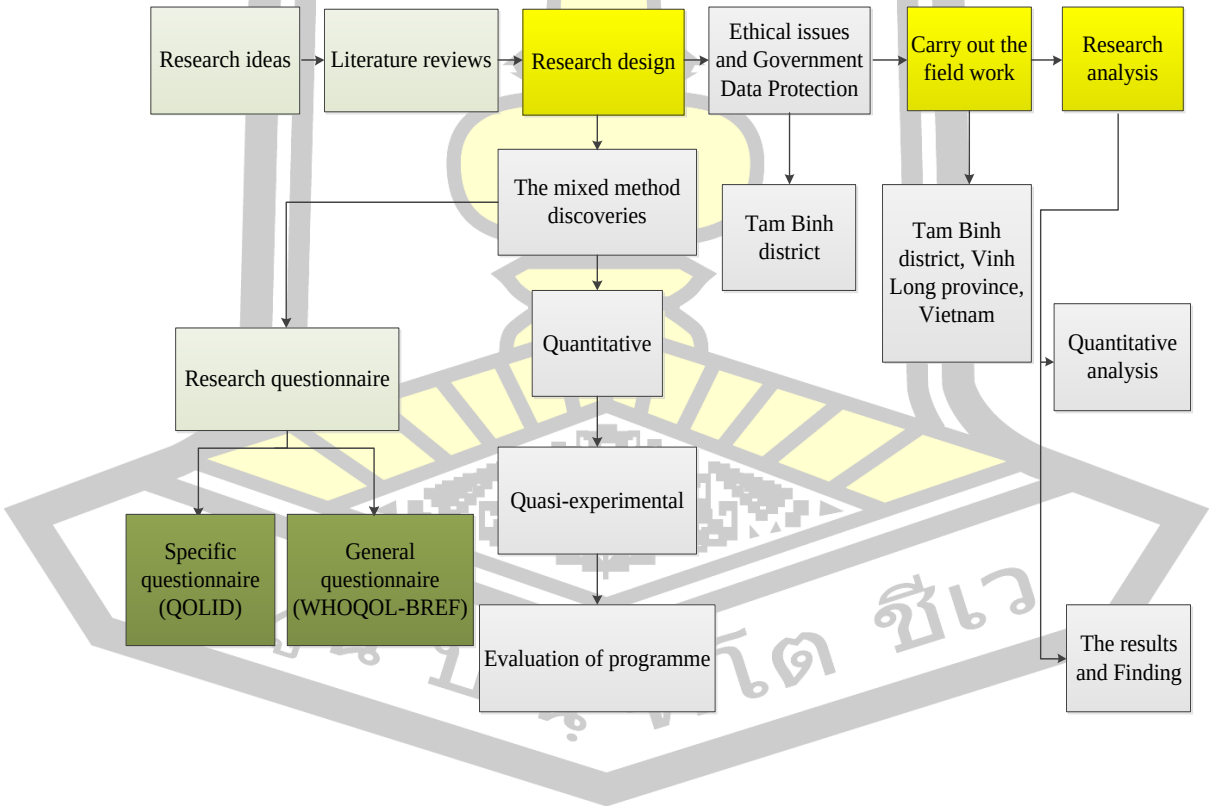


Figure 9 Flowchart of study methodology

Likewise, type of family had two types such as small family that have 1-2 generations and big family which is over 2 pedigrees. Although, there were some of

ethnicity in Tam Binh district, in there we distributed three ethnic groups, as Kinh, Khomer and others (Chinese, Cham)

In addition, the alcohol intake was divided into drinker and non-drinker. Similarly, the smoking included smoker and non-smoker. About the glycemia, we used the fast check meter to audit blood glucose of all people who aged 35 and over years old in Tam Binh district. These were divided three groups to include hyperglycemic (> 7mmol/L), normal glycemic (4 – 7mmol/L), hypoglycemic (< 4mmol/L). The HbA_1C, we checked for individuals, who chose to complete questionnaire, on before and after the health empowerment programme. About type of treatment, we separated the using table, insulin, both, diet and exercise. Finally, the complications or other chronic diseases included DM with and without complication.

3.2.3 Methods of data collection

3.2.3.1 Socio-demographic sheet

The questionnaire was assigned for 27 questions which were to collect data about the participants' socio-demographic status. The socio-demographic information sheet covered the following areas of interest: 1) gender, age, educational level, marital status, type of family, ethnicity, income status, employment; 2) health profile: duration of DM, alcohol, smoking, glycaemia, HbA_1C, type of treatment, presence of complications or other chronic diseases.

3.2.3.2 The QOL questionnaire

The instrument used in this study which was Vietnamese diabetes quality of life (VNDQOL) questionnaire (See appendix C). The VNDQOL used to assess HRQoL in this study. It contented 68 items which included 27 items about background information and 41 items describe QoL that produced a profile nine domain scores which were general health, activity limitation, physical endurance, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health and inter-personal relationship. This questionnaire was taken from the WHOQOL-BREF and quality of life instrument for Indian diabetes patients (QOLID) [99]. The response format was a 5-point Likert scale with various sets of wordings. Item responses were summed within domains to produce a domain score which were then transformed in a scale from 0 to 100 as recommended in the developer's manual. Higher scores indicated better HRQoL. According to the VNDQOL manual, missing item responses were imputed using the mean of the other items within the domain. Domain scores were calculated if at least 80% of the items had been responded. The VNDQOL was self-administered by respondents. The forty-one QoL items built within 9 groups as follows:

1. General health has 3 items which included 3 questions, as
2. Activity limitation had 6 items which described six questions, as

3. Physical endurance had 6 items that displayed by six questions, as
4. Diet and eating habits had 6 items that showed in six questions, as
5. Four questions about treatment, as
6. Symptom burden included three items with three questions, as
7. The financial aspects domains had 5 items with five questions
8. The emotional/mental health had 5 items which contained 5 questions
9. Finally, the inter-personal relationship discussed on three items with 3 questions

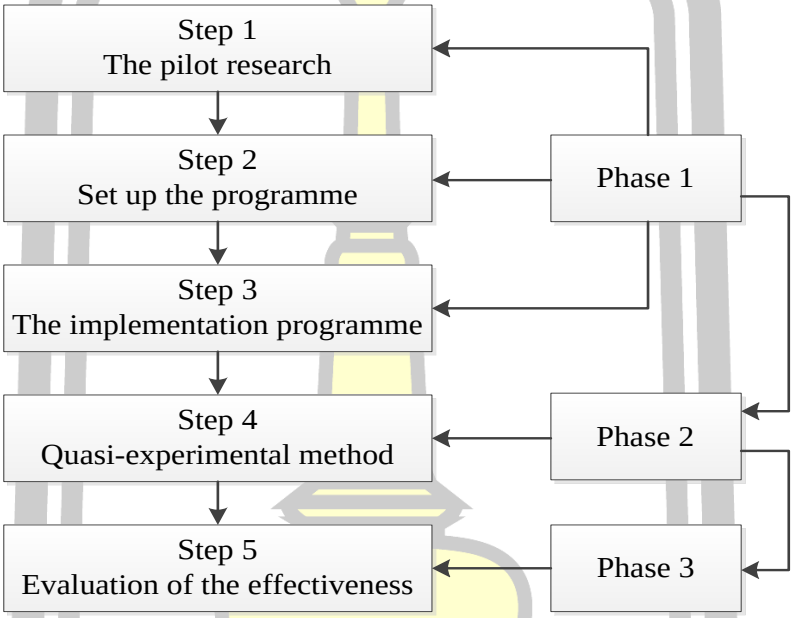


Figure 10 The flowchart of data collection

3.2.3.3 Expert review

The draft of this questionnaire was translated into Vietnamese. Then, the both English and Vietnamese questionnaire versions were sent to 5 experts, who took PhD and over position, who worked on diabetes and had knowledge about the quality of life. After, there had the answer from them, this questionnaire was confirmed and sent back to them again to confirm the accuracy.

3.2.4 The steps of data collection

3.2.4.1 Phase 1

Step 1: The pilot research on exploration of the factors related to the health-related quality of life of diabetic out-patients in Tam Binh health center, Tam Binh district, Vinh Long province, Vietnam in 2018 – 2019 by using the health behaviour and VNQOL questionnaire. The questionnaire was administered with a sample about 9% of research sample size on chapter 5. Therefore, this pilot sample size was n =

9%*494 = 44.46. Finally, we chose 45 diabetic patients for the pilot research. The participants with type 2 diabetes diagnosed more than half year ago and between the ages of 35 to 65 years were included in the study; the participants with any other chronic illness which required the patient to be admitted in the hospital for more than two weeks in the past one year, gestational diabetes mellitus or inability to communicate due to physical or mental disability were excluded from the study. This questionnaire was used for evaluation the health-related quality of life of these patients. After that, the data was analysed to confirm its valuation

Step 2: Set up the programme of health-related quality of life of diabetic patients in Tam Binh district, Vinh Long province. The experts have proved for the questionnaire before the collected data. Setting up a collaborative group of doctors, nurses, laborators and community staffs involved in the data collection process. This team had been trained as well as the questionnaire and steps to collect the data. Procceed with permission and ask for the help of the local authorities to faciliate research. Contact health commune for specific planning for the research process which included taking off the list of diabetes, setting up a location for samples, announcing the patients. Prepared all necessary tools to collect the study samples.

Step 3: The implementation the health-related quality of life programme of diabetic patients in Tam Binh district. The research team went to a specific location arranged by the health commune to conduct a fast blood glucose test, HbA_1C for all diabetic patients in each commune. At the same time, patients were invited to participate in the study. Patients were carefully explained that their participantion was completely voluntary, and they could stop participating regardless of their preference without any constraints. After they signed the consent form, they were asked by the staff to answer the VNDQOL questionnaire.

3.2.4.2 Phase 2

Step 4: Quasi-experimental method compared the results of the knowledge, attitude and practice (KAP) of diabetic patients before and after attending this programme. We assessed 85 participants with 35 – 65 years old on the sample size in section 3.1.1.1 of this chapter. The KAP questionnaire was designed to document knowledge of diabetes, attitudes towards the disease and self-control practices. The propaganda provided by the brochure contains essential information about diabetes.

3.2.4.3 Phase 3

Step 5: Evaluation of the effectiveness of health education programme of 85 diabetic patients on step 4 after six months.

3.2.5 Health education programme

The aims of program produced for patient basic knowledge about diabetes, self-management, treating adherence, diet and complicated prevention. The program had to be designed to save time about fifteen minutes, brief content, intelligibility.

3.2.6 Error control measures

The sample must conform of selection and exclusion criteria. Participants must attend implementation program and complete all the questionnaire which is two times.

3.2.7 Data analysis

After overviewing the questionnaire, each one was coded, and the usable number of questionnaires was determined. Data was coded and transferred into specially designed formats for data entry using the Statistical Package for Social Sciences (SPSS) version 20 program. Cleaning of data was done; the data was analyzed by performing the following statistical analyses. A descriptive statistical analysis of frequency, mean, and standard deviation was carried out on all the codified variables. An independent sample t-test was used to make comparisons among the demographic variables of respondents. The level of significance selected for this study was < 0.05.

One-way analysis of variance (ANOVA) was used to evaluate the differences in the domains of the HRQoL among the different groups. In case of the presence of significant differences in the HRQoL domains among the groups and the independent variable composed of more than one level, a procedures called "post-hoc multiple comparisons" was used to determine these differences. The t-test was used for the analysis of quasi-experimental research. Comparison of changes in HRQoL and KAP between before and after the program tested by Pair Sample T-test.

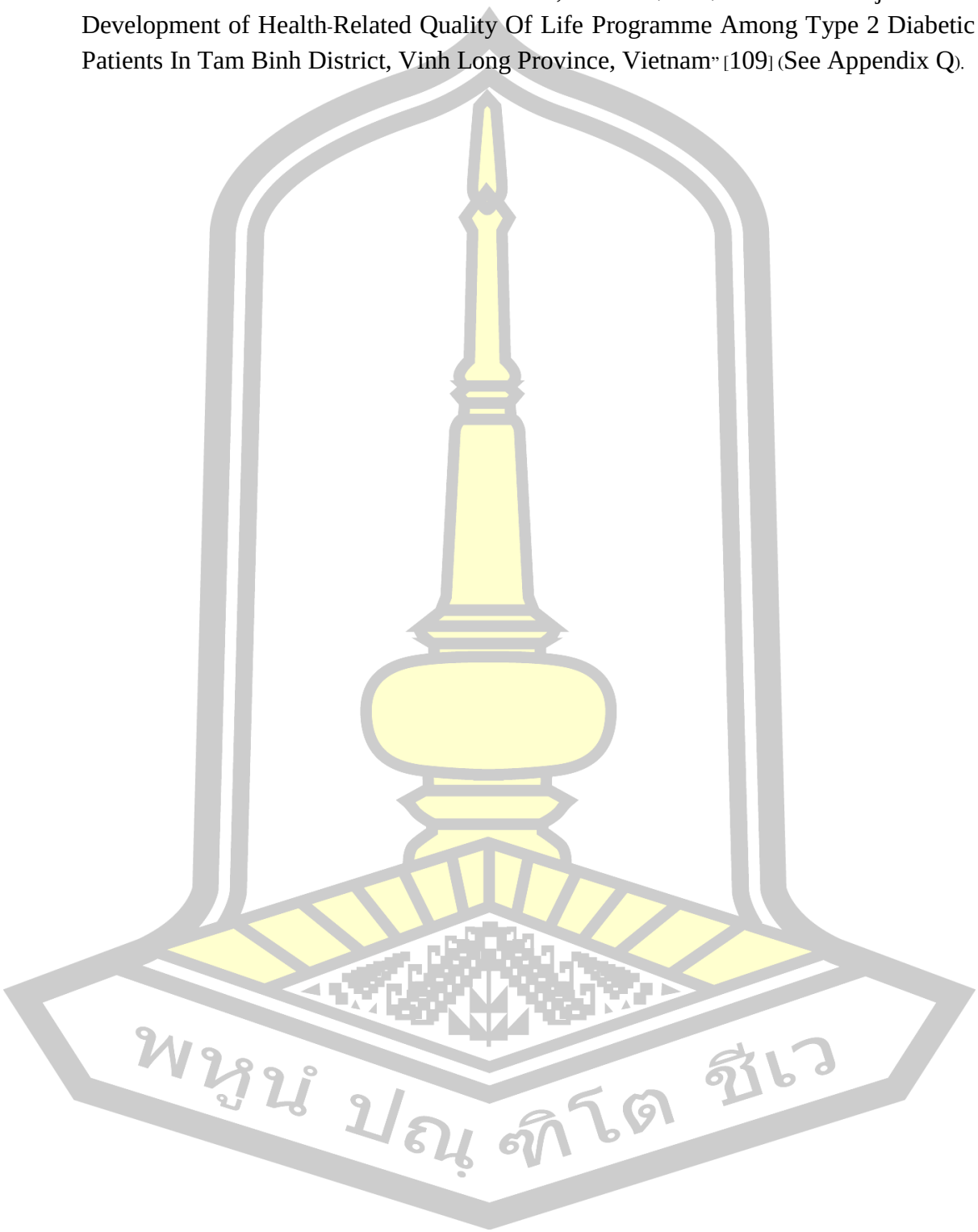
3.2.8 Research ethics

Participants were assured anonymity that participation was voluntary and they could choose to discontinue their participation at any time. They were informed that their participation would have no bearing on any future professional relationship with the current medical provider or the researcher.

This research investigation had been carried out with the integrity and had at all times respected and ensured patient confidentiality and privacy of personal details. All researchers had scrupulously respected the ethical principles that all biomedical research must ensure. The principles of non-maleficence, legality, free will and beneficence had been faithfully accomplished. Permission and approval letters were received to recruit patients from government in Tam Binh district.

After submitting the proposal to the science committee of the Faculty of Public Health of Mahasarakham University, the thesis was allowed to conduct field research of the ethics committee of Mahasarakham University with approval number: 077/2079 (See Appendix I).

A study proposal of this research was published on the International Journal of Public Health and Clinical Sciences Vol.6, No. 5 (2019) which is subject "The Development of Health-Related Quality Of Life Programme Among Type 2 Diabetic Patients In Tam Binh District, Vinh Long Province, Vietnam" [109] (See Appendix Q).



Chapter 4

RESULTS AND DISCUSSION

4.1. The results of phase one

4.1.1 The pilot research

4.1.1.1 Introduction

T2DM could seriously affect the patient's HRQoL. People with diabetes had reduced QoL to compare those without [110]. The HRQoL is a topic-based health condition assessment covering related aspects such as general health, physical, emotional, cognitive and functional, as well as social and medical activities. The HRQoL for people with diabetes can be measured using the diabetes-specific or generic tools [74]. The magnitude of specific tools assessing the QoL of DM was due to the fact that this device was directed at the most appropriate characteristics of the disease or condition of the study and the patient, considering that the QoL measurements have supported intervention strategies in an effort to minimize the impact of T2DM [28].

Today, many tools have been developed for evaluating the HRQoL, based on various definitions of this concept [28]. Although a range of tools was available to assess the HRQoL for DM patients, the researchers did not identify any studies in the literature describing the use of Vietnamese tools to evaluate the HRQoL and specific instruments for Vietnamese DM patients. This section aimed to carry out the VNDQOL of Vietnamese cultural adaptation, to test the reliability and validity of the appropriate version in the T2DM sample.

4.1.1.2 Methodology

i. The framework of the research design

Figure 4.1 described the steps in the pilot study. It summarizes the entire process from designing the questionnaire to assess the reliability and validity of the questionnaire. Step 1 was the design of the new questionnaire. Step 2 was the review result of the VNQOL of the five experts. Step 3 was the checked step for the questionnaire on the participants. Step 4 was the survey result which used this new question on the field.

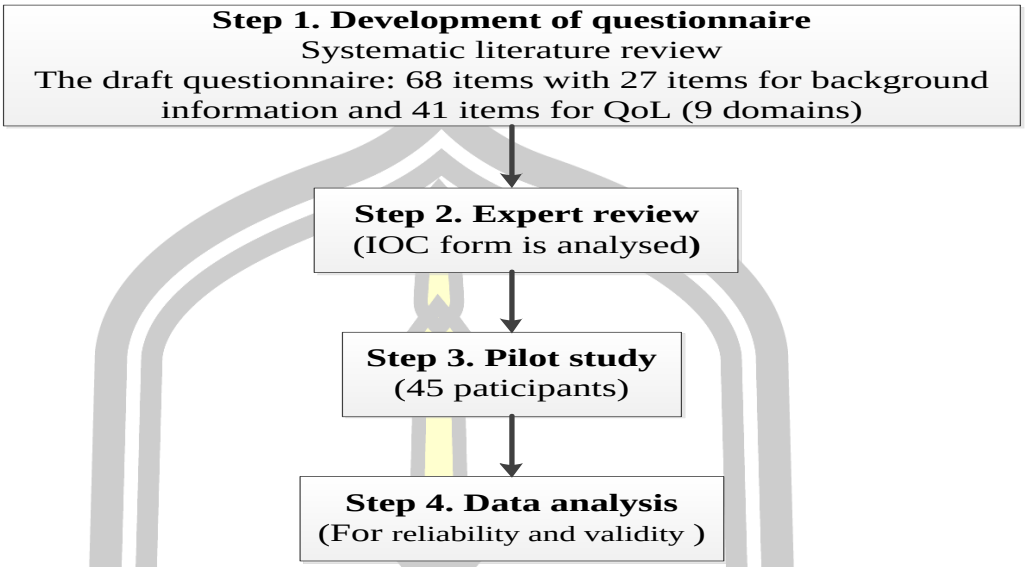


Figure 11 The flowchart of the study design.

ii. Development of VNDQOL questionnaire

The literature reviewed for the generic and specific QoL measures, and found the seventeen instruments (Table 2.3). These reviews were written two papers and presented on the ISER 151st International Conferences on Medical and Health Science (ICMHS) in London, UK in 18th – 19th, August 2018 [111] which was published on the Journal of Clinical and Diagnostic Research (2020) [112] and the 10th International Conference On Public Health Among Greater Mekong Sub-Regional Countries in Kunming, China in November 2018 [113]. Based on these reviews, a new questionnaire which is Vietnam Diabetes Quality of Life was designed to evaluate the HRQoL of diabetic Vietnamese population.

iii. Expert review

This questionnaire was evaluated by a group of five experts who hold a doctorate degree and higher including Dr. Truyen Van Ngo PhD, MD, Dean of Faculty of Medicine; Dr. Minh Van Le PhD, MD, Vice-Dean of Faculty of Medicine and Deputy-Head of the Department of Interventional Cardiology - Neurology; Dr. Son Kim Tran PhD, MD, Department of Internal Medicine; Dr. Thu Minh Pham Vo PhD, MD, Head of the Personal Department and Dean of Department of General Medicine; Dr. Diem Thi Nguyen PhD, MD, Faculty of Medicine. The English and Vietnamese version of this questionnaire, the forms for evaluation to contain three Likert scale with -1: not agree; 0: not sure; 1: agree and comment column and the comment form were sent for the evaluation. Then the Item Objective Congruence (IOC) Index was used for screening the item quality. The qualified items should have the IOC equal or greater than 0.50.

iv. The pilot research

At the final step, for basic pilot evaluation research of questionnaire was performed. After adjusting the questionnaire which was received from the experts, a

pilot study was conducted on type 2 diabetic patients at the examination department of Tam Binh district health center, Tam Binh district, Vinh Long province, Vietnam. A 45 diabetic-patients was selected for the pilot research. The type 2 diabetic patients who were diagnosed more than half a year ago and the participants' age from 35 to 65 years old were included in the research. The volunteers with any other chronic illness which they were necessarily admitted more than two weeks in the hospital one year ago, gestational DM or communicating inability due to physical or mental disability were excluded from the study (See 3.1.3). This questionnaire was used for evaluating the HRQoL of these patients. After that, the data was analyzed to confirm its valuation.

v. Data analysis

To evaluate the reliability of the VNDQOL questionnaire, its internal consistency was analyzed by using Cronbach's alpha coefficient [8]. Evaluating its validity, the structure of the questionnaire was identified by factor analysis. Eventually, confirmatory factor analysis (CFA) was carried on the examination of the construct validity [114]. The IBM SPSS statistics 22 software has used the data analysis.

4.1.1.3 Result

i. Development of VNDQOL questionnaire

The 17 questionnaires were reviewed including the generic (6) and specific (11) questionnaire (Table 3.1). A VNDQOL questionnaire was developed for Vietnamese population in Tam Binh district. This instrument covered two parts which were the background information with 27 questions that collected the personal information of diabetic people and the QoL part assessed the HRQoL of these patients on 41 questions. Particularly, the part 2 had 9 domains that were the general health, activity limitation, physical endurance, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health, inter-personal relationship (See 3.2.3.2). Each question response was scored a 5-point Likert scale from 1 to 5 (See appendix C). This questionnaire was designed to English and Vietnamese languages.

ii. The expert review

Both versions are assessed by 5 medical professionals, who received doctoral level and higher, at Can Tho University of Medicine and Pharmacy, Can Tho City, Vietnam. The result of the expert evaluations was analyzed by the IOC Index (see appendix L).

The qualified items had the IOC equal to or greater than 0.50 to keep for the questionnaire. Table 6.1 showed that all items would keep for the pilot research. Some questions that experts gave the IOC score of 0 and -1 are due to the error of translating from English into Vietnamese and using the words that could make difficult for patients to answer. Experts have commented specifically and have been modified to make it more relevant and easier to understand.

iii. The results of pilot research

Table 4 The characteristic of participants

No.	Characteristic	Number/percentage
1	Age	
	Mean ± SD.	52.49 ± 8.385
2	Sex	
	Male	17 (37.8%)
	Female	28 (62.2%)
3	Ethnicity	
	Kinh	42 (93.3%)
	Khmer	3 (6.7%)
4	Monthly Income	
	Low	13 (28.9%)
	Medium	13 (28.9%)
	High	19 (42.2%)
5	Education level	
	Illiterate	4 (8.9%)
	Primary	15 (33.3%)
	Secondary	13 (28.9%)
	Tertiary and above	13 (28.9%)
6	Marriage	
	Never married	1 (2.2%)
	Married	39 (86.7%)
	Separated/Divorced	2 (4.4%)
	Widowed/Widower	3 (6.7%)
7	Type of family	
	Big (>= 3 generations)	15 (33.3%)
	Small (1-2 generations)	30 (66.7%)
8	Employment status	
	Full-time	13 (28.9%)
	Part-time	19 (42.2%)
	Unemployed	7 (15.6%)
	Retired	6 (13.3%)
9	Duration (year)	
	Mean ± SD.	3.7 ± 3.49
	Minimum	0.5
	Maximum	15
10	Diabetic information	
	Yes	17 (37.8%)
	No	28 (62.2%)

No.	Characteristic	Number/percentage
11	Glycemic level	
	Mean	9.2 ± 3.88
	Minimum	4.92
	Maximum	22.0
12	Glycemic checking place	
	Government hospital	39 (86.7%)
	Private hospital	1 (2.2%)
	Both	5 (11.1%)
13	Medical problem beside diabetes	
	Yes	40 (88.9%)
	No	5 (11.1%)
14	Sign of hypoglycemia	
	Never One/Few months	27 (60%)
	One/Week	10 (22.2%)
	2 – 3 times/Week	6 (13.3%)
	Daily	2 (4.4%)
15	Treatment	
	Diet	2 (4.4%)
	Oral medication	39 (86.7%)
	Insulin	1 (2.2%)
	No	3 (6.7%)
16	Smoking	
	Yes	10 (22.2%)
	No	35 (77.8%)
17	Drinking	
	Yes	14 (31.1%)
	No	31 (68.9%)

- Participant's characteristics

Totally 45 patients with type 2 diabetes visiting an examination department of Tam Binh district health center on February 2019 were screened for eligibility for the study. The characteristics of recruited participants were described on table 4.1.

The mean age of the respondents was 52.49 ± 8.385 years. The proportion of female was 62.2% which was 1.65 times higher than male. Almost they married (86,7%) and lived on the small family (66.7%) which was 1 – 2 generations. Kinh people occupied the majority of the research group (93.3%). Most participants in the study were literate, accounting for 91.1% and had jobs including both full-time (28.9%) and part-time jobs (42.2%) which the monthly income of 3 groups accounting was nearly

equal proportions (28.9%), in which dominant rather than high income group (42.2%). The average of glycemic level was 9.2 ± 3.88 mmol/L and duration of diabetes was 3.4 ± 3.49 years. The result showed that 40% of patients had hypoglycemia, of which 22.2% suffered 1 time per week, 13.3% suffered 2-3 times a week, 4.4% suffered daily. Only about 37.8% of the participants were aware of diabetes information through various sources. Moreover, most diabetic patients (88.9%) have other medical problems associated with hypertension (62.2%), dyslipidemia (22.2%), poor sexual desire (24%), erection problems (8.9%), neuropathy (31.1%), heart (11.1%), small blood vessels (2.2%), eye problems (42.2%), kidneys (2.2%), recurrent vaginal infection/itchiness (2.2%) and other problems (57.8%). In this study, most patients were treated with oral hypoglycemic agents, 86.7% and they were usually checked the blood glucose at the government clinics or hospitals (86.7%). In addition, the major of these people were not smoking (77.8%) and drinking (68.9%).

- Reliability of the VNDQOL

The VNDQOL item structure was inspected by the Cronbach's alpha coefficient, and the question results about HRQoL were showed that 41 HRQoL questions had the Cronbach's Alpha > 0.95. This means the indicating that the reliability of the VNDQOL was more than sufficient [115] (see appendix M).

- Validity of the VNDQOL

Table 5 KMO and Bartlett's Test validated the VNQOL

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.612
Bartlett's Test of Sphericity	Approx .Chi-Square	2540.624
	df	820
	Significant	<0.001

To evaluate furthermore the validity of the VNDQOL, the CFA was conducted. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity have used for the evaluation of the overall model fit: x^2/df was 2540.62/820, statistical significance (p<0.0001) (Table 4.2). Since the overall fit indices were adequate, this concluded that the VNDQOL achieved acceptable construct validity.

4.1.1.4 Discussion

This study provides for the reliability and validity of the VNDQOL questionnaire that developed for use on the pilot research on type 2 diabetic patients in Tam Binh District Health Center. Particularly, this research found out that the VNDQOL instruments had high internal consistency, as measured by Cronbach's alpha > 0.95. There was also strong proof of the test-retest reliability of the measurement. Using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity, the result has shown the evidence for the convergent validity of the VNDQOL. Because no specific measure assesses the diabetes-related QoL, this study did not

have a "gold standard" to assess validity. These theoretically relevant approaches have provided a network of QoL approximating evaluation on type 2 DM population.

The developed and validated questionnaire consisted of 41 items covered on nine domains which included the aspects of QoL, namely role limitations of the general health, activity limitation, physical sustaining, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health, inter-personal relationship. These domains and items had high internal consistency (Cronbach's alpha > 0.95). The questionnaire expressed a QoL tool covering the HRQoL of type 2 diabetic population to develop and validate in Vietnam using standard methodology. The psychometric measurement of this equipment was explained variability, factor loadings, item-total correlations, concordant and discriminant validity within desirable range and above-suggested cutoff [116]. The questionnaire psychometric strength was strongly enhanced by the use of a standard Likert scale (five Likert scales) for all questions.

The research was restricted by the shortage of the number of study volunteers, so this may lead the selection bias i.e. highly motivated participants to fill the questionnaire. Also, the study population was selected from a specific health center and may not deputize for the community response. In spite of these, this tool was the first reliable, validated and sensitive implement for the comprehensive health-related and diabetes-specific to assess the QoL of type 2 diabetic patients in Vietnam. This could be applied to practice-based care as an outcome scale on assessing the impact on the QoL for more or less intense treatment options.

The factor analysis and Cronbach's alpha were exposed to satisfactory results. In particular, Cronbach's alpha of the VNDQQL outperformed over 0.95, which added the strength of accuracy and cultural adaptation. In addition, the KMO and Bartlett's Test were significant, which found out that criterion-related validity was instituted.

4.1.1.5 Conclusion

In conclusion, the study determined that the VNDQOL had allowable reliability and acceptable validity. Examining the impact of diabetes on a specific domain of life and its importance on each patient could lead to more accurate individualized QoL measurements in diabetic patients. Further studies are looked for confirming the validity of the VNDQOL on the large community. This research was published on the International Journal of Innovative Science and Research Technology, volume 4, issue 5, 2019 (See appendix Q).

4.1.2 The health-related quality of life survey

4.1.2.1 Introduction

T2DM was a radical persistent onward metabolic confusion disease with a currently figured global commonness of 8.3% [10] [117]. In 2015, there were over 3.5 million Vietnamese adults who were acquired diabetes. T2DM is the most typical kind

in Vietnam, with a prevalence that has doubled from 2.7% in 2002 to 5.4% in 2012 [24]. The 2002 National Survey found that the percentage of people with diabetes between the ages of 30 and 60 nationwide was 2.7% [12].

HRQoL has described as the overall impingement of a medical proviso on a person's physical, spiritual and social aspects of health [118] [119]. Also, the HRQoL notion mentions discerned bodily and psychological well-being of an individual or group [120]. It has been concerning as an essential outcome in managing of population health status as well as in evaluating sickness encumbrance and efficacy of medical interference [121]. In dissociating the health effect of chronic illness, HRQoL has also applied as an outcome criterion because the patient collaboration was created the nucleus of the medical program for the intractable malady [122].

T2DM could solemnly have an effect on HRQoL of patients [110] [123]. The HRQoL was a significant outcome with T2DM people and has been consumed to assess the disease impact and its intervention on individuals and healthcare fees [124]. Previous studies showed that T2DM was a factor, which detrimentally impacted the cognizance of HRQoL of T2DM patients [125]. Most cross-sectional studies were discovered that the diabetic person' HRQoL was worse than none [126]. This section analyzed the HRQoL and the relative factors of type 2 diabetic patients in Tam Binh District Health Center, Vinh Long Province, Vietnam.

4.1.2.2 Result of phase one

i. Participant characteristics

Table 6 The characteristics of study participants

No.	Characteristics (n = 500)	Number/ Percentage
1	Age (mean, SD, range (year))	59.77 ± 9.81 (35 – 90)
2	Gender (n, %)	
	Male	113 (22.6%)
	Female	387 (77.4%)
3	Ethnicity (n, %)	
	Kinh	490 (98%)
	Khmer	8 (1.6%)
	Others (Chinese)	2 (0.4%)
4	Education level (n, %)	
	Illiterate	40 (8%)
	Primary	173 (34.6%)
	Secondary	179 (35.8%)
	Tertiary and above	108 (21.6%)
5	Diabetes-related information (n, %)	176 (35.2%)
6	Type of family (n, %)	
	Small (1 - 2 generations)	305 (61%)
	Big (>= 3 generations)	195 (39%)
7	Hypoglycemia (n, %)	

No.	Characteristics (n = 500)	Number/ Percentage
	Never once/few months	284 (56.8%)
	One/week	84 (16.8%)
	2-3 times/week	102 (20.4%)
	Daily	30 (6%)
8	Diabetic duration (n, SD, range)	3.15 ± 4.84 (0.3 – 37)
9	Diabetic management organization (n, %)	
	Government clinic/hospital	335 (67%)
	Private clinic/hospital	165 (33%)
10	Marital status (n, %)	
	Single	1 (0.2%)
	Married	470 (94%)
	Separated/Divorced	1 (0.2%)
	Widowed/Widower	28 (5.6%)
11	Employment status (n, %)	
	Working (full-time)	231 (46.2%)
	Working (part-time)	87 (17.4%)
	Unemployed/Not working	36 (7.2%)
	Retired	146 (29.2%)
12	Treatment method	
	Diet therapy only	66 (13.2%)
	Oral medications only	238 (47.6%)
	Insulin only	20 (4%)
	Oral medications + insulin	2 (0.4%)
	Not on any treatment	173 (34.6%)
	Others (Traditional medicine)	1 (0.2%)
13	Other medical problems (n, %)	442 (88.4%)
	Hypertension	280 (56%)
	High cholesterol	154 (30.8%)
	Heart disease/heart block	33 (6.6%)
	Visual problems	120 (24%)
	Nerve problems	226 (45.2%)
	Problems with achieving/ maintaining erection	3 (0.6%)
	Poor sexual desire	27 (5.4%)
	Renal problems	71 (14.2%)
14	Glycemic level (mean, SD, range (mmol/L))	9.84 ± 4.03 (1.3 – 33.3)
15	HbA_1C (mean, SD, range (%))	7.01 ± 2.52 (2.8 – 15.1)
16	Income monthly (n, %)	
	Low	50 (10%)
	Medium	84 (16.8%)
	High	

No.	Characteristics (n = 500)	Number/ Percentage
		366 (73.2%)

The participants were an average age of 59.77 ± 9.81 years and a range of 35 - 90 years old. In which women accounted for the majority of 77.4%. Table 4.3 showed that the Kinh dominated 98%, followed by the Khmer with 1.6% and only 2 (0.4%) Chinese in this survey. Most married patients accounted for 94% and live in small families at 61%. The majority of the participants had primary or higher education, only 8% had no education. Most of them have jobs with 63.6%, the rest retired, accounting for 29.2% and without jobs, only 7.2%. Figure 4.2 expanded the distribution of patients across all 17 communes of Tam Binh district, however, Hoa Loc (54 cases) and Ngai Tu (49 cases) accounted for the highest numbers, while Long Phu had the lowest number of patients (19 cases).

The median duration of diabetes was 3,15 ± 4.84 years, as early as 6 months and as long as 37 years. However, only 35.2% of people have received information related to diabetes. The average glycemic level was 9.84 ± 4.03 mmol/L, the lowest was 1.3 mmol/L and the highest was 33.3 mmol/L. The mean HbA1C was 7.01 ± 2.52%, from 2.8% to 15.1%. 67% of patients with type 2 diabetes were treated at public clinics or hospitals. Regarding the treatment of diabetes, the single use of oral medication took the highest proportion of 47.6%, followed by no treatment accounted for 34.6%, adjusted the diet was 13.2%, insulin injection was 4%, combined insulin injection and oral medication were 0.4%, only 1 case treated with traditional medicine calculated for 0.2%.

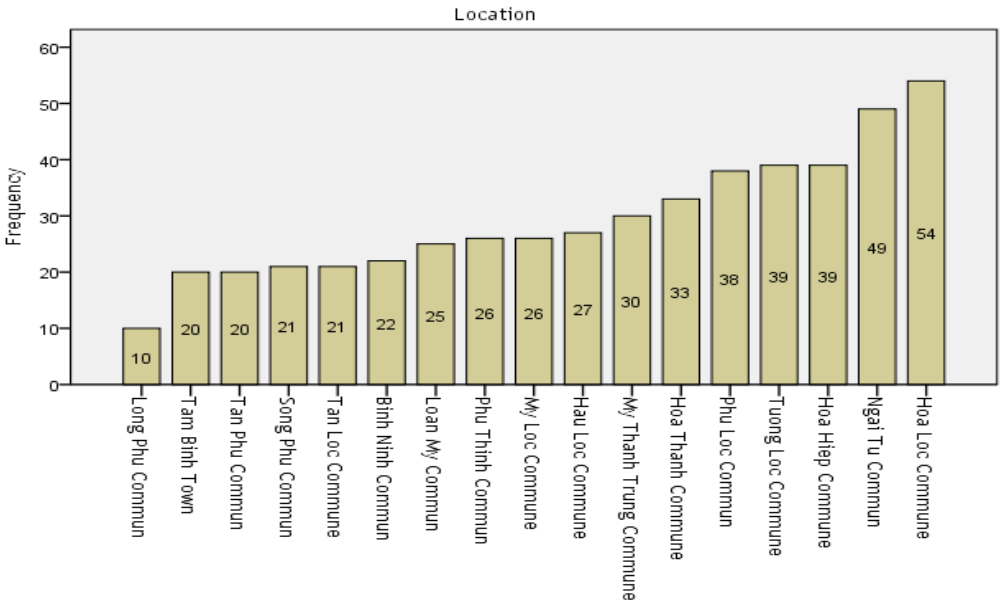


Figure 12 The number of participants is distributed in 17 communes, Tam Binh District

56.8% of patients had no signs of hypoglycemia in the past few months, 20.4% expressed 2 - 3 times/week, 16.8% had one time/week, especially 6% had the symptoms of daily hypoglycemia. 88.4% of people had other medical problems out of type 2 diabetes, including hypertension 56%, nerve problems 45.2%, high cholesterol 30.8%, visual problems 24%, renal problems 14.2%, heart disease/heart block 6.6%, poor sexual desire 5.4%, problems with achieved/maintaining erection 0.6%.

ii. Health-related quality of life of type 2 diabetic patients

Table 7 Result of the health-related quality of life in the VNDQOL questionnaire

	N		Mean	Median	SD	Minimum	Maximum
	Valid	Missing					
General health	500	0	49.9	58.33	25.31	0	100
Activity limitation	500	0	63.66	70.83	28.39	0	100
Physical endurance	500	0	79.48	91.67	24.89	8.33	100
Diet and eating habits	500	0	56.25	58.33	30.29	0	100
Treatment	500	0	48.96	50	19.61	0	100
Symptom burden	500	0	70.27	75	21.41	8.33	100
Financial aspects	500	0	76.98	80	24.41	0	100
Emotional/ mental health	500	0	57.24	65	21.41	0	100
Inter-personal relationship	483	17	40.06	50	17.57	0	83.33
VNDQOL	500	0	60.15	65.63	21	3.24	94.44

The HRQoL of type 2 diabetes in Tam Binh District was moderate 60.15 ± 21 points. The inter-personal relationship domain had the lowest score with an average of 40.06 as can be seen in table 4.4. In analyzing, the highest score was detected for the physical endurance domain with 79.48 points. Three fields had HRQoL score less than 60 points as general health (49.9), diet and eating habits (56.25), treatment (48.96), emotional/ mental health (57.24), inter-personal relationship (40.6).

iii. Relationship between health-related quality of life and personal factors

As shown in table 4.5, statistically significant differences can be distinguished at different components of the individual factors such as age group, marital status, place of residence, type of family, occupational status, monthly income, duration of diabetes, blood sugar, HbA_1C, hypoglycemia, treatments and other medical issues.

Table 8 compare between HRQoL and the personal factors

No.	Personal factors	Mean/Mean square	t/F	Significant	95% CI	
					Lower	Upper
1	Age group	0.383	5.008	<0.001	0.233	0.534
2	Gender	0.095	1.157	0.248	-0.066	0.256
3	Ethnicity	1.02	1.022	0.361	1.01	1.04
4	Place of residence	8.44	8.603	<0.001	8.01	8.86
5	Marital status	2.11	8.066	<0.001	2.07	2.15
6	Type of family	1.39	10.118	<0.001	1.35	1.43
7	Education level	2.71	1.809	0.165	2.63	2.79
8	Employment status	2.19	28.605	<0.001	2.08	2.69
9	Monthly income	2.63	4.103	0.017	2.57	2.69
10	Diabetic duration	3.152	88.481	<0.001	2.726	3.577
11	Glycemic level	1.78	3.073	0.047	1.71	1.84
12	HbA1C (%)	7.013	30.328	<0.001	6.792	7.234
13	Hypoglycemia	1.76	193.862	<0.001	1.67	1.84
14	Smoking	-0.067	-0.682	0.495	-0.261	0.126
15	Drinking	0.146	1.753	0.080	-0.018	0.309
16	Treatment method	2.96	52.728	<0.001	2.83	3.10
17	Other medical problems	-0.850	-8.527	<0.001	-1.045	-0.654

The patients aged over 65 had lower of total HRQoL scores and some domain than younger patients, but the difference of treatment and inter-personal relation was not significant. The difference in HRQoL between men and women was only statistically significant with the physical strength domain ($p = 0.045$). The difference in HRQoL and its components among patients of different ethnicities, glycemic checking place and smoking persons was not statistically significant. The research results showed that there was a difference in the HRQoL in patients in different localities, treatment method, hypoglycemic, and other medical problems ($p < 0.05$). There were significant differences between patients who drank alcohol and were not in components such as activity limitation ($p = 0.035$), physical endurance ($p = 0.004$), emotional/mental health ($p = 0.032$). Differences in marital status had a difference in HRQoL ($p = 0.001$) and some specific components such as general health ($p = 0.001$), activity limitation ($p = 0.018$), physical endurance ($p <0.001$), treatment ($p = 0.001$), emotional mental health ($p = 0.001$). Differences in family type also had different meanings for HRQoL, but there were two components of treatment ($p = 0.224$) and interpersonal relationships ($p = 0.418$) showing no significant difference. Only two

components of VNDQOL, such as physical endurance (p = 0.030) and treatment (p = 0.023), were statistically significant differences in educational attainment. There were differences in HRQoL in patients who had received and never received information about diabetes, HbA_1C, diabetic duration and employment status, except for the inter-personal relationship component (p = 0.817, 0.371, 0.637 and 0.284). In addition, statistics showed that patients with a higher monthly income had better HRQoL scores, however this showed on three domains as general health (p = 0.001), physical endurance (p <0.001) and emotional/mental health (p = 0.009). There were also differences in HRQoL in patients with different blood glucose levels (p = 0.047) specifically expressed in four components such as general health (p <0.001), activity limitation (p = 0.008), diet and eating habits (p <0.001) and treatment (p <0.001). (Table 4.6).

4.1.2.3 Discussion

T2DM was a chronic metabolic disorder that definitely reduces a patient's HRQoL [125]. This study discovery disclosed that VNDQOL was a profitable questionnaire evaluating the HRQoL of Vietnamese patients with T2DM. The quantitative detections of this research of 500 participants accommodated a better profound comprehension of the execution of the VNDQOL in Vietnam. Moreover, we observed that other medical issues such as hypertension, hyper-cholesterol, heart affair, optical disease, nerves matters, sexual libido, and kidney malady considerably impacted the HRQoL of these patients. The age group, education level, and monthly income were also essential agents to HRQoL of Vietnamese T2DM patients. First of all, there was significant difference in HRQoL between two age group. The average score of the VNDQOL mark was lower in > 65 age group compared to 35 – 65 age group, which was pertinent to other studies digging the QoL among diabetic patients [126] [127]. Indeed, all elements of VNDQOL in the age group > 65 were lower than the age group 35 - 65. This was because older people are often more worried and had more comorbidities [24].

In additional, patient's education had a negative effect on HRQoL. This result was consistent with previous studies of other authors [118] [127]. This showed that people with higher education will be better aware of diabetes so their quality of life is more improvement. It was also clearly seen in the areas of "Physical endurance" and "Treatment". Furthermore, the previous researches were found the QoL of diabetes decreased on the lower income group [126] [127]. A shortage of revenue guiding to depression and insufficient health support might be another paternity [126]. This research also showed similar results, those with low incomes showed a statistically low QoL. On the other hand, this study also found a significant relationship in terms of HRQoL with other personal factors such as: marital status, location, type of family, working status, diabetic duration, glycemic level, HbA1C, hypoglycemia, drinking, treatment and other medical problem. These issues were also indicated in the studies

of Hakan Demirci et al (2012) [128], You Lu et al (2017) [126], and Huong Thi Thu Nguyen et al (2018) [24].

Table 9 Relationship between the health-related quality of life domains and some personal characteristic

		General health	Activity limitation	Physical endurance	Diet and eating habits	Treatment	Symptom burden	Financial aspects	Emotional mental health	Inter-personal relationship	VNDQOL
Age group	35 - 49	1.920	2.350	2.850	2.200	1.380	2.270	2.490	1.880	1.160	2.160
	50 - 65	1.490	1.960	2,480	1.830	1.330	2.120	2.230	1.630	1.030	1.800
	> 65	1.210	1.570	1.910	1.640	1.210	1.840	1.950	1.390	1.020	1.490
	Significant	<0.001	<0.001	<0.001	<0.001	0.026	0.001	<0.001	<0.001	<0.001	<0.001
Gende	Female	1.447	1.886	2.522	1.811	1.284	2.075	2.191	1.581	1.046	1.75
	Male	1.593	2.009	2.344	1.920	1.381	2.044	2.204	1.690	1.063	1.85
	Significant	0.069	0.173	0.045	0.265	0.073	0.740	0.886	0.091	0.512	0.248
Ethnicity	Kinh	1.482	1.912	2.376	1.831	1.308	2.063	2.196	1.600	1.049	1.770
	Khmer	1.500	2.125	2.875	2.250	1,125	2.375	2.125	2.000	1.125	2.130
	Other	1.000	1.500	2.500	1.500	1.500	2.000	2.000	1.500	1.000	0.150
	Significant	0.662	0.611	0.239	0.382	0.512	0.596	0.914	0.172	0.654	0.383
Location	Tam Binh	1.650	2.000	2.000	1.800	1.600	2.300	2.450	1.650	1.294	1.850
	Tuong Loc	1.641	2.205	2.154	2.051	1.538	2.359	2.410	1.795	1.114	2.050
	My Thanh Trung	1.600	2.067	2.400	1.867	1.467	2.167	2.233	1.633	1.200	1.870
	Hoa Loc	1.315	1.685	2.019	1.667	1.278	1.944	2.130	1.519	1,039	1.590
	Hoa Hiep	1.333	1.923	2.487	1.897	1.256	2.359	2.436	1.667	1.027	1.850
	Hoa Thanh	1.606	1.788	2.212	1.818	1.273	1.879	2.030	1.636	1.091	1.730
	Hau Loc	1.667	1.926	2.519	1.667	1.222	2.148	2.333	1.630	1.039	1.780
	Tan Loc	1.429	1.857	2.429	1.810	1.286	2.191	2.381	1.619	1.000	1.710
	My Loc	1.577	2.115	2.654	1.962	1.154	2.192	2.346	1.731	1.000	1.920
	Phu Loc	1.921	2.474	2.790	2.447	1.263	2.553	2.500	1.737	1.000	2.240

	Phu Thinh	1.269	1.769	2.385	1.539	1.269	1.808	2.115	1.423	1.000	1.500
	Song Phu	1.048	1.286	2.286	1.333	1.000	1.476	1.714	1.333	1.000	1.330
	Tan Phu	1.450	2.000	2.750	1.600	1.500	2.150	2.200	1.700	1.000	1.900
	Long Phu	1.200	1.600	2.000	1.700	1.100	1.800	1.700	1.200	1.000	1.400
	Ngai Tu	1.367	1.694	2.388	1.776	1.204	1.612	1.939	1.429	1.000	1.590
	Binh Ninh	1.227	1.727	2.636	1.864	1.546	1.864	1.818	1.636	1.000	1.640
	Loan My	1.600	2.160	2.520	2.000	1.240	2.200	2.160	1.760	1.080	1.920
	Significant	0.001	<0.001	<0.001	0.004	<0.001	<0.001	0.001	0.048	<0.001	<0.001
Education level	Illiterate	1.375	1.775	2.250	1.750	1.150	1.875	2.050	1.500	1.000	1.600
	Primary	1.399	1.896	2.393	1.856	1.295	2.121	2.225	1,636	1.035	1.770
	Secondary	1.486	1.888	2.291	1.810	1.285	2.045	2.162	1.559	1.041	1.740
	Tertiary and above	1.639	2.037	2.574	1.880	1.417	2.093	2.250	1.676	1.105	1.910
	Significant	0.053	0.303	0.030	0.845	0.023	0.411	0.500	0.239	0.053	0.127
Smoki	Yes	1.493	1.916	2.563	1.817	1.254	1.930	2.070	1.563	1.056	1.720
	None	1.478	1.914	2.354	1.839	1.315	2.091	2.215	1.613	1.049	1.790
	Significant	0.875	0.987	0.050	0.849	0.343	0.145	0.161	0.521	0.804	0.495
Drinki	Yes	1.596	2.064	2.587	1.963	1.340	2.083	2.257	1.716	1.065	1.890
	None	1.448	1.872	2.327	1.801	1.297	2.064	2.177	1.575	1.045	1.740
	Significant	0.067	0.035	0.004	0.100	0.433	0.842	0.355	0.032	0.451	0.080
Family	Small	1.607	2.039	2.630	1.925	1.328	2.148	2.269	1.689	1.043	1.890
	Big	1.282	1.718	2.000	1.697	1.272	1.944	2.077	1.477	1.062	1.600
	Significant	<0.001	<0.001	<0.001	0.007	0.224	0.010	0.009	<0.001	0.418	<0.001
Inf	Yes	1.239	1.534	2.085	1.392	1.222	1.688	1.812	1.392	1.046	1.430
	No	1.611	2.120	2.546	2.077	1.352	2.275	2.401	1.722	1.052	1.970

Others	Significant	<0.001	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	0.817	<0.001
	Yes	1.388	1.810	2.320	1.739	1.268	1.980	2.118	1.533	1.019	1.680
	No	2.170	2.695	2.864	2.559	1.593	2.729	2.763	2.153	1.276	2.530
Income	Significant	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Low	1.340	1.820	2.200	1.920	1.180	2.040	2.100	1.480	1.022	1,620
	Medium	1.250	1.738	2.048	1.714	1.250	1.917	2.071	1.464	1.013	1.580
	High	1.552	1.967	2.486	1.852	1.336	2.106	2.235	1.656	1.061	1.840
Treatment method	Significant	0.001	0.056	<0.001	0.363	0.064	0.186	0.164	0.009	0.222	0.007
	Diet	1.877	2.354	2.723	1.892	1.646	2.508	2.523	1.939	1.161	2.220
	Oral medication	1.088	1.427	2.109	1.218	1.280	1.665	1.820	1.301	1.000	1.310
	Insulin	1.000	1.050	1.500	1.000	1.000	1.050	1.250	1.000	1.000	1.000
	Medicine + Insulin	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	None treatment	1.936	2.538	2.757	2.780	1.254	2.595	2.717	1.983	1.084	2.350
	Others	1.000	1.000	2.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Employment	Significant	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Full-time working	1.706	2.130	2.732	2.039	1.407	2.242	2.390	1.766	1.070	2.000
	Part-time working	1.448	1.954	2.460	1.724	1.299	2.103	2.172	1.609	1.046	1.800
	Unemployment	1.417	1.972	2.444	1.944	1.194	2.028	2.111	1.583	1.000	1.720
	Retired	1.158	1.534	1.774	1.555	1.178	1.781	1.918	1.356	1.031	1.420
Hb	Significant	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.284	<0.001
	< 4%	2.269	2.615	2.654	2.462	1.385	2.577	2.654	1.885	1.115	2.380
	4 – 6%	1.595	2.115	2.555	2.045	1.425	2.350	2.390	1.775	1.047	2.000

	> 6%	1.321	1.701	2.234	1.624	1.212	1.814	2.007	1.456	1.046	1.550
	Significant	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.371	<0.001
Checking	Government clinic	1.236	1.600	2.227	1.457	1.266	1.815	1.937	1.409	1.009	1.500
	Private clinic	1.976	2.552	2.703	2.606	1.388	2.582	2.715	2.006	1.334	2.350
	Significant	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	< 10 years	1.518	1.987	2.443	1.902	1.330	2.141	2.271	1.653	1.054	1.840
Duration	10 – 20 years	1.030	1.030	1.758	1.061	1.030	1.242	1.333	1.061	1.000	1.030
	20 – 30 years	1.000	1.250	1.500	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	>30 years	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	Significant	0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	0.637	<0.001
	Never/one/month	1.824	2.359	2.704	2.254	1.033	2.514	2.581	1.880	1,088	2.190
Hypoglycemi	One/week	1.060	1.667	2.298	1.631	1.078	1.893	2.119	1.500	1.000	1.500
	2 – 3/week	1.010	1.137	1.863	1.088	1.286	1.265	1.471	1.098	1.000	1.080
	Daily	1.000	1.033	1.367	1.000	1.423	1.067	1.200	1.033	1.000	1.000
	Significant	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
	< 3.9mmol/L	1.000	1.800	1.800	1.400	1.200	2.000	2.000	1.200	1.000	1.200
Glycemic	3.9 – 6.4mmol/L	1.071	1.589	2.214	1.339	1.625	2.161	2.214	1.536	1.000	1.610
	> 6.4mmol/L	1.538	1.957	2.412	1.904	1.267	2.057	2.194	1.620	1.057	1.800
	Significant	<0.001	0.008	0.071	<0.001	<0.001	0.688	0.849	0.198	0.257	0.047

4.1.2.4 Conclusion

The study has highlighted that type 2 diabetes patients had a negative impact on health-related quality of life. Health-related quality of life was associated with age, level of education, marital status, location, type of family, employment status, income, duration, treatment, glycemic level, HbA_1C, hypoglycemia, drinking, other medical problems. Increased age resulted in lower Vietnamese diabetes quality of life scores. This is the first report about health-related quality of life in Tam Binh district, Vinh Long province, Vietnam by the specific questionnaire for Vietnamese. However, since this study has applied for cross-sectional study, further prospective studies will be needed to confirm the results of particular study.

4.1.3 Discussion

T2DM was a burdensome global problem with exponential amplification in contemporary decades [129]. It was a chronic disease with terrible short-term and long-term repercussions for the afflicted [130]. T2DM was a substantial chronic disorder and its treatment did not cure completely [131]. Therefore, the treating diabetic goal was the blood sugar symptom improvement and the diabetes-related complication risk reduction [132] and thereby the HRQoL increase of the patient [133] [134]. Numberless instruments have been exerted to assess the HRQoL in diabetic patients [135]. Indeed, in our systematic assessment of the quality of life of diabetics in ASEAN countries, 17 questionnaires were found [83] [112]. Moreover, over the past two decades, some HRQoL tools have been formulated specifically for diabetics. However, systematic reviews have disclosed that these devices had some cultural or psychological confinements [136]. The instruments must therefore be sensitive and pertinent to local people because the different languages, races, cultures, socio-economic progress, and beliefs in different populations could have a direct or indirect impact on HRQoL [137].

Thus, a VNDQOL tool was created to assess the HRQoL for Vietnamese diabetics in Tam Binh district. This questionnaire was evaluated by experts with an IOC > 0.5 (Appendix G). Also, this questionnaire was performed to assess reliability and validity with a pilot study showing the Cronbach's Alpha > 0.95 and statistically significant CFA (Appendix H and 4.2). This showed that this was a suitable questionnaire to evaluate the HRQoL of T2DM patients in Tam Binh district, Vinh Long province, Vietnam. Consequently, the questionnaire was used as a tool to carry out survey studies on T2DM participants in 17 communes of Tam Binh district.

The results showed that 500 patients participated in the study with an average age of 59.77 ± 9.81 years old. This average age is seen in a study of Mehdi Javanbakht et al. (2012) (59.4 ± 11.7 years old) [138]. In addition, several other studies showed that the average age of T2DM was lower such as Bela Patel et al (2014) (56.8 ± 10.5 years) or higher such as Fatima Al Sayah et al (2016) (64.6 ± 10.9 years). However, this difference was not statistically significant and was appropriate for the age group of people with type 2 diabetes as Robert H. Eckel wrote in the literature [30]. Furthermore, HRQoL of T2DM patients also varied across age groups, except for

treatment and interpersonal relationship domains. This expression was seen in the study of Ronald Nyanzi et al. (2014) in Uganda [69].

Like other studies of Saku Väätäinen et al (2016) [139] and Eldad Davidov et al (2019) [140], women accounted for a higher proportion than men. In contrast, some studies reported that there was no gender difference in T2DM patients [141], but others showed that the diabetic incidence of men was higher than women (2015) [142]. Differences in results between studies may be due to differences in customs, lifestyle, and diet. Indeed, this gender difference was also observed in the Vietnamese population study by Huong Thi Thu Nguyen et al (2018) [24]. However, the HRQoL was similar in both genders. This result was similar to the studies of Ronald Nyanzi et al. (2014) [69] and M. P. O'Shea et al. (2015) [143], while differences in the study of Angelos A Papadopoulos et al (2007) were found [144].

The differences in QoL related to diabetes about the ethnicities in Michelle J. Naughton et al (2008) [145], Joanne HM Quah et al (2011) [146] and Ping Zhang et al (2012) did not show the statistical significance as our study. Similarly, differences in educational attainment did not indicate a significant change in HRQoL in T2DM patients. This was further confirmed by Eva Turk et al (2013) [147], M. P. O'Shea et al (2015) [143] and Melba Sheila D'Souza et al (2016) [25]. Although several studies have reported differences in quality of life at different levels of education such as Mehdi Javanbakht et al (2012) [138] and Godfrey Mutashambara Rwegerera et al (2017) [118]. This was due to the propaganda of good knowledge about the disease in the community, but this has not been done best in the Vietnamese community, but only through health workers at health facilities. However, the workload of these employees was so great that this issue was has taken lightly. It has been clearly shown in the research of Nhung Thi Ninh et al (2001), and the author has proposed strengthening community education on type 2 diabetes [54]. This argument was also confirmed with the result that patients received information about T2DM but the quality of life was lower than patients who did not know the disease information, this was because the patient had not received an exactly informative source. This has confirmed the weakness in education about diabetes prevention.

Patients in different areas showed a difference in the HRQoL, the more it was confirmed with research by RuiWang et al (2008) [127]. Similarly, the marital status and the type of family large or small of the patient also greatly affected their HRQoL. This was made more explicit in the study of Basilio Pintaudi et al (2015) [148]. However, the study by Angelos A Papadopoulos et al (2007) [144] and M. P. O'Shea et al (2015) [143] did not show a significant difference between marital status and QoL. The research result of Ronald Nyanzi et al (2014) [69] was similar to our study with no statistical significance between the relationship of smoking and drinking with HRQoL.

It was clear that patients with high careers and jobs had higher HRQoL. This was also evident in the researches of Joanne HM Quah, et al (2011) [146] and Andrew J. Green (2012) [149] with significant differences in the quality of life between different

income groups. In addition, the study of Fatma Ibrahim Abd El Latif et al (2016) also showed a significant relationship between the HRQoL and the socio-economic status of patients [150]. However, the study of Hakan Demirci et al (2012) did not give statistical significance between income and quality of life [128]. Moreover, the study of Seyed Morteza Shamshirgaran et al. (2017) also have results unrelated to the quality of life between patients with different incomes and their occupational status [151]. This could be the reason of the economic policies vary by country and region.

The proportion of patients who smoked cigarettes and drank alcohol in our study was low. At the same time, the results also showed that there was no statistically significant difference in HRQoL. Joanne HM Quah et al. (2011) also reported that there was no difference in the quality of life between smoking and non-smoking patients [146].

Long-term diabetes showed poor HRQoL. This result was also found in the studies of Joanne HM Quah et al (2011) and Hye Ah Lee et al (2014) [152]. The longer the duration of diabetes, there were many diseases related to diabetes that had changed the QoL of diabetics. It was clearly shown in the studies of Joanne HM Quah et al (2011) [146] and Fahad S. Al-Shehri (2014) [14]. This made the hypoglycemic complication more likely to occur and reduced the patient's HRQoL. It was also concluded by Joanne HM Quah et al (2011) in the study at Primary Health Care of Singapore [146]. However, research by Michelle J. Naughton et al (2008) had shown no statistically significant results between the quality of life and duration of diabetes, but this difference was due to the sample selection. by the author at the age of Youth [145].

Diabetes treatments also showed significant differences with HRQoL. This was clearly seen in the psychological composition of Hye Ah Lee et al, 2014 [152]. However, the study of Imaniar Noor Faridah et al. (2017) showed no difference in the quality of life of mono-therapy and multiple-treatment [153]. Good control of blood sugar and HbA1C increased HRQoL for patients. Research by Karina Corrêa et al (2017) showed a statistically significant difference between the quality of life of diabetic patients among different HbA1C levels, but there was no significant level of rapid blood sugar in these patients [1]. In addition, the study of Wisit Chaveepojnkamjorn et al (2008) showed significant results between the quality of life of patients with diabetes and drug use [34]. This was also evidenced by the study of Yolanda V Martínez et al (2008) [79].

4.1.4 Conclusion

Type 2 diabetes has been affecting global health. It was a chronic metabolic disorder due to peripheral insulin resistance, so it was not completely cured. Therefore, the evaluation of treatment results included the results of monitoring blood sugar and assessing the patient's HRQoL. This required an appropriate tool developed with credibility and value for diabetics as a questionnaire about the quality of life of Vietnamese diabetes. Research results have shown that patients with type 2 diabetes have an average health-related quality of life, but there were 4 domains at low levels

such as general health, diet and eating habits, treatment, emotional/mental health, inter-personal relationship. There were several differences in the quality of life regarding the health of type 2 diabetes patients with a number of patient characteristics.

4.2. The quasi-experimental programme results

4.2.1 Introduction

As a result of section 4.1.2.2, it is necessary to provide disease control knowledge, attitude, and practice for patients with T2DM. Indeed, diabetes has surfaced as one of the most demanding public health issues of the twenty-first century [154]. Demographic variation, integration with urbanization, and industrialization have led to significant shifts in the way of living globally [155]. Due to rapid lifestyle upheaval, the incidence of T2DM has increased dramatically in recent years and is now reaching epidemic size [156]. DM is related to many traditional manifestations including rising thirst and hunger in addition to frequent urination inducing solemn long-term macro and micro-vascular complications if untreated may lead to death [157].

The proof showed that prevalence was influenced by various sectors such as sociology, health knowledge, and early identification [158]. Various studies have described that in low-resource countries, a range of social determinants, including poor health knowledge, were essential in the epidemiological process of outcomes [159]. DM-related problems can be alleviated by early diagnosis and strict stewardship [160]. DM management mainly depended on the patient's ability to self-care in daily living, and therefore, patient education was always considered a necessary part of the DM control [161].

The diabetic knowledge would help to detect the early disease and reduce the complications [155]. Moreover, there was increasing proof from KAP researches that supported the stronger recognition necessities for prevention, diagnosis, risk factors control, and disease administration [159]. As indicated, good diabetic KAPs of diabetic patients as well as in the general population was helpful in effective diabetic prevention and management among the population [160]. There were many studies investigated the KAP in T2DM patients around the world [162]. Notwithstanding, very few studies have been elaborated in Vietnam to evaluate the level of awareness, attitudes, and practices in T2DM patients. Therefore, this chapter described diabetic knowledge, attitude, and practices among Vietnamese T2DM patients, which set it up for a health education programme. It also assessed the early results of a health education intervention programme in the community of T2DM patients in 17 communes of Tam Binh district, Vinh Long province.

4.2.2 Methods

4.2.2.1 The participants

85 T2DM patients were randomly drawn from the list of patients of phase 1 in 17 communes of Tam Binh district (5 patients each commune). Selection criteria

presented in chapter 5 including patients aged 35 - 65 years old. Besides that, participants were diagnosed with T2DM for more than 6 months and were not hospitalized for diabetes-related treatment for the past 3 months. Exclusion criteria were patients who did not agree to participate or did not meet after 2 visits. Moreover, the study participants were excluded due to their communication inability because of a physical or mental disability.

4.2.2.2 The KAP questionnaire

The knowledge, attitude toward diabetics, and practice of self-care management (KAP) questionnaire was created by the researchers in both Vietnamese and English to suit Vietnamese culture. The KAP questionnaire consisted of four parts that included 1) the participant demographics, 2) the knowledge of diabetics, 3) the attitude towards the diabetics and 4) the self-care management care for diabetics.

The participant demographic part contained basic patient information similar to the VNDQOL questionnaire, including age, gender, occupation, marital status, education level, location, ethnicity, monthly income, blood glucose, HbA_1C, duration of diabetes, family type, information related to diabetes, comorbidities, treatments, glycemic and HbA1C testing place, smoking, drinking, lowering blood sugar.

Knowledge contains 10 multiple choice questions with only one correct answer. This section tested the patient's knowledge of T2DM. It included the concept of diabetes, types of DM, T2DM notion, risk person, symptoms, complication types, acute complications, chronic complications, hypoglycemic symptoms (see appendix E). Each correct answer got 1 point.

The attitude toward diabetics' component had 10 five-like scale questions about diabetic feelings. The attitude points, after being aggregated, would also be converted to a scale of 100 according to the formula of Jacobson & DCCT, 1994 and Best J et al,2006"$Transformed\ scale\ \left[\frac{Actual\ raw\ score - Lowest\ possible\ raw\ score}{Possible\ raw\ score\ range}\right] * 100$" [127] [163].

The practical section had 10 questions about self-management of diabetes. For a sub-question to be divided into sub-questions, if the participant answered a sub-question unsuccessfully, the question was considered incorrect. The correct answer was recorded with "1"; otherwise, an incorrect answer was given a score of "0". Specifically, question 1, if the patient was treated with diet, medication, insulin injections, or all three, the result was correct; if untreated, it was wrong. Question 2, the patient got a monthly blood glucose test that was pinpointed; the rest was wrong. Question 3, patients who were tested for HbA_1C every 3 months were determined to be correct; the others were false. Question 4, patients did exercise 35 - 45 minutes a day and knew that exercise can reduce blood sugar to be accurately assessed; the rest was incorrect. Question 5, patients who ate 2-3 meals a day and did not skip meals were determined to be true; the rest was wrong. Question 6, the patient answered exactly the foods that should be limited such as starch, sugar, fat, meat, spices were

correctly identified; missing or other answers are wrong. Question 7 and 8 was true if participants answer none. Question 9 was true only if the patient answered that he had not had hypoglycemia or was already suffering from the problem but treated like sugar tea, sugar drink or candy. Question 10 was correct only if the patient answered to wear soft shoes, hygiene, and foot checks daily (See appendix E).

4.2.2.3 Data Collection

KAP questionnaire and diabetic brochure (See appendix G) were reviewed by 5 experts who reviewed the questionnaire VNDQOL with the doctorate or higher degree at Can Tho University of Medicine and Pharmacy. Next, a pilot study was conducted to test the KAP questionnaire with 10 participants at Tam Binh District Health Center. After that, the KAP questionnaire was sent directly to each patient. After participants completed the questionnaire, they would be given leaflets and taught by staff about knowledge about illnesses, allowed and not allowed food consumption, and types of complications, how to monitor disease and daily care for yourself. After completing the training and exchanging questions for about 15 minutes, participants were invited to answer the KAP question again to assess their ability to grasp the problem. The staff would guide how to answer but they had absolutely no hint of the answer.

4.2.2.4 Statistical Analysis

All collected data was encrypted and grouped before they were analyzed by IBM SPSS software version 22. The variables were continuously grouped as follows the age was separated two group as group 1 from 35 – 49 years old, group 2 50 - 65 years old. Also, the duration of T2DM was divided four groups as group 1 under ten years, group 2 from 10 – 20 years, group 3 from 20 – 30 year, group 4 over 30 years. Furthermore, the glycemic levels were diverged the three groups such as: group 1 under 3.9 mmol/L, group 2 from 3.9 – 6.4 mmol/L and group 3 over 6.4 mmol/L. In addition, the HbA1C levels were divorced three groups as group 1 under 4%, group 2 from 4 – 6% and group 3 over 6%. The scores were divided into 3 levels: low level (less than 60 per cent of total points), moderate level (60-79 per cent of total points), and high level (80 and above per cent of total points) [164].

The descriptive statistics including frequency, mean, and standard deviation were used for the participant characteristics and KAP score. The correlation between variables was assessed by regression correlation. The difference in KAP scores between pre- and post-education results was tested by T-test. The significant level for all test was fixed at $\alpha < 0.05$.

4.2.3 Result

4.2.3.1 The expert's result

Evaluation results of 3 experts on KAP questionnaire were presented in table 4.7 with IOC results including 30 questions about 3 parts of knowledge, attitude, and practice with 1. At the same time, they all agreed with the brochure and believe that it provided enough information necessary for diabetics (See appendix O).

4.2.3.2 The KAP questionnaire's reliability and validity

Table 10 Reliability Statistics of KAP questionnaire

Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
0.767	0.618	30

An empirical study was conducted just 10 patients with T2DM in Tam Binh Medical Center to evaluate the reliability and value. The result of Cronbach Alpha was 0.767 (Table 4.7).

The validity of the KAP questionnaire showed on the table 4.8 with the components over 0.5.

Table 11 Rotated Component Matrixa of KAP questionnaire

Section	Question	Component							
		1	2	3	4	5	6	7	8
Knowledge	1			-0.872					
	2								-0.566
	3						0.592		
	4						0.856		
	5					-0.908			
	6			0.904					
	7				-0.614	0.531			
	8		0.918						
	9			-0.774					
	10	0.745							
Attitude	1		0.706						
	2				0.731				
	3	0.820							
	4	0.962							
	5	0.682							
	6	0.761		0.513					
	7					0.682			
	8				0.841				
	9			0.639	0.549				
	10				0.599	0.503			

Section	Question	Component							
		1	2	3	4	5	6	7	8
Practice	1				-0.852				
	2		-0.580						
	3						0.666		
	4								0.868
	5		0.920						
	6		0.533			0.503			
	7						-0.662		
	8		0.585						
	9							0.919	
	10		0.544				0.544		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 15 iterations.

4.2.3.3 Participant demographic data

85 patients were selected for the health intervention study with an average age of 57.14 ± 6.413 years. Specifically, the percentage of women (75.3%) was 2/3 higher than men (24.7%). Specifically, the proportion of women (75.3%) accounted for more than 2/3 of men (24.7%). Moreover, the majority was Kinh 97.6%, the rest was Khmer (2.4%). Most of the participants were 98.8% married, only 1 widower, and most of them live in a 1 - 2 generation family (72.9%). The results also showed that up to 76.5% of patients had full-time or part-time jobs, 16.5% were retired and the remaining 7.1% were unemployed. Furthermore, 81.2% of participants have high monthly income, 11.8% of average income, 7.1% of low income.

Table 12 The demography of participants

No.	Characteristics (n=85)	Number/ Percentage
1	Age (mean, SD, range (year))	57.14 ± 6.413
2	Gender (n, %)	
	Male	21 (24.7%)
	Female	64 (75.3%)
3	Ethnicity (n, %)	
	Kinh	83 (97.6%)
	Khmer	2 (2.4%)
4	Glycemic level (mean, SD, range (mmol/L))	9.736 ± 3.782 (4.6 – 23.8)
5	HbA_1C (mean, SD, range (%))	7.432 ± 2.363 (4.6 – 13.3)
6	Marital status (n, %)	
	Married	84 (98.8%)

	Widowed/Widower	1 (1.2%)
7	Type of family (n, %)	
	Small (1 - 2 generations)	62 (72.9%)
	Big (>= generations)	23 (27.1%)
8	Income monthly (n, %)	
	Low	6 (7.1%)
	Medium	10 (11.8%)
	High	69 (81.2%)
9	Diabetic management organization (n, %)	
	Government clinic/hospital	81 (95.3%)
	Private clinic/hospital	4 (4.7%)
10	Education level (n, %)	
	Illiterate	6 (7.1%)
	Primary	26 (30.6%)
	Secondary	26 (30.6%)
	Tertiary and above	27 (31.8%)
11	Employment status (n, %)	
	Working (full-time)	47 (55.3%)
	Working (part-time)	18 (21.2%)
	Unemployed/Not working	6 (7.1%)
	Retired	14 (16.5%)
12	Smoking	
	Yes	14 (16.5%)
	No	71 (83.5%)
13	Treatment method	
	Diet therapy only	2 (2.4%)
	Oral medications only	70 (84.2%)
	Insulin only	7 (8.2%)
	Not on any treatment	6 (7.1%)
14	Drinking	
	Yes	18 (21.2%)
	No	67 (78.8%)
15	Other medical problems (n, %)	79 (92.9%)
	Hypertension	53 (62.4%)
	High cholesterol	27 (31.8%)
	Heart disease/heart block	3 (3.5%)
	Visual problems	25 (29.4%)
	Nerve problems	51 (60%)
	Poor sexual desire	4 (4.7%)
	Renal problems	16 (18%)
16	Diabetic duration (n, SD, range)	4.771 ± 4.793 (0.5 – 22)

17	Hypoglycemia (n, %)	
	Never once/few months	29 (34.1%)
	One/week	17 (20%)
	2-3 times/week	30 (35.3%)
	Daily	9 (10.6%)
18	Diabetes-related information (n, %)	
	` Yes	48 (56.5%)
	No	37 (43.5%)

The average duration of type 2 diabetes of patients was 4.771 ± 4.793 years, of which, the shortest duration of the disease was 0.5 years, and the longest was 22 years. During this period, 48 people received information about diabetes, accounting for 48.5%. As many as 92.9% of patients with other medical problems related to diabetes included 62.4% with hypertension, 60% with neurological problems, 31.8% with lipid disorders, visual problems 29.4%, kidney problems 18%, sexual disease 4.7%, heart disease 3.5%. The patient's average blood sugar was 9.736 ± 3.782 mmol/L, the lowest 4.6 mmol/L, the highest 23.8 mmol/L; and the average HbA_1C was 7.432 ± 2.363%, minimum 4.6%, the highest 13.3%.

All patients had blood sugar testing with 95.3% at commune health stations and district health centers, only 4.7% at private clinics. Most patients were treated the T2DM by oral medication (84.2%), insulin injection by 8.2%, dietary modification by 2.4%, and no treatment by 7.1%. The majority of patients had symptoms of hypoglycemia 1 time per week (20%), 2-3 times 1 week (35.3%), and daily (10.6%). The proportion of patients smoking and drinking alcohol was low, respectively 16.5% and 21.2%.

4.2.3.4 The participant's knowledge, attitudes and practices

Table 13 The participant's knowledge, attitude and practice scores

		Knowledge	Attitude	Practice
N	Valid	85	85	85
Mean		37.882	65.971	52.120
Std. Deviation		12.639	19.488	14.150
Minimum		10	0	20
Maximum		80	100	80

All study participants had little knowledge of T2DM with an average score of 37.882 ± 12.639 points. Meanwhile, the patient's attitude toward the disease was average with a score of 65.971 ± 19.488 points. However, the actual ability of the patient was still low with a score of 52.120 ± 14.150 points (Table 4.10).

4.2.3.5 The compare between the participant's knowledge, attitude, demographics and practice self-managerment

Table 14 The compare of patient's knowledge, attitude, demographics and practice self-management with One-Way- ANOVA

	Sum of Squares	Mean Square	F	Significant
Age	0.204	0.102	0.971	0.383
Gender	0.151	0.075	0.394	0.675
Ethnicity	0.008	0.004	0.179	0.836
Location	15.022	7.511	0.304	0.739
Marital status	0.453	0.226	5.306	0.007
Type of family	0.624	0.312	1.583	0.212
Education level	1.249	0.624	0.689	0.505
Employment status	0.462	0.231	0.178	0.838
Monthly income	0.631	0.315	0.935	0.397
Diabetic duration	1.324	0.662	5.712	0.005
Glycemic level	0.400	0.200	1.143	0.324
HbA_1C level	0.119	0.060	0.226	0.798
Diabetic information	0.319	0.160	0.636	0.532
Other diseases	0.124	0.062	0.930	0.399
Treatment method	0.624	0.312	0.455	0.636
Hypoglycemia	2.567	1.283	1.193	0.308
Glycemic checking place	0.062	0.031	0.675	0.512
Smoking	0.416	0.208	1.514	0.226
Drinking	0.327	0.164	0.968	0.384
Knowledge	0.053	0.027	0.327	0.722
Attitude	2.633	1.317	1.961	0.147

There were different relationships between the characteristics, knowledge, and attitudes of T2DM with self-control practices. However, these differences were only statistically significant in variables such as marital status ($p = 0.007$) and diabetic duration ($p = 0.005$) (Table 4.11).

Table 15 The regression of the practice and some participant's factor

Effect	Likelihood Ratio Tests		
	Chi-Square	df	Sig.
Age	11.010	2	0.004
Diabetic duration	11.085	2	0.004

Hypoglycemia	33.764	6	<0.001
Knowledge	10.411	4	0.034
Attitude	24.926	4	<0.001

In addition, the analysis results with multinomial logistic regression showed the statistically significant relationship between self-control practices and age (p = 0.004), duration of diabetes (p = 0.004), hypoglycemia complication (p <0.001), knowledge (p = 0.034) and attitude (p = <0.001) toward type 2 diabetes (Table 4.12).

4.2.3.6 The difference in the KAP scores pre- and post-education

Table 4.13 showed the outcome of the knowledge and attitude of patient after the face to face discussion about the diabetic information. This program has really improved the knowledge and attitude of type 2 diabetics with p values of 0.008 and <0.001 respectively.

Table 16 The results of participant's knowledge and attitude after the diabetic education programme

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Knowledge	4.235	14.424	1.564	7.346	1.124	2.707	84	0.008
Attitude	27.206	25.126	2.725	32.625	21.786	9.983	84	<0.001

4.2.4 Discussion

A number of studies have been done on the KAP of diabetes [165]. The research from both developed and developing countries had described that diabetic knowledge was often poor in diabetics [161]. However, the KAP status on diabetes was not an immutable topic. It varies greatly from individual to individual based on personal demographics. In-depth understandings of these variables were imperative to promote and design prevention strategies to avert diabetes and delay the development of its complications [160]. The findings of this study emphasize the presence of KAP holes related to DM of participants.

The KAP questionnaire was newly designed to suit Vietnamese culture. This questionnaire was highly appreciated for its structure, rationality, and relevance by experts from Can Tho University of Medicine and Pharmacy, especially with an IOC of 1 for all questions. In addition, the pilot study results showed that the questionnaire was reliable with Cronbach's Alpha = 0.767 (Table 4.7) and the validity of the CFO of questions > 0.5 (Table 4.8). Moreover, the educational brochure was also highly

appreciated for their content, form, and understanding to patients by the experts at Can Tho University of Medicine and Pharmacy.

This study showed that the average age of patients with type 2 diabetes was 57.14 ± 6,413 years old. Similarly, the study of Erva C. Magbanua et al. (2017) patients had an average age of 59.09 years [166]. Moreover, research by Lamis R. Karaoui et al. (2018) reported an average patient age of 60.29 ± 14.04 years [154]. This was consistent with the age range common in type 2 diabetics mentioned in the literature of author Robert H. Eckel [30]. However, a study in Bangladesh by Farzana Saleh et al (2012) found that the average age of diabetes patients was 45.0 ± 9.5 years [155]. This difference was due to the author selecting new patients with diabetes.

Similar to the study in chapter 6, more than 2/3 of the patients were female (75.3%). Fatma Al-Maskari et al. (2013) also reported a higher proportion of women than men [161].

This was further reinforced by the research of Shooka Mohammadi et al (2015) on the population of type 2 diabetes in Iran with 61% of the patients being femalev[167]. In addition, a study in Thailand by Saruta Saengtipbovorn et al (2014) had more than half of female participants [162]. In addition, a study in Thailand by Saruta Saengtipbovorn et al (2014) had more than half of female participants [162]. Tam Binh district was predominantly Kinh, so our study had 97.6% of Kinh people participating in the study. Most participants got married and separated from the big family to live in a 1 - 2 generation family. Moreover, Alzahrani Salem et al (2018) also found that the marriage rate accounted for more than half of the sample [160].

Furthermore, Alzahrani Salem et al (2018) also reported that the patients in his study were highly educated from high school and above [160]. Simultaneously, the study of Saruta Saengtipbovorn et al (2014) reported 76.5% finished primary school [162]. Similarly, this study found that most patients had primary or higher education (93%). Nevertheless, a study in Iran by Shooka Mohammadi et al (2015) found that nearly 27 illiterate patients, but the majority (41%) of the study participants were not attending primary school [167]. Low levels of education were also found in the study of Fatma Al-Maskari et al (2013) with 46% illiteracy [161].

Most patients had a job, so their income was high. Concurrently, a study by Saruta Saengtipbovorn et al (2014) showed that 37.1% earned less than 1,500 baht per month.[162]. In addition, a study by Shooka Mohammadi et al (2015) found that only 27% of patients had jobs and their monthly income was lower than 8,000,000 Rials [167]. The average duration of diabetes in Fatma Al-Maskari et al (2013) was 9 years [161]. Kh. Shafiur Rahaman et al (2017) also showed that the average duration of diabetes was 9.16 ± 6.03 years [165]. However, patients in this study had a significantly lower duration of type 2 diabetes than the previous two studies (4,771 ± 4,793). More than half of patients have received information about diabetes. However, Kh. Shafiur Rahaman et al (2017) reported that only 38.6% of patients participated in a

diabetes-related education program [165]. About one quarter (26%) of the patients in the study of Erva C. Magbanua et al. (2017) participated the diabetes education [166].

Most patients had at least one other condition related to diabetes (92.9%) such as hypertension, hypercholesterolemia, heart disease, vision problems, neurological problems, poor sexual desire sex, kidney problems. These issues were also found in the study of Shooka Mohammadi et al (2015) in Iran [167]. Participants' blood sugar and HbA_1C levels were quite high. High levels of HbA_1C were also found in Fatma Al-Maskari et al (2013) [161] and Kh. Shafiur Rahaman et al (2017) [165]. Kh. Shafiur Rahaman et al (2017) also showed that blood glucose levels were also high, although participants tested their own blood glucose levels at home and in the hospital [165]. However, patients in this study did not self-test their blood glucose and HbA_1C, most of them checked at government hospitals and a few did not at private clinics. Moreover, the results of this study showed that patients with poor glycemic control have a relatively high rate of hypoglycemia (65.9%).

Similar to research by Lamis R. Karaoui et al (2018) [154], most patients have used oral medications to control the disease. In addition, this result was similar to Alzahrani Salem et al (2018) [160] with high smoking denial rates. Similar results were found in the study of Saruta Saengtipbovorn et al (2014) with the rate of never smokers up to 87.1% [162]. In contrast, Lamis R. Karaoui et al. (2018) reported that more than half of smoking patients participated in the study [154]. Correspondingly, the drinking rate in this study was low.

Alzahrani Salem et al (2018) reported that diabetics in their study were actually quite knowledgeable (75 points) [160]. Similarly, patients in the Saruta Saengtipbovorn et al (2014) study also had a high knowledge score (score 7.1) [162]. Despite this, this study has shown that patients with little knowledge of type 2 diabetes. This result was similar to the research result of Fatma Al-Maskari et al (2013) [161]. Besides, the attitude towards the disease of patients in this study and Fatma Al-Maskari et al [161] was quite positive (Table 4.10). This was in contrast to the two studies of Saruta Saengtipbovorn et al (2014) [162] and Alzahrani Salem et al (2018) [160]. Moreover, the research of Alzahrani Salem et al (2018) [160] had a low practical score similar to this one.

The practical outcome of diabetics was low due to many factors from the characteristics to the knowledge and attitude of diabetics. However, there were really meaningful relationships between practice and age, marital status, diabetic duration, hypoglycemia, knowledge and attitude toward T2DM. Meanwhile, research by Fatma Al-Maskari et al (2013) had shown a significant relationship between practice level and education level, marital status, diagnostic mode, duration of illness, using insulin, and frequency of seeing diabetes educator [161]. Moreover, Kh. Shafiur Rahaman et al (2017) found that practice scores are affected by gender, habitat, marital status, and education [165]. In addition, research by Lamis R. Karaoui et al (2018) also reported

that age, education level, and diabetic knowledge were significantly related to practice [154].

The educational program was designed for patients with detailed information in the brochure which was provided directly to the patient and the sampling staff explained in detail all participants' questions in about 15 minutes. The results showed that there was significant progress in the knowledge and attitude towards the patients' diabetes. Since this was an initial evaluation immediately after the end of the program, this study did not find any difference in practice. Therefore, this practical part will be assessed after 6 months, especially in section 4.3.

4.2.5 Conclusion

Medical education and intervention programs must be properly planned and administered to manage risk factors for diabetes. This study designed a set of questionnaires to assess knowledge, attitudes, and practices, along with educational content that was appropriate for the cognitive and cultural of Vietnamese people. Current research had demonstrated a low total score of knowledge and practice but a moderate attitude score for diabetes care. Patient self-management practices affected by age, marital status, diabetic duration, hypoglycemia, knowledge and attitude toward T2DM. Preliminary results of the education program had shown that there was a significant impact that positively changed the knowledge and attitudes of type 2 diabetics.

4.3. The evaluation of the implementation programme

4.3.1 Introduction

Diabetes had become an epidemic in many parts of the world and an increasingly important public health problem [168]. It was a serious chronic disease that significantly influenced the morbidity, mortality, and QoL of people with this disease [169]. However, these unwanted problems could be impeded or even averted by effective treatment and education [170]. Patient education was an essential component of diabetes care [171]. Patient instruction facilitated diabetic self-management and had progressed to become the foundation of quality-oriented diabetic care [172]. Diabetes self-control education to empower diabetics with the knowledge, skills, and motivation needed to take appropriate personal care [171]. Supporting this statement was that if patients with chronic diseases were knowledgeable and understanding about the disease and its management practices, increase the capacity for collaborative care, there were fewer problems and complications [20].

Patient empowerment or self-stewardship interferences had shaped from an instructional approach to one that required a theoretical cornerstone. This reflected the increased interest in addressing individuals, basic beliefs, and attitudes that were considered significant in sustaining self-care activities and upgrading long-term outcomes [173]. Moreover, diabetic knowledge could turn into the foundation for decision making about diet, exercise, blood glucose monitoring, medication use,

weight control, and foot care. In addition, the attitude of diabetes people could perform an important role in their emotional response, as well as affect their efforts to manage diabetes in everyday life [174]. Therefore, it was essential to inspect the diabetic knowledge and the attitude of diabetics that could affect their self-management practices and HRQoL [174].

This section presented the results of HRQoL and KAP assessments after 6 months of community education programs implemented in 4.2 section.

4.3.2 Methodology

4.3.2.1 Study population

85 patients participating in this chapters were selected to evaluate HRQoL and KAP. Selection and exclusion criteria were presented in chapters 3 and 4.2 section.

4.3.2.2 Data collection

The VNDQOL and KAP questionnaires were similar to the questionnaires designed in chapters 3 and 4.2 section that were directly sent to participants by the sampling staff after 6 months of implementing the educational program as in 4.2 section.

4.3.2.3 Statistical Analysis

All collected results were encrypted and entered into the SPSS software version similar to chapters 4 and 4.2 section. Comparison of changes in HRQoL and KAP between before and after the program tested by Pair Sample T-test in SPSS. P-value <0.05 was considered to be statistically significant.

4.3.3 Result

85 patients participating in the health education programme in 4.2 section were invited to answer 2 questionnaires of VNDQOL and KAP which used in chapters 6 and 7.1 section to evaluate the effectiveness of the programme.

4.3.3.1Participants physical characteristic changes

Table 17 The changes of some participant's physical factors after the programme

	Paired Differences					t	Sig.
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Diabetic information	0.388	0.490	0.053	0.494	0.282	7.301	<0.001
Glycemic	2.728	2.544	0.276	2.179	3.277	9.885	<0.001
HbA_1C	6.432	2.363	0.256	5.922	6.942	25.091	<0.001

Table 4.14 presented the patient's progress in acquiring diabetes information, glycemic control, and HbA_1C control after receiving diabetes health education. Indeed, after attending the program, the patients had more information about T2DM and this difference was statistically significant p <0.001 with a different value of -0.388. Furthermore, blood sugar levels were also better controlled with a statistically significant difference of 2,728 (p <0.001). Therefore, the amount of HbA_1C was also better controlled with a difference of 6.432 statistically significant with p <0.001

4.3.3.2 HRQoL changes

Table 18 The changes of the VNDQOL score

	Paired Differences					t	.
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
General health	2.918	0.517	0.056	3.029	2.806	52.063	<0.001
Activity limitation	5.353	1.882	.204	5.759	4.947	26.228	<0.001
Physical endurance	2.847	2.146	0.233	3.310	2.384	12.229	<0.001
Diet and eating habits	5.447	1.855	0.201	5.847	5.047	27.074	<0.001
Treatment	3.965	1.200	0.130	4.223	3.706	30.469	<0.001
Symptom burden	2.482	0.934	0.101	2.684	2.281	24.512	<0.001
Financial aspects	3.706	1.882	0.204	4.112	3.300	18.151	<0.001
Emotional/mental health	4.800	0.613	0.067	4.932	4.668	72.152	<0.001
Inter-personal relationship	3.000	0.267	0.029	3.058	2.942	103.489	<0.001
VNDQOL	34.518	8.443	0.916	36.339	32.697	37.694	<0.001

The VNDQOL score of T2DM patients was moderate before attending a health education program (Table 4.4). However, this score has improved significantly after 6 months from the end of the program with another index of -34.518 (p <0.001). Indeed, each domain's score also increased markedly with p <0.001. Specifically, the general health increased to 2.918 points. At the same time, the active limit component has increased to 5.353 points. Similarly, the composition of physical strength increased to a statistically significant level with a score of 2.847 (p <0.001). In addition, the field of diet and dietary habits was higher than before being educated with a difference of 5.447. The treatment composition also showed a significant increase in scores with a difference of 3.965 (p <0.001). Even the component of the symptom burden showed a significant improvement with a difference of 2.482. Besides, the financial aspects

domain has improved significantly p <0.001with a difference of 3.706. Furthermore, the variable emotional/mental health has got markedly better after attending the program with a difference of 4.8 (p <0.001). In particular, the value of Inter-personal relationship has also risen significantly with a difference of 3.

4.3.3.2 KAP changes

The score of knowledge, attitude towards disease, and self-care practice of patients with type 2 diabetes in the study were low (attitude and practice) to moderate (practice) before joining the health education program. There have been significant changes in scores 6 months after the program ended (p <0.001). Specifically, patient knowledge was more advanced with a difference of 6,212. The patient's attitude also improved with a positive level of 9.494. The patient's self-control practice also significantly improved with the level of 4.771.

Table 19 The improvement of knowledge, attitude and practice

	Paired Differences					t	Sig.
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Knowledge	6.212	1.264	0.137	6.484	5.939	45.311	<0.001
Attitude	9.494	6.378	0.692	10.870	8.118	13.724	<0.001
Practice	4.471	1.296	0.141	4.750	4.191	31.793	<0.001

4.3.4 Discussion

Diabetes has suited a chronic disease epidemic in many countries [175]. T2DM accounted for about 95% of all diabetic diagnosed [175] [176]. DM affected a person's health-related quality of life [177]. Patient education has become an integral part of the treatment of chronic disease in general and diabetes in particular, which was considered a core therapeutic means [178]. This has contributed the improving HRQoL and KAP of T2DM patients [178].

This was clearly seen through the results of this study. First of all, there were marked improvements in some of the patient's physiological characteristics. As the understanding of T2DM increased, patients were provided additional information about their disease. Similar to the study by Kam Meat Khunti et al (2012), the participants in the intervention group understood the better their disease and more severity and awareness, better on the duration of diabetes and the ability to affect the course of the disease [179]. Moreover, patients also had better control of blood sugar before participating in educational programs. This result was consistent with the study of Mirjana Pibernik-Okanovic et al (2004) with improved and maintained glycemic control results after 3 and 6 months of follow-up [178]. This had improved the patient's HbA_1C blood level. This improvement was also seen in the study of Kam Meat Khunti

et al (2012) with the internal correlation of HbA_1c after three years of 0.02 [179]. Moreover, Mirjana Pibernik-Okanovic et al (2004) showed that the average reduction of HbA1C from baseline to 6-month values was 0.60%, which could be considered clinically appropriate [178]. This result is further supported by the study of Takehiro Sugiyama et al (2015) which the decrease or improvement of HbA1c in the intervention group was greater than that in the control group [180].

Next, QoL changes were found in M.H. Bagherimoghadam et al (2009) which QoL scores of cases were 49.98 before the intervention and increased to 60.49 after the intervention [181]. These positive changes were similar to this study with an increase in the overall VNDQOL and its domain scores. M.H. Baghianimoghadam et al. (2009) also showed that most components of QoL improved better after the intervention, except for mental function and health awareness domains [181]. Meanwhile, Kam Meat Khunti et al. (2012) reported that there was no difference in QoL after three years since the end of the health education program [179]. In contrast, Marzieh Kargar Jahromi et al (2015) found an improvement in the QoL in the intervention group after 3 months of education [182].

Finally, it affected the patient's KAP after joining the educational program. Research by JW Manyiri et al (2016) found a significant increase in participants' knowledge and attitudes after participating in nutrition education for T2DM patients in South Africa [171]. Also, patients with diabetes were two to three times more likely to have a knowledge score according to the study of Erva C. Magbanua et al (2017) [166]. This was in line with the results of this study with a significant improvement in the knowledge, attitudes and practices of type 2 diabetics after attending the educational program.

4.3.5 Conclusion

To control T2DM, patients must understand the disease, so self-management diabetes education was an essential element of diabetes care, thereby improving attitude knowledge, practice self-care, and improve the health-related quality of life of patients. Indeed, this research confirmed the importance of health education. After attending the health educational program, the patient gained more knowledge and information about their illness. Since then, they had a more positive attitude that helped them to practice more active self-care to better control blood sugar and HbA_1C than before. This has improved their health-related quality of life.

4.4. Discussion

4.4.1 Introduction

A large number of people regardless of their religion, ethnicity, economy, and society have been affected by DM worldwide [183]. It had knobbed one of the most challenging public health issues of the twenty-first century [154]. Due to the silent

nature of the disease, many people remain undiagnosed until complications appear [165]. At the same time, diabetes is a major and life-threatening disease with many complications [174]. Therefore, this could seriously reduce a patient's HRQoL [184].

A number of individual lifestyle factors were associated with improving QoL health in diabetic people. Indeed, the combination of fat and sugar reduction in diet and increased exercise not only improved HbA_1C but also controlled blood sugar levels in diabetics, and also significantly HRQoL improvement. Therefore, self-management was an important part of the day life of diabetics [174].

Self-management behaviors referred to an individual's ability to manage symptoms, treatment, physical and psychosocial, and lifestyle changes necessary to adapt to life with T2DM [175]. Improving self-care required a health education program for T2DM people. Improving self-care required a health education program for T2DM people. Educating T2DM patients to increase self-management behavior was an important issue for health care providers to reduce the negative effect of diabetes on public health [175].

In this program, people got new information, learn new skills, and develop a higher level of confidence to manage and deal with T2DM [185]. Furthermore, the effective diabetic education should be provided to facilitate the necessary behavioral changes for patients to proactively manage and improve their condition [186]. Therefore, optimizing self-management for diabetics was an important strategy to improve the HRQoL and other outcomes [187]. Indeed, this study has provided positive results on changes in the health-related quality of life and the knowledge, attitudes, and practices of type 2 diabetics.

4.4.2 The participant's demographic

Type 2 diabetes was a chronic disease that usually occurred in middle-aged and old people [188]. This average age was found in studies of other authors such as NM Alavi et al (2007) 50.5 ± 12.8 years old [189], Eun-Hyun Lee et al (2012) 60.45 ± 8.23 years old [136], and Liina Pilva et al 64 ± 10.5 years old [8]. This average age was confirmed with this study with an average age of 57.14 ± 6.413. The study also showed that the higher the age, the lower the HRQoL was statistically significant with $p < 0.001$. It was evident in all domains of VNDQOL with all values of $p < 0.05$. Moreover, the study of Melba Sheila D PARTouza et al (2016) also showed significant differences in the QoL among age groups ($p < 0.001$) [25]. This result was further confirmed by the study of Mehdi Javanbakht et al (2012) with a statistically significant relationship between age groups and all elements of EQ-5D [138]. On the other hand, this research showed a significant relationship between age and type 2 diabetes self-control practices. The same thing was observed in Lamis R. Karaoui et al (2018) with a statistically significant relationship between age and self-care practice $p = 0.032$ [154]. However, research by Farzana Saleh et al (2012) did not show a link between age groups and two groups of good and moderate practices [155].

The relationship between type 2 diabetes and gender has been previously studied with inconsistent results [66]. According to the study of author Genevieve Gariepy et al (2013) reported a higher proportion of women than men [190]. A study by Tamara Poljičanin et al (2010) also showed that the percentage of women with diabetes was higher than men, but had a lower quality of life than men [191]. This was seen in our study with three times more women with diabetes than men, but the only physical endurance component was the statistically significant difference between the two genders. Nevertheless, the study found no difference in self-care practices of T2DM patients and sex. Similar results were also found in the study by Farzana Saleh et al (2012) with a higher proportion of women with diabetes than men and no difference in self-care practices [155]. The results were further supported by the study of Erva C. Magbanua et al (2017) with the rate of female 66.06% but the difference in the practice of self-control type 2 diabetes between the sexes was not significant statistical (p=0.056) [166].

Several studies have identified marital status related to T2DM [69]. This was evident in this study with the majority of married patients (94%) having a strong relationship with the HRQoL of T2DM patients (p <0.001). This significant difference was again found in the study of Mehdi Javanbakht et al (2012) in Iran with $p < 0.001$ [138]. Moreover, the study of Godfrey Mutashambara Rwegerera et al (2017) also showed statistically significant results between marital status with physical composite score and mental composite score of SF12 questionnaires (p <0.001) [118]. At the same time, our study found a statistically significant relationship between self-control practices and marital status $p = 0.007$. In addition, Alzahrani Salem et al (2018) found a statistically significant relationship between marital status and KAP with significance $p = 0.004$ [160]. However, the study of Tefera Kassahun et al (2016) did not show any significance between KAP and marital status [192].

On the other hand, the study showed that patients living in 17 different communes had a statistically significant difference with quality of life with $p < 0.05$. Similarly, a study by Mehdi Javanbakht et al (2012) showed the different meanings of living places with the QoL of diabetics [138]. This was also seen in research by Rui Wang et al (2008) that showed statistically significant differences between different living areas and components of the QoL of diabetic patients [127]. However, this did not show any difference in KAP. Indeed, the study of Alzahrani Salem et al (2018) also showed significant differences between residence and KAP [160].

Previous studies on HRQoL in diabetics had shown that poorer HRQoL was associated with longer duration of diabetes [146]. This was found in the study of Melba Sheila D Normalouza et al (2016) which the relationship between QoL and diabetic duration was statistically significant with $p < 0.005$ [25]. This relationship was further strengthened with the conclusion of Mehdi Javanbakht et al (2012) that HRQoL decreases with the longer duration of diabetes $p < 0.01$ [138]. It was these results that added to the sustainability of our study with a statistically significant correlation between duration of illness and HRQoL. Moreover, this study also showed

the close relationship between duration of T2DM and the patients' self-control practices. This was found in the study of Fatma Al-Maskari et al (2013) with the relationship between self-control practices and duration of diabetes was statistically significant p = 0.007 [161].

Family members could help people with diabetes in self-care, emotional support and information [193]. Therefore, patients living in large and small families had different meanings affecting their HRQoL with p <0.001. This relationship was strengthened by the research of S. Grandy et al (2008) with household size was significantly associated with HRQoL [194]. However, research by Dominik Ose et al. (2011) did not show statistical significance between the living in partnership variable and quality of life [56]. In addition, the study of Roger T. Anderson et al (2011) discribed dissignificant relation of the QoL and the living with other someone with p = 0.771 [195]. In addition, KAP in this study was not related to family type.

Previous research indicated that less education effected the perceived quality of life in diabetic patients [196]. The truth has been proved by S. Grandy et al (2008) with a statistical relationship between the quality of life and the education level of patients [194]. Although our research showed that most patients had primary education or above, it only showed a statistically significant relationship with two components as physical endurance (p = 0, 03) and treatment (p = 0.023). Meanwhile, the study of Wisit Chaveepojnkamjorn et al (2008) did not show statistical significance between QoL and education [34]. Moreover, the study by Karina Corrêa et al (2017) also showed no significant difference between QoL and education level [1]. In addition, the study found no correlation between educational attainment and ability to practice diabetes self-control. Farzana Saleh et al (2012) found similar results [155]. In contrast, the research of Kh. Shafiur Rahaman et al (2017) found a statistically significant relationship between diabetes self-management practices and patient understanding [165].

Moreover, our research showed that the majority of T2DM people had been employed and this had significantly increased their HRQoL. The statistically significant relationship of both employed and unemployed groups with HRQoL was found in the study of Margaret M. Collins et al (2009) [197]. However, this relationship is not statistically significant in Fahad S. Al-Shehri (2014) [14]. Furthermore, Wisit Chaveepojnkamjorn et al (2008) also clearly reported no statistical significance in the relationship between QoL and occupation [34]. Moreover, the practice of self-control did not show a significant relationship with the patient's employment status. However, the study of Erva C. Magbanua et al (2017) had shown statistically significant results between employed and self-care practice (p = 0.016) [166]. In addition, Farzana Saleh et al (2012) found a significant relationship between good self-care practices and business (p = 0.03) [155].

Monthly income also made sense for the quality of life. Indeed, our study was the majority of high-income patients and this suggested that high-income patients had

higher HRQoL than low-income patients. This fact was seen in the research of W. Jack Rejeski et al (2006) with the significant relationship between income and the two components of physical component summary and mental component summary of the SF-36 questionnaire ($p < 0.0001$) [198]. In contrast, Shiva Raj Mishra et al (2015) found no association between HRQoL and income [199]. Besides, our study found no association between monthly income and self-care practices. This was also found in the study of Erva C. Magbanua et al (2017) [166]. In contrast, the study by Farzana Saleh et al (2012) showed a statistically significant difference between income level and level of self-care practice [155].

Over the past decade, a few studies suggested a linkage between diabetic information that was the ability to obtain, read, understand, and communicate about health-related information needed to make informed health decisions, and health outcomes such as glycemic control and HRQoL [200]. This has been proven through your research with people with type 2 diabetes who received information in advance with better HRQoL ($p <0.001$). Even so, it did not seem to be related to self-control practices. Nevertheless, Erva C. Magbanua, et al. Suggest that there was a significant difference between previous diabetic education attendance and self-care practice $p = 0.03$ [166].

People with diabetes were more likely to get older, be overweight, exercise less and are more likely to suffer from conditions such as hypertension, coronary artery disease, and hypercholesterolemia that could impair quality of life [65]. This was further confirmed by the statistically significant relationship between HRQoL and other medical issues besides diabetes that were found in this study. Indeed, Romulus Timar et al (2016) showed a statistically significant relationship between QoL and T2DM complications and comorbidities [201]. However, there was no relationship between comorbidities and HRQoL in the study of Michelle Ang Co et al (2015) [202]. In addition, the results did not show a link between self-care practices and comorbidities.

On the other hand, the effect of glycemic control on QoL had been demonstrated in many studies [203]. In our study, the ability to control blood sugar was expressed in blood glucose levels, HbA_1C and testing places. Furthermore, all these variables had statistically significant results related to HRQoL. In addition, author Lis Ribu et al (2007) only found the relationship between $HbA_1C >= 8.3$ with 3 components of general health perceptions, vitality and social functioning of SF-36 [204]. However, the study of Melba Sheila D Normalouza et al (2016) did not show a statistically significant relationship between HRQoL and HbA_1C [25]. In fact, the results did not show a relationship between the glycemic components, HbA_1C and the testing site with self-care practices that were statistically significant. Similarly, Kh. Shafiur Rahaman et al (2017) also showed no statistical significance in the relationship between blood glucose monitoring and self-care practices [165].

The treatment would not achieve optimal results without the awareness of the patient, because without it, this therapy might fail or the complications might

eventually lead to fatal events [205]. Therefore, treatment of T2DM had a significant effect on the patient's HRQoL. However, research by Imaniar Noor Faridah et al (2017) only showed significant meaning between QoL and physical function (p = 0.005) and treatment satisfaction (p = 0.008) [153]. Moreover, Dyah A. Perwitasari et al (2014) showed a significant relationship between the four components of QoL: physical function, energy, satisfaction and treatment effect with type of treatment [206]. Nonetheless, our study did not find a statistically significant relationship between self-care practice and treatment. This was also found in the research of Kh Shafiur Rahaman et al (2017) [165]. In contrast, Fatma Al-Maskari et al (2013) reported a significant association between insulin therapy and type 2 diabetes practice [161].

Hypoglycemia was a meaningful complication of diabetes therapy [207]. Besides it had a significant effect on HRQoL in patients with type 2 diabetes. Moreover, research by Amer H. Al-Shehri et al (2008) also showed a significant relationship between HRQoL and hypoglycemia [208]. In addition, Eva S Vadstrup et al (2011) also reported statistically significant between HRQoL and hypoglycemia (p = 0.04) [110]. Furthermore, hypoglycemia had a statistically significant relationship with self-care practice of type 2 diabetes patients.

4.4.3 The health-related quality of life by Vietnamese Diabetes Quality of Life Questionnaire

HRQOL was an issue outcome for T2DM persons and has been used to evaluate the influence of the disease and its treatment on individuals and health care finance [14]. Indeed, the questionnaire we built VNQOL to evaluate HRQoL of type 2 diabetes patients includes 9 elements such as general health, activity limitation, physical endurance, diet and eating habits, treatment, symptom burden, financial aspects, emotional/mental health, inter-personal relationship. It has been rated a reliability and validity questionnaire by experts and through pilot research results. The results of the study showed that HRQoL was moderate among patients, while 5 areas such as general health, diet and eating habits, treatment, emotional/mental health, and relationship between individuals with low scores, in addition to the financial aspects to be average and the only physical endurance domain to have high score. However, Fahad S. Al-Shehri (2014) has shown that less than a quarter of diabetics had good QOL, so most diabetics had a ADDQOL negative score which was nearly half of all diabetics to have scores from very bad to extremely bad [14]. Meanwhile, research by Anumol Mathew et al (2014) showed that the majority of the subjects (57%) had moderate QoL, followed by good QoL for 38%, followed by very good QoL for 4%, and only 1 % of the subject had poor QoL [38].

In order to control the disease, DM patients must understand the power of medication and diet and be aware of how to modify according to exercise routines. Therefore, self-management diabetes education was an essential element of diabetes care [170]. The results show that HRQoL of type 2 diabetic patients has been significantly improved after 6 months of participating in health education program for

patients with diabetes. The results showed that HRQoL of type 2 diabetic patients has been significantly improved after 6 months of participating in health education program for patients with diabetes. Moreover, M.H. Baghianimoghadam et al (2009) showed that all dimensions of SF-20 were significantly improved after health education interventions [181]. In addition, Marzieh Kargar Jahromi et al (2015) also showed a clear difference in the QoL between the intervention and control groups and self-control education programs [182].

4.4.4 The knowledge, attitude and practice on the implemetation programme

The use of self-management programs in chronic disease was relatively well known, and some of these programs were beginning to show success [176]. Indeed, the patient's knowledge, attitude and initial behavior were at a low average level. This was even more evident with diabetes self-care practices that were closely related to patients' knowledge and attitudes. Similar to the study of Fatma Al-Maskari et al (2013), it showed that type 2 diabetics were less knowledgeable and had positive attitudes about the disease but had poor self-care habits [161]. This was also evident in the study of Alzahrani Salem et al (2018) with diabetic patients with poor knowledge, positive attitude but poor self-control diabetes practices [160]. However, the patient's knowledge, attitude and behavior have improved significantly after 6 months of participating in health education programs.

Chapter 5
CONCLUSION, RECOMMENDATIONS AND FUTURE WORKS

5.1. Conclusion

Diabetes could affect individual health-related quality of life from pathways associated with weakness and disease progression, a lifelong disease requiring lifestyle restrictions, and medical therapies that apply side effects and burden of possible treatment. Results showed that some characteristics of patients with type 2 diabetes were closely related to health-related quality of life, knowledge, attitudes, and self-control practices of patients. Moreover, the health-related quality of life of these patients was an average level and there has been a significant change after participating in health education programs. At the same time, research shows that the patient's knowledge was low, the attitude toward the disease was moderate and the practice of self-care was low, but these problems have changed markedly after attending health education.

Moreover, type 2 diabetes mellitus was a chronic metabolic disorder which was a negative impact on the health-related quality of life. In addition, the knowledge about the disease, attitudes to the disease, and self-care practices had a great influence on patients with type 2 diabetes. In summary, findings from the current study show that a significant number of diabetics have a medium health-related quality of life, low levels of knowledge, average attitude toward diabetes, and poor self-care behaviors. The health education program with the knowledge provided in the instructor's materials and explanations has greatly improved the quality of life, knowledge and attitudes towards diabetes, and self-management practices. Moreover, the study has designed two Vietnamese diabetes quality of life and knowledge, attitude, and practice questionnaire to apply to Vietnamese people.

5.2. Recommendations

Type 2 diabetes is a chronic metabolic disorder that cannot be completely cured. Therefore, the evaluation of treatment outcomes should be based on the improvement of the patient's health-related quality of life. To achieve this, it is important to have health intervention programs for patients in the community. In which, it is indispensable for health education programs to improve knowledge, attitude and practices of patients. This work should be done in health facilities as well as in the community

Although the research has yielded some very successful results, it still has some limitations that need to be complemented by future research. The study compares the quality of life related to health between patients with diabetes and the healthy or general population. Develop an intervention study divided into two intervention and control groups to better assess the effectiveness of the health care self-education programme. Carry out a follow-up study of this study for longer periods of time.

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APPENDICES

Appendix A (English version)

Mahasarakham University

Faculty of Public Health

Consent form

Dear Participant,

I am a Dr.P.H student in the faculty of public health at Mahasarakham University - Thailand. I am conducting a research about the quality of life of type 2 diabetes patients who live in Tam Binh district.

You are invited to participate in this study. The following information is provided in order to help you to make an informed decision whether or not to participate. If you have any question, please do not hesitate to ask.

The general purpose of this study is to develop the health-related quality of life programme among type 2 diabetes patients in Tam Binh district, Vinh Long province, Vietnam. This study sought an understanding of how the diabetics manage their illness and daily activities.

This aims of this study are, first, to provide a general understanding of the experience of having and managing diabetes from the views of patients and how this impacts on their quality of their lives; second, to provide valid and reliable information that help in improving the quality of life for the diabetes in Tam Binh district. Third, health managers, administrators and policy-makers can also use the results of this study to plan for effective public health programs for diabetics to improve their abilities to control their disease and prevent its complications.

Your participation in this study is voluntary you have the right to withdraw at any time. You are free to decide not to participate in this study without adversely affecting the health services that you or any member of your family may receive. Please do not include your name in your response. All responses will be confidential and will be considered only in combination with those from other participants. The information obtained will be used only for scientific study purposes and may be published in scientific journals or presented at scientific meetings.

Thank you very much for your completing the questionnaire and I appreciate the time you will take to complete this study.

Sincerely,

The researcher Participant's Signature.

Nghiep Ke Le

Appendix B (Vietnam version)

Đại học Mahasarakham

Khoa Y tế Công Cộng

Bản chấp thuận

Kính gửi người tham gia,

Tôi là nghiên cứu sinh của Khoa Y tế Cộng Cộng, Đại học Mahasarakham, Thái Lan. Tôi đang nghiên cứu về độ tin cậy và hiệu lực của bộ câu hỏi về chất lượng cuộc sống liên quan đến sức khỏe: Liên quan đến bệnh nhân đái tháo đường Việt Nam.

Bạn được mời tham gia nghiên cứu này. Các thông tin sau đây được cung cấp để giúp bạn đưa ra quyết định sáng suốt cho việc lựa chọn tham gia hay không. Nếu bạn có bất kỳ câu hỏi, xin đừng ngần ngại hỏi.

Mục đích của nghiên cứu này là xây dựng bộ câu hỏi về chất lượng cuộc sống liên quan đến sức khỏe của bệnh nhân đái tháo đường tuýp 2 tại Trung tâm y tế Tam Bình, huyện Tam Bình, tỉnh Vĩnh Long, Việt Nam. Nghiên cứu này đánh giá độ tin cậy và giá trị của bộ câu hỏi về chất lượng cuộc sống của bệnh đái tháo đường Việt Nam (VNDQOL). Đây là bước đầu tiên của luận án xây dựng chương trình chất lượng cuộc sống liên quan đến sức khỏe ở bệnh nhân đái tháo đường týp 2 ở huyện Tam Bình, tỉnh Vĩnh Long, Việt Nam.

Việc bạn tham gia nghiên cứu này là tự nguyện, bạn có quyền rút lui bất cứ lúc nào. Bạn được tự do quyết định không tham gia nghiên cứu này mà không ảnh hưởng xấu đến các dịch vụ y tế mà bạn hoặc bất kỳ thành viên nào trong gia đình bạn có thể nhận được. Vui lòng không nêu tên trong bảng trả lời. Tất cả các phản hồi sẽ được bảo mật và chỉ được xem xét kết hợp với những phản hồi từ những người tham gia khác. Thông tin thu được sẽ chỉ sử dụng cho mục đích nghiên cứu khoa học và có thể được công bố trên các tạp chí khoa học hoặc được trình bày tại các cuộc họp khoa học.

Cảm ơn bạn rất nhiều vì đã hoàn thành bộ câu hỏi và tôi đánh giá cao thời gian bạn dành để hoàn thành nghiên cứu này.

Trân trọng,

Người nghiên cứu

Lê Kế Nghiệp

Người tham gia.

Appendix C (English version)

VIETNAMESE DIABETES QUALITY OF LIFE

A. BACKGROUND INFORMATION

In this section, questions will be asked about your basic personal informa as your age, the area you are living and about your diabetes. **The information which you provide will be kept confidential at all times**.

Kindly put a tick "√" in the box of your choice.

Example: i) What is the color of your hair?

☑ Black □ Blue □ Yellow □ Green **Or**

Fill in your answers in the space (_____) provided

Example: ii) What year are you born in? Year 1980

1. Age: _____ (years)
2. Gender: □ Male □ Female
3. Ethnicity: □ Kinh □ Khomer □ Other
4. Location:

□ Tam Binh Town	□ My Thanh Trung	□ Hoa Loc
□ Tuong Loc	□ My Loc	□ Phu Loc
□ Hau Loc	□ Tan Loc	□ Song Phu
□ Long Phu	□ Tan Phu	□ Phu Thinh
□ Hoa Hiep	□ Hoa Thanh	□ Ngai Tu
□ Loan My	□ Binh Ninh	

5. Marital status:
   □ Never married □ Married □ Separated/Divorced □ Widowed/Widower
6. Type of family: □ Small (1 - 2 generations) □ Big (≥ 3 generations)
7. Education level:
   □ Illiterate □ Primary □ Secondary □ Tertiary and above
8. Employment status:
   □ Working (full time) □ Working (par-time/some days)
   □ Unemployed/Not working □ Retired
9. Income monthly (Vietnam dong):
   □ Low (<1,000,000) □ Medium (1,000,000 - 1,500,000) □ High (>1,500,000)
10. Year having diabetes: _____ (years)
11. Have you ever received diabetes-related information? □ Yes □ No
12. Which following medical problems do you have besides diabetes? (You can tick **more than one**)
    □ Hypertension/high blood pressure
    □ High cholesterol
    □ Heart disease/heart block (previous episode of heart attack/chest pain)
    □ Visual problems (cataract/diabetic eye problems)
    □ Nerve problems (feeling tingling sensation of ant crawling/pain/numbness/ feeling hot on extremities)
    □ Problems with achieving/maintaining erection (**For males only**)

□ Recurrent vaginal infection/itchiness (**For female only**)
□ Poor sexual desire
□ Peripheral vascular disease (ulcers on extremities/amputations/gangrene)
□ Other endocrine problems (thyroid problems)
□ Renal problems (on hemodialysis/recurrent lower limbs swelling)
□ Others (please state) _____

13. What type of treatment are you currently on for diabetes?

□ Diet therapy only
□ Oral medications only (**Proceed to Q14 and Q15**)
□ Insulin only (**Proceed to Q16 and Q17**)
□ Oral medications + insulin (**Proceed to Q18, Q19 and Q20**)
□ Not on any treatment
□ Others (please state) _____

14. Oral medications only

How many types of medications are you currently taking for diabetes? ____ types

15. Oral medications only

How many times a day you need to take the medications? ____ (**Proceed to Q21**)

16. Insulin only

How long have you been on insulin? _____ year(s)

17. Insulin only

How many times a day you need to inject yourself? ___ time(s) (**Proceed to Q21**)

18. Oral medications + insulin

How many types of oral medications are you currently taking for diabetes? _____

19. Oral medications + insulin

How many times a day you need to take your medications? _____ time(s)

20. Oral medications + insulin

How many times a day you need to inject yourself? ___ time(s) (**Proceed to Q21**)

21. What type(s) of traditional medicine/herbs are you taking? (please list)

_____
_____
_____
_____

(**If NONE please fill in "N" and proceed to Q22**)

22. How frequent do you monitor your blood sugar at home?

_____ times/day
_____ times/week
_____ times/month
Others: please specify _____

23. What is your average blood sugar reading? _____ mmol/L

24. How frequent do you experience signs of hypoglycemia (feeling of light-headiness, dizzy, extreme hunger, fainting due to low blood sugar)?

□ Never Once/few months □ One/wee □ 2-3 times/week □ Daily

25. Where do you go for check-up/medications for your diabetes?

□ Government clinic/hospital

□ Private clinic/hospital

□ Others (please state): _____

26. Are you smoking? □ Yes □ No

27. Are you drinking? □ Yes □ No

B. HEALTH-RELATED QUALITY OF LIFE

The follow questions will ask you about your quality of life, health, or other areas of your life. Please answer all the questions. If you are sure about which response to give to a question, please **CIRCLE** the answer you choose.

Example: What is your favorite food?

1) Chicken rice 2) Burgers 3) Noodle 4) Fried rice 5) Cakes

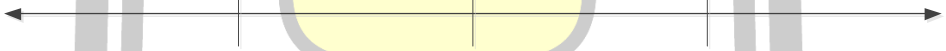
I. General health

28. In general, would you say your health is

1) Poor 2) Faire 3) Good 4) Very good 5) Excellent

29. How well are you able to concentrate in everything?

1) Not at all 2) A little 3) Moderate 4) Very much 5) An extreme amount



30. Have you had fatigue/felt very tired on the past three months?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

Score	

II. Activity limitation

31. How often do you miss your work because of your diabetes?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

32. How does your eating and medication schedule affect your work?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

33. How often does diabetes affect your efficiency at work?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

34. How often do you find diabetes limiting your social life?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

35. To what extent do you avoid traveling (business tour, holiday, general outings) because of your diabetes?

1) A lot 2) Highly 3) Little 4) Very little 5) Not at all

36. Compared to others of your age are your social activities (visiting friends/partying) limited because of your diabetes?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

Score	

III. Physical endurance

37. How often in last three months has your overall health problems limited the kind of vigorous activities you can do like lifting heavy bags/objects, running, skipping, jumping

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

38. How often in last three months has your overall health problems limited the kind of moderate activities you can do like moving a table, carrying groceries or utensils

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

39. How often in last three months has your overall health problems limited you from walking uphill or climbing 1-2 floors

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

40. How often in last three months has your overall health problems limited you from walking 1-2 km at a stretch

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

41. How often in last three months has your overall health problems limited you from bending, squatting, or turning

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

42. How often in last three months has your overall health problems limited you from eating, dressing, bathing, or using the toilet

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

Score	

IV. Diet and eating habits

43. How satisfied are you with your current diet?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

44. How happy are you with current eating habits as compared to before the onset of diabetes?

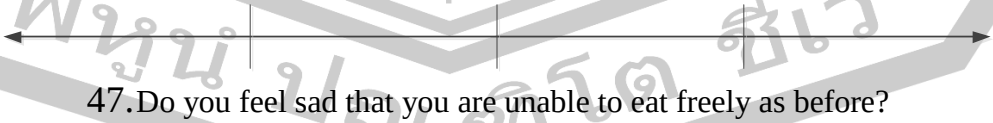
1) Very unhappy 2) Unhappy 3) Unsure 4) Happy 5) Very happy

45. Do you find it a burden to follow the diet you are supposed to take?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

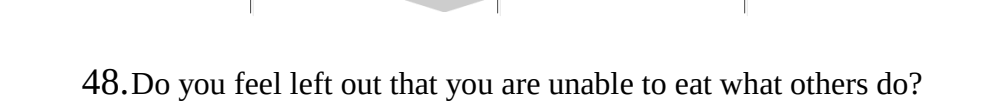
46. Are you still able to enjoy the food you like to eat now, as compared to before the onset of diabetes?

1) Never 2) Sometimes 3) Often 4) Frenquently 5) Always



47. Do you feel sad that you are unable to eat freely as before?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never



48. Do you feel left out that you are unable to eat what others do?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

Score	

V. Treatment

49. How satisfied are you with your current diabetes treatment?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

50. How satisfied are you with amount of time it takes to manage your diabetes?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

51. How satisfied are you with the amount of time you spend getting regular checkups (once in 3 months)?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

52. A person with diabetes needs to exercise for 35-45 minutes, 4 times a week. Keeping this in mind how satisfied are you with the time you spend exercising?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

Score	

VI. Symptom burden

53. How many times in the past three months have you had thirst/dry mouth?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

54. How many times in the past three months have you felt excessive hunger?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

55. How many times in the past three months have you had frequent urination related to diabetes management?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

Score	

VII. Financial aspects

56. Do you spend time worrying about your medical cost?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

57. Do you feel that diabetes have increased your financial burden?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

58. Do you have difficulties in paying for your medical expenses?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

59. Do you spend time worrying about your future medical expenses?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

60. Are you in constant fear that you may be a burden financially to your family?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

Score	

VIII. Emotional/mental health

61. How satisfied are you with yourself?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

62. How satisfied are you with your personal relationships (family, friends, relatives and acquaintances)?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

63. How satisfied are you with the emotional support you get from your friends and family?

1) Very dissatisfied 2) Dissatisfied 3) Unsure 4) Satisfied 5) Very satisfied

64. How often are you discouraged by your health problem?

1) Always 2) Frequently 3) Often 4) Sometimes 5) Never

65. To what extent do you feel that you have been able to fulfill certain roles and lead your lives in a purposeful manner?

1) Not at all 2) A little 3) Moderate 4) Very much 5) An extreme amount

Score	

IX. Inter-personal relationship

66. How do you find your relationship with your spouse/partner?

1) Very poor 2) Worse 3) No change 4) Better 5) Much better

□ **Not applicable (kindly proceed to question 67)**

67. How would you describe your sexual relationship now as compared to before the onset of diabetes?

1) Very bad 2) Worse 3) No change 4) Better 5) Much better

□ **Not applicable (kindly proceed to question 68)**

68. How is your sexual desire as compared to before the onset of diabetes?

1) Very bad 2) Worse 3) No change 4) Better 5) Much better

□ **Not applicable**

Score	

TOTAL SCORE (For office use only)	

THANK YOU FOR YOUR HELP

Appendix D (Vietnam version)

BỘ CÂU HỎI CHẤT LƯỢNG CUỘC SỐNG LIÊN QUAN ĐẾN SỨC KHỎE CỦA BỆNH NHÂN ĐÁI THÁO ĐƯỜNG VIỆT NAM

A. THÔNG TIN CHUNG

Trong phần này, các câu hỏi sẽ yêu cầu về thông tin cá nhân của bạn như tuổi, nơi sống và bệnh đái tháo đường. Thông tin mà bạn cung cấp sẽ được giữ kín

Vui lòng đánh dấu "√" vào trong ô mà bạn chọn

Ví dụ: i) Tóc của bạn màu gì?

□ Đen □ Xanh dương □ Vàng □ Xanh lá cây **hoặc**

Điền câu trả lời vào khoảng trống (_____)

Ví dụ: ii) Bạn sinh năm mấy? Năm 1980

1. Năm sinh: _____ (năm)
2. Giới tính: □ Nam □ Nữ
3. Dân tộc: □ Kinh □ Khơmer □ Khác
4. Chỗ ở: □ Thị trấn Tam Bình □ Mỹ Thạnh Trung
   □ Hòa Lộc □ Tường Lộc
   □ Mỹ Lộc □ Phú Lộc
   □ Hậu Lộc □ Tân Lộc
   □ Song Phú □ Long Phú
   □ Tân Phú □ Phú Thịnh
   □ Hòa Hiệp □ Hòa Thạnh
   □ Ngãi Tứ □ Loan Mỹ
   □ Bình Ninh
5. Tình trạng hôn nhân:
   □ Chưa kết hôn □ Đã kết hôn □ Ly thân/ly dị □ Góa chồng/vợ
6. Loại gia đình:
   □ Nhỏ (1-2 thế hệ) □ Lớn (≥ 3 thế hệ)
7. Trình độ giáo dục:
   □ Mù chữ □ Cấp 1 □ Cấp 2 □ Cấp 3 trở lên
8. Tình trạng nghề nghiệp:
   □ Việc làm toàn thời gian □ Việc làm bán thời gian
   □ Thất nghiệp □ Nghỉ hưu
9. Thu nhập hàng tháng (VNĐ)

□ Thấp (<1.000.000) □ Trung bình (1.000.000 – 1.500.000) □ Cao (> 1.500.000)

10. Thời gian phát hiện đái tháo đường: _____ (năm)
11. Bạn đã bao giờ nhận được thông tin liên quan đến bệnh đái tháo đường chưa?
    □ Có □ Chưa
12. Bạn có những vấn đề y tế nào ngoài bệnh đái tháo đường? (Bạn có thể đánh dấu **nhiều đáp án**)
    □ Tăng huyết áp
    □ Tăng Cholesterol

□ Bệnh tim/Ức chế tim (đau tim tình cờ trước đây/đau ngực)
□ Các vấn đề về thị giác (đục thủy tinh thể/vấn đề mắt đái tháo đường)
□ Các vấn đề thần kinh (cảm giác ngứa ran của kiến bò/đau/tê/cảm thấy nóng tay, chân)
□ Các vấn đề đạt được/duy trì cương cứng (**Chỉ dành cho nam**)
□ Nhiễm trùng âm đạo tái phát/ngứa (**Chỉ dành cho nữ**)
□ Kém ham muốn tình dục
□ Bệnh mạch máu ngoại vi (loét/cắt cụt/hoại tử tay, chân)
□ Các vấn đề nội tiết khác (vấn đề tuyến giáp)
□ Các vấn đề về thận (chạy thận nhân tạo/phù chi dưới thường xuyên)
□ Các vấn đề khác (vui lòng nêu rõ) _____

13. Hiện tại bạn đang điều trị đái tháo đường bằng phương pháp nào?

□ Duy nhất bằng chế độ ăn (**đi đến câu hỏi 21**)
□ Duy nhất bằng thuốc uống (**đi đến câu hỏi 14 và 15**)
□ Duy nhất insulin (**đi đến câu hỏi 16 và 17**)
□ Thuốc uống và insulin (**đi đến câu hỏi 18, 19 và 20**)
□ Không điều trị
□ Phương pháp khác (vui lòng nêu rõ) _____

14. Duy nhất thuốc uống
Có bao nhiêu loại thuốc bạn sử dụng điều trị đái tháo đường? ___

15. Duy nhất thuốc uống
Bạn sử dụng bao nhiêu lần thuốc uống trong ngày? ___ (**đi đến câu hỏi 21**)

16. Duy nhất insulin
Bạn sử dụng insulin bao lâu? _____ năm

17. Duy nhất insulin
Bạn cần tiêm insulin bao nhiêu lần một ngày? ___ lần (**đi đến câu hỏi 21**)

18. Thuốc uống và insulin
Có bao nhiêu loại thuốc bạn sử dụng điều trị đái tháo đường? ___

19. Thuốc uống và insulin
Bạn sử dụng bao nhiêu lần thuốc uống trong ngày? ___ lần

20. Thuốc uống và insulin
Bạn cần tiêm insulin bao nhiêu lần một ngày? ___ lần (**đi đến câu hỏi 21**)

21. Bạn sử dụng thuốc truyền thống/thảo dược nào? (vui lòng liệt kê)
_____
_____
(**nếu không sử dụng vui lòng điền "N" và đi đến câu hỏi 22**)

22. Bạn thường xuyên kiểm tra đường huyết tại nhà như thế nào?
_____ lần/ngày
_____ lần/tuần
_____ lần/tháng
Khác: vui lòng ghi cụ thể _____

23. Mức đường huyết trung bình của bạn là bao nhiêu? _____ mmol/L

24. Bạn có thường xuyên bị các dấu hiệu hạ đường huyết (cảm giác lâng lâng, chóng mặt, cực kỳ đói, ngất xỉu do đường huyết thấp)?

□ Chưa bao giờ trong một hoặc vài tháng □ Một lần/tuần

□ 2 – 3 lần/tuần □ Hàng ngày

25. Bạn đi đâu để kiểm tra/điều trị bệnh đái tháo đường?

□ Phòng khám/bệnh viện chính phủ

□ Phòng khám/bệnh viện tư nhân

□ Nơi khác (vui lòng nêu rõ): _____

26. Bạn có hút thuốc không? □ Có □ Không

27. Bạn có uống rượu không? □ Có □ Không

B. CHẤT LƯỢNG CUỘC SỐNG

Các câu hỏi tiếp theo sẽ hỏi bạn về chất lượng cuộc sống, sức khỏe của bạn, hoặc các lĩnh vực khác trong cuộc sống của bạn. Vui lòng trả lời tất cả các câu hỏi. Nếu bạn chắc chắn về câu trả lời nào cho câu hỏi, vui lòng **khoanh tròn** câu trả lời bạn chọn.

Ví dụ: Loại thức ăn nào bạn thích?

1) Thịt gà 2) Bánh mì kẹp thịt 3) Mì 4) Cơm chiên 5) Bánh tây

I. Sức khỏe chung

28. Sức khỏe của bạn nói chung là

1) Xấu 2) Hơi xấu 3) Tốt 4) Rất tốt 5) Tuyệt vời

29. Bạn có thể tập trung vào mọi thứ như thế nào?

1) Không được 2) Chút ít 3) Trung bình 4) Rất nhiều 5) Quá mức

30. Bạn đã cảm thấy mệt mỏi/rất mệt mỏi trong ba tháng qua chưa?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

Điểm	

II. Giới hạn hoạt động

31. Bạn có bỏ lỡ công việc của mình vì bệnh đái tháo đường không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

32. Lịch ăn uống và thuốc của bạn ảnh hưởng như thế nào đến công việc?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

33. Bệnh đái tháo đường ảnh hưởng đến hiệu quả ở nơi bạn làm việc như thế nào?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

34. Bạn có thường xuyên bị đái tháo đường hạn chế cuộc sống xã hội của bạn không?

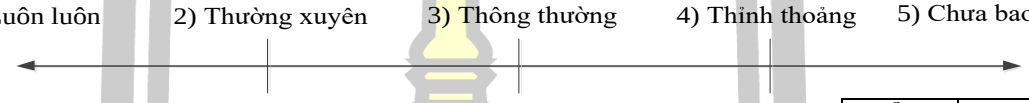
1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

35. Bạn đã từ chối đi du lịch bao nhiêu lần (chuyến công tác, nghỉ lễ, đi chơi chung) vì bệnh đái tháo đường?

1) Nhiều 2) Cao 3) Ít 4) Rất ít 5) Chưa bao giờ

36. So với những người khác cùng độ tuổi, bạn thấy các hoạt động xã hội của bạn (thăm bạn bè/tiệc tùng) bị giới hạn vì bệnh đái tháo đường như thế nào?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

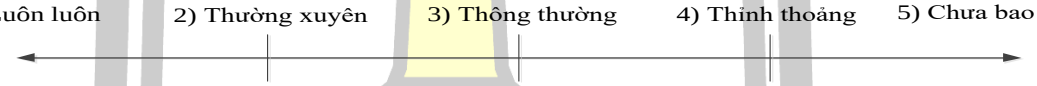


Điểm	

III. Độ bền sinh lý

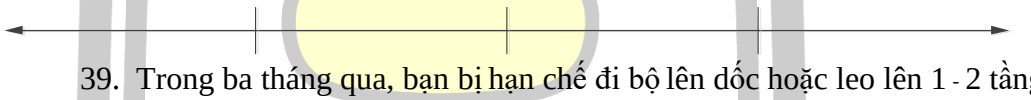
37. Trong ba tháng qua, bạn bị hạn chế loại hoạt động nặng như nâng túi/vật nặng, chạy, nhảy cao, nhảy xa như thế nào

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



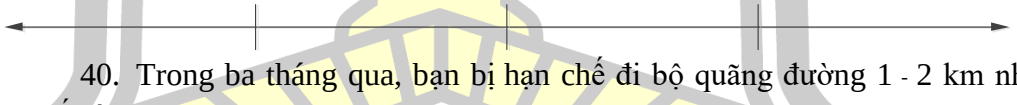
38. Trong ba tháng qua, bạn bị hạn chế các loại hoạt động vừa phải như di chuyển bàn, mang hàng tạp hóa hoặc đồ dung như thế nào

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



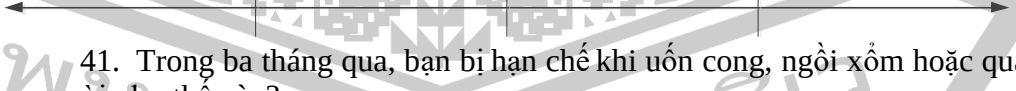
39. Trong ba tháng qua, bạn bị hạn chế đi bộ lên dốc hoặc leo lên 1 - 2 tầng như thế nào?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



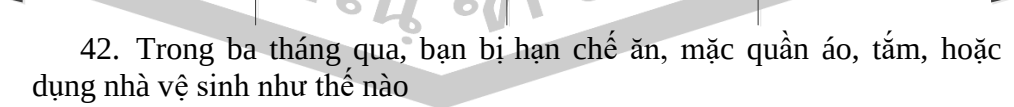
40. Trong ba tháng qua, bạn bị hạn chế đi bộ quãng đường 1 - 2 km như thế nào?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



41. Trong ba tháng qua, bạn bị hạn chế khi uốn cong, ngồi xổm hoặc quay người như thế nào?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



42. Trong ba tháng qua, bạn bị hạn chế ăn, mặc quần áo, tắm, hoặc sử dụng nhà vệ sinh như thế nào

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

Điểm	

IV. Chế độ ăn và thói quen ăn uống

43. Bạn hài lòng với chế độ ăn uống hiện tại của mình như thế nào?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

44. Bạn hạnh phúc như thế nào với thói quen ăn uống hiện tại so với trước khi bị bệnh đái tháo đường?

1) Rất không hạnh phúc 2) Không hạnh phúc 3) Không chắc 4) Hạnh phúc 5) Rất hạnh phúc

45. Bạn có thấy gánh nặng để tuân theo chế độ ăn uống mà bạn phải thực hiện không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

46. Bạn vẫn có thể thưởng thức các món ăn mà bạn thích ăn so với trước khi bị bệnh đái tháo đường không?

1) Chưa bao giờ 2) Thỉnh thoảng 3) Thông thường 4) Thường xuyên 5) Luôn luôn

47. Bạn có cảm thấy buồn vì bạn không thể ăn tự do như trước?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

48. Bạn có cảm thấy bị bỏ quên do bạn không thể ăn những gì người khác làm không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

Điểm	

V. Điều trị

49. Bạn hài lòng với điều trị bệnh đái tháo đường hiện tại của mình như thế nào?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

50. Bạn hài lòng với lượng thời gian cần thiết để quản lý bệnh đái tháo đường của mình?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

51. Mức độ hài lòng của bạn với lượng thời gian bạn dành cho việc kiểm tra thường xuyên (một lần trong 1 tháng)?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

52. Một người mắc bệnh đái tháo đường cần tập thể dục trong 35-45 phút, 4 lần một tuần. Theo bạn hài lòng với thời gian bạn tập thể dục như thế nào?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

Điểm	

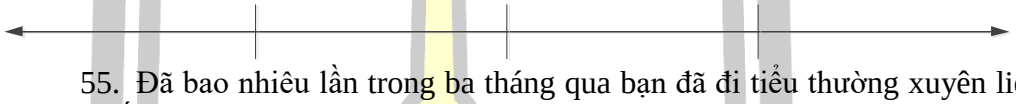
VI. Gánh nặng triệu chứng

53. Đã bao nhiêu lần trong ba tháng qua bạn đã khát/khô miệng?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

54. Đã bao nhiêu lần trong ba tháng qua bạn cảm thấy đói quá mức?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



55. Đã bao nhiêu lần trong ba tháng qua bạn đã đi tiểu thường xuyên liên quan đến bệnh đái tháo đường?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

Điểm	

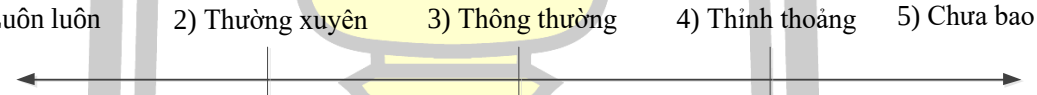
VII. Các khía cạnh tài chính

56. Bạn có lo lắng về chi phí y tế của bạn?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

57. Bạn có cảm thấy bệnh đái tháo đường đã làm tăng gánh nặng tài chính của bạn không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

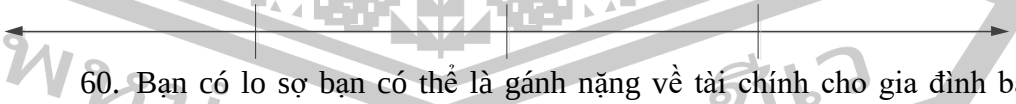


58. Bạn có gặp khó khăn trong việc chi trả cho chi phí y tế của bạn không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

59. Bạn có lo lắng về chi phí y tế trong tương lai không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



60. Bạn có lo sợ bạn có thể là gánh nặng về tài chính cho gia đình bạn không?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ

Điểm	

VIII. Sức khỏe tâm thần/cảm xúc

61. Bạn hài lòng với bản thân mình như thế nào?

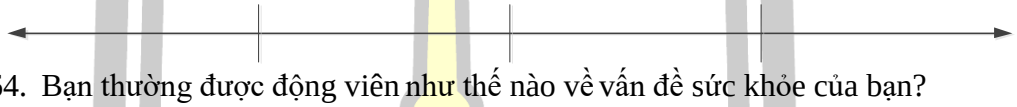
1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

62. Bạn hài lòng với mối quan hệ cá nhân của bạn như thế nào (gia đình, bạn bè, người thân và người quen)?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng

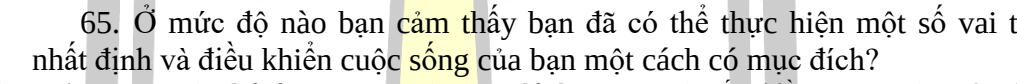
63. Bạn hài lòng như thế nào với sự hỗ trợ tinh thần mà bạn nhận được từ bạn bè và gia đình?

1) Rất không hài lòng 2) Không hài lòng 3) Không chắc 4) Hài lòng 5) Rất hài lòng



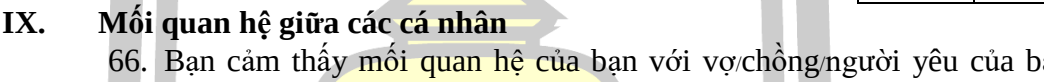
64. Bạn thường được động viên như thế nào về vấn đề sức khỏe của bạn?

1) Luôn luôn 2) Thường xuyên 3) Thông thường 4) Thỉnh thoảng 5) Chưa bao giờ



65. Ở mức độ nào bạn cảm thấy bạn đã có thể thực hiện một số vai trò nhất định và điều khiển cuộc sống của bạn một cách có mục đích?

1) Không được 2) Chút ít 3) Trung bình 4) Rất nhiều 5) Quá mức

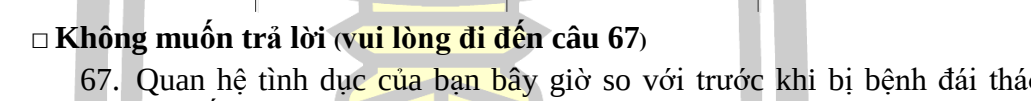


Điểm	

IX. Mối quan hệ giữa các cá nhân

66. Bạn cảm thấy mối quan hệ của bạn với vợ/chồng/người yêu của bạn như thế nào?

1) Rất tệ 2) Tệ 3) Không thay đổi 4) Tốt hơn 5) Tốt hơn nhiều



□ **Không muốn trả lời (vui lòng đi đến câu 67)**

67. Quan hệ tình dục của bạn bây giờ so với trước khi bị bệnh đái tháo đường như thế nào?

1) Rất xấu 2) Tệ 3) Không thay đổi 4) Tốt hơn 5) Tốt hơn nhiều

□ **Không muốn trả lời (vui lòng đi đến câu 68)**

68. Ham muốn tình dục của bạn như thế nào so với trước khi bị bệnh đái tháo đường?

1) Rất xấu 2) Tệ 3) Không thay đổi 4) Tốt hơn 5) Tốt hơn nhiều

□ **Không muốn trả lời**

Điểm	

Tổng số điểm (Do nhân viên cộng)	

Cám ơn sự giúp đỡ của quí vị

Appendix E (English version)

DIABETIC KNOWLEDGE, ATTITUDE AND PRACTICE QUESTIONNAIRE

A. PARTICIPANT INFORMATION

69. Full name: _____
70. Birth year: _____
71. Gender: □ Male □ Female
72. Address: _____
73. Glycemia: _____ mmol/L
74. HbA_1C: _____ %

B. DIABETIC KNOWLEDGE

Please circle in the letter that you think is the best.

1. What is diabetes?
   a. Diabetes is a chronic metabolic disorder characterized by hyperglycemia
   b. Diabetes is a chronic metabolic disorder with a manifestation of hypoglycemia
   c. Diabetes is a disease spread in the community
2. How many types of diabetes are there?
   a. 1 type
   b. 2 types
   c. 3 types
3. What is type 2 diabetes?
   a. Because the body produces lack or does not produce insulin
   b. Because the body is resistant to insulin (usually occurs in obese people and >40 years old)
   c. Occurs in pregnant women (no previous diabetes)
4. Who is at risk for diabetes?
   a. People who are obese, sedentary, eat a lot of fat, sweet, starch, alcohol, tobacco, family history of diabetes
   b. Muscular people, exercise regularly, eat well, do not smoke, do not drink alcohol
   c. Thin people, eat normally, have no family history of diabetes
5. What are diabetic symptoms?
   a. Eat a lot, drink a lot, lose weight a lot, urinate a lot
   b. Eating normally, losing little weight, moderate urination
   c. Eat less, lose weight, urinate often
6. How many types of diabetic complication are there?
   a. One type: acute complications
   b. Two types: acute complications and chronic complications
   c. Three types: acute complication, subacute complication and chronic complication
7. What are the acute complications of diabetes mellitus?

a. Hyperglycemia and foot ulcer
b. Insomnia, anxiety and weight loss
c. Hypoglycemia and coma due to hyperglycemia, ketoacidosis and lactic infections

8. What are the chronic complications of diabetes mellitus?
   a. Hypoglycemia and coma
   b. Cardiovascular complications, decreased vision, kidney failure, impotence, foot ulcers
   c. Insomnia, anxiety, difficulty breathing
9. What are the methods of complication prevention in diabetic patients?
   a. Routine blood glucose testing, prescription medication, reasonable eating, proper exercise
   b. There is no need for routine blood glucose testing, no need for food, no medication, and limited movement
   c. Test whenever you want, just taking the medicine is enough without don't need the well eating and exercise
10. What are the signs of hypoglycemia in diabetic patients?
    a. High fever, cold shaking
    b. Uncomfortable, sweating, dizziness
    c. Abdominal pain, difficulty breathing

C. DIABETIC ATTITUDE

Please circle the answer you choose

1. Do you agree that blood glucose testing for you and your family is necessary?

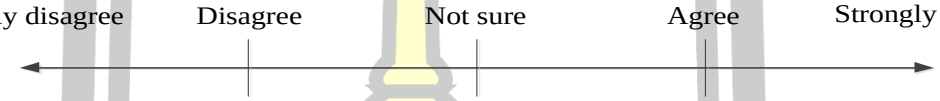
Strongly disagree Disagree Not sure Agree Strongly agree

2. Do you agree that diabetes can be well controlled?

Strongly disagree Disagree Not sure Agree Strongly agree

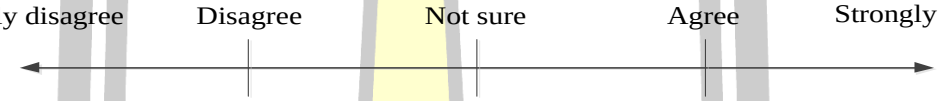
3. Do you agree that blood sugar can be controlled by exercise, sports and medicine?

Strongly disagree Disagree Not sure Agree Strongly agree



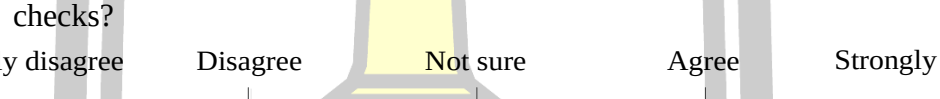
4. Do you agree with a reasonable diet that can control blood sugar?

Strongly disagree Disagree Not sure Agree Strongly agree



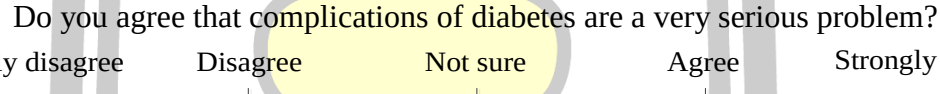
5. Do you agree with the need to have regular medical checkups and blood sugar checks?

Strongly disagree Disagree Not sure Agree Strongly agree



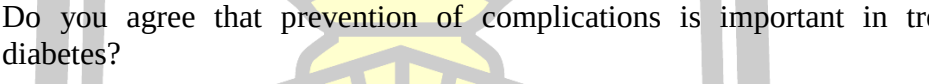
6. Do you agree that complications of diabetes are a very serious problem?

Strongly disagree Disagree Not sure Agree Strongly agree



7. Do you agree that prevention of complications is important in treating diabetes?

Strongly disagree Disagree Not sure Agree Strongly agree

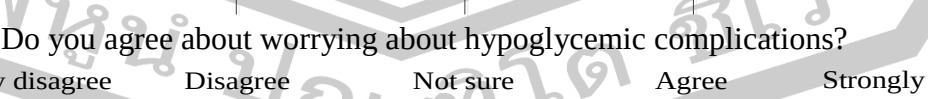


8. Do you agree that daily exercise can control diabetes complications?

Strongly disagree Disagree Not sure Agree Strongly agree

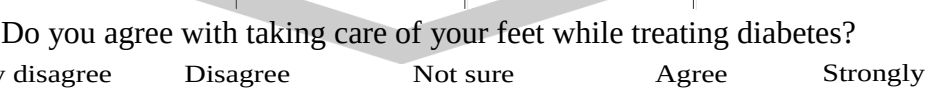
9. Do you agree about worrying about hypoglycemic complications?

Strongly disagree Disagree Not sure Agree Strongly agree



10. Do you agree with taking care of your feet while treating diabetes?

Strongly disagree Disagree Not sure Agree Strongly agree



D. DIABETIC PRACTICE

Please answer all the questions below

1. Which method do you treat diabetes with?
   - Oral medicine. How many tablets per day? ____ tablets. How many times per day? ____ times
   - Insulin injection. How many times of injection? _____ times. Injection site? _____
2. Do you have regular blood sugar tests? ___ yes ___ no
   Where do you check? _____ How often? _____
3. Do you have an HbA1C test? _____ has _____ no
   Where do you check? _____ How often? _____
4. Do you exercise regularly? _____ yes _____ no
   How long is a day? _____ How many days per week? _____
   Which method do you exercise? _____
   Do you know exercise can lower blood sugar? ___ yes ___ no
5. How many meals do you eat a day? _____
   Should you skip meals? _____ yes _____ no
6. What kind of foods do you need to limit or reduce?
   _____
   _____
7. Do you smoke cigarettes? _____ has _____ no
   How many cigarettes per day? _____ cigarettes
   How long have you smoked? _____
8. Do you drink alcohol? _____ yes _____ no
   If yes, what is the level of drinking? _____
9. Have you ever had hypoglycemia? _____ has _____ not yet
   If so, how did you handle it? _____
10. How do you take care of your feet?
    _____
    _____

THANK YOU FOR YOUR ANSWERS!

Appendix F (Vietnam version)

BỘ CÂU HỎI KIẾN THỨC, THÁI ĐỘ VÀ HÀNH VI BỆNH ĐÁI THÁO ĐƯỜNG

A. THÔNG TIN CHUNG

1. Họ và tên: _____
2. Năm sinh: _____
3. Giới tính: □ Nam □ Nữ
4. Địa chỉ: _____
5. Đường huyết: _____ mmol/L
6. HbA1C: _____ %

B. KIẾN THỨC VỀ BỆNH ĐÁI THÁO ĐƯỜNG

Vui lòng khoanh tròn vào ô mà bạn cho là đúng nhất.

1. Đái tháo đường là gì?
   a. Là bệnh rối loạn chuyển hóa mạn tính với biểu hiện tăng đường trong máu
   b. Là bệnh rối loạn chuyển hóa mạn tính với biểu hiện giảm đường trong máu
   c. Là bệnh lây truyền trong cộng đồng
2. Đái tháo đường được chia ra mấy loại?
   a. 1 loại
   b. 2 loại
   c. 3 loại
3. Đái tháo đường típ 2 là gì?
   a. Do cơ thể sản xuất thiếu hoặc không sản xuất insulin
   b. Do cơ thể đề kháng với insulin (thường xảy ra ở người béo phì và > 40 tuổi)
   c. Xảy ra ở phụ nữ mang thai (không bị đái tháo đường trước đó)
4. Ai có nguy cơ mắc bệnh đái tháo đường?
   a. Người béo phì, ít vận động, ăn nhiều chất béo, ngọt, tinh bột, nghiện rượu, thuốc lá, tiền sử gia đình bị đái tháo đường
   b. Người vạm vỡ, vận động tập thể dục thường xuyên, ăn uống hợp lý, không hút thuốc, uống rượu
   c. Người ốm, ăn uống bình thường, không có tiền sử gia đình bị đái tháo đường.
5. Triệu chứng của bệnh đái tháo đường là gì?
   a. Ăn nhiều, uống nhiều, sụt cân nhiều, tiểu nhiều
   b. Ăn uống bình thường, sụt cân ít, tiểu vừa phải
   c. Ăn uống ít, sụt cân, tiểu lắt nhắt
6. Có mấy loại biến chứng do đái tháo đường?
   a. Một loại: biến chứng cấp tính
   b. Hai loại: biến chứng cấp tính và biến chứng mãn tính
   c. Ba loại: biến chứng cấp tính, biến chứng bán cấp và biến chứng mạn tính
7. Biến chứng cấp tính ở bệnh nhân đái tháo đường bao gồm những loại nào?
   a. Tăng đường huyết và loét chân
   b. Mất ngủ, lo âu và sút cân

c. Hạ đường huyết và hôn mê do tăng đường huyết, nhiễm toan ceton và lactic

8. Biến chứng mạn tính ở bệnh nhân đái tháo đường bao gồm những loại nào?
   a. Hạ đường huyết và hôn mê
   b. Biến chứng tim mạch, giảm thị lực, suy thận, liệt dương, loét bàn chân
   c. Mất ngủ, lo âu, khó thở
9. Các biện pháp phòng ngừa biến chứng ở bệnh nhân đái tháo đường?
   a. Xét nghiệm đường huyết định kỳ, dùng thuốc theo toa, ăn uống hợp lý, vận động thích hợp
   b. Không cần xét nghiệm đường huyết định kỳ, không cần ăn kiêng, không dùng thuốc, hạn chế vận động
   c. Xét nghiệm bất kỳ khi nào muốn, chỉ cần uống thuốc là đủ không cần phải ăn uống hợp lý và tập thể dục
10. Biểu hiện hạ đường huyết ở bệnh nhân đái tháo đường như thế nào?
   a. Sốt cao, lạnh run
   b. Cồn cào, vã mồ hôi, hoa mắt
   c. Đau bụng, khó thở

C. THÁI ĐỘ VỀ BỆNH ĐÁI THÁO ĐƯỜNG

Vui lòng khoanh tròn câu trả lời bạn chọn

1. Bạn có đồng ý việc kiểm tra đường huyết cho bạn và gia đình là cần thiết hay không?

Rất không đồng ý | Không đồng ý | Không biết | Đồng ý | Rất đồng ý

2. Bạn có đồng ý rằng bệnh đái tháo đường có thể được kiểm soát tốt không?

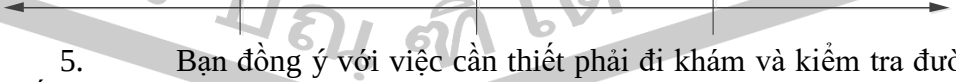
Rất không đồng ý | Không đồng ý | Không biết | Đồng ý | Rất đồng ý

3. Bạn có đồng ý đường huyết có thể được kiểm soát bằng chế độ tập luyện thể dục, thể thao và dùng thuốc không?

Rất không đồng ý | Không đồng ý | Không biết | Đồng ý | Rất đồng ý

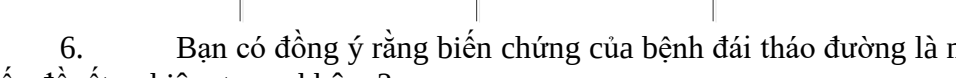
4. Bạn có đồng ý với việc thực hiện chế độ ăn hợp lý có thể kiểm soát tốt đường huyết không?

Rất không đồng ý | Không đồng ý | Không biết | Đồng ý | Rất đồng ý

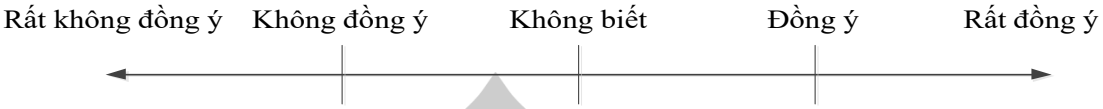


5. Bạn đồng ý với việc cần thiết phải đi khám và kiểm tra đường huyết định kỳ không?

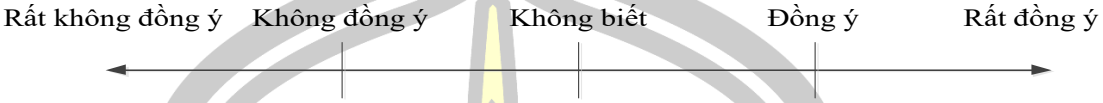
Rất không đồng ý | Không đồng ý | Không biết | Đồng ý | Rất đồng ý



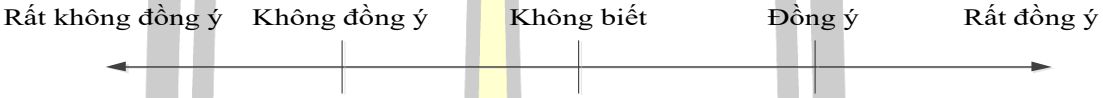
6. Bạn có đồng ý rằng biến chứng của bệnh đái tháo đường là một vấn đề rất nghiêm trọng không?



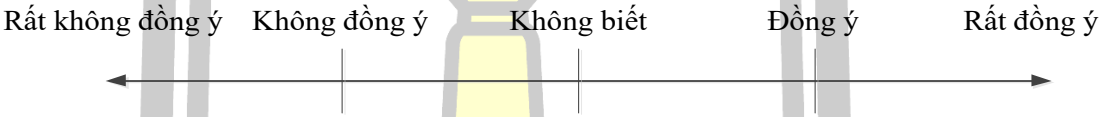
7. Bạn có đồng ý rằng việc phòng ngừa biến chứng là quan trọng trong điều trị bệnh đái tháo đường không?



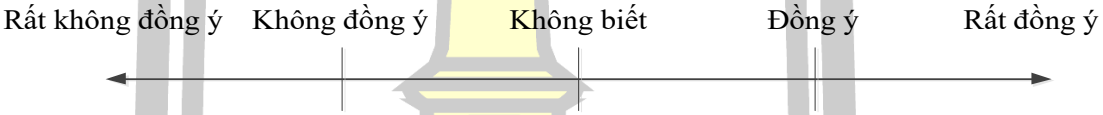
8. Bạn có đồng ý với việc tập luyện thể dục hàng ngày có thể kiểm soát tốt biến chứng do bệnh đái tháo đường không?



9. Bạn có đồng ý về việc lo lắng biến chứng hạ đường huyết xảy ra không?



10. Bạn có đồng ý với việc quan tâm chăm sóc bàn chân của mình trong khi điều trị bệnh đái tháo đường không?



D. THỰC HÀNH VỀ BỆNH ĐÁI THÁO ĐƯỜNG

Vui lòng trả lời đầy đủ các câu hỏi bên dưới

1. Bạn điều trị đái tháo đường bằng phương pháp nào?
   - Thuốc uống. Ngày mấy viên? _____ viên. Ngày uống mấy lần? _____ lần.
   - Tiêm isulin. Ngày tiêm mấy lần? _____ lần. Vị trí tiêm? _____
2. Bạn có kiểm tra đường huyết thường xuyên không? ___ có ___ không
   Bạn kiểm tra ở đâu? _____ Bao lâu một lần? _____
3. Bạn có được kiểm tra HbA_1C không? _____ có _____ không
   Bạn kiểm tra ở đâu? _____ Bao lâu một lần? _____
4. Bạn có thường xuyên tập thể dục không? _____ có _____ không
   Bao nhiêu lâu một ngày? _____ Mấy ngày một tuần? _____
   Bạn tập thể dục bằng phương pháp nào? _____
   Bạn có biết tập thể dục có thể làm giảm đường huyết không? __ có ___ không
5. Bạn ăn uống bao nhiêu bữa ăn một ngày? _____
   Bạn có nên bỏ bữa ăn không? _____ có _____ không
6. Bạn cần hạn chế hoặc giảm những loại thức ăn nào?
   _____
7. Bạn có hút thuốc lá không? _____ có _____ không
   Bao nhiêu điếu một ngày? _____ Bạn hút trong bao lâu? _____
8. Bạn có uống rượu không? _____ có _____không
   Nếu có thì mức độ uống như thế nào? _____
   Có ảnh hưởng đến việc dùng thuốc của bạn như thế nào? _____
9. Bạn có bao giờ bị hạ đường huyết chưa? _____ có _____ chưa

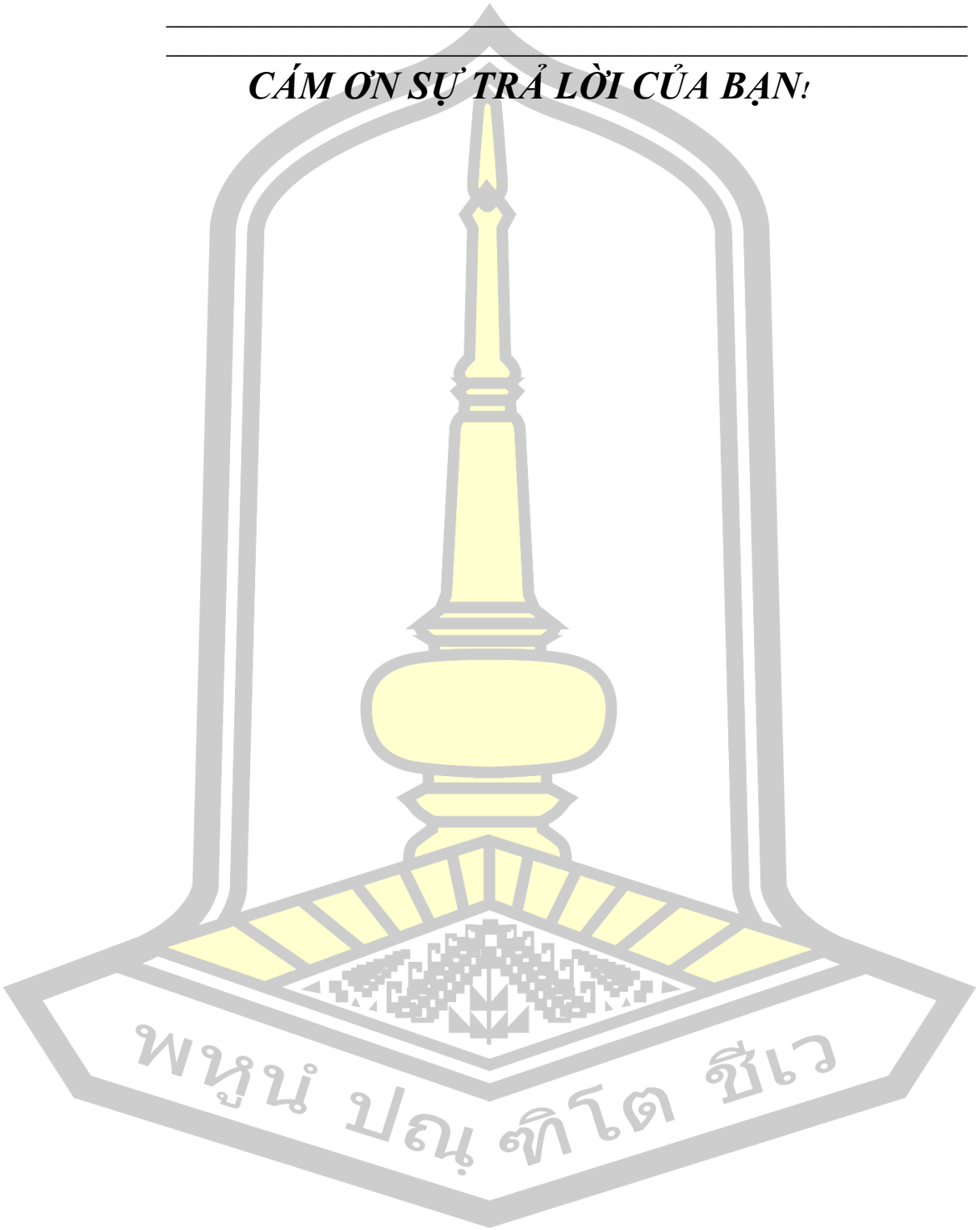
Nếu có, bạn đã xử trí như thế nào? _____

10. Bạn chăm sóc bàn chân như thế nào?

_____

_____

CÁM ƠN SỰ TRẢ LỜI CỦA BẠN!



Appendix G (English version)

* Limit meat and fat of animal origin, especially for patients with protein in the urine. Replace with foods with fat from plants such as beans, peanuts ...

* Reducing savory spices and foods such as salt, fish sauce, soup, melon/salt, dried fish, sausage ...

* Enhance eating vegetables.

* Processing food in the form of boiling, steaming. Limit fried food.

* Do not use alcohol, beer, cigarettes.

4. Reasonable physical activity

- Physical activity helps reduce blood sugar, obesity risk, improving health, mental comfort.
- Patients need to comply with the training time (at least 35 - 45 minutes a day, 4 times a week) and the level of exercise.
- Limit watching television, using computers.
- Strengthening the exercise in accordance with health conditions, such as walking, up and down stairs, gardening, cycling, table tennis, badminton, swimming, running, playing football, basketball, tennis, martial arts, lifting light weight.

Management of hypoglycemia

Causes: The patient performs a strict diet, overdose and excessive exercise.

Expression: Discomfort, sweating, dizziness.

How to solving:

- Drink sugar water, eat cakes, candies, then eat an extra meal when there are signs of hypoglycemia.
- Always bring sugar, cakes, sweets or essential foods.

Complications in the foot

Cause: Vascular and nerve damage facilitates bacterial growth.

Expression: Foot skin is dry, peeling, cracking, loss of sensation, thick toenails, and heavier pedicure than foot ulcers and toe necrosis...

Prevention:

Should do: Wear soft shoes and sandals; Check, wash and dry your feet daily.

Shouldn't do: Apply heat or soak your feet in hot water >30^{0}C because it will cause blistering of feet; Cut toenails too close to the skin; Remove, jerky scratches on excess skin; Puncture rupture the bulging nodes/blisters; Wear high heels; tight shoes, sandals or barefoot.

MAHASARAKHAM UNIVERSITY

Publishing information for doctoral thesis

What is diabetes?

Diabetes is a chronic metabolic disorder characterized by hyperglycemia (blood sugar) due to defects in insulin secretion, the effect of insulin or both.

Diabetes classification

Type 1 diabetes: Because the body lacks insulin production or does not produce it. Usually develop disease in young people before 40 years old..

Type 1 diabetes: Because the body is resistant to insulin. Usually occurs in obese and over 40 years old. However, today this type is tending to be younger.

Gestational diabetes: Occurs in pregnant women without previous evidence of diabetes.

Symptoms

- Increased appetite
- Intense thirst
- Frequent urination
- Weight loss
- Slow wound healing
- Blurred vision
- Trembling and nervous
- Itchy skin

2

Who often gets sick?

- Overweight, obese.
- Alcohol and tobacco addiction.
- Eat lots of fat, sweet, starch.
- Physical inactivity.
- Family with people with diabetes.
- Hypertension, good fast (HDL) low

Complication

** Acute complication:*

- Hypoglycemia.

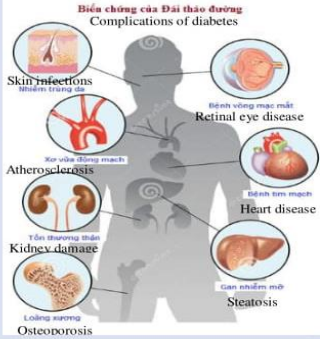
- Coma due to hyperglycemia, ketoacidosis, lactic acidosis.

** Chronic complication:*

- Cardiovascular complications: stroke, peripheral circulation disorders.
- Reduced vision, blindness.

3

- Renal failure.
- Sexual decline, impotence.
- Injury to the feet, can be amputated.



Prevent complications

1. Examination and testing of blood sugar at least once a month and HbA1C every 3 months to adjust drugs, diet, appropriate exercise and early detection of complications

2. Use the medicine according to the instructions of the medical staff

3. Make the right diet

* Eat on time, don't skip meals even if you don't want to eat.

* Limit eating cakes, candies, high sweet fruits, mangoes, longan, bananas ... Sweet foods for diabetics can be used to replace regular sugar.

* Reduce starch but still ensure enough ratio in the composition of food.

4

Appendix H (Vietnam version)

* Hạn chế thịt, chất béo có nguồn gốc động vật, đặc biệt với người bệnh có protein trong nước tiểu. Thay thế bằng thức ăn có chất béo từ thực vật như các loại đậu, lạc…

* Giảm các gia vị và thực phẩm mặn như muối, nước mắm, bột canh, dưa/cà muối, cá khô, giò chả…

* Tăng cường ăn rau.

* Chế biến thức ăn dưới dạng luộc, hấp. Hạn chế chiên, xào.

* Không sử dụng rượu, bia, thuốc lá.

4. Hoạt động thể lực hợp lý

- Hoạt động thể lực giúp làm giảm đường huyết, giảm nguy cơ béo phì, nâng cao sức khỏe, thoải mái tinh thần.
- Người bệnh cần tuân thủ về thời gian tập luyện ít nhất 35 – 45 phút mỗi ngày, 4 lần 1 tuần và mức độ tập luyện
- Hạn chế xem ti vi, sử dụng máy tính.
- Tăng cường vận động phù hợp với tình trạng sức khỏe, như đi bộ, lên xuống cầu thang, làm vườn, đạp xe đạp, chơi bóng bàn, cầu lông, bơi, chạy, chơi bóng đá, bóng rổ, tennis, tập võ, nâng tạ nhẹ.

Xử trí hạ đường huyết

Nguyên nhân: Người bệnh thực hiện chế độ ăn quá khắc khe, dùng thuốc quá liều và luyện tập quá mức.

Biểu hiện: Cồn cào, vã mồ hôi, hoa mắt.

Cách xử trí:

- Uống nước đường, ăn bánh, kẹo, sau đó ăn thêm bữa ăn phụ khi có biểu hiện hạ đường huyết.
- Luôn mang theo đường, bánh, kẹo hoặc các thực phẩm cần thiết.

Biến chứng bàn chân

Nguyên nhân: Tổn thương mạch máu và thần kinh tạo điều kiện cho vi khuẩn phát triển.

Biểu hiện: Da bàn chân khô, bong tróc, nứt nẻ, mất cảm giác, móng chân dày, bở nặng hơn là loét bàn chân và hoại tử ngón chân....

Cách phòng tránh:

Nên: Đi giày, dép mềm; Kiểm tra, rửa và lau khô bàn chân hàng ngày.

Không nên: Chườm nóng hoặc ngâm chân vào nước nóng >30^0C vì sẽ gây phồng rộp bàn chân; cắt móng chân quá sát da; dứt, giật các xướt măng rô ở phần da thừa; chọc vỡ các nốt phồng/rộp; mang giày cao gót; giày, dép chật hoặc đi chân đất.

TRƯỜNG ĐẠI HỌC MAHASARAKHAM

Tài liệu tuyên truyền dành cho đề tài nghiên cứu sinh

Bệnh đái tháo đường là gì?

Đái tháo đường là bệnh rối loạn chuyển hóa mạn tính với biểu hiện tăng glucose (đường) máu do khiếm khuyết về tiết insulin, về tác động của insulin hoặc cả hai.

Phân loại đái tháo đường

Đái tháo đường típ 1: Do cơ thể sản xuất thiếu hoặc không sản xuất insulin. Thường phát bệnh ở người trẻ trước 40 tuổi.

Đái tháo đường típ 2: Do cơ thể đề kháng với insulin. Thường xảy ra ở người béo phì và người trên 40 tuổi. Tuy nhiên, ngày nay loại này đang có xu hướng trẻ hóa.

Đái tháo đường thai kỳ: Xảy ra ở phụ nữ mang thai mà trước đó không có bằng chứng nào về đái tháo đường.

Triệu chứng

- Ăn nhiều
- Uống nhiều
- Tiểu nhiều
- Sút cân nhiều
- Vết thương chậm lành.
- Mờ mắt
- Run và hồi hộp
- Ngứa da

Ai thường mắc bệnh?

- Người thừa cân, béo phì.
- Nghiện rượu, thuốc lá.
- Ăn nhiều chất béo, ngọt, tinh bột.
- Người ít vận động thể lực.
- Gia đình có người bị đái tháo đường.
- Tăng huyết áp, mỡ tốt (HDL) thấp

Biến chứng

** Biến chứng cấp tính:*

- Hạ đường huyết.

- Hôn mê do tăng đường huyết, nhiễm toan ceton, toan lactic.

** Biến chứng mạn tính:*

- Biến chứng tim mạch: đột quỵ, rối loạn tuần hoàn ngoại vi.
- Giảm thị lực, mù lòa.

- Suy thận.
- Suy giảm tình dục, liệt dương.
- Tổn thương bàn chân, có thể bị cắt cụt.

Phòng ngừa biến chứng

1. Khám và xét nghiệm đường huyết ít nhất mỗi tháng 1 lần và HbA_1C mỗi 3 tháng để được điều chỉnh thuốc, chế độ ăn uống, luyện tập phù hợp và phát hiện sớm biến chứng

2. Dùng thuốc theo đúng hướng dẫn của cán bộ y tế

3. Thực hiện chế độ ăn uống phù hợp

* Ăn đúng giờ, không bỏ bữa ngay cả khi không muốn ăn.

* Hạn chế ăn bánh, kẹo, trái cây có độ ngọt cao, xoài, nhãn, chuối… Có thể dùng các thực phẩm ngọt dành cho người đái tháo đường để thay thế đường thông thường.

* Giảm tinh bột nhưng vẫn đảm bảo đủ tỉ lệ trong thành phần thức ăn.

Appendix I

MAHASARAKHAM UNIVERSITY ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS

Certificate of Approval

Approval number: 071 / 2019

Title : The Development of Health-related Quality of Life Programme Among Type 2 Diabetic Patients in Tam Binh District, Vinh Long Province, Vietnam.

Principal Investigator : Mr. Le Ke Nghiep

Responsible Department : Faculty of Public Health

Research site : Vietnam

Review Method : Expedited review

Date of Manufacture : 25 March 2019 **expire :** 24 March 2020

This research application has been reviewed and approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University, Thailand. Approval is dependent on local ethical approval having been received. Any subsequent changes to the consent form must be re-submitted to the Committee.

.....

(Assoc.Prof. Thiensak Mekkapanopas)

Chairman

Approval is granted subject to the following conditions: (see back of this Certificate)

Appendix J (English version)

INVITATION LETTER AS THE EXPERT FOR VNDQOL

To: .....

.....

Dear .....,

I am Le Ke Nghiep a doctoral degree of Public Health student from the Faculty of Public Health, Thailand. I am going to commit my research on the topic of "*The development of health-related quality of life programme among type 2 diabetic patients in Tam Binh district, Vinh Long province, Vietnam*". I work under my supervisors as Asst. Prof. Niruwan Turnbull, Ph.D. (Mahasarakham University); Assoc. Prof. Cuong Van Dam, Ph.D. (Can Tho University of Medicine and Pharmacy); and Asst. Prof. Santisith Khewkhen, Ph.D. (Mahasarakham University); Surasak Thiabrithi Ph.D. (Mahasarakham University).

We would like to invite you as an expert to evaluate the Vietnammese diabetes quality of life (VNDQOL) questionnaire. This questionnaire will be the conduct of our research operation. Therefore, your opinions will be valuable for us as an assessment of the validity of this questionnaire.

We would appreciate your participation in this important process for the development of a new questionnaire. If you agree, please complete the attached forms and return it by email to lekenghiep@gmail.com.

Should you wish to discuss the questionnaire or your participation in more detail please feel free to contact me on telephone (+84-919281591 or +66-985920699), Line (Nghiep), Zalo (Nghiep), Facebook (Ke Nghiep Le), Email (lekenghiep@gmail.com or 60011460011@msu.ac.th).

Thank you in advance for your time,

Yours sincerely,

Le Ke Nghiep
Doctoral of Public Health (Candidate)
Faculty of Public Health
Mahasarakham University, Thailand

Appendix K (Vietnam version)

THƯ MỜI LÀM CHUYÊN GIA ĐÁNH GIÁ BỘ CÂU HỎI VNDQOL

Đến: .....

Kính chào .....,

Chúng tôi gồm có: Lê Kế Nghiệp, nghiên cứu sinh trường đại học Mahasarakham, Thái Lan; Phó giáo sư, Tiến sỹ Niruwan, hướng dẫn khoa học, trường đại học Mahasarakham; Phó giáo sư, Tiến sỹ Đàm Văn Cương, đồng hướng dẫn khoa học, trường đại học y dược Cần Thơ, Việt Nam; Phó giáo sư, Tiến sỹ Santisith Khiewkhern, và Tiến sỹ Surasak Thiabrithi, đồng hướng dẫn khoa học, trường đại học Mahasarakham.

Chúng tôi trân trọng kính mời bạn làm chuyên gia đánh giá bộ câu hỏi "đánh giá chất lượng cuộc sống của bệnh nhân đái tháo đường Việt Nam (VNDQOL)". Đây là bộ câu hỏi được chúng tôi sử dụng trong nghiên cứu "Phát triển chương trình chất lượng cuộc sống liên quan đến sức khỏe ở bệnh nhân đái tháo đường loại 2 ở huyện Tam Bình, tỉnh Vĩnh Long, Việt Nam". Mục đích tham gia của quí vị nhằm lấy ý kiến về tính toàn diện, rõ ràng và chất lượng của bộ câu hỏi.

Chúng tôi biết rằng quí vị đang rất bận rộn trong lĩnh vực của mình, nhưng vì đầu vào quan trọng mà quý vị có thể mang đến cho nghiên cứu của chúng tôi, chúng tôi hy vọng rằng quí vị sẽ đồng ý tham gia.

Chúng tôi sẽ đánh giá cao sự tham gia của quí vị trong quá trình phát triển bảng câu hỏi mới. Nếu quí vị đồng ý, xin vui lòng điền vào mẫu đính kèm và gửi lại qua thư điện tử: lekenghiep@gmail.com hoặc trực tiếp cho tôi.

Nếu quí vị muốn thảo luận về bộ câu hỏi hoặc sự tham gia của quí vị một cách chi tiết hơn, vui lòng liên hệ với tôi qua điện thoại (+84-919281591/+66-985920699), Line (Nghiep), Zalo (Nghiep), Facebook (Ke Nghiep Le), Email (lekenghiep@gmail.com hoặc 60011460011@msu.ac.th).

Cảm ơn quí vị trước vì đã dành thời gian

Trân trọng

Lê Kế Nghiệp

Nghiên cứu sinh, Khoa y tế công cộng, Trường đại học Mahasarakham, Thái Lan

Appendix L

The Item Objective Congruence (IOC) Index of the VNDQOL Questionnaire

Item No.	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Total Score	The IOC Index Mean of Expert Score
1	1	1	0	1	1	4	IOCI = 4/5 = 0.8
2	1	1	1	1	1	5	IOCI = 5/5 = 1
3	1	1	1	1	1	5	IOCI = 5/5 = 1
4	1	1	1	1	1	5	IOCI = 5/5 = 1
5	1	1	1	1	1	5	IOCI = 5/5 = 1
6	1	1	1	1	1	5	IOCI = 5/5 = 1
7	1	1	0	1	1	4	IOCI = 4/5 = 0.8
8	1	1	1	0	1	4	IOCI = 4/5 = 0.8
9	1	1	-1	1	1	3	IOCI = 3/5 = 0.6
10	1	1	0	1	1	4	IOCI = 4/5 = 0.8
11	1	1	0	1	0	3	IOCI = 3/5 = 0.6
12	1	1	0	0	1	3	IOCI = 3/5 = 0.6
13	1	1	0	1	1	4	IOCI = 4/5 = 0.8
14	1	1	1	1	0	4	IOCI = 4/5 = 0.8
15	1	1	1	1	0	4	IOCI = 4/5 = 0.8
16	1	1	1	1	1	5	IOCI = 5/5 = 1
17	1	1	1	1	1	5	IOCI = 5/5 = 1
18	1	1	1	1	-1	3	IOCI = 3/5 = 0.6
19	1	1	1	1	-1	3	IOCI = 3/5 = 0.6
20	1	1	1	1	1	5	IOCI = 5/5 = 1
21	1	1	1	1	1	5	IOCI = 5/5 = 1
22	1	1	0	1	1	4	IOCI = 4/5 = 0.8
23	1	1	1	1	1	5	IOCI = 5/5 = 1
24	1	1	1	1	1	5	IOCI = 5/5 = 1
25	1	1	1	1	1	5	IOCI = 5/5 = 1
26	1	1	1	1	1	5	IOCI = 5/5 = 1
27	1	1	1	1	1	5	IOCI = 5/5 = 1
28	1	1	1	1	0	4	IOCI = 4/5 = 0.8
29	1	1	1	0	0	3	IOCI = 3/5 = 0.6
30	1	1	1	1	0	4	IOCI = 4/5 = 0.8
31	1	1	1	1	1	5	IOCI = 5/5 = 1
32	1	1	1	1	1	5	IOCI = 5/5 = 1
33	1	1	1	1	0	4	IOCI = 4/5 = 0.8
34	1	1	1	1	0	4	IOCI = 4/5 = 0.8
35	1	1	1	1	0	4	IOCI = 4/5 = 0.8
36	1	1	1	1	1	4	IOCI = 4/5 = 0.8
37	1	1	1	1	1	4	IOCI = 4/5 = 0.8
38	1	1	1	1	1	4	IOCI = 4/5 = 0.8
39	1	1	1	1	1	4	IOCI = 4/5 = 0.8
40	1	1	1	1	1	4	IOCI = 4/5 = 0.8
41	1	1	1	1	1	4	IOCI = 4/5 = 0.8
42	1	1	1	1	1	4	IOCI = 4/5 = 0.8

43	1	1	1	1	1	5	IOCI = 5/5 = 1
44	1	1	0	1	1	4	IOCI = 4/5 = 0.8
45	1	1	1	1	0	4	IOCI = 4/5 = 0.8
46	1	1	1	1	1	5	IOCI = 5/5 = 1
47	1	1	1	1	1	5	IOCI = 5/5 = 1
48	1	1	1	1	1	5	IOCI = 5/5 = 1
49	1	1	1	1	1	5	IOCI = 5/5 = 1
50	1	1	1	1	1	5	IOCI = 5/5 = 1
51	1	1	0	1	1	4	IOCI = 4/5 = 0.8
52	1	1	0	1	0	3	IOCI = 3/5 = 0.6
53	1	1	1	1	1	5	IOCI = 5/5 = 1
54	1	1	1	1	1	5	IOCI = 5/5 = 1
55	1	1	1	1	0	4	IOCI = 4/5 = 0.8
56	1	1	1	1	1	5	IOCI = 5/5 = 1
57	1	1	1	1	1	5	IOCI = 5/5 = 1
58	1	1	1	1	1	5	IOCI = 5/5 = 1
59	1	1	1	1	1	5	IOCI = 5/5 = 1
60	1	1	1	1	1	5	IOCI = 5/5 = 1
61	1	1	0	1	1	4	IOCI = 4/5 = 0.8
62	1	1	1	1	1	5	IOCI = 5/5 = 1
63	1	1	-1	1	1	3	IOCI = 3/5 = 0.6
64	1	1	-1	1	1	3	IOCI = 3/5 = 0.6
65	1	1	0	1	0	3	IOCI = 3/5 = 0.6
66	1	1	1	1	1	5	IOCI = 5/5 = 1
67	1	1	1	1	1	5	IOCI = 5/5 = 1
68	1	1	1	1	1	5	IOCI = 5/5 = 1

Appendix M

Descriptive analysis of the VNDQOL (N=45)

Question (Q)		Mean	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q	Contents			
28	In general would you say your health is?	153.62	0.799	0.953
29	How well are you able to concentrate in everything?	153.51	0.702	0.953
30	Have you had fatigue/felt very tired on the past three months?	152.73	0.823	0.952
31	How often do you miss your work because of your diabetes?	152.62	0.813	0.952
32	How does your eating and medication schedule affect your work?	152.29	0.663	0.953
33	How often does diabetes affect your efficiency at work?	152.76	0.826	0.952
34	How often do you find diabetes limiting your social life?	152.29	0.744	0.953
35	To what extent do you avoid traveling (business tour, holiday, general outings) because of your diabetes?	152.53	0.812	0.952
36	Compared to others of your age are your social activities (visiting friends/partying) limited because of your diabetes?	152.51	0.790	0.953
37	How often in last three months has your overall health problems limited the kind of vigorous activities you can do like lifting heavy bags/objects, running, skipping, jumping	153.09	0.778	0.952
38	How often in last three months has your overall health problems limited the kind of moderate activities you can do like moving a table, carrying groceries or utensils	152.64	0.838	0.952
39	How often in last three months has your overall health problems limited you from walking uphill or climbing 1-2 floors	152.44	0.792	0.953
40	How often in last three months has your overall health problems limited you from walking 1-2 km at a stretch	152.20	0.787	0.953
41	How often in last three months has your overall health problems limited you from bending, squatting, or turning	151.98	0.739	0.953

42	How often in last three months has your overall health problems limited you from eating, dressing, bathing, or using the toilet	151.64	0.595	0.955
43	How satisfied are you with your current diet?	152.96	0.755	0.953
44	How happy are you with current eating habits as compared to before the onset of diabetes?	152.98	0.720	0.953
45	Do you find it a burden to follow the diet you are supposed to take?	152.67	0.681	0.953
46	Are you still able to enjoy the food you like to eat now, as compared to before the onset of diabetes?	153.38	0.471	0.955
47	Do you feel sad that you are unable to eat freely as before?	152.82	0.696	0.953
48	Do you feel left out that you are unable to eat what others do?	152.27	0.643	0.954
49	How satisfied are you with your current diabetes treatment?	152.91	0.511	0.954
50	How satisfied are you with amount of time it takes to manage your diabetes?	153.04	0.638	0.954
51	How satisfied are you with the amount of time you spend getting regular checkups (once in 3 months)?	152.98	0.342	0.955
52	A person with diabetes needs to exercise for 35-45 minutes, 4 times a week. Keeping this in mind how satisfied are you with the time you spend exercising?	153.40	0.267	0.956
53	How many times in the past three months have you had thirst/dry mouth?	152.40	0.516	0.954
54	How many times in the past three months have you felt excessive hunger?	152.38	0.454	0.955
55	How many times in the past three months have you had frequent urination related to diabetes management?	152.40	0.513	0.954
56	Do you spend time worrying about your medical cost?	152.00	0.475	0.954
57	Do you feel that diabetes have increased your financial burden?	151.98	0.432	0.955
58	Do you have difficulties in paying for your medical expenses?	151.71	0.178	0.955
59	Do you spend time worrying about your future medical expenses?	152.02	0.494	0.954
60	Are you in constant fear that you may be a burden financially to your family?	152.04	0.509	0.954
61	How satisfied are you with yourself?	152.71	0.840	0.952

62	How satisfied are you with your personal relationships (family, friends, relatives and acquaintances)?	152.44	0.638	0.954
63	How satisfied are you with the emotional support you get from your friends and family?	152.38	0.355	0.955
64	How often are you discouraged by your health problem?	153.60	0.194	0.957
65	To what extent do you feel that you have been able to fulfill certain roles and lead your lives in a purposeful manner?	153.29	0.690	0.953
66	How do you find your relationship with your spouse/partner?	153.91	0.083	0.957
67	How would you describe your sexual relationship now as compared to before the onset of diabetes?	154.36	0.057	0.957
68	How is your sexual desire as compared to before the onset of diabetes?	154.33	0.070	0.957

Appendix N (English version)

INVITATION LETTER AS THE EXPERT FOR BROCHURE AND DIABETIC KNOWLEDGE, ATTITUDE AND PRACTICE QUESTIONNAIRE

To: .....

Dear .....,

I am Le Ke Nghiep a doctoral degree of Public Health student from the Faculty of Public Health, Thailand. I am going to commit my research on the topic of "*The development of health-related quality of life programme among type 2 diabetic patients in Tam Binh district, Vinh Long province, Vietnam*". I work under my supervisors as Asst. Prof. Niruwan Turnbull, Ph.D. (Mahasarakham University); Assoc. Prof. Cuong Van Dam, Ph.D. (Can Tho University of Medicine and Pharmacy); and Asst. Prof. Santisith Khewkhen, Ph.D. (Mahasarakham University); Surasak Thiabrithi Ph.D. (Mahasarakham University).

We would like to invite you as an expert to evaluate the brochure and the Diabetic Knowledge, Attitude and Practice (KAP) questionnaire. Thes brochure and questionnaire will be the conduct of our research operation. Therefore, your opinions will be valuable for us as an assessment of the validity of this questionnaire.

We would appreciate your participation in this important process for the development of a new questionnaire. If you agree, please complete the attached forms and return it by email to lekenghiep@gmail.com.

Should you wish to discuss the questionnaire or your participation in more detail please feel free to contact me on telephone (+84-919281591 or +66-985920699), Line (Nghiep), Zalo (Nghiep), Facebook (Ke Nghiep Le), Email (lekenghiep@gmail.com or 60011460011@msu.ac.th).

Thank you in advance for your time,

Yours sincerely,

Le Ke Nghiep
Doctoral of Public Health (Candidate)
Faculty of Public Health
Mahasarakham University, Thailand

Appendix O

THƯ MỜI LÀM CHUYÊN GIA ĐÁNH GIÁ TỜ RƠI VÀ BỘ CÂU HỎI KIẾN THỨC, THÁI ĐỘ VÀ HÀNH VI ĐÁI THÁO ĐƯỜNG

Đến: .....

Kính chào .....,

Chúng tôi gồm có: Lê Kế Nghiệp, nghiên cứu sinh trường đại học Mahasarakham, Thái Lan; Phó giáo sư, Tiến sỹ Niruwan, hướng dẫn khoa học, trường đại học Mahasarakham; Phó giáo sư, Tiến sỹ Đàm Văn Cương, đồng hướng dẫn khoa học, trường đại học y dược Cần Thơ, Việt Nam; Phó giáo sư, Tiến sỹ Santisith Khiewkhern, và Tiến sỹ Surasak Thiabrithi, đồng hướng dẫn khoa học, trường đại học Mahasarakham.

Chúng tôi trân trọng kính mời bạn làm chuyên gia đánh giá tờ rơi và bộ câu hỏi kiến thức, thái độ và hành vi đái tháo đường (KAP)". Đây là tài liệu và bộ câu hỏi được chúng tôi sử dụng trong nghiên cứu "Phát triển chương trình chất lượng cuộc sống liên quan đến sức khỏe ở bệnh nhân đái tháo đường loại 2 ở huyện Tam Bình, tỉnh Vĩnh Long, Việt Nam". Mục đích tham gia của quí vị nhằm lấy ý kiến về tính toàn diện, rõ ràng và chất lượng của bộ câu hỏi.

Chúng tôi biết rằng quí vị đang rất bận rộn trong lĩnh vực của mình, nhưng vì đầu vào quan trọng mà quý vị có thể mang đến cho nghiên cứu của chúng tôi, chúng tôi hy vọng rằng quí vị sẽ đồng ý tham gia.

Chúng tôi sẽ đánh giá cao sự tham gia của quí vị trong quá trình phát triển bảng câu hỏi mới. Nếu quí vị đồng ý, xin vui lòng điền vào mẫu đính kèm và gửi lại qua thư điện tử: lekenghiep@gmail.com hoặc trực tiếp cho tôi.

Nếu quí vị muốn thảo luận về bộ câu hỏi hoặc sự tham gia của quí vị một cách chi tiết hơn, vui lòng liên hệ với tôi qua điện thoại (+84-919281591/+66-985920699), Line (Nghiep), Zalo (Nghiep), Facebook (Ke Nghiep Le), Email (lekenghiep@gmail.com hoặc 60011460011@msu.ac.th).

Cảm ơn quí vị trước vì đã dành thời gian

Trân trọng

Lê Kế Nghiệp

Nghiên cứu sinh, Khoa y tế công cộng, Trường đại học Mahasarakham, Thái Lan

Appendix P
The Item Objective Congruence (IOC) Index of the KAP Questionnaire

Section	Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Total Score	The IOC Index Mean of Expert Score
Knowledge	1	1	1	1	1	1	5	IOCI = 5/5 = 1
	2	1	1	1	1	1	5	IOCI = 5/5 = 1
	3	1	1	1	1	1	5	IOCI = 5/5 = 1
	4	1	1	1	1	1	5	IOCI = 5/5 = 1
	5	1	1	1	1	1	5	IOCI = 5/5 = 1
	6	1	1	1	1	1	5	IOCI = 5/5 = 1
	7	1	1	1	1	1	5	IOCI = 5/5 = 1
	8	1	1	1	1	1	5	IOCI = 5/5 = 1
	9	1	1	1	1	1	5	IOCI = 5/5 = 1
	10	1	1	1	1	1	5	IOCI = 5/5 = 1
Attitude	1	1	1	1	1	1	5	IOCI = 5/5 = 1
	2	1	1	1	1	1	5	IOCI = 5/5 = 1
	3	1	1	1	1	1	5	IOCI = 5/5 = 1
	4	1	1	1	1	1	5	IOCI = 5/5 = 1
	5	1	1	1	1	1	5	IOCI = 5/5 = 1
	6	1	1	1	1	1	5	IOCI = 5/5 = 1
	7	1	1	1	1	1	5	IOCI = 5/5 = 1
	8	1	1	1	1	1	5	IOCI = 5/5 = 1
	9	1	1	1	1	1	5	IOCI = 5/5 = 1
	10	1	1	1	1	1	5	IOCI = 5/5 = 1
Practice	1	1	1	1	1	1	5	IOCI = 5/5 = 1
	2	1	1	1	1	1	5	IOCI = 5/5 = 1
	3	1	1	1	1	1	5	IOCI = 5/5 = 1
	4	1	1	1	1	1	5	IOCI = 5/5 = 1
	5	1	1	1	1	1	5	IOCI = 5/5 = 1
	6	1	1	1	1	1	5	IOCI = 5/5 = 1
	7	1	1	1	1	1	5	IOCI = 5/5 = 1
	8	1	1	1	1	1	5	IOCI = 5/5 = 1
	9	1	1	1	1	1	5	IOCI = 5/5 = 1
	10	1	1	1	1	1	5	IOCI = 5/5 = 1

Appendix Q: Article publications

1. Diabetes Specific Quality of Life in the Association of Southeast Asian Nations: A Systematic Review, Journal of Clinical and Diagnostic Research. 2020 May, Vol-14(5): LE01-LE06,https://jcdr.net/article_fulltext.asp?issn=0973-709x&year=2020&volume=14&issue=5&page=LE01&issn=0973-709x&id=13696.

2. The Reliability and Validity of a Questionnaire of Health-Related Quality of Life: Concerning for Diabetes Patient in Vietnamese, International Journal of Innovative Science and Research Technology May- 2019, Volume 4, Issue 5: 1198-211, https://www.ijisrt.com/the-reliability-and-validity-of-a-questionnaire-of-health-related-quality-of-life-concerning-for-diabetes-patient-in-vietnamese.

3. The Development of Health-Related Quality of Life Programme Among Type 2 Diabetic Patients in Tam Binh District, Vinh Long Province, Vietnam, International Journal of Public Health and Clinical Sciences, September/October 2019, Vol.6, No. 5, 167-79, https://doi.org/10.32827/ijphcs.6.5.167.

4. The Health-Related Quality of Life of Vietnamese Type 2 Diabetic Patients, the Medicine and Health journal (reviewed)

5. Impact of Knowledge, Attitudes, and Practices of Type 2 Diabetes Patients: a study in the Local of Vietnam, Journal of Education and Health Promotion (accepted).

6. The assessment of health-related quality of life and knowledge, attitudes and practices of type 2 diabetics after participating in health education programs: a study in the local of Vietnam, (Prepare to submit a journal)

LIST OF ABBREVIATIONS

15D	15-dimension instrument
ADDQoL	Audit of Diabetes-Dependent Quality of Life
ADDQoL-18	Audit of Diabetes-Dependent Quality of Life-18
ADDQoL-19	Audit of Diabetes-Dependent Quality of Life-19
ADS	Appraisal of Diabetes Scale
AIDS	Acquired Immune Deficiency Syndrome
AIs	American Indians
ANOVA	Analysis of variance
ASEAN	Association of Southeast Asian Nations
Asian DQoL	Asian diabetes quality of life
BAPADI	Barriers to physical activity in diabetes (type 1)
BMI	Body mass index
CAPN10	CAPN10 gen encodes for calpain-10 protease
CDC	Centers for disease control and prevention
CFA	Confirmatory factor analysis
D-39	Diabetes 39
DES	Diabetes empowerment scale
DHP	Diabetes health profile
Diabetes-CAT	Computerised adaptive testing
DIS	Diabetes impact survey
DM	Diabetes mellitus
DOQ	Diabetes obstacles questionnaire
DQLCTQ	Diabetes quality of life clinical trial questionnaire
DQOL	Diabetes quality of life measure
DQoL-BCI	Diabetes quality of life-brief clinical inventory
Dr	Doctor
Dr.P.H	Doctoral of public health
DSC-R	Diabetes symptom checklist-revised
	Diabetes treatment satisfaction questionnaire for inpatients

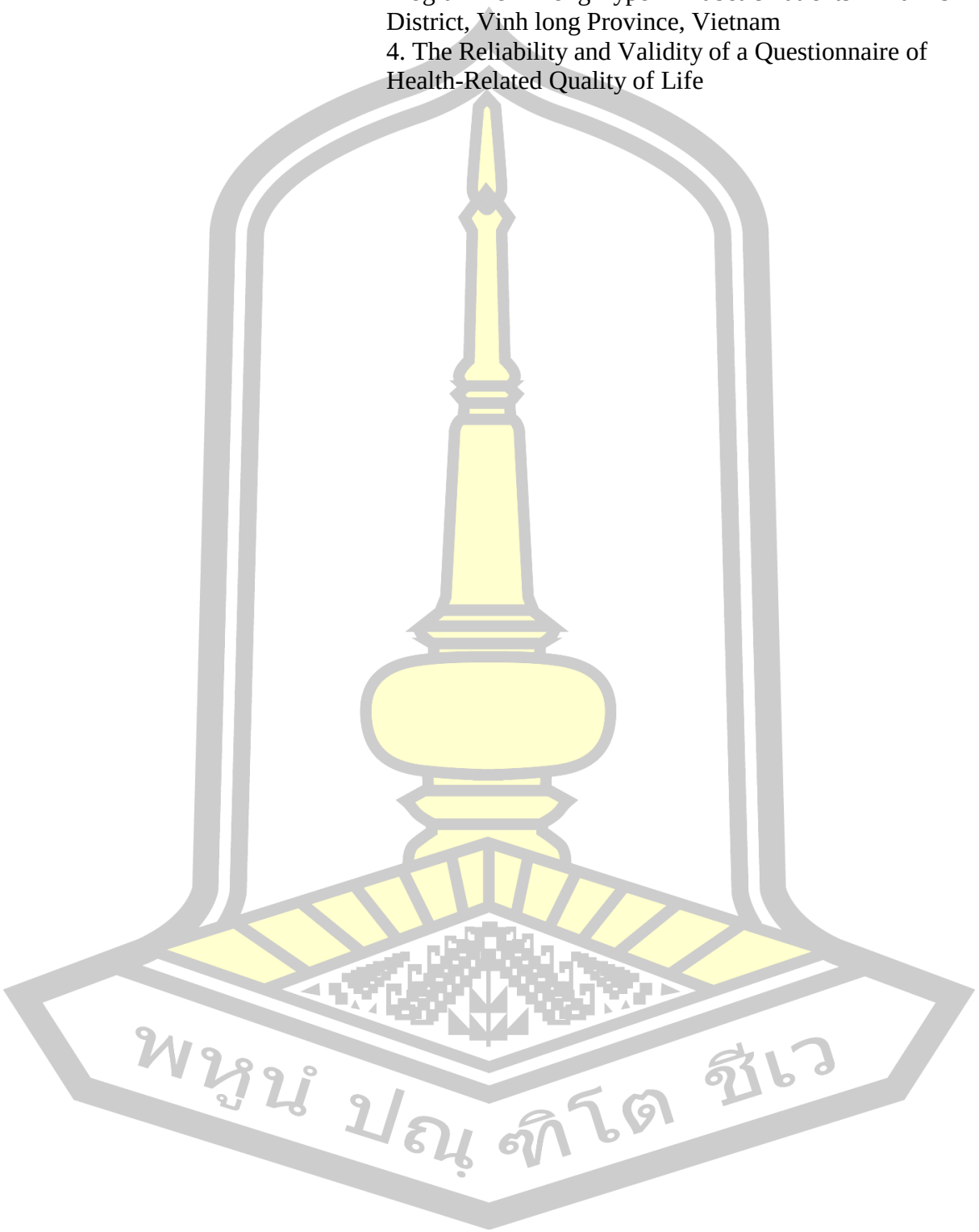
DSQOL	Diabetes treatment satisfaction questionnaire
DTSQ-IP	Diabetes specific quality of life
DTSQs, DTSQc	
EH	Environmental health
ESRD	End-stage renal disease
EQ-5D	EuroQoL-5 dimension
EQ-5D-3L	EuroQoL-5 dimension-3 level version
FFA	Free fatty acids
GL	Glycemic load
HbA_1C	Glycated hemoglobin
HIV	Human immunodeficiency virus
HDL	High density lipoprotein
HRQoL	Health-related quality of life
IBM SPSS	IBM Statistical package for the social sciences
IDF	International diabetes federation
IDI	In-depth interviews
IFG	Impaired fasting glucose
IGT	Impaired glucose tolerance
IOC	Item objective congruence index
ITSQ	Insulin treatment satisfaction questionnaire
IVI	Impact of visual impairment questionnaire
KAP	Knowledge, attitude and practice
KCNJ11	KCNJ11 gen encodes for Kir6.2 channel
MD	Medical doctor
MENQOL	Menopause-specific quality of life
N	Number
NCDs	Non-communicable diseases
NHBs	Non-Hispanic blacks
NHWs	Non-Hispanic whites
PAID	Problem areas in diabetes scale

PH	Physical health
PhD	Phylosophy doctor
PPARG	Peroxisome proliferator-activated receptor gamma
PSH	Psychological health
Q	Question
QoL	Quality of life
QOLID	Quality of life instrument for Indian diabetes
SD	Standard deviation
SF-12	Short form-12
SF-36	Short form-36
SF-6D	MOS 6-item short form health survey
SG	Standard gamble
SOADAS	Satisfaction with oral anti-diabetic agent scale
SPSS	Statistical package for social sciences
SR	Social relationships
T1DM	Type one diabetes mellitus
T2DM	Type two diabetes mellitus
TCF7L2	Transcription factor 7-like 2
TNF-α	Tumor necrosis factor alpha
TTO	Time Trade-Off
UK	United Kingdom
US	United States
USA	United States of America
VAS	Visual Analog Scale
VND	Vietnam dong
VNDQOL	Vietnamese diabetic quality of life
WHO	World Health Organization
WHOQOL-BREF	World Health Organization quality of life brief
WHOQOL-100	World Health Organization quality of life 100

BIOGRAPHY

NAME	Nghiep Ke Le
DATE OF BIRTH	28/04/1982
PLACE OF BIRTH	Vinh Long province - Vietnam
ADDRESS	Number 74, Vo Tan Duc street, Group 2, Tam Binh town, Tam Binh district, Vinh Long province, Vietnam
POSITION	Doctor
PLACE OF WORK	Tam Bình Health Center, Tam Bình Town, Tam Bình district, Vĩnh Long province, Vietnam
EDUCATION	1. The bachelor degree of general medicine doctor University of medicine and pharmacy at Ho Chi Minh city (UMP) in 2007 2. The degree of master medicine Can Tho University of medicine and pharmacy (CTUMP) in 2013 3. The doctor degree of Doctor of Public Health (Dr.P.H) Mahasarakham University (MSU) in 2021
Research grants & awards	1. The Treatment of Bladder Stones by Mechanical Lithotripsy at The General Central Hospital of Can tho (2013) 2. A Systematic Literature Review of Diabetes-specific Quality of Life in Asean. (2018) 3. Comparing Quality of Life of Diabetic People in Asean, Europe And United Stated : A Systematic Literature Review. (2018) 4. The Development of Health-Related Quality of Life Programme Among Type 2 Diabetic Patients in Tam binh District, Vinh long Province, Vietnam (2019) 5. The Reliability and Validity of a Questionnaire of Health-Related Quality of Life (2019) 6. The Health-Related Quality of Life of Vietnamese Type 2 Diabetic Patients 7. The assessment of health-related quality of life and knowledge, attitudes and practices of type 2 diabetics after participating in health education programme: a study in the local of Vietnam (2020) 8. The Evaluation of the Results of Renal Cyst Treatment by Retroperitoneal Laparoscopic Decortication (2021)
Research output	1. The Treatment of Bladder Stones by Mechanical Lithotripsy 2. Diabetes Specific Quality of Life in the Association of Southeast Asian Nations - A Systematic Review

3. The Development of Health-Related Quality of Life Programme Among Type 2 Diabetic Patients in Tam binh District, Vinh long Province, Vietnam
4. The Reliability and Validity of a Questionnaire of Health-Related Quality of Life



พหูน ปณ ฑิโต ชีเว