FACTORS INFLUENCING QUALITY OF LIFE AMONG ELDERLY POPULATION WITH TYPE 2 DIABETES MELLITUS: A CLINIC BASED CROSS SECTIONAL STUDY IN KATHMANDU VALLEY

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for the Degree of Master of Public Health Program in Public Health
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ปัจจัยที่มีผลต่อคุณภาพชีวิตของผู้ป่วยโรคเบาหวานชนิดที่ 2 ในกลุ่มผู้สูงอายุ: การศึกษาภาคตัดขวางในโรงพยาบาลเอกชน

นางสาวกริธิ อดิการิ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
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Thesis Title	FACTORS INFLUENCING QUALITY OF LIFE AMONG ELDERLY POPULATION WITH TYPE 2 DIABETES MELLITUS: A CLINIC BASED CROSS SECTIONAL STUDY IN KATHMANDU VALLEY
By	Miss Kriti Adhikari
Field of Study	Public Health
Thesis Advisor	Professor Peter Xenos, Ph.D.

Accepted by the College of Public Health Sciences, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master's Degree

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กริธิ อดิการิ : ปัจจัยที่มีผลต่อคุณภาพชีวิตของผู้ป่วยโรคเบาหวานชนิดที่ 2 ในกลุ่มผู้สูงอายุ: การศึกษาภาคตัดขวางในโรงพยาบาลเอกชน (FACTORS INFLUENCING QUALITY OF LIFE AMONG ELDERLY POPULATION WITH TYPE 2 DIABETES MELLITUS: A CLINIC BASED CROSS SECTIONAL STUDY IN KATHMANDU VALLEY) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ปีเตอร์ ซีนอส, 121 หน้า.

ความเป็นมา: โรคเบาหวานเป็นหนึ่งในสี่กลุ่มโรคไม่ติดต่อที่สำคัญ มีการแพร่หลายไปทั่วโลกและมีแนวโน้มเพิ่มขึ้น ส่งผลให้คุณภาพชีวิตเสื่อมถอยลงโดยเฉพาะผู้สูงอายุ ทั้งนี้มีปัจจัยหลายประการที่มีอิทธิพลต่อคุณภาพชีวิตของผู้สูงอายุ การศึกษานี้จึงมีวัตถุประสงค์เพื่อหาปัจจัยที่มีอิทธิพลต่อคุณภาพชีวิตของผู้สูงอายุในหุบเขากาฐมาณฑุ ประเทศเนปาล

วิธีการวิจัย: การศึกษานี้มีการสุ่มตัวอย่างกลุ่มผู้ป่วยโรคเบาหวานที่เป็นผู้สูงอายุจำนวน 310 ราย โดยเป็นผู้ป่วยที่มาตรวจที่คลินิกโรคเบาหวานที่ศูนย์เบาหวานกาฐมาณฑุ และศูนย์ธัยรอยด์ในหุบเขากาฐมาณฑุ ประเทศเนปาล โดยมีการสัมภาษณ์แบบตัวต่อตัวเพื่อให้ได้ข้อมูลโดยใช้ภาษาเนปาลีที่แปลจาก WHOQOL BREF ทั้งนี้ ได้มีการหาความสัมพันธ์ของตัวแปรอิสระและตัวแปรตามโดยใช้การประเมินจากการวิเคราะห์สองตัวแปร (Bivariate Analysis) และใช้การทดสอบ t-test ANOVA สหสัมพันธ์ของเพียร์สัน และการวิเคราะห์หลายตัวแปร โดยใช้การวิเคราะห์การถดถอยเชิงเส้นหลายแบบจากห้ารูปแบบ

ผลการวิจัย: การวิเคราะห์เชิงพรรณนา (Descriptive Analysis) พบว่ามากกว่าครึ่งหนึ่งของผู้ตอบแบบสอบถามมีคุณภาพชีวิตในระดับปานกลางและสถิติการวิเคราะห์พบว่าปัจจัยต่างๆ เช่น อายุ เพศ สถานภาพสมรส รายได้ ระดับการศึกษา การดำเนินชีวิต การจัดการภาวะเบาหวาน การตรวจระดับน้ำตาลในเลือด ภาวะแทรกซ้อน ชั่วโมงการทำงาน มีความสัมพันธ์กับคะแนนคุณภาพชีวิตทั้งหมด

ผลสรุป: หลากหลายปัจจัยมีผลต่อคุณภาพชีวิต และไม่ใช่แค่ความใส่ใจในสุขภาพเท่านั้น เรื่องอื่นๆ ในชีวิตก็ควรได้รับการดูแลด้วยเช่นกัน นอกจากนี้ การดูแลจัดการตนเองในโรคเบาหวาน ถือว่าเป็นหนึ่งในปัจจัยที่มีความสำคัญในหมู่ประชากรที่เป็นโรคเบาหวาน ซึ่งเป็นสิ่งสำคัญในการเสริมสร้างสุขภาพที่ดี การควบคุมระดับน้ำตาลในเลือดที่ดีขึ้น มีภาวะแทรกซ้อนน้อยลง และทำให้คุณภาพชีวิตดียิ่งขึ้น ดังนั้นควรจัดให้มีการฝึกอบรมด้านการจัดการตนเอง (Self-management) เพื่อเพิ่มทักษะในการเผชิญกับความเครียด และควรจัดทำยุทธศาสตร์ที่มีประสิทธิภาพและสอดคล้องกัน เพื่อให้ผู้สูงอายุสามารถจัดการกับชีวิตได้ในหลายด้าน ซึ่งส่งผลต่อคุณภาพชีวิตที่ดีขึ้น

สาขาวิชา สาธารณสุขศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2560 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

5978828553 : MAJOR PUBLIC HEALTH

KEYWORDS: QUALITY OF LIFE, TYPE 2 DIABETES MELLITUS, AGEING, NEPAL

KRITI ADHIKARI: FACTORS INFLUENCING QUALITY OF LIFE AMONG ELDERLY POPULATION WITH TYPE 2 DIABETES MELLITUS: A CLINIC BASED CROSS SECTIONAL STUDY IN KATHMANDU VALLEY. ADVISOR: PETER XENOS, Ph.D., 121 pp.

Background: Diabetes is one of the four priority non communicable disease whose worldwide prevalence is at an increasing trend and is accompanied by deterioration of quality of life especially that of the elderly population. Several factors contribute to influence quality of life among the elderly; therefore, this study aims to identify the factors that influence quality of life among elderly population of Kathmandu valley, Nepal

Methods: A cross sectional survey was conducted among random sample of 310 elderly diabetic patients visiting diabetic clinic of Kathmandu Diabetes and Thyroid center in Kathmandu valley, Nepal. Translated Nepali version of WHOQOL BREF was administered through face to face interview in order to obtain the data. Association of independent and dependent variables were assessed in bivariate analysis using Independent sample t-test, ANOVA and Pearson correlation and Multivariate analysis was done using multiple linear regression analysis with estimation of five models.

Results: Descriptive analysis showed that more than half of the respondents had moderate quality of life and analytical statistics showed that factors such as age, sex, marital status, income, educational level, lifestyle, diabetes self-management, fasting blood sugar level, complications, convenient hours of operation to be significantly associated with total score of quality of life.

Conclusion: Several factors contributed to influence quality of life and in addition to health attention should be paid to other aspects of their life also. Among several factors diabetes self-management is one critical factor among diabetic population which is essential to enhance wellbeing, better glycemic control, fewer complication and hence improve quality of life. Therefore, self-management training with an effort to enhance coping skills should be incorporated and effective strategies should be formulated in order to deal with several aspects of life of elderly population that could influence their quality of life.

Field of Study: Public Health Student's Signature .....

Academic Year: 2017 Advisor's Signature .....

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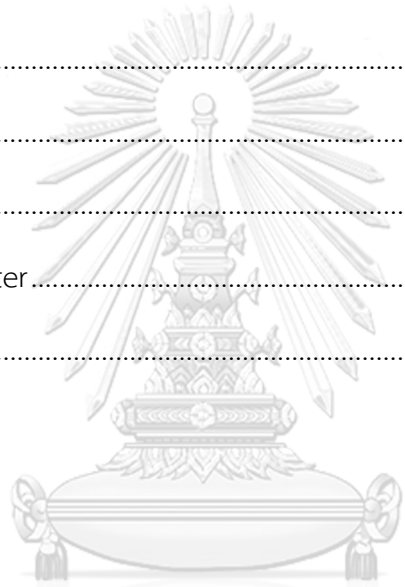

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LIST OF ABREVIATIONS

ADA: American diabetic association

ANOVA: Analysis of Variance

CBS: Central Bureau of Statistics

DM: Diabetes Mellitus

DSMQ: Diabetes Self-Management Questionnaire

ESRD: End Stage Renal Disease

FBS: Fasting blood sugar

GDP: Gross Domestic product

HbA1c: Glycosylated Hemoglobin

HRQOL Health Relates Quality of Life

IDF: International Diabetes Federation

NCD: Non Communicable Disease

NHRC Nepal Health Research Council

MOHP: Ministry of Health and Population

OPD: Outpatient Department

QOL: Quality of Life

UN: United Nations

WHO: World Health Organization

WHOQOL: World Health Organization Quality of Life

CHAPTER 1

INTRODUCTION

1.1 Background and Rationale

Worldwide prevalence of non-communicable diseases is increasing at an alarming rate. With 38 million global deaths in 2012, the four priority non communicable diseases (NCDs), such as diabetes, chronic respiratory diseases, cancers and cardiovascular diseases have the greatest share of mortality in the world. (WHO, 2017c)

Diabetes Mellitus is a chronic non communicable disease caused by inherited or acquired deficiency in production of insulin by the pancreas, or by the decreased effectiveness of the insulin produced resulting in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, especially the blood vessels and nerves. (WHO, 2017a)

In comparison with 108 million individuals with diabetes in 1980, it was evaluated that around 422 million adults were living with diabetes in 2014 causing 4.9 million deaths globally (First WHO Global account on diabetes). This demonstrates that there is expanding pattern in worldwide prevalence of diabetes which has almost doubled, ascending from 4.7% to 8.5% since 1980 and is likely to increase furthermore in decades to come. By far most of cases of diabetes fall into two etiopathogenetic classifications, type 1 and type 2 where 90% of the total population fall into the category of type 2.A person with type 2 diabetes is 2 – 4 times more likely to have cardiovascular diseases such as stroke, myocardial infarction and coronary artery disease which is responsible for 80% of the total deaths (Tabish, 2007) (Gyawali et al., 2015).Almost 80% of the total adult diabetics are in living in low and middle income countries and have the highest premature deaths(<70 years) due to diabetes

than the high income nations . However, by 2030, the number of individuals of more than 60-year age group with diabetes in low and middle income nations is expected to increase two fold whereas in high income nations an increase of only 38% is expected with slight decrease in number of younger age group. (Shaw, Sicree, & Zimmet, 2010). Each year 7 million individuals are diagnosed with Diabetes and the most dramatic increments in type 2 Diabetes have occurred where there have been rapid and significant changes in lifestyle, exhibiting the vital role played by lifestyle factors and the potential for switching the worldwide epidemic (Tabish, 2007)

A rapid increase in prevalence over the last two decades in the South Asian region was reported by a systematic review conducted in 2012 (Gyawali et al., 2015). As per International Diabetes Federation (IDF) estimation, the prevalence of type 2 diabetes in South Asia in 2011 is shown below (Fig. 1). Factors such as increasing urban residence, advanced age, family history, poor lifestyle , high BMI and hypertension were observed to be major drivers behind the increasing prevalence of diabetes in South Asia (Jayawardena et al., 2012)

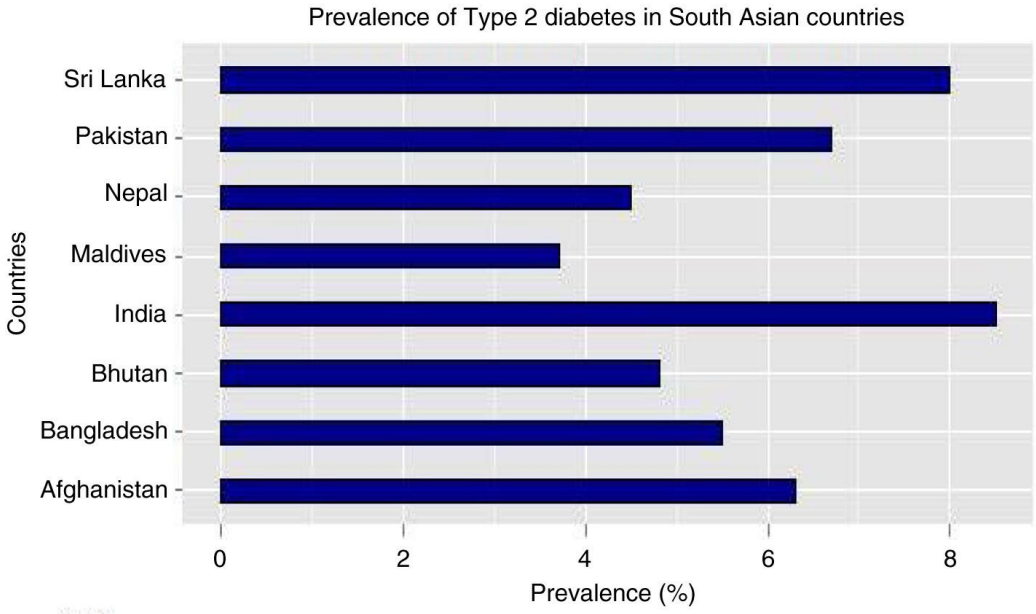

Figure 1: Prevalence of Type 2 diabetes in South Asian countries. Source: International Diabetes Federation, 2012.

Like other developing countries Nepal is also going through its epidemiological transition, from high prevalence of communicable to that of non-communicable

disease and is currently facing double burden of diseases.(Aryal et al., 2015) .According to World bank, NCD's impose a largest health burden in Nepal as it accounts for 60% of the total disease burden and the prevalence of NCDs including type 2 diabetes is expected to rapidly increase in the near future .

A number of cross-sectional studies have reported the prevalence of Type 2 DM in different settings in Nepal. For instance, a study to demonstrate the prevalence of Diabetes Mellitus among elderly population aged 60 years and above in Kathmandu, it was seen that the general predominance of Type 2 DM was 25.9% and almost half of the cases were diagnosed amid the study (Chhetri & Chapman, 2009). Elevated state of heterogeneity with prevalence rates ranging from 1.4 to 19.0% have been observed in a systematic survey and meta-analysis which gathered prevalence studies of 14-year period (2000-2014). A study by Shrestha et al. in 2006 also reported that 54.4% (53.8% of men and 55.1% of women) were undiagnosed (Shrestha, Singh, & Bhattarai, 2006b), where other studies have also reported similar outcome (Singh & Bhattarai, 2003) (Ono et al., 2007)

Diabetes being a chronic disease, with its rising prevalence people diagnosed with diabetes mellitus face more number of complications and a high cost burden in the long run. As per studies carried out in Nepal, the prevalence of complications in type 2 DM patients were Diabetic retinopathy (19.3–78%), ocular problems (39%), neurological problems (Diabetic neuropathy) 25%, renal problems (Diabetic nephropathy) 25%, diabetic foot 21.4%, depressive symptoms 6.2–54.1%. It was likewise detailed that the aggregate direct cost every year for a patient living with diabetes for 16-20 years of illness in Nepal is roughly 161% higher than for a patient with history of type 2 DM for 1-5 years.(Niraj Shrestha, Shyam Prasad Lohani, Mirak Raj Angdembe, Kreepa Bhattarai, & Jyoti Bhattarai, 2013)

With the burden of NCD's increasing every year, there has been minimal effort with regard for prevention and control of diabetes mellitus. In a country like Nepal where only 6% of its GDP is spent on -health care with limitation of resources and most of the expenditure (about 70%) being out-of-pocket, non-communicable disease like

diabetes mellitus bring about additional challenges to the individual, society and nations' healthcare system as a whole. As per the annual health report of Nepal, neither government nor other development partners have taken initiatives to deal with NCDs. The nation has one of the most deprived health systems in the world with a density of nurses, medical doctors and midwives of 0.67 per 1,000 population which is far less than the benchmark set by WHO that is 2.3 health care professionals per 1,000 population.(MoHP, 2013) The issue is even worse at district and peripheral level due to concentration of health care facilities and medical specialists in the urban areas. The availability of drugs for the treatment of NCDs is extremely poor in comparison to the availability of drugs for acute conditions. Nonetheless, this issue has been further driven by poor service delivery, inadequate infrastructure, poor access to new technologies and financial instability with increasing health care costs. One of the factors hindering to carry out the intervention at primary level for prevention and early diagnosis of diabetes mellitus is low budget allocation by the government for NCDs which is 0.7% and even less for diabetes mellitus.

Thus, the concern is not only the rising prevalence of diabetes in Nepal and in the world, but also its long term complications, level of self-care awareness among patients, treatment and increase in medical costs affecting economy, health systems, households and the economic burden it causes on an individual and society which has a huge impact on their quality of life.

Quality of life and Diabetes

"Quality of life (QOL) is the general wellbeing of individuals and societies, outlining negative and positive features of life. It observes life satisfaction, including everything from physical health, family, education, employment, wealth, religious beliefs, finance and the environment" (Barcaccia et al., 2013).

As per WHO, one of the most essential aspects of care for patients with chronic disease like diabetes is their quality of life (QOL). Studies suggest that people suffering from Type 2 diabetes mellitus have several psychological and emotional wellbeing issues indicating a low quality of life. Moreover, due to tremendous burden

of the disease in the society, its impact on QOL is one of the major concerns to patients, their families, health care providers and even employers and payers. It intends to assess the individual's perception of health, wellbeing and other aspects of life. As QOL is closely related to chronic diseases and their risk factors, measuring QOL would help determining the burden and impact of chronic diseases and gain new insights in the relationship between QOL and risk factors. It would also help distinguish subgroups with relatively poor perceived health, monitor progress and guide mediations in order to enhance their health status and forestall serious complications.

Factors such as gender, age, co morbid conditions, presence or severity of complications, diabetes, treatment regimen and self-management behavior have been found to influence the quality of life in diabetic patients(Lin, Yang, Yin, & Lin, 2016; Luscombe).The aim of clinical and self-management of DM is to improve metabolic control, reduce and prevent acute and chronic complications, and optimize quality of life. Engaging patients to range of self-care practices such as adherence to medication protocols, monitoring symptoms and modifying behaviors and diet have been shown to be vital for effective self-management. (Bartlett, 1986)

Education is another indicator of socioeconomic status which is related to QOL in diabetes (R. R. Rubin & M. Peyrot, 1999) Similarly, access to health care is another important factor as it impacts one's overall mental, social, physical health status and quality of life. The US Department of Health and Human Services identified access to health care-related factors as the most significant barriers to equitable care in people with chronic conditions and must be addressed as an important first step toward eliminating healthcare disparities (Hossain, Ehtesham, Salzman, Jenson, & Calkins, 2013)

The gradual demographic transition of the world's population to old age and increase in life expectancy is frequently associated with higher extent of chronic disorders, their complications and functional impairments(Teymoori, Dadkhah, & Shirazikhah, 2006). Researching about the QOL of the elderly is imperative on the grounds that numbers of medical problems are confronted by them in old age which limit their autonomy and capacity to take part in life exercises. The importance of assessment is

demonstrated by the observation that about 85 percent of the population older than 65 are diagnosed with at least one chronic condition, and 42 per cent are limited in function. (RL, 1981).

While several studies have tended to the issue of QOL among diabetes patients (Kiadaliri, Najafi, & Mirmalek-Sani, 2013) (Thommasen, Berkowitz, Thommasen, & Michalos, 2005) over various cultural settings globally, a little is known about the concept of QOL in Nepal .On reviewing a number of available online resources (PubMed, Medscape, EMBASE, the Cochrane Library) using the keywords "focusing quality of life", "Diabetes and Nepal", "quality of life and elderly", very few researches on quality of life focusing on elderly and a single research in health related quality of life among patients with type 2 diabetes mellitus was available. Therefore, this study into quality of life is an endeavor to identify and address the factors that influence quality of life in elderly population in hopes of maintaining their versatility, dynamic commitment to society and independence, helping them deal with the challenges of old age and bring about constructive and positive experience of ageing.

1.2 Research Objectives

1.2.1 General Objectives

- To determine the factors influencing to quality of life among elderly population diagnosed with type 2 diabetes mellitus in Kathmandu Diabetes and Thyroid Center in Kathmandu, Nepal

1.2.2 Specific Objectives

- To assess the level of quality of life of elderly population diagnosed with type 2 diabetes mellitus in Kathmandu Diabetes and Thyroid Center in Kathmandu, Nepal
- To ascertain relationship between self-management behavior and quality of life of elderly population diagnosed with type 2 diabetes mellitus in Kathmandu Diabetes and Thyroid Center in Kathmandu, Nepal.
- To determine an association of demographic characteristics, socioeconomic status, lifestyle, medical history, access to health care services with quality of

life among elderly population diagnosed with type 2 diabetes mellitus visiting Kathmandu Diabetes and Thyroid Center in Kathmandu, Nepal

1.3 Research Question

- **1**. What is the quality of life among elderly population diagnosed with type 2 diabetes mellitus visiting Kathmandu Diabetes and Thyroid center, Kathmandu, Nepal?
- **2**. What are the factors that are associated with the quality of life of elderly population diagnosed with type 2 diabetes mellitus visiting Kathmandu Diabetes and Thyroid center, Kathmandu, Nepal?

1.4 Hypothesis

Hypothesis 1

Null Hypothesis

- There is no association between self-management behavior, and quality of life among type 2 diabetes mellitus population aged 60 years and above visiting Kathmandu Diabetes and Thyroid center in Kathmandu Nepal.

Alternative Hypothesis

- There is an association between self-management behavior and quality of life among type 2 diabetes mellitus population aged 60 years and above visiting Kathmandu Diabetes and Thyroid center in Kathmandu Nepa1.5 Conceptual Framework

Hypothesis 2

Null Hypothesis

- There is no association between socio demographic characteristics, socioeconomic status, self-management behavior, medical history, accessibility to health services and quality of life among type 2 diabetes mellitus population aged 60 years and above visiting Kathmandu Diabetes and Thyroid center in Kathmandu Nepal

Alternative hypothesis

- There is an association between socio demographic characteristics, socioeconomic status, self-management behavior, medical history, accessibility to health services and quality of life among type 2 diabetes mellitus population aged 60 years and above visiting Kathmandu Diabetes and Thyroid center in Kathmandu Nepal

1.5 Conceptual Framework

After reviewing number of literatures and conceptual framework models on health related quality of life of type 2 diabetes and factors influencing quality of life of elderly population with diabetes, the conceptual framework for this study is as follows:

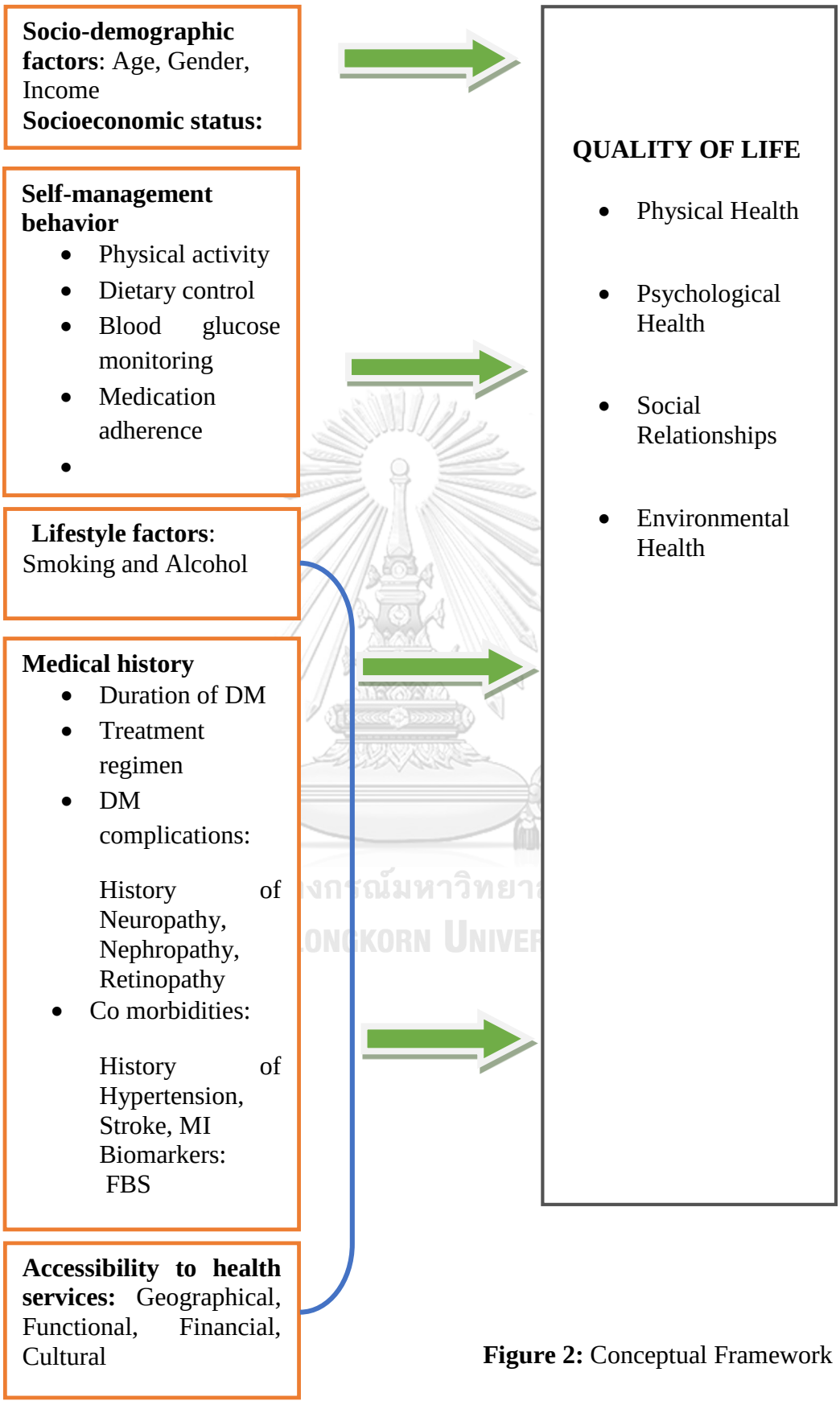

Figure 2: Conceptual Framework

1.6 Operational Definitions

Diabetes Mellitus Diabetes is a group of metabolic diseases which is characterized by abnormally high blood glucose level (hyperglycemia) which results from defects in insulin action, insulin secretion or both. In this study if the person has been previously diagnosed as diabetic by a doctor and is on anti-diabetic medication were considered diabetic. (American Diabetes, 2010)

Quality of life: Quality of life (QOL) is a multidimensional concept that includes subjective evaluations of negative and positive aspects of life. It is a concept which is affected by a person's psychological state, physical health, social relationships, personal beliefs, their relationship to the surrounding environment and level of independence ("The World Health Organization Quality of Life Assessment (WHOQOL): development and general psychometric properties," 1998). In this study, to measure quality of life, WHOQOL-BREF questionnaire will be used.

Elderly: Elderly is the person who is old or is ageing. It is generally the age where one receives pension benefits. As per United Nations the cuff off age for elderly population is 60 years and above (UNFPA) In this study people above 60 years of age has been defined as elderly.

Age: It is the amount of time during which a person has lived measured by years from birth. In this study it is the self-reported number of years from the latest birthday of the person

.

Sex: It is the state of being male or female. It refers to the socially defined characteristics of women and men – such as roles, norms and relationships of and between groups of men and women, typically used with reference to cultural and social differences rather than biological ones (WHO, 2017b)

Marital Status: It is a person’s state of being married or unmarried. In this study marital status has been classified as married; unmarried; widow/widower and divorced.

Income: It is the amount of money a person receives on a regular basis, for work or through investments. In this study the amount of money the participant makes or the family income of the participant and has been classified as follows:
Less than Rs. 10,000 (<$ 96.)/month - low income, Rs.10.000-30,000 ($96-$288)/ month -moderate income, More than Rs. 30,000 (>$288)/ month - high income

Education level: It refers to the highest degree of education an individual has completed. For this study it is classified into 5 categories: Illiterate- not able to read and write, literate -Able to read and write but no schooling, primary level 1-10, secondary level 10-12,

higher studies – bachelor degree and above.

Diabetes self-management behavior: It is the behavior of the patient diagnosed with type 2 diabetes mellitus to care for themselves. In this study, diabetes self-management questionnaire (DSMQ) has been used to assess self-management and its correlation with quality of life. It contains following components:

- **Self-blood glucose monitoring**: It is a way of testing the level of glucose in the blood which is essential in the care of diabetes mellitus. To test blood glucose, the skin of the finger is pricked by a sterile needle to draw blood. Then the drawn blood is applied into a 'test strip' containing chemically active agent which gives the blood glucose reading when put into a glucometer. In this study the participant will be asked about self-blood glucose monitoring during past 8 weeks.
- **Dietary control:** Dietary control in diabetes is the practice of consuming healthy foods in moderate amounts and sticking to regular. For this study the participant will be asked about their eating habit since past 8 weeks.
- **Physical activity**: Any movement of the body that leads to energy expenditure is referred to as physical activity. In this study the 3 items in the questionnaire are related to physical activity where the participant will be asked if he/ she has followed the recommended physical activity during past 8 weeks. According to WHO recommended physical activity for older adults is 150 minutes of moderate-intensity aerobic physical activity throughout the week or at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week.

- **Medication compliance**: It is the extent to which the prescribed medications are timely taken by the patients as advised by their health care provider. In this study the participant will be asked about their compliance or adherence to prescribed medication during past 8 weeks.
- **Contact with health care professional**: A health care professional is an individual who provides rehabilitative, curative and preventive health care services to people seeking care. In this study the participant will be asked about their extent of contact with their health care professionals.

Lifestyle factors:

- **Smoking status:** It refers to the participant's cigarette smoking behavior. For this study smoking status have been classified in 3 categories- never; past smoker; current smoker
- **Alcohol Consumption:** It refers to consumption of alcoholic drinks. In this study it is classified in three categories- non- drinkers; past drinker and current drinker

Medical history: It is an important tool in the management of the patient which accounts for all the medical problems and events that the individual has experienced or is experiencing. In this study the participant will be asked about his/her medical events related to diabetes such as duration, treatment regimen, complications and co morbidities till date.

- **Duration of Diabetes Mellitus**: Duration is the length of time something continues or exists. So, the patient will be asked about the time period as to when he/she has been diagnosed with diabetes
- **Treatment Regimen:** It is a structured treatment plan designed to improve and maintain health. In this study it has been categorized into a) oral hypoglycemic agents b) insulin c) Diet modifications only and d) others.
- **Complication:** It is an unfavorable consequence of the disease determined by worsening of its severity or showing higher number of symptoms, signs or new

pathological changes and affecting other organ systems. Long term hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of different organs, especially the kidneys, eyes, heart, nerves and blood vessels (ADA) .In this study the participants will be asked if they have been diagnosed with any complications of type 2 diabetes such as diabetic nephropathy, diabetic neuropathy, and diabetic retinopathy and will be cross checked with the record in the medical card.

- **Diabetic neuropathy:** refers to numbness, tingling, burning or pain that usually begins at the tips of the fingers or toes and spread upward The affected limbs of the patient could lose all sense of feeling.
- **Diabetic nephropathy (kidney damage):** refers to severe damage to tiny blood vessels in the kidney can lead to irreversible end-stage kidney disease or kidney failure which may require dialysis or even a kidney transplant
- **Diabetic retinopathy (eye damage):** Diabetes can damage the blood vessels of the retina potentially leading to blindness. Diabetes also increases the risk of other serious visual impairments, such as cataracts and glaucoma.
- **Co morbidities:** It is the simultaneous presence of two chronic diseases or conditions in a patient. In this study the participants will be asked if he/she has been diagnosed with co morbidities of diabetes mellitus such as hypertension, stroke and myocardial infarction (MI) and will be cross checked in the medical card.
- **Hypertension**: Hypertension is defined as a systolic blood pressure (SBP) of 140 mm Hg or more, or a diastolic blood pressure (DBP) of 90 mm Hg or more.
- **Stroke:** It is a cerebrovascular disorder caused by deprivation of blood flow to an area of the brain, generally as a result of thrombosis or embolism.
- **Myocardial Infarction:** Myocardial infarction (MI) (i.e., heart attack) is the irreversible death (necrosis) of heart muscle which is secondary to prolonged lack of oxygen supply (ischemia).

Biomarker

Fasting blood sugar (FBS): A check of a person's blood glucose level after the person has not eaten for 8 to 12 hours (usually overnight). It is used to monitor people

with diabetes. (American Diabetic Association). In this study FBS will be recorded from the patient's medical record from the OPD card.

Accessibility to health services: "Accessibility to health services is understood as the availability of good health services within reasonable reach of those who need them and of opening hours, appointment systems and other aspects of service organization and delivery that allow people to obtain the services when they need them". (WHO). There are four dimensions of accessibility to health care and has been classified similarly in this study (Levesque, Harris, & Russell, 2013)

Geographical accessibility: refers to transportation, travel time, or physical distance that an individual life to in relation to his preferred health care facility at which he receives care. This distance is measures not only terms of distance, but also in terms of ease of accessibility and travel time

Functional accessibility: It refers to the method and process of managing care for those who seek it and can also be defined in terms of delivery of services.

Financial accessibility: refers to the fee an individual incurs to receive care in relation to his ability to pay. Financial access can also refer to the cost-benefit analysis in terms of time and money spent in order to access care

Cultural acceptability: refers to the appropriateness in the delivery of care as it relates to cultural patterns and beliefs of the individual seeking care

CHAPTER 2

LITERATURE REVIEW

2.1 Country Profile:

Nepal is a landlocked multiethnic, multilingual, multi-religious country in South Asia. Located in the Himalayas, it is bordered by China to the north and India to the south, west and east. The total area of Nepal is 147181 sq. Km with an East to West length of about 800Km. and a North to South width of about 90-230Km.The country is divided broadly into three ecological and 14 administrative zones. The three ecological zones are the lowland known as the “Terai Region”, the midland known as the “Hilly Region” and the highland known as the “Himlayan region”. It is a developing country with GDP growth rate of 2.7% (World Bank data 2015). As of 22 June 2011, the total population was 26.5 million with a decadal growth of 14.4% from 2001 and with the average annual growth of 1.35% from 2001 to 2011 (CBS 1991, 2001, 2011- population monograph 2014). The proportion of growth differs in rural and urban areas with 0.98% per year in rural areas and 3.38% per year in urban areas. Kathmandu being the capital city currently has a population of 2.5 million people and is growing at the rate of 4 percent per year one of the fastest-growing metropolitan areas in South Asia. (WB, 2013)

The estimated life expectancy at birth is 67.44 years for females in 2011 from 60.7 years in 2001 and 64.94 years for males in 2011 from 60.1 in 2001.(CBS 2001,2011).("<Nepal_Population_Report_2011.pdf>,").With the decline in the proportion of children of age 0-4 from 15.4% of the total population in 1981 to 9.7% in 2011, the older population (population of age 65 +) on the other hand has increased from 3.3% in 1981 to 5.3% in 2011. This indicates gradual increase in ageing population of the country and as the ageing population is increasing the concern for the risk of non-communicable disease is also growing. Despite of its richness in natural resources, biodiversity and cultural multiplicity, Nepal is still a developing

country where one quarter of its population live below the poverty line-(Nepal public health association) (NEPHA, 2017) and is heavily dependent on remittances, which amount to as much as 29% GDP (CIA, 2017)

2.2 Levels and Trends in Prevalence of DM

The Global evaluations of diabetes prevalence have demonstrated increments over the previous years. Assessments of the present and future weight of diabetes are imperative to properly allocate assets and resources, drive wellbeing promoting policies, and urge activity to anticipate diabetes in who and what is to come. From the chosen 174 information sources of 130 nations from seven IDF regions and World Bank income group, the estimation for the year 2013 was 219 nations was 381.8 million adults and regions with diabetes and anticipated the number to ascend to 591.9 million in 2035. The estimation for the year 2013 and projections for 2035 outperform projections made by past evaluations.(Guariguata et al., 2014)

Various reviews suggest possible explanation for higher prevalence of DM to be increase in risk factors such as increased age ,being a woman, higher body mass index (BMI) (Shrestha, Singh, & Bhattarai, 2006a), higher socio-economic status, urban residency, lack of physical activity and low education .(Gautam, Bhatta, & Aryal, 2015)

It has been found that the prevalence of diabetes is the highest in the older age-groups (>70 years) in Chinese and Japanese population at 60–69 years old, trailed by a decrease at 70–79 years old in Indian population.

In a systematic survey and meta-analysis conducted in Nepal ,the pooled rural and urban prevalence of type 2 diabetes mellitus was 8.1% and 1.0 respectively.(Gyawali et al., 2015) which was similar with the national studies showing the prevalence of type 2 diabetes mellitus in neighboring countries of Nepal that have comparative culture and way of life profiles. (Misra & Shrivastava, 2013) Other studies have also detailed that the issue of diabetes is to a great extent gathered in urban areas (Katulanda et al., 2008) (Mohan et al., 2008). These urban differences may be due to various socio-economic and cultural characteristics and also lifestyle habits between

urban and rural regions. The survey also demonstrated that there is an increased risk of diabetes among women in Nepal but Nepal lacks in country specific reviews that determine high risk of type 2 diabetes among elderly women.

2.3 Ageing

Globally, the number of older people is growing faster than the number of individuals in other age gathering. As per an World Population Prospects, the rate of older people of 60 years or more has expanded considerably in recent years in most part of the nations, and that development is estimated to rise exponentially in the coming years. In the vicinity of 2015 and 2030, the number of individuals in the world aged 60 years or over is anticipated to increase by 56 percent, to 1.4 billion from 901 million and by 2050, the worldwide population of older people is anticipated to dramatically increase its size than in 2015, achieving about 2.1 billion. (UN, 2015)

As 70% of older individuals now live in low or middle income nations, the rapid ageing of population around the globe is displaying challenges for developed as well as developing nations (WHO, Aging and life course, 2011)

The Global Burden of Diseases, Injuries, and Risk Factors Study 2010 (GBD 2010) evaluated that the toll NCDs are taking (measured by years of life lost) on individuals aged 60 years and above established in low-and middle income nations is considerably more noteworthy than for individuals in high-income nations. Furthermore, WHO estimates that non communicable diseases will represent an expanding total number and rate of overall deaths, ascending to around 70% of deaths in 2030. This expansion in supreme mortality is basically because of the expansion in the size and age of the total population. (UN, 1950-2050)

Nepal has begun to come across with the phenomenon of ageing population as well. A report by WHO on ageing and life course proposed that, in the year 2011, Nepal had 9.1% of its aggregate elderly population. Amid the year 1991-2001, the yearly elderly population growth rate of Nepal was 3.39 % which is higher than a yearly population growth rate of 2.3%. Along these lines worries over the soundness of

health of the elderly are expanding with this exceptional increase of the population (Shrijan lal shrestha, 2014)

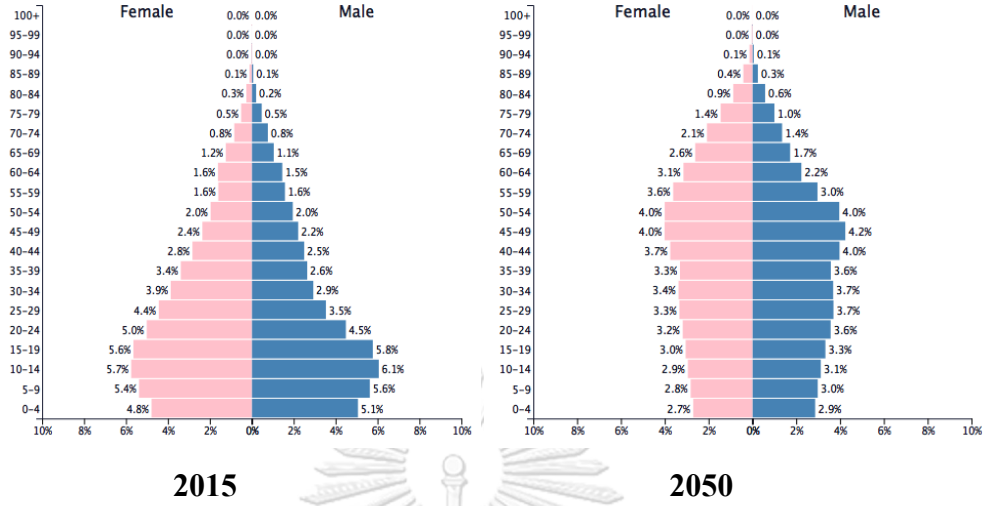

Figure 3: Population pyramid comparison of Nepal

2.4 Definition of health

The constitution of World Health Organization defined health as “the state of complete physical, mental, physical and social well-being and not merely the absence of disease or infirmity” (WHO 1948). From that point forward, there has been expanded concentrate on personal satisfaction which measures the patient's viewpoint while assessing the weight of ailment and advantage of treatment in health practice and in research. It takes after that the estimation of health and the impact of health care services must also consolidate an estimation of wellbeing, which can be surveyed by measuring the improvement in health related quality of life (WHO, 1997)

2.5 Concepts of quality of life

The concept of 'quality of life' first turned out amid the post-war period in the USA to decide the impact of materialistic ownership, for example, houses, autos and other shopper products have on one's life and was accordingly widened to incorporate wellbeing, training, welfare, monetary and mechanical development.

This idea on this day and age is still extremely expansive with measurement of general wellbeing estimation stretching out to different themes which is displayed in number of ways. As indicated by World Health Organization the quality of life is understood as “the individual’s perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.” This definition reflects the view that quality of life refers to a subjective evaluation that is embedded in social, environmental and cultural context ("Development of the World Health Organization WHOQOL-BREF Quality of Life Assessment," 1998)

It is an idea which is influenced by the individual's, mental state, physical wellbeing, social connections, individual beliefs, level of autonomy, and their relationship to environmental components of their condition.

Quality of life is narrowed to the term “health related quality of life” (HRQoL) which deals with the aspects that are relevant to health. A representative definition of health related quality of life is "a multi-dimensional concept that encompasses the physical, emotional, and social components associated with an illness or treatment".

In recent years there has been expanding enthusiasm for HRQOL research around the world. It is contended that the expanding worldwide enthusiasm for research into HRQOL is partly because of global population ageing as the vast majority of the elderly with chronic diseases encounter a burden of sicknesses that deteriorate their HRQOL (Forouhari et al., 2010)

2.6 Review of studies on quality of life of elderly

With increasing life expectancy, older people with diabetes encounter considerable amount of co-morbidity, psychosocial morbidity and physical disability, and including poor social freedom, impaired cognitive function and increased medical service use. (Trief, Wade, Pine, & Weinstock, 2003) A study in Slovakia on quality of life determinants among elderly using WHOQOL-BREF demonstrated that the least level of quality of life was observed in physical health domain and highest was in the area of social relations.(Sováriová Soósová, 2016)Living in poorly built houses, lack of social connections and poor financial condition were additional essential

factors which decreased their QOL (Bowling, 2005) Similarly, a research done in South East England reported that old individuals recognized family relationship, wellbeing, way of living, various activities and other social relations are vital to add quality to their life. (Farquhar, 1995)

2.7 Influencing factors

Demographic Characteristics

The evidence suggests that psychosocial issues are critical for good care of diabetes (Fisher EB Jr, 1996) (Glasgow RE, 1992). Psychosocial factors determining self-management practices are one of the strongest indicators of medical outcomes such as morbidity and mortality. Studies that surveyed the effect of diabetes and its repercussions on QOL among young population of various ages have exhibited distinctive outcomes but most noticeably worst assessment of QOL was seen among older population in the largest review. (Trevizan, Mendes, Mazzo, & Ventura, 2010) In studies contrasting the QOL of elderly and young diabetics, the researchers found that elderly people revealed more constraints because of physical issues in terms of more number of complications, low physical role working and physical functioning than younger age group.(Klein BE, 1998; Trief et al., 2003) It appears that as the age advances, various aspects of quality of life is affected among individuals with diabetes particularly those related with physical functioning. Therefore, the assessment of relationship amongst quality of life and diabetes must control for age.

Most studies suggest that elderly people with diabetes experience much lower quality of life than that of general population especially elderly women with lower educational level(Maryam Tajvar, Mohammad Arab, & Ali Montazeri, 2008) Various researchers have concluded that quality of life is lower in diabetic woman than in diabetic men. For instance, a review done in Madrid on Men and diabetes behavioral and psychosocial issues , compared to women men reported more satisfaction their diabetes treatment regimen, and exercised more often They likewise found that was diabetes burden to be lower in men compared to women.(Richard R Rubin & Mark

Peyrot, 1999) .A study carried out in Nepal recognized increased age and being a women to be non-modifiable risk factors for type 2 diabetes mellitus (Gyawali, Ferrario, van Teijlingen, & Kallestrup, 2016)

Socioeconomic status is one of the important determinants of health. In individuals with diabetes mellitus, low SES(socio-economic status) groups appear to be confronted with a twofold weight once health is impeded: first, increased levels of ailment and, second, low levels of valuated QOL .Various studies demonstrate significant associations between socioeconomic status (measured by income or educational level) and quality of life among diabetic and general population (Gyawali et al., 2016) (Connell, Davis, Gallant, & Sharpe, 1994) Many Studies also recommend that marital status is related to and can be identified with quality of life in the general population. In a study by Jacobson and colleagues to determine a relation between marital status and health related quality of life (measured by the SF-36 and DQOL), suggested that separated or divorced people had lower quality of life than the individuals who were married or single.

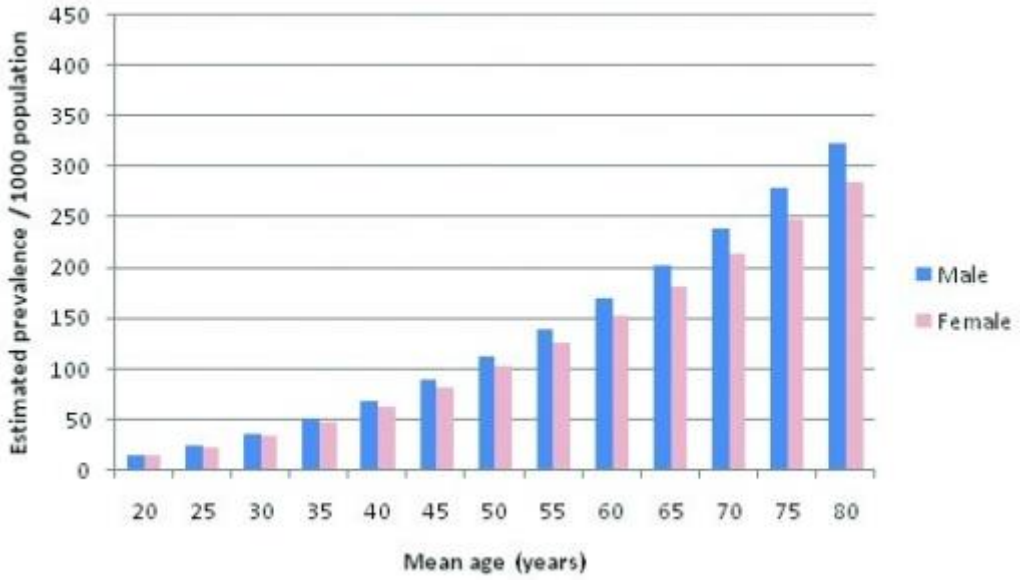

Figure 4: Male and female prevalence of type 2 diabetes in Southern Asia in 2005 (Cheema, Adeloye, Sidhu, Sridhar, & Chan, 2014)

Self-Management Behavior

Several studies have suggested that negative emotions and distress can interfere with self-care behavior (Piette, Richardson, & Valenstein, 2004),(Peyrot, 1999) and therefore lead to elevated glycemic values (Aikens, Perkins, Lipton, & Piette, 2009). Hyperglycemia has been often shown to be associated with poor adherence to oral medications and insulin. Changing the diet to a lower glycemic index has shown the potential to control glycemic level.

Studies suggest that self-monitoring of blood glucose (SMBG), can impact glycemic control in well-established diabetes especially those under insulin treatment. Although there are controversies and uncertainty about its benefit in patients under insulin, several reviews suggest the benefits of self-monitoring of blood glucose. Furthermore, few studies suggest that if used in a proper way, self-monitoring of blood glucose can be effective means of glycemic control. Similarly, studies have also shown the effectiveness of physical exercise in achieving metabolic control. Studies also show the association of frequency of visit to health care facility and appointment adherence with better glycemic outcome. (Schmitt et al., 2013)

Duration of Diabetes

A few reviews have found that expanded duration of diabetes was related to diminished quality of life in individuals with both types of diabetes (Connell et al., 1994) For instance, a review done in Nepalese population utilizing WHOQOL-BREF detailed that a patient diagnosed to have diabetes since over 10 years was related with low quality of life in physical health domain scores (Mishra, Sharma, Bhandari, Bhochhibhoya, & Thapa, 2015)

Complications and Co morbidities

Most cases of mortality and morbidity associated with type 2 diabetes is caused by co morbidities and complications related with the disease. The incidence and greater severity of diabetic complications has been shown to have significant impact on quality of life by numerous studies (R. E. Glasgow, L. Ruggiero, E. G. Eakin, J. Dryfoos, & L. Chobanian, 1997) (Wändell, 2005)

As indicated by World Health Organization (2002a), almost 10% of the patients with long term history of diabetes have a severe visual impairment, nearly 2% of patients become blind, and up to 25% of patients on dialysis suffer from diabetic nephropathy and 50% experience the ill effects of diabetic neuropathy. Individual studies have found that reduced quality of life is associated with diabetic neuropathy, retinopathy, neuropathy end stage renal disease and cardiovascular disease(Klein, Klein, & Moss, 1998) (Parkerson et al., 1993)

In contrast to non-diabetics, the risk of coronary artery disease and myocardial infarction (heart attack) are 2 and 3 times higher in diabetics. (Polaski & Tatro, 1996). Studies conducted on QOL and DM complications also suggest that the presence co morbidities and complications is associated with increased cost and diabetes QOL treatment burden scores. A study carried out in Nepal on the cost of diabetic patients, detailed that the average cost treatment and care of diabetes every month was US$ 40.4 and US$ 445 per year. Therapeutic expenses represented greater part (80%) of the aggregate direct cost per visit (US$ 11) revealing that diabetes patients in Nepal encounter a high cost burden in the long run (N. Shrestha, S. P. Lohani, M. R. Angdembe, K. Bhattarai, & J. Bhattarai, 2013)

Treatment Regimen

It has been indicated that aggressive treatment regimens are associated with worsened quality of life. In a study done by Jacobson and colleagues it was accounted that patients under insulin were felt more burden of illness and were less satisfied with the treatment compared to those taking oral medications or under exercise and dietary modifications only (Jacobson, De Groot, & Samson, 1994) which is consistent with the results observed in other studies (Bui, Ostir, Kuo, Freeman, & Goodwin, 2005) (Keinänen-Kiukaanniemi, Ohinmaa, Pajunpää, & Koivukangas, 1996)

Glycemic Control

There has been burgeoning of research in past few years on glycemic control and its relationship with quality of life of diabetic patients. A study suggests that lower fasting blood glucose levels are associated with less fatigue and fewer self-reported

symptoms of hyperglycemia which reduced diabetes burden and increased treatment satisfaction, resulting in better quality of life compared those having higher blood sugar levels. In a study by Wikblad and colleagues, on measuring the glycemic level by HbA1c, it was reported that for those with the higher level of HbA1c had the lowest scores on quality of life scale than those with lower level of HbA1c.

Accessibility to Health Services

"Access to comprehensive and quality health care services are important for preventing and managing disease, promoting and maintaining health, reducing unnecessary disability and premature death, and achieving health equity". (HealthyPeople.gov, 2014)

Several dimensions of access can be measured such as Organizational accessibility which is based on operating time and procedure to follow that is perceived as constrains by the individual. Geographical accessibility is based on (physical and temporal) distance within reach and the provision of service. Economic accessibility is the costs of services in relation to individuals' socio economic status and lastly social accessibility is the individual's social and cultural characteristics in relation to services offered (Da Silva, Contandriopoulos, Pineault, & Tousignant, 2011)

Elderly people living with chronic disease are vulnerable as a result of having a condition, as multiple issues such as access and ability to go to appointments, communication issues (literacy and language barrier), lack of support, several financial issues and lack of information about their disease that create barriers for being able to access to care which have an impact on their quality of life (Schneider, 2010)

A study done in United States among patients with chronic conditions reported that among 67% diabetic patients, 49 % of the participants reported difficulty in getting medical attention, 29% did not get medication and 76% were not compliant with their prescribed medications despite having insurance and only 52% visited their healthcare provider (not hospital) for non-routine urgent care where women visited more than men.(Hossain et al., 2013)

2.8 Instruments

Development of World Health Organization Quality of Life (WHOQOL-100)

With the aim to develop cross culturally comparable quality of life evaluation around the world, the WHOQOL-100 was the first tool developed by World Health Organization to measure quality of life. The project was started in 1991. A number of centers around the world collaboratively worked in developing each step of WHOQOL and has been field tested widely. 15 field centers (from developing and developed countries) were selected to take into account the variations in different cultures. First step in development involved establishment of an agreed upon definition of QOL then, important characteristics of QOL construct were recognized, emphasizing on cultural relevance. A list of domains and facets were then drafted by each center. Six broad domains were which describe core aspects of QOL were identified namely psychological, level of independence, physical social relationships, personal beliefs/spirituality and environment. These Domains were further categorized into numerous facets, for e.g. psychological domain included facets that assess body image, self-esteem, positive feelings, negative feelings, thinking, concentration and memory states of being (e.g. fatigue), capacities (e.g. ability to move about) or subjective perceptions of experiences (e.g. pain), description of behavior (e.g. personal relationships).To evaluate the appropriateness of the drafted definition of the facets next step involved was group interviews (focus groups) with patients, well persons and health personnel in each of the field centers. On the basis of these reports, the definitions of the facets were revised. Questions were drafted by focus groups thus generating ideas within each centre, as to how and in which form the questions relating to QOL should be asked. To generate cross-culturally comparable response scales, each item was rated on a 5-point response scale concerned with frequency (never-always), intensity (not at all-extremely), capacity (not at all-completely), and evaluation (very satisfied-very dissatisfied, very good-very poor). Although endpoints (e.g. never-always) are relatively universal, ambiguity and cultural variations exist for intermediate responses.

236 items relating to quality of life was included in the original pilot version of WHOQOL. 300 people with multiple health problems were piloted by fifteen field centers. 100 items were selected for inclusion from these data in a revised version of the evaluation: the WHOQOL-100 field trial

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WHOQOL encompasses 24 facets which allow a detail assessment of individual facets relating to quality of life. It comprises of 100 questions with 6 different domains: 1) Physical Health 2).Psychological Health 3) Level of independence 4) Social Relationships 5) Environment and 6) Spiritual

WHOQOL-BREF

The WHOQOL - 100 might be excessively long in a situation where quality of life is not the variable of interest. For such cases, WHOQOL-BREF which is a shorter form of WHOQOL consisting of 26 items is easier and appropriate for the evaluation to be conducted

Utilizing information from the pilot WHOQOL appraisal and every single accessible data from the Field Trial Version of the WHOQOL-100, the WHOQOLBREF Field Trial Version has been developed to give a short form quality of life evaluation that looks at domain level profiles. Twenty field centers arranged inside eighteen nations have included information for these reasons. The WHOQOL-BREF contains an aggregate of 26 questions. One from each of the 24 facets in the WHOQOL-100 has been incorporated to give a detailed and comprehensive assessment. Likewise, two items from the overall quality of life and General Health facet have been incorporated. Six domains that constituted WHOOL-100 is reduced to four, which includes physical health, social relationships, psychological and environment. The benefit of this instrument is that it is shorter, yet permits an exhaustive measure of quality of life, wellbeing and health (WHO 1998). The four domain structure of WHOOL-BREF is laid out as follows:

Domain	Facets incorporated within domains
1. Physical health	Activities of daily living Dependence on medicinal substances and medical aids Energy and fatigue Mobility Pain and discomfort Sleep and rest Work Capacity
2. Psychological	Bodily image and appearance Negative feelings Positive feelings Self-esteem Spirituality / Religion / Personal beliefs Thinking, learning, memory and concentration
3. Social relationships	Personal relationships Social support Sexual activity
4. Environment	Financial resources Freedom, physical safety and security Health and social care: accessibility and quality Home environment Opportunities for acquiring new information and skills Participation in and opportunities for recreation / leisure activities Physical environment (pollution / noise / traffic / climate) Transport

Figure 5: WHOQOL-BREF Model

This measurement tool has two different archetypes used in measurement of **QO**L 1) General version 2) Specific version

General version has been used in this study. It was chosen as it the gold standard in assessing quality of life. It has been well validated for measuring quality of life in people living with diabetes mellitus across different settings (Eren, Erdi, & Şahin, 2008) (Huang & Hung, 2007) and has been used in previous study in Nepal demonstrating applicability. (Mishra et al., 2015)

Diabetes Self-Management Questionnaire (DSMQ)

Diabetes Self-Management is the first German instrument focusing on diabetes self-care, which was developed at the Research Institute of the Diabetes Academy Mergentheim. It was designed to assess behaviors related to metabolic control with common treatment regimens for type 1 and type 2 diabetes in adult patients.

It is known that in order to achieve optimal blood glucose outcome, good self-care acts as a protective factor against diabetic complications and that it is important for patient to manage the disease according to its requirements in order to achieve optimal blood glucose level. Despite of various studies revealing association between low self-management behavior and negative emotions and increase blood glucose levels only limited knowledge has been revealed regarding the behavioral mechanisms between negative emotional effect and hyperglycemia. Therefore, Diabetes Self-Management Questionnaire (DSMQ) was developed in order to facilitate the collection of appropriate data. A second objective was to construct an instrument that would be useful to clinical trials and studies which involve multitude of data collection instruments. The reliability coefficients of the instrument were observed as follows (Cronbach's α; stratified by scale): dietary adherence 0.79; medication adherence 0.75; blood glucose monitoring 0.83; physical activity 0.74; appointment adherence 0.72. The questionnaire was developed on a broad empirical and theoretical basis, and its evaluation indicates very good psychometric properties with adequate item characteristics, satisfactory reliability, and good validity (Schmitt et al. 2013)

CHAPTER 3

RESEARCH METHODOLOGY

This chapter comprises of research design, study area, study population, sampling technique, sample size, measurement tool and ethical considerations

3.1 Research Design

This is a cross sectional hospital based research which comprises of two distinct design considerations; descriptive and analytical research design which will apply quantitative research methodology. To learn the profile of the respondent, presentation and description of the data collection and to describe the characteristics of the subject descriptive research design was undertaken. On the other hand, analytical research design will be employed to examine the relationship between the independent variable (factors that influence the quality of life among elderly population diagnosed with type 2 diabetes mellitus) and dependent variable (quality of life of elderly population diagnosed with type 2 diabetes mellitus). This design of study was conducted as a cross sectional study in order to identify the existence and relationship of one or more independent variables upon a dependent variable of interest at a given point of time.

The selection of the participants for the study was conducted on the basis of sample drawn from the currently active outpatient appointment record available (those diagnosed for more than a year) on the day of the interview. For data collection the information was provided by the primary informant through interviewer administered structured questionnaires.

3.2 Study Area

Kathmandu Diabetes and Thyroid Center Pvt. Ltd was chosen purposively as a study area for collection of data. This is a private sector clinic located in Pulchowk, Kathmandu established in 2012 with the primary goal to provide affordable standard medical service and to bring a world class center that specializes in the

treatment of diabetes, thyroid and other endocrine diseases in Nepal. Since private hospitals outnumber the number of government hospitals in Nepal with 233 hospitals all over the country with 99 hospitals in Kathmandu valley compared to 123 government hospitals all over Nepal (MoHP), this private clinic was selected because it is one of the best centers for diabetes management comprising of renowned endocrinology specialists of Nepal catering majority of diabetic patients of Kathmandu who are on regular follow up at an interval of two months. The clinic has 5 specialists and 30 other health staffs who are available from morning 9 am to evening 5 pm on weekdays and 9 am to 1 pm on weekends. It also provides equipped lab facilities and various outpatient services such as curative, disease education, dietician consultation and free phone call consultation, weight loss programs and various other health packages. The patient's records in the clinic were based on log records which were recorded in a register by a clinic staff and was secured by head of managing department.

3.3 Study Period

The study period was approximately from August 2017 to November 2017

3.4 Study Population

The study population includes elderly people of both sexes of age 60 years and above who have been diagnosed with type 2 diabetes mellitus

3.4.1 Inclusion Criteria

- Participant of both sexes (male and female) of 60 years and above diagnosed with type 2 Diabetes Mellitus
- Participants residing in Kathmandu valley, who visit the Endocrinology outpatient department of Kathmandu Diabetes and Thyroid Center
- Participants who gave informed written consent
- Participants who were diagnosed with diabetes mellitus for more than a year

3.4.2 Exclusion criteria

Those people who do not meet the above listed inclusion criteria were excluded from the study. The exclusion criteria for this study are as follows:

- People who could not respond to the questionnaire due to language barrier (who do not understand English or Nepali language).
- People with hearing and vision loss
- Severely ill people who had difficulty in answering the questionnaire

3.5 Sample Size

The sample size calculation for this study is based on the previous study conducted in 2012 in Kathmandu where the prevalence of type 2 diabetes mellitus among elderly population was 23.5% (Rimal & Panza, 2017). After reviewing many literatures on prevalence of diabetes mellitus in elderly in Kathmandu valley, the sample size for this study was calculated by estimating 24% as the prevalence for Type 2 DM with confidence interval of 95%.

Cochran formula was applied for calculation of sample size

Sample size calculation:

$$n = \frac{Z^2 p(1-p)}{d^2}$$ (W. Cochran, 1963)

$$n = \frac{(1.96)^2\ 0.24\ (1 - 0.24)}{(0.05)^2}$$

n = 280

Hence, the sample size (**n**) is 280

Where,

p = estimated proportion of the elderly population to have Diabetes in Kathmandu valley

q = 1-p

d = desired level of precision or error allowance

Z = area under normal curve (from statistical Z table) associated with 95% confidence interval which is 1.96.

As a result of above calculation the required sample size was 280 participants. Assuming the chances of refusal for the interview, missing or dropout in the middle of interview, 10 % of the total sample size was added to the above calculated sample size,

280+30= 310

Therefore, the resulting sample size was **310** which is a good number of population for this study.

3.6 Sampling Technique

Endocrinology OPD of Kathmandu diabetes and Thyroid center was purposively selected for this study. Computer based simple random sampling was done for selection of participants. This sampling technique was adopted as it was the easiest method to recruit the participants for the researcher. The estimated total number of diabetic patients visiting the Endocrinology OPD (from previous years' record) those registered in the clinic records were approximately 8,000 patients and the estimated number of diabetic patients (new and old patients) visiting the OPD was 40-50 per day among which the patients meeting the criteria of being 60 years and above and those residing in Kathmandu was approximately 20-25 per day. Around 10-15 participants were interviewed each day In order to recruit the participants following method were be adopted:

- The participants were selected from the client based appointment record of the clinic on the same day of the interview.
- A list of patients (both male and female) of 60 years and above with type 2 diabetes mellitus residing in Kathmandu valley was listed by trained assistants and was entered into the computer program (random number generators) for random selection of participants.
- After random selection, the people who meet the inclusion criteria and those willing to participate was selected and enlisted as participants for the study by trained assistants.

- The time taken for data collection to conduct this study was approximately 1 month which was adequate to obtain the calculated sample size.

The sample selection flow chart is as follows:

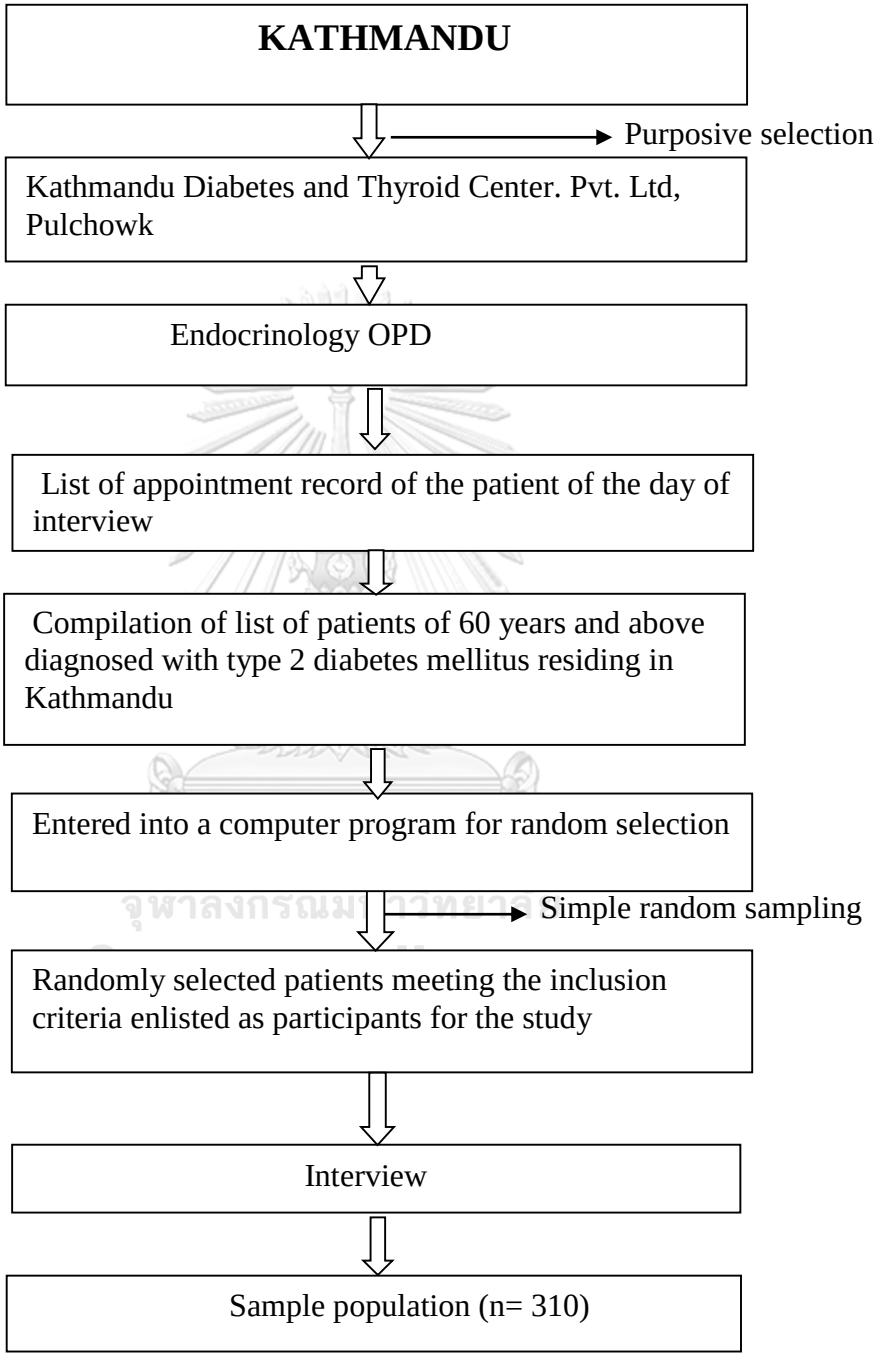

Figure 6: Sample selection flow chart

3.7 Measurement Tools:

3.7.1 Questionnaire

After studying various theories, journals, concepts and literature review in detail which is related to type 2 diabetes mellitus, a structured questionnaire was developed in English that was related to the objective of the research. Two translators who had clear understanding of the instrument was hired and the English version of the questionnaire was be translated to Nepali language which is the local language (forward translation). A bilingual health professional (clinician) was asked to review for any inconsistencies between the source language version and the translated version. Then a monolingual Nepalese individual who is unfamiliar with the instrument and is the representative of the population to be studied was asked to read through it to identify aspects which are not clearly comprehensible or are ambiguous which was again considered by a bilingual clinician ensuring its accuracy with the English version. The questionnaires were then translated back to English to verify that actual content has retained while translating (backward translation). In case where there were discrepancies between the questionnaires translated by two translators, it was agreed upon a common question consulting both of them. The data collection was done by face to face interview through interviewer administered questionnaires

The questionnaire has multiple choice questions and has been divided into 5 parts:

Part 1: The questionnaires are related to socio demographic factors which cover:

- Age
- Sex: male or female
- Marital status: married, unmarried, widower, divorcee which later on changed into two categories 1) living with a partner and 2) not living with a partner.
- Monthly income: Less than Rs 10,000- low income, Rs 10.000-30,000- moderate income, More than Rs 30,000- high income
- Educational level: 1) No schooling 2) Primary level (grade 1-10), 3) Secondary level (Grade 10-12) 4) Bachelor degree and above.

Part 2: The questionnaires are related to Diabetes self-management behavior measured by diabetes self-management questionnaire (DSMQ). It consists of 16 items which covers five components of diabetes self-management. The respondents rated the extent to which applies to them referring to previous eight weeks on four point likert scale. The questionnaire allowed estimation of four subscale score as well as summation of all 16 items to 'Sum Scale' score. In view of their contents, the subscales are labelled 'Glucose Management' (items 1, 4, 6, 10, 12), 'Dietary Control' (items 2, 5, 9, 13), 'Physical Activity' (items 8, 11, 15), and 'Health-Care Use' (items 3, 7, 14). One item (16) requests an overall rating of self-care which was included in the 'Sum Scale' only. In this study, sum scale score as well as subscale score was used to analyze the data with reverse scoring of negatively framed questions where higher score indicated higher self-management behavior. The summation of all 16 items was categorized into 3 categories by mean and SD, low (score<Mean-SD), moderate (Mean-SD to Mean+SD) and high (score >Mean+SD) of total diabetes self-management score for descriptive analysis.

Scoring: Sub scale scores were calculated as sums of item scores and then transformed to a scale ranging from 0 to 10 (raw score / theoretical maximum score * 10; for example, for the subscale 'Glucose Management' a raw score of 12 leads to a transformed score of 12 / 15 * 10 = 8) and sum scale score was calculated by summing up all 16 items.

Part 3: The questionnaires in this section are related to medical history and biomarkers consisting of 4 questions. It covers duration of diabetes mellitus, treatment regimen such as oral hypoglycemic agent, Insulin or dietary modifications only, history of diagnosed diabetic complications like Neuropathy, Retinopathy, Nephropathy which was group into two categories of having and not having complications. History of co morbidities such as Hypertension, Stroke or MI and Biomarker such as fasting blood sugar which was be recorded from the patient's OPD card.

Part 4: The questionnaires in this section are related to access to health services. It covers 4 parts:

1) **Geographical accessibility** consists of 3 questions regarding visit to type of health care facility mostly, distance of the health care facility, mode of transportation while getting to health care facility.

2) **Functional accessibility** consists of 2 questions regarding convenience of hours of operation of the health care facility and waiting time

3) **Financial accessibility** consists of 1 question on perception of the patient regarding health care costs due to diabetes

4) **Cultural acceptability** consisting of 2 questions regarding satisfaction with the facilities, goods and services provided at the health care facility and satisfaction with the doctors treating behavior

Part 5: The questionnaires in this section are related to quality of life were measured by WHOQOL-BREF. It comprised of 26 items measuring four broad domains. The broad domains are Physical Health, Psychological, Social Relationships, and Environment and there are also two items that are examined separately: question 1 asks about an individual's overall perception of quality of life and question 2 asks about an individual's overall perception of their health. Each item uses a Likert type five-point scale: very poor to very good" (evaluation scale), "very dissatisfied to very satisfied" (evaluation scale), "none to extremely" (intensity scale), "none to complete" (capacity scale) and "never to always" (frequency scale).

Scoring: The four domain scores denote an individual's perception of quality of life in each particular domain. Negatively scaled questions were made positive by reverse scoring of 3 items (question 3, 4 and 21), whereas all other items were scaled in a positive direction (i.e. higher scores denote higher quality of life) .In this study, total score of quality of life was used to analyze the data and was computed by summing up the raw score of all the domains. However, analysis of each variable by domains was considered before analyzing with total score and

when each domain was analyzed separately, despite of low correlation all the domains demonstrated similar results. Therefore, total score of quality of life domains was used to analyze each independent variable

The 26 questions of WHOOL-BREF, the scores ranged between 26 and 130 points. The level of QOL were calculated by dividing the total scores into 3 categories:

QOL DOMAIN	LOW	MODERATE	HIGH
1) Physical health	7-16	17-26	27-35
2)Psychological	6-14	15-22	23-30
3)Social relationships	3-7	8-11	12-15
4)Environment	8-18	19-29	30-40
5)Overall OL & General Health	2-4	5-7	8-10
6)**TOTAL SCORE**	26-60	61-95	96-130

(Phungrassami, Katikarn, Watanaarepornchai, & Sangtawan, 2004)

Figure 7: The level of QOL by dividing the total scores into 3 categories

3.7.2 Biomarker

Fasting blood sugar: A check of a person's blood glucose level after the person has not eaten for 8 to 12 hours (usually overnight). It is used to monitor people with diabetes. (American Diabetic Association). In this study FBS was recorded from the patient's medical record from the OPD card by the trained assistants.

3.8 Validity

The questionnaires utilized for this study was taken from previous studies' validated questionnaires. The details are as follows:

Questions on socio demographic characteristics were based on general information of the participant (part1)

Questions on Self-management behavior were taken from standard diabetes self-management questionnaire (DMSQ) and its validity has previously been confirmed. (part 2)

Questions related to medical history were based on the medical history of the patient and are relevant to diabetes (part 3)

Questions related to accessibility to health services were taken from previous studies and were modified and adjusted to fit into Nepalese context. (part 4)

Questions on quality of life were taken from previously validated standardized quality of life questionnaire (WHOQOL-BREF) (part 5)

For part 3 and part 4 of the questionnaire content validity was adopted in order to ensure clarity, accuracy and appropriateness of the instrument. A panel of three experts Assoc.Prof Ratana Somrongthong, Ph.D, Dr Ansu Mali Joshi (DM Endocrinology) and research advisor Prof. Peter Xenos, Ph.D was consulted in order to evaluate the content of the questionnaire by Item-Objective Congruence (IOC) Index where evaluation was based on following scale: +1= agreement between item and study variable, 0= undecided and -1 = disagreement between item and study variable.

IOC=Sum(R)/n

Where, R=total score of the ith item,

n= number of specialists

IOC of at least 0.5 is accepted.

3.9 Reliability

In order to ensure reliability, pretesting (pilot test) of the questionnaire was done with 30-35 participants which is 10% of the calculated sample size. Medicare hospital which is situated in another area of Kathmandu valley was selected for the test. This hospital was selected because it shared similar characteristics to Kathmandu Diabetes and Thyroid center (type of specialists, number of patients and facilities). Internal consistency was checked by Cronbach's alpha and WHO-BREF questionnaire demonstrated good internal consistency where Cronbach's alpha was 0.762 for the WHO-BREF questionnaire and 0.865 between the individual domains scores, which is higher than the Cronbach's Alpha's standard

measurement in reliability scale of 0.7. To make sure that the participants understand the questions without losing its content, the interview was closely monitored by the researcher and modified accordingly

3.10 Data collection

Before proceeding for data collection, the permission to conduct the study was obtained from the managing director of Kathmandu Diabetes and Thyroid Center Pvt Ltd. through a request letter issued by the College of public health sciences Chulalongkorn University. The collection of data was done with face to face interview in the outpatient department by the principle researcher and two trained nurses at respondent's convenience, in a separate quiet room with the help of interviewer administered questionnaires.

The collection of data comprised of following steps:

- Nurses those who work in the same clinic having experience in the field of research and clear understanding of the disease and patients were hired as assistants.
- Training was provided by the principal researcher for a day with the aim to develop the skill to conduct interviews, elicit informed consent and build rapport with the respondents. The trained assistants consisted of those nurses who work in the morning shift. Since the doctor was available throughout the day from 9' o' clock in the afternoon to 5 'o' clock in the evening, afternoon time was selected for the interview so as not to disturb the timing of the nurses those working in the morning shifts.
- For training PowerPoint presentations, various booklets, questionnaires, regulation of data collection and face to face interviews was used.
- Following training session, practice session was held to assess the knowledge and skills of the assistants learnt from the training.
- Before conducting the interview, the purpose of the study, components of the questionnaire and expected benefits was thoroughly explained to the respondent and informed consent was taken by the researcher or the assistants

ensuring their confidentiality, voluntary participation, freedom of withdrawal at any point and not use of data for any other purpose.

- The questions were then asked in Nepali language to the participants until it reached the required sample.
- Each participant was interviewed for about 10-15 minutes and
- After finishing the interview, the researcher and the assistants checked the questionnaires to ensure that all the questions had been answered

3.11 Data Analysis

After data collection, the data was edited and was coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 21. The data coded was manually tabulated and was categorized and entered into the database.

The independent variable and their measurement are shown below:

Variables	Measurement Scale	Descriptive statistics
A) Sociodemographic characteristics		
Age	Nominal scale	Frequency, percentage
Gender	Nominal scale	Frequency, percentage
Marital status	Nominal scale	Frequency, percentage
Income	Ordinal scale	Percentage, Mean, SD
Education level	Ordinal scale	Frequency, percentage
B) Self-management behavior (Total score)	Continuous variable	Percentage, Mean, SD
C) Medical history		
Duration of DM	Ordinal scale	Percentage, Mean, SD
Treatment Regimen	Nominal scale	Frequency, Percentage
DM complications	Nominal scale	Frequency, Percentage
DM comorbidities	Nominal scale	Frequency, Percentage
D) Biomarker		
Fasting blood sugar	Continuous variable	Percentage, Mean, SD
E) Access to health care service		
Geographical	Nominal scale	Frequency, Percentage
Functional	Nominal scale	Frequency, Percentage
Financial	Nominal scale	Frequency, Percentage

Cultural	Nominal scale	Frequency, Percentage

Figure 8: Measurement of independent variable

The analysis was carried out in two parts:

3.11.1 Descriptive statistics*:*

Descriptive statistics was performed with the aim to describe the basic features of data and to record frequency, percentages, means, medians, standard deviations for all the independent variables (socio demographic factors, self-management, medical history, accessibility to health services) and dependent variable (quality of life)

3.11.2 Analytical Statistics:

Analytical statistics was performed to test the hypothesis and answer the research question and normality test was done for each of the independent and dependent variable which showed normal distribution of the data.

Independent Sample T-test was performed to compare the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different

One-way ANOVA was performed to compare the means of two or more independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different.

Correlation was done between two continuous variables in order to determine the degree to which the variables are related

In order to find association between several independent variables and a dependent variable at the same time multivariate regression was used. Multiple Linear regression with estimation of five models was done in order to determine whether there is statistically significant relationship between multiple

independent variables and a continuous dependent variable and the quality of model was predicted on the basis of adjusted R^2

Independent Variable	**Dependent Variable**	**Bivariate analysis**	**Multivariate analysis**
Two independent groups: Gender DM complications DM co-morbidities Financial accessibility**:** • Price at the health care facility • Cultural acceptability	Total score of quality of life domains	Independent Sample T-test	Multivariable linear Regression
More than two independent groups: Age Marital status Income Education level Treatment regimen FBS	Total score of quality of life domains	ANOVA	Multivariable linear Regression
Self-Management Behavior (Sum scale)	Total score of quality of life domains	Correlation	Multivariable linear Regression

Figure 9: Analytical statistic

3.12 Ethical Considerations:

Thesis proposal and its measurement tools was reviewed and approved by the Nepal health research council (NHRC), ministry of health and population (MoHP). The participants were explained about the purpose and the objective of the study before the survey. The questionnaire did not have any sensitive information. It was coded by the researcher. Before starting the procedure written consent was taken from the participant and the participation in this study has remained confidential. The data was exhibited in aggregated tables so that the particular respondent was not linked in any way with the result. The list consisting of participant's name with the code was only available to the principal researcher only so there was no way to relate the questionnaire's participant code with the name of the participant in questionnaire, which was destroyed after the completion of the research. It was a voluntary participation, no one was forced to participate in this study and the participant had the freedom to withdraw. The data was used for the purpose of research work only for the partial fulfillment of MPH degree. A copy of the thesis will be submitted to the concerned department of Ministry of Health and Population (MoHP), Nepal; highlighting the key findings and recommendations for policy purposes with a covering letter.

3.13 Limitations of the study

1) Due to time constrains, the study was conducted in only one hospital in Kathmandu and thus was not able to compare diabetic population from other areas and from other various health facilities.

2) This study could not include HbA1c that was proposed earlier due to unavailability of HbA1c record of majority of patients at the time of the interview, which would have been a better indicator of glycemic level control of diabetes and that it would allow to achieve comparability between both biomarkers bringing out more weight and details to this study.

3) There were many missing values on question 21 (regarding sex life of the individual) it being a sensitive question, widow/widower, divorcee and unmarried participants preferred not to answer and therefore could not be recorded. The missing value however was recoded as sysmis= -8 and categorized as 'No information' in the data set. Such large missing data might have led to larger error terms.

4) As the study area was chosen by purpose, and the sampling took in account only OPD patients, the findings of the study cannot be generalized for the whole diabetic population of Kathmandu valley and such design might have biased our results in a way that only better off elderly people were recruited in the sample

5) Since this study did not involve patients who were severely ill, who could not understand Nepali or English language and those who had hearing or vision loss, these people who did not meet the inclusion criteria might have been the population with compromised quality of life.

6) The cross-sectional nature of this study made it difficult to identify cause and effect relationship and variations at different point of time.

7) Since the data was collected via face to face interview rather than self-report method, it might have introduced as interviewer's bias in the result and since some questionnaires required recall time frame of past few weeks, there might have resulted in recall bias. In addition, some elderly might have either 'under-reported' or 'over-reported' their QOL depending on the time and place of interviews.

8) The study does not make comparison between quality of life of diabetic and non-diabetic patients, which could have resulted in interesting findings regarding quality of life and factors influencing that influence quality of life among diabetic and non-diabetic population.

9) Though Diabetes self-management questionnaires have been validated in other countries, this is the first study to use this questionnaire in Nepal and that few questions might not have been suitable in Nepalese context.

10) Though total score of quality of life was used to analyze the data in this study, analysis by each domain would yield the result in detail regarding each domain

11) The sample size calculation in this study was based on previous prevalence study of type 2 DM however the appropriate method would be to calculate the prevalence from previous quality of life study itself

CHAPTER IV

RESULTS

This chapter comprises of data analysis which has been divided into two parts, namely descriptive and analytical statistics.

Descriptive statistics was done with the aim to describe basic features of data. Frequency, percentages, means, medians, standard deviations, have been calculated for all independent variables and dependent variable.

Analytical statistics was performed in order to test the hypothesis and answer the research question and to reach to conclusions that extend beyond the immediate data alone.

Independent Sample T-test was performed to compare the means of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different

One-way ANOVA was performed to compare the means of two or more independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different.

Correlation was done between two continuous variables in order to determine the degree to which the variables are related

In order to find association among several independent variables and a dependent variable at the same time multiple linear regression was used. Inclusion of variables in multiple linear regression is based on conceptual and empirical evidence from previous literatures. Five multiple regression models were estimated in order to assess the individual as well as combined effects of set of variables on the outcome measurement of a continuous variable (a scale). Variables with p value<0.2 from bivariate analysis was earlier proposed to be analyzed in multivariate analysis, but considering the fact that some independent variables might have a combined or confounding effect in multivariate analysis, all set of variables were included in

multivariate analysis. The independent variables in the regression equation are included on the basis that exists in the literature and the quality of the model will be described using the accuracy of the prediction by adjusted R^2.

4.1 Descriptive analysis

4.1.1 Socio demographic characteristics

The distribution of socio demographic factors in table 4.1 shows that majority of the respondents were females (54.5%) followed by male participants (45.5%). The highest number of participants was observed in the age group of 60-69 years (67.4%). Categories of marital status were merged into two categories of living with a partner and not living with a partner and most of the participants (71.3%) were married and living with a partner. Majority of the participants (57.1 %) had income between Rs. 10,000-. 30,000 and around 20 % had no schooling with majority having primary education only. (35.5%)

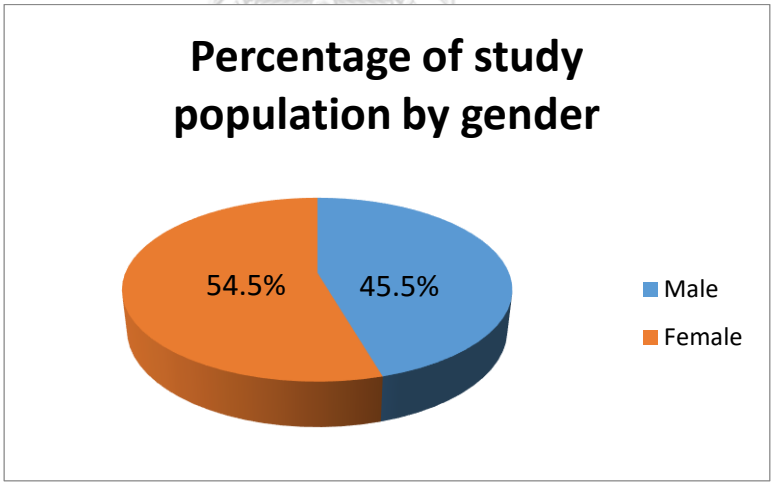

Figure 10: Percentage of study population by gender

Table 1: Descriptive analysis of sociodemographic factors of the study population (n=300)

Variables	Frequency	Percentage
Age group		
60-69	209	67.4
70-79	71	22.9
>80	30	9.7
Mean±SD	65.33±6.90	
Gender		
Male	141	45.5
Female	169	54.5
Marital Status		
Married (living with a partner)	221	71.3
Unmarried/divorced/widow (not living with a partner)	89	28.7
Income		
Low income	86	27.7
Middle income	177	57.1
High income	47	15.2
Educational level		
No schooling	62	20.0
Grade 1-10(primary)	110	35.5
Grade 10-12(Secondary)	61	19.7
Bachelors degree and above	77	24.8

4.1.2 Diabetes self-management

Table 4.2 demonstrates the descriptive analysis of four components of diabetes self-management (glucose management, dietary control, physical activity and health care use) which consists of 16 items using four point likert scale as described earlier in chapter 3.

Table 2:Descriptive analysis of components of diabetes self-management questionnaire (DSMQ)

DSMQ components	N	Mean±SD	Min	Max
Physical activity	310	4.57±1.34	1	6
Health care use	310	4.53±0.76	2	6
Glucose management	310	7.02±0.99	3	9
Dietary control	310	5.02±0.94	3	7

Table 4.3 below demonstrates the descriptive analysis of categories of diabetes self-management. The sum of all 16 items was categorized into 3 categories of low, moderate and high using mean and SD of total diabetes self-management score (<Mean –SD, Mean- SD to Mean +SD , >Mean+SD). The result depicted that majority of the respondents that is 68% had moderate self-management, whereas 20.8 % had low self-management with only 9.9% having high self-management level.

Table 3 Descriptive analysis of diabetes self-management categories: (n=310)

Diabetes self-management level	Number	Percentage
Low	65	20.80%
Moderate	213	68.30%
High	31	9.90%
Mean±SD	33.8±4.127	
Min	18	
Max	44	

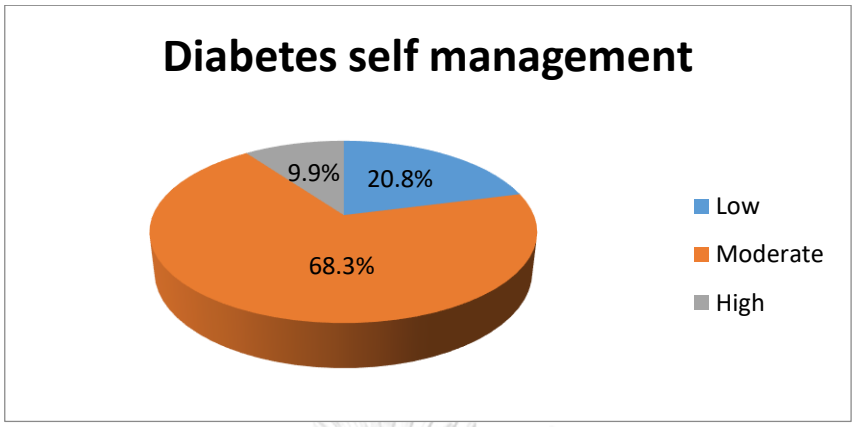

Figure 11: Percentage of level of diabetes self-management

4.1.3 Lifestyle

Table 4.3 shows that majority of the participants 182 (58.7%) never smoked cigarettes, followed by 82 (26.5%) participants who smoked in the past. Similarly, majority of the participants 150 (48.4%) never drank alcohol followed by 105(33.9%) participants who drank previously.

Table 4 Descriptive analysis of lifestyle factors of study population (n=310)

Variables	Frequency	Percentage
Smoking status		
Current smoker	46	14.8
Past smoker	82	26.5
Never smoker	182	58.7
Drinking Status		
Current drinker	55	17.7
Past drinker	105	33.9
Never drinker	150	48.4

4.1.4 Medical history

Descriptive analysis of table 4.4 shows that majority of the participants 111(35.8%) had Diabetes mellitus for more than 10 years and 135 (43.5%) participants had fasting blood sugar less than 126mg/dl. Most of the participants that is 74.8% were under oral hypoglycemic agent while only 11.9% were under insulin, and 10.3% under dietary modifications only and only 2.9% were under both oral hypoglycemic agent and insulin.

Table 5 Descriptive analysis of medical history of the study population(n=310*)*

Variables	Frequency	Percentage
Medical history		
Duration of DM		
1-5 years	102	32.9
6-10 years	97	31.3
>10 years	111	35.8
Treatment regimen		
Oral hypoglycemic agent	232	74.8
Insulin	37	11.9
Both	9	2.9
Dietary modifications only	32	10.3
Fasting blood sugar (FBS)		
<126mg/dl*	135	43.5
126-200mg/dl	108	34.8
>200mg/dl	67	21.3

*mg/dl=milligram/deciliter

The descriptive analysis of complications and co morbidities in table 4.5 shows that majority of the participants did not have any complications with only 5 (1.6%) participants having Nephropathy, 15(4.8%) participants having Retinopathy and 2 (0.6%) participants having Neuropathy. However, 171 (55.3%) participants were suffering from hypertension while only 1 (0.3%) and 6 (0.3%) participant having

past history of stroke and myocardial infarction respectively. However, majority (92.6%) of the study population did not have complications, only 6.7% suffered complications. Whereas, more than half of the study population (56.1%) had co morbidities associated with diabetes mellitus.

Table 6: Descriptive analysis of medical history (complications and co morbidities) of the study population (n=310) (continued)

Variables	Frequency	Percentage
Complications		
Nephropathy	5	1.6
Retinopathy	15	4.8
Neuropathy	2	0.6
Total	21	6.7
Comorbidities		
Hypertension	171	55.2
Myocardial Infarction	6	1.9
Stroke	1	0.3
Total	175	56.1

4.1.5 Accessibility to health services

Table 4.6 shows accessibility to health care services due to diabetes mellitus, 221(71.3%) respondents mostly visited hospital when they got ill. Majority of the participants (51%) travelled approximately 2-5 km to arrive at the health center where they receive care for diabetes mellitus and most of them in a public vehicle (60.6%).Hours of operation of health care facility, which was which was categorized ad as very inconvenient, inconvenient, convenient and very convenient in questionnaire, were re grouped as ‘inconvenient’ and ‘convenient’ where 91.3% of the respondents claimed that the hours of operation to be convenient for them and only 8% claimed it to be inconvenient. However, majority of them 33.9% had

to wait for more than 30 minutes before they were attended by a health care professional. With regard to the cost of health care due to diabetes, 45.2% claimed it to be expensive and only 1% claimed it to be cheap. When asked about the satisfaction with the behavior of the health care staff and maintenance of privacy majority of them were satisfied that is 94.5% and 91.6% respectively

Table 7 Descriptive analysis of accessibility to health care services *(n=310)*

Variables	Frequency	Percentage
Geographical accessibility:		
Location		
Hospital	221	71.3
Clinic	85	27.4
Health center	4	1.3
Distance		
Less than 2km	23	7.4
2-5km	158	51
More than 5km	129	41.6
Mode of transportation		
Walk	29	9.4
Private vehicle	93	30
Public vehicle	188	60.6
Functional accessibility:		
Hours of operation		
Inconvenient	25	8.0
Convenient	285	91.3
Waiting time		
Less than 10 minutes	27	8.7
10-20 minutes	97	31.3
20-30 minutes	81	26.1
More than 30 minutes	105	33.9
Financial accessibility:		
Health care cost		

Very expensive	60	19.4
Expensive	141	45.2
Fair	106	34.2
Cheap	3	1
Cultural acceptability:		
Good Behavior		
Yes	293	94.5
No	17	5.5
Privacy		
Yes	284	91.6
No	26	8.4

4.1.6 Level of quality of life

For 26 questions of WHOQOL BREF, the score ranged from 26-130 points. The QOL was then determined by dividing the scores into three categories as follows:

QOL Domains	**Low**	**Moderate**	**High**
1) Physical health	7-16	17-26	27-35
2)Psychological	6-14	15-22	23-30
3)Social relationships	3-7	8-11	12-15
4)Environment	8-18	19-29	30-40
5)Overall OL & General Health	2-4	5-7	8-10
6)**Total Scores**	26-60	61-95	96-130

(Phungrassami et al., 2004)

Table 8 shows the quality of life by domains of elderly diabetics using the WHOQOL BREF questionnaire. The total score of quality have been divided into which is divided into three categories (1) Low (2) Moderate and (3) High. The result demonstrates that majority of the respondents had moderate quality of life in all domains, 67.7% in physical health, 80% in psychological health, 49% in social

relationships, 87.7% in environmental health and lastly 66.1% in overall QOL and general health.

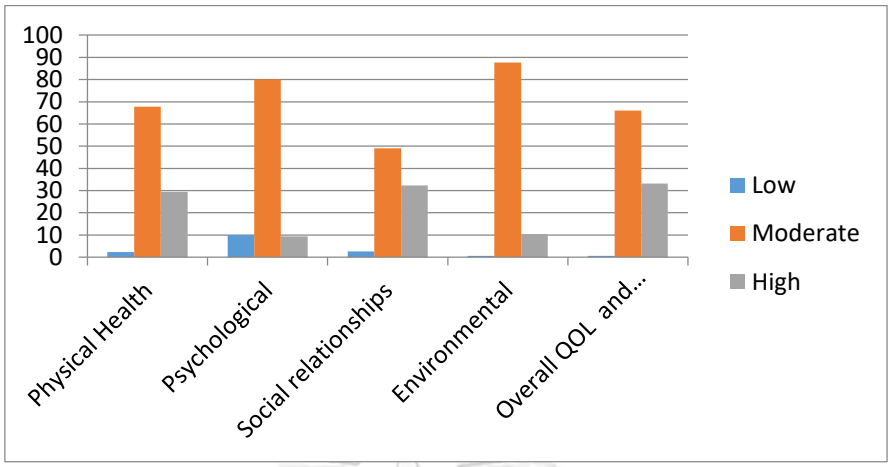

Figure 12: Level of QOL by domains

Table 8: Number and percentage of respondents by level of quality of life measured by WHOQOL –BREF

Quality of life	Low N(%)	Moderate N(%)	High N(%)	NI*	Mean±SD
Physical Health	7(2.3%)	210(67.7%)	91(29.4%)	4(1.3%)	24.35±4.46
Psychological Health	31(10%)	248(80%)	29(9.4%)	4(1.3%)	18.36±3.44
Social Relationships	8(2.6%)	152(49%)	100(32.3)	52(16.6%)	7.82±7.09
Environmental Health	2(0.6%)	272(87.7%)	32(10.3%)	6 (1.9%)	25.89±4.39
Overall QOL & General Health	2(0.6%)	205(66.1%)	103(33.2%)	2(0.6%)	7.03±0.90

Total	2(0.6%)	214 (68.6%)	43(13.8%)	51(16.3%)	72.24±36.74

NI=No information*

4.2 Analytical Statistics

4.2.1 Bivariate analysis

4.2.1.1 Relationship of Socio demographic characteristics and socioeconomic status with quality of life

Table 4.8 shows statistically significant relationship between age and quality of life (p=0.00) with highest mean and SD (83.129±23.89) in age group of 60-69 years. Similarly sex also had statistically significant relationship with quality of life p=0.001 and P=0.00 with males having the highest mean score and SD (79.31±30.43) compared to females. The analysis showed statistically significant relationship of marital status with quality of life (p=0.00). Socioeconomic status measured by income and educational revealed statistically significant relationship with quality of life p=0.01 and p=0.00 respectively.

Table 9 Relationship of socio demographic characteristics and socioeconomic status with quality of life analyzed by independent sample t-test (2 categories) and One Way ANOVA (more than 2 categories) (n=310)

Variables	N	Mean±SD	P value
Socio-demographic characteristics			
Age			
60-69	209	83.129±23.89	
70-79	71	56.61±44.80	**0.00**
>80	30	33.40±49.30	
Sex			
Male	141	79.31±30.43	
Female	169	66.34±40.42	**0.001**
Marital status			
Living with a partner	221	87.33±12.75	**0.00**

Not living with a partner	89	34.78±48.40	
Socioeconomic status			
Income			
Low	86	62.52±41.81	
Middle	177	73.13±35.36	**0.001**
High	47	86.68±25.69	
Educational level			
No schooling	62	53.22±23.51	
Primary	110	73±36.42	
Secondary	61	79.11±29.52	**0.00**
Bachelors and above	77	81.03±31.08	

4.2.1.2 Relationship between diabetes self-management and total score of quality of life

In table 4.9 statistically significant relationship between diabetes self-management score and total score of quality of life (P=0.00) was observed with correlation coefficient of 0.262.

Table 10 Relationship between Diabetes self-management and total score quality of life analyzed by Pearson Correlation (n=310)

	Details	**Quality of life score**
Diabetes self-management score	Pearson Correlation	0.262**
	Sig (2 tailed)	0.00
	N	310

**Correlation is significant at the 0.01 level (2 tailed)

4.2.1.3 Relationship between lifestyle and quality of life

Table 4.10 demonstrates the relationship between lifestyle and quality of life, where statistically significant relationship of smoking (p=0.01) and drinking status (0.034) with quality of life with highest mean quality of life scores in current smokers (81.195) and current drinkers (83.89) can be seen

Table 11 Relationship between lifestyle and quality of life (total score) analyzed by independent sample t-test(n=310)

Variables	N	Mean±SD	P value
Lifestyle			
Smoking status			
Current Smoker	46	81.195±29.14	
Past smoker	82	63.35±42.30	**0.018**
Never smoker	182	73.98±35.12	
Drinking status			
Current Drinker	55	83.89±24.41	
Past Drinker	105	69.47±36.54	
Never Drinker	150	69.91±39.884	**0.034**

4.2.1.4 Relationship between medical history and quality of life

On analysis of relationship between medical history and quality of life score (table 4.11) statistically significant relationship was found in fasting blood sugar (P=0.009) and complications (P=0.041). Whereas variables such as duration of DM, treatment regimen and co morbidities were statistically not significant with quality of life.

Table 12 Relationship between medical history and quality of life (total score) analyzed by one-way ANOVA (n=310)

Variables	N	Mean±SD	P value
Medical history			
Duration of DM			
1-5 years	102	75.35±32.80	
6-10 years	97	71.52±37.95	**0.557**
more than 10 years	111	70.01±39.14	
Treatment regimen			
Oral hypoglycemic agent	232	72.82±36.922	
Insulin	37	42.30±6.95	**0.198**
Both	9	40.52±13.50	
Dietary modifications only	32	24.35±4.30	
Fasting blood sugar (FBS)			
<126mg/dl	135	79.34±34.27	
126-200mg/dl	108	68.15±38.27	**0.009**
>200 mg/dl	67	64.53±40.50	
Complications			
Yes	21	50.476±48.26	**0.041**
No	289	73.88±36.95	
Comorbities			
Yes	175	69.14±38.93	**0.084**
No	135	76.26±33.39	

4.2.1.5 Relationship between medical history and quality of life

Table 4.12 shows relationship of all components of accessibility to health care services with total score of quality of life where hours of operation of functional accessibility was found to have statistically significant relationship with quality of life score. (P=0.002). Whereas variables such as location of getting care, distance,

mode of transportation, waiting time, cost, behavior and privacy were observed to be statistically not significant.

Table 13 Relationship between accessibility to health care services and quality of life total score(n=310)

Variables	N	Mean±SD	P value
Geographical Accessibility			
Location of getting care			
Hospital	221	73.23±35.89	**0.629**
Clinic	85	69.27±39.67	
Health center	4	80.75±10.01	
Distance			
less than 2 km	23	65.60±40.67	
2-5 km	158	74±34.27	**0.549**
more than 5 km	129	71.27±39	
Mode of transportation			
Walk	29	72.65±38.62	
Private	93	75.51±36.06	**0.569**
Public	188	70.56±36.87	
Functional Accessibility			
Hours of operation			
Inconvenient	25	53.20±43.41	**0.002**
Convenient	285	73.91±35.70	
Waiting time			
Less than 10 km	27	64.44±44.93	**0.104**
10-20 km	97	66.37±39.97	
20-30km	81	76.85±33.044	
more than 30 km	105	76.12±33.33	
Cost			
Very expensive	60	76.95±34.79	
Expensive	141	66.70±39.10	
Fair	106	76.53±34.22	**0.107**
Cheap	3	86.66±15.30	

Cultural acceptability			
Good behavior			
Yes	293	71.36±37.55	
No	17	87.47±18.30	**0.079**
Maintained Privacy			
Yes	284	72±36.78	
No	26	74.88±36.95	**0.703**

4.2.2 Multivariate analysis

The description of five models of multivariate regression analysis is as follows:

Model 1: Includes all independent variables by itself where each independent variable will be analyzed separately with dependent variable (total score of quality of life)

Model 2: Includes set of independent variables, where each set of independent variable will be analyzed with dependent variable (total score of quality of life)

Model 3: Includes set of independent variables along with control variables analyzed with dependent variable (total score of quality of life)

Model 4: Includes sets of independent variables with addition of controls to model 3 analyzed with dependent variable (total score of quality of life)

Model 5: Includes all sets of independent variables analyzed with dependent variable (total score of quality of life)

Models of factors influencing quality of life among elderly with type 2 diabetes mellitus analyzed by multiple linear regression.

MODEL 1: Multiple regression analysis of factors (demographic, socioeconomic, lifestyle, diabetes self-management, medical history and accessibility to health services) associated with quality of life among elderly diabetics within each variable by itself.

MODEL 2: Multiple regression analysis of factors (demographic, socioeconomic, lifestyle, diabetes self-management, medical history and accessibility to health services) associated with quality of life among elderly diabetics among each of the variable within its set.

MODEL 3: Multiple regression analysis of factors such as socio demographic, diabetes self-management, medical history and accessibility to health care services associated with quality of life among elderly diabetics while controlling for each of the variable by other set of variables.

MODEL 4: Multiple regression analysis of factors (demographic, socioeconomic, lifestyle, diabetes self-management, medical history and accessibility to health services) associated with quality of life among elderly diabetics further controlling with other variable in addition to variables in model 3.

MODEL 5: Multiple regression analysis of factors (demographic, socioeconomic, lifestyle, diabetes self-management, medical history and accessibility to health services) associated with quality of life among elderly diabetics controlled with all set of variables

4.2.2.1 Multiple linear regression analysis of socio demographic variables controlled with set of socioeconomic (model 3) and diabetes self-management variables (model 4) and all sets of variables (model 5) (Table 4.13)

Socio demographic characteristics and quality of life

In all five models, age had statistically significant association with quality of life. Model 1 shows respondents in the age bracket of 70-79 years with coefficient (B) = -26.509 and $p<0.001$ which means that for every unit increase in age of 70-79 years -26.509-unit decrease in quality of life score is expected and quality of life among 70-79 years is 26.509 points lower than respondents in the age bracket of 60-69 years of age. Similarly, for age group more than 80 years old in model 1, the quality of life score was 49 .72 points lower than the reference age group 60-69 years. After adjusting with other socio demographic variables (sex and marital status) in model 2, it shows results similar to model 1. The coefficient (B) for 70-

79 age group is -10.172 ($p<0.05$) and -23.326 for more than 80 age group ($p<0.01$) indicating lower quality of life than the reference age group 60-69 years.

After adjusting for socioeconomic status in model 3, the age group of 70-79 years had 9.613 points lower than the reference age group and > 80 age group had, 23.388 points lower than reference age group 60-69 years.

Model 4 shows result after further adjustment with diabetes self-management score, the quality of life scores of age group 70-79 years became 9.375 points lower (B=-9.375) than reference age group and 22.683 points lower than reference age group in >80 years' age group (B=-22.683)

In model 5 after controlling for all set of variables, the quality of life score for 70-79 years was 10.017 points (B=-10.017) lower than 60-69 years and >80 years was 26.698 points lower than younger age group 60-69 years

Therefore, all the models show lower quality of life score in older age group (70-79 and >80) compared to younger age group (60-69).

Female sex in model 1 had statistically significant association with quality of life ($p<0.01$) and 12.976 points lower than male which means that males have higher quality of life score than females. Whereas, after adjusting sex with other variables (models 2, 3 and 4) it lost its association with quality of life.

Marital status showed statistically significant association in all five models ($P<0.001$)

In model 1 not living with a partner had a lower quality of life score by 52.544 (B=-52.544) points than those who lived with a partner. When adjusted with other variables in model 2, 3, 4 and 5 it remained significant indicating that people who did not live with a partner had lower quality of life than the ones who lived with a partner even after controlling for other variables.

Socioeconomic status and quality of life

In model 1, high income showed statistically significant relationship, however after controlling for socio demographic variables such as age, sex and marital status (model 2) , socio demographic and socio economic variables (model 3), socio demographic, socioeconomic and diabetes self-management (model 4) and all set of variables (model 5) it lost its association with quality of life

All categories of educational level showed high statistical significance in model 1 and model 2 ($p<0.001$).

In model 1 primary level education had 19.774 points higher quality of life score than people without schooling (B=19.774), similarly secondary education and bachelors and above had 25.889 and 27.813 points higher quality of life score compared to people without schooling respectively.

In model 2 after adjusting with income level, people with primary level education and secondary education had 19.575 and 23.923 points higher quality of life score respectively than people without schooling (B= 19.575) Similarly bachelors and above(B=23.923) also had higher quality of life scores compared to people without schooling but with reduction of quality of life score than in model 1. While adjusting with other variables in model 3, model 4 and model 5, all categories of education level lost its association with quality of life.

Diabetes self-management and quality of life

Diabetes self-management score was positive and statistically significant in model 1. ($p<0.001$) indicating higher diabetes self-management score associated with higher quality of life in (B=2.334). After adjusting with socio demographic and socioeconomic variables in model 4 (B=0.513) and all set of variables in model 5 (B=0.953) the association no longer remained significant

Table 14 Multiple linear regression of socio demographic variables adjusted with socioeconomic (model 3) and diabetes self-management variables (model 4) and all set of variables (model 5)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
SOCIODEMOGRAPHIC					
Age					
60-69 years					
70-79 years	-26.509*	-10.172*	-9.613*	-9.375*	-10.017*
>80 years	-49.729*	-23.326*	-23.683*	-22.683*	-26.628*
Model summary	*R=0.458, R^2=0.209*				
Sex					
Male(ref)					
Female	-12.976*	-5.978	-23.388	-5.463	-1.191
Model summary	R=0.146, R^2=0.031				
Marital status					
Living with a partner (ref)					
Not living with a partner	-52.544*	-43.877*	-43.753*	-43.311*	-41.891*
Model summary	R=0.648 R^2=0.42	R=0.676, R^2=0.457			
SOCIOECONOMIC					
Income					
Low (ref)					
Middle	10.612	-0.774	-5.613	-5.420	-4.191
High	24.158**	11.248	2.7	1.805	-2.18
Model summary	R=0.20, R^2=0.043				
Educational level					
No schooling (ref)					
Primary	19.774**	19.575**	2.41	1.293	2.67
Secondary	25.889**	25.631**	2.504	0.955	2.031
Bachelors and above	27.813**	23.923**	2.062	0.112	2.878
Model summary	R=0.274, R^2=0.075	R=0.294, R^2=0.086	R=0.680 R2=0.447		
DIABETES SELF MANAGEMENT					
Diabetes self-management score	2.334***	2.383***		0.513	0.953

Model summary	R=0.262, R^2=0.069	R=0.315, R^2=0.099	R=0.686, R2=0.453

****P value is significant at the level of 0.001, **P value is significant at the level of 0.001, *Pvalue is significant at the level of 0.05. Ref=reference*

4.2.2.2. Multiple linear regression analysis of lifestyle factors, diabetes self-management and socio demographic variables with quality of life scores (Table 4.14)

In model 1, past smokers show statistically significant association with quality of life score (p<0.01) with 17.842 points lower than current smokers indicating past smokers have lower quality of life than current smokers. However, after adjusting with drinking status (model 2), and further adjustment with diabetes self-management (model 3) in addition to demographic variables (model 4), it lost its association with quality of life.

Both past drinkers and never drinkers were statistically significant in model 1 (p<0.05). Past drinkers and never drinkers have 14.415 and 13.978 points lower quality of life score than current drinkers. After adjusting with variables such as smoking status (model 2) and diabetes self-management score (model 3), only never drinkers remained statistically significant with 17.293 points lower quality of life score compared to current drinker. Whereas in model 4 and model 5 with further adjustment of other variables, it lost its association with quality of life

Diabetes self-management score showed positive statistical significance in model 1 and model 2 (p<0.001, B=2.334) without controls and with controls in model 3 (p<0.05, 2.371) indicating higher the self-management, higher is the quality of life and vice versa. However, after further adjusting it with socio demographic variables (model 4) and all set of variables (model 5), it lost its statistical significant association with quality of life

While adjusting socio demographic variables with lifestyle and diabetes self-management (model 4), both the age group of 70-79 years and 60-69years remained significant (p<0.05, B=-9.375 and -23.680 respectively) indicating lower quality of life score in both the age group compared to younger age group of 60-69 years.

Not living with a partner was significant in all the models ($p<0.001$) with and without controls indicating lower quality of life compared to those who are living with a partner. However lowest quality of life score was observed in model 1 (B=-52.554) without controlling for any variables.

Table 15 Multiple linear regression analysis of lifestyle factors adjusted with diabetes self-management (model 3) and socio demographic variables (model 4) with quality of life score.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
LIFESTYLE					
Smoking status					
Current Smoker (ref)					
Past smoker	-17.842*	-11.474	-10.023	-5.777	-2.128
Never smoker	-7.207	1.819	-0.563	-8.048	-1.63
Model summary	R=0.160, R^2=0.026				
Drinking status					
Current Drinker (ref)					
Past Drinker	-14.415*	-10.496	-12.559	-3.281	-4.397
Never Drinker	-13.978*	-15.51*	-17.293*	-1.019	-6.928
Model summary	R=0.148, R^2=0.022	R=0.205, R^2=0.042	R=0.207 R2=0.02		
DIABETESSELF MANAGEMENT					
Diabetesself management score	2.334***	2.334***	2.371*	0.146	0.953
Model summary	*R=0.262, R^2=0.069*	*R=0.262 R^2=0.069*			

SOCIODEMOGRAPHIC				
Age				
60-69 years				
70-79 years	-26.509*	-10.172*	-9.375*	-10.017*
>80 years	-49.729*	-23.326*	-20.572*	-26.628*
Model summary	R=0.458 R^2=0.209			
Sex				
Male(ref)				
Female	-12.976*	-5.978	-2.827	-1.191
Model summary	R=0.146, R^2=0.031			
Marital status				
Living with a partner (ref)				
Not living with a partner	-52.544*	-43.877*	-44.268*	-41.891*
Model summary	R=0.648, R^2=0.420	R=0.676, R^2=0.457	R=0.688 R2=0.457	

****P value is significant at the level of 0.001, **P value is significant at the level of 0.001, *Pvalue is significant at the level of 0.05. Ref=reference*

4.2.2.3 Multiple linear regression analysis of medical history, diabetes self-management and socio demographic variables with quality of life score (Table 4.15)

Treatment regimen comprising of both oral hypoglycemic drug and insulin was statistically significant only in model 3 ($p<0.05$). After adjusting it with diabetes self-management score (model 3) it was observed that people taking both treatment

regimens had 14.581 points higher quality of life score than people who take oral hypoglycemic drug only.

Both the categories of fasting blood sugar, 126-200mg/dl and >200 mg/dl in model 1 showed statistically significant association with quality of life ($P<0.05$ and $p<0.01$ respectively). Patients with fasting blood sugar of 126-200 mg/dl was associated with 11.183 points lower on quality of life score than those with < 126mg/dl, similarly patients with > 200mg/dl were associated with 14.803 points lower quality of life score than the patients with fasting blood sugar <126mg/dl. After controlling for other variables such as medical history (model 2) and further controlling with socio demographic variables in addition to medical history (model 3) it remained statistically significant ($p<0.05$) in both the models.

In model 2 after adjusting with other variables of medical history (duration of DM, treatment regimen, complications and co morbidities) it showed similar results to model 1 where patients who had fasting blood sugar 126- 200mg/dl (B= -10.248) and more than 200mg/dl (B= -11.258) had lower quality of life than the patients with fasting blood sugar < 126mg/dl.

However, in model 3 after adjusting with diabetes self-management score, only fasting blood sugar > 200mg/dl remained significant ($p<0.05$, B=12.787). Whereas in model 4 and model 5 after controlling for socio demographic and all set of variables respectively both categories of fasting blood sugar range became statistically not significant.

Having no complications was statistically significant in model 1 ($p<0.01$) and model 2($p<0.05$).

In model 1, having no complications was associated with 23.351 higher quality of life score than having complications. Similarly, in model 2, in comparison to having complications, having no complications was associated with 18.533 points higher quality of life score. However, after adjusting with diabetes self-management score in model 3 and socio demographic variables in model 4, it was no longer associated with quality of life

Socio demographic variables such as age group and marital status remained significant even after adjusting with medical history, diabetes self-management, socio demographic variables (model 4) and all set of variables (model 5)

In model 4, the age group of 70-79 ($p<0.05$) had 10.496 points lower quality of life score than that of 60-69 years and the age group of >80 years had 25.309 points lower quality of life than that of age group 60-69 years. Similar results were seen in model 5 after controlling for all set of independent variables, age group of 70-79 years had 10.052 points lower quality of life than that of reference age group of 60-69 years and >80 age group had 26.343 points lower quality of life score than that of reference age group of 60-69 years. Thus both the age groups had lower quality of life compared to younger age group of 60-69 years

Not living with a partner was statistically significant in all five models($p<0.001$) with and without controls ($p<0.001$) indicating lower quality of life scores for those who do not live with a partner compared to those who live with their partners.

Table 16 Multiple linear analysis of medical history adjusted with diabetes self-management (model 3) and socio demographic variables (model 4) with total score of quality of life

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
MEDICAL HISTORY					
Duration of DM					
1-5 years (ref)					
6-10 years	-3.827	-1.288	-1.253	-1.573	-1.164
more than 10 years	-5.335	1.137	1.126	5.860	5.994
Model summary	R=0.062, R^2=0.004				
Treatment regimen					
Oral hypoglycemic agent(ref)					
Insulin	-9.472	-3.206	-3.268	4.892	4.076
Both	8.208	6.60	6.15	0.712	6.445
Dietary modifications only	-10.157	-7.778	-7.712	-8.662	-4.474
Model summary	R=0.123, R^2=0.015				
Fasting blood sugar (FBS)					
<126mg/dl (ref)					

126-200mg/dl	-11.183*	-10.248*	-7.432	-2.470	-1.6
>200 mg/dl	-14.803**	-11.258*	-12.787*	-6.062	-4.693
Model summary	R=0.174, R^2=0.030				
Complications					
Yes (ref)					
No	23.351**	18.533*	8.469	2.202	2.595
Model summary	R=0.160, R^2=0.026				
Comorbities					
Yes (ref)					
No*	7.124	3.277	3.942	3.065	3.459
Model summary	R=0.096, R^2=0.009	R=0.240 R^2=0.05			
DIABETES SELF MANAGEMENT					
Diabetes self-management score	2.334***	2.383**	2.526*	0.308	0.953
Model summary	R=0.262, R^2=0.069	R=0.315 R^2=0.09	R=0.24 R2=0.0		
SOCIODEMOGRAPHIC					
Age					
60-69 years					
70-79 years	-26.509*	-10.172*		-10.496*	-10.017*
>80 years	-49.729**	-23.326*		-25.309*	-26.628*
Model summary	R=0.458, R^2=0.209				
Sex					
Male(ref)					
Female *	-12.976*	-5.978		-5.987	-1.191
Model summary	R=0.146, R^2=0.03				
Marital status					

Living with a partner (ref)				
Not living with a partner	-52.544*	-43.877*	-42.084*	-41.891*
	R=0.648,	R=0.676	R=0.69	
Model summary	R^2=0.420	R^2=0.45	R^2=0.4	

****P value is significant at the level of 0.001, **P value is significant at the level of 0.001, *Pvalue is significant at the level of 0.05. Ref=reference, Ref=reference*

4.2.2.4 Multiple linear analysis of components of diabetes self-management behavior controlled with medical history (model 3) and lifestyle (model 4).

The analysis showed statistical significant association of physical activity with total score of quality of life in all the models. Health care use was however showed statistical significant association only in model 1 (without controls).

Table 17: Components of Diabetes self-management (DSM) adjusted with medical history (model 3) , lifestyle (model 4) and all set of variables (model 5)

DSM components	Model 1	Model 2	Model 3	Model 4	Model 5
Physical activity	12.966***	13.100***	13.136***	12.512***	5.358**
Health care use	6.489*	3.142	1.308	1.013	1.415
Glucose management	0.269	1.599	0.839	0.62	1.644
Dietary control	3.723	5.203	4.803	4.524	4.457

4.2.2.5 Multiple linear analysis of accessibility to health care services adjusted with socio-demographic variables (model 4) with total score of quality of life

On adjusting all accessibility variables with socio demographic variables health center of geographical accessibility showed statistically significant association with quality of life in model 4 ($p< 0.05$ and B=33.496) indicating that people who visit health center have 33.496 points higher quality of life score than who visit hospital. Whereas after adjusting it with all set of variables it lost its association with quality of life.

Convenient hours of operation of the health care facility was statistically significant in all five models.

In model 1, the respondents who said that the operating hours to be convenient (B= 20.716) for them was associated with higher quality of life than those who thought it to be inconvenient.

After controlling with waiting time in model 2, the association remained significant ($p< 0.01$) with higher score (B=24.783) compared to model 1 indicating higher quality of life for those who thought it to be convenient compared to those who thought it to be inconvenient for them After adjusting with geographical, financial and cultural accessibility in model 3 with further adjustment of socio demographic variables in model 4 and all set of variables in model 5, operating hours remained statistically significant with reduction of effect of the category on subsequent models.

Getting care at health care center was statistically significant in model 4 with 33.496 higher quality of life score than those who visit hospital

Table 18: Multiple linear regression analysis of accessibility to health services (model 1, 2 and 3) and socio demographic variables (model 4) with total score of quality of life

Variables	Model 1	Model 2	Model 3	Model 4	Model5
ACCESSIBILITY					
Geographical					
Accessibility					
Getting care					
Hospital (ref)					
Clinic	-3.965	-6.841	-8.047	-7.973	-7.558

Health center	7.515	10.09	8.141	33.496*	-34.472*
	R=0.05,				
Model summary	R^2=0.003				
Distance					
less than 2 km					
2-5km	8.398	19.211	8.466	11.464	10.7
>5km	5.663	15.258	3.573	9.918	8.242
	R=0.062,				
Model summary	R^2=0.004				
Mode of transportation					
Walk (ref)					
Private	2.861	-10.653	-5.892	-3.072	-0.874
Public	-2.091	-16.853	-9.357	-10.5	-7.596
	R=0.061,	R=0.1			
Model summary	R^2=0.004	R^2=0.0			
Functional Accessibility					
Hours of operation					
Inconveninet (ref)					
conveninet*	20.716**	24.783 *	21.56*	16.203*	13.147*
	R=0.154,				
Model summary	R^2=0.024				
Waiting time					
Less than 10 mins (ref)					
10-20 mins	1.927	2.949	2.192	-11.515	-12.634
20-30mins	12.407	13.325	11.843	-6.769	-8.654
more than 30 mins	11.67	15.928	15.038	-5.039	-6.224
	R=0.141,	R=0.227,			
Model summary	R^2=0.020	R^2=0.052			
Financial accessibility					
Cost					
Very expensive (ref)					
Expensive					
Fair	-10.241	-10.241	-5.884	-1.536	-1.98
Cheap	0.412	0.412	1.716	-3.005	-4.596

Model summary	9.717	9.717	16.283	4.048	1.999
Cultural acceptability	R=0.140, R^2=0.020	R=0.140, R^2=0.020			
Maintaned Privacy					
Yes (ref)					
No	16.107	16.107	11.366	4.607	1.19
Model summary	R=0.10, R^2=0.010	R=0.10, R^2=0.010	R=0.28 R^2=0.038		
SOCIODEMOGRAPHIC					
Age					
60-69 years					
70-79 years	-26.509**	-10.172*		-11.025*	-10.017*
>80 years	-49.729**	-23.326*		-27.145*	- 26.62*
Model summary					
Sex					
Male(ref)					
Female	-12.976**	5.978		-3.694	-1.191
Model summary					
Marital status					
Living with a partner (ref)					
Not living with a partner	-52.544***	-43.877*		-43.994***	-41.891**
Model summary				R=0.714 R^2=0.479	R=0.727R^2=0.529

****P value is significant at the level of 0.001, **P value is significant at the level of 0.001, *Pvalue is significant at the level of 0.05***.** *Ref=reference*

CHAPTER V

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

The main objective of this study was to identify the factors influencing quality of life among elderly population with type 2 diabetes mellitus in Kathmandu Valley Nepal. Several factors (Age, gender, marital status, income, educational level, diabetes self-management behavior, medical history, accessibility to health services) associated with type 2 diabetes mellitus that have the potential to influence the quality of life of elderly population were considered after extensive literature review. The study involved interview of 310 respondents meeting the inclusion criteria. The data was checked and coded before analysis. Almost all questions were answered by the 310 respondents except question no 21of quality of life which had which had maximum number of missing data. HbA1c record which had >50% of missing data however was removed from the variable list. The data was analyzed using SPSS version 21 and the results of analysis have been discussed in this chapter.

It has been categorized into following parts:

5.1 Discussion on demographic characteristics of the study population

5.2 Quality of life of elderly population with type 2 diabetes mellitus.

5.3 Discussion on factors that influence quality of life

5.4 Conclusion

5.5 Recommendations

5.6 Benefits and application of the study

5.1 Discussion on demographic characteristics of study population

In this study, response of 310 type 2 diabetic populations aged 60 years and above were collected. The median age was 62 years with maximum number of respondents in the age group of 60-69 years. The average life expectancy of Nepal is being 67.44 years for females and 64.94 years for males supports the result obtained in this study. The number of female respondents was higher than male. There were 169 female respondents and 141 male respondents which is again consistent with the sex ratio of general population of Nepal (0.94 male: female) of female population being higher than male population. According to NGIIP ATLAS 2011, the maximum number of population falls into the category of being married. Similarly, the results obtained from this study also demonstrates that majority of the participants were married and were living with a partner (71.3%) with 28.7% in the category of not living with a partner (divorced/unmarried, widow/widower). In terms of educational level this study illustrates that majority (35.5%) of the population have had education only till primary level which is similar to the results demonstrated by population census 2011. Thus, the findings of socio demographic characteristics of this study are consistent with the socio demographic characteristic of general population of Nepal.

5.2 Level of Quality of life of elderly population with type 2 diabetes mellitus

In this study, while examining the level of quality of life domains by categorizing each domain into low, moderate and high, majority of the participants had moderate quality of life in all the domains. Although several studies conducted in different countries report low quality of life among elderly with chronic disease like diabetes(Brown et al., 2004), the finding of this study is similar to several quality of life studies conducted among elderly in India which reveal moderate quality of life among majority of the elderly population living with diabetes. (Polonsky et al., 1995) (Varma, Kusuma, & Babu, 2010). A possible reason for similar finding in current and Indian studies may be due to comparative way of culture and lifestyle similarities shared between two countries and that other countries might have differed due to dissimilarities in culture, lifestyle and other social aspects of life.

5.3 Discussion on factors that influence quality of life

Association between socio demographic characteristics and quality of life of elderly with type 2 diabetes mellitus

This study accounted for 45.5% male and 54.5% female respondents and bivariate analysis showed statistically significant association between sex and quality of life In model 1(without controls), it was observed that females had lower quality of life compared to that of males. However, after adjusting for other predictors in multivariate analysis (model 2, model3, model 4, model 5) it lost its significance with quality of life

This study is consistent with a study conducted in Nepal among elderly with chronic diseases which report that, men have higher quality of life as compared to women

Various studies conducted worldwide in different cultural settings also report similar findings(Hibbard & Pope, 1983) (Fernandez, Schiaffino, Rajmil, Badia, & Segura, 1999)

A study in Madrid suggests that treatment satisfaction to be higher and diabetes burden to be lower in male as compared to female which in turn influence their quality of life outcome (Richard R Rubin & Mark Peyrot, 1999)

Nevertheless, several other studies on quality of life conducted in Nepal have highlighted this issue of women having lower quality of life than men (Chalise, 2012) (H.Sakai, 2009) which is possibly due to their passive role in the society in terms of economic and social point of view, sexual inequality, lack of social support, violence against women ,cultural beliefs in addition to higher functional and psychological disability as compared to men. Therefore, these findings suggesting that diabetic men have an advantage over diabetic women in health-related quality of life reinforce the need to improve women's health and their QOL demands a multi-sectional, multi-disciplinary, and culturally relevant approach to create a suitable environment for providing better living conditions for women.

Association between age and quality of life among elderly population with diabetes mellitus

In this study statistically significant relationship was observed between age and quality of life in bivariate analysis

This statistically significant association was found in all models both before and after controlling for confounders in bivariate and multivariate analysis, where both the age group 70-79 years and >80 years revealed lower quality of life score compared to younger age group 60-69 years in all five models.

However, in multivariate analysis, after adjusting age with all set of variables the effect of > 80 years reduced considerably amongst all models compared to reference age group 60-69 years (model 5). A possible reason for this further reduction of effect among >80 years' age group may be due to the combined effect of the variable – 'hours of operation' under geographical accessibility which when analyzed separately, resulted in considerable reduction of quality of life score.

This finding is in accordance with other studies conducted in Nepal and in Asia which suggest lower quality of life among older age group compared to younger age group. It has been observed that as a process of ageing elderly people reveal more constraints due to health issues such as physical disability in terms of number of complications, mental health and psychological disorders (M. Tajvar, M. Arab, & A. Montazeri, 2008) (Jain, Shivkumar, & Gupta, 2014) (Mishra et al., 2015)

A large national survey in done US on quality of life and associated characteristics also found that younger people had significantly higher quality of life score than older people on SF-20 scales. (R. E. Glasgow et al., 1997)

Therefore, current and past findings suggest that advancing age does affect some aspects of health-related quality of life in people with diabetes, which may be due to increasing amount of co-morbidity, psychosocial morbidity and physical disability, including poor social freedom, impaired cognitive function and increased medical service use in old age.

Association between current marital status and quality of life

Bivariate analysis showed highly statistical significant relationship of marital status with quality of life.

This statistical significant association was found in all models before and after controlling for other factors. In multivariate analysis, not living with a partner was associated with lower quality of life score than living with a partner.

This finding is congruent with that of Tajvar and Hanestad who reported that unmarried, widowed, separated/divorced people or those living alone had lower quality of life than the individuals who were married and were living with a partner.(M. Tajvar et al., 2008) (Hanestad, 1993)

Since elderly people who do not live with their partners lack emotional and financial support (esp. women) and also face multiple issues in terms of psychological, social and cultural point of view (Houston et al., 2016) , and that the finding in current study may be due to the above mentioned reason which lowered their quality of life.

Association of socioeconomic status (income and educational level) with quality of life

The result of this study in bivariate analysis shows statistically significant association of both income and educational level with quality of life.

High income showed positive statistical significant association with quality of life in model 1 (without controls) where, high income was associated with higher quality of life compared to low income (model 1) However in multivariate analysis after adjusting with other predictors in subsequent models it lost its association with quality of life. This finding is in line with a large national survey in conducted in U.S that concluded higher income to be associated with good health status and hence higher quality of life. (R. E. Glasgow et al., 1997)

Educational level such as primary, secondary and bachelors and above showed positive and statistical significant association with quality of life in model 1 and model 2. The patients who had education level of bachelors and above were associated with higher quality of life than other educational level. Similar finding was observed in a study conducted in Tanzania which suggested that a high level

of education of an individual was associated with higher quality of life and good health status. (Mwanyangala et al., 2010) This reinforces the hypothesis that individual's health and thereby quality of life is improved by education, possibly due to having greater access to information on health, better eating habits and self-care (Herd, Goesling, & House, 2007)

Studies have reported that, socioeconomic status (measured by income and educational level) of people having higher education and higher income to be associated with higher quality of life, (Russell E Glasgow, Laurie Ruggiero, Elizabeth G Eakin, Janet Dryfoos, & Lisa Chobanian, 1997)

On controlling educational level with income in current study, highest quality of life was observed among secondary level education (model 2) with reduction of effect of bachelors and above education on quality of life score. This finding is unexpected of and counter intuitive in light of findings of current literature. A possible reason for this unanticipated finding may be due to interaction of higher education with income in such a way that despite of having higher education, they might not be satisfied with their income which in turn might have lowered their quality of life score.

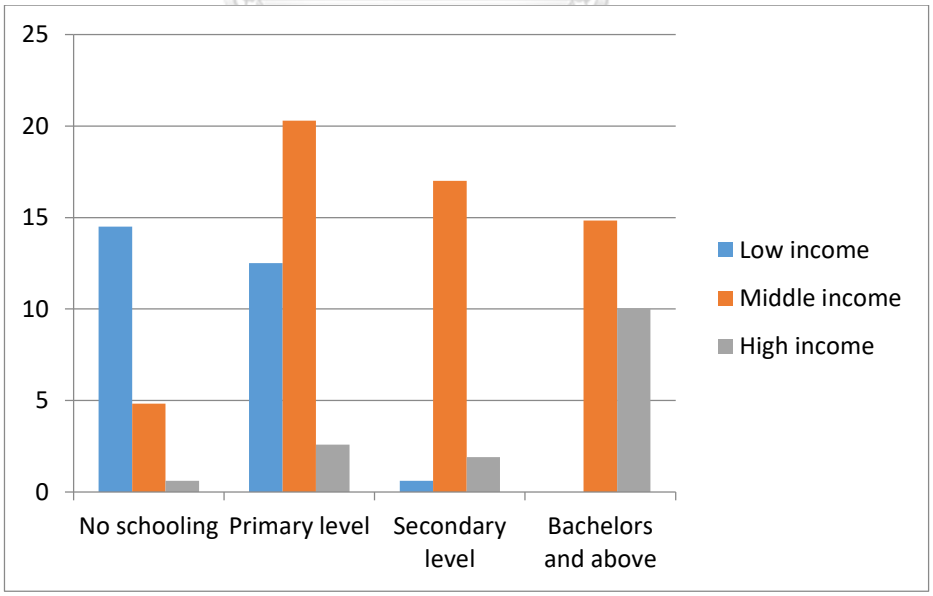

Figure 13: Percentage of study population by income and educational level

Diabetes self-management and quality of life

Pearson correlation showed statistically significant relationship between diabetes self-management score and quality of life score.

Model 1 and model 2 showed positive statistical significant association with quality of life without controlling for predictors revealing highest effect on quality of life score among all models.

In multivariate analysis, after adjusting it with lifestyle and medical history (model 3) it remained significantly associated with quality of life.

On analysis by components of diabetes self-management, only physical activity showed positive statistical significant association in all models indicating higher physical activity to be associated with higher quality of life.

This is in accordance with other research that has shown that diabetes self-management positively affects quality of life in people with diabetes. (Rose, Fliege, Hildebrandt, Schirop, & Klapp, 2002) A meta analytic study done on quality of life outcomes following self-management behavior in adult diabetic patients also demonstrated similar results.(J. Cochran & Conn, 2008)

A reasonable explanation for this expected association of higher self-management with higher quality of is due to the fact that effective management with better glycemic control and hence less disease burden leading to better quality of life outcome.(Al-Khawaldeh, Al-Hassan, & Froelicher, 2012) Therefore current and past studies both reinforce the finding of positive association of diabetes self-management with quality of life.

Lifestyle and quality of life

Bivariate analysis shows statistically significant association of smoking and drinking status with quality of life

In model 1, past smokers, past drinkers and never drinkers showed negative statistical significant association with quality of life, (without controls) indicating lower quality of life of past smokers compared to that of current smokers, and

similarly lower quality of life scores of past and never drinkers compared to that of current drinkers.

In multivariate analysis, after adjusting with other predictors such as diabetes self-management and socio demographic variables in subsequent models, the association of never drinkers remained significantly associated in model 3, whereas past smokers and past drinkers no longer remained significant.

The result of this study in terms of smoking oppose the trend suggested in the literature by several researchers who reveal the negative effect of smoking on quality of life as it is thought to worsen the glycemic level. (Chang, 2012)

Considering the descriptive finding of the current study, that majority of the past smokers were the oldest age group (>80 years) and current smokers apparently happen to be in the youngest age group 60-69 years (Fig.11) from this it can be presumed that current smokers might not have yet experienced the after effects of long term smoking that would deteriorate their quality of life. However, the current study does not address duration of smoking that would strongly reinforce this finding and that further research is needed controlling for duration to be able to explore this association in detail.

Nevertheless, the result of current drinkers having better quality of life is justified by the evidence that moderate consumption of alcohol has been reported to decrease the risk of diabetes by approximately 30% and it is only cases of prolonged heavy alcohol intake where alcohol has been shown to have delirious effect.(Steiner, Crowell, & Lang, 2015) Furthermore, a randomized, controlled trial of moderate alcohol consumption among 109 previously abstentious adults with diabetes found that consumption of 13 g of alcohol daily reduced fasting plasma glucose by 9% compared to non-alcohol consuming controls. (Ahmed, Karter, Warton, Doan, & Weisner, 2008)

The results of this study extend to a finding of Iain Lang who reported that those elderly who consume moderate amount of alcohol have fewer depressive symptoms, higher cognition and hence higher quality of life than those who abstain or have never drank alcohol.(Lang, Wallace, Huppert, & Melzer, 2007)

Since moderate levels of alcohol consumption are often associated with socializing,(Hoops, 2012) based on findings of previous and current study two

possible assumptions can be made, that current drinkers have better quality of life probably either due to better glycemic control and fewer number of complications or due to the associations that have been identified relate to effects of social interaction which might have resulted in higher quality of life among them. However, the current study does not enable us to examine the association of type of drinking and social interaction on quality of life that would strongly reinforce this finding in greater detail and that future researches are needed addressing the fore mentioned factors.

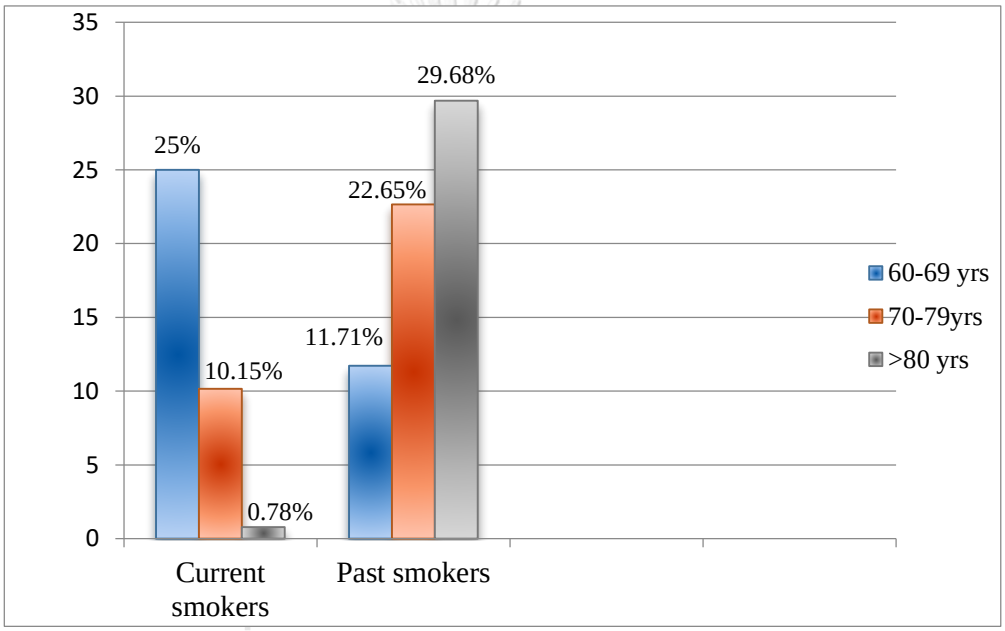

Figure 14: Percentage of study population by age and smoking status

Medical history and quality of life

Medical history in this study includes complications, co morbidities, duration of diabetes, treatment regimen and biomarker such as fasting blood sugar.

Bivariate analysis demonstrated statistical significant association of fasting blood sugar and complication with quality of life

In model 1, fasting blood sugar <126 mg/dl was associated with higher quality of life score than higher range of fasting blood sugar (>200 mg/dl)

After adjusting with other medical history variables (model 2) and further adjustment with diabetes self-management score (model 3), in multivariate

analysis, high fasting blood sugar >200mg/dl was associated with lower quality of life scores compared to fasting blood sugar <126mg/dl in all three models. However, lowest quality of life score was observed in model 1 without controls.

Similar findings have been observed in other studies, which report that lower fasting blood glucose levels have shown association with less fatigue and fewer self-reported symptoms of hyperglycemia which reduced diabetes burden and increased treatment satisfaction, resulting in better quality of life compared those having higher blood sugar levels. (Boyer & Earp, 1997)

The preponderance of several studies suggest that better glycemic control is related with better quality of life.(Wredling et al., 1995) It creates the impression that for majority of patients the advantages of good glycemic control, more than offset the increased burden it might involve. .

In model 1, having no complications was associated with higher quality of life than those having complications.

Multivariate analysis revealed that, after adjusting with predictors such as duration of DM, treatment regimen, fasting blood sugar and co-morbidities in model 2, it remained significantly associated with quality of life and with slight decrease of effect on quality of life score. However, further adjustments with other predictors (diabetes self-management and socio demographic variables) lead to lose its association in subsequent models.

Similar results have been observed in other studies in line with the results of this study which report that the incidence and severity of diabetes complications have significant impact on quality of life. (Polonsky et al., 1995) (Russell E Glasgow et al., 1997). Several studies also indicate that the presence of complications has shown to be associated with increased QOL treatment burden scores and. with greater health worries and reduced perceived health (Richard R Rubin & Mark Peyrot, 1999)

Though duration of DM was not significant in both bivariate and multivariate analysis, it is important to note that several studies suggest that longer duration of

diabetes is associated with more complications with more difficulty in maintaining glycemic control and direct increase in health care cost which have a considerable impact on quality of life of the elderly (Nathan, Singer, Godine, & Perlmuter, 1986). The bivariate analysis of current study clearly shows lower mean score of quality of life among duration of >10 years compared to that of 1-5 years and 6-10 years (Table 4.0). A previous study in Nepal among diabetic patients also suggests that patients with duration of DM of > 10 years are associated with lower quality of life than those with shorter duration.(Mishra et al., 2015) While another study details the aggregate health cost of people living with diabetes mellitus suggesting higher cost for people with increased duration of disease. .(Niraj Shrestha et al., 2013)

Accessibility to health services

Bivariate analysis of association between accessibility to health care services and quality of life analyzed by one-way ANOVA showed statistical significant association between hours of operation of health care facility and quality of life score.

Multivariate analysis demonstrated convenient hours of operation to be positively associated with quality of life in all the models. However highest effect on quality of life score was observed when it was controlled with waiting time (model 2). This is consistent with a national health care quality report of US which address the importance of timeliness and its impact on health status and quality of life .(AHRQ, 2013)

Health center in geographical accessibility was not statistically significant in bivariate analysis and after controlling with socio demographic variables in model 4 and with all set of variables in model 5 it showed statistical significant association with quality of life score indicating higher quality of life score than getting care at the hospital. According to Winnipeg regional health authority, elderly people with chronic disease face number of problems with access and ability to go to appointments with lack of financial support and advocacy (WRHA, 2010). Hence,

less cost and ease of approach to the nearest health care facility might have resulted in higher quality of life scores than going to hospital or private clinic in current study. Also, small sample size assesses 'getting care at health care center' (n=5), it is also possible that it might just have been a matter of chance for such result to appear in multivariable analysis.

5.4 Conclusion

This study was conducted among 310 participants above 60 years of age those diagnosed with type 2 diabetes mellitus in a diabetic clinic based in Kathmandu. Participants were selected through simple random sampling. Data was collected through interviewer administered questionnaires in a separate quiet room in the clinic. Data analysis was done using multiple linear regression by estimating conceptual models with statistical significance threshold of P=0.05

Analysis of level of quality of life showed that majority of participants having moderate quality of life which was similar to a study done in India showing moderate quality of life. Female gender, age group of >80 years, and not living with a partner was associated with lower quality of life than other groups. Likewise, high income, high educational level and high self-management were significantly associated with higher quality of life. Lifestyle factors such as past drinkers, never drinkers and past smokers were associated with lower quality of life than current drinkers and current smokers. Having no complications and fasting blood sugar less than 126mg/dl was associated with higher quality of life compared to having complications and with fasting blood sugar >126 mg/dl. Convenient hours of operation and health center for getting care were statistically significant and were associated with higher quality of life in accessibility to health services.

It can be concluded from above findings that, several factors contribute to affect quality of life of elderly with diabetes and more attention should be paid to all aspects of their life in addition to health such as their economic status, lifestyle and accessibility to health care services. Among several factors diabetes self-management is one critical factor among diabetic population which is essential to

enhance wellbeing, achieve good glycemic control with fewer complications and distress and hence improve quality of life. It is hoped that this survey could add to the existing literature on QOL of old people in Nepal and findings from this study will assist clinicians, policies makers, concerned bodies of disease prevention and control, and others in developing targeted interventions for elderly patients in order to add quality to their life and bring about positive and constructive experience of ageing.

5.5 Recommendations

Recommendations for future research

1) Future research can involve psychosocial factors health beliefs, social support, coping strategies and personality traits which have the potential to influence quality of life among elderly diabetics

2) A case control or cohort study design in a larger diabetic population comparing diabetic and non-diabetic population and also younger and older population would be a good design to get more results on factors that influence quality of life.

4) Different study areas can be studied thereby comparing quality of life among different areas and thus identify factors that influence quality of life in those areas

5) Nationwide research can be conducted in order to formulate policies and programs on national level.

6) Studies examining educational interventions and patient empowerment programs for those under treatment can be conducted that would help to see the disease impact and attitude towards diabetes

7) Several clinical trials can be conducted through several lifestyle interventions and with classes of medications.

8) Additionally, qualitative studies such as in-depth interviews with elderly can be used to have a better understanding on the topic.

Recommendations for policy makers

1) NCD policy and strategies drafted in 2009 should be implemented as soon as possible

2) Public health policy should allocate adequate budget for NCDs like diabetes mellitus and focus on impact of the disease on quality of life of the elderly

3) Establishment of more government health care facilities which has equipped health infrastructure with low cost as well as basic diagnostic and management capacity.

4) Provision of Universal Health Care program all over Nepal or medical schemes such as issuing voucher or medical card can be launched which would reduce the health care cost burden thereby improving their quality of life

5) Nationwide health promotion strategies such as campaigns, posters, pamphlets, advertisements addressing importance of healthy lifestyle and self-management of diabetes should be adopted in order to educate the general population regarding disease prevention and effective glycemic control.

6) Provision of long term care for the elderly

7) Provision of special aid for widow or separated people (those not living with a partner) especially with low or no income

8) Several health camps should be organized and screening programs should be held in close coordination with concerned bodies in order to detect undiagnosed cases of diabetes and those with potential of having the disease (pre-diabetes) and thus prevent possible complications in the long run.

9) Provision of several jogging parks with outdoor exercising space and equipments should be placed in order to promote recreational and healthy lifestyle among elderly as well as younger adults.

10) Social support groups for the elderly- increase social integration and frequency of social interaction that would help improve quality of life

11) Strategies for prevention and control of NCDs and risk factors should be encouraged at primary health care level and also provision of home visits for chronically ill patients (e.g.: Cuba's health care system) which would help decrease the disease burden

12) Evaluation plans should be prepared in order to fine tune the formulated policies and to redirect efforts and resources

Recommendations for clinical practice

1) Detailed counselling regarding physical activity as a part of self-management by the consulting physician at every visit.

3) Persistent pain from complication like neuropathy or other causes or its inadequate treatment is associated with adverse outcomes in older adults. Pain should be assessed at every visit in older patients with strategies for pain management

5) As with all persons with diabetes, diabetes self-management education/training (DSME/T) for older adults should be individualized and tailored to the individual's unique medical, cultural, and social situation.

6) Private hospitals should include outpatient education programs that in co-operate coping skills training interventions which is designed to improve various aspects of quality of life.

5.6 Benefit and Application of the study

In medical practice

This study may provide with the important information to the clinician regarding areas in which a diabetic person is affected the most, thus helping him/her in making the best alternatives in patient care and also measure the change in quality of life over the course of treatment

. **In health services evaluation**

It is expected to provide an invaluable supplementary appraisal of health care services, by yielding a measure of the relationship between the health care service and patients' quality of life, and also by directly presenting a measure of patients' perception of the quality and availability of health care.

In research

By assessing what are the potential factors of diabetes that impair the subjective wellbeing of a person, it will provide knowledge into the nature of the disease and help guide mediations.

In policy making

This study will provide policy makers and concerned bodies with important information regarding quality of life of elderly people with diabetes which will help them to identify the factors that affect quality of life and thus formulate policies focusing on the areas where the target population is affected the most.

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APPENDIX

Appendix A

QUESTIONNAIRES

Interviewer's Code: …….

Before we begin, I would like to ask you to answer a few general questions about yourself.

Part 1- <u>Socio demographic characteristic</u>

1. General Information:

1.1 Name: ……

1.2 Age: …….

1.3 Gender: Male ☐ Female ☐

1.4 Marital status: Unmarried ☐ Married ☐
Widow/Widower ☐ Divorcee ☐

1.5 Income:

1. Less than Rs.10000
2. Rs.10,000-20,000
3. Rs.20,000-30,000
4. Rs.More than 30,000

1.6 Education Level: Illiterate ☐ (Not able to read and write) ☐

Able to read and write (No schooling) ☐ Grade 1-10 (Primary level) ☐

Grade 10-12 (secondary level) ☐ Bachelor degree and above ☐

Part 2 -<u>Diabetes Self Management Questionnaire</u>

TIME FRAME: Last 8 weeks

	The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.	Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
1.	I check my blood sugar levels with care and attention. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
2.	The food I choose to eat makes it easy to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
3.	I keep all doctors' appointments recommended for my diabetes treatment.	☐3	☐2	☐1	☐0
4.	I take my diabetes medication (e. g. insulin, tablets) as prescribed. ☐ *Diabetes medication / insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.		Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
5.	Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐3	☐2	☐1	☐0
6.	I record my blood sugar levels regularly (or analyse the value chart with my blood glucose meter). ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
7.	I tend to avoid diabetes-related doctors' appointments.	☐3	☐2	☐1	☐0
8.	I do regular physical activity to achieve optimal blood sugar levels.	☐3	☐2	☐1	☐0
9.	I strictly follow the dietary recommendations given by my doctor or diabetes specialist.	☐3	☐2	☐1	☐0
10.	I do not check my blood sugar levels frequently enough as would be required for achieving good blood glucose control. ☐ *Blood sugar measurement is not required as a part of my treatment.*	☐3	☐2	☐1	☐0

	The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.	Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
11.	I avoid physical activity, although it would improve my diabetes.	☐3	☐2	☐1	☐0
12.	I tend to forget to take or skip my diabetes medication (e. g. insulin, tablets). ☐ *Diabetes medication / insulin is not required as a part of my treatment.*	☐3	☐2	☐1	☐0
13.	Sometimes I have real 'food binges' (not triggered by hypoglycaemia).	☐3	☐2	☐1	☐0
14.	Regarding my diabetes care, I should see my medical practitioner(s) more often.	☐3	☐2	☐1	☐0
15.	I tend to skip planned physical activity.	☐3	☐2	☐1	☐0

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the last 8 weeks, please specify the extent to which each statement applies to you.		Applies to me very much	Applies to me to a consider-able degree	Applies to me to some degree	Does not apply to me
16.	My diabetes self-care is poor.	☐3	☐2	☐1	☐0

Part 3

Medical history and Biomarker

Duration of DM

How long has it been since you've been diagnosed with diabetes mellitus?

Treatment Regimen

What type of anti-diabetic medication are you taking?

a) Oral hypoglycemic agent b)Insulin
b) Dietary modifications only d) Others

Diabetic Complications

1)How long have you been diagnosed with Diabetic Neuropathy? (cross check with medical record)

Yes No

2)How long have you been diagnosed with Diabetic Retinopathy? (cross check with medical record)

Yes No

3)How long have you been diagnosed with Diabetic Nephropathy? (cross check with medical record)

Yes No

Co-morbidities

1)Have you been diagnosed with Hypertension?

Yes No

2) Do you have past history of Stroke?

Yes No

3)Do you have past history of Myocardial infarction?

Yes No

Biomarkers:

HBA1C (as recorded in OPD card):

Part 4 -Accessibility to health services

Geographical accessibility

A) When you or your family members get ill, where do you mostly go to get care?

1) Hospital
2) Private clinic
3) Community health center
4) Drug store
5) Others: Please specify……..

B) Approximately how far is it from your home to the health care facility where you mostly receive care for diabetes mellitus?

1) Less than 2 km
2) 2-3 km
3) 3-5 km

4) More than 5 km

C) Mode of transportation while getting to the health care facility where you mostly receive care for diabetes mellitus?

1) Walk
2) Motorcycle
3) Bus/Taxi
4) Own Car
5) Others

Functional accessibility

A) How convenient are the hours of operation of the health care facility for you where you mostly go for diabetes follow up?

1) Very convenient
2) Convenient
3) Inconvenient
4) Very Inconvenient

B) How long do you usually wait to meet the health care personnel at the health care facility where you mostly visit for diabetes follow up from the time you have registered?

1) 10 minutes
2) 10-20 minutes
3) 20-30 minutes
4) More than 30 minutes

Financial Accessibility

A) What do you think about your health care cost due to Diabetes Mellitus?

1) Very expensive 2) Expensive 3) Fair 4) Cheap 5) Very Cheap

B) Do you have health insurance?

1) Yes 2) No

If yes,

Who is your health insurance provided by?

1) Nepal government
2) Private insurance
3) Others. Please specify……

Cultural acceptability

A) Are the service providers friendly and welcome you where you receive care for Diabetes Mellitus ?

1) Yes 2) No

B) Are you satisfied with the privacy you got while getting checked at the health care facility where you receive care for Diabetes Mellitus?

1) Yes 2) No

Part 5

WOQOL-BREF QUESTIONNAIRE

Instructions:

This assessment asks you how you feel about your quality of life, health, or other areas of your life. Please answer questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your 1st response.

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in last four weeks.

Ranking Scale

Very poor means very frequent, long lasting, and severe sickness in the last four weeks

Poor means relatively frequent and somewhat long lasting and severe sickness in the last

four weeks.

Neither poor nor good means sickness of moderate frequency, duration, and severity in

the last four weeks

Good means not much sickness, not very long lasting, and not very severe in the last four

weeks

Very good means slight or no sickness, very short term, and not severe

at all in the last four weeks.

Satisfaction Scale

Very dissatisfied means that you were highly displeased in the last four weeks

Dissatisfied means that you were moderately displeased in the last four weeks

Neither poor nor good means that you felt neutral in the last four weeks

Satisfied means that you were moderately pleased in the four weeks

Very satisfied means that you were highly pleased in the last four weeks

Extent Scale

Not at all means that this has had no importance to you in the last four weeks

A little means that is has been of slight importance to you in the last four weeks

A moderate amount means that it has been somewhat important to you in the last four

weeks

Very much means that it has been quite important to you in the last four weeks

An extreme amount means that it has been very important to you in the last four weeks

Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.

		Very poor	Poor	Neither poor nor good	Good	Very good
1(G1)	How would you rate your quality of life?	1	2	3	4	5

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
2 (G4)	How satisfied are you with your health?	1	2	3	4	5

The following questions ask about **how much** you have experienced certain things in the last two weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
3 (F1.4)	To what extent do you feel that physical pain prevents you from doing what you need to do?	1	2	3	4	5
4(F11.3)	How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
5(F4.1)	How much do you enjoy life?	1	2	3	4	5
6(F24.2)	To what extent do you feel your life to be meaningful?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	Extremely
7(F5.3)	How well are you able to concentrate?	1	2	3	4	5
8 (F16.1)	How safe do you feel in your daily life?	1	2	3	4	5
9 (F22.1)	How healthy is your physical environment?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last two weeks.

		Not at all	A little	Moderately	Mostly	Completely
10 (F2.1)	Do you have enough energy for everyday life?	1	2	3	4	5
11 (F7.1)	Are you able to accept your bodily appearance?	1	2	3	4	5
12 (F18.1)	Have you enough money to meet your needs?	1	2	3	4	5
13 (F20.1)	How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
14 (F21.1)	To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

		Very poor	Poor	Neither	Good	Very good

				poor nor good		
15 (F9.1)	How well are you able to get around?	1	2	3	4	5

The following questions ask you to say how **good or satisfied** you have felt about various aspects of your life over the last two weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
16 (F3.3)	How satisfied are you with your sleep?	1	2	3	4	5
17 (F10.3)	How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
18(F12.4)	How satisfied are you with your capacity for work?	1	2	3	4	5
19 (F6.3)	How satisfied are you with yourself?	1	2	3	4	5
20(F13.3)	How satisfied are you with your personal relationships?	1	2	3	4	5
21(F15.3)	How satisfied are you with your sex life?	1	2	3	4	5
22(F14.4)	How satisfied are you with the support you get from your friends?	1	2	3	4	5
23(F17.3)	How satisfied are you with the conditions of your living place?	1	2	3	4	5
24(F19.3)	How satisfied are you with your access to health services?	1	2	3	4	5
25(F23.3)	How satisfied are you with your transport?	1	2	3	4	5

	Equations for computing domain scores	Raw score	Transformed scores*	
Domain 1	(6-Q3) + (6-Q4) + Q10 + Q15 + Q16 + Q17 + Q18 ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐	=	4-20	0-100
Domain 2	Q5 + Q6 + Q7 + Q11 + Q19 + (6-Q26) ☐ + ☐ + ☐ + ☐ + ☐ + ☐	=		
Domain 3	Q20 + Q21 + Q22 ☐ + ☐ + ☐	=		
Domain 4	Q8 + Q9 + Q12 + Q13 + Q14 + Q23 + Q24 + Q25 ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐ + ☐	=		

	Steps	SPSS syntax for carrying out data checking, cleaning and computing total scores
1.	Check all 26 items from assessment have a range of 1-5	RECODE Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 (1=1) (2=2) (3=3) (4=4) (5=5) (ELSE=SYSMIS). (This recodes all data outwith the range 1-5 to system missing).
2.	Reverse 3 negatively phrased items	RECODE Q3 Q4 Q26 (1=5) (2=4) (3=3) (4=2) (5=1). (This transforms negatively framed questions to positively framed questions)
3.	Compute domain scores	COMPUTE DOM1=MEAN.6(Q3,Q4,Q10,Q15,Q16,Q17,Q18)*4. COMPUTE DOM2=MEAN.5(Q5,Q6,Q7,Q11,Q19,Q26)*4. COMPUTE DOM3=MEAN.2(Q20,Q21,Q22)*4. COMPUTE DOM4=MEAN.6(Q8,Q9,Q12,Q13,Q14,Q23,Q24,Q25)*4. (These equations calculate the domain scores. All scores are multiplied by 4 so as to be directly comparable with scores derived from the WHOQOL-100. The '.6' in 'mean.6' specifies that 6 items must be endorsed for the domain score to be calculated).
4.	Delete cases with >20% missing data	COUNT TOTAL=Q1 TO Q26 (1 THRU 5). (This command creates a new column 'total'. 'Total' contains a count of the WHOQOL-100 items with the values 1-5 that have been endorsed by each subject. The 'Q1 TO Q26' means that consecutive columns from 'Q1', the first item, to 'Q26', the last item, are included in the count. It therefore assumes that data is entered in the order given in the assessment). FILTER OFF. USE ALL. SELECT IF (TOTAL>=21). EXECUTE. (This second command selects only those cases where 'total', the total number of items completed, is greater or equal to 80%. It deletes the remaining cases from the data set).
5.	Check domain scores	DESCRIPTIVES VARIABLES=DOM1 DOM2 DOM3 DOM4 /STATISTICS=MEAN STDDEV MIN MAX. (Running descriptives should display values of all domain scores within the range 4-20).
6.	Save data set	Save data set with a new file name so that the original remains intact.

Appendix B

Informed Consent

This informed consent form is for research for thesis titled – Factors influencing quality of life among elderly population with type 2 diabetes mellitus in Kathmandu valley: a hospital based cross sectional study. I, Dr. Kriti Adhikari currently acquiring my MPH degree at College of Public Health Sciences, Chulalongkorn Unversity,Thailand. This research is being carried out because Type 2 diabetes is one of the most common non communicable disease in our region. This research focuses on factors that influence quality of life of elderly those diagnosed with type 2 diabetes mellitus. The information provided in the questionnaire will be kept confidential. Your participation in the research is entirely voluntary. It is your choice whether to participate or not .If you choose not to participate all the services you receive at the Centre will continue and nothing will change. Also that the information provided will not be used against you in anyway. But if you choose to participate the information you will be provided will help us find the quality of life of elderly population those living with diabetes and this information can help the concerned bodies in planning and making policies. You will not be provided incentive as such or there may be no direct benefit but any information gained will be provided to you for future interventions. The study will be conducted by the interviewer who will be ask questions which will take no more than 15 mins. If you have any questions regarding the research you can ask them now or later. If you wish to ask later, you may contact me Dr.Kriti Adhikari, mobile no:9841522185.

If you agree on the following and wish to participate willingly please sign the following below giving your approval.

.....

Name of the participant

Appendix C

Activity timeline

Activity	2016	2017				2017						
	December	January	February	March	April	May	June	July	August	September	October	November
1. Literature Review	←	—	—	—	→							
2. Develop proposal		←	—	—	→							
3. Proposal examination							↔					
4. Ethical Consideration								←	→			
5. To respond to the comments from research ethics review								←	→			

6. Try-out the questionnaires								↔				
7. Set and train the team for collecting data									↔			
8. Data collection									↔	↔		
9. Data entry and analysis										↔		
10. Final examination											↔	
11. Revise and publication											↔	

BUDGET

1. Training of data collection team	5,500 baht
2. Ethical Approval in Nepal	3,000 baht
3. Souvenir to data collection team (NURSES)	2,000 baht
4. Travel Costs	50,000 baht
5. Hired translators (2)	10,000 baht
6. Printing and photo copy cost	2,000 baht
7.Pretesting of questionnaires	2,500 baht
TOTAL COST	**75,000 baht**

APPENDIX D

Ethical Approval Letter

Government of Nepal

Nepal Health Research Council (NHRC)

Estd. 1991

Ref. No.: 404

27 August 2017

Ms. Kriti Adhikari
Principal Investigator
College of Public Health Sciences, Thailand

Ref: **Approval of thesis proposal** entitled **Factors Influencing Quality of Life among Elderly Population with Type 2 Diabetes Melllitus: a Clinic Based Cross Sectional Study in Kathmandu Valley, Nepal**

Dear Ms. Adhikari

It is my pleasure to inform you that the above-mentioned proposal submitted on **09 August 2017** (**Reg. no. 310/2017** please use this Reg. No. during further correspondence) has been approved by Nepal Health Research Council (NHRC) Ethical review board on **23 August 2017**.

As per NHRC rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit the detail of such changes intended or desired with justification prior to actual change in the protocol. Expiration date of this proposal is **November 2017.**

If the researcher requires transfer of the bio samples to other countries, the investigator should apply to the NHRC for the permission. The researchers will not be allowed to ship any raw/crude human biomaterial outside the country; only extracted and amplified samples can be taken to labs outside of Nepal for further study, as per the protocol submitted and approved by the NHRC. The remaining samples of the lab should be destroyed as per standard operating procedure, the process documented, and the NHRC informed.

Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of their project proposal and **submit progress report in between and full or summary report upon completion.**

As per your research proposal, the total research amount is **NRs. 210,000.00** and accordingly the processing fee amounts to **NRs-10,000.00**. It is acknowledged that the above-mentioned processing fee has been received at NHRC.

If you have any questions, please contact the Ethical Review M & E Section at NHRC.

Thanking you,

Prof. Dr. Anjani Kumar Jha
Executive Chairman

VITA

A. Personal Details

Full Name : Dr. Kriti Adhikari

Address : Boudha-6, Mahankal, Kathmandu, Nepal.

Phone : 9779851034000

Email : adhkriti@gmail.com

Date of birth: 19 July1992

Nationality : Nepali

Sex : Female

B. Education/Qualifications

Course Completed Institution Date of Completion

Bachelor of Medicine, Bachelor of Surgery (MBBS) : Manipal College of Medical Sciences, Pokhara, Nepal. Year -2015

CBSE Class 12: D.A.V Sushil Kedia Vishwa Bharati Higher Secondary School, Kathmandu, Nepal. Year- 2009

CBSE Class 10: Modern Indian School, Chobar, Nepal. Year-2007

C. Professional Work Experience

1. Medical Officer: Lake City hospital, Pokhara Nepal since 1st Nov 2015-31st March 2016

2. Medical Officer: Dirghayu Guru Hospital and Research Center, Kathmandu , Nepal since 1st April 2016- 10th Nov 2016