MULTIMORBIDITY, HEALTH SERVICE UTILIZATION, AND QUALITY OF LIFE AMONG OLDER PEOPLE IN KAMALAMAI MUNICIPALITY, SINDHULI DISTRICT, NEPAL

A Dissertation

Submitted to the Faculty of Humanities and Social Sciences of

Tribhuvan University in Fulfillment of the Requirements for

the Degree of

DOCTOR OF PHILOSOPHY

in

POPULATION STUDIES

By

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LETTER OF RECOMMENDATION

We certify that this dissertation entitled "MULTIMORBIDITY, HEALTH SERVICE UTILIZATION, AND QUALITY OF LIFE AMONG OLDER PEOPLE IN KAMALAMAI MUNICIPALITY, SINDHULI DISTRICT, NEPAL" is prepared by Naba Raj Thapa under our guidance. We hereby recommend this dissertation for final examinations by the Research Committee of the Faculty of Humanities and Social Sciences, Tribhuvan University, in fulfillment of the requirements for the Degree of DOCTOR OF PHILOSOPHY in POPULATION STUDIES.

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APPROVAL LETTER

This dissertation entitled **Multimorbidity, Health Service Utilization, and Quality of Life Among Older People in Kamalamai Municipality, Sindhuli District, Nepal** was submitted by **Mr. Naba Raj Thapa** of Humanities and Social Sciences, Tribhuvan University, in fulfillment of the requirements for the **Degree of Doctor of Philosophy in Population Studies.** I hereby, certify that the Research Committee of the Faculty has found this dissertation satisfactory in scope and quality. Therefore, it has been accepted for the degree.

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DECLARATION

I hereby declare that this dissertation entitled "MULTIMORBIDITY, HEALTH SERVICE UTILIZATION, AND QUALITY OF LIFE AMONG OLDER PEOPLE IN KAMALAMAI MUNICIPALITY, SINDHULI DISTRICT, NEPAL" is my own work and that it contains no materials previously published. I have not used its materials for the award of any kind and any other degree. Where other authors' sources of information have been used, they have been acknowledged.

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Naba Raj Thapa

May 2025

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ABSTRACT

Nepal is entering an aging society with new challenges, such as increasing demand for healthcare services, multiple chronic conditions, the need for specialized geriatric care, and changing roles of older people within family and society.

Understanding the interconnected issues of multimorbidity, health service utilization, and quality of life is essential for promoting active and successful aging. This study aims to identify the patterns, prevalence, and correlates of multimorbidity, examine the factors associated with health service utilization, and assess the extent and correlates of quality of life among older people. A conceptual framework was developed from existing theoretical and empirical literature, with multimorbidity, health service utilization, and quality of life as the primary outcome variables. Variables were categorized into sociodemographic, economic, health status, and health behavior factors.

A cross-sectional survey was conducted among 692 individuals aged 60 and above in Kamalamai Municipality, Sindhuli district. Data were collected through structured face-to-face interviews between January and March 2023 using a multistage sampling design. Statistical analyses, including multinomial logistic regression, logistic regression, and hierarchical regression models, were used to identify factors influencing multimorbidity, health service utilization, and quality of life.

The findings of the study showed that almost one-half (49.6%) of older people reported multimorbidity conditions. The multinominal logistic regression revealed that the relative risk of multimorbidity was higher among older people who reported old-age allowance as an economic source of living (aRRR=2.28, 95% CI [1.08-4.83], p<.05). Furthermore, older people in the richest wealth quintile had a significantly higher relative risk of multimorbidity (aRRR=4.79, 95% CI [2.09-11.01], p<.001) compared to those in the poorest wealth quintile. The relative risk of multimorbidity was higher among older people with poor health status (aRRR=10.83, 95% CI [3.03-38.66], p<.001) than that of

those with good health status, and dependence on ADL was also associated with a higher risk of multimorbidity. In contrast, older people from Hill Janajati, those without disability, and current or former tobacco users were less likely to have multimorbidity.

Regarding health service utilization, nearly two-thirds of older people utilized health services in the past 12 months. The findings indicate variation in health service utilization based on education, wealth quintile, and health insurance coverage. Older people who were literate but no formal education (aOR=2.14, 95% CI [1.18-3.87], p<.05), had health insurance (aOR=1.65, 95% CI [1.16-2.33], p<.01), and those belonged to the richest wealth quintile (aOR=2.02, 95% CI [1.09-3.73], p<.05) were more likely to use health services. Likewise, those with poor health status (aOR=3.12, 95% CI [1.63-5.98], p<.001), those with multimorbidity (aOR=3.03, 95% CI [1.83-5.00], p<.001) and those who experienced elder abuse (aOR=1.77, 95% CI [1.22-2.56], p<.01) were more likely to utilize health services.

The analysis of quality of life reveals a mean total quality of life score of 27.6 (±3.5. Education level, wealth quintile, and physical activity emerged as important factors in determining a better quality of life. Furthermore, quality of life was positively associated with current or past smoking habits and dependence on activities of daily living. Fair or poor health status and experience of elder abuse were associated with a lower quality of life.

The study concludes that multimorbidity, health service utilization, and quality of life are closely interconnected, influencing each other. This study enhances understanding of the complex health challenges of older people by identifying factors that influence multimorbidity, health service utilization, and quality of life. This study offers a separate, deeper level of investigation and understanding of multimorbidity, health service utilization, and quality of life among older people. As a cross-sectional study, the inherent limitation of this study was that it did not establish the causal effects.

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LIST OF ACRONYMS AND ABBREVIATIONS

ADL	Activity of Daily Living
ANOVA	Analysis of Variance
aOR	Adjusted Odds Ratio
APA	American Psychological Association
aRRR	Adjusted Relative Risk Ratio
BMI	Body Mass Index
BSRS	Brief Symptom Rating Scale
CBS	Central Bureau of Statistics
CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Diseases
EUROHIS	European Health Interview Surveys
IADL	Instrumental Activity of Daily Living
ICPD	Internal Conference on Population and Development
KMO	Kaiser-Meyer-Olkin
LASI	Longitudinal Aging Study in India
MPCE	Monthly Per Capita Expenditure
NCD	Non-Communicable Diseases
NHMS	National Health and Mortality Survey
non-HDL	non-High-Density-Lipoprotein
NSO	National Statistics Office
NSS	National Sample Survey
OBC	Other Backward Classes
OECD	Organization for Economic Co-operation and Development
OR	Odds Ratio
PCA	Principle Component Analysis
RRR	Relative Risk Ratio
SAGE	Study of Global Aging and Adult Health
SD	Standard Deviation
SDG	Sustainable Development Goal
UN	United Nations
UNFPA	United Nations Population Fund

WG-SS	Washington Group Short Set on Functioning
WHO	World Health Organization
WHOQOL-8	World Health Organization Quality of Life-8 Items
WHOQOL-BREF	World Health Organization Quality of Life-Bref

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Population aging, defined as the increasing proportion of older people in a population, is both a significant demographic change and a profound social transformation of the twenty-first century, with wide-ranging, far-reaching, and multifaceted implications for sustainable development. Nepal is also experiencing growth in the number and proportion of older people in their population. An increasing number of older people is closely associated with Sustainable Development Goals (SDGs), such as reducing inequalities, promoting the rights and well-being of older people throughout their lives, and ensuring that all people, including older people, enjoy peace and prosperity.

The drivers of population aging are declining fertility rates and rising life expectancy. Increased investment in public health, advances in health care, nutrition, prevention of infectious and parasitic diseases, improvements in hygiene, sanitation, education, and a higher standard of living have all contributed to people living longer. Progress in the reduction of child mortality, improvement in employment opportunities, access to education, improvement in reproductive health and quality of family planning services, and changing gender norms have fueled the decline in fertility.

The definition of the threshold of older people is somewhat arbitrary. However, the United Nations consistently defines individuals aged 60 and above as older people (United Nations [UN], 2017). The Senior Citizens Act of Nepal 2063 (2006) defines senior citizens or older people as individuals who are 60 years of age or older.

Every country in the world is experiencing an increase in the number and proportion of older people aged 60 years and above in their population. It has been noted that

population aging has already started in developed countries. However, developing countries are now experiencing population aging that will continue for several decades. The recent World Population Prospects 2024 affirmed that four-fifths of the world population over 60 years will live in developing countries by 2050. The proportion of older people is expected to increase more rapidly, from 12 percent in 2023 to 20 percent in 2050. Asia has the greatest number of older people. Asia's older population will increase from 698 million (14% of their total population) in 2024 to 1.32 billion (25%) by 2050. Likewise, in South Asia, the proportion of older people will increase by 125 percent, from 10 percent in 2024 to 19 percent by 2050 (UN, 2024). Evidence suggests that Asian countries will experience rising population aging challenges in the coming decade.

Widespread concern about the aging population has been rising among researchers since the International Plan of Action on Aging in 1982. The Second World Assembly on Aging, held in 2002, emphasized older people in the development process, advancing health and well-being in old age, enabling them to ensure a supportive environment for older people and recognizing the challenges posed by population aging (UN, 2002). Madrid International Plan of Action on Aging provided the framework for responding to the challenges of population aging (UN, 2007). The Government of Nepal has formulated a National Plan of Action for Senior Citizens 2062 (2005) in line with the Madrid International Plan of Action on Aging 2002. This action plan includes economic and social security, health and nutrition, participation and involvement, education, and entertainment for the well-being of older people. The 2030 Agenda for Sustainable Development Goals has directly or indirectly addressed the health and well-being of older people. Health is the central position of SDG. SDG 3: Ensuring healthy lives and promoting well-being for all ages is closely linked to the health of older people (Dugarova, 2017; UN, 2015). The International Conference on Population and Development (ICPD) recommended that

governments develop social security systems that ensure between and within generations equity and solidarity to support older people and also to develop systems of healthcare that enable older people to lead healthy and productive lives (United Nations Population Fund [UNFPA], 1996). It has encouraged prioritizing the health status and challenges experienced by older people.

Nepal is entering an aging society with a new set of challenges. Population aging is associated with an increased risk of multiple chronic diseases, a gradual decline in physical capacities, a rise in multiple disabilities, greater demand for healthcare services, increased social isolation, and a changing perception of quality of life. As Nepal undergoes a demographic shift marked by a growing aging population, the interrelationships among three interconnected themes—multimorbidity, health service utilization, and quality of life—have emerged as a growing area of attention and concern for the health and well-being of older people.

1.2 Statement of the Problem

Population aging poses unpredictable health challenges (World Bank, 2016). Older people need more health services and are more at risk of many health disorders compared to other age groups (Amente & Kebede, 2016). Older people have specific characteristics that distinguish them from other population groups in terms of socioeconomic status, lifestyles, prevalence of diseases, cognitive functioning, activities of daily living, and dependency on family and society. From a biological point of view, aging is associated with a high risk of diseases, the gradual and lifelong accumulation of molecular and cellular damage, and a gradual decline in physiological reserves, as well as a reduction in the individual's functional capacity and resistance to stress (Vasto et al., 2010). In terms of health, old age is characterized by a greater risk of various health disorders, a higher prevalence of multimorbidity, low levels of physical activity, increased needs for healthcare

and long-term care services, the need to ensure adequate access to health services, and a rise in body mass index (World Helath Organization [WHO], 2015).

The prevalence of multimorbidity is more common among older people in Nepal (Balakrishnan et al., 2022; Lohani et al., 2024). Multimorbidity poses particular healthcare challenges as it requires a comprehensive and integrated approach to healthcare services for older people. The healthcare system in Nepal is primarily structured to address a single disease approach, which may not effectively meet the needs of older people with multimorbidity (Balakrishnan et al., 2022). This approach leads to fragmented care, increased use of health care services, and a decline in the quality of life of older people. Moreover, multimorbidity is associated with a greater risk of adverse health outcomes, including functional decline, disability, and mortality. It also places a substantial burden on healthcare and related resources, increases demand for healthcare, increases hospitalizations and longer hospital stays, and results in higher healthcare costs.

Multimorbidity disproportionately affects socio-economically disadvantaged older people, further exacerbating health inequalities among them. Understanding the effects of multimorbidity on health service utilization and quality of life among older people is crucial for effective interventions to improve health outcomes and the well-being of older people.

The government of Nepal enacted the Senior Citizen Act, 2063 (2006), along with the Senior Citizen Regulations 2065, to ensure the social, economic, and human rights of the senior citizens. Additionally, the Jyestha Nagarik Swasthya Upachar Nirdeshika (Senior Citizens Treatment Guidelines) 2061 was introduced to deliver and improve the healthcare services of older people. Similarly, a free health service program was also endorsed to improve essential health services for older people (Geriatric Center Nepal, 2010).

The utilization of health services among older people is an important issue in Nepal due to the growing number of older people and the burden of multimorbidity (Chhetri et al., 2023; Gurung et al., 2016; Sanjel et al., 2012). The government of Nepal is endeavoring to address the health challenges of older people through the provision of healthcare services. However, the level of health service utilization among older people is still low (Acharya et al., 2019; Chhetri et al., 2023; Ghimire, Singh, et al., 2021; Karmacharya et al., 2021), suggesting that the health care of older people has not yet received desirable attention and most of the older people utilize conventional health care facilities. The utilization of health services depends on morbidity conditions, health-seeking behavior, accessibility and quality of health services, and socioeconomic, cultural, and environmental barriers. These challenges ultimately lead to poor health outcomes and a higher risk of multimorbidity. To address these issues, there is a need to explore the factors associated with the utilization of health services among older people in Nepal to strengthen geriatric health care.

The quality of life of older people is becoming a growing concern in Nepal as the country experiences a rapid demographic shift. The overall quality of life score of older people has ranged from 12.9 in Western Nepal (Joshi & Chalise, 2021) to 25.7 in Kavre (Risal et al., 2020). Various studies in the literature show that the quality of life of older people in Nepal is affected by various factors, such as demographic factors, socioeconomic conditions, lifestyle characteristics, health status, access to health care services, affordability of health care services, and social support. Older people suffer from multiple chronic conditions, which increases demand for health care services, raises healthcare expenditure, and reduces their quality of life. The traditional social structure that once supported older people in Nepal is eroding due to urbanization, child migration, and shifts in family structure (Shrestha et al., 2018). As a result of these factors, older people often

become isolated from their families and face a lack of adequate family care, support, and social interaction, which may lead to a lower quality of life. Owing to the growing number of older people and their increasing vulnerability, it is crucial to examine and understand the various dimensions of quality of life and factors associated with quality of life among older people, as there is limited research and data on the quality of life of older people in Nepal.

As discussed in the literature review, several studies have assessed the patterns and factors that affect multimorbidity (e.g., Dhungana et al., 2021; Poudel et al., 2022), the factors associated with health service utilization (e.g., Acharya et al., 2019; Ghimire et al., 2021), and quality of life and its associated factors (e.g., Risal et al., 2020; Acharya Samadarshi et al., 2022), among older people in different settings of Nepal. However, there remains an opportunity for more comprehensive research on the impact of multimorbidity on health service utilization and its effects on quality of life among older people. In this context, this study has the opportunity to plug in the research gap of previous studies concerning factors associated with multimorbidity, health service utilization, and quality of life among older people, along with the relationships among these interconnected themes.

1.3 Research Questions

The broader proposition of this study is how the presence of multimorbidity affects the utilization of health services among older people and how this, in turn, affects their quality of life. Based on this proposition, this study sets out the following research questions:

1. What is the prevalence of multimorbidity? How does multimorbidity correlate among older people?
2. How are predisposing, enabling, need, and health behavior factors associated with health service utilization among older people?

3. How do socio-demographic, economic, and health-related factors correlate with the quality of life among older people?

1.4 Objectives of the Study

The general objective of the study is to identify the factors associated with multimorbidity, health service utilization, and quality of life among older people in Kamalamai Municipality of Sindhuli district. The specific objectives of the study are:

1. To identify the prevalence and correlates of multimorbidity among older people.
2. To examine predisposing, enabling, need, and health behavior factors associated with health service utilization among older people.
3. To analyze the extent and correlates of quality of life among older people.

1.5 Rationale of the Study

This study is a population-based study in Kamalamai Municipality, Sindhuli district, covering multimorbidity, health service utilization, and quality of life of older people. The present study is novel in this sense as it focuses on patterns of multimorbidity among older people, health service utilization among older people using the Andersen behavioral model, and quality of life of older people based on World Health Organization Quality of Life-8 items (WHOQOL-8).

The prevalence and pattern of multimorbidity, levels of health service utilization, and quality of life are changing and vary by location and type of residence, as well as by the sociodemographic and economic conditions of each area. Thus, this study fills a knowledge gap and enhances the existing knowledge regarding multimorbidity, health service utilization, and quality of life of older people in the context of Kamalamai Municipality.

In this study, advanced statistical approaches such as the chi-square test, analysis of variance (ANOVA), multicollinearity test, internal consistency test (Cronbach's alpha),

multinomial logistic regression, logistic regression, and hierarchical multiple regression analysis have been used to examine the extent and correlates of outcome variables. This study attempts to make a methodological contribution to model development.

This study provides a picture of patterns of multimorbidity, utilization of health services, and quality of life of older people in terms of sociodemographic, economic, health status, lifestyle or health behavior, and functional health factors. This picture can serve as input for policy and decision-makers and provide insight into the identification of further research areas.

1.6 Limitations of the Study

Despite its strengths, this study has some limitations: prominently, the lack of a theoretical model is a limitation in the literature concerning the inter-connected themes of multimorbidity, health service utilization, and quality of life among older people. The selection of independent variables for the operational conceptual framework of multimorbidity is based on the previous studies and health-ecological model, whereas the conceptual framework for health service utilization is based on Andersen's behavioral model, adding health behavior factors with predisposing, enabling, and need factors. The WHOQOL instrument was developed cross-culturally. This study utilized the WHOQOL-8 items as the quality of life assessment instrument.

As a cross-sectional study, it is difficult to establish a causal relationship between the variables examined. The main conceptual framework (Figure 2.1) presents two main recursive relationships: health service utilization is expected to affect morbidity conditions, and quality of life is expected to affect health service utilization. Despite the importance of recursive relationships, this study did not analyze recursive effects between these variables.

Likewise, the target population for this study is the population aged 60 years and above who have resided in Kamalamai Municipality of Sindhuli district for at least one

year. Older people with cognitive, hearing, and communication impairments are not included in the study. Information on general health status, activities of daily living (ADL), instrumental activities of daily living (IADL), disability, chronic diseases, and health service utilization are collected by self-report of older people, which may not reflect the true estimates. However, self-reported information is a widely accepted approach. An additional limitation is that there could have been some memorizing bias among older people, resulting in inaccurate reporting of chronic conditions, co-morbidities, and health service utilization.

Quality of life is conceptualized as a subjective well-being perception, encompassing several elements such as general health, energy for everyday life, daily living activity, self-satisfaction, personal relationships, and financial resources. There is a downward trend in quality of life as people age; their quality of life decreases due to the changing roles and a decline in physical, social, and psychological status. Some older people may not be able to understand some questionnaires properly due to the predominance of illiteracy. As a result, this can result in older people perceiving a lower quality of life than they have.

1.7 Organization of the Study

This study is organized into eight chapters. Chapter I deals with the background, problem statements, research questions, research objectives, rationale, and limitations of the study.

Chapter II presents a review of the relevant literature on the theoretical perspective of aging, theoretical approaches to health service utilization, and empirical studies on patterns and correlates of multimorbidity, health service utilization, and quality of life among older people. In addition, this chapter addresses the conceptual framework based on the literature review.

Chapter III is related to the research methodology. This chapter describes the research philosophy, study area, study design, data source, sample size, sample population and sampling techniques, questionnaire design, methods of data collection, data management, study variables, data analysis, statistical tools, and constructions of indices.

Chapter IV analyzes the sociodemographic characteristics, economic characteristics, health status, functional health, risk factors, and health behavior of older people.

Chapter V focuses on assessing the prevalence of multimorbidity by sociodemographic and economic characteristics, health state, and health behavior. Further, this chapter presents the results and discussion of factors associated with multimorbidity.

Chapter VI presents the analysis of health service utilization by predisposing, enabling, need, and health behavior factors. This chapter also covers the results and discussion on factors associated with health service utilization among older people.

Chapter VII presents a description of the World Health Organization Quality of Life (WHOQOL) score by sociodemographic characteristics, economic characteristics, health state and functional health, and health behavior. In addition to this, the results and discussion of multivariable hierarchical regression analysis are presented in this chapter.

Chapter VIII focuses on a summary of major findings, conclusions, contributions of the study, and recommendations.

Finally, additional information on the construction of household wealth quintiles, the questionnaire used in this study, and the survey tools used in the study are provided in the Appendix. A list of materials that have been consulted or cited in the text of this study is presented in References. The in-text citations and works cited list follow the APA style seventh edition (American Psychological Association [APA], 2020).

CHAPTER II

LITERATURE REVIEW

Reviewing literature is an integral part of the research process and helps to develop a good understanding and insight into relevant previous studies and emerging trends (Saunders et al., 2016). This chapter primarily focuses on reviewing the relevant literature on the theoretical perspective of aging, theoretical approaches to health service utilization, and empirical studies on multimorbidity, health service utilization, and quality of life.

The chapter is organized into seven sections. Section 2.1 presents the situation of aging in Nepal, focusing on levels and trends in aging in Nepal. Section 2.2 presents theoretical perspectives on aging, including some theories of aging relevant to the study. Section 2.3 deals with theoretical approaches to health service utilization, focusing on the health behavioral model and health belief model. The subsequent sections 2.4, 2.5, and 2.6 deal with the review of the patterns and correlates of multimorbidity, correlates of health service utilization, and quality of life in older people, respectively. This review of previous literature is primarily concerned with peer-reviewed articles from population-based cross-sectional surveys, existing books, an online database, and reports on the related topic. Section 2.7 deals with the conceptual framework, presenting the hypothesized relationship between independent and outcome variables.

2.1 Levels and Trends in Aging in Nepal

Nepal has been experiencing a gradual increase in the older population, with implications on all sectors of society, including demand for healthcare services, social protection, family structures, and intergenerational ties. The growth in both the absolute

number and percentage of the older population over the period from the 1952/54 to 2021 census is presented in Appendix 1, Table A1.1. The number of older people aged 60 and above has increased over time. In 1952/54, there were 0.41 million older people aged 60 and above in Nepal, and this number has increased steadily over the subsequent decades, reaching 0.65 million in 1971 (Central Bureau of Statistics [CBS], 1987), 1.07 million in 1991 (CBS, 1995), and 2.98 million in 2021(National Statistics Office [NSO], 2023). The number of older people increased by 0.82 million from 2011 to 2021, representing the largest numeric increase to date. The second largest numeric increase was 0.68 million between 2001 and 2011. Between 2011 and 2021, the older population increased by 38.2 percent while the total population grew by 10.1 percent, indicating that the older population is growing more rapidly than the overall population.

The share of the older population to the total population has also been trending upward. The population 60 years and above comprised 5.0 percent of the total population in 1952/54. In the subsequent censuses, the share of the older population steadily increased. The share of older population reached 5.6 percent in 1971, 5.8 percent in 1991, and 8.1 percent in 2011. In 2021, the share of the older population accounted for 10.1 percent, which is larger than in any previous census.

The demographic indicator of aging population is index of aging, defined as the number of people aged 60 and above per 100 children under the age of 15. A higher index value indicates the greater the relative size of the older population compared to the population of children (Department of Population, 2017). The index of aging in Nepal increased slowly between 1991 and 2001, but it has been found to increase rapidly between 2011 and 2021. In 1991, the index of aging was 13.7 older people per 100 children. It has increased to 16.5 in 2001 and 23.3 in 2011. In 2021, the index of aging

reached 36.7 in 2021, the highest level recorded in any previous census (Appendix 1, Table A1.2). The increment of index of ageing over the period indicates a change in age structure and rapid shift towards an older population.

The index of aging for males (number of males aged 60 and above per 100 male children aged 0-14) has increased from 13.5 in 1991 to 34.1 in 2021. Over the same period, the index of aging for females (number of females aged 60 and above per 100 female children aged 0-14) has increased significantly from 13.8 to 39.5. Since 1991, the index of aging for females has consistently been higher than for males, indicating that the older female population has increased by a larger number than the older male population.

The absolute and proportion of the older population in Nepal has increased over the years as a result of a rapid decline in fertility and mortality and an increase in life expectancy (Chalise, 2023). It is believed that a decline in fertility can cause the aging of the population. The decline in mortality in younger ages leads a population to a younger population, while an increase in longevity and decline in mortality play a crucial role in population aging. Due to a decline in fertility and mortality, the population of Nepal has been gradually aging over the past three decades.

Total fertility rate has decreased more than half in Nepal, from 6.4 children per woman in 1981 to 1.9 children per woman in 2021 (Appendix 1, Table A1.3). This decline in fertility has resulted in a decrease in the 'inflow' of the population into the lower age cohorts (Mujahid & Siddhisena, 2009). Since 1961, life expectancy at birth in Nepal has increased by about 35 years, from 36.3 years in 1961 to 71.3 years in 2021. This increment in life expectancy has resulted in an increase in the number of older people and more people surviving old age. This demographic shift caused by a historic shift from high to low fertility and mortality, with increased life expectancy, is associated with both challenges and opportunities. The growing older population requires more healthcare services,

including chronic illness management, geriatric care, and social and mental health support, which in turn contributes to rising healthcare costs.

2.2 Theoretical Perspective of Aging

Aging is a complex process that brings about physical, social, mental, and emotional changes in an individual over time (Cannon, 2015). Aging, as defined by Bernard Strehler, an American gerontologist, is a universal, intrinsic, progressive, and detrimental process (Viña et al., 2007). Additionally, the term "aging process" also refers to a set of changes that lead to a reduction in the length of human life or longevity (Kolovou et al., 2014). Aging is the natural process of becoming older and is characterized by changes in the physical, psychological, and social functioning of an individual. Chronological, physiological, psychological, and social aging are the four dimensions of aging. The process by which a person ages over time since birth is known as chronological aging. It is a widely used aging matric. Old age is divided into three categories: young old, ages 60-69 years; old-old, ages 70-79 years; and oldest-old, ages 80 years and above (Forman et al., 1992).

Physiological aging is the process by which physical changes occur in all organs as we age. Psychological aging refers to the changes in memory, problem-solving, and mental abilities that occur with aging. Social aging refers to changes in an individual's behavior, as well as his or her role and status in the family and society. Social aging is related to chronological age, that is, age-related roles. As a person ages, he/she takes on different roles in his/her family, community, and society. However, social aging is distinct from physical and psychological aging.

Gerontologists, social scientists, and demographers have made numerous efforts to comprehend and explain the aging process and issues. There are several theories and

approaches to aging. The earliest studies have classified theories of aging into biological, psychological, and sociocultural theories. The major theories of aging are as follows:

The Wear and Tear Theory. The wear and tear theory of aging is a biological theory of aging. It was first proposed by August Weismann in 1882. This theory suggests that the human body, like machines, eventually deteriorates due to repeated use over time (Jin, 2010; Park & Yeo, 2013). This theory suggests that damage to cells and tissues of the human body because of stressful activities and other degenerative processes contributes to aging. Even if a person leads a healthy lifestyle, the internal and external organs of the body and nerve cells gradually deteriorate over time. Eventually, the loss of cells, which are not replaced, leads to a decline in body function (Sattaur et al., 2020).

As the body ages, the cumulative effects of chronic conditions reflect the wear and tear that leads to multimorbidity. The gradual deterioration of the body often leads to increased utilization of health services, as older people require healthcare more frequently. Consequently, the burden of multimorbidity and accumulated physical impairment can significantly affect the quality of life of older people.

The Immunological Theory. The immunological theory of aging is also considered a biological theory, which was proposed by Roy Walford (1969). This theory assumes that the aging process in humans is pathogenically related to impaired immunological processes (Effros, 2004). This theory posits that changes in immune system function are the main cause of aging (Fulop et al., 2014). The immune system is a critical protective system that produces antibodies. The immune system weakens with age, and a weak immune system impairs the body's ability to fight infectious diseases. Thus, rheumatoid arthritis, cardiovascular disease, cancer, diabetes, and multiple sclerosis in older persons are all associated with dysfunction or dysregulation of the immune response (Diggs, 2008a; Jin, 2010). Many conditions, such as a rise in age, can weaken the immune

system, make older people susceptible to infection, and develop non-communicable diseases.

The immunological theory of aging suggests that a decline in immune system function drives aging. As the immune system gradually deteriorates with age, the body's ability to fight off infection and diseases decreases, leading to a higher incidence of chronic conditions in older people. As a result, older people require more frequent visits to health facilities and more intensive health service utilization, including long-term care. Consequently, the burden and challenge of managing multiple health problems caused by an aging immune system can significantly affect the quality of life of older people.

Oxidative Damage. Oxidative damage is another biological theory of aging. It was proposed by Denham Harman in 1956. The theory postulates that aging is associated with progressive damage to the body's chemistry produced by reactive oxygen species (Mitteldorf, 2010). Reactive oxygen species are the byproduct of aerobic metabolism, which causes oxidative stress in cells and molecules (Buffenstein et al., 2008). Oxidative damage occurs when the body cannot maintain the balance between free radicals, reactive oxygen, and antioxidants due to various environmental factors. People are exposed to oxidative damage from birth, and the oxidative damage process accelerates with age. Therefore, various age-related diseases, such as cardiovascular disease, chronic obstructive pulmonary disease, chronic kidney disease, diabetes, neurodegenerative disease, and cancer are associated with oxidative stress (Liguori et al., 2018).

The oxidative damage theory of aging is closely related to multimorbidity. The cellular damage from oxidative stress can accelerate age-related chronic conditions such as cardiovascular diseases, neurodegenerative diseases, diabetes, cancer, and osteoarthritis (Yang et al., 2024), contributing to the development of multimorbidity. Older people with multimorbidity increase the demand for healthcare services and consultations and a greater

financial burden (Thanakiattiwibun et al., 2023). Furthermore, the burden of multimorbidity is associated with reduced physical and mental health and reduced functional health that negatively impact the quality of life of older people (Yogesh et al., 2024).

According to the theories discussed above, the aging process is associated with the deterioration of cells and tissues due to wear and tear, changes in the immune system, and oxidative damage. As a result, many diseases became more common in old age, such as heart diseases, diabetes, chronic lung and kidney diseases, arthritis, asthma, stroke, and cancer.

Disengagement Theory. Disengagement theory was the first social gerontological theory proposed by Cumming and Henry (Rosenberg, 2022). The disengagement theory of aging suggests that aging is a natural process of mutual withdrawal, leading to reduced interaction between the older person and the social system to which he/she belongs (Burbank, 1986). This theory explains how people experience a process of disengagement from social roles and activities as they age (Crossman, 2020). Therefore, disengagement is the separation of an individual from social roles, social activities, and relationships. This theory suggests that as people grow older, they lose social connections and become physically inactive compared to their younger counterparts (Asiamah, 2017), and younger people are displacing older people. Retirement is a good example of a disengagement process that allows the aged person to lose their job responsibilities and ultimately prepare for death (Powell, 2000). Most importantly, disengagement can be beneficial for older people and society as a whole because it allows for a smooth transfer of power from older people to young adults.

This theory posits that older people gradually withdraw from social roles and relationships as they age, which correlates with multi-disease, health service utilization,

and quality of life for older people. When older people lose their social roles, social interactions, and activities as they engage in society and become physically inactive, it puts them at a greater risk of adverse health outcomes, such as the presence of many chronic conditions (Ejiri et al., 2022). Conversely, health problems limit the social roles and social connections of older people. This disengagement from social life significantly increases the need for health facility visits and the use of health services. Consequently, the social and emotional well-being and overall quality of life of older people deteriorate due to disengagement.

Activity Theory. Activity theory was developed by Robert J. Havighurst in 1963. Activity theory suggests that life satisfaction in old age depends upon participation in social activities and social interactions (Hasworth & Cannon, 2015). This theory assumes a positive relationship between activity and successful aging. Older people who remain socially active are more likely to acquire a positive self-image, social integration, and satisfaction with life (Hillier & Barrow, 2011). Activity theory suggests that high activity levels are associated with better life satisfaction and a happier and healthier life. Hence, this theory is appreciable in encouraging older people to be involved in social networks and participate in social activities for successful old age (Baru et al., 2018). It was believed that socially less active and socially isolated older people are at greater risk of adverse health outcomes.

According to activity theory, maintaining active participation in social, physical, and cognitive activities in a society is crucial for successful aging. This, in turn, allows them to achieve greater satisfaction and well-being. The linkage of this theory with the present study is that older people who remain active and participate in social activities often have better health outcomes and a lower risk of developing multi-morbidities. Therefore, maintaining an active lifestyle reduces the need for receiving frequent health services. The

theory argues that older people who remain physically, mentally, and socially active have a higher quality of life.

Continuity Theory. The continuity theory of aging was developed by Robert Atchley in 1989. It takes a life course perspective of aging in which the aging process is shaped by historical events, cultural norms, and social constructs (Diggs, 2008b). Continuity theory suggests that older people strive to retain the same activities, habits, personalities, lifestyles, and relationships they established in their earlier years of life.

The basis of continuity theory is that individuals tend to maintain a consistent pattern of behaviors that are linked to their previous experiences. In other words, individuals do not change their behavior dramatically as they age, and their behavioral preferences remain consistent throughout their adult lives unless age-related changes influence them as they occur (Hasworth & Cannon, 2015). Continuity theory addresses both internal and external continuity. Internal continuity refers to persistent individual experiences such as values, beliefs, knowledge, temperament, emotions, preferences, deposition, and skills, while external continuity refers to consistency in social roles, activities, relationships, and living arrangements (von Bonsdorff & Ilmarinen, 2012).

According to the continuity theory of aging, individuals strive to maintain consistent patterns of behaviors, relationships, and activities that they established over the past years of their lives, which has a significant impact on multimorbidity, health service utilization, and quality of life in older people. Individuals who establish a positive lifestyle early in life—during youth and adulthood—maintain a social role, adhere to a consistent treatment plan, and engage in responsible personal behavior are better able to manage multiple chronic conditions. In addition, maintaining long-term relationships with healthcare providers can promote trust and communication and lead to more appropriate

and efficient use of health services. These sustained senses of consistency and identity also contribute positively to quality of life.

Modernization Theory: Modernization theory was formalized as the aging theory by Cowgill and Holmes in 1972, noting that the social status of older people appeared to be lower in developed societies than in less developed societies (Rosenberg, 2022). The modernization theory posits that pre-modern or traditional societies were a golden age for older people in which the social status of older people was higher due to their knowledge, skills, experience, and control over resources. The social status of older people declines as society progresses from pre-modern to modern society. The forces of modernization and the deterioration of the social status of older people have been attributed to five factors: health technology, economic technology, child-centered education system, rapid social change, and urbanization (Rosenberg, 2022).

In the context of this study, it can be explained that as societies get modernized, the status of older people decreases. They are more likely to face social exclusion as the nuclear family replaces the extended family, decreasing family and social support. As a result, managing multiple chronic conditions may become a more challenge. On the other side, modernization often brings lifestyle changes that may contribute to the risk of developing multimorbidity. In modern societies, the healthcare system may become increasingly fragmented, older people may face challenges in accessing healthcare, and there may be inequalities in access to healthcare services. With the modernization of society, older people lose their social role, lose control over resources, get deprived of social support, and become more dependent, which negatively affects their mental and emotional well-being and further reduces their overall quality of life.

Age Stratification Theory: Age stratification is a conceptual framework that explains how individuals age throughout life and what meaning is given to age in a society

(Uhlenberg & Dannefer, 2007). Age stratification theory attempts to explain the interdependence between older people and society, recognizing that aging and society are interconnected and cause reciprocal changes in individuals, age groups, cohorts, and society (Lange & Grossman, 2006).

In the context of this study, this theory is useful for understanding how aging affects individuals and how societal norms and expectations related to age influence their health outcomes, access to health services, and quality of life.

2.3 Theoretical Approaches of Health Service Utilization

Several theoretical models have been developed to analyze the factors associated with health service utilization. The behavioral model (Andersen, 1968), health belief model (Hochbaum, 1958), and economic model (Grossman, 1972) are widely accepted conceptual models of health service utilization (Pokhrel & Sauerborn, 2004). McKinlay (1972) identified six different approaches—the sociodemographic, the socio-psychological, the socio-cultural, the geographic, the organizational, and the economic approaches—to analyze health service utilization.

Kroeger (1983) developed the conceptual framework into two main categories: the path model and the determinant model (Kroeger, 1983, cited in Pokhrel & Sauerborn, 2004).

Andersen developed the behavioral model of health service utilization in 1968 to explain how families use health services, assess equitable access to health services, and promote the formulation of policies to ensure equitable access to healthcare services (Andersen, 1995). Later, Andersen and Newman (1973), Andersen (1995), and Andersen and Davidson (2001) made a theoretical refinement to the behavioral model to better understand and explain how and why people utilize health services. The initial unit of analysis was household, but individuals became the unit of analysis in the subsequently

revised model. The behavioral model is based on three main tenets, namely predisposing factors, enabling factors, and need factors. Therefore, this model suggests that health service utilization is the result of individual behavior influenced by a combination of predisposing, enabling, and need factors. This model has been modified several times. However, the fundamental principles of the model have not changed (Andersen, 2008). The model argues that individuals' use of health services is a function of predisposing, enabling, and need factors at both contextual and individual level (Andersen & Davidson, 2001). Predisposing factors refer to the individuals' demographic, social characteristics and health beliefs.

At the individual level, predisposing factors like demographic factors—age, sex, marital status, previous illnesses; social factors—education, occupation and caste/ethnicity, religion; and health beliefs—attitude, values, and knowledge regarding health service utilization—determine the likelihood of receiving health services or propensity of individuals to use health services.

Enabling factors refer to means or individuals' ability to mobilize available resources to access and utilize required health services. At the individual level, enabling factors include financial factors such as income, health insurance, and getting the money needed for health service; and organizational factors such as affordability of health services, accessibility of the source to the individual, modes of transportation, travel time to health facility and waiting time for health service, which may hinder utilization of health services.

Need factors refer to the immediate cause of the use of health services. At the individual level, need factors were categorized as perceived needs and evaluated needs. Perceived need is how an individual views and experiences his/her general health status, functional state, and illness symptoms and severity. Evaluated need is the professional judgment and objective measurement of a person's physical health status and need for

medical care. These need factors are the direct and strongest factors influencing the utilization of health services as well as how they motivate individuals to utilize health services as needed.

At the contextual level, Andersen and Davidson (2001) define contextual factors as conditions at the societal or community level that are beyond the control of the individual. These factors are divided into predisposing, enabling, and need factors. Contextual predisposing factors include demographic and social characteristics of a community, as well as community or organizational values, cultural norms, and political perspectives related to health beliefs. Contextual enabling factors consist of health policies—authoritative decisions regarding the use of health services; financing—which includes the resources available in a community for health services; and organization—which comprises the amount and distribution of health facilities and health personnel, as well as structure of health service in a community. Contextual need factors include environmental need factors (e.g., physical environment, housing quality, water supply, air quality, and accidents) and population health indices (e.g., infant mortality, cause-specific mortality rate, morbidity, prevalence of chronic and acute diseases, and disability). In addition to contextual and individual factors, the model focuses on the health behavior of individuals as a major influencing factor of health service use. Health behavior includes the use of alcohol and tobacco, self-care, physical exercise, stress reduction, medication, diet, and nutrition.

The model illustrated that predisposing, enabling, and need factors at contextual and individual levels and health behavior are the most important explanatory factors of health service utilization.

Kroeger (1983) proposed another health service utilization model with modifications of Andersen's behavioral model based on the detailed literature review in the field of health service utilization. Kroeger's health service utilization model combined

Andersen's predisposing, enabling, and need factors into characteristics of the individual, characteristics, and perception of the disorder, as well as characteristics of health service. In this model, the characteristics of the individual are similar to predisposing factors suggested by Andersen's behavioral health service utilization model (Kanbarkar & Chandrika, 2017). These individual or predisposing characteristics include age and sex, status in the household and household size, marital status, education, ethnic group, occupation, assets, and interaction with family and community. Characteristics and perception of disorder consist of chronic or acute disease, the severity of disease, expected benefits of treatments, and perception of satisfaction with past treatments. Characteristics of health service also termed as enabling factors include the availability of healthcare providers, acceptability and quality of health services, treatment costs, communication, and attitudes towards the traditional and modern healer. Kroeger reported that predisposing factors (i.e., characteristics of the individual), characteristics and perception of the disorder, and characteristics of health service (i.e., enabling factors) were the strongest explanatory variables, and he hypothesized that choice and use of healthcare resources are the outcomes of a wide range of interacting explanatory variables. Therefore, Kroeger's framework is considered holistic for examining the determinants of health-seeking behavior and health service utilization in developing countries (Shaikh et al., 2008).

As previously mentioned, the Andersen behavioral model of health service utilization is a widely used framework for studying health service use in general (Babitsch et al., 2012; Kim & Lee, 2016; Li et al., 2016) as well as in older people (Amente & Kebede, 2016; Fu et al., 2018; Hlaing et al., 2020; Jiang et al., 2018; Nguyen, 2022; Travers et al., 2020; Volkert et al., 2018; Yunus et al., 2017; Zhang et al., 2018). From the review of theoretical approaches to health service utilization, a conceptual framework for this study was developed, based on Andersen’s behavioral model, to examine the predisposing,

enabling, need, and health-related factors that have the potential to influence the utilization of health services among older people.

2.4 Studies on Patterns and Correlates of Multimorbidity Among Older People

Several studies have attempted to illustrate the patterns and correlates of multimorbidity among older people. A study by Patel et al. (2023) used data from the Longitudinal Aging Study in India (LASI), a nationwide population-based survey, to investigate the prevalence of multimorbidity and its association with demographic and socioeconomic characteristics among older people aged 60 years and above. The study showed that about one-third of older adults had single morbidity, and another one-third of older adults had multimorbidity. The results of the multinomial logistic regression model showed that sociodemographic variables such as age group, sex, place of residence, education, marital status, religion, social group, wealth quintile, region, tobacco/smoke use, alcohol consumption, physical activity, ill-treatment, and satisfaction with current living arrangement were significantly associated with multimorbidity. In particular, older adults in the age group 65-69 years and above, who were female, educated, belonged to Muslim or other religion, belonged to OBC and other social groups, belonged to poorer, middle, richer, and richest wealth quintiles, and who were dissatisfied with current living arrangement had a higher risk of having multimorbidity. On the other hand, older adults belonging to the 'other' marital category, who consumed alcohol and engaged in vigorous physical activities, were less likely to have multimorbidity.

Another study examined the prevalence, patterns, determinants, and inequalities in multimorbidity among older adults aged 60 years and above using data from a nationally representative longitudinal aging study in India. It showed a higher prevalence of multimorbidity among older adults with socioeconomic differentials. The results of multinomial regression analysis also showed that education, place of residence, working

status, wealth index, self-rated health status, tobacco use, activities of daily living disability, and instrumental activities of daily living disability were the most important predictors of multimorbidity. The study noticed that the relative risk ratio was significantly higher among older adults with higher levels of education, urban older adults, older adults who were not currently employed, and older adults in the richest wealth index were more likely to have multimorbidity. Moreover, older adults who reported good health status, who used tobacco, and who had no activities of daily living disability had a lower risk of having multimorbidity (Chauhan, Patel, et al., 2022). Using data from a longitudinal aging study in India, Khan et al. (2022) examined the prevalence of multimorbidity and risk factors of multimorbidity among older adults aged 45 years and above. The study used a comprehensive list of potential confounding variables in the logistic regression analysis. The results showed that age, sex, quintile monthly per capita expenditure, education, place of residence, working status, religion, and alcohol consumption were statistically strong determinants of multimorbidity. The study found that the relative risk was highest among older adults aged 75 years and above, the wealthiest group, those only with primary education, women, urban residents, and Muslim older adults. Older people belonging to the scheduled tribe and other backward classes had lower odds of having multimorbidity.

A study based on data from the National Sample Survey (NSS) 2017-18 examined the prevalence of multimorbidity and its association with demographic and socioeconomic factors in India among older people aged 60 years and above. The study stated that the prevalence of self-reported single morbidity and multimorbidity was higher among older people. It also showed that older people aged 70 years and above, belonging to higher income groups, with primary and secondary and higher education, and living in rural areas are more likely to report multimorbidity (Anushree & Mishra, 2022).

A study of 3637 older adults aged 60 years and above in Shanxi, China, documented that one-fifth of older adults suffer from multimorbidity, and it was disproportionately distributed across personal innate, behavioral, family and social network, socioeconomic, and macro-environmental characteristics. It also pointed out that multimorbidity is determined by several factors associated with personal innate, behavioral lifestyle, interpersonal network, and socioeconomic status (Chen et al., 2022).

A study on the prevalence and factors associated with multimorbidity in Malaysia was conducted among 3966 older adults aged 60 years and above using data from the 2018 National Health and Mortality Survey (NHMS), which found that the prevalence of multimorbidity was about 41 percent. In addition, the results of adjusted logistic regression revealed that age, ethnicity, occupation, activity of daily living, physical activity, body mass index (BMI), and waist circumference were significantly associated with multimorbidity. Specifically, older adults aged 70-79 years, belonging to Indian and Bumiputera Sarawak ethnic groups, who were unemployed, had limitations in activities of daily living, were physically inactive, were underweight, overweight, obese, and had abnormal obesity, were associated with multimorbidity (Shariff Ghazali et al., 2021).

There is limited literature on morbidity and multimorbidity in Nepal. Only three previous studies—Manandhar and Joshi (2019), Pant et al. (2023), and M. Poudel et al. (2022)—examined morbidity patterns among older people in Nepal. In contrast, Yadav et al. (2021) and Balakrishnan et al. (2022) studied the prevalence of multimorbidity and its associated factors among older people, and Dhungana et al. (2021) examined the prevalence of multimorbidity and its associated factors in the population aged 20 years and above.

According to the 2021 census, 6.9 percent of the older population in Nepal lived with physical disabilities. Non-communicable diseases were the leading causes of death

among older people, accounting for more than half of the deaths of older people. Communicable diseases, accidents, violence, and suicide were more frequent causes of death among younger people (NSO, 2025a).

A study by Dhungana et al. (2021), using data from a nationally representative population-based Survey of non-communicable diseases (NCDs), showed that the prevalence of multimorbidity was higher among older people aged 60 years and above, and age, alcohol consumption, body mass index, non-HDL, and place of residence were strong determinants of multimorbidity in the population aged 20 years and above. A sample size of 8931 participants aged 20 years and older is sufficient and provides a statistical basis for identifying associations between various factors and multimorbidity. However, there is a lack of specific focus on older people aged 60 years and above, who are typically more susceptible to multimorbidity. Including only six non-communicable diseases (NCDs) in defining multimorbidity is likely to understate multimorbidity in Nepal.

Based on data collected from 847 older adults aged 60 years and above in eastern Nepal, a study found that one in five older people had multimorbidity. Regarding the correlates of multimorbidity, age, marital status, place of residence, distance to the nearest health facility, and knowledge of senior citizen services were significantly associated with multimorbidity in the adjusted model (Balakrishnan et al., 2022). This study included only nine chronic conditions in the definition of multimorbidity, which may lead to an underestimate of multimorbidity. Furthermore, this study did not examine household wealth quintile, health state, and functional health factors that may influence the likelihood of multimorbidity in older people.

A community-based cross-sectional survey of 794 older people aged 60 years and above showed that osteoarthritis, chronic obstructive pulmonary disease, diabetes, and cardiovascular diseases were the most common chronic diseases among older people.

About half of older people had at least one chronic disease, and about 15 percent suffered from multimorbidity. The adjusted regression model showed that age, caste/ethnicity, alcohol consumption, and physical activity were significantly associated with multimorbidity. Specifically, older people aged 70-79 years, those who belonged to the Madhesi and other ethnic groups, those who never consumed alcohol, and those who were physically inactive were more likely to have multimorbidity (Yadav et al., 2021). This study is the first to estimate the prevalence of multimorbidity among older people in eastern rural Nepal. However, this study covered only four chronic conditions in the definition of multimorbidity. As a result, the estimated prevalence of multimorbidity in rural Nepal may be underestimated. Some variables associated with household socioeconomic status, functional health, and health status were excluded from the analysis despite their potential impact on the risk of multimorbidity.

2.5 Studies on Correlates of Health Service Utilization Among Older People

Chatterjee et al. (2019) examined the determinants of the choice of healthcare utilization between private and public services among the older population in India using the National Sample Survey (NSS) data. The study is based on 7044 older people aged 60 years and above who had reported utilization of in-patient health care services in the last 365 days preceding the survey. The choice of healthcare utilization (private and public) was taken as the outcome variable. All the explanatory variables for the choice of healthcare utilization were selected based on Andersen's health behavioral model. The study found that older people belonging to the upper caste, having higher education levels, higher income, larger family size, and needing surgery were more likely to choose private health care. In contrast, those experiencing higher economic dependence, chronic diseases, and higher duration of hospitalization were more likely to choose public health care.

Terfa et al. (2019) conducted a cross-sectional study on 422 older people living in Jimma town, Southwest Ethiopia. The objective of this study was to identify factors influencing healthcare utilization among older people living in Jimma town. The study found that about two-thirds of the older persons had utilized modern healthcare services in the last three years. The results also revealed that the burden of illness and physical and mental health status were the main determinants of healthcare utilization among the older people in Jimma town.

Tsou (2018) analyzed the factors affecting healthcare utilization among older people in northern Taiwan. The sample population was 1356 older people aged 65 years and above. The study showed that most older people (95%) utilized Western medicine to treat their illness, followed by Chinese medicine (11%). The study also indicates that older people with higher education, people who lived with family, and people with a Brief Symptom Rating Scale (BSRS) score of ≥6 were more likely to utilize Western and Chinese medicine outpatient services. The study showed that age, education level, living arrangement, treatment for chronic diseases, health status, BSRS score, and health concerns were the main factors influencing healthcare service utilization.

A study conducted by Amente and Kebede (2016) in Ethiopia found that age, occupation, income, education, self-reported health status, medical history of at least one chronic condition, and need for care were the most critical determinants of health service utilization among older adults. The study showed that older people below the mean age, who had at least one chronic condition, had an occupation, had enough money to meet needs, had a caregiver, and rated their health status as poor, were more likely to utilize health services than their counterparts.

Falaha et al. (2016) conducted another cross-sectional study to assess healthcare-seeking behavior and its determinants among older people in rural Ethiopia. The study

showed that age, education, family support in case of illness, knowledge about visiting health facilities, and accessibility to health facilities were major determinants of the healthcare-seeking behavior of older people in Ethiopia.

Chukwudi et al. (2015) examined health service utilization among older people in Nigeria. The study included 200 older people aged 65 to 90 in Calaber Municipality. The study found that over two-thirds of older people have visited the hospital/health center in the last 12 months. Forty-one percent of older people visited the hospital/health center only once a year. Likewise, a quarter of older people have visited the hospital for a general health checkup. The study also showed that gender, education status, occupational status, and income level were all strongly associated with health service utilization among older people in Calabar Municipality.

Hakmaosa et al. (2015) conducted a community-based cross-sectional survey in rural Assam, India. A total of 390 older people aged 60 years and above were included in the study. The study aimed to assess the health-seeking behavior and factors associated with health-seeking behavior among older people. The study showed that about 72 percent of older people sought treatment for their chronic illness, and 29 percent did not seek treatment. The study also showed that education, socio-economic status, and living status were important factors influencing the health-seeking behavior of older people in rural Assam.

Addo and Gyamfuah (2014) conducted a cross-sectional study in Ghana comprising 339 people aged 60 years and above. This study applied Andersen's behavioral model of healthcare utilization as a conceptual framework. The study found that socio-economic and demographic factors such as age, ethnicity, formal education, marriage, income, and type of occupation were strongly associated with the use of health services.

Alkhawaldeh et al. (2014) examined the factors associated with primary healthcare service utilization among older adults in Jordan. Data for this study were collected from 190 older adults aged 50 years and above. Use of primary healthcare services in the past month was associated with level of education, chronic illness, tobacco use, and perceived general health status today and last month. Likewise, age, level of education, chronic illness, tobacco use, and perceived general health status were significantly associated with the use of primary healthcare services of older adults at 6 and 12 months. Chronic illness was a significant predictor of primary healthcare service utilization among older people in the past 1 month, 6 months, and 12 months.

Ibitoye et al. (2014) examined the determinants of healthcare utilization among older people in Nigeria. The study was cross-sectional of 1217 older people aged 65 years and above. The study showed that about 70 percent of older people were recently sick. Among them, 98 percent sought treatment. Socioeconomic status, types of family, and chronic conditions were significant predictors of healthcare utilization among older people in Nigeria.

Park (2014) examined health status and health services utilization among older Koreans using data from the 2008 Korean Longitudinal Study of Aging. The sample for this study included 4400 older people aged 65 years and above. Logistic regression analysis was employed to describe factors associated with health service utilization. The study results showed that self-rated poor health status was higher among women than men. Uracratia, arthritis, and hypertension were the most common chronic conditions reported by women. Likewise, prostate, hypertension, arthritis, and diabetes were the most reported health problems by men. The study also revealed that the health status of older people was significantly lower among those aged 80 years and above, with a lower level of education, with low incomes, and with chronic conditions. The results of the study showed that age,

sex, education, income, and chronic conditions were significantly important predictors that led the aged people to consult physicians and use traditional Korean medicine.

In the Nepalese context, a cross-sectional study was conducted among 293 senior citizens aged 60 years and above of the Kushma Municipality to identify the factors contributing to health service utilization (Chhetri et al., 2023). The independent variables were classified as predisposing, enabling, and need factors according to Andersen's behavioral model. Predisposing factors included age, sex, ethnicity, religion, marital status, educational status, family type, place of residence, and awareness of free health services. Enabling factors included personal monthly income, family monthly income, insurance knowledge, insurance plan membership, family support, and responsibility for household decision-making. Need factors included perceived health status, health problems, medication, difficulties experienced in the past month, and the presence of a disability. The results of adjusted logistic regression analysis revealed that predisposing factors included gender, ethnicity, and place of residence; enabling factors included family income per month and family support; and need factors included the presence of chronic diseases and under medication, were all strong predictors of health service utilization among older people.

Sharma (2023) examines the self-reported health status of older people in Nepal using data from the Nepal Ageing Survey 2015. This study examines seven key areas: demographic, socio-cultural, economic, support and care, modernization, living arrangements, and health-related factors, with 40 independent variables. The results of binary logistic regression identified that age, sex, literacy, acceptance of household advice, religion, wage employment, property sufficiency, nutrition, care conditions, enthusiasm, and access to medical treatment are significant predictors of the good health status of older people. The findings also highlighted that older male people report better health status than

females, and factors like low educational attainment, family dynamics, and sufficient resources significantly influence health outcomes.

Another community-based cross-sectional study from urban areas of eastern Nepal examined morbidity, health problems, health care seeking, and utilization behavior among older people. The study indicated that about half of the older people have pre-existing chronic conditions, and almost all reported having some health problems, suggesting that older people have a high burden of chronic diseases and other diseases. The study also showed that despite the need for health care, the majority of older people did not visit a health facility or health care providers. The study identified that economic status, pre-existing morbidities, health insurance, and awareness of the government geriatric health scheme were significant predictors of health service utilization (M. Poudel et al., 2022).

Karmacharya et al. (2021) conducted a cross-sectional survey in Pokhara metropolitan city to examine the utilization and correlates of health services and other welfare schemes among older people. The sample size for this study was 201 older people. This study used the Andersen behavioral model of health services utilization to identify the correlates of health services utilization. In this study, predisposing factors encompassed age, sex, ethnicity, marital status, and access to health services. Enabling factors included household income, economic activities, and health insurance status. Self-perceived health status, difficulties with daily activities, and chronic diseases were included in need factors. The study found that females were more likely to visit health facilities compared to males. The study also observed that older adults with higher co-morbidity were more likely to visit health facilities. The study showed that among the predisposing and need factors, only sex and the frequency of chronic diseases were significantly associated with health service utilization. None of the enabling factors appeared to be a significant predictor of health service utilization among older people.

Ghimire, Singh, et al. (2021) used Andersen's health service utilization model to assess predisposing, enabling, and need factors that potentially influence healthcare utilization among older adults. This study was cross-sectional and conducted in the Sudurpaschim Province of Nepal. The sample size of this study was 260 older adults aged 60 years and above. Predisposing factors in this study included age, sex, educational status, ethnicity, family structure, knowledge of free health services, and health care preference. Enabling factors included monthly household income, tertiles of monthly household income, mode of transportation, and travel companion. Chronic conditions are considered a need factor. The study showed that 62.3 percent of older adults had attended a health facility. An adjusted multivariable logistic regression model showed that two predisposing factors—family structure and health care preference; two enabling factors— monthly household income and travel companion; and one need factor—number of chronic diseases, were significantly associated with healthcare visits. In particular, older adults living in a nuclear family were less likely to use health services, and older people preferred Ayurvedic/Homeopathic health care, those with a monthly household income in tertile, those who traveled to health facilities with children, and those with more than two chronic conditions were more likely to use health services than their respective reference category.

Acharya et al. (2019) examined healthcare utilization and expenditure among older adults in the Pokhara Lekhnath Metropolitan City of Nepal. The study was a community-based cross-sectional survey of 401 older adults aged 60 and above. The study exhibited that hypertension, gastritis, asthma, and arthritis were major health problems among older adults. The study also found that the use of private health facilities was high compared to the use of government health facilities. Older people from privileged ethnicity, living with a partner, having higher annual incomes, knowledge of social insurance, and having multimorbidity were more likely to utilize the health services.

Chalise and Rosenberg (2019) used secondary data to examine the social and health status of older adults in Nepal. This study analyzed the three dimensions of self-reported health status: physical health, physical disability, and mental health. The study revealed that three-quarters of older adults had physical health problems, 15 percent had physical disability, and about 53 percent had mental health problems. Physical pain, respiratory problems, gastritis, eye problems, high blood pressure, and teeth problems were the most common physical health problems among older adults. Similarly, hearing and visual disability were the most common physical disability, while anxiety or stress, boredom, loneliness, insecurity, and sadness or depression were frequently reported mental health problems. The study further showed that females were more likely to self-report physical health and mental health problems compared to men. The study further mentioned statistically significant gender differences in marital status, living arrangements, literacy, pensions, and physical and mental health.

Gurung et al. (2016) conducted a cross-sectional study based on 212 older people aged 60 and above residing in the Butwal Sub-metropolitan city to analyze the utilization of healthcare services among older people. The results showed that 84 percent of older people utilized health services in the past year. The majority of older people have faith in traditional health services. The utilization of healthcare services was found to be significantly associated with chronic disease, family income, medication, and self-rated health status.

Bista et al. (2012) conducted a study to analyze the health status and social needs of older people in rural Nepal. This study is based on cross-sectional data from a survey conducted by the Central Department of Population Studies, Tribhuvan University, and Aging Nepal in six Village Development Committees of the Pharping area in Kathmandu district. The study found 1375 older people aged 60 and above in 1070 households, but the

survey successfully interviewed 1355 older people. Regarding the physical and mental health status of older people, physical pain, respiratory problems, eye problems, gastritis, high blood pressure, and dementia/Alzheimer's were major health problems. Anxiety/stress, boredom, and loneliness were found to be major mental health problems. Gender differences were observed in mental health problems. More than half of older females and 48 percent of older males have mental health problems. Looking for healthcare-seeking behavior, the study found that about 51 percent of the males and 54 percent of the females had a health checkup during the last year with a doctor. Eighty-three percent of males and 78 percent of females did not get their health check-ups, reporting 'not needed' as the primary reason, followed by lack of money and knowledge. Most older people visited government health facilities, followed by private hospitals and community hospitals. The study concluded that older people, 80 years and above, single women, chronically ill and physically disabled, widows, Dalit women, living alone, and having no living children were in a vulnerable situation.

Sanjel et al. (2012) studied the utilization of healthcare services and their determinants among the elderly population in Dhulikhel Municipality. The study showed that 68 percent of elderly persons utilized health services in the past year. A majority of older people prefer modern health services when seeking healthcare. The study found that marital status, ADL, having a chronic disease, and regular medication were significantly associated with health service utilization.

After reviewing several studies on the health service utilization of older people in Nepal, it was found that some studies mainly focus on assessing the factors associated with health service utilization among older people (Acharya et al., 2019; Gurung et al., 2016; M. Poudel et al., 2022; Sanjel et al., 2012). On the other hand, some studies focus mainly on assessing the factors responsible for the utilization of health services among older people

using the Andersen behavioral model (Chhetri et al., 2023; Ghimire, Singh, et al., 2021; Karmacharya et al., 2021). In the study by Chhetri et al. (2023), age, sex, ethnicity, religion, marital status, educational level, family type, place of residence, and awareness of free health services were considered predisposing factors. Personal monthly income, family monthly income, insurance, family support, and household decision-making were considered as enabling factors. Perceived health, frequency of health problems, medication, experienced difficulties, and the presence of disabilities were included as important need factors. Likewise, Ghimire et al. (2021) included age, sex, educational status, ethnicity, knowledge of free health services, preference for health care, and family structure as predisposing factors in their study. Monthly household income, tertiles of monthly household income, mode of transport, and travel companion were classified as enabling factors, while chronic condition was the sole variable included as a need factor. In another study, Karmacharya et al. (2021) embraced age, sex, ethnicity, marital status, awareness of free health services, and awareness of welfare schemes as predisposing factors. Enabling factors included annual household income, economic activity, and insurance ownership. Self-perceived health, difficulty with daily activities, and chronic disease were considered as need factors. However, based on the literature, potentially important predisposing factors include living arrangement; enabling factors such as working status, economic sources of living, state of economic dependency, receiving social security allowance, household wealth quintile, and decision to health care; need factors such as functional ability, disability, and morbidity condition; and health behavior factors that were not measured in these studies, which may play an important role in health service utilization among older people.

2.6 Studies on Correlates of Quality of Life Among Older People

Quality of life of older people is a subjective and multidimensional concept (Bowling et al., 2013; Gabriel & Bowling, 2004) that can be explained by personal preferences, social, economic, cultural, and religious backgrounds, and philosophy of life. The substantial increase in the number of older people has made society more conscious of social problems and successful and active aging. The concept of quality of life of older people has become a new concern for social development and achieving sustainable development goals. Therefore, numerous studies have been conducted on the quality of life of older people from various disciplines. A study was conducted among older people aged 60 years and above in Penang, Malaysia, using the World Health Organization Quality of Life (WHOQOL)-BREF scale. An adjusted regression analysis showed a statistically significant association of the quality of life of older people with their living arrangements, mobility, social participation, and social support. It was observed that there is a positive association between living arrangements and social involvement but a negative association between mobility and social support with quality of life scores among older people (Khan & Tahir, 2014). Among Iranian older people, a high quality of life was found to be associated with marital status, diseases, disability, and housing (Golamrej Eliasi et al., 2017). The final model of stepwise multiple regression analysis, which included 280 older people in Bangladesh, showed that depression, social support, availability of health services, ADL, and sleep problems were the most important influencing factors on the quality of life of older people. This study also found that depression and sleep problems have a negative impact on the quality of life of older people (Uddin et al., 2018).

Furthermore, a study conducted in Sir Lanka using WHOQOL-BREF scale showed that marital status, education level, living arrangement, employment, income, income adequacy, and ownership of a house were associated with all domains of quality of life. In

contrast, age, sex, religion, number of children, and presence of a monthly income were associated with at least one domain of quality of life of older people (Santhalingam et al., 2022). Similarly, a study conducted in rural Haryana, India, showed that age, caste, marital status, and socioeconomic status were significantly associated with at least one domain of quality of life. However, education and occupation were significantly associated with all four domains (Rajput et al., 2022). Another study conducted in Indonesia using WHOQOL-BREF revealed that age, retirement, living conditions, health insurance, and medical history were significantly associated with the quality of life of older people (Sinaga et al., 2022).

In Nepal, there are limited studies on the quality of life of older people. However, in these studies, greater priority has been given to studying the quality of life of older people and its correlates. A cross-sectional study of 403 older people aged 60 years and above in Baglung district of Nepal, using WHOQOL-BREF as the outcome variable, found that about half of the older people had a high quality of life and also showed that age, gender, marital status, religion, family structure, social capital, neighborhood aesthetic and crime rates were significantly associated with quality of life (GC et al., 2017).

Another study of 462 older people aged 70 years and above conducted in Tarkeshwor Municipality of Kathmandu showed that more than two-thirds of older people experienced loneliness and boredom, almost half of them suffered from depression, and more than four-fifths of them reported a fair level of quality of life. The study also identified that increasing age, being female, living alone, low education, and low economic status are associated with low quality of life (Adhikari et al., 2018). The chi-square test was used to measure the statistical association between selected variables and quality of life. However, this study did not examine the effects of selected variables on the quality of life. Similarly, a survey of 547 older people aged 60 years and above from Kailali district showed that about one-third of older people had a good quality of life. This study also found that age,

marital status, elderly abuse, living arrangements, education level, physical health, and land ownership were significantly associated with the perceived quality of life of older people (Joshi et al., 2018). Only bivariate analysis (chi-square test) has been performed to examine the association between selected variables and perception of quality of life. The study suggests that a further in-depth study using a standard questionnaire on quality of life is required to assess the actual quality of life of older people in Nepal.

A cross-sectional study was conducted in Kavre district, among 439 older people aged 60 years and above. The World Health Organization Quality of Life 8-question scale was used to measure quality of life. The study found that the mean quality of life score was 25.7, and the highest score was in the psychological domain. The study found that urban residence, employment, absence of chronic physical health problems, absence of depression, adequate time given by family, and absence of family abuse were positive predictors of quality of life in older people (Risal et al., 2020). This study used an independent sample t-test to compare the mean quality of life scores of two independent groups and determine whether this difference is statistically significant. Similarly, multivariate regression analysis has been used to determine the association between the total quality of life score and the independent study variables. Another study conducted by Acharya Samadarshi et al. (2022) in a remote community of Nepal with 671 older adults aged 60 years and above found that age, insufficient income, depression, social support, and health care service affordability were significant predictors of quality of life in older people.

Likewise, Shrestha et al. (2022), in their study of Kathmandu using WHOQOL-BREF questionnaires, showed that literacy status, involvement in decision-making, and education of the head of the family have a significant association with mean scores of quality of life among older people aged 60 years and above.

While reviewing previous studies in the context of Nepal, it is found that these studies have not analyzed the relationship between sociodemographic factors (caste/ethnicity, family type, living arrangement, and religion), economic factors (working status, economic source of living, economic dependency, social security allowance, health insurance, and household wealth quintile), health-related factors (health status, multimorbidity, and health service utilization), functional health, and health behavior and quality of life of the older people.

2.7 Conceptual Framework

The conceptual framework is essential in the research process for articulating the relationship between explanatory and outcome variables. This section presents the conceptual framework used for this study. A conceptual framework is a description of how a researcher understands the factors and/or variables involved in the study and their relationships based on relevant literature (Luft et al., 2022). It grounds the study in the relevant knowledge bases that lay the foundation for the importance of the problem statement and research questions (Rocco & Plakhotnik, 2009). Based on an extensive review of theoretical approaches and empirical studies on multimorbidity, health service utilization, and quality of life of older people and their correlates, a conceptual framework for this study has been developed, which is illustrated in Figure 2.1.

Age-associated multimorbidity is becoming a growing concern as the elderly population increases. A systematic review showed that several factors, such as individual and biomedical factors, socioeconomic characteristics, social and environmental factors, and health behavior, were associated with multimorbidity (Xu et al., 2017). Another study used a health-ecological model to analyze the potential factors associated with multimorbidity. The health-ecological model includes individual, behavioral, interpersonal, socio-economic, and environmental characteristics (Chen et al., 2022). As depicted in

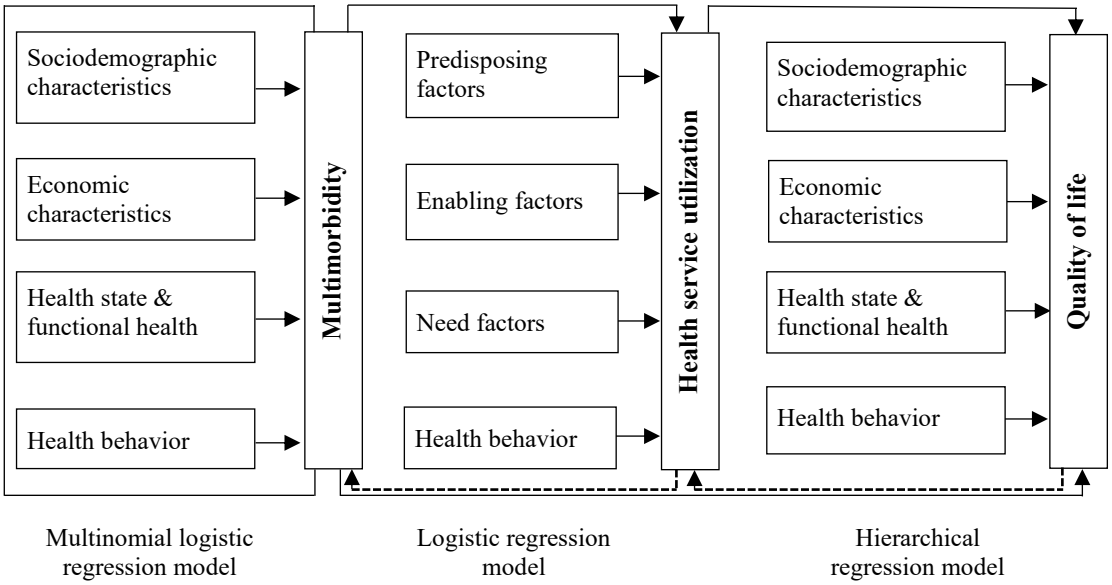
Figure 2.1, it is hypothesized that sociodemographic characteristics, economic characteristics, health state and functional health, and health behavior determine multimorbidity. The framework considers that socioeconomic characteristics of older people—including age, sex, marital status, living arrangement, caste/ethnicity, religion, types of family, and education level– can significantly impact vulnerability to multiple chronic conditions. Working status, economic source of living, economic dependency, social security allowance, health insurance, wealth quintile, and owning a mobile phone are considered economic characteristics that may impede access to healthcare and the ability to manage chronic conditions. Health state and functional health encompass health status, ADL, IADL, level of disability, and disability index, which may influence the presence and progression of multiple chronic conditions among older people. Health behavior refers to actions and habits taken by older people that have a positive or negative impact on their health and play a crucial role in either increasing or reducing the risk of chronic disease and multimorbidity.

Several previous studies have used Andersen's behavioral model to examine health service utilization among older people (Addo & Gyamfuah, 2014; Amente & Kebede, 2016; Chatterjee et al., 2019; Chhetri et al., 2023; Ghimire, Singh, et al., 2021; Karmacharya et al., 2021; Zhang et al., 2018). The variables used for the analysis were selected based on Andersen's behavioral model by adding health behavior and multimorbidity. The broader proposition of this conceptual framework is that predisposing, enabling, need, and health behavior factors influence health service utilization among older people. Predisposing factors include sociodemographic characteristics (e.g., age group, living arrangement, caste/ethnic groups, and education). These factors influence an individual's use of health services and help to predict the patterns and levels of health service utilization. Enabling factors primarily include economic factors such as working

status, economic source of living, health insurance, wealth quintile, and decision to health care that influence the access to healthcare and the attitude toward receiving healthcare. Need factors, defined as either perceived need by the individual or evaluated need by professionals, are the most important factors influencing health service utilization (Andersen & Davidson, 2001) and encompass general health status, ADL, level of disability, and morbidity conditions in this study. In addition, the study proposed that health behaviors are potentially associated with the use of health services among older people. Health behaviors include smoking, tobacco use, alcohol consumption, physical activity, and elder abuse.

Figure 2.1 depicts the relationship between sociodemographic characteristics, economic characteristics, health state and functional health, health behavior, health service utilization, and the quality of life of older people. After reviewing various studies on the quality of life of older people and their correlates, variables have been selected for this study.

Figure 2.1: *Conceptual Framework for the Study*



Note: Developed by the researcher based on literature review, 2024

Previous studies show that individual factors (sociodemographic factors), economic factors, health behavior, and environmental factors influence quality of life. Therefore, the conceptual framework of this study proposes that sociodemographic characteristics, economic characteristics, health state and functional health, and health behavior influence the quality of life of older people. This study also posits that multimorbidity and health service utilization influence the quality of life of older people. Previous studies have demonstrated the influence of multimorbidity on the quality of life of older people. Studies showed that as the burden of multimorbidity increases, the number of functional limitations increases, leading to a decline in quality of life (Wilk et al., 2024). Another study showed that the magnitude of multimorbidity affects every aspect of people's lives and leads to poor quality of life (Eyowas et al., 2022). The relationship between health service utilization and the quality of life of older people is multifaceted. Previous studies suggest that older people who adopt healthier behaviors, utilize health services for preventive measures, and manage chronic disease have a better quality of life. On the other hand, older people who are less active and have difficulty accessing health services may diminish their quality of life (Margaretha et al., 2021).

Figure 2.1 also illustrates the two main recursive relationships, i.e., utilization of health services is expected to affect multimorbidity and quality of life is expected to affect health service utilization. Utilization of health services has an effect on multimorbidity among older people. The frequent use of health services facilitates early diagnosis, preventive care, management of chronic conditions, and mitigation of complications and progression of multiple chronic conditions. This, in turn, contributes to lower morbidity and reduces hospitalization, thereby enhancing overall well-being. However, it helps to identify new chronic diseases, which may increase the prevalence of multimorbidity among older people.

Quality of life influences health service utilization among older people by shaping their perception of health and well-being. Quality of life is a multidimensional concept and

refers to how an individual perceives his/her position in life within the context of his/her culture and the value system in which he/she lives (WHOQOL Group, 1998). Older people who perceive a higher quality of life or are satisfied with their lives are more likely to seek healthcare services, including routine check-ups, preventive care, and chronic condition management, which improve the quality of care for older people. Conversely, older people who perceive a low quality of life or feel unhappy in life may underutilize healthcare services. Physical health, psychological health, social relationships, and environmental factors are key domains of the WHOQOL framework that influence health service utilization. Physical limitations, including difficulty performing daily activities and low energy levels, can hinder access to health service utilization. Psychological well-being, such as feelings of happiness or unhappiness and personal relationships, may influence the decision to seek care or neglect health needs among older people. Additionally, utilization of health services among older people is often shaped by environmental factors, such as the availability of financial resources and living conditions.

The researcher acknowledges that the analysis of recursive relationships—between health service utilization and multimorbidity and between quality of life and health service utilization—is well-organized and theoretically significant. However, their analysis is not included in this study because the primary focus of this study is to examine the factors that influence multimorbidity, health service utilization, and quality of life among older people. Analyzing recursive relationships requires advanced modeling or longitudinal analysis, which demands longitudinal data and additional methodological considerations. Further research could expand to a separate, deeper analysis of multimorbidity, health service utilization, and quality of life among older people using longitudinal data. This study is particularly designed to examine the direct relationships between dependent and independent variables of interest.

With a comprehensive review of the relevant literature, encompassing both theoretical and empirical perspectives, the structurization of variables influencing multimorbidity, health service utilization, and quality of life has been drawn in Table 2.1.

Table 2.1: *Structurization of Variables*

Multimorbidity	**Health service utilization**	**Quality of life**
Sociodemographic characteristics	**Predisposing factors**	**Sociodemographic characteristics**
Age	Age group	Age
Sex	Living arrangement	Sex
Living arrangement	Caste/Ethnicity	Marital status
Caste/ethnicity	Education level	Living arrangement
Religion		Caste/ethnicity
Education level		Education level
Economic characteristics	**Enabling factors**	**Economic characteristics**
Working status	Working status	Working status
Economic source for living	Economic source of living	Economic source for living
State of economic dependence	Health insurance	State of economic dependence
Social security allowance	Wealth quintile	Social security allowance
Health insurance	Decision to health care	Wealth quintile
Wealth quintile		Own mobile phone
Own mobile phone		
Health state and functional health	**Need factors**	**Health state and functional health**
General health status	General health status	Morbidity
ADL	ADL	Health service utilization
IADL	Level of disability	General health status
Disability index	Morbidity condition	ADL
		IADL
		Disability index
Health behavior	**Health behavior**	**Health behavior**
Smoking	Smoking	Smoking
Tobacco use	Tobacco use	Physical activity
Alcohol consumption	Alcohol consumption	Elder abuse
Physical activity	Physical activity	
Elder abuse	Elder abuse	

Following the literature review and theoretical framework, the subsequent chapter describes the methodology used in this study.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describes the methodology used in the study. The methodology covers the issues related to study design as well as data collection and analysis techniques. This chapter is organized into thirteen sections. The first section discusses the research philosophy, and subsequent sections are devoted to discussion of the study area, study design, data source, sample size, sample population and sampling techniques, selection of respondents, questionnaire design, pre-testing, tools used in data collection, data management process, validity and reliability, study variables, data analysis, statistical methods, and finally, construction of indices.

3.1 Research Philosophy

Aging brings inevitable physiological changes, such as a reduction in the number of cellular tissues, a decrease in the metabolic rate, an increase in diseases, and a loss of adaptability (Park & Yeo, 2013). As age increases, chronic diseases start to develop due to physiological changes and deteriorating health conditions, making the body more susceptible to multimorbidity. Older people with multimorbidity require frequent and varied healthcare services, resulting in increased use of health services and multiple medications. Effective use of health services can improve the management of chronic conditions and prevent potential complications, thereby improving physical and mental health, which leads to an increase in the overall quality of life of older people. On the other hand, high levels of health service utilization often lead to higher out-of-pocket costs. This financial burden ultimately leads to physical and emotional exhaustion, which reduces the quality of life of older people. Based on the assumption that the phenomena of multimorbidity, health service utilization, and quality of life exist independently of human perceptions, beliefs, or interpretations. Hence, this study believes in a single reality.

Multimorbidity can be measured by examining its prevalence, patterns, and factors associated with multimorbidity among older people. Health service utilization can be assessed through levels of utilization of health services, frequency of visits, factors influencing health service utilization, and quality of life of older people. Quality of life is measured using standardized WHOQOL scoring. The central objective of this study is to determine the extent to which sociodemographic, economic, health state, functional health, and health behaviors influence multimorbidity, health service utilization, and the quality of life of older people. Therefore, this study employs a positivist ontology.

The nature of the burden of diseases is changing, with non-communicable diseases becoming a common cause of death among older people in Nepal (Nepal Health Research Council [NHRC], 2021). Owing to this, in the context of multimorbidity, various surveys conducted in different settings in Nepal (Balakrishnan et al., 2022; Dhungana et al., 2021; Manandhar & Joshi, 2019; Pant et al., 2023; M. Poudel et al., 2022; Yadav et al., 2021) have shown that patterns and prevalence of multimorbidity among older people are not consistent across all study areas. Similarly, several studies have been conducted on health service utilization among older people in different areas of Nepal (Acharya et al., 2019; Chhetri et al., 2023; Gurung et al., 2016; Karmacharya et al., 2021; Poudel et al., 2022; Sanjel et al., 2012; Saruna Ghimire et al., 2021), which exhibited that not all older people utilized health services. In studying on the quality of life of older people (Acharya Samadarshi et al., 2022; GC et al., 2017; Risal et al., 2020; Shrestha et al., 2018) reported a moderate level of quality of life of older people in Nepal. These studies also indicated that various factors contributed to the prevalence of multimorbidity, health service utilization, and quality of life. In order to achieve the research objectives of this study, survey research was most suitable. Therefore, this study focused on data collection using a structural questionnaire through a standardized community-based survey, as well as

multivariate logistic regression and hierarchical regression analyses employed as statistical analyses, ensuring that the variables of interest, such as the number of chronic diseases, utilization of health services, and quality of life scores, were objectively measured. Hence, this study believed the epistemological stance to be post-positivist.

Positivist research requires the deductive method. Therefore, this study has been conducted using a deductive method. The deductive method incorporates quantitative techniques. So, this study has adopted a quantitative method.

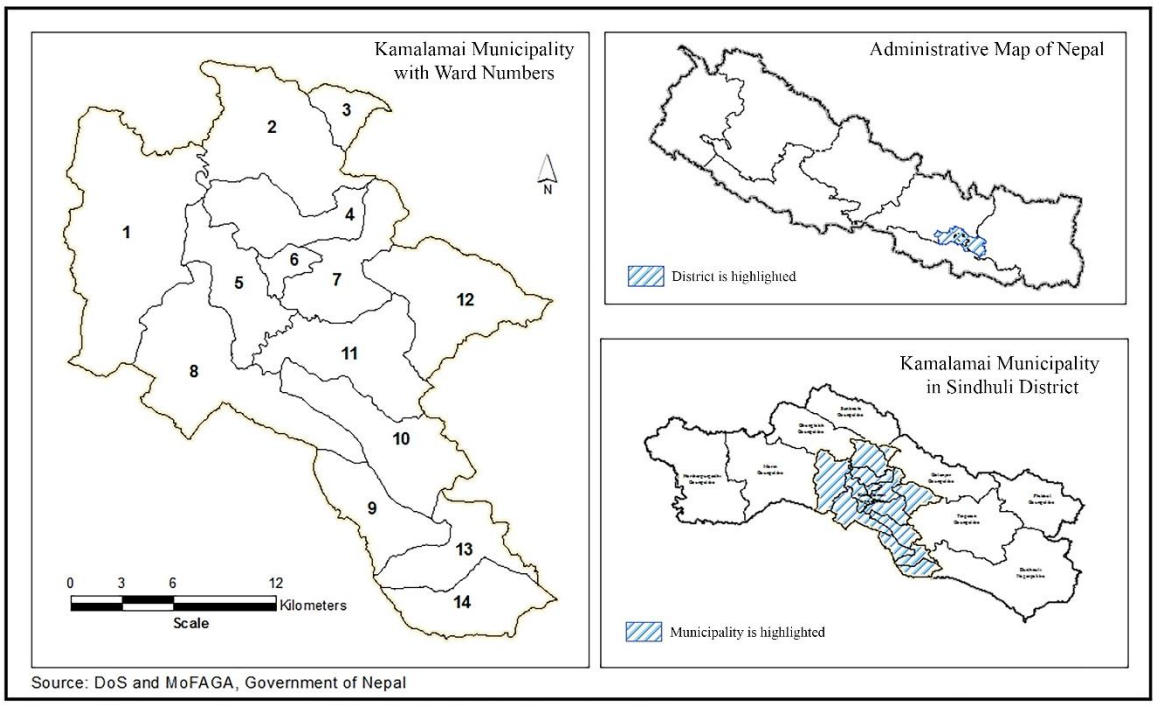
The ontological position of this study is objectivism, and the epistemological position is positivism. The methodological choice of this study is deductive and follows a survey research strategy. This study also focused on a quantitative approach with a cross-sectional study by collecting quantitative data.

3.2 Study Area

The study area of this research is Kamalamai Municipality in Sindhuli district of Bagmati Pradesh. Sindhuli district is located north of the Mahabharat range and south of the Chure range. The total area of the district is 2491 square kilometers. Sindhuli district is surrounded by Udayapur district in the east, Siraha, Dhanusha, Mahottari, Sarlahi, and Rautahat districts in the south, Makawanpur district in the west, Kaverpalanchock district in the north-west and Ramechhap district in the North. The total population of Sindhuli district is 3,00,026, with a sex ratio of 96.2 males per 100 females (NSO, 2023). It represents 1.03 percent of the total population of Nepal. People of various castes and ethnicities, like Tamange, Magar, Chhetri, Brahman, Danuwar, Newar, Kami, Sharki, Majhi and Damai, Sunuwar, Gharti/Bhujel, and Rai are major habitants of the district. This district consists of one district hospital, four primary healthcare centers, 51 health posts, five urban health centers, three community health units, one other health facility, and 21 non-public health facilities (Department of Health Services, 2020). The literacy rate of Sindhuli

district is 72.6 percent, and the average household size is 4.3 people per household. The annual average growth rate is 0.12 percent in 2021 (NSO, 2023). Sindhuli district consists of nine municipalities, two of which are urban municipalities and seven are rural municipalities. Kamalamai Municipality is one of the two urban municipalities, and the other is the Dhodhauli Municipality. Kamalamai Municipality has a total of 14 wards (Figure 3.1) covering an area of 482.57 sq.km and is located from the Chure range in the south to Mahabharat in the north.

Figure 3.1: *Location Map of Study Area*



According to the 2021 census, out of nine municipalities, the largest population was found in Kamalamai Municipality, which had a total population of 70,207, of which 34,316 were male and 36,700 were female. Accordingly, the sex ratio is 93.5. The average household size, also known as the population-to-household ratio, is 3.9 persons per household. The population density of Kamalamai Municipality is 147 persons per sq.km. The average population growth rate of 0.94 percent is higher than the district as well as other municipalities. The literacy rate of Kamalamai Municipality is 77.8 percent as per the

2021 census, which is the highest literacy rate among the municipalities. The literacy rate for males and females is 85.2 percent and 71.0 percent, respectively. Considering the caste/ethnicity, Tamang, Chhetri, Magar, Newar, Brahman-Hill, Kami, Sarki, Majhi, Damai, Danu war, Gharti/Bhujel, Hayu, and Sunuwar are the major caste/ethnic group, accounting for 95.4 percent of the total population (NSO, 2023).

3.3 Design of the Study

There are five types of research design: experimental design, cross-sectional or social survey design, longitudinal design, and case study design (Bryman & Bell, 2016). This study used a cross-sectional study design. The cross-sectional design is appropriate when the researcher wants to examine the prevalence of a phenomenon at a particular time (Bryman & Bell, 2016; Kumar, 2013; Saunders et al., 2016).

This study collected self-reported information from older people aged 60 and above at a specific point in time. The cross-sectional study seemed suitable for assessing the health status of older people, health service utilization, subjective well-being, and the association between exposure and outcome variables at a specific time (Kesmodel, 2018; Setia, 2016). Conceptually, the cross-sectional study begins with a population-based study. Cross-sectional study design is the most commonly used study design to determine the relationship between exposure and outcome variables (Omair, 2015).

In general, there are three common and useful research approaches: exploratory, explanatory, and descriptive (Babbie, 2014; Bhattacherjee, 2012). Explanatory and descriptive designs are suitable for this study. Explanatory studies strive to explain an observed phenomenon and address the question of why. On the other hand, descriptive studies examine the detailed description of a phenomenon and answer questions about what, where, and when (Aggarwal & Ranganathan, 2019).

3.4 Sources of Data

The data for this study has been gathered from both primary and secondary sources. However, this study was mainly based on primary data collected from Kamalamai Municipality. The primary data used in this study was based on a cross-sectional household survey. The data was collected using structural interviews with older people aged 60 and above. A structured interview schedule was developed that included information on household characteristics, demographic and socioeconomic characteristics, health status and functional difficulties, health behavior, morbidity, health service utilization, abuse and subjective well-being, and quality of life of older people. The KoBo Toolbox was used to collect data for this study.

The researcher collected secondary data from various sources such as journal articles, research reports, and reports of the population census of Nepal.

3.5 Sample Size

When designing a research study, a decision must be made about the sample size. The sample size is important to determine the representees of the sample for generalizations (Sekaran & Bougie, 2016). Various questions arise regarding sample size, such as what sample size should be or how large or small the sample should be (Washington Group on Disability Statistics, 2023). In general, the sample must be adequate or optimum size, that is, neither too large nor too small (Kothari, 2009). Washington Group on Disability Statistics (2023) argued that a small sample size may waste resources for obtaining valid results, while a large sample size may require more resources than necessary. There is no clear-cut answer to sample size. However, Fisher et al. (1991) mentioned that the sample size must be large enough to ensure reliable analysis of cross-tabulation analysis, provide a desirable level of precision in estimating proportions, and test the significance of

differences between proportions. Fisher et al. (1991) and Rea and Parker (2014) mentioned that while determining the sample size, a researcher must consider the following points:

Population Size

The size of the entire population included in the study should be ascertained. The population size refers to the total number of people from which we select a sample and draw conclusions.

Estimation of the Proportion

Estimate the percent of the population with the outcome of interest that satisfies the research need. If the researcher is unsure of the percentage, use 0.50 (50%), which gives the most significant sample size.

Margin of Error

The margin of error is the degree of accuracy in the study. Generally, the margin of error is taken as 0.05 (5%) for social research.

Level of Confidence

It indicates the probability that the parameters or actual value falls within the range of the confidence interval. Most researchers use the 95 percent confidence level.

The sample size of the study was calculated using OpenEpi with following formula (Dean et al., 2013) and parameters:

$$\text{Sample size (n)} = \text{deff} \times \frac{N \times p \times (1-p)}{(N-1) \times \frac{d^2}{z^2_{1-\alpha/2}} + p \times (1-p)}$$

where,

Study population (N) = 7646 older people aged 60 years and above in Kamalamai Municipality.

Proportions (p): As the study utilized three dependent variables, the proportion varies for each dependent variable. Further, there are no nationally representative household surveys

revealing the prevalence of each of the outcome variables considered in this study. The researcher has cited some small-scale studies.

- Health service utilization by older people = 62%. According to a previous study by Ghimire, Singh, et al. (2021), 62 percent of older people visited a health facility in the past 12 months.
- Prevalence of multimorbidity = 23%. The prevalence of multimorbidity is derived from a community-based cross-sectional study conducted in Eastern Nepal (Balakrishnan et al., 2022).
- Quality of life = 17%. The proportion of older people with a high quality of life is taken as 17 percent, based on the study conducted in Tarakeshwor Municipality, Kathmandu (Adhikari et al., 2018)

Confidence limits as % of 100 (absolute +/- %) (d) = 5%

The standard variate for a 95% confidence level ($z_{1-\alpha/2}$) = 1.96

Design effect (deff) = 2

The sample size was drawn using the formula and putting the different proportions, as shown in Table 3.1.

Table 3.1: *Outcome Variables, Proportions, and Sample Size*

Outcomes	Proportion (p)	Sample size
Health service utilization	62%	692
Multimorbidity	23%	526
Quality of life	17%	422

Among the three sample sizes, the researcher selected the largest sample size of 692 for this study to enhance the statistical robustness and reliability of the results. Additionally, this larger sample size also reduces the margin of error, making the results more generalizable.

3.6 Study Population and Sampling Techniques

The study population of this study consists of older people aged 60 years and over from the Kamalamai Municipality. The proportion of older people in Kamalamai Municipality was 10.8 percent, according to the 2021 census.

This study followed a multi-stage sampling design to obtain a representative sample of the municipality. The sampling took place in the following four stages:

In the first stage, Kamalamai Municipality was selected purposively as a study site due to its diverse socioeconomic status and semi-urban area. In the second stage, all wards of the Kamalamai Municipality were selected as primary sampling units (PSUs). The sample size required for each ward was determined based on probability proportional to the number of older people aged 60 years and over in each ward (Table 3.1). In the third stage, a list of the households with older people aged 60 years and above was prepared using the District Election Office's voter roll, and then an updated household list with the consultation of community leaders and residents once we reached the central catchment area of the ward.

Table 3.2: *Sample Size for Each Ward*

Ward No.	Ward	Total population, 2021	Population 60 years and above, 2021	Proportion	Sample Size
1	Dadiguranshe	4565	553	0.0723	50
2	Bhadrakali	3790	548	0.0717	50
3	Jalkanya	1359	234	0.0306	21
4	Kamalamai	8818	849	0.1110	77
5	Kamalamai	8292	772	0.1010	70
6	Kamalamai	12498	946	0.1237	86
7	Kamalamai	6828	672	0.0879	61
8	Kamalamai	3672	440	0.0575	40
9	Kamalamai	4728	581	0.0760	53
10	Kamalamai	3375	462	0.0604	42
11	Ranichuri	3800	489	0.0640	44
12	Ranichuri	3822	463	0.0606	42
13	Ranibas	2258	303	0.0396	27
14	Ranibas	3211	334	0.0437	30
	Total	71016	7646	1.0000	692

In the fourth stage, the required number of household/eligible individuals was selected from the list of households by simple random sampling techniques using 'Decision Analyst STATS 2.0 software. In the sample household, only one eligible person from each household was interviewed. If an eligible individual was unavailable in a household during the first visits, follow-up visits were made to get the eligible individual for an interview. We continued to visit sample households until we reached the target number of older people.

3.7 Selection of Respondents

If a selected household had more than one older person aged 60 years and above, one respondent was chosen using a Kish grid (Kish, 1949) to minimize the selection bias. The Kish grid is a method of choosing one eligible member (older person) in a household by assigning numbers to each eligible member of the household and assigning an equal probability for the selection of each member. In this study, a modified version of the Kish grid, as employed in demographic and health surveys (Ministry of Health and Population [MOHP] et al., 2012; Ministry of Health and Population [Egypt] et al., 2015), has been used.

To select the respondents, the researcher first determined the number of older persons in the household and looked at the last digit of the household number. In the Kish grid table, one should find the intersection of the row (corresponding to the last digit of the household number) and the column (representing the number of older people in the household) that number indicates the selected respondent, as identified from the roster of older person aged 60 and above (Appendix 3).

3.8 Questionnaire Design

In order to answer the research questions, a structural questionnaire was designed to collect quantitative data from older people. The researcher reviewed the World Health

Organization Study of Global Aging and Adult Health (SAGE) Wave 1 Individual Questionnaire (health state description, chronic conditions, health service coverage, health care utilization and subjective well-being and quality of life), the 2018 Longitudinal Study of Aging and Health in the Philippines Questionnaire (Cruz et al., 2019), and the Household Survey on Health and Social Care Needs Assessment of Older People Questionnaire (Bista et al., 2012) to develop a questionnaire.

The draft questionnaire was shared with experts in the relevant field for suggestions and feedback. In order to ensure its reliability, the researcher held face-to-face and online discussions with experts and supervisors and incorporated comments and suggestions from the discussion into the final questionnaire design. A digital questionnaire was set up on the KoBo Toolbox, an open-source field data collection that was developed by Harvard Humanitarian Initiative (KoBo Inc., 2023). After setting up the digital questionnaire on the KoBo Toolbox server, the questionnaire was deployed on the server, and the questionnaire was downloaded from smartphones using the KoBoCollect application. KoBoCollect is an Android application that collects survey data. Initially, questionnaires were prepared in English and then translated into Nepali. The researcher also created digital questionnaires on the KoBo Toolbox in Nepali. Please refer to Appendix 6 for the details of the questionnaire.

3.9 Pre-testing of the Questionnaire

A pre-test of the questionnaire was conducted in the first week of January 2023 in the Sunkoshi Rural Municipality, Sindhuli District, based on a digital questionnaire on the KoBo Toolbox. The researcher interviewed 20 older people aged 60 and above, representing approximately 3 percent of the sample. The purpose of the pre-test was to avoid any ambiguity in the questions, gain more clarity on content and language, finalize questionnaires, and check reliability and validity before the fieldwork. The researcher

himself was involved in the pre-test. The researcher shared the experiences of the pre-test with the supervisors. The questionnaires were then modified and simplified according to the feedback from the pre-test and suggestions from the supervisor, the co-supervisor, and the other experts.

3.10 Data Collection

Data collection is a crucial aspect of research because the ability to achieve research objectives and answer the research questions depends on the effectiveness of data collection (Washington Group on Disability Statistics, 2023). The data collection process started with the selection and recruitment of two enumerators to collect the data. They were given an orientation about the questionnaire and how to collect data from Kobo Collect/Toolbox, download the questionnaire from a smartphone, and send data (data upload). The fieldwork (actual data collection) for this study was conducted from the last week of January to the first week of March 2023 under the close supervision of the researcher. The researcher himself was responsible for monitoring enumerators and checking questionnaires. In order to maintain quality in the data collection, the researcher himself actively conducted interviews and provided guidance to the enumerators. The enumerators sent finalized forms to the researcher every day and verified them every day.

The interview was conducted primarily with eligible respondents who had lived in the study area for at least one year. If eligible respondents were absent during the survey period, other knowledgeable family members were interviewed. The older people who had speech loss, hearing loss, and mental disorders were excluded from participating in the interview. In addition, the researcher explained the objectives of the research to the eligible respondents, and their informed consent was obtained before the interview commenced. Participation in the study was voluntary, and the respondents were assured of the confidentiality and anonymity of their responses. Therefore, the eligible individuals who

were willing to participate in the study were interviewed. Some paper-based questionnaires were printed for emergency use when the smartphone battery would run out during the interview.

3.11 Data Management

The data was collected by KoBoCollect, and then the field data was sent directly to the KoBo Toolbox server. Once the field data was submitted to the KoBo Toolbox server, the researcher was involved in identifying any errors in the data. The data was edited in the KoBo Toolbox and was then downloaded in the MS Excel data format. Later, the Excel data file was imported into STATA version 15.1. Some responses to the questionnaire were pre-coded, while semi-closed responses were post-coded. Data cleaning and cross-checking of errors and outliers were performed in the STATA. Further activities, such as cross-referencing questionnaires for inconsistencies and incompleteness checks, recording, labeling, adding, and normality tests, have also been done in the STATA.

3.12 Validity and Reliability

Validity and reliability are central issues because all social researchers want to ensure that their measures are valid and reliable, which helps to establish the truthfulness and accuracy of findings (Neuman, 2014). Validity refers to the extent to which a specific concept is truthfully measured in the study, whereas reliability refers to the internal consistency of a measure (Zikmund et al., 2013). Lack of validity implies that the findings of the study differ from the reality in the population under study. The validity of the study can be increased by ensuring careful study planning, adequate quality control, and implementation strategies of data collection, data analysis, sample size, and sample selection (Patino & Ferreira, 2018). On the other hand, reliability can be improved by using clearly defined constructs, a precise level of measurement, multiple indicators, and pilot

tests (Neuman, 2014). Therefore, all possible efforts were made to reduce sampling and non-sampling errors and prevent bias in the study. Sampling frames were prepared for each ward using the Election Commission's voter roll, and this sample frame was updated with the help of knowledgeable persons in the central catchment area of each ward.

The questionnaire used in this study was based on revisions to the World Health Organization Study of Global Aging and Adult Health (SAGE) Wave 1 Individual Questionnaire and the 2018 Longitudinal Study of Aging and Health in the Philippines Questionnaire (Bista et al., 2012; Cruz et al., 2019). Furthermore, pilot testing of the questionnaire allowed for correcting and adjusting specific parts in order to improve its reliability and validity. Besides, follow-up visits were made to respondents who were not available in their households. However, none of the respondents refused the interview. The questionnaire was also developed in Nepali. Cronbach's alpha was used to measure the internal consistency. Cronbach's alpha value ranges from 0, indicating no consistency among items, to 1, indicating complete consistency among items. Cronbach's alpha coefficient value above 0.7 is considered to have good reliability.

3.13 Study Variables

Dependent variables

The study has three dependent variables. The first dependent variable is multimorbidity. In order to determine the morbidity conditions, older people were asked, " Have you ever been told by a doctor or any health professional that you have high blood pressure, diabetes, heart disease, arthritis, high cholesterol, osteoporosis, asthma, gastritis/ulcer, cancer (including cervical/breast cancer), liver diseases, kidney disease, depression and anxiety, cataracts/glaucoma, oral diseases, prostate and uterine prolapse,

nerve-related problems, thyroid, and other diseases? All diseases were in binary response, no ‘0’ and yes ‘1’. A score was derived from the 18 chronic diseases reported by older people. Based on the scores, a new variable was created. The researcher categorized older people who received a score of 0 as having no morbidity and coded 0; a score of 1 as single morbidity and coded 1, and scores 2 to 7 as multimorbidity and coded 2. Based on these criteria, the researcher classified morbidity into three categories: no morbidity (older people with no chronic diseases), single morbidity (older people with exactly one chronic disease), and multimorbidity (older people with simultaneous occurrence of two or more diseases)

The second dependent variable is health service utilization. This variable was assessed by asking older people two questions: (1) In the past 12 months, have you visited any healthcare facility, or has any health worker visited you? (2) Have you consulted a doctor or other health care provider in the past 12 months? The responses to these two questions were used to generate an outcome variable. The outcome variable was binary and coded as 1 for older people who had visited a health facility or consulted with a doctor or other healthcare provider and 0 for older people who had not visited any health facility or consulted a doctor or other healthcare provider. In this study, health service utilization has been defined as an older person visiting any health facility for treatment or to consult with a doctor or health care provider about their health problem or illness.

The third dependent variable is quality of life. The WHOQOL-8 item has been used to measure the quality of life of older people. This framework has eight items of four domains. Each item of the WHOQOL-8 has been rated on a five-point Likert scale from 1 to 5, (1 represents the worst condition and 5 represents the best condition). The total score ranges from 5 to 40, with a higher score indicating a better quality of life. This is a continuous variable.

Independent Variables

The independent variables used in this study are as follows:

Sociodemographic Characteristics. Sociodemographic characteristics include age, sex, marital status, living arrangement, caste/ethnicity, religion, types of family, and education level. Age has been categorized into 60-69 years, 70-79 years, and 80 years and above. Education has been categorized into no education, literate but no formal education, basic education, and secondary and higher education. Living arrangements have been categorized into living alone, living with a spouse only, living with a son/daughter-in-law, and living with others. Caste/ethnicity is categorized into three groups: Hill Caste, Hill Janajati, and Hill Dalit. Religion has been categorized as Hinduism and other religions (Buddha/Christian).

Economic Characteristics. Economic characteristics include working status, economic source of living, economic dependency, social security allowance, health insurance, wealth quintile, and a mobile phone. Working status has been categorized into currently working and not working. Likewise, economic sources of living have been categorized as own income, son/daughter support, and old age allowance. Economic dependency has been classified into not dependent, partially dependent, and fully dependent. Social security allowance, health insurance coverage, and owning a mobile phone have been categorized as yes or no. The wealth quintile has been categorized into poorest, poor, middle, rich, and richest.

Health State and Functional Health. Health state and functional health factors comprised general health status, ADL, IADL, level of disability, and disability index. General health status has been categorized into good, fair, and poor. Disability level has been classified into no difficulty, some difficulty, a lot of difficulty, and cannot do it at all. The disability index has been classified as with disability and without disability.

Health Behavior. Health behavior consisted of smoking, tobacco use, alcohol consumption, physical activities, and elder abuse. Smoking, tobacco use, and alcohol use have been categorized into two groups: never smoker/tobacco user/alcohol user and current/former smoker/tobacco user/alcohol user. Physical activities have been classified into yes and no categories. Abuse has been categorized as experienced and never experienced.

The researcher selected the following independent variables based on Andersen's behavioral model of health service utilization:

Predisposing Factors. The predisposing factors included eight sociodemographic characteristics: age, sex, education, marital status, living arrangement, family type, caste/ethnicity, and religion.

Enabling Factors. The enabling factors included working status, economic source of living, economic dependency, social security allowance, health insurance, wealth quintile, and decision to health care. Healthcare decisions have been categorized as self-decision and others.

Need Factors. Need factors comprise six health-related variables: general health status, ADL, IADL, disability level, disability index, and morbidity condition.

Health Behavior. Health behavior consists of five variables: smoking, tobacco use, alcohol consumption, physical activities, and elder abuse.

3.14 Data Analysis

Data analysis is a crucial aspect of research. This includes organizing and tabulating data, performing statistical analysis, and drawing conclusions. Bryman and Bell (2016) stated that there are mainly three main methods of data analysis: univariate analysis, which refers to the analysis of one variable at a time; bivariate analysis, which refers to the analysis of two variables at a time; and multivariate analysis, which involves the simultaneous analysis of three or more variables. Therefore, to achieve the objective of the

study, univariate, bivariate, and multivariate analysis methods were used for data analysis. In univariate analysis, frequency tables, mean, standard deviation (SD), and diagrams were used to analyze the background characteristics of older people and other variables. The chi-square test was used in bivariate analysis to determine the statistically significant association between two variables. The variance inflation factor (VIF) was used to examine the multicollinearity between independent variables. The VIF is a measure of the degree of multicollinearity between independent variables. A VIF of less than 5 indicates that the independent variables are low correlated (Kim, 2019). Similarly, multiple logistic regression and multivariate analysis were used to identify the patterns and associations between multiple factors by analyzing more than two variables. Principal component analysis (PCA) was used to generate a wealth index. All analyses were performed with STATA version 15.1 software.

3.15 Statistical Methods for Data Analysis

Descriptive Statistics

In univariate data analysis, descriptive statistics such as frequency distribution and percentage were used to present sociodemographic characteristics, economic characteristics, health status, and health behavior of older people.

Chi-square Test

Crosstabulations have been performed to study the relationship between independent variables and the outcome of interest. The chi-squared test was used to determine whether the independent variables have a statistically significant association with the outcome variables. It can be determined by the following formula:

$$\text{Chi-square } (\chi^2) = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where, O_{ij} = observed frequency of the cell in the i^{th} row and j^{th} column, E_{ij} = expected frequency of the cell in the i^{th} row and j^{th} column.

A statistical relationship between explanatory and outcome variables is considered significant if the p-value is found to be less than 0.05.

Crosstabulations have been used to assess the prevalence of multimorbidity among older people with different background characteristics. A Chi-square test (χ^2) was performed to examine the significant association between background characteristics of older people and multimorbidity. Furthermore, crosstabulations have been performed to examine the association between predisposing factors, enabling factors, need factors, health behavior, and health service utilization, using the Chi-square test to determine a significant association between independent and dependent variables.

Analysis of Variance (ANOVA) and T-test

A one-way ANOVA was used to determine whether there were any significant differences between means of three or more mutually exclusive groups of independent variables using F-statistics. This F-ratio showed the difference between within-groups and the between-group variance. The F-value indicated that there were significant differences between the groups of the independent variables when the p-value was less than 0.05.

The independent sample t-test was used to determine whether there is a significant difference between the mean of continuous normally distributed variables with two independent groups. Therefore, a t-test was used to examine the differences between the mean of the two groups or compare two means.

A one-way analysis of variance (ANOVA) and independent sample t-test have been used to determine the significant difference in mean quality of life score between the independent variables.

Cronbach's Alpha

Cronbach's alpha is a useful test that is employed to estimate the reliability, or internal consistency, of a composite score. A Cronbach's alpha coefficient ranging from

0.70 to 0.79 is considered acceptable internal consistency, indicating all items are consistent with each other (Ahmad et al., 2024). The internal consistency reliability of the WHOQOL-8 was measured by Cronbach's alpha coefficient. The Cronbach's alpha coefficient was 0.78, which indicated that WHOQOL-8 had good internal consistency.

Multinomial Logistic Regression

Multinomial logistic regression is the extension of binomial logistic regression in which the dependent variable has more than two categories. In multinomial logistic regression, one of the categories of the dependent variable is designed as the reference category, and all other categories of the dependent variable are compared with the reference category. The multinomial logistic regression model assumes that the dependent variables must be nominal or categorical and three or more categories. It is not necessary for data to have a normal distribution, no linear relationship, and no equality of variance. The results of multinomial logistic regression are interpreted as relative risk ratio (RRR). The multinomial logistic regression model can be expressed as follows:

$$\log\left(\frac{P(Y=i)}{P(Y=0)}\right) = \beta_{i0} + \beta_{i1} X_1 + \ldots + \beta_{ij} X_j$$

where, i = 0, 1, 2 are constants, $X_1, \ldots, X_j$ are explanatory variables, and Y is outcome variable with 0,1 and 2 levels. The results of multinomial logistic regression are presented in terms of relative risk ratio (RRR). This can be expressed as,

$$RRR = \frac{\frac{P(Y=1 \mid X+1)}{P(Y=0 \mid X+1)}}{\frac{P(Y=1 \mid X)}{P(Y=0 \mid X)}}$$

In order to identify the factors associated with single or multimorbidity, multivariate multinomial logistic regression models have been performed. The presence of morbidity was classified into three categories—no morbidity, single morbidity, and multimorbidity. The reference category was no morbidity. For each category of outcome variables, separate

relative risk ratios (RRR) were computed for all independent variables. RRRs were used in multinomial logistic regression. It could be interpreted as the effect of a one-unit change in the predictor variables on the probability of being in the outcome variable category under consideration compared to the reference category. An RRR of less than one indicated that the likelihood of the outcome variable was lower than the reference category, whereas an RRR of greater than one indicates that the likelihood of the outcome variable was more likely than the reference category. Therefore, the results have been presented in RRR. Variables with a *p*-value of <0.25 in the bivariate analysis (i.e., in crosstabulations) are retained in the multinomial logistic regression models (Hosmer & Lemeshow, 2000). Multicollinearity has been checked before conducting multivariate multinomial regression models. The level of disability and the disability index are found to be highly correlated. Thus, the level of disability is removed from the multinomial regression analysis.

Multivariate Logistic Regression

Logistic regression is a statistical model used to understand the relationship between a dependent variable and one or more independent variables when the dependent variable or response is binary. In order to examine the effects of one or more independent variables to categorical dependent variables, multivariate logistic regression analysis is employed. The multivariate logistic regression has been expressed as,

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n$$

where p is the probability of the outcome variable, β_0 is the odds of the intercept, $\beta_1 \ldots \beta_n$ are the coefficients associated with the reference group, and $X_1 \ldots X_n$ are independent variables.

Multivariate logistic regression is an appropriate statistical model for examining the effects of multiple independent variables or factors on binary response outcomes. A logistic regression model is less restrictive than a linear regression model because it does not require

a linear relationship between the dependent and independent variables; independent variables do not have to be interval, normally distributed, or linear. Logistic regression assumes that the resulting logit transformation is linear, the dependent variable is binary, and the resulting logarithmic curve contains no outliers.

A logistic regression model was performed to examine the factors associated with health service utilization among older people. Variables whose *p*-value in the bivariate analysis (i.e., in crosstabulations) was less than 0.25 were included in the logistic regression analysis (Hosmer & Lemeshow, 2000). The study also estimated the marginal effects of the different factors. Before performing the logistic regression analysis, multicollinearity was checked, and no multicollinearity was found between the variables. Therefore, eighteen independent variables have been included in the logistic regression model. Five logistic regression models were conducted. First, a partially adjusted model was performed in which only predisposing factors were included. Second, a partially adjusted model was run in which only enabling factors were taken into account. Third, an adjusted logistic regression analysis was conducted that only considered need factors. Fourth, only health behavior factors were regressed with health service utilization. Finally, four factors—predisposing, enabling, need, and health behavior factors—were entered into the final adjusted logistic regression model.

Hierarchical Regression

Hierarchical regression analysis is used to examine the relationship between a dependent variable and multiple independent variables where the dependent variable is continuous. Hierarchical regression analysis is a type of multiple regression analysis in which the independent variables are entered into the model in a specific order, with each step adding new variables to the model. The hierarchical regression analysis is expressed in simple form as,

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n + \varepsilon$$

where y is the dependent variable, β_0 is the intercept, $\beta_1 \ldots \beta_n$ are the regression coefficients for the independent variables, $X_1 \ldots X_n$ are independent variables, and ε is the error term.

Hierarchical regression is a statistical method that allows us to perform several different linear regression models. First, we fit the linear regression model with some selected independent or explanatory variables. We then conduct another regression model with additional explanatory variables. At each step of the regression model, the next explanatory variable is introduced to the model based on a predetermined plan for the order of entering the explanatory variable. The increase in R^2 statistics (proportion of variance in the dependent variable that can be explained by the explanatory variables) in each regression model is important in hierarchical regression. If R^2 statistics in the second model are significantly higher than those R^2 in the first model, the second model is better.

When performing hierarchical regression analysis, a linear relationship between the dependent variable and independent variable, normality of the dependent variable, and no multicollinearity among independent variables is required.

In this study, the researcher selected quality of life as the dependent variable, which is a continuous variable, and analyzed it in relation to five sets of independent variables. Therefore, hierarchical regression analysis was chosen as an appropriate statistical method to identify the factors that are significantly associated with the quality of life of older people. The variables whose *p*-values were less than 0.25 in ANOVA were included in the hierarchical regression models. Before conducting the regression analysis, a test of assumptions was performed. Outliers in linear regression were detected by boxplot, and outlier observations have been winsorized.

Winsorizing data is the process of replacing the extreme observations or value of data with minimum and maximum percentiles to remove the effect of extreme value in the

analysis (Ludwig-Mayerhofer, 2020). The normality test of the visualized histogram of the winsorized dependent variable shows that the data were distributed under the normal curve of approximately bell-shaped, thereby indicating a normal distribution of the dependent variable (Appendix 4). The variance inflation factor (VIF) was also used to assess multicollinearity among independent variables. The result indicated that there were multicollinearity issues between the level of disability and the disability index. Tests of equal variance between dependent and independent variables were also conducted, and most of the variables were found insignificant. All the assumptions of the parametric test have been satisfied. The level of disability was not included in the regression models due to high colllinearity. Six hierarchical regression models were conducted. The multivariable hierarchical regression models have been performed as follows:

Model 1. Consists of multimorbidity and health service utilization;

Model 2. Consists of significant variables in Model 1 and sociodemographic characteristics;

Model 3. Consists of significant variables from Model 2 and economic characteristics

Model 4. Consists of significant variables from Model 3 and health state and functional health;

Model 5. Consists of significant variables from Model 4 and health behavior;

Model 6. It consists of significant variables from Model 5 only.

3.16 Construction of Indices

Wealth Index

The wealth index is a composite measure of the cumulative living standard of a household (ICF, 2023). The information related to household ownership of selected key assets such as radio, television, computer, internet, telephone/mobile, refrigerator, bicycle, and livestock; household characteristics such as type of drinking water source, type of toilet

facilities, fuel for cooking, type of stove, source of light, materials of the floor, materials of the roof, the material of wall and foundation of the house were used to construct the wealth index. The wealth index is used as a proxy indicator of household wealth.

Calculation of the wealth index is performed through Principal Component Analysis (PCA). PCA is a statistical technique that reduces the number of variables in a data set to a smaller number of dimensions (Vyas & Kumaranayake, 2006). PCA generates a new set of variables called 'principal component' based on the variables and their relationship to one another. It is assumed that the first principal component represents the household's wealth. Therefore, the first principal component is used to calculate a relative household score. Compared to other components, the first component explains the largest amount of variance between a household's assets and characteristics.

Moreover, Kaiser-Meyer-Olkin (KMO) was performed to measure the sampling adequacy. The KMO value was 0.84, indicating that sampling is adequate to perform PCA. Household assets consisted entirely of yes/no questions and were converted into binary, i.e., 0 for no and 1 for yes. The variables with more than two categories were recorded as 0 and 1. For example, in the case of drinking water sources, tap/piped water was recorded as 1, while the remaining categories were recorded as 0. After converting household assets and characteristics into binary, principal component analysis was applied to compute the household wealth index. The calculated wealth index has been divided into five equal parts and categorized as poorest, poor, middle, rich, and richest based on the aggregate wealth score for each household. Further descriptions are presented in Appendix 2.

Katz Index of Independence in Activities of Daily Living (Katz ADL)

Katz index of independence in activities of daily living is commonly referred to as the Katz ADL. It is the most appropriate instrument for assessing the health status of older

people and their ability to perform activities of daily living independently. The index is based on the performance of older people in the six functions of bathing, dressing, toileting, transferring, continence, and feeding (Katz et al., 1970). The performance of activities was coded into two categories. A person received a score of 1 if he/she was able to perform the activity independently and a score of 0 if one needed partial or full need assistance. The total scores for activities of daily living ranged from 0 to 6. A score of 6 indicated complete independence, 3–5 indicated moderate independence, and a score of 2 or less indicated complete dependence (Wallace & Shelkey, 2008). Internal consistency reliability or Cronbach alpha for ADL in this study was 0.76.

The Lawton Instrumental Activity of Daily Living Scale (IADL)

The Lawton instrumental activity of daily living (Lawton IADL) scale, also called the Lawton scale, was developed by Lawton and Brody to measure an individual's ability to independently perform complex tasks necessary for daily living in the community. The Latwon scale includes eight domains representing different instrumental activities of daily living: shopping, food preparation, housekeeping, laundry, independent use of transportation, own medications, and financial management. Each domain has a score of 0 and 1. A score of 1 was given if a person could perform the activity independently; otherwise, they received a score of 0. The final total score ranged from 0 to 8. The highest score of 8 means that all activities could be carried out independently, and a score of 0 means that activities could be carried out partially or not at all. Cronbach alpha for IADL in this study is 0.84.

Washington Group Short Set on Functioning (WG-SS)

Disability is primarily an old age phenomenon. The accumulation of age-related disadvantages can lead to disability later in life. The Washington Group Short Set on

Functioning has been included in this study to identify persons with functional disabilities among older people. The short set on functioning included questions about six core functional domains: seeing, hearing, walking, cognition, self-care, and communication (Washington Group on Disability Statistics, 2023).

World Health Organization Quality of Life -8 (WHOQOL-8)

The World Health Organization Quality of Life (WHOQOL) was developed in 1991 as a universal assessment tool for quality of life WHOQOL-100 using a unique cross-cultural approach. The conceptual structure of WHOQOL-100 has six domains—physical, psychological, level of independence, social relationships, environment, and spirituality/religion/personal beliefs—that provide an overall assessment of the quality of life. Later, the World Health Organization developed WHOQOL-BREF in 1995, a shorter version of WHOQOL-100. The WHOOQL-BREF includes 26 questions on the individual's perceptions of their own health and well-being. The WHOQOL-BREF framework encompasses four essential domains of quality of life: physical health, psychological state, social relationship, and environment, which contribute to overall quality of life.

WHOQOL Group developed a WHOQOL-8 item assessment of quality of life based on WHOQOL-BREF items in order to need a more practical and easily administered quality of life measure (da Rocha et al., 2012; Pires et al., 2018). The items for WHOQOL-8 were extracted from the WHOQOL-BREF. This is another shorter version of WHOQOL that has been used for validation in European Health Interview Surveys (EUROHIS) conducted in different European countries and is known as the EUROHIS-QOL 8-item index (Schmidt et al., 2006). The EUROHIS-QOL 8-item index has been found to be valid and cross-culturally appropriate in low-income countries (Pires et al., 2018; Risal et al., 2020). The WHOQOL-8 item is a cross-culturally valid instrument for the comprehensive assessment

of the overall quality of life (Kowal et al., 2010), which comprises the four domains of quality of life— overall quality of life, physical health, psychological state, and environment. Each domain contains two items extracted from 26-items of WHOQOL-BREF. WHOQOL-8 item index was used to assess the quality of life score.

The data analysis and presentations in the forthcoming chapters are based on the research methodology described in this chapter.

CHAPTER IV

CHARACTERISTICS AND HEALTH STATUS OF OLDER PEOPLE

This chapter attempts to identify in detail the sociodemographic and economic identifications, health status, and health-related behavior of older people of Kamalamai Municipality, Sindhuli district. This chapter is composed in such a way that it provides descriptive results for sociodemographic and economic characteristics, as well as health status, functional health, and health-related behavior of older people, which are presented in six sections. Sections 4.1 and 4.2 present sociodemographic and economic profiles of older people. Section 4.3 discusses the health status profile, while Section 4.4 describes the functional health of older people. Section 4.5 deals with the health-related behavior of older people. The discussion of the results is presented in the final section of this chapter. Furthermore, this chapter is useful in understanding the sociodemographic characteristics, economic characteristics, health status, and health-related behavior of older people in the study area.

4.1 Sociodemographic Characteristics of Older People

An overview of the demographic characteristics of older people is important. It helps to understand the nature and distinct attributes of older people. Demographic characteristics include age, sex, marital status, type of family, living arrangement, caste/ethnicity, religion, and education. They offer insight into the composition and diversity of older people.

The percentage distribution of older people by sociodemographic characteristics is presented in Table 4.1. The mean age of older people was 71.7 years. Forty-three percent of older people belonged to the age group 60-69 years, followed by 38.8 percent in the age group 70-79 years and 17.9 percent in the age group 80 years and above. The proportion of

males (54.3%) was higher than that of females (45.7%). The sex ratio was 119 males per 100 females. More than half of older people (56.5%) were married, and about two-fifths (41.9%) were widows or widowers. More than two-thirds of older people (67.1%) lived in a joint family, and only 32.9 percent lived in a nuclear family.

Table 4.1: *Percentage Distribution of Older People by Sociodemographic Characteristics*

Demographic characteristics	Percent	Number
Age group		
60-69	43.4	301
70-79	38.8	269
80+	17.9	124
Sex		
Male	54.3	377
Female	45.7	317
Current marital status		
Married	56.5	392
Widowhood	41.9	291
Separated/Divorced	1.6	11
Type of family		
Nuclear family	32.9	228
Joint family	67.1	466
Living arrangement		
Living alone	9.5	66
Living spouse only	18.9	131
Living with son/daughter and grandchildren	8.1	56
Living with son/daughter-in-law	61.7	428
Living with daughter/son-in-law	1.9	13
Caste/Ethnicity		
Hill caste	44.1	306
Hill Janajati	32.7	227
Hill Dalits	23.2	161
Religion		
Hindu	86.7	602
Buddha/Christian	13.3	92
Education status		
No education	70.5	489
Literate but no education	10.2	71
Basic education	13.0	90
Secondary and above	6.3	44
Total	100.0	694

The results showed that 61.7 percent of older people lived with a son/daughter-in-law, 18.9 percent with a spouse, 9.5 percent alone, 8.1 percent with a son/daughter and grandchildren, and 1.9 percent with a daughter/son-in-law.

Regarding caste/ethnicity, 44.1 percent of older people belonged to the hill caste, followed by 32.7 percent of the Hill Janajati and 23.2 percent of the hill Dalits. Hindu was the predominant religion; the overwhelming majority of older people belonged to Hindu (86.7%), and 13.3 percent belonged to Buddhism/Christianity. Regarding education status, 70.5 percent of older people had no education, followed by 13 percent who had attained basic education, 10.2 percent were literate but had no formal education, and only 6.3 percent had attained secondary or higher education.

4.2 Economic Characteristics of Older People

The percentage distribution of older people by economic characteristics is presented in Table 4.2. More than half of the older people were not currently working, while 43 percent of older people were currently working. About 40 percent of older people reported old age allowance as their economic source of living, followed by their son/daughter income (34.1%), and their own income (29.0%). Regarding economic dependence, almost 60 percent of older people were partially dependent on others, 28.5 percent were independent, and only 12 percent stated they were entirely dependent on others to meet their basic needs.

More than two-thirds of older people received allowances such as senior citizens, the disabled, endangered ethnic groups, or Dalit allowances. Health insurance plays an important role in improving the health status of older people and reducing disparities in receiving health services. This study found that more than half (53.2%) of older people were covered by health insurance.

The majority (88.9%) of older people had a mobile phone. Concerning household wealth status, all older people were evenly distributed across the wealth quintiles. Nevertheless, a relatively high proportion of older people belonged to the poorest (20.2%) and middle (20.2%) wealth quintiles.

Table 4.2: *Percentage Distribution of Older People by Economic Characteristics*

Economic characteristics	Percent	Number
Working status		
Currently working	42.7	296
Not working	57.3	398
Economic source of living		
Own income	29.0	201
Son/daughter income	34.1	237
Old age allowance	36.9	256
State of economic dependence		
Not dependent	28.5	198
Partial dependent	59.5	413
Full dependent	12.0	83
Receiving social security allowance		
Yes	68.7	477
No	31.3	217
Health insurance coverage		
Yes	53.2	369
No	46.8	325
Mobile phone		
No	11.1	77
Yes	88.9	617
Wealth quintile		
Poorest	20.2	140
Poorer	19.9	138
Middle	20.2	140
Richer	19.9	138
Richest	19.9	138
Total	100.0	694

4.3 Health Status of Older People

Health status refers to the description of the health of an individual at a specific point in time, including health conditions and associated medication use, functional disability, and subjective perception of health. Table 4.3 depicts the health status of older people, including perceived general health status, chronic conditions, medications,

treatments, and morbidity. In this study, respondents were asked, “How is your health in general?” with possible responses: very good, good, fair, poor, or very poor. These possible responses were categorized as good (very good and good), fair, and poor (very poor and poor). The study revealed that 51.9 percent of older people rated their general health status moderate. About one-third (32.7%) of older people reported good general health status, while 15.4 percent reported poor health status.

Injuries caused by falls or accidents were a significant cause of death among older people. The risk of injuries is high in older age. Injuries among older people were an important problem. This study found that 15.3 percent of older people were injured in the past 12 months due to falls or accidents. About a tenth of the injured older people became physically disabled due to injuries.

Table 4.3: *Percentage Distribution of Older People by Health Status*

Health status	Percent	Number
General health status		
Good	32.7	227
Fair	51.9	360
Poor	15.4	107
Multimorbidity		
No morbidity	16.4	114
Single morbidity	34.0	236
Multimorbidity	49.6	344
Injuries in the past 12 months		
Yes	15.3	106
No	84.7	588
Physical disability due to injuries (N=106)		
Yes	8.5	9
No	91.5	97
Total	100.0	694

Table 4.4 presents the percentage distribution of older people by age group, sex, and caste/ethnicity according to general health status, morbidity, and injuries. Among the older people, a higher percentage of young old (60-69 years) had a good self-rated health status

than middle old (70-79 years) and oldest old (80+ years). On the other hand, a higher percentage of the oldest old had poor health status compared to the middle and young old. In addition, poor health status was found to be increasing in older people with age. Results further showed that older females had a poorer health status than males, with a higher percentage of males and females rating their health status fairly.

By caste/ethnicity, a higher proportion of older people from the Hill Caste, Hill Janajati, and Hill Dalits reported their perceived health status as fair. The prevalence of multimorbidity increased with age, from 42.9 percent among those aged 60-69 years to 62.1 percent in 80 years and above. The prevalence of single morbidity decreased with age. Female older people had a higher prevalence of multimorbidity (55.5%) than male older people. Considering caste/ethnicity, a higher proportion of older people from Hill Caste were found to suffer from multimorbidity.

The prevalence of injuries was higher among older people aged 60-69 years (18.3%), females (16.7%), and Hill Janajati (16.7%). The results also showed that a higher proportion of older people aged 70-79 years (13.5%), males (9.4%), and Hill Dalits (16.7%) were physically disabled due to injuries in the past 12 months.

Older people are at higher risk of chronic conditions due to the decline in physical and mental health, the appearance of degenerative changes, and the deterioration of body functions. This study assessed the prevalence of chronic conditions based on self-reported diagnosis. In order to determine the chronic conditions, respondents were asked, “Have you ever been told by a doctor/health professional that you have …?”. About half (49.6%) of the older people suffered from multimorbidity (two or more chronic diseases), 34 percent suffered from at least one chronic disease, and 16.4 percent had no chronic disease.

Table 4.4: *Percentage Distribution of Older People by Age Group, Sex, and Caste/Ethnicity According to General Health Status, Morbidity, and Injuries*

Health status	Age group						Sex				Caste/ethnicity					
	60-69		70-79		80+		Male		Female		Hill caste		Hill Janajati		Hill Dalits	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
General health status																
Good	42.9	[37.6, 48.3]	27.1	[22.4, 32.5]	20.2	[14.2, 27.8]	36.3	[31.8, 41.1]	28.4	[23.9, 33.4]	35.3	[30.4, 40.6]	31.3	[25.8, 37.3]	29.8	[23.5, 37.0]
Fair	53.2	[47.8, 58.5]	58.4	[52.6, 63.9]	34.7	[27.2, 43.1]	50.9	[46.1, 55.7]	53.0	[47.7, 58.2]	48.4	[43.1, 53.7]	55.5	[49.3, 61.6]	53.4	[46.0, 60.7]
Poor	4.0	[2.3, 6.7]	14.5	[10.9, 19.0]	45.2	[37.0, 53.6]	12.7	[9.8, 16.3]	18.6	[14.9, 23.1]	16.3	[12.8, 20.7]	13.2	[9.5, 18.0]	16.8	[11.9, 23.0]
Multimorbidity																
No morbidity	20.3	[16.3, 25.0]	14.5	[10.9, 19.0]	11.3	[7.0, 17.8]	20.7	[17.1, 24.9]	11.4	[8.4, 15.1]	13.1	[9.9, 17.1]	19.8	[15.3, 25.2]	18.0	[13.0, 24.4]
Single morbidity	36.9	[31.8, 42.2]	34.2	[29.0, 39.8]	26.6	[19.9, 34.7]	34.7	[30.3, 39.5]	33.1	[28.4, 38.2]	27.1	[22.6, 32.1]	38.8	[32.9, 45.0]	40.4	[33.4, 47.8]
Multimorbidity	42.9	[37.6, 48.3]	51.3	[45.6, 57.0]	62.1	[53.7, 69.9]	44.6	[39.8, 49.4]	55.5	[50.2, 60.7]	59.8	[54.5, 64.9]	41.4	[35.4, 47.6]	41.6	[34.6, 49.0]
Injuries in the past 12 months																
Yes	18.3	[14.5, 22.8]	13.8	[10.3, 18.2]	11.3	[7.0, 17.8]	14.1	[11.0, 17.8]	16.7	[13.2, 21.0]	14.4	[11.0, 18.6]	16.7	[12.6, 21.9]	14.9	[10.4, 21.0]
No	81.7	[77.2, 85.5]	86.2	[81.8, 89.7]	88.7	[82.2, 93.0]	85.9	[82.2, 89.0]	83.3	[79.0, 86.8]	85.6	[81.4, 89.0]	83.3	[78.1, 87.4]	85.1	[79.0, 89.6]
Physical disability due to injury																
Yes	7.3	[2.8, 17.4]	13.5	[5.9, 28.0]	0.0		9.4	[4.1, 20.3]	7.5	[3.0, 18.0]	2.3	[0.3, 13.7]	10.5	[4.1, 24.3]	16.7	[6.6, 36.1]
No	92.7	[82.6, 97.2]	86.5	[72.0, 94.1]	100.0		90.6	[79.7, 95.9]	92.5	[82.0, 97.0]	97.7	[86.3, 99.7]	89.5	[75.7, 95.9]	83.3	[63.9, 93.4]

The distribution of older people by chronic conditions and by taking medications and treatments is presented in Table 4.5. It showed that the most common chronic conditions in older people included high blood pressure (39.9%), gastritis and gastrointestinal diseases (37.3%), arthritis (16.4%), diabetes (15.4%), osteoporosis (13.3%), asthma (11.5), cataracts/glaucoma (11.4%), heart disease (7.8%), high cholesterol (5.3%) and kidney disease (4.5%). Among those with chronic conditions, 77.4 percent of older people were taking medication and treatments.

Table 4.5: *Percentage Distribution of Older People by Chronic Condition and Taking Medicine and Treatment*

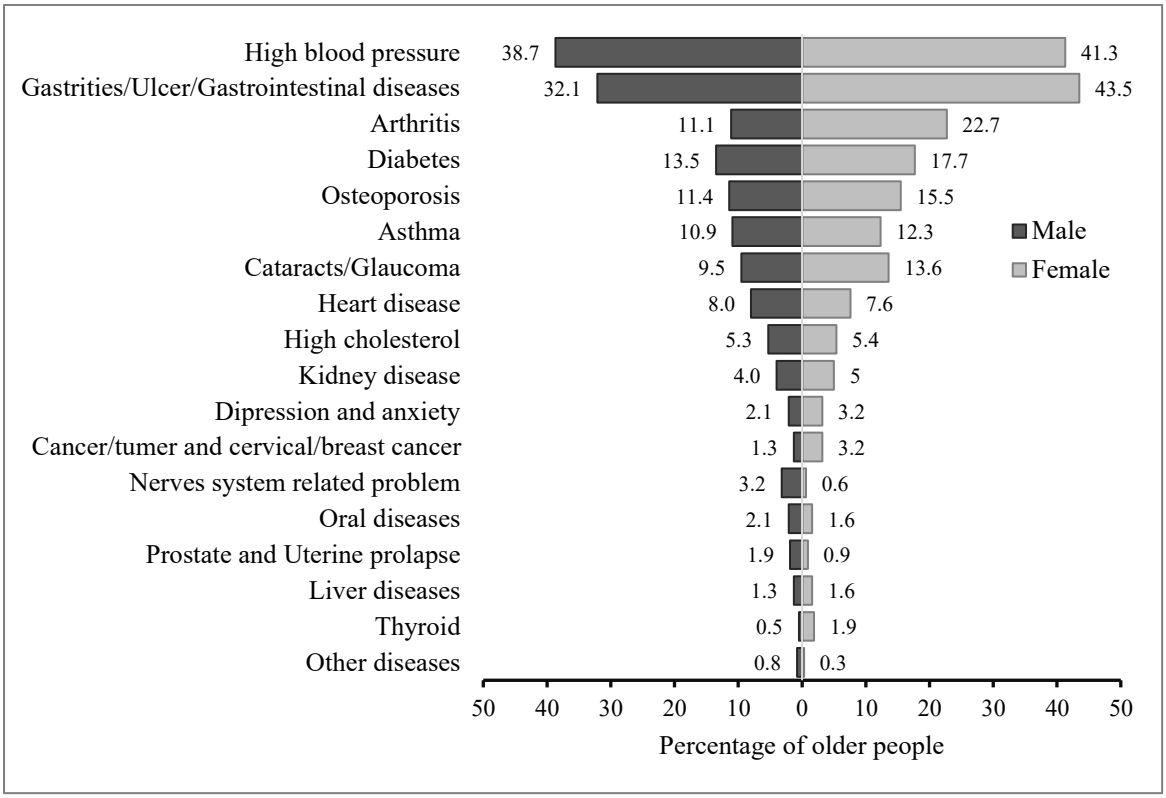
Chronic condition	Percent	Number
Chronic diseases*		
High blood pressure	39.9	277
Gastritis/Ulcer/Gastrointestinal diseases	37.3	259
Arthritis	16.4	114
Diabetes	15.4	107
Osteoporosis	13.3	92
Asthma	11.5	80
Cataracts/Glaucoma	11.4	79
Heart disease	7.8	54
High cholesterol	5.3	37
Kidney disease	4.5	31
Depression and anxiety	2.6	18
Cancer/tumor and cervical/breast cancer	2.2	15
Nervous system-related problem	2.0	14
Oral diseases	1.9	13
Liver diseases	1.4	10
Prostate and Uterine prolapse	1.4	10
Thyroid	1.2	8
Other diseases	0.6	4
Taking medicine and treatments (N=580)		
Yes	77.4	449
No	22.6	131

*Multiple response

Figure 4.1 depicts the differentials in chronic diseases among older people by sex. The findings showed that gastritis and gastrointestinal diseases (43.5%), high blood

pressure (41.3%), arthritis (22.7%), diabetes (17.5%), osteoporosis (15.5%), and cataracts/glaucoma (13.6%) were found to be the most common chronic diseases among females. Similarly, high blood pressure (38.7&), gastritis and gastrointestinal diseases (32.1%), diabetes (13.5%), osteoporosis (11.4%), arthritis (11.1%), and asthma (10.9%) were also the most prominent chronic diseases among males. However, the prevalence of these chronic diseases was higher in females than males. The prevalence of kidney diseases, depression and anxiety, cancer/tumor/cervical/breast cancer, and thyroid disease was higher among female older people than in male older people. In contrast, the prevalence of heart diseases, nervous system-related problems, and oral diseases was relatively higher among older males than in older females.

Figure 4.1: *Prevalence (%) of Chronic Diseases Among Older People by Sex*



4.4 Functional Health of Older People

The aging process is associated with a gradual decrease in physiological reserve, various cellular damage, structural and physiological changes in the brain, loss of muscle strength and power, and biological dysfunction (Clegg et al., 2013). Functional health and

age were closely related in the context of the aging population. As people get older, their functional ability decreases. As a result, older people gradually lose their ability to perform daily activities (Kendall & Wiltjer, 2019).

The health status of older people can be assessed by limitations in activities of daily living (ADL). The activity of daily living is defined as the individual's ability to perform daily self-care activities (Roper et al., 2000, as cited in Kendall & Wiltjer, 2019). The ability or inability to perform activities of daily living is used to measure the functional status of older people.

Table 4.6 shows the prevalence of ADL difficulty in older people. Forty-six percent of older people reported difficulty with controlling bladder and bowel functions. One-tenth of older people indicated difficulty with transferring, such as moving from one body position to another, moving from a bed to a chair, standing up from bed or chair without assistance, and walking independently. The least common ADL difficulty was eating (3.3%). The results showed that fifty percent of older people reported having at least one ADL difficulty, while 12 percent of older people reported having at least two or more ADL difficulties.

Among the eight instrumental activities of daily living (IADL) tasks examined, shopping (51.0%) and use of telephone/mobile (40.2%) were the most common IADL difficulties. This is followed by preparation of food (35.3%), use of transportation (30.3%), taking medications as prescribed (26.9%), ability to manage finances (22.2%), and laundry (17.1%). Housekeeping, such as dusting, cleaning, dishwashing, or other light housework, was found to be a less stressful IDAL task (10.5%). Among the older people, about 69 percent reported having at least one ADL difficulty, while about 52 percent reported having at least two or more IADL difficulties.

Physical activity refers to the activity at work, in the home, and the garden for domestic duties, as well as an activity undertaken for traveling to and from places and for recreation, fitness, and support (WHO, 2020).

Table 4.6: *Percentage Distribution of Older People by ADL and IADL Difficulties*

Activities of Daily Living	Percent	Number
Experience ADL difficulty		
Bathing	8.4	58
Dressing	8.1	56
Toileting	5.6	39
Transferring	10.5	73
Continence	46.0	319
Feeding	3.3	23
At least one ADL difficulty	50.3	349
Two or more ADL difficulty	12.4	86
Experience IADL difficulty		
Using the telephone/mobile	40.2	279
Shopping	51.0	354
Preparing food	35.3	245
Housekeeping	10.5	73
Laundry	17.1	119
Using transportation	30.3	210
Take medications as prescribed	26.9	187
Ability to handle finances	22.2	154
At least one IADL difficulty	69.2	480
Two or more IADL difficulties	51.9	360
Physical activities		
Yes	85.4	593
No	14.6	101
Total	100.0	694

Considering physical activities, this study includes questions about two types of activities: (1) vigorous-intensity activity, such as running, lifting heavy weights, digging, carrying water, or chopping wood, which results in a significant increase in breathing, and (2) moderate-intensity activity, such as brisk walking, carrying light loads, cleaning, cooking, washing cloth or dishes, collecting dung, which elevates heart rate, faster breathing, and cause the body to become warmer. It is observed that 85.4 percent of older people engaged in vigorous or moderate physical activity, whereas 14.6 percent did not engage in any physical activity at all.

Table 4.7: *Percentage Distribution of Older People by Age Group, Sex, and Caste/Ethnicity According to ADL and IADL Difficulties*

Activities of daily living	Age group						Sex				Caste/ethnicity					
	60-69		70-79		80+		Male		Female		Hill Caste		Hill Janajati		Hill Dalits	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
ADL difficulty																
Bathing	3.0	[1.6, 5.5]	7.1	[4.6, 10.6]	24.2	[17.7, 32.1]	8.8	[6.4, 11.9]	7.9	[5.5, 11.2]	8.5	[5.9, 12.0]	10.6	[7.3, 15.0]	5.0	[2.6, 9.4]
Dressing	3.7	[2.1, 6.3]	6.7	[4.3, 10.2]	21.8	[15.6, 29.5]	7.7	[5.5, 10.7]	8.5	[6.0, 12.0]	8.5	[5.9, 12.0]	9.7	[6.6, 14.0]	5.0	[2.6, 9.4]
Toileting	2.3	[1.1, 4.6]	4.8	[2.9, 8.0]	15.3	[10.2, 22.4]	4.2	[2.7, 6.7]	7.3	[5.0, 10.5]	5.6	[3.6, 8.6]	7.5	[4.8, 11.5]	3.1	[1.3, 7.0]
Transferring	3.0	[1.6, 5.5]	11.2	[8.0, 15.3]	27.4	[20.6, 35.5]	8.5	[6.2, 11.6]	12.9	[9.8, 16.9]	11.4	[8.4, 15.3]	11.0	[7.7, 15.5]	8.1	[4.9, 13.1]
Continence	30.2	[25.5, 35.4]	53.5	[47.8, 59.2]	67.7	[59.4, 75.1]	40.1	[35.4, 44.9]	53.0	[47.7, 58.2]	45.4	[40.2, 50.8]	45.8	[39.7, 52.0]	47.2	[39.9, 54.6]
Feeding	1.0	[0.3, 2.9]	4.1	[2.3, 7.1]	7.3	[3.9, 13.0]	3.2	[1.9, 5.4]	3.5	[2.0, 6.0]	3.3	[1.8, 5.8]	4.4	[2.5, 7.8]	1.9	[0.6, 5.4]
At least one ADL difficulty	33.6	[28.7, 38.8]	56.5	[50.8, 62.1]	77.4	[69.6, 83.7]	43.2	[38.5, 48.1]	58.7	[53.4, 63.7]	51.0	[45.6, 56.3]	49.3	[43.2, 55.5]	50.3	[43.0, 57.6]
Two or more ADL difficulties	3.7	[2.1, 6.3]	11.2	[8.0, 15.3]	36.3	[28.6, 44.7]	11.9	[9.1, 15.4]	12.9	[9.8, 16.9]	12.4	[9.3, 16.4]	14.1	[10.3, 19.0]	9.9	[6.3, 15.3]
IADL difficulty																
Using the telephone/mobile	26.9	[22.4, 32.0]	44.2	[38.7, 50.0]	63.7	[55.3, 71.4]	31.3	[27.0, 35.9]	50.8	[45.5, 56.0]	31.0	[26.3, 36.2]	47.1	[41.0, 53.4]	47.8	[40.6, 55.2]
Shopping	31.6	[26.8, 36.8]	56.5	[50.8, 62.1]	86.3	[79.4, 91.1]	38.5	[33.9, 43.2]	65.9	[60.8, 70.7]	49.3	[44.0, 54.7]	53.3	[47.1, 59.4]	50.9	[43.6, 58.2]
Preparing food	17.9	[14.2, 22.5]	38.7	[33.3, 44.3]	70.2	[61.9, 77.3]	35.8	[31.3, 40.6]	34.7	[29.9, 39.9]	30.7	[26.0, 35.9]	41.4	[35.4, 47.6]	35.4	[28.7, 42.7]
Housekeeping	2.3	[1.1, 4.6]	9.3	[6.5, 13.2]	33.1	[25.7, 41.4]	9.8	[7.3, 13.1]	11.4	[8.4, 15.1]	10.8	[7.9, 14.6]	11.5	[8.0, 16.0]	8.7	[5.3, 13.9]
Laundry	7.3	[4.9, 10.7]	19.0	[14.9, 23.8]	37.1	[29.4, 45.5]	18.3	[14.9, 22.3]	15.8	[12.3, 20.0]	17.6	[13.9, 22.1]	19.4	[14.9, 24.8]	13.0	[8.8, 18.9]
Using transportation	15.0	[11.5, 19.2]	31.6	[26.5, 37.1]	64.5	[56.1, 72.1]	20.2	[16.6, 24.3]	42.3	[37.2, 47.5]	29.1	[24.5, 34.2]	33.0	[27.5, 39.1]	28.6	[22.4, 35.7]
Taking medication	12.6	[9.5, 16.7]	28.6	[23.8, 34.1]	58.1	[49.6, 66.1]	19.9	[16.3, 24.0]	35.3	[30.5, 40.5]	24.5	[20.2, 29.4]	27.8	[22.5, 33.6]	30.4	[24.1, 37.6]
Ability to handle finances	16.3	[12.7, 20.7]	19.0	[14.9, 23.8]	43.5	[35.5, 52.0]	13.8	[10.8, 17.5]	32.2	[27.5, 37.3]	23.2	[19.0, 28.0]	21.1	[16.5, 26.7]	21.7	[16.3, 28.4]
At least one IDAL difficulty	54.2	[48.7, 59.5]	74.7	[69.4, 79.4]	93.5	[88.0, 96.6]	57.6	[52.7, 62.2]	83.0	[78.6, 86.6]	65.4	[60.1, 70.3]	73.1	[67.3, 78.3]	70.8	[63.7, 77.0]
Two or more IADL difficulties	33.6	[28.7, 38.8]	56.9	[51.2, 62.4]	85.5	[78.5, 90.5]	40.8	[36.2, 45.7]	65.0	[59.8, 69.8]	48.0	[42.7, 53.4]	55.5	[49.3, 61.6]	54.0	[46.6, 61.3]
Physical activities																
Yes	94.4	[91.3, 96.4]	87.4	[83.1, 90.7]	59.7	[51.2, 67.6]	88.3	[84.9, 91.1]	82.0	[77.6, 85.7]	85.3	[81.1, 88.7]	84.1	[79.1, 88.2]	87.6	[81.8, 91.7]
No	5.6	[3.6, 8.7]	12.6	[9.3, 16.9]	40.3	[32.4, 48.8]	11.7	[8.9, 15.1]	18.0	[14.3, 22.4]	14.7	[11.3, 18.9]	15.9	[11.8, 20.9]	12.4	[8.3, 18.2]

Table 4.7 shows that continence was the most common ADL difficulty for all age groups while feeding was the least common ADL difficulty. Older people aged 80 and above experienced higher ADL difficulty than older people aged 70-79 and 60-69 years.

The percentage of older people with at least one ADL difficulty was found to increase with advancing age. Likewise, the percentage of older people with two or more ADL difficulties also increased with increasing age. The most common ADL difficulty in both sexes was continence, and the least common was feeding. The percentage of older people with at least one ADL difficulty was higher among females than males. However, no significant differences existed between males and females in two or more ADL difficulties. Regarding caste/ethnicity, the most common ADL difficulty was continence for all caste/ethnic groups, and feeding was the least common ADL difficulty. A higher percentage of Hill Caste older people experienced more difficulty performing at least one ADL, whereas more Hill Janajati older people experienced two or more ADL difficulties.

The most common IADL difficulties for older people of all age groups were using the telephone/mobile, shopping, and preparing food, while housekeeping and laundry were the least common. For males, shopping (38.5%), preparing food (35.8%), and using the telephone/mobile (31.3%) were the most common IADL and the least was housekeeping (9.8%). Likewise, the most common IADL difficulties for females were shopping (65.9%), using the telephone/mobile (50.8%), and using transportation (42.3%), with housekeeping being the least difficult (11.4%). It has also been observed that females experience more IADL difficulties than males. For all caste/ethnic groups, using the telephone/mobile, shopping, and preparing meals were the most common IADL difficulties, while housekeeping represented the least difficulty. It has been observed that at least one IADL difficulty, as well as two or more, increases with age. In addition, females had higher IADL

difficulty than males. A higher proportion of Hill Janajati older people had at least one IADL difficulty and two or more IADL difficulties than other caste/ethnic groups.

Table 4.8: *Percentage Distribution of Older People by Functional Disability and Domains*

Disability domain	Percent	Number
Seeing		
No difficulty	55.8	387
Some difficulty	40.1	278
A lot of difficulty	3.9	27
Cannot do it at all	0.3	2
Hearing		
No difficulty	71.9	499
Some difficulty	23.2	161
A lot of difficulty	3.9	27
Cannot do it at all	1.0	7
Walking or climbing steps		
No difficulty	61.1	424
Some difficulty	31.4	218
A lot of difficulty	6.6	46
Cannot do it at all	0.9	6
Remembering or concentrating		
No difficulty	64.3	446
Some difficulty	30.8	214
A lot of difficulty	4.0	28
Cannot do it at all	0.9	6
Washing all over or dressing (self-care)		
No difficulty	82.0	569
Some difficulty	14.8	103
A lot of difficulty	2.6	18
Cannot do it at all	0.6	4
Communicating		
No difficulty	91.2	633
Some difficulty	7.6	53
A lot of difficulty	0.9	6
Cannot do it at all	0.3	2
Level of disability		
No difficulty	30.1	209
Some difficulty	53.9	374
A lot of difficulty	13.4	93
Cannot do it at all	2.6	18
Disability index		
With disability	16.0	111
Without disability	84.0	583
Total	100.0	694

Table 4.8 presents the percentage distribution of older people by functional disability and domains. It was observed that about 91 percent of older people reported having no difficulty in communicating, while 56 percent reported no difficulty in seeing. The most common difficulties—including some difficulty, a lot of difficulty, and cannot at all—were seeing (44.3%), followed by walking or climbing steps (38.9%), remembering or concentrating (35.7%), hearing (28.1%), and self-care (18%). The least common difficulty was communicating (8.8%).

Similarly, the most common severe disability or difficulty (a lot of difficulty and cannot at all) was walking or climbing steps (7.5%). This was followed by hearing (4.9%), remembering or concentrating (4.9%), seeing (4.2%), and self-care (3.2%). Conversely, the least frequent severe difficulty was communicating (1.2%).

Thirty percent of older people had no difficulty in the six domains. More than half (53.9%) had some difficulty, 13.4 percent had a lot of difficulties, and 2.6 percent could not do it at all. Taking disability index into account, 84 percent of older people had no difficulty, while 16 percent had disabilities.

The functional disability of older people by age group, sex, and caste/ethnicity is presented in Table 4.9. It showed that the most common functional disability among older people of all age groups was “some difficulty,” ranging from 47.2 percent in the age group 60-69 years to 62.1 percent aged 80 years and above. The percentage of older people with disability increased with increasing age. As shown in the table, “some difficulty” was the most prevalent form of functional disability for both sexes. The proportion of older people with disability was higher among females than among males. Similarly, “some difficulty” was one of the most common functional difficulties among older people across all caste/ethnic groups, with a higher percentage observed among Hill Caste older people.

Table 4.9: *Percentage Distribution of Older People by Functional Disability According to Age Group, Sex, and Caste/Ethnicity*

Functional disability	Age group						Sex				Caste/ethnicity					
	60-69		70-79		80+		Male		Female		Hill Caste		Hill Janajati		Hill Dalits	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Level of disability																
No difficulty	42.2	[37.0, 47.6]	26.8	[22.0, 32.1]	8.1	[4.5, 14.0]	34.7	[30.3, 39.5]	24.6	[20.4, 29.4]	27.8	[23.2, 32.8]	32.6	[27.1, 38.7]	31.1	[24.7, 38.3]
Some difficulty	47.2	[41.8, 52.6]	57.6	[51.9, 63.1]	62.1	[53.7, 69.9]	50.9	[46.1, 55.7]	57.4	[52.1, 62.5]	53.9	[48.6, 59.2]	50.7	[44.5, 56.8]	58.4	[51.0, 65.4]
A lot of difficulty	9.0	[6.3, 12.6]	13.0	[9.6, 17.4]	25.0	[18.4, 33.0]	11.4	[8.7, 14.9]	15.8	[12.3, 20.0]	15.7	[12.2, 20.0]	12.8	[9.2, 17.5]	9.9	[6.3, 15.3]
Cannot do it at all	1.7	[0.7, 3.8]	2.6	[1.3, 5.2]	4.8	[2.3, 10.0]	2.9	[1.7, 5.1]	2.2	[1.1, 4.4]	2.6	[1.4, 5.0]	4.0	[2.1, 7.2]	0.6	[0.1, 3.9]
Disability index																
With disability	10.6	[7.7, 14.4]	15.6	[11.9, 20.2]	29.8	[22.7, 38.1]	14.3	[11.3, 18.0]	18.0	[14.3, 22.4]	18.3	[14.5, 22.8]	16.7	[12.6, 21.9]	10.6	[6.8, 16.0]
Without disability	89.4	[85.6, 92.3]	84.4	[79.8, 88.1]	70.2	[61.9, 77.3]	85.7	[82.0, 88.7]	82.0	[77.6, 85.7]	81.7	[77.2, 85.5]	83.3	[78.1, 87.4]	89.4	[84.0, 93.2]

4.5 Risk Factors and Health Behavior

Health-related behavior is a crucial factor in the health of older people. Health-related behaviors are a series of actions taken by an individual that affect health or mortality (Short & Mollborn, 2015). This study included health-related behaviors such as eating fruits, vegetables, and milk, smoking, tobacco use, alcohol consumption, and physical activity. This health behavior can have long-term effects on the health implications and functional capacity of older people. On the other hand, health risk behaviors are actions and habits that increase the likelihood of negative physical, social, or psychological consequences for the health of older people (Oduro et al., 2023).

The use of tobacco, smoking, and alcohol was considered a health risk behavior. Smoking and tobacco use are major risk factors for many chronic diseases, such as chronic pulmonary diseases, hypertension, cardiovascular diseases, diabetes, cancer, and respiratory and cognitive deficits (Sarkar et al., 2020).

Health behaviors and exposure to health risks are dynamic, varying across the lifespan and over time. Older people are vulnerable to health risk behaviors such as tobacco use, smoking, and alcohol consumption for social and psychological reasons. There is a causal relationship between smoking and tobacco use and their adverse health effects. Most cardiovascular diseases, cancers, and chronic lung diseases are directly attributed to smoking and tobacco use. As a result, smoking and tobacco use substantially increase the risk of dying from non-communicable diseases (WHO, 2009).

Table 4.10 shows the percentage distribution of older people by health behaviors. About a quarter (23.5%) of older people were current smokers, and another quarter (24.9%) were current non-smokers. About 52 percent of older people had never smoked. Tobacco use is a global public health problem. Any form of tobacco use is harmful to the individual and family. Tobacco is primarily used in both smoking and non-smoking forms. Smoking is the most common form of tobacco use. Chewing tobacco, paan masala, and gutkha are smokeless forms of tobacco products. It was found that more than two-thirds (69.9%) of

older people had never used smokeless tobacco products. In contrast, about one-fifth of older people currently use tobacco, and seven percent do not currently use tobacco. Thirty percent of older people had ever used smokeless tobacco products.

Table 4.10: *Percentage Distribution of Older People by Health Behavior*

Health behavior	Percent	Number
Smoking		
Never smoker	51.6	358
Currently smoking	23.5	163
Not currently smoking	24.9	173
Tobacco use*		
Never use	69.9	485
User	22.9	159
Not current user	7.2	50
Alcohol use		
Lifetime abstainer	58.1	403
Current drinker	25.6	178
Former drinker	16.3	113
Elder abuse		
Never experience	65.6	455
Experience	34.4	239
Total	100.0	694

* Smokeless tobacco uses include chewing tobacco, paan masala, and gutkha.

Alcohol consumption is related to the caste and ethnic groups of Nepal. Many people consume alcohol according to their social, religious, and cultural traditions during festivals and special religious occasions. On the other hand, many people consume alcohol for pleasure and to relieve pain and tension. Alcohol has been socially and culturally acceptable among many caste and ethnic groups. Despite this, drinking alcohol is a harmful practice and a major risk factor for premature mortality and disability (Anderson et al., 2023). Alcohol consumption has acute and chronic health consequences, ranging from injuries to chronic illnesses such as cardiovascular disease, liver damage, and mental illness. Alcohol consumption in older people is associated with an increased risk of many health conditions, such as fatty liver, permanent damage to the liver, damage to blood vessels, weakened heart muscles, diabetes, hypertension, depression, poor memory, and concentration (Arokiasamy et al., 2020).

About 26 percent of older people were current drinkers, and 16 percent were not current drinkers or former drinkers. Fifty-eight percent of older people never consumed alcohol. The proportion of older people who had ever consumed alcohol was 42 percent. Likewise, 34 percent of older people reported experiencing elder abuse. Table 4.11 presents health risk behavior by age group, sex, and caste/ethnicity. It revealed that the proportion of older people who were 'current smokers' was higher in the age group 60-69 (28.2%) and lower in the age group 80 years and above (17.7%). The proportion of those who were not current smokers was 21.9 percent in the age group 60-69 and 37.9 percent in the age group 80 years and above.

Regarding tobacco use, the proportion of older people who consumed tobacco was higher among those aged 60-69 and lower among those aged 80 years and above, while the proportion of older people who were 'not current tobacco users was higher among those aged 80 years and above, and lower in the age group 60-69 years.

A similar pattern was observed for alcohol consumption. The proportion of current alcohol users was higher among older people aged 60-69 years and lower in those aged 80 years and above. The proportion of 'not current users of alcohol' was higher among older people aged 80 years and above (20.2%) and lower among those aged 60-69 years (14.3%).

Healthy behaviors, such as consuming fruits, vegetables, beans, milk, and meat, help reduce the risk of non-communicable diseases and improve the physical and mental health of older people. Older people are at risk of malnutrition. Micronutrient deficiencies are common in older people due to reduced food intake and a lack of variety in their consumed foods. A long and healthy life span for older people is associated with various food intake, exercise, and physical and social activities. A better understanding of the health behaviors of older people related to dietary intake is essential to improve the quality of life and healthy aging and to predict the risk of developing chronic conditions.

Table 4.11: *Percentage Distribution of Older People by Health Behavior According to Age Group, Sex and Caste/Ethnicity*

Health behavior	Age group						Sex				Caste/ethnicity					
	60-69		70-79		80+		Male		Female		Hill Caste		Hill Janajati		Hill Dalits	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Smoking																
Never smoker	49.8	[44.5, 55.2]	56.9	[51.2, 62.4]	44.4	[36.2, 52.8]	43.8	[39.1, 48.6]	60.9	[55.6, 65.9]	61.4	[56.1, 66.5]	46.7	[40.6, 52.9]	39.8	[32.8, 47.2]
Smoker	28.2	[23.6, 33.3]	20.8	[16.6, 25.8]	17.7	[12.2, 25.1]	28.6	[24.5, 33.2]	17.4	[13.7, 21.7]	15.7	[12.2, 20.0]	26.4	[21.3, 32.3]	34.2	[27.5, 41.5]
Not current smoker	21.9	[17.8, 26.7]	22.3	[17.9, 27.4]	37.9	[30.1, 46.3]	27.6	[23.5, 32.1]	21.8	[17.7, 26.4]	22.9	[18.7, 27.7]	26.9	[21.7, 32.7]	26.1	[20.1, 33.1]
Tobacco use																
Never use	62.8	[57.4, 67.8]	75.1	[69.8, 79.7]	75.8	[67.9, 82.3]	53.8	[49.0, 58.6]	89.0	[85.2, 91.9]	77.1	[72.3, 81.3]	64.3	[58.2, 70.0]	64.0	[56.6, 70.7]
User	30.6	[25.8, 35.8]	19.3	[15.2, 24.2]	12.1	[7.6, 18.7]	35.0	[30.6, 39.7]	8.5	[6.0, 12.0]	15.7	[12.2, 20.0]	26.0	[20.9, 31.8]	32.3	[25.8, 39.5]
Not current user	6.6	[4.4, 9.9]	5.6	[3.5, 8.9]	12.1	[7.6, 18.7]	11.1	[8.4, 14.6]	2.5	[1.3, 4.8]	7.2	[4.9, 10.5]	9.7	[6.6, 14.0]	3.7	[1.7, 7.8]
Alcohol use																
Never user	56.5	[51.1, 61.7]	58.0	[52.3, 63.5]	62.1	[53.7, 69.9]	46.2	[41.4, 51.0]	72.2	[67.3, 76.7]	86.6	[82.5, 89.8]	37.9	[32.1, 44.1]	32.3	[25.8, 39.5]
User	29.2	[24.6, 34.4]	25.3	[20.6, 30.6]	17.7	[12.2, 25.1]	33.2	[28.8, 37.8]	16.7	[13.2, 21.0]	6.5	[4.3, 9.7]	37.9	[32.1, 44.1]	44.7	[37.5, 52.1]
Not current user	14.3	[10.9, 18.5]	16.7	[12.9, 21.4]	20.2	[14.2, 27.8]	20.7	[17.1, 24.9]	11.0	[8.1, 14.8]	6.9	[4.6, 10.1]	24.2	[19.3, 29.9]	23.0	[17.4, 29.8]

Considering these facts, older people were asked, "Do you eat fruits, vegetables, and beans according to the season?" Fruit, vegetable, milk, and meat intake of older people is presented in Table 4.12. About 22 percent of older people consumed seasonal fruit daily, while 56 percent consumed vegetables daily. Similarly, about half (51.6%) of older people consumed beans, peas, or lentils daily. Thirty-seven percent of older people consumed milk or milk products every day, while about 8 percent did not consume milk or milk products. Fourteen percent of older people were vegetarians. More than half (54.6%) of older people ate meat, fish, or eggs once or twice a week, while 31 percent ate them once or twice a month.

Table 4.12: *Percentage Distribution of Older People by Fruit, Vegetables, Milk and Meat Intake*

Fruit, vegetables, and meat	Percent	Number
Fruits		
Every day	21.9	152
Sometimes	78.1	542
Vegetables		
Every day	56.2	390
Sometimes	43.8	304
Beans, peas, or lentils		
Every day	51.6	358
Sometimes	48.4	336
Milk or milk product		
Every day	36.7	255
Sometimes	55.0	382
No	8.2	57
Meat or fish or eggs		
Once or twice a week	54.6	379
Once or twice a month	31.0	215
Vegetarian	14.4	100
Total	100.0	694

4.6 Discussion

The study of sociodemographic, economic, and other characteristics provides an identification of who older people are, which directly or indirectly affects their health status, morbidity conditions, use of health services, and quality of life. Analysis of

sociodemographic characteristics in this study showed that the mean age of older people was about 72 years, while according to 2021 census, the mean age of older people was 70 years in Kamalamai Municipality. Most of the older people were male, married and widowed, living in joint families, Hill caste, Hindus, and uneducated. This finding is consistent with previous studies conducted in the Sudurpaschim Province of Nepal (Ghimire, Singh, et al., 2021) and Western Nepal (Chhetri et al., 2023). Living with a spouse, adult children, and a married child has been a traditional social norm for older people in Nepalese society. In this situation, caring for and supporting older parents is the responsibility of the son or daughter and the family. However, with the expansion of nuclear families, modernization, urbanization, and migration of children, this tradition of family support for older persons is eroding.

However, the living arrangement is an important component of the well-being of older people, which is closely linked to the support provided by their families. The type of living arrangement can affect social interaction, the provision of available resources for daily living, and the level of family support for older people (Singh et al., 2021). A different situation exists for living arrangements; more than two-thirds of older people lived with a son/daughter and son/daughter-in-law, about one-fifth lived with their spouse, and 10 percent lived alone.

Economic characteristics play an important role in well-being and healthy aging. It is an important aspect in the decision-making process in health behavior for the family and themselves. In general, unhealthy behavior and poor health status of older people were related to low socioeconomic status. Therefore, economic factors have a greater influence on the subjective health status of older people than sociodemographic factors (Kim et al., 2017). There are differences in economic characteristics among older people. More than half of the older people were currently not working at the time of study. Most of older

people relied on their son/daughter's income and other sources for economic source of living and were dependent on other family members.

Most older people relied on their son's or daughter's income and other sources for economic support and were dependent on other family members."

The Government of Nepal has arranged social security allowances targeting senior citizens, single women, citizens with disabilities, endangered ethnicity, and children to provide social security and ensure a safe life. Of all older people, more than two-thirds received social security allowance. Social security allowance has become an economic source of living for older people. For example, over one-third of older people stated that their economic source of living was an old age allowance.

Nepal has adopted the National Health Insurance Program to provide quality healthcare services to citizens without imposing financial burdens on them based on social health insurance (Khanal et al., 2023). Social health insurance is an effective strategy for ensuring access to health care services with minimum possible financial burden for older people. Despite this, health insurance coverage for older people is found to be low in Nepal. Previous studies conducted in the Pokhara Metropolitan City showed that about 20 percent of older people had health insurance (Karmacharya et al., 2021), and another study conducted in the Pokhara Lekhnath Metropolitan showed that less than one-third of older people were enrolled in health insurance (Ghimire, Singh, et al., 2021). Consistent with previous studies, this study found that more than half of older people had health insurance, which, as mentioned, is higher than previous studies. The impact of health insurance is evaluated on the use of health services, financial security, and health status of older people. In general, older people with health insurance are more likely to use health care services frequently than those without health insurance, and having health insurance significantly reduces out-of-pocket expenditure for health care as well as the financial burden of families.

In addition, health insurance can improve the health status of older people by reducing financial barriers to the use of health care services.

Mobile phone usage has increased over the last decade from a young age to the old and has become an integral part of personal life. The use of mobile phones has both positive and negative consequences. Mobile phone use among older people is more likely to have positive rather than negative consequences. For example, mobile phone use increases social interaction with social groups, maintains contact with family members and friends, can help control disease, improves quality of life, and helps prevent loneliness (Busch et al., 2021). This study found that about 90 percent of older people had used mobile phones. The wealth quintile is estimated by taking household facilities and assets, ranging from a radio to a dhiki/janto, and housing characteristics such as source of drinking water, source of fuel for cooking, and toilet facilities. Wealth quintiles group households into five equal categories, each comprising 20 percent of the total households. Looking at the distribution of older people by household wealth status, it is clear that older people are almost equal in each wealth quintile.

General health status is measured by self-rated health status. Self-rated health status is an individual's subjective assessment of their health status, which is used to assess the health of older people (Zhang et al., 2021), including physical, mental, and social well-being rated as very good, good, moderate, bad, and very bad. This study asked older people a single general health question: "In general, how is your health status now?" While examining the self-rated health status of older people, it is important to consider that responses are subjective and may vary depending on their socio-cultural and economic backgrounds. In addition, older people may suffer from some health problems as they age, making them less likely to report they are in good health (Organization for Economic Co-operation and Development [OECD], 2021). This study found that a higher proportion of

older people reported moderate health status. The reason for this result can be attributed to the fact that some older people have serious health problems even though they rate their health status in the "neutral" response category. The result regarding health status is consistent with previous studies—a higher proportion of older people rated their health status as neutral (Chhetri et al., 2023; Gurung et al., 2016; Sanjel et al., 2012).

Multimorbidity reflects the presence of two or more chronic conditions in an individual. It has multifaceted effects ranging from individual health to quality of life. At present, multimorbidity is a growing concern in the aging society. Older people have been identified as susceptible to multimorbidity in the study area. The results clearly showed that one in two older people has multimorbidity. This prevalence of multimorbidity is higher than the estimated prevalence of previous studies (Balakrishnan et al., 2022; Yadav et al., 2021). A high prevalence of multimorbidity in this study could be due to the increasing burden of non-communicable diseases as a result of changes in lifestyle and dietary habits of people and the escalating risk of one disease after another among older people. Moreover, a scoping review conducted by Abebe et al. (2020) revealed that the prevalence of multimorbidity among older people aged 60 years and above in low- and middle-income countries varied from 27.3 percent to 90.5 percent.

In Nepal, chronic diseases are now surpassing the burden of communicable diseases. Diseases such as high blood pressure, diabetes, gastritis, arthritis, asthma, chronic disease of the lungs, liver, heart, and kidneys, Parkinson's, Alzheimer's, depression and anxiety, and cancer are on the rise. In this study, high blood pressure, gastritis, arthritis, diabetes, osteoporosis, asthma, and cataract and glaucoma were found to be the most common diseases. A multi-country study asserted that hypertension, cataracts, arthritis, asthma, chronic obstructive pulmonary diseases (COPD), and angina were the most common diseases (Garin et al., 2016). A study in India reported that hypertension, cancer,

chronic lung disease, chronic heart disease, stroke, and arthritis were the most common diseases among older people (Chauhan, Patel, et al., 2022). Previous studies in Nepal found that hypertension, gastritis, arthritis, asthma, diabetes, COPD, and cancer were the most common diseases among older people (Chhetri et al., 2023; Gupta et al., 2016; Shrestha et al., 2022). The first non-communicable disease prevalence survey conducted in Nepal by the NHRC (2019) revealed that the prevalence of diabetes, chronic kidney diseases, and COPD was higher among older people aged 60 and above. This study identified that most older people were taking medications and receiving treatment for chronic diseases. Medication and treatment are essential for managing chronic diseases and preventing their progression and associated death.

This study showed a high prevalence of ADL and IADL difficulties among older people. Half of the older people had at least one ADL difficulty, and 69 percent had at least one IADL difficulty. This ADL and IADL functional impairment is higher than in previous studies of Nepal (Chalise & Khanal, 2020), India (Chauhan, Kumar, et al., 2022), and Ethiopia (Takele et al., 2024). A study conducted in Nepal showed that about 48 percent and 91 percent of older people had a functional disability in ADL and IADL, respectively (Koirala et al., 2022). The main reason for this difference in the level of ADL and IADL difficulties can be attributed to the differences in the sample population included in the study. This study found that the most common ADL difficulty among older people was continence, which is consistent with findings from the previous studies from Nepal (Chalise & Khanal, 2020; Koirala et al., 2022) and Bangladesh (Debnath et al., 2017). Among the seven IADL items, this study reported that difficulty shopping (51%) was the most prevalent IADL difficulty, followed by difficulty using the telephone/mobile and food preparation. This contradicts the previous study results, which indicated that difficulty taking medication is the most common difficulty in IADL, followed by difficulty traveling

and shopping (Chalise & Khanal, 2020). A study from Ethiopia showed that difficulty using the telephone and shopping were the most prevalent difficulties of IADL (Takele et al., 2024). The higher prevalence of difficulty shopping in this study might be attributed to the long distance of the shopping market, limited financial resources, and limited availability of convenient transportation options for older people.

Physical activity is one of the most important activities in preventing diseases, reducing disability, maintaining function, and improving mental health and quality of life (Langhammer et al., 2018; Mjøsund et al., 2022). A study conducted in India stated that older people who engaged in physical activities were less likely to have morbidity (Boro & Saikia, 2022). This study found that about 9 in 10 older people were engaged in vigorous or moderate physical activities in the household.

This study included a series of questions based on the Washington Group on Disability Statistics Short Set on Functioning (WG-SS) to identify older people who had difficulties in performing basic, universal activities. This is the first study ever conducted in Nepal among older people aged 60 years and above to assess health-related difficulties in seeing, hearing, walking, remembering/concentrating, self-care, and communicating using the WG-SS disability tools. The finding of this study indicated that about 16 percent of older people had at least one with 'a lot of difficulty among the six domains. This is similar to previous studies conducted in the Philippines (Cruz et al., 2019) and Viet Nam (Vu et al., 2020), which showed that about 18 percent and 15 percent have at least one with 'a lot of difficulty'.

Smoking, tobacco use, and alcohol consumption are health risk behaviors that contribute to health problems in older people. Risky health behavior has profound detrimental long-term implications in older age. Consistent with previous studies (Ghimire,

Paudel, et al., 2021; Koirala et al., 2022), this study also found that smoking and tobacco use, besides alcohol consumption, are common practices among older people.

This chapter provides an overview of the sociodemographic and economic characteristics of older people, along with their health state and health-related behaviors. The following chapter focuses on analyzing the prevalence of multimorbidity and its associated factors among older people.

CHAPTER V

MULTIMORBIDITY AND ITS CORRELATES

This chapter attempts to assess the prevalence of chronic diseases, multimorbidity, and its correlates. It begins with the concept and context of multimorbidity. The results will begin with a crosstabulation of sociodemographic characteristics, economic characteristics, health state and functional health, health behavior, and outcome variables. Finally, the results are presented as unadjusted and adjusted multinomial logistic regression models with relative risk ratio (RRR), followed by a discussion of the key findings.

5.1 Introduction

Nepal has experienced rapid demographic changes in recent decades, with an increasing proportion of the older population due to a decline in fertility and mortality and an increase in life expectancy (Amin et al., 2017). In addition, Nepal has also been experiencing an increasing burden of noncommunicable diseases, with a rapid growth of the older population (NHRC, 2021). Aging and multimorbidity are closely related because aging is a risk factor for the development of chronic disease, and multiple chronic diseases are common features of the aging process. Chronic diseases become progressively more common with age because the cumulative effects of aging lead to a gradual decrease in physical, mental, and functional capacity, which increases disease susceptibility, and the presence of one disease increases the risk of other co-existing diseases. For example, having hypertension may increase the risk of developing diabetes. Therefore, old age is associated with a higher prevalence of multiple comorbid conditions, which is commonly called multimorbidity. Multimorbidity is defined as the coexistence of two or more chronic diseases in the same individual (Salive, 2013; WHO, 2016).

Multimorbidity has become a major public health concern due to population aging, changing lifestyles, improvement in socioeconomic conditions, and diagnostic capabilities. The global prevalence of multimorbidity was about 37 percent, while 51 percent of older people aged 60 and above had multimorbidity (Chowdhury et al., 2023). The progress in public health has not only significantly increased life expectancy, but an increase in chronic conditions and multimorbidity is becoming more prevalent. Multimorbidity is associated with additional burden on the health care system, disability, functional impairment, growing widespread demand for treatment of chronic diseases, poor quality of life, unhealthy lifestyle, and high health care costs. Thus, multimorbidity independently poses adverse outcomes, including quality of life, disability, complications of treatment, health system, medications, and hospitalization (Ofori-Asenso et al., 2019). In addition, multimorbidity also affects the functional status and independence of older people. This can lead to worsening physical and cognitive function, increased disability, and a high risk of injury.

A previous study conducted in Nepal found that about 49 percent of older people had at least one chronic disease, and about 15 percent had multimorbidity ((Yadav et al., 2021). Another study found that about 67 percent of older people had at least a single morbidity, and about 23 percent had multimorbidity (Balakrishnan et al., 2022) and further showed that demographic, socioeconomic, and behavioral factors were strongly associated with multimorbidity. Looking at the growing prevalence of multimorbidity and socioeconomic differentials in multimorbidity, it is essential to better understand issues related to multimorbidity and associated significant risk factors for multimorbidity among older people.

5.2 Prevalence of Multimorbidity by Sociodemographic Characteristics

The association between morbidity and sociodemographic characteristics of older people is presented in Table 5.1. Four of nine sociodemographic characteristics—age group, sex, caste/ethnicity, and education level—were significantly associated with

multimorbidity. Table 5.1 showed that the prevalence of no morbidity and single morbidity decreased with age, while the prevalence of multimorbidity increased significantly with age, from 42.9 percent in 60-69 years to 62.1 percent in 80 years and above.

About one-fifth (20.7%) of older males had no morbidity, while more than one-third (34.7%) had a single morbidity. The multimorbidity was more prevalent among females (55.5%) than males (44.6%).

Considering caste/ethnicity, Hill Janajati (18.9%) had the highest proportion of no morbidity, and Hill Dalits (40.4%) had single morbidity. However, compared to other caste/ethnic groups, the Hill caste had a higher prevalence of multimorbidity (59.8%).

Table 5.1 also shows that among the sociodemographic variables, marital status, living arrangements, religion, types of family, and owning a mobile phone do not have statistically significant associations with multimorbidity. No significant differences were observed in multimorbidity by marital status.

Older people who lived with others had the highest proportion of no morbidity. Similarly, older people who lived with their son or daughter-in-law had the highest prevalence of single morbidity. The prevalence of multimorbidity was higher among older people who lived alone (59.1%).

Older people who follow Buddhist and Christian religions had a higher prevalence of no morbidity. In contrast, half of older people (51%) belonging to the Hindu religion had a higher prevalence of multimorbidity. Considering the education level, older people who were literate but had no formal education had a considerably higher prevalence of multimorbidity (63.4%), which decreased to 45.6 percent and 54.5 percent in older people with basic education and secondary and above education, respectively. This study observed that the prevalence of no morbidity increased with increasing educational level of older people.

Table 5.1: *Prevalence of Multimorbidity Among Older People by Sociodemographic Characteristics*

Background characteristics	No-morbidity	Single-morbidity	Multimorbidity	χ^2
	% 95% CI	% 95% CI	% 95% CI	p-value
Age group				
60-69	20.3[16.3, 25.0]	36.9[31.8, 42.2]	42.9[37.6, 48.3]	.003
70-79	14.5[10.9, 19.0]	34.2[29.0, 39.8]	51.3[45.6, 57.0]	
80+	11.3[7.0, 17.8]	26.6[19.9, 34.7]	62.1[53.7, 69.9]	
Sex				
Male	20.7[17.1, 24.9]	34.7[30.3, 39.5]	44.6[39.8, 49.4]	.001
Female	11.4[8.4, 15.1]	33.1[28.4, 38.2]	55.5[50.2, 60.7]	
Marital status				
Married	17.1[13.8, 21.0]	33.7[29.4, 38.3]	49.2[44.5, 54.0]	.852
Widowed/Separated/Divorced	15.6[12.0, 19.9]	34.4[29.5, 39.7]	50.0[44.6, 55.4]	
Living arrangement				
Living alone	16.7[9.7, 27.1]	24.2[15.7, 35.4]	59.1[47.5, 69.8]	.085
Living spouse only	16.0[10.9, 23.0]	31.3[24.2, 39.3]	52.7[44.5, 60.7]	
Living with son/daughter-in-law	15.0[12.0, 18.5]	36.9[32.7, 41.4]	48.1[43.6, 52.7]	
Living with others	26.1[17.4, 37.1]	30.4[21.1, 41.7]	43.5[32.8, 54.8]	
Caste/Ethnicity				
Hill caste	13.1[9.9, 17.1]	27.1[22.6, 32.1]	59.8[54.5, 64.9]	<.001
Hill Janajati	19.8[15.3, 25.2]	38.8[32.9, 45.0]	41.4[35.4, 47.6]	
Hill Dalits	18.0[13.0, 24.4]	40.4[33.4, 47.8]	41.6[34.6, 49.0]	
Religion				
Hindu	15.6[13.0, 18.6]	33.9[30.4, 37.6]	50.5[46.7, 54.3]	.236
Buddha/Christian	21.7[14.7, 30.8]	34.8[26.1, 44.6]	43.5[34.2, 53.3]	
Type of family				
Nuclear family	17.1[12.9, 22.3]	30.7[25.3, 36.7]	52.2[46.0, 58.3]	.403
Joint family	16.1[13.2, 19.5]	35.6[31.6, 39.9]	48.3[44.0, 52.6]	
Education level				
No education	15.7[12.9, 19.1]	36.4[32.4, 40.6]	47.9[43.6, 52.1]	.016
Literate but no formal education	14.1[8.0, 23.7]	22.5[14.6, 33.1]	63.4[52.2, 73.3]	
Basic education	16.7[10.5, 25.4]	37.8[28.8, 47.7]	45.6[36.0, 55.4]	
Secondary and above	27.3[16.6, 41.4]	18.2[9.7, 31.6]	54.5[40.5, 67.9]	
Total	16.4[14.0, 19.2	34.0[30.7, 37.5]	49.6[46.0, 53.1]	

The percentage of older people without morbidity was highest in the nuclear family (17.1%), whereas the higher percentage of older people with single morbidity was found in the joint family (35.6%). The prevalence of multimorbidity was higher among older people living in a nuclear family (52.2%).

5.3 Prevalence of Multimorbidity by Economic Characteristics

The results of the bivariate analysis of morbidity status and economic characteristics of older people are shown in Table 5.2. Among the economic variables included in the study, four variables—working status, economic source of living, received allowance, and wealth quintile—are significantly associated with multimorbidity. About three-fifths (59.0%) of older people who were not working have a higher prevalence of multimorbidity than those who are currently working (36.8%). The highest prevalence of single morbidity was found among older people who reported their son/daughter's income as economic source of living. Likewise, the highest prevalence of multimorbidity was found in older people who reported their pension as economic source of living. The prevalence of multimorbidity was more than half (52.6%) in the older people who receive senior citizen, disabled, endangered ethnic group, or Dalits allowances.

The study showed that the prevalence of multimorbidity also increases with the increase in household wealth, from 33.6 percent in the lowest wealth quintile to 62.3% in the highest wealth quintile. On the other hand, the prevalence of single morbidity decreases with increasing household wealth from 44.3 percent in the lowest wealth quintile to 24.6 percent in the highest wealth quintile. Among the economic variables, neither economic dependency nor health insurance coverage showed a statistically significant association with morbidity. It has been found that the prevalence of multimorbidity is higher in older people who are fully dependent on others (60.2%) and have health insurance (51.2%). Likewise, the prevalence of multimorbidity was higher among older people who do not have their mobile phones (51%).

Table 5.2: *Prevalence of Multimorbidity Among Older People by Economic Characteristics*

Background characteristics	No-morbidity	Single-morbidity	Multimorbidity	χ^2
	% 95% CI	% 95% CI	% 95% CI	p-value
Working status				
Currently working	18.6 [14.7, 23.2]	44.6 [39.3, 50.1]	36.8 [31.7, 42.2]	<.001
Not working	14.8 [11.8, 18.5]	26.1 [22.2, 30.5]	59.0 [54.4, 63.6]	
Economic source of living				
Own income	19.9 [15.1, 25.7]	33.8 [27.9, 40.3]	46.3 [39.8, 52.9]	.002
Son/daughter	19.8 [15.4, 25.1]	36.7 [31.1, 42.7]	43.5 [37.6, 49.6]	
Old age allowance	10.5 [7.5, 14.7]	31.6 [26.5, 37.3]	57.8 [51.9, 63.5]	
State of economic dependence				
Not dependent	16.2 [11.8, 21.7]	35.4 [29.3, 41.9]	48.5 [41.9, 55.1]	.245
Partial dependent	16.7 [13.5, 20.4]	35.4 [31.1, 39.9]	47.9 [43.4, 52.6]	
Full dependent	15.7 [9.5, 24.6]	24.1 [16.4, 33.9]	60.2 [49.9, 69.8]	
Receiving social security allowance				
Yes	13.6 [10.9, 16.8]	33.8 [29.8, 37.9]	52.6 [48.3, 56.9]	.004
No	22.6 [17.7, 28.3]	34.6 [28.8, 40.8]	42.9 [36.7, 49.2]	
Health insurance covered				
Yes	14.1 [11.0, 17.8]	34.7 [30.2, 39.5]	51.2 [46.3, 56.1]	.177
No	19.1 [15.3, 23.5]	33.2 [28.5, 38.3]	47.7 [42.5, 52.9]	
Wealth quintile				
Poorest	22.1 [16.3, 29.4]	44.3 [36.6, 52.2]	33.6 [26.5, 41.4]	<.001
Poorer	12.3 [8.0, 18.6]	37.7 [30.3, 45.7]	50.0 [42.1, 57.9]	
Middle	20.0 [14.4, 27.1]	33.6 [26.5, 41.4]	46.4 [38.7, 54.3]	
Richer	14.5 [9.7, 21.1]	29.7 [23.0, 37.5]	55.8 [47.8, 63.5]	
Richest	13.0 [8.5, 19.4]	24.6 [18.4, 32.1]	62.3 [54.3, 69.7]	
Own mobile phone				
Yes	17.5 [14.4, 21.2]	33.7 [29.6, 38.1]	48.7 [44.3, 53.2]	.549
No	14.5 [10.8, 19.1]	34.5 [29.2, 40.3]	51.0 [45.1, 56.8]	
Total	16.4 [14.0, 19.2]	34 [30.7, 37.5]	49.6 [46.0, 53.1]	

5.4 Prevalence of Multimorbidity by Health State and Functional Health

The prevalence of multimorbidity status by selected health state is presented in Table 5.3. The results showed that all covariates were significantly associated with morbidity. The prevalence of no morbidity was highest among older people who reported good health status (28.2%), who reported being independent in ADL (21.4%), who reported high functioning in IADL (20.4%), who had no disability (24.9%), and who had no disability (18.4%).

Table 5.3: *Prevalence of Multimorbidity Among Older People by Health Status*

Health state	No-morbidity		Single-morbidity		Multimorbidity		χ^2
	%	95% CI	%	95% CI	%	95% CI	p-value
General health status							
Good	28.2	[22.9, 34.1]	34.8	[29.1, 40.9]	37.0	[31.2, 43.2]	<.001
Moderate	12.8	[9.8, 16.5]	35.3	[30.7, 40.1]	51.9	[47.0, 56.8]	
Poor	3.7	[1.5, 9.2]	28.0	[20.7, 36.8]	68.2	[59.3, 76.0]	
Activities of daily living							
Independent	21.4	[17.6, 25.9]	40.6	[35.7, 45.6]	38.0	[33.2, 43.0]	<.001
Dependent	11.5	[8.6, 15.1]	27.5	[23.3, 32.2]	61.0	[56.0, 65.8]	
Instrumental activities of daily living							
High-functioning	20.4	[17.0, 24.3]	36.7	[32.4, 41.1]	42.9	[38.5, 47.4]	<.001
Low, functioning	9.9	[6.9, 13.9]	29.7	[24.7, 35.2]	60.5	[54.7, 65.9]	
Level of disability							
No difficulty	24.9	[19.7, 30.9]	43.5	[37.3, 50.0]	31.6	[25.9, 37.9]	<.001
Some difficulty	14.7	[11.6, 18.5]	33.4	[29.0, 38.1]	51.9	[47.0, 56.7]	
A lot of difficulty	6.5	[3.0, 13.2]	17.2	[11.0, 25.8]	76.3	[67.1, 83.6]	
Cannot do it at all	5.6	[0.8, 28.8]	22.2	[9.0, 45.2]	72.2	[49.2, 87.5]	
Disability index							
With disability	6.3	[3.1, 12.3]	18.0	[12.2, 25.9]	75.7	[67.3, 82.5]	<.001
Without disability	18.4	[15.5, 21.5]	37.0	[33.4, 40.9]	44.6	[40.8, 48.5]	
Total	16.4	[14.0, 19.2]	34.0	[30.7, 37.5]	49.6	[46.0, 53.1]	

Among older people who reported a moderate health status (35.3%), were independent in ADL (40.6%) and IADL (36.7%), had no disability severity (43.5%), or were without disability (37.0%) were found to have a higher prevalence of single morbidity. Similarly, multimorbidity is more common among older people who reported poor health (68.2%), who were dependent on ADL (61.0%), who had low-functioning IADL (60.5%), who had moderate (76.3%) or severe (72.2%) level of disability, and who had a disability (75.7%).

5.5 Prevalence of Multimorbidity by Health Behavior

The results from the bivariate analysis of morbidity status and health behaviors of older people are shown in Table 5.4. Smoking, use of tobacco, alcohol use, consumption of fruits, vegetables, or beans, and consumption of milk, meat, fish, or eggs were significantly associated with morbidity status. The prevalence of single morbidity was higher in older people who smoke (45.4%), use tobacco (44.7%), and drink alcohol (44.9%). Similarly, the

prevalence of multimorbidity was higher among older people who do not currently smoke (61.3%), use tobacco (62%), and never drink alcohol (55.6%). Single-morbidity was more prevalent in older people who sometimes ate seasonal fruits, vegetables, or beans and consumed milk, meat, fish, or eggs. A higher share of multimorbidity was found among older people who ate fruits, vegetables, or beans daily (57.3%) and were vegetarians (65.0%).

Table 5.4: *Prevalence of Multimorbidity Among Older People by Health Behavior*

Health behaviors	No morbidity		Single-morbidity		Multimorbidity		χ^2
	%	95% CI	%	95% CI	%	95% CI	p-value
Physical activities							
No	9.9	[5.6, 17.0]	33.7	[25.5, 43.0]	56.4	[47.1, 65.4]	.100
Yes	17.5	[14.8, 20.7]	34.1	[30.5, 37.8]	48.4	[44.6, 52.2]	
Smoking							
Never smoker	16.8	[13.4, 20.8]	31.8	[27.4, 36.6]	51.4	[46.5, 56.3]	<.001
Smoker	21.5	[16.1, 28.1]	45.4	[38.2, 52.8]	33.1	[26.6, 40.4]	
Not current smoker	11.0	[7.3, 16.3]	27.7	[21.8, 34.5]	61.3	[54.1, 67.9]	
Tobacco use							
Never use	13.8	[11.1, 17.0]	31.8	[27.9, 35.8]	54.4	[50.2, 58.6]	<.001
User	24.5	[18.7, 31.5]	44.7	[37.4, 52.1]	30.8	[24.4, 38.1]	
Not current user	16.0	[8.5, 28.2]	22.0	[13.0, 34.8]	62.0	[48.6, 73.8]	
Alcohol use							
Never user	14.6	[11.6, 18.3]	29.8	[25.7, 34.2]	55.6	[50.9, 60.2]	<.001
User	22.5	[17.2, 28.9]	44.9	[38.1, 52.0]	32.6	[26.4, 39.5]	
Not currently user	13.3	[8.3, 20.5]	31.9	[24.3, 40.6]	54.9	[46.0, 63.4]	
Elder abuse							
Not experience	17.1	[14.1, 20.7]	31.0	[27.1, 35.2]	51.9	[47.5, 56.2]	.053
Experience	15.1	[11.2, 19.9]	39.7	[34.0, 45.8]	45.2	[39.3, 51.3]	
Total	16.4	[14.0, 19.2]	34.0	[30.7, 37.5]	49.6	[46.0, 53.1]	

Among the behavioral characteristics of older people, physical activities and abuse have no statistically significant association with morbidity status. The result shows that the prevalence of single mortality differs little between older people who can perform vigorous and moderate-intensity activities and those who cannot. However, the prevalence of multimorbidity is higher in older people who cannot perform vigorous and moderate-intensity activities (56.4%). Looking at elder abuse, the prevalence of single morbidity was

higher among older people who had experienced abuse, and the prevalence of multimorbidity was higher among older people who had not experienced abuse.

5.6 Factors Associated With Multimorbidity

The unadjusted and adjusted multinomial logistic regression results of factors associated with single morbidity among older people are presented in Table 5.5. No morbidity was considered the base outcome in the analysis. The occurrence of a single morbidity was considered for the relative risk ratios (RRR) with respect to no morbidity. Unadjusted multinomial logistic regression results show that six variables—sex, education level, economic source of living, receiving social security allowance, general health status, and instrumental activities of daily living—are significantly associated with single morbidity as the reference category. The relative risk of having a single morbidity versus no morbidity was 74 percent higher in females (RRR=1.74, 95% CI [1.11, 2.72], <.05) than in males. The relative risk of single morbidity versus no morbidity was found to be 71 percent lower in older people with secondary and higher education (RRR=0.29, 95% CI [0.12, 0.70], p<.01) compared to older people with no education.

The relative risk of single morbidity compared to no morbidity was 76 percent higher for older people who rely on old age allowance as their economic source of living compared to those who rely on their own income. Similarly, the relative risk of having a single morbidity compared to no morbidity was 62 percent higher for older people who received social security allowance compared to older people who did not receive social security allowance. Poor general health status was also associated with an increased risk of single morbidity. The relative risk of single morbidity compared to no morbidity was higher in older people with fair general health status (RRR=2.24, 95% CI [1.43, 3.51], p<.001) and poor general health status (RRR=6.08, 95% CI [2.14, 17.29], p<.001) than in older people with good health status. The relative risk of single morbidity relative to no morbidity

was higher (RRR=1.67, 95% CI [1.02, 2.73], p<.05) among older people with low-functioning in IADL compared to older people with high-functioning in IADL.

Table 5.5: *Multinomial Logistic Regression of the Factors Associated With No Morbidity Versus Single Morbidity*

	Unadjusted		Adjusted	
Variables	RRR	95% CI	aRRR	95% CI
Age group				
60-69	1.00		1.00	
70-79	1.30	[.81, 2.07]	0.92	[.50, 1.69]
80+	1.30	[.66, 2.53]	0.58	[.24, 1.39]
Sex				
Male	1.00		1.00	
Female	1.74*	[1.11, 2.72]	1.81	[.99, 3.31]
Living arrangement				
Living alone	1.00		1.00	
Living spouse only	1.34	[.55, 3.27]	1.83	[.66, 5.08]
Living with son/daughter-in-law	1.70	[.77, 3.72]	2.41	[.93, 6.24]
Living with others	0.80	[.31, 2.07]	1.21	[.41, 3.58]
Caste/ethnicity				
Hill caste	1.00		1.00	
Hill Janajati	0.94	[.57, 1.55]	0.68	[.36, 1.25]
Hill Dalits	1.08	[.62, 1.88]	0.92	[.40, 2.13]
Religion				
Hindu	1.00		1.00	
Other	0.74	[.41, 1.32]	0.64	[.29, 1.41]
Education level				
Illiterate	1.00		1.00	
Literate but no education	0.69	[.31, 1.54]	0.88	[.35, 2.20]
Basic education	0.98	[.52, 1.85]	1.36	[.64, 2.89]
Secondary and above	0.29**	[.12, .70]	0.47	[.16, 1.36]
Working status				
Currently working	1.00		1.00	
Not working	0.73	[.48, 1.13]	0.53*	[.30, .94]
Economic source of living				
Own income	1.00		1.00	
Son/daughter	1.09	[.66, 1.80]	0.78	[.40, 1.53]
Old age allowance	1.76*	[1.01, 3.09]	2.34*	[1.08, 5.05]
State of economic dependence				
Not dependent	1.00		1.00	
Partial dependent	0.97	[.60, 1.57]	0.63	[.36, 1.10]
Full dependent	0.70	[.32, 1.53]	0.51	[.20, 1.34]
Receiving social security allowance				
No	1.00		1.00	
Yes	1.62*	[1.04, 2.51]	0.94	[.47, 1.90]

	Unadjusted		Adjusted	
Variables	RRR	95% CI	aRRR	95% CI
Health insurance				
No	1.00		1.00	
Yes	1.41	[.92, 2.17]	1.40	[.85, 2.30]
Wealth quintile				
Poorest	1.00		1.00	
Poorer	1.53	[.79, 2.98]	2.02	[.95, 4.29]
Middle	0.84	[.46, 1.54]	1.12	[.57, 2.18]
Richer	1.03	[.53, 1.98]	1.32	[.63, 2.77]
Richest	0.94	[.48, 1.87]	1.12	[.50, 2.54]
General health status				
Good	1.00		1.00	
Fair	2.24***	[1.43, 3.51]	1.99**	[1.20, 3.30]
Poor	6.08***	[2.14, 17.29]	5.75**	[1.60, 20.69]
Activities of daily living				
Independent	1.00		1.00	
Dependent	1.27	[.81, 1.98]	1.35	[.76, 2.42]
Instrumental activities of daily living				
Full functioning	1.00		1.00	
Low functioning	1.67*	[1.02, 2.73]	1.50	[.76, 2.97]
Disability index				
With disability	1.00		1.00	
Without disability	0.71	[.30, 1.66]	0.95	[.35, 2.58]
Physical activities				
No	1.00		1.00	
Yes	0.57	[.28, 1.16]	1.24	[.50, 3.08]
Smoking				
Never	1.00		1.00	
Current/ex-smoker	1.19	[.78, 1.82]	1.41	[.82, 2.42]
Tobacco use				
Never	1.00		1.00	
Current/Ex-user	0.76	[.49, 1.18]	0.75	[.44, 1.29]
Alcohol use				
Never	1.00		1.00	
Current/ex-user	1.04	[.68, 1.59]	1.24	[.66, 2.31]
Abuse				
Not abuse	1.00		1.00	
Abuse	1.46	[.93, 2.29]	1.32	[.79, 2.19]

Note: ***p < .001 refers to significant at < .001., **p < .01 refers to significant at < .01, *p < .05 refers to significant at <.05.

The adjusted multinomial logistic regression results showed that only working status, economic source of living, and general health status have a significant relationship with a single morbidity among older people. The relative risk of having a single morbidity

relative to no morbidity was 47 percent lower for older people who did not work (aRRR=0.53, 95% CI [0.30, 0.94], p<.05) than for older people who did work. Older people who reported old-age allowances as their economic source of living were found to be 2.34 times more likely to have a single morbidity (aRRR=2.34, 95% CI [1.08, 5.05], p<.05) than those who reported their own income. In terms of health status, the relative risk of single morbidity compared to no morbidity was 99 percent higher (aRRR=1.99, 95% CI [1.20, 3.30], p<.01) in older people with fair health status and 475 percent higher (aRRR=5.75, 95% CI [1.60, 20.69], p<.01) in older people with poor health status compared to older people with good health status.

The unadjusted and adjusted multinomial logistic regression results of factors associated with multimorbidity among older people are shown in Table 5.6. In the analysis, no morbidity was considered the base outcome. Results were presented as relative risk ratios with multimorbidity versus no morbidity. Unadjusted multinomial logistic regression results showed that age, sex, caste/ethnicity, working status, economic source of living, receiving social security allowance, wealth quintile, general health status, activity of daily living, instrumental activities of daily living, disability, physical activity, tobacco use, and alcohol use were significantly associated with multimorbidity as the reference category.

In unadjusted multinomial logistic regression, the relative risk of multimorbidity compared to no morbidity was 67 percent higher among older people aged 60-69 years compared to those aged 50-59 years (RRR=1.67, 95% CI [1.07, 2.62], p<.05). It was 160 percent higher among those aged 80 years and over compared to those aged 50-59 years (RRR=2.60, 95% CI [1.40, 4.82], p<.01). The relative risk of multimorbidity versus no morbidity was higher among females (RRR=2.27, 95% CI [1.48, 3.48], p<.001) compared to males. Hill Janajati and Hill Dalit older people were 54 percent (RRR=0.46, 95% CI [0.28, 0.73], p<.01) and 50 percent (RRR=0.50, 95% CI [0.30, 0.86], p<0.05) less likely to

have multimorbidity compared to Hill Caste older people, respectively. In terms of working status, the relative risk of multimorbidity compared to no morbidity was higher among non-working older people (RRR=2.01, 95% CI [1.33, 3.04], p<.001) than working older people. Furthermore, the relative risk of multimorbidity was higher (RRR=2.36, 95% CI [1.39, 4.00], p<.01) among older people who reported old age allowance as their main economic source of living compared to those who reported their own income as their main economic source of living. The risk of having multimorbidity compared to no morbidity was 103 percent higher (RRR=2.03, 95% CI [1.34, 3.10], p<.001) among older people who received social security allowance compared to older people who did not receive social security allowance. Similarly, the relative risk of multimorbidity was significantly higher for older people in the poorer (RRR=2.68, 95% CI [1.37, 5.22], p<.01), richer (RRR=2.54, 95% CI (1.34, 4.81], p<.01) and richest (RRR=3.15, 95% CI [1.64, 6.04], p<.001) wealth quintile than the poorest older people. The results indicate that multimorbidity is not confined to older people with low economic status and may also be prevalent among wealthier older people.

The study found that poor health status was associated with a higher risk of multimorbidity among older people. The relative risk of multimorbidity was 3.10 times higher (RRR=3.10, 95% CI [2.00, 4.80], p<.001) among older people with fair health status compared to older people with good health status. And it was 13.90 times higher (RRR=13.90, 95% CI [5.06, 38.22], p<.001) among older people with poor health status compared to older people with good health status. The study also found that dependence on ADL and low functioning in IDAL were associated with a higher risk of multimorbidity in older people. Likewise, older people without disabilities and older people who engage in physical activities have a lower risk of multimorbidity. The relative risk of multimorbidity versus no morbidity was 3.01 times higher (RRR=3.01, 95% CI [1.97, 4.59], p<.001)

among older people with dependence in ADL compared to older people with independence in ADL. Similarly, it was more than two times higher (RRR=2.91, 95% CI [1.83, 4.63], p<.001) in older people with low functioning in IADL compared to full functioning older people. The relative risk of multimorbidity was 80 percent lower in older people with disability compared to no morbidity (RRR=0.20, 95% CI [0.09, 0.44], p<.001) and it was 52 percent lower in physically active older people (RRR=0.48, 95% CI [0.25, 0.95], p<.05) than those who were not physically active.

The relative risk of multimorbidity, compared to no morbidity, was found to be lower among older people who used tobacco and consumed alcohol compared to their respective reference groups. The relative risk of multimorbidity was 57 percent lower (RRR=0.43, 95% CI [0.28, 0.66], p<.001) among older people who used tobacco compared to those who did not use tobacco. It was 43 percent lower (RRR=0.57, 95% CI [0.38, 0.87], p<.01) among older people who consumed alcohol compared to those who did not drink alcohol.

The adjusted multivariate multinomial logistic regression results showed that sex, caste/ethnicity, economic source of living, wealth quintile, general health status, activities of daily living, and disability continued to have a significant relationship with multimorbidity. The results further showed that the relative risk of having multimorbidity relative to no morbidity was 92 percent higher in females (aRRR=1.92, 95% CI [1.04, 3.52], p<.05) than in males. Likewise, older people from Hill Janajati have a lower risk of having multimorbidity relative to no morbidity (aRRR=0.44, 95% CI [0.24, 0.84], p<.05) than those from Hill Caste when keeping the other variables constant in the model. The relative risk of having multimorbidity compared to no morbidity for older people who reported old-age allowance as an economic source of living was 128 percent higher

(aRRR=2.28, 95% CI [1.08, 4.83], p<.05) compared to older people who reported their own income as an economic source of living, after controlling for other variables.

Table 5.6: *Multinomial Logistic Analysis of the Factors Associated with Multimorbidity Versus No Morbidity*

	Unadjusted		Adjusted	
Variables	RRR	95% CI	aRRR	95% CI
Age group				
60-69				
70-79	1.67*	[1.07, 2.62]	0.80	[.44, 1.47]
80+	2.60**	[1.40, 4.82]	0.64	[.27, 1.52]
Sex				
Male				
Female	2.27***	[1.48, 3.48]	1.92*	[1.04, 3.52]
Living arrangement				
Living alone				
Living spouse only	0.93	[.42, 2.05]	1.32	[.52, 3.35]
Living with son/daughter-in-law	0.91	[.45, 1.82]	1.07	[.44, 2.57]
Living with others	0.47	[.20, 1.10]	0.77	[.28, 2.09]
Caste/ethnicity				
Hill caste				
Hill Janajati	0.46**	[.28, .73]	0.44*	[.24, .84]
Hill Dalits	0.50*	[.30, .86]	0.82	[.34, 2.01]
Religion				
Hindu				
Other	0.62	[.35, 1.08]	0.51	[.22, 1.15]
Education				
Illiterate				
Literate but no education	1.48	[.74, 2.98]	1.64	[.70, 3.86]
Basic education	0.90	[.49, 1.67]	1.58	[.73, 3.41]
Secondary and above	0.66	[.32, 1.33]	0.85	[.35, 2.04]
Working status				
Currently working				
Not working	2.01***	[1.33, 3.04]	0.86	[.48, 1.53]
Economic source of living				
Own income				
Son/daughter	0.94	[.58, 1.53]	0.67	[.35, 1.29]
Old age allowance	2.36**	[1.39, 4.00]	2.28*	[1.08, 4.83]
State of economic dependence				
Not dependent				
Partial dependent	0.96	[.60, 1.52]	0.58	[.33, 1.02]
Full dependent	1.28	[.64, 2.58]	0.65	[.26, 1.63]
Receiving social security allowance				
No				
Yes	2.03***	[1.34, 3.10]	0.99	[.49, 2.03]

	Unadjusted		Adjusted	
Variables	RRR	95% CI	aRRR	95% CI
Health insurance				
No				
Yes	1.45	[.97, 2.18]	1.51	[.92, 2.47]
Wealth quintile				
Poorest				
Poorer	2.68**	[1.37, 5.22]	4.28***	[1.88, 9.76]
Middle	1.53	[.84, 2.81]	2.73**	[1.31, 5.71]
Richer	2.54**	[1.34, 4.81]	5.13***	[2.31, 11.39]
Richest	3.15***	[1.64, 6.04]	4.79***	[2.09, 11.01]
General health status				
Good				
Fair	3.10***	[2.00, 4.80]	3.76***	[2.25, 6.28]
Poor	13.90***	[5.06, 38.22]	10.83***	[3.03, 38.66]
Activities of daily living				
Independent				
Dependent	3.01***	[1.97, 4.59]	2.77***	[1.57, 4.86]
Instrumental activities of daily living				
Full functioning				
Low functioning	2.91***	[1.83, 4.63]	1.82	[.93, 3.57]
Disability				
With disability				
Without disability	0.20***	[.09, .44]	0.37*	[.14, .95]
Physical activities				
No				
Yes	0.48*	[.25, .95]	2.56	[.99, 6.63]
Smoking				
Never				
Current/ex-smoker	0.97	[.64, 1.45]	1.24	[.72, 2.15]
Tobacco use				
Never				
Current/Ex-user	0.43***	[.28, .66]	0.58	[.34, 1.01]
Alcohol use				
Never				
Current/ex-user	0.57**	[.38, .87]	1.23	[.65, 2.30]
Abuse				
Not abuse				
Abuse	0.99	[.64, 1.53]	1.22	[.72, 2.06]

Note: *** p < .001, ** p < .01, * p <.05

The wealth quintile was found to be a significant predictor of multimorbidity among older people. Compared to no morbidity, the relative risk of having multimorbidity was significantly higher across all wealth quintiles above the poorest. Older people in the poorer

wealth quintile had a 4.28 times higher for older people in the poorer wealth quintile (aRRR=4.23, 95% CI [1.88, 9.76],p<.001), those in the middle wealth quintile had a 2.73 times higher risk (aRRR=2.73, 95% CI [1.31, 5.71], p<.0.01), those in the richer wealth quintile had a 5.13 times higher risk (aRRR=5.13, 95% CI [2.31, 11.39], p<.001), and those in the richest quintile had a 4.79 times higher risk (aRRR=4.79, 95% CI [2.09, 11.01], p<.001) of multimorbidity, compared to older people in the poorest wealth quintile.

The result also revealed that general health status was a strong predictor of multimorbidity among older people. The relative risk of multimorbidity was higher in those older people with fair and poor health status. Older people with fair health status had a 3,76 times higher risk of having multimorbidity (aRRR=3.76, 95% CI [2.25, 6.28], p<.001) compared to older people with good health status, while those with poor health status had a 10.83 times higher risk of having multimorbidity (aRRR=10.83, 95% CI [3.03, 38.66], p<.001) compared to those with good health status.

Moreover, the relative risk of having multimorbidity compared to no morbidity was found to be 2.77 times higher for those older people who were dependent on ADL compared to those who were independent. In contrast, the risk was 63 percent lower (aRRR=0.37, 95% CI [0.14, 0.95], p<.05) in older people without disability compared to older people with disability.

5.7 Discussion

Multimorbidity has become an emerging challenge as the proportion of older people in the population increases, particularly in less developed countries such as Nepal. This study showed that the prevalence of multimorbidity varied with demographic characteristics, socioeconomic characteristics, health state, and health behaviors of older people. The results of bivariate analysis exhibited that the prevalence of single morbidity

was higher among older people aged 60-69 years, older men, older hill Dalits, older people with basic education, older people who were currently working, older people whose economic source was the income of their son/daughter, those who did not receive social security allowance, and those belonging to the poorest wealth quintile category.

Similarly, the prevalence of single morbidity was found to be the highest among older people with moderate health status, independence in ADL, high functioning in IADL, a lot of difficulty, and older people with disability. Likewise, the percentage of older people with single morbidity was found to be highest among those who engage in physical activities, smoke, and tobacco use, consume alcohol, eat fruits and vegetables sometimes, and experience elder abuse. A study conducted in India revealed that older people aged 60-69 years, those who smoke or use tobacco, and those who engage in physical activities had a higher prevalence of single morbidity (Patel et al., 2023). Another study in India reported a higher prevalence of single morbidity among older men, older adults currently working, older adults with less education, and older adults belonging to the poorest monthly per capita expenditure (MPCE) quintile (Khan et al., 2022). Similarly, another study also reported a higher prevalence of single morbidity in older people with ADL and IADL disability (Chauhan, Patel, et al., 2022).

The results of multinomial logistic regression showed that economic sources of living (old age allowance) and general health status consistently had highly significant effects on the single morbidity of older people. The study observed that older people with old age allowance as an economic source of living and older people with moderate and poor self-rated health status were significantly more likely to be affected by a single morbidity compared to the respective reference group.

The prevalence of multimorbidity generally increases with age (Garin et al., 2016). Analysis of the relationship between demographic characteristics and multimorbidity in

this study revealed that the prevalence of multimorbidity increased with the increasing age of older people. This finding is consistent with previous studies conducted in Nepal (Balakrishnan et al., 2022), India (Chauhan, Patel, et al., 2022; Khan et al., 2022; Patel et al., 2023), China (Yao et al., 2020) and Brazil (Keomma et al., 2022), as well as this finding is in line with expectations. One possible explanation is that older people who live longer have a greater risk for more than a single morbidity, leading to an increased prevalence of multimorbidity with advancing age. Fabbri et al. (2015) argued that multimorbidity is associated with age-related multisystem loss of reserves and function, resulting in increased susceptibility to multiple chronic diseases.

The study found that the risk of multimorbidity was higher among older women than men. Previous studies have also documented that older women were more vulnerable to multimorbidity than men (Abebe et al., 2020; Balakrishnan et al., 2022; Goel et al., 2024; Musa et al., 2024). The higher prevalence of multimorbidity among women could be explained by the fact that women have a longer life expectancy than men; those who live longer are more likely to suffer from many chronic diseases (Musa et al., 2024). Furthermore, the higher prevalence of multimorbidity among women in Nepal could be due to existing socio-cultural issues, traditional lifestyles, and inadequate access and utilization of healthcare facilities.

Caste/ethnic and cultural diversity is the unique social landscape of Nepal, while variation in the prevalence of multimorbidity by caste and ethnic groups reflects social disparities in access to and use of health services and facilities. This study found that Hill Caste older people had a higher prevalence of multimorbidity compared to Hill Janajati and Dalits. The human development index and household well-being index were high for Hill Caste (United Nations Development Programme [UNDP], 2014), reflecting well-off, well-educated, and higher socioeconomic status. Therefore, they might be health conscious and

have a positive attitude and belief toward health services. Similarly, they tend to have fewer financial problems in accessing health services, which makes it easier for them to seek treatment and consult with doctors and medical professionals. This may result in a higher prevalence of multimorbidity among Hill Caste. The adjusted multinomial logistic regression results showed that Hill Janajati was less likely to suffer from multimorbidity than Hill Caste. A possible explanation for this finding is that older people belonging to this group may be unable to diagnose diseases due to a lack of resources and opportunities for treatment and counseling, which may lead them to understate many chronic conditions.

This study found that the prevalence of multimorbidity is higher among not working older people, which is consistent with the previous studies (Boro & Saikia, 2022; Chauhan, Patel, et al., 2022). Furthermore, this result is also consistent with the systematic review and meta-analysis on risk factors of multimorbidity among older people in India (Goel et al., 2024). A study conducted in Nepal highlighted that the prevalence of multimorbidity was significantly higher among unemployed older adults (Yadav et al., 2021). The study also depicted the high risk of multimorbidity among older people who are not working. But, after adjusting for other factors, working status did not remain a significant predictor of multimorbidity.

The study pointed out that older people who reported old age allowance as an economic source of living have a higher prevalence of multimorbidity. Similarly, this study also identified a higher risk of multimorbidity among older people whose old age allowance was the main economic source of living after controlling for other factors. Moreover, consistent with the findings of a previous study (Balakrishnan et al., 2022), this study demonstrated that the risk of multimorbidity is higher among older people who received social security allowance. Older people receiving social security allowances could eliminate financial barriers to accessing basic health care and encourage visits to doctors

or health professionals, which helped to detect more than one chronic condition. This condition would probably result in a higher risk of multimorbidity reporting among older people who receive social security allowance.

The study indicated a positive association between wealth quintile and multimorbidity. The effects of the wealth quintile on multimorbidity appeared to be strong, even after controlling for other factors. This finding is not unique to this study and is consistent with previous studies (Chauhan, Patel, et al., 2022; Patel et al., 2023). In line with the findings of this study, a study of the Indonesian adult population found that high per-capital expenditure was significantly associated with a higher likelihood of multimorbidity, while individuals with low per-capital expenditure were associated with a low risk of multimorbidity (Hussain et al., 2015). Older people in wealthy households were more likely to be educated and had positive attitudes or beliefs toward health care. Furthermore, older people in wealthy households were more likely than older people in poorer households to have the financial capacity to visit health facilities and get correct diagnoses frequently, which might explain why older people in wealthier households have a higher risk of multimorbidity.

The study further showed that the general health status of older people was significantly associated with multimorbidity, even after adjusting other variables. Older people with fair and poor self-reported health status had a higher risk of multimorbidity than those with good self-reported health status. The result of this study is consistent with the results of previous other studies (Aye et al., 2019; Yang et al., 2021). This could be due to the direct or indirect influence on health conditions caused by the increasing number of chronic diseases.

As expected, the risk of multimorbidity is found to be retained higher among older people who are dependent on ADL after controlling for other variables. This finding is

consistent with the findings from previous studies, which have shown a lower risk of multimorbidity among older people with no ADL disability (Chauhan, Patel, et al., 2022). Disability is a significant factor associated with multimorbidity. Older people without disabilities had a lower risk of developing multimorbidity than older people with disabilities. This result could be associated with physical activity, which could reduce the risk of suffering multiple chronic conditions.

Disability appears to be significantly associated with multimorbidity in both the unadjusted and adjusted models. The results indicate that older people without disabilities have a lower risk of multimorbidity than those with disabilities. This study also found that current/former tobacco users had a lower risk of multimorbidity than those who never used tobacco. This result is inconsistent with previous studies (Saoud et al., 2024).

After controlling for other variables, there is no significant association between multimorbidity and age group, Hill Dalits, working status, receiving social security allowance, IADL, physical activity, current/former tobacco user, and current/former alcohol consumer.

The continuing increases in the burden of multimorbidity are recognized as major demographic, public health, and healthcare challenges. To better understand the healthcare challenges associated with multimorbidity, the linkage between multimorbidity and health service utilization must be examined. Therefore, the subsequent chapter discusses the extent and patterns of health service utilization and factors associated with health service utilization among older people.

CHAPTER VI

HEALTH SERVICE UTILIZATION AND ITS CORRELATES

The previous chapter deals with the prevalence and correlates of multimorbidity among older people. Multimorbid older people require frequent visits to health facilities or healthcare professionals, making them more likely to seek healthcare services, such as emergency care, inpatient, or outpatient services. Therefore, multimorbidity is associated with higher healthcare service utilization. This chapter is intended to examine the levels of health service utilization among older people and identify which predisposing, enabling, need factors, and health behavior factors are associated with health service utilization among older people. This chapter commences with the concept and context of health service utilization, then moves on to a crosstabulation of predisposing, enabling, need factors, and health behavior in relation to health service utilization. Finally, it outlines the results of logistic regression analysis and concludes with a discussion of the key findings.

6.1 Introduction

Health is the main concern of older people. When we ask older people about their problems, they usually mention health problems. That is why health problems are the primary concern of old age. As advancing age, older people are more likely to have multiple chronic conditions and multi-morbidity (Rechel et al., 2009; Wolff et al., 2002). The prevalence of chronic or noncommunicable diseases is high in old age and faces challenges of multimorbidity (Barnett et al., 2012). Therefore, older people are potentially at risk and have a higher demand for health services (Faraji-Khiavi et al., 2022) compared with other age groups. The use of health services by older people is a very important aspect of universal health coverage. Universal health coverage includes good health services from health promotion to prevention and treatment to rehabilitation without fear of financial risks

(Evans et al., 2013). Utilization of health services is one of the key elements to improving health status and reducing morbidity and mortality among older people.

Healthcare utilization is defined as the use of healthcare services by individuals to prevent and cure health problems, promote health and well-being, and obtain information about their health status (Carrasquillo, 2013). In addition, healthcare utilization is also defined as the consumption of a service, procedure, device, or medication (Fisher, 2019; Mkanta & Uphold, 2006) by individuals to prevent diseases and maintain or regain good health. Likewise, healthcare service utilization is defined as the actions in which older people respond to their perceived ill health and health-seeking behavior (Abuduxike et al., 2020; Jiang et al., 2018). Furthermore, health service utilization is an outcome of health-seeking behavior and an indicator of an individual's health status and well-being.

When considering the use of health services among older people, it refers to the use of any health care services, procedures, devices, or medications by older people in order to prevent or cure diseases, promote, maintain, or regain good health, and to obtain advice on their health problems.

The use of health services is an outcome of a complex interaction of various factors relating to the person's self-perceived health status and availability of health care services (Fernández-Olano et al., 2006). Older people are more likely to suffer from chronic diseases, physical impairments, and multimorbidity, which require increased use of chronic care services. Furthermore, older people also need health services for both acute and preventive health care. Health service utilization is a positive factor in improving the general health and well-being of older people. However, health service utilization among older people is influenced by personal, social, economic, and environmental factors and the burden of diseases (Abera Abaerei et al., 2017; Chatterjee et al., 2019; Mwami & Oleche, 2017). In general, older people face greater barriers to accessing health services compared

to other groups due to several factors ranging from their physical condition to disabilities and psychological factors (Bastani et al., 2021).

The Senior Citizens Act 2063 provides priority and subsidies in health care services to senior citizens. Similarly, the Public Health Act 2075 emphasizes that basic health services should be provided free of cost to senior citizens. In accordance with the provisions of the Act, the Senior Citizens Health Services Implementation Guidelines 2077 has made a provision to provide a 50 percent discount on certain health services to senior citizens above 60 years of age and to provide subsidies in treatment for serious health conditions to senior citizens above 70 years of age. Senior citizen health service is one of the priority areas of the Government of Nepal. As part of Universal Health Coverage, the Government of Nepal has developed a Geriatric (Senior citizen) Health Service Strategy for 2021-2030 to build state capacity to support healthy aging and provide quality health services to senior citizens. This strategy has considered that senior citizens face an increased risk of chronic conditions and multimorbidity, resulting in a decline in their functional capacity and increased needs and limitations of health services. This strategy emphasizes easy access to and availability of quality health services, strengthening health promotion and protection, strengthening family and community support systems for healthy aging, expanding the capacity of health facilities at all levels, gender equality and inclusive health care services, as well as the integration and development of geriatric health services at the provincial and local levels (MOHP, 2022).

6.2 Health Facility Visits and Consultations of Healthcare Professionals

The growing number of older people increases the risk of chronic diseases or impairments. Older people have a higher demand for health services than young people. Health services provided to older people during poor health are crucial for promoting healthy aging and well-being. We asked older people which health facility they visited for

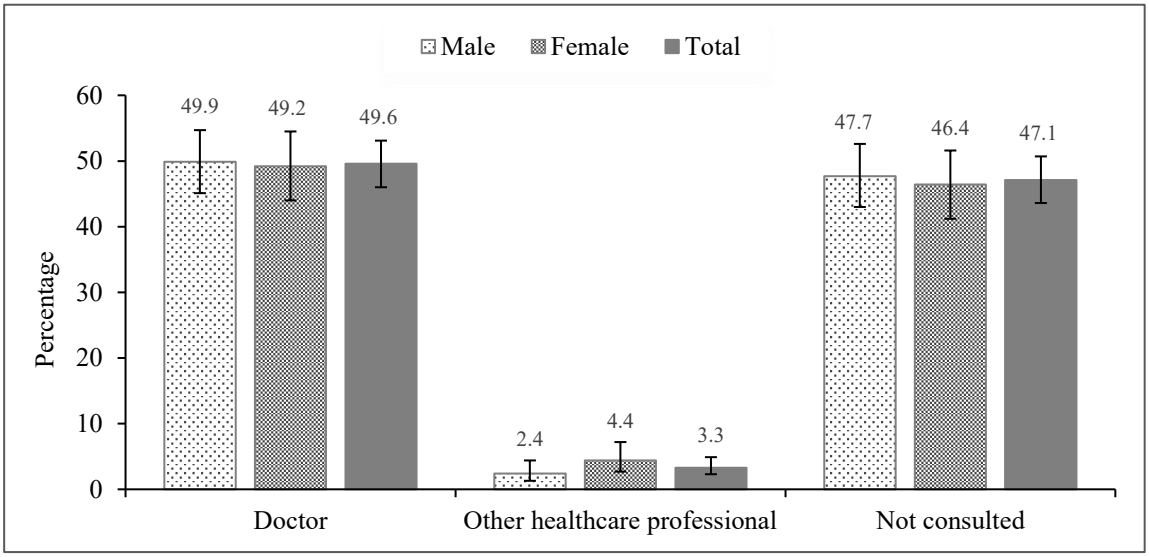
health services when they felt sick in the past 12 months, and Table 6.1 shows that government health facilities were the primary source of treatment, with the highest proportion of older people visiting a government health facility (52.9%), followed by private health facilities (7.6%) and other (0.4%) for health check-ups or treatment. Males and females older people exhibited similar patterns. Thirty-nine percent of older people have not visited a health facility in the past 12 months. However, the tendency to avoid visiting health facilities was more common among males older than females.

Table 6.1: *Percentage Distribution of Older People by Sex Who Visited a Health Facility in the Past 12 Months, by Type of Health Facility*

Types of health facility	Male	Female	Total
Government health facility	51.5	54.6	52.9
Private health facility	7.4	7.9	7.6
Others	0.5	0.3	0.4
Not visit	40.6	37.2	39.0
Total	100.0	100.0	100.0
N	377	317	694

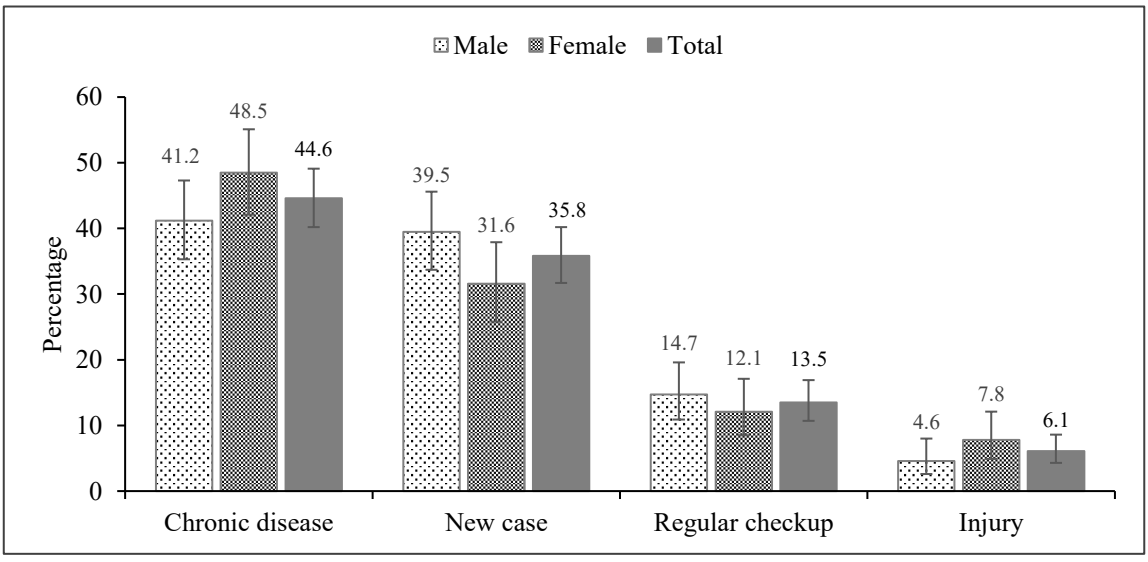
Regarding consultation about health problems, about half of older people have consulted a doctor for their health problems, followed by other health professionals (3.3%), such as health assistants/auxiliary health workers, nurses/midwives, and pharmacists. The findings also show that about 47 percent of older people have not consulted healthcare professionals (Figure 6.1).

Figure 6.1: *Percentage Distribution of Older People by Sex and Healthcare Professional Consultations*



There are many reasons to visit a health facility, including preventive care, routine care, regular check-ups, treatment, injuries, and advice to improve health. However, this study classifies visits to health facilities into four categories: visits for a chronic condition, new cases, regular check-ups, and injuries.

Figure 6.2: *Percentage Distribution of Older People by Sex and Reason to Visit a Health Facility in the Past 12 Months*



The study showed that chronic condition was the most common reason for visiting a healthcare facility (44.6%) during the past 12 months, followed by new cases (35.8%), regular check-ups (13.5%), and injury (6.1%) (Figure 6.2).

6.3 Predisposing Factors and Health Service Utilization

The results of the bivariate analysis of the predisposing factors and health service utilization in the past 12 months are presented in Table 6.2. The results showed that 64 percent of older people had utilized health services in the last 12 months. The pattern of health service utilization did not differ significantly by age, sex, marital status, living arrangement, caste/ethnicity, religion, and education level. The analysis shows that older people in the age group 70-79 years and 80 years and over have a higher proportion of health service utilization than older people in the age group 50-59 years. The analysis further shows that utilization of health services among older people did not vary significantly by sex. About one-third of both males and females utilized health services. A higher proportion of married older people utilized health services than those who were widowed/separated. The results show that the use of health services among older people varies depending on their living arrangements. More than one-third of older people living with a spouse only, and 55 percent living with others, utilized health services. However, the difference in levels of health service utilization between caste/ethnicity is not large. The level of health service utilization was higher among the Hill Caste older people than among Hill Dalits and Hill Janajati older people. The education of older people plays a crucial role in health service utilization. The differences in health services use were not large among older people with different educational levels. However, the differences in the levels of health service utilization were large between literate older people with no formal education and those with secondary and above. About 75 percent of older people who were literate but had no formal education utilized health services, while 59 percent of older people with secondary and above education utilized health services.

Table 6.2: *Percentage of Older People by Health Service Utilization and Predisposing Factors*

Predisposing	Health service utilization				χ^2
	No		Yes		
	Percent	95% CI	Percent	95% CI	p-value
Age group					
60-69	39.5	[34.4, 44.9]	60.5	[55.1, 65.6]	.207
70-79	33.1	[27.9, 38.7]	66.9	[61.3, 72.1]	
80+	33.9	[26.4, 42.2]	66.1	[57.8, 73.6]	
Sex					
Male	36.9	[32.3, 41.6]	63.1	[58.4, 67.7]	.595
Female	35.0	[30.2, 40.2]	65.0	[59.8, 69.8]	
Marital status					
Married	34.4	[30.1, 39.1]	65.6	[60.9, 69.9]	.300
Widowed/Separated/Divorced	38.1	[33.0, 43.4]	61.9	[56.6, 67.0]	
Type of family					
Nuclear family	36.8	[31.1, 43.0]	63.2	[57.0, 68.9]	.742
Joint family	35.6	[31.6, 39.9]	64.4	[60.1, 68.4]	
Living arrangement					
Living alone	40.9	[30.2, 52.5]	59.1	[47.5, 69.8]	.182
Living spouse only	31.3	[24.2, 39.3]	68.7	[60.7, 75.8]	
Living with son/daughter-in-law	35.3	[31.1, 39.7]	64.7	[60.3, 68.9]	
Living with others	44.9	[34.1, 56.2]	55.1	[43.8, 65.9]	
Caste/Ethnicity					
Hill caste	32.0	[27.2, 37.2]	68.0	[62.8, 72.8]	.098
Hill Janajati	40.5	[34.6, 46.7]	59.5	[53.3, 65.4]	
Hill Dalits	37.3	[30.4, 44.6]	62.7	[55.4, 69.6]	
Religion					
Hindu	35.5	[32.0, 39.3]	64.5	[60.7, 68.0]	.485
Buddha/Christian	39.1	[30.1, 49.0]	60.9	[51.0, 69.9]	
Education level					
No education	37.2	[33.2, 41.4]	62.8	[58.6, 66.8]	.198
Literate but no education	25.4	[16.9, 36.2]	74.6	[63.8, 83.1]	
Basic education	35.6	[26.8, 45.5]	64.4	[54.5, 73.2]	
Secondary and above	40.9	[28.0, 55.2]	59.1	[44.8, 72.0]	
Total	36.0	[32.7, 39.5]	64.0	[60.5, 67.3]	

6.4 Enabling Factors and Health Service Utilization

The association between health service utilization and enabling factors is presented in Table 6.3. Enabling factors refer to economic or structural characteristics that facilitate or impede the use of health services. Three of the seven variables—health insurance, wealth quintile, and decision to health care—were significantly associated with health service utilization. The results showed that having health insurance has a positive association with

health service utilization. About 72 percent of older people with health insurance had used health services. Likewise, health service utilization was positively associated with the wealth quintile.

Table 6.3: *Percentage of Older People by Health Service Utilization and Enabling Factors*

Enabling	Health service utilization				χ^2
	No		Yes		
	Percent	95% CI	Percent	95% CI	p-value
Working status					
Currently working	33.1	[28.2, 38.4]	66.9	[61.6, 71.8]	.149
Not working	38.2	[33.7, 42.8]	61.8	[57.2, 66.3]	
Economic source of living					
Own income	36.8	[30.7, 43.4]	63.2	[56.6, 69.3]	.109
Son/daughter	31.2	[25.9, 37.1]	68.8	[62.9, 74.1]	
Old age allowance	39.8	[34.3, 45.7]	60.2	[54.3, 65.7]	
State of economic dependence					
Not dependent	35.4	[29.3, 41.9]	64.6	[58.1, 70.7]	.860
Partial dependent	35.8	[31.5, 40.4]	64.2	[59.6, 68.5]	
Full dependent	38.6	[29.1, 48.9]	61.4	[51.1, 70.9]	
Receiving social security allowance					
Yes	35.6	[31.6, 39.8]	64.4	[60.2, 68.4]	.744
No	36.9	[31.0, 43.2]	63.1	[56.8, 69.0]	
Health insurance					
Yes	28.2	[24.0, 32.8]	71.8	[67.2, 76.0]	<.001
No	44.9	[39.8, 50.1]	55.1	[49.9, 60.2]	
Wealth quintile					
Poorest	45.0	[37.3, 52.9]	55.0	[47.1, 62.7]	.033
Poorer	32.6	[25.6, 40.5]	67.4	[59.5, 74.4]	
Middle	35.7	[28.5, 43.6]	64.3	[56.4, 71.5]	
Richer	38.4	[31.0, 46.4]	61.6	[53.6, 69.0]	
Richest	28.3	[21.7, 36.0]	71.7	[64.0, 78.3]	
Decision to health care					
Self	40.0	[35.1, 45.1]	60.0	[54.9, 64.9]	.030
Other	32.4	[28.0, 37.2]	67.6	[62.8, 72.0]	

The level of health service utilization was higher among older people belonging to the higher wealth quintile. The proportion of older people using health services ranges from 55.0 percent in the poorest wealth quintile to 71.7 percent in the richest wealth quintile. However, older people whose healthcare decisions were made by others were more likely

to use health services. More than two-thirds of older people have decisions about health service utilization made by others.

Working status, economic source of living, state of economic dependency, and social security allowance were found to have no significant association with health service utilization among older people, indicating that health service utilization patterns did not differ significantly.

6.5 Need Factors and Health Service Utilization

Need factors play an important role in health service utilization among older people. Table 6.4 depicts the relationships between health service utilization and need factors. General health status and morbidity conditions were significantly associated with health service utilization. The results showed that older people who rated their health status as poor were more likely to use health services than those who reported their health status as fair and good. Health service utilization was highest among older people who reported poor health status (77.6%), followed by fair (68.9%), than among older people who reported good health status.

The study found that the level of health service utilization was higher among older people with single morbidity and multimorbidity. The proportion of older people who utilized health services was 70.3 percent among those with multimorbidity, 66.1 percent among those with single morbidity, and 40.4 percent among those with no morbidity. On the other hand, activities of daily living, instrumental activities of daily living, level of disability, and disability were not statistically significantly associated with health service utilization among older people. However, the level of health service utilization was higher among older people who perform ADL independently (66.1%), have low IADL functioning (65.0%), have some functional difficulties (66.3%), and have no disability (64.5%).

Table 6.4: *Percentage of Older People by Health Service Utilization and Need Factors*

	Health service utilization				
	No		Yes		χ^2
Need factors	Percent	95% CI	Percent	95% CI	p-value
General health status					
Good	50.2	[44.0, 56.4]	49.8	[43.6, 56.0]	<.001
Fair	31.1	[26.7, 35.9]	68.9	[64.1, 73.3]	
Poor	22.4	[15.8, 30.9]	77.6	[69.1, 84.2]	
Activities of daily living					
Independent	33.9	[29.3, 38.8]	66.1	[61.2, 70.7]	.228
Dependent	38.1	[33.4, 43.1]	61.9	[56.9, 66.6]	
Instrumental activities of daily living					
High- functioning	36.7	[32.4, 41.1]	63.3	[58.9, 67.6]	.640
Low-functioning	35.0	[29.7, 40.7]	65.0	[59.3, 70.3]	
Level of disability					
No difficulty	38.8	[32.7, 45.2]	61.2	[54.8, 67.3]	.172
Some difficulty	33.7	[29.3, 38.4]	66.3	[61.6, 70.7]	
A lot of difficulty	35.5	[26.8, 45.2]	64.5	[54.8, 73.2]	
Cannot do it at all	55.6	[33.9, 75.2]	44.4	[24.8, 66.1]	
Disability index					
With disability	38.7	[30.5, 47.7]	61.3	[52.3, 69.5]	.496
Without disability	35.5	[31.9, 39.3]	64.5	[60.7, 68.1]	
Morbidity conditions					
No morbidity	59.6	[50.8, 67.9]	40.4	[32.1, 49.2]	<.001
Single morbidity	33.9	[28.4, 39.9]	66.1	[60.1, 71.6]	
Multimorbidity	29.7	[25.3, 34.5]	70.3	[65.5, 74.7]	

6.6 Health Behavior and Health Service Utilization

Health behaviors significantly influence the health, health service utilization, and overall well-being of older people. Health behavior refers to any activity undertaken by an individual that is associated with positive or negative health outcomes (Conner, 2015). Individuals perform different types of health behavior. Some behaviors of older people prevent diseases and improve health and well-being, while other behaviors have detrimental effects on health and well-being. The prevalence of health-enhancing and health-impairing behaviors and their relationships to morbidity and the use of health services are essential aspects of healthy aging. Smoking, tobacco use, alcohol consumption, physical activity, and abuse are all considered health behaviors in this study.

The associations between health behaviors and health service utilization among older people are shown in Table 6.5. The results showed that five of four variables—smoking, tobacco use, alcohol consumption, and abuse—were significantly associated with health service utilization among older people. The proportion of older people reporting health service utilization was 68.2 percent among those who had never smoked, while 59.5 percent among those who were current/former smokers. Similarly, older people who are current/former tobacco users had lower levels of health service utilization (57.4%) than older people who never use tobacco (66.8%).

Table 6.5: *Percentage of Older People by Health Service Utilization and Health Behaviors*

	Health service utilization				
	No		Yes		χ^2
Health behaviors	Percent	95% CI	Percent	95% CI	p-value
Smoking					
Never smoker	31.8	[27.4, 36.6]	68.2	[63.4, 72.6]	.013
Current/former	40.5	[35.6, 45.6]	59.5	[54.4, 64.4]	
Tobacco use					
Never user	33.2	[29.3, 37.3]	66.8	[62.7, 70.7]	.013
Current/former	42.6	[36.3, 49.1]	57.4	[50.9, 63.7]	
Alcohol user					
Never user	32.5	[28.3, 37.0]	67.5	[63.0, 71.7]	.018
Current/former	40.9	[35.6, 46.4]	59.1	[53.6, 64.4]	
Physical activities					
No	29.7	[21.9, 38.9]	70.3	[61.1, 78.1]	.134
Yes	37.1	[33.5, 40.9]	62.9	[59.1, 66.5]	
Abuse					
Not abuse	40.2	[36.0, 44.6]	59.8	[55.4, 64.0]	.001
Abuse	28.0	[22.9, 33.8]	72.0	[66.2, 77.1]	

The results also showed that the level of health service utilization is lower among older people who are current/former alcohol consumers (59.1%) than among older people who never consumed alcohol (67.5%). Furthermore, older people who had experienced abuse had a higher level of health service utilization (72.0%) than older people who had not experienced abuse.

The percentage of health service utilization was higher among older people (70.3%) who could perform vigorous and moderate physical activity than those who could not perform physical activities (62.9%). However, the results showed no significant association between physical activity and health service utilization.

6.7 Factors Associated With Health Service Utilization

Bi-variate analysis has been performed to examine the association between predisposing, enabling, need factors and health behaviors, and health service utilization among older people. The bi-variate analysis does not imply a net effect of variables in the presence of other variables. Therefore, a multivariate logistic regression has been performed to examine the net effects of predisposing, enabling, need, and health behavior factors on health service utilization among older people.

The partially and fully adjusted logistic regression analysis results are presented in Table 6.6. The logistic regression results, incorporating predisposing factors, showed that caste/ethnicity (Hill Janajati) was statistically significantly associated with health service utilization. The odds of health service utilization indicated that older people from Hill Janajati were 33 percent less likely to use health services than older people from Hill Caste. Hill Dalit older people were 18 percent less likely to use health services than Hill Caste older people. However, the result was not significant. The results showed that age group, living arrangement, and educational level had no statistically significant relationship with health service utilization (Table 6.6 and column 2).

A logistic analysis of the net effect of enabling factors on health service utilization among older people reveals that older people covered by health insurance have significantly 93 percent higher odds of using health services compared with older people without health insurance. Similarly, older people in the poorer, middle, richer, and richest wealth quintiles have 61 percent, 31 percent, 18 percent, and 93 percent higher odds of using health services,

respectively, compared with older people in the poorest wealth quintile. However, the odds ratio was significant only for the richest wealth quintile. In contrast, working status, economic resources of living, and the decision to seek health care were not found to have a statistically significant effect on health service utilization among older people (Table 6.6 and column 2).

When all need factors are taken together to examine the net effect on health service utilization among older people, the result shows that general health status, ADL, level of disability (cannot do it at all), and morbidity conditions have significant effects on health service utilization. However, general health status and morbidity conditions significantly affect health service utilization. Older people who reported fair health status were 1.99 times (OR=1.99, 95% CI [1.41, 2.81], p<.001) more likely to use health services than older people who reported good health status. On the other hand, older people with poor health status were found to be 3.79 times (OR=3.79, 95% CI [2.16, 6.65], p<.001) more likely to use health services than those with good health status. This indicates an inverse relationship between health service utilization and health status. The study also found that older people who are dependent on ADL were less likely to use health services (OR=0.65, 95% CI [0.46, 0.92], p<.0.5).

Likewise, older people with a more severe disability (cannot do it at all) were 70 percent less likely to use health care services compared to older people with no difficulty. The relationship between morbidity conditions and utilization of health services is positive. Older people with single morbidity were 2.54 times more likely to use health services (OR=2.54, 95% CI [1.60, 4.02], p<.001), while those with multimorbidity were 3.33 times more likely to use health services (OR=3.33, 95% CI [2.09, 5.30], p<.001) compared to older people without morbidity (Table 6.6 and column 2).

An assessment of the association between health behavior factors and health service utilization (partially adjusted) reveals that older people who have experienced abuse are 1.85 times (OR=1.85, 95% CI [1.32, 2.58], p<.001) more likely to use health services than those who have not experienced abuse (Table 6.6 and column 2).

It was found that older people who were current/former smokers had 20 percent, those who were current/former tobacco users had 24 percent, those who were current/former alcohol consumers had 24 percent, and those who were physically active had 21 percent lower odds of using health services compared to the respective reference category. However, the effects were not statistically significant (Table 6.6 and Column 2).

Table 6.6 also presents fully adjusted logistic regression analysis results examining the influence of predisposing, enabling, need, and health behavior factors in health service utilization among older people. After controlling for all other variables in the model, the results show the independent effects of each factor on the outcome variable.

The study found that, among the predisposing factors, only education level (being literate but no schooling) was significantly associated with health service utilization in the fully adjusted logistic regression. The odds of health service utilization were 2.14 times higher among older people with literate but no schooling (OR=2.14, 95% CI [1.18, 3.87], p<.05) compared to those illiterates. In contrast, other predisposing factors did not show a statistically significant relationship. Similarly, among the enabling factors, health insurance and the richest wealth quintile were significantly associated with health service utilization among older people. Older people with health insurance were more likely to use health services (OR=1.65, 95% CI [1.16, 2.33], p<.01) compared to those without health insurance. However, the odds ratio of health insurance decreased slightly in the fully adjusted model compared to the partially adjusted model.

Table 6.6: *Logistic Regression Analysis of Predisposing, Enabling, Need, and Health Behavior Factors Affecting Health Service Utilization Among Older People*

	Partially adjusted[@]		Fully adjusted	
Variables	OR	95% CI	aOR	95% CI
Predisposing factors				
Age group				
60-69	1.00		1.00	
70-79	1.34	[.96, 1.88]	1.27	[.87, 1.86]
80+	1.28	[.82, 1.99]	1.18	[.68, 2.06]
Living arrangement				
Alone	1.00		1.00	
Living with spouse only	1.62	[.89, 2.94]	1.35	[.68, 2.67]
Living with son/daughter-in-law	1.32	[.79, 2.20]	0.80	[.42, 1.54]
Living with others	0.92	[.48, 1.75]	0.89	[.42, 1.87]
Caste/ethnicity				
Hill Caste	1.00		1.00	
Hill Janajati	0.67*	[.46, .96]	0.87	[.56, 1.35]
Hill Dalits	0.82	[.55, 1.23]	1.13	[.68, 1.89]
Education level				
Illiterate	1.00		1.00	
Literate but no education	1.72	[.99, 3.00]	2.14*	[1.18, 3.87]
Basic education	1.03	[.64, 1.66]	1.04	[.60, 1.82]
Secondary and above	0.71	[.38, 1.35]	0.96	[.44, 2.12]
Enabling factors				
Working status				
Currently working	1.00		1.00	
Not working	0.79	[.56, 1.11]	0.79	[.52, 1.20]
Economic source of living				
Own income	1.00		1.00	
Son/daughter	1.16	[.77, 1.75]	1.30	[.79, 2.13]
Old age allowance	0.86	[.57, 1.30]	0.73	[.45, 1.21]
Health insurance				
No	1.00		1.00	
Yes	1.93***	[1.42, 2.63]	1.65**	[1.16, 2.33]
Wealth quintile				
Poorest	1.00		1.00	
Poorer	1.61	[1.00, 2.58]	1.54	[.89, 2.65]
Middle	1.31	[.81, 2.10]	1.50	[.86, 2.59]
Richer	1.18	[.74, 1.88]	1.18	[.68, 2.06]
Richest	1.93**	[1.18, 3.16]	2.02*	[1.09, 3.73]
Decision to health care				
Self	1.00		1.00	
Other	1.27	[.93, 1.74]	1.16	[.81, 1.67]

	Partially adjusted@		Fully adjusted	
Variables	OR	95% CI	aOR	95% CI
Need factors				
General health status				
Good	1.00		1.00	
Fair	1.99***	[1.41, 2.81]	1.81**	[1.25, 2.64]
Poor	3.79***	[2.16, 6.65]	3.12***	[1.63, 5.98]
Activities of daily living				
Independent	1.00		1.00	
Dependent	0.65*	[.46, .92]	0.68	[.46, 1.00]
Level of disability				
No difficulty	1.00		1.00	
Some difficulty	0.98	[.68, 1.41]	1.01	[.67, 1.51]
A lot of difficulty	0.68	[.38, 1.21]	0.65	[.34, 1.25]
Cannot do it at all	0.30*	[.10, .89]	0.49	[.17, 1.45]
Morbidity condition				
No morbidity	1.00		1.00	
Single morbidity	2.54***	[1.60, 4.02]	2.50***	[1.54, 4.06]
Multimorbidity	3.33***	[2.09, 5.30]	3.03***	[1.83, 5.00]
Health behaviors				
Smoking				
Never smoker	1.00		1.00	
Current/ex-smoker	0.80	[.57, 1.11]	0.88	[.60, 1.29]
Tobacco user				
Never user	1.00		1.00	
Current/Ex-user	0.76	[.53, 1.08]	0.75	[.50, 1.11]
Alcohol user				
Never user	1.00		1.00	
Current/ex-user	0.76	[.54, 1.08]	0.76	[.49, 1.17]
Physical activity				
No	1.00		1.00	
Yes	0.79	[.51, 1.24]	0.85	[.46, 1.55]
Abuse				
Never experience	1.00		1.00	
Experience	1.85***	[1.32, 2.58]	1.77**	[1.22, 2.56]

Note: *** p < .001, ** p < .01, * p < .05, CI = Confidence interval

@ including only predisposing, enabling, need, and health behavior factors

The wealth quintile was found to be significantly associated with health service utilization, particularly among older people in the richest wealth quintile. Compared with those in the poorest wealth quintile, older people in the richest wealth quintile were more likely to use health services (OR=2.02, 95% CI [1.09, 3.73], p<.05).

Among need factors, general health status and morbidity conditions have been found to continue to have highly statistically significant and independent effects on the likelihood of older people using health services. Older people with fair health status were 1.81 times more likely to use health services (OR=1.81, 95% CI [1.25, 2.64], p<.01), and older people with poor health status were 3.12 times more likely to use health services (OR=3.12, 95% CI [1.63, 5.98], p<.001) compared to older people with good health status. Similarly, older people with single morbidity (OR=2.50, 95% CI [1.54, 4.06], p<.001) and multimorbidity (OR=3.03, 95% CI [1.83, 5.00], p<.001) were more likely to use health services compared to older people with no morbidity. However, the odds of health service utilization for older people with single morbidity and multimorbidity versus older people with no morbidity decreased slightly in the fully adjusted model than in the partially adjusted model. Furthermore, after controlling other factors, ADL and level of disability did not have a significant impact on health service utilization.

Regarding health behaviors, smoking, tobacco use, alcohol consumption, and physical activity were not found to have a significant impact on health service utilization, even in the fully adjusted logistic regression. However, elder abuse continued to be a significant predictor of health service utilization. Older people who experienced abuse were 77 percent more likely to use health services (OR=1.77, 95% CI [1.22, 2.56], p<.01) compared to older people who did not experience elder abuse.

The results of adjusted logistic regression analysis show that, among the need factors, general health status and morbidity conditions significantly influence health service utilization. Among the enabling factors, only health insurance was significantly associated with health service utilization. Among the health behavior factors, only elder abuse was found to have a statistically significant effect on health service utilization.

6.8 Discussion

This study primarily intended to answer the research question regarding the level of health service utilization and the predisposing, enabling, need, and health behavior factors associated with health service utilization among older people. The level of health service utilization in the past 12 months by older people was 64 percent in this study. This finding is lower than previous studies conducted in Dhulikhel municipality (Sanjel et al., 2012), Pokhara metropolitan city (Acharya et al., 2019; Karmacharya et al., 2021), Kushma municipality (Chhetri et al., 2023), and slightly higher than Sudurpaschim province (Ghimire, Singh, et al., 2021) of Nepal.

Among the predisposing factors, Hill Janajati has been found to be significantly associated with the utilization of health services, indicating that older people belonging to Hill Jananatis were less likely to use the health services than Hill Caste. A previous study found that older people from a privileged group were less likely to utilize health services compared to underprivileged ethnic groups (Acharya et al., 2019). Similarly, another study from Sudurpaschim province of Nepal reported that Janajati older people were less likely to use health services compared to Upper caste older people (Ghimire, Singh, et al., 2021). One possible explanation for this result could be that the majority of Hill Dalits and Janajati are below the poverty line and suffer from poverty. Therefore, they may have limited access to health service utilization. However, it is noted that when all additional variables are taken into consideration, Hill Janajati does not appear to have had a significant effect on health service utilization, but education level does appear to have a significant effects of health service utilization. This study revealed that literate older people were more likely to use health services compared to illiterate older people. The literate older people tend to be more inclined toward in self-care, which in turn enables them to more effectively utilize health services.

As in a previous study conducted in India (Rahaman et al., 2022), this study found that among the enabling factors, health insurance and the richest wealth quintile were significantly positive predictors of health service utilization, even after controlling for the other factors. It has been observed that older people with health insurance were more likely to utilize health services than those who did not have health insurance. Health insurance coverage reduced the burden of out-of-pocket payment associated with the use of health care services. As a result, older people with health insurance were more likely to use health services. This finding is consistent with previous studies from India (Rahaman et al., 2022) but inconsistent with previous studies conducted in different settings in Nepal (Acharya et al., 2019; Karmacharya et al., 2021). However, awareness of health insurance had a significant and positive relationship with health service utilization among older people (Acharya et al., 2019).

The wealth quintile is one of the enabling factors that influenced health service utilization in such a way that older people in the richest wealth quintile were more likely to utilize health services than those in the poorest wealth quintile. After controlling for all other factors, the odds of using health services increased compared to the partially adjusted model, suggesting that the richest wealth quintile had a stronger influence on health service utilization. This could be explained by the fact that older people in the richest wealth quintile had better financial capacity and were able to pay the cost needed in order to access health services. As a result, older people in the richest wealth quintile were more likely to use health services.

A systematic review on primary healthcare utilization among older people in low- and middle-income countries conducted by Gao et al. (2022) demonstrated that, in addition to inequalities in the utilization of primary healthcare across the range of socio-economic status, indicators among older people, higher socioeconomic status and enrollment in health

insurance were associated with increased primary health care utilization. Another study from Ghana documented that the rich and richest wealth quintiles, as well as having health insurance, were strong predictors of healthcare utilization among older adults, indicating that older people in the rich and richest wealth quintile and who had health insurance coverage were more likely to use health care facilities (Awoke et al., 2017).

In the partially adjusted model, which only includes need factors, general health status, level of disability (cannot do it at all), morbidity condition, and elder abuse are statistically associated with health service utilization; however, in the fully adjusted model, general health status, morbidity condition, and elderly abuse remain the most significant predictors of health service utilization among the older people. The study revealed that general health status was the most important need factor for health service utilization among older people, implying that older people with worse health status were more likely to utilize health services compared to those who reported good health status. This finding is consistent with the findings of previous studies in Nepal (Karmacharya et al., 2021) and other countries (Amente & Kebede, 2016; Rahaman et al., 2022; Zeng et al., 2021). This could be explained by the fact that older people with poor health status are more likely to suffer from chronic diseases and require frequent check-ups. As a result, older people with poor health status are more likely to use health services.

Morbidity condition is a significant need factor associated with health service utilization. Older people with single morbidity were more likely to use health services than those without any morbidity. The study also demonstrated that older people with two or more morbidities (multimorbidity) used significantly more health services than those without multimorbidity. This result is consistent with previous studies, which have shown that older people with multimorbidity have a higher level of health service utilization

(Thanakiattiwibun et al., 2023). Previous studies in Nepal by Acharya et al. (2019), Ghimire, Singh, et al. (2021), M. Poudel et al. (2022), and Chhetri et al. (2023) found that older people with one or more morbidities were more likely to utilize health services than those with no morbidity. A study among older people conducted in India by Puri and Pati (2022) highlighted that healthcare utilization increased significantly with multimorbidity. Regarding morbidity and healthcare-seeking behavior, Zeng et al. (2021) argued that older people were more likely to suffer from multiple chronic diseases, required more primary healthcare and more frequent visits to health facilities, and increased the possibility of hospitalization in primary healthcare facilities. Due to this fact, increasing number of chronic diseases among older people in Nepal is leading to a higher likelihood of using health services.

Elder abuse was found to be significantly associated with health service utilization in both the partially and fully adjusted models. The study found that older people who had experienced abuse were more likely to use health services. Previous studies postulated that older people experiencing abuse had a higher likelihood of healthcare utilization (Firdaus et al., 2022; Rosen et al., 2023). In the case of Nepal, there has not been any study on elder abuse and utilization of health services; therefore, there is a need to explore the linkage between elder abuse and its correlates with health service utilization among older people, as elder abuse is widespread and poses a serious health consequence.

The upcoming chapter examines the quality of life and its predictors among older people.

CHAPTER VII

QUALITY OF LIFE AND ITS CORRELATES

This chapter intends to achieve the third objective of the study, which is to assess the extent and correlates of the quality of life of older people. Quality of life is measured using the WHO Quality of Life-8 (WHOQOL-8) scale. This chapter begins by explaining the concept and context of quality of life among older people and ends with a discussion of the findings from a hierarchical multiple regression analysis.

7.1 Introduction

The increasing older population in Nepal faces unique challenges due to changing demographic and social structures. Therefore, quality of life is an important and emerging social issue for healthy and active aging. Healthy aging is the process of developing and maintaining the functional ability to enable well-being in older age (WHO, 2015). Active aging is the process of optimizing opportunities for health, participation, and security in order to improve the quality of life and well-being of older people (WHO, 2002). Healthy aging, active aging, and quality of life are interconnected each other. Healthy and active aging are both positively associated with the quality of life of older people. Any change in one component of healthy aging, active aging, or quality of life will change the component of healthy aging, active aging, or quality of life.

In general, quality of life is the difference between the actual and desired conditions of life. It is the individual's subjective satisfaction with their own experiences and their projection on all aspects of their life, such as physical, psychological, social, emotional, and spiritual. Quality of life is defined by World Health Organization Quality of Life (WHOQOL) Group as the individual's perception of their position of life in the context of

their cultural and value system and also with respect to their goals, expectations, standards, and concerns (WHOQOL Group, 1998). This definition of quality of life reveals that quality of life is a complex and subjective assessment that includes physical health, psychological state, personal beliefs, social relationships, and environmental relationships. Therefore, the quality of life is a multidimensional aspect that includes perception and other contextual elements of life rather than only the state of health, life satisfaction, lifestyle, or well-being.

7.2 Quality of Life Mean Score

The domain-specific and item-specific mean score is presented in Table 7.1. The mean score was calculated according to WHOQOL guidelines, where a lower score indicates a low quality of life, and a higher score indicates a high quality of life in older people. The overall internal consistency using Cronbach's alpha (α) is 0.78, indicating good internal consistency. Cronbach's alpha coefficient ranged from 0.77 to 0.81, indicating that all items are consistent with each other. The result revealed that the mean score of total quality of life was 27.6 with SD = 3.5. Looking at the quality of life in four domains, the highest quality of life score was found for the psychological domain (mean = 7.4, SD = 1.0), followed by the global domain (mean = 7.0, SD = 1.1) and the environmental domain (mean = 6.7, SD = 1.1). The lowest mean score for quality of life was 6.4, with SD = 1.2 for the physical domain.

Regarding item-specific quality of life, the highest mean score for living conditions was 3.8 with SD = 0.6, followed by personal relationships (mean = 3.8, SD = 0.6), daily living activities (mean = 3.7, SD = 0.6), self-satisfaction (mean =3.7, SD = 0.6), general health (mean = 3.5, SD = 0.7), and overall quality of life (mean = 3.5, SD = 0.7). Energy for everyday living had the lowest mean score (mean = 2.7, SD = 0.8), followed by financial resources (mean = 2.9, SD = 0.9).

Table 7.1: *Quality of Life Score by Their Items and Domains Among Older People*

Quality of life items/domains	Mean raw score	SD
Quality of life items		
Overall quality of life	3.5	0.7
General health	3.5	0.7
Energy for everyday life	2.7	0.8
Daily living activities	3.7	0.6
Self-satisfaction	3.7	0.6
Personal relationships	3.8	0.6
Financial resources	2.9	0.9
Living conditions	3.8	0.6
Quality of life domains		
Global	7.0	1.1
Physical	6.4	1.2
Psychological	7.4	1.0
Environmental	6.7	1.1
Total quality of life score	27.6	3.5

Note: SD = Standard deviation

Table 7.2 showed that older people aged 60-69 years had a higher mean score for living conditions (mean = 3.9), daily living activities (mean = 3.8), general health (mean = 3.6) and energy levels (mean = 2.9) than other age groups, but older people aged 70-79 years had a higher score for financial resources (mean = 3.0). The study found that the mean score for overall quality of life was the same across all age groups. Male older people had higher mean scores for living conditions (mean = 3.8) and personal relationships (mean = 3.8), followed by self-satisfaction (mean = 3.7) and daily living activity (mean = 3.7) and a lower mean score for energy level (mean = 2.8). Likewise, the mean score of older female people was higher in living conditions (mean = 3.8) but lower in energy level (mean = 2.6). Except for living conditions, daily living activity, and general health status, older female people were found to have lower mean scores on all items than males.

All caste/ethnic groups had a better score of living conditions (mean = 3.8), but a lower score was found in the energy level, with mean scores ranging from 2.7 for Hill Janajati and Hill Dalits to 2.8 for Hill Caste. Furthermore, the study revealed that older

people from Hill Dalits had lower mean scores than older people from Hill Caste and Hill Janajati, with the exception of living conditions.

Table 7.2 also showed that older people aged 60-69, 70-79, and 80 years and above had a higher mean score in the psychological domain, followed by the global domain. On the other hand, the physical domain had the lowest mean score across all age groups. Furthermore, the study indicated that the mean score in all domains decreased with increasing age. The mean score for all domains was nearly equal, even though female older people had a lower score in all domains than males.

Regarding caste/ethnicity, older people from the Hill Caste, Hill Janajati, and Hill Dalits had a higher score in the psychological domain, followed by the global domain in all caste/ethnic groups, and were found to have lower scores in the physical domain. The results suggested that older people from Hill Dalits had lower mean scores in all domains than Hill Caste and Hill Janajati.

Table 7.2: *Quality of Life Score by Age Group, Sex, and Caste/Ethnicity According to Their Items and Domains Among Older People.*

	60-69	70-79	80+	Male	Female	Hill Caste	Hill Janajati	Hill Dalits
Quality of life items and domains	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Quality of life items								
Overall quality of life	3.5 (0.7)	3.5 (0.7)	3.5 (0.7)	3.5 (0.7)	3.4 (0.7)	3.6 (0.6)	3.5 (0.7)	3.3 (0.8)
General health	3.6 (0.6)	3.5 (0.7)	3.4 (0.8)	3.5 (0.6)	3.5 (0.7)	3.5 (0.7)	3.5 (0.6)	3.4 (0.7)
Energy for everyday life	2.9 (0.8)	2.7 (0.7)	2.3 (0.7)	2.8 (0.8)	2.6 (0.8)	2.8 (0.8)	2.7 (0.8)	2.7 (0.7)
Daily living activities	3.8 (0.5)	3.7 (0.6)	3.5 (0.9)	3.7 (0.6)	3.7 (0.6)	3.8 (0.6)	3.7 (0.6)	3.6 (0.7)
Self-satisfaction	3.7 (0.5)	3.7 (0.6)	3.5 (0.8)	3.7 (0.6)	3.6 (0.6)	3.7 (0.6)	3.6 (0.6)	3.6 (0.7)
Personal relationship	3.8 (0.5)	3.8 (0.5)	3.5 (0.9)	3.8 (0.6)	3.7 (0.6)	3.8 (0.6)	3.7 (0.6)	3.7 (0.6)
Financial resources	2.9 (0.9)	3.0 (0.9)	2.9 (0.9)	3.0 (0.9)	2.9 (0.9)	3.0 (0.9)	2.9 (0.9)	2.7 (0.9)
Living conditions	3.9 (0.5)	3.8 (0.5)	3.7 (0.7)	3.8 (0.5)	3.8 (0.5)	3.8 (0.6)	3.8 (0.5)	3.8 (0.6)
Quality of life domains								
Global	7.1 (1.1)	7.0 (1.1)	6.8 (1.2)	7.1 (1.1)	6.9 (1.2)	7.2 (1.1)	7.0 (1.1)	6.7 (1.2)
Physical	6.7 (1.1)	6.3 (1.1)	5.8 (1.4)	6.5 (1.2)	6.3 (1.2)	6.5 (1.2)	6.3 (1.2)	6.3 (1.2)
Psychological	7.5 (0.9)	7.5 (0.9)	7.1 (1.5)	7.4 (1.0)	7.3 (1.1)	7.5 (1.0)	7.4 (1.0)	7.3 (1.1)
Environmental	6.8 (1.1)	6.8 (1.1)	6.6 (1.2)	6.8 (1.1)	6.6 (1.1)	6.8 (1.1)	6.8 (1.0)	6.5 (1.2)
Total QoL score	28.1 (3.1)	27.6 (3.2)	26.3 (4.2)	27.8 (3.3)	27.3 (3.6)	28.0 (3.5)	27.4 (3.3)	26.9 (3.5)

7.3 Correlation Between Four Domains and Individual Items of Quality of Life

The correlation between the four domains of quality of life is presented in Table 7.3. Before execution, pairwise correlation, normality, and linear relationship between two variables and outliers were checked (Appendix 5). It is observed that all domains are significantly positively associated with each other. A strong relationship between the environment and the global was observed with a correlation coefficient of 0.57. The correlation between the psychological and global domains was 0.54, and an almost similar degree of correlation was also observed between the physical and global domains. The correlation between the environment and the physical domain appeared to be weak compared to the relationship with the psychological domain. Similarly, a weak relationship between the psychological and physical domains was also observed.

Table 7.3: *Correlation Between Four Domains of Quality of Life*

QoL domains	Global	Physical	Psychological	Environmental
Global	1.000			
Physical	.519***	1.000		
Psychological	.539***	.319***	1.000	
Environmental	.568***	.393***	.438***	1.000

*** p < .001, ** p < .01, * p < .05

The results of the Spearman correlation between individual items are shown in Table 7.4, which revealed that all individual items had statistically significant positive associations with each other. The highest correlation was found between living conditions and personal relationships with a coefficient of 0.49, followed by a high correlation between personal relationships and self-satisfaction, daily living activities and general health, and personal relationships and overall QoL. The lowest correlation was found between living conditions and daily living activities.

Table 7.4: *Spearman Correlation Between Individual Items of Quality of Life*

QoL items	Overall quality of life	General health	Energy for everyday life	Daily living activity	Self-satisfaction	Personal relationships	Financial resources	Living conditions
Overall quality of life	1.000							
General health	.356***	1.000						
Energy for everyday life	.183***	.372***	1.000					
Daily living activity	.326***	.449***	.393***	1.000				
Self-satisfaction	.392***	.424***	.187***	.239***	1.000			
Personal relationships	.407***	.353***	.120**	.219***	.465***	1.000		
Financial resources	.306***	.436***	.349***	.369***	.206***	.182***	1.000	
Living conditions	.338***	.295***	.077*	.055*	.385***	.494***	.083*	1.000

*** p < .001, ** p < .01, * p < .05

7.4 Quality of Life Domain Score by Health Service Utilization and Multimorbidity

The mean score differences in the quality of life of older people are illustrated in Table 7.5. The study found that the mean score difference in quality of life with health service utilization was statistically significant only in the global domain (mean=6.9, p < .01) and physical domain (mean = 6.3, p < .01). Older people who utilized health services had a higher mean score in the psychological domain (mean = 7.4), followed by the global and environment domain.

Table 7.5: *Mean Score of Quality of Life Domain by Health Service Utilization and Morbidity*

	Global	Physical	Psychological	Environmental
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Health service utilization				
No	7.2 (1.1)	6.6 (1.3)	7.4 (1.0)	6.8 (1.1)
Yes	6.9 (1.1)	6.3 (1.1)	7.4 (1.0)	6.7 (1.1)
t-test	t (692) = 2.98 p = .003	t (692) = 2.84 p = .005	t (692) = 0.18 p = .861	t (692) = 0.96 p = .335
Morbidity				
No morbidity	7.0 (1.1)	6.9 (1.0)	7.3 (0.9)	6.8 (1.1)
Single morbidity	6.9 (1.1)	6.4 (1.1)	7.4 (1.0)	6.6 (1.1)
Multimorbidity	7.1 (1.1)	6.2 (1.3)	7.4 (1.1)	6.8 (1.1)
F-test	F (2,691) = 2.61 p = .074	F (2,691) = 15.44 p = .001	F (2,691) = 0.64 p = .525	F (2,691) = 5.18 p = .006

Regarding the mean score differences in the quality of life of older people with morbidity conditions, a significant difference was found in the physical domain (mean = 6.2, $p < .01$). Older people suffering from multimorbidity had a higher mean score in the physiological domain, followed by the global, and the environmental domains, while the lowest mean score was observed in the physical domain.

7.5 Mean Quality of Life Scores and Sociodemographic Characteristics

The mean quality of life score among older people by sociodemographic characteristics is shown in Table 7.6. A one-way analysis of variance was conducted to determine whether the mean quality of life score differed significantly across sociodemographic characteristics of older people. The results revealed significant differences in mean quality of life scores based on sociodemographic characteristics. The mean quality of life scores were found to decrease with increasing age. Older people in the age group 60-69 had a mean quality of life score of 28.1 (SD = 3.1), those aged 70-79 years had a mean of 27.6 (SD = 3.3), and those aged 80 years and over had a mean of 26.3 (SD = 4.2). Older married people had a significantly higher quality of life score (mean = 28.1, SD = 3.2), while it was lower for those widowed/separated/unmarried (mean = 26.9, SD = 3.7). It has been found that there are significant differences in the quality of life in terms of living arrangements. Older people living only with their spouses had a higher mean quality of life score (mean = 28.2, SD = 3.4), followed by those living with their son or daughter-in-law and others, and older people who stayed alone had lower mean quality of life score (mean = 26.5, SD = 4.4). By caste/ethnicity, Hill Dalit older people had significantly lower mean quality of life score (mean = 26.9, SD = 3.6) than Hill Caste (mean = 28.0, SD = 3.5) and Hill Janajati (mean = 27.4, SD = 3.3). There were significant differences in quality of life scores among older people based on their level of education. Older people with no

education had lower mean quality of life scores (Mean = 27.0, SD = 3.5), and those with secondary and higher education had higher mean scores (mean = 30.3, SD = 3.5). The analysis further revealed no significant differences in mean quality of life score based on sex, type of family, and religion.

Table 7.6: *Mean Score of Quality of Life by Sociodemographic Characteristics of Older People*

	Quality of life scores			
Characteristics	Mean	SD	Sample	*F*-test and *t*-test
Age group				
60-69	28.1	3.1	301	$F(2,691) = 11.76$
70-79	27.6	3.3	269	$p < .001$
80+	26.3	4.2	124	
Sex				
Male	27.8	3.3	377	$t(692) = 1.91$
Female	27.3	3.6	317	$p = .056$
Marital status				
Married	28.1	3.2	392	$t(692) = 4.60$
Widowhood	26.9	3.7	302	$p < .001$
Type of family				
Nuclear	27.7	3.6	228	$t(692) = 0.56$
Joint	27.5	3.4	466	$p = .577$
Living arrangement				
Alone	26.5	4.4	66	$F(3,690) = 3.61$
Living spouse only	28.2	3.4	131	$p = .013$
Living with son/daughter-in-law	27.5	3.3	428	
Living with others	27.8	3.0	69	
Caste/ethnicity				
Hill Caste	28.0	3.5	306	$F(2,691) = 6.30$
Hill Janajati	27.4	3.3	227	$p = .002$
Hill Dalit	26.9	3.6	161	
Religion				
Hindu	27.5	3.4	602	$t(692) = -0.26$
Other	27.6	3.6	92	$p = .793$
Education level				
No education	27.0	3.5	489	$F(3,690) = 21.58$
Literate but not schooling	28.9	2.5	71	$p < .001$
Basic education	28.4	2.9	90	
Secondary education	30.3	3.5	44	
Total	27.6	3.5	694	

7.6 Mean Quality of Life Scores and Economic Characteristics

The differences in the mean quality of life score in terms of the economic characteristics of older people are illustrated in Table 7.7. The analysis revealed significant differences in mean quality of life scores with working status, economic source of living, state of economic dependency, receiving social security allowance, and wealth quintiles. On the other hand, there were no significant differences in mean quality of life score with health insurance.

Table 7.7: *Mean Score of Quality of Life by Economic Characteristics*

	Quality of life scores			
Characteristics	Mean	SD	Sample	*F*-test and *t*-test
Working status				
Currently working	27.9	2.9	296	t (692) = 2.22
Not working	27.3	3.8	398	p = .027
Economic source of living				
Own income	28.7	3.3	201	F (2,691) = 16.60
Son/daughter	27.1	3.1	237	p < .001
Old age allowance	27.0	3.7	256	
State of economic dependency				
Not dependent	28.2	3.6	198	F (2,691) = 6.49
Partial dependent	27.4	3.2	413	p = .002
Full dependent	26.7	4.1	83	
Receiving social security allowance				
Yes	27.2	3.5	477	t (692) = -4.60
No	28.4	3.2	217	p < .001
Health insurance				
Yes	27.5	3.1	369	t (692) = -0.14
No	27.6	3.9	325	p = .892
Wealth quintile				
Poorest	26.3	3.9	140	F (4,689) = 10.34
Poorer	27.2	3.3	138	p < .001
Middle	27.4	3.2	140	
Richer	28.4	3.3	138	
Richest	28.6	3.1	138	
Own mobile phone				
Yes	27.9	3.0	330	t (692) = 3.34
No	27.0	4.0	364	p = .001
Total	27.6	3.5	694	

Quality of life scores were significantly higher among older people who were currently working (mean = 27.9, SD = 2.9), had their own income as an economic source of living (mean = 28.7, SD = 3.3), and were not dependent (mean = 28.2, SD = 3.6). Regarding receiving security allowance, older people who did not receive security allowance have a higher quality of life score (mean = 28.4, SD = 3.3) than those who received security allowance.

Household wealth status is positively associated with the mean quality of life scores. Older people in the poorest wealth quintile had lower mean quality of life scores (mean = 26.3, SD =3.9) than older people in the poorer, middle, richer, and richest wealth quintile. The mean score for quality of life was 28.6, with SD = 3.1 for older people in the richest wealth quintile. The quality of life score among older people with mobile phones (mean = 27.9, SD = 3.0) was significantly higher than among those without mobile phones.

7.8 Mean Quality of Life Scores and Multimorbidity and Health Service Utilization, Health State, and Functional Health

Table 7.8 presents the differences in mean quality of life score with respect to the multimorbidity, health service utilization, health state, and functional health of older people. The results showed significant differences in quality-of-life mean scores based on health service utilization, general health status, instrumental activities of daily living (IADL), level of disability, and disability index. The results illustrated that mean quality of life scores did not differ significantly with morbidity conditions. The results showed that older people who use health services had higher mean quality of life scores than those who did not use health services. The results also showed that the mean quality of life score was positively associated with the general health status of older people. Older people who reported their health status as good health had a higher mean quality of life score (mean = 29.1, SD = 3.2) than those who reported their health status as poor health (mean = 24.7, SD

= 3.8). Regarding instrumental activities of daily living, older people with high IADL functioning had higher quality of life scores (mean = 28.1, SD = 3.1) than older people with low IADL functioning (mean = 26.7, SD = 3.8).

Table 7.8: *Mean Score of Quality of Life by Multimorbidity, Health Service Utilization, Health State, and Functional Health of Older People*

	Quality of life scores			
Variables	Mean	SD	Sample	*F*-test and *t*-test
Multimorbidity and health service utilization				
Multimorbidity condition				
No morbidity	28.1	3.1	114	F (2,691) = 2.65
Single morbidity	27.2	3.3	236	p = .072
Multimorbidity	27.6	3.6	344	
Health service utilization				
Yes	27.3	3.4	444	t (692) = 2.32
No	28.0	3.5	250	p = .021
Health state and functional health				
General health status				
Good	29.1	3.2	227	F (2,691) = 69.74
Fair	27.4	2.9	360	p < .001
Poor	24.7	3.8	107	
Activities of daily living				
Independent	27.6	3.0	345	t (692) = 0.00
Dependent	27.6	3.8	349	p = .998
Instrumental activities of daily living				
High-functioning	28.1	3.1	431	t (692) = 4.95
Low-functioning	26.7	3.8	263	p < .001
Level of disability				
No difficulty	28.4	3.1	209	F (3,690) = 16.15
Some difficulty	27.5	3.2	374	p < .001
A lot of difficulty	26.5	4.4	93	
Cannot do it at all	23.7	4.0	18	
Disability index				
With disability	26.0	4.5	111	t (692) = -5.25
Without disability	27.9	3.1	583	p < .001
Total	27.6	3.5	694	

By level of disability, the mean quality of life score was lowest in older people who reported cannot do it at all (mean = 23.7, SD = 4.0), and it was highest in older people who reported they had no difficulty (mean = 28.4, SD = 3.1), suggesting that the mean quality of life scores was negatively associated with the level of disability of older people.

Similarly, older people with disability reported a higher quality of life score (mean = 27.9, SD = 3.1) than those without disability (mean = 26.0, SD = 4.5). On the other hand, no significant differences in quality of life scores were observed among older people in relation to multimorbidity conditions and ADL.

7.9 Mean Quality of Life Scores and Health Behavior

The results of differences in quality of life scores according to health behavior or health habits are illustrated in Table 7.9. The results revealed significant differences in mean quality of life scores for physical activity and elder abuse. Older people who engaged in physical activity had higher quality of life scores (mean = 28.0, SD = 3.2) than those who did not engage in physical activity (mean = 24.8, SD = 3.6).

Table 7.9: *Mean Score of Quality of Life by Health Behavior of Older People*

	Quality of life scores			
Variables	Mean	SD	Sample	*t*-test
Smoking				
Never smoking	27.4	3.3	358	t (692) = -1.57
Current/ex-user	27.8	3.6	336	p = .117
Tobacco use				
Never use	27.6	3.6	485	t (692) = 0.76
Current/ex-user	27.4	3.2	209	p = .448
Alcohol user				
Never use	27.6	3.5	403	t (692) = 0.29
Current/ex-user	27.5	3.3	291	p = .772
Physical activities				
Yes	28.0	3.2	593	t (692) = -9.18
No	24.8	3.6	101	p < .001
Elder abuse				
Not experience	28.2	3.4	455	t (692) = 6.57
Experience	26.4	3.2	239	p < .001
Total	27.6	3.5	694	

The results showed that older people who had not experienced elder abuse have higher mean quality of life scores (mean = 28.2, SD = 3.4) than those who had experienced elder abuse (mean = 26.4, SD = 3.2). On the other hand, higher quality of life scores were

reported by older people who were current/former smokers and never used tobacco or alcohol. However, these differences were not statistically significant.

7.10 Factors Associated With Quality of Life

The results of the hierarchical multiple regression analysis conducted to comprehensively identify factors influencing the quality of life of older people are shown in Table 7.10. Model 1 included multimorbidity and health service utilization and accounted for 2 percent of the variability in the quality of life scores explained by these variables. The results showed that older people with single morbidity have a significantly lower quality of life score (β = -0.66, 95% CI [-1.26, -0.07], p<.05) compared to those who had no morbidity. Older people with multimorbidity also had a lower quality of life score, but the association was not statistically significant. Likewise, older people who used health services had a lower quality of life score (β = -0.58, 95% CI [-1.03, -0.13], p<.05) compared to those who did not use health services.

Model 2 included significant variables from Model 1 and sociodemographic characteristics. The explanatory power of the model has increased to 14 percent, implying that sociodemographic variables account for an additional 12 percent of the variations in the quality of life score. In Model 2, health service utilization continues to have negative effects on the quality of life score. The results also showed that older people aged 80 and over had a lower quality of life (β = -0.90, 95% CI [-1.52, -0.27], p<.01) compared to those aged 60-69 years, suggesting that increasing age is negatively associated with quality of life. The regression coefficient of sex indicates that females had higher quality of life scores (β = 0.68, 95% CI [0.17, 1.19], p<.01) than males, keeping the remaining variables of the model constant. Marital status was significantly and negatively associated with the quality of life of older people. Those who were widowed, separated, divorced, or single had a lower quality of life score (β = -0.58, 95% CI [-1.12, -0.04], p<.05) compared to their married counterparts. Additionally, education level had a statistically significant and positive

relationship with quality of life scores. Older people with literate but no education, basic education, and secondary and higher education had 1.83 points, 1.11 points, and 2.36 points higher quality of life than older people with no education, respectively, keeping the remaining variables constant.

Model 3 included significant predictors of Model 2 and economic characteristics accounting for 18 percent of the variation in quality of life scores. The economic characteristics in the model account for an additional 4 percent of the variation in quality of life scores among older people. The regression results showed that six variables— health service utilization, sex, marital status, education level, economic source of living, and wealth quintile— were significantly associated with quality of life scores. It is observed that health service utilization, marital status, and economic source of living were negatively associated with quality of life scores, whereas sex, education level, and wealth quintile were positively associated with quality of life scores. Older people who reported their son and daughter's income (β = -0.85, 95% CI [-1.42, -0.28], $p<.01$) and old age allowance (β = -0.77, 95% CI [-1.42, -0.12], $p<.05$) as their main economic source of living had a lower quality of life score compared to those who reported own income. The quality of life score was 0.67 points higher for older people in the poor wealth quintile, 0.96 points higher for those in the middle wealth quintile, 1.43 points higher for those in the richer wealth quintile, and 1.82 points higher for those in the richest wealth quintile, compared to poorest wealth quintile. The regression results further indicated that age groups, working status, state of economic dependency, receipt of social security allowance and mobile phone ownership were negatively associated with quality of life scores, however these relationships were not statistically significant.

Model 4 included significant predictors from Model 3, as well as health state and functional health. The explanatory power of this model is 31 percent. Health state and functional health account for an additional 13 percent of variation in quality of life scores.

The results indicate a statistically significant association between quality of life scores and sex, marital status, education level, economic source of living, wealth quintile, general health status, activity of daily living, and disability among older people. Marital status, economic source of living, and general health status were negatively associated with quality of life scores. In contrast, sex, education level, wealth quintile, activity of daily living, and disability were positively associated. Quality of life score was 1.02 points lower among older people with fair health status (β = -1.02, 95% CI [-1.41, -0.63], p<.001) and 3.24 points lower among older people with poor health status (β = -3.24, 95% CI [-3.87, -2.61], p<.001) than those who reported good health status. Older people who required assistance in ADL had 1.22 points higher quality of life scores than those who were independent in ADL. Additionally, older people without disabilities had 0.73 points higher quality of life scores (β = 0.73, 95% CI [0.13, 1.33], p<.05) compared to those older people with disabilities.

Model 5 comprises all significant predictors from Model 4 and health behavior factors. This model accounted for 36 percent of the variation in the quality of life. The health behavior factors in the model explained an additional 5 percent of the variation in quality of life scores among older people. The results show that sex, education level, economic source of living, wealth quintile, general health status, activity of living, smoking, physical activities, and elder abuse are statistically significantly associated with quality of life scores. The findings from Model 5 revealed that sex, education level, wealth quintile, ADL, smoking, and physical activity were positively associated with quality of life scores, whereas economic source of living, general health status, and elder abuse were negatively associated with quality of life scores. Older people who were current/former smokers have a higher quality of life score (β = 0.47, 95% CI [0.11, 0.82], p<.05) than non-smokers and older people who engaged in physical activity also had a higher quality of life score (β = 1.77, 95% CI [1.17, 2.38], p<.001) than those who did not engage in physical activity. The results also showed that older people who had experienced abuse had lower

quality of life scores (β = -0.81, 95% CI [-1.19, -0.43], p<.001) compared to older people who had not experienced abuse.

Model 6 included all significant predictors in Model 5 that explained 35 percent variations in scores of quality of life among older people. The Model 6 results revealed that five variables—education level, wealth quintile, ADL, smoking, and physical activity—were statistically significant and positively associated with the quality of life scores. Likewise, three variables—economic sources of living, general health status, and elder abuse—were statistically significantly and negatively associated with the quality of life score of older people. No statistically significant relationship was observed between the sex and quality of life scores.

The final model (Model 6) revealed that older people who were literate but had no formal education (β = 0.96, 95% CI [0.41, 1.51], p<.001), had basic education (β = 0.75, 95% CI [0.19, 1.32], p<.01), and had secondary and higher education (β = 1.09, 95% CI [0.35, 1.84], p<.01) had higher quality of life scores than those with no education, keeping remaining variables as constant. The results also showed that wealth had the strongest relationship with the quality of life of older people. Quality of life scores were higher among older people in the richest wealth quintile than those in the poorest. However, the estimated regression coefficient was very small (β = 0.63, 95% CI [[0.04, 1.21], p<.05) in the poorer wealth quintile and high (β = 1.74, 95% CI [1.12, 2.35], p<.001) in the richest wealth quintile. The study also found that older people dependent on ADL had higher quality of life scores (β = 1.13, 95% CI [0.74, 1.52], p<.001) than those with independents in ADL. Likewise, older people who were current/former smokers had higher quality of life scores (β = 0.47, 95% CI [0.11, 0.82], p<.05) than non-smokers and older people who engaged in physical activity also had higher quality of life score (β = 1.89, 95% CI [1.29, 2.48], p<.001) than those who did not engage in physical activity.

Table 7.10: *Hierarchical Regression Models for Predicting Factors Associated with Quality of Life in Older People*

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variables	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI
Multimorbidity												
No morbidity												
Single morbidity	-0.66*	[-1.26, -.07]	-0.49	[-1.07, .08]								
Multimorbidity	-0.16	[-.75, .43]	-0.15	[-.72, .43]								
Health Service Utilization												
No												
Yes	-0.58*	[-1.03, -.13]	-0.68**	[-1.11, -.25]	-0.81***	[-1.22, -.40]	-0.34	[-.72, .04]				
Age group												
60-69												
70-79			-0.12	[-.55, .32]	-0.01	[-.53, .52]						
80+			-0.90**	[-1.52, -.27]	-0.67	[-1.36, .03]						
Sex												
Male												
Female			0.68**	[.17, 1.19]	0.63*	[.14, 1.11]	0.51*	[.07, .94]	0.45*	[.03, .88]	0.34	[-.06, .74]
Marital status												
Married												
Widowhood/Separated/Divorced			-0.58*	[-1.12, -.04]	-0.58*	[-1.08, -.09]	-0.53*	[-.97, -.09]	-0.30	[-.73, .12]		
Living arrangement												
Alone												
Living spouse only			0.74	[-.31, 1.78]								
Living with son/daughter-in-law			0.68	[-.21, 1.57]								
Living with others			0.96	[-.12, 2.04]								
Caste/ethnicity												
Hill caste												
Hill Janajati			-0.14	[-.62, .33]								
Hill Dalit			-0.51	[-1.07, .06]								

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variables	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI
Education level												
No education												
Literate but no education			1.83***	[1.23, 2.43]	1.59***	[.97, 2.20]	1.27***	[.72, 1.82]	0.96***	[.41, 1.51]	0.96***	[.41, 1.51]
Basic education			1.11***	[.49, 1.74]	0.81*	[.18, 1.43]	0.77**	[.20, 1.33]	0.73*	[.16, 1.30]	0.75**	[.19, 1.32]
Secondary and above			2.36***	[1.51, 3.21]	1.57***	[.71, 2.42]	1.26**	[.48, 2.05]	1.09**	[.34, 1.83]	1.09**	[.35, 1.84]
Working status												
Currently working												
Not working					-0.08	[-.52, .37]						
Economic source of living												
Own income												
Son/daughter					-0.85**	[-1.42, -.28]	-0.79***	[-1.24, -.33]	-0.75**	[-1.19, -.30]	-0.80***	[-1.24, -.35]
Old age allowance					-0.77*	[-1.42, -.12]	-0.67**	[-1.17, -.16]	-0.75**	[-1.23, -.27]	-0.86***	[-1.32, -.39]
State of economic dependency												
Not dependent												
Partial dependent					-0.07	[-.58, .43]						
Full dependent					-0.56	[-1.44, .32]						
Receiving social security allowance												
No												
Yes					-0.12	[-.71, .48]						
Wealth quintile												
Poorest												
Poorer					0.67*	[.02, 1.31]	0.68*	[.10, 1.27]	0.64*	[.07, 1.22]	0.63*	[.04, 1.21]
Middle					0.96**	[.30, 1.62]	0.90**	[.30, 1.50]	0.98***	[.40, 1.56]	0.99***	[.41, 1.57]
Richer					1.43***	[.79, 2.07]	1.48***	[.90, 2.07]	1.55***	[.98, 2.11]	1.55***	[.99, 2.12]
Richest					1.82***	[1.13, 2.50]	1.77***	[1.14, 2.39]	1.73***	[1.11, 2.34]	1.74***	[1.12, 2.35]
Own mobile phone												
No												
Yes					-0.03	[-.50, .45]						

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variables	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI	β-coef	95% CI
General health status												
Good												
Fair							-1.02***	[-1.41, -.63]	-0.91***	[-1.29, -.53]	-0.93***	[-1.31, -.55]
Poor							-3.24***	[-3.87, -2.61]	-2.67***	[-3.30, -2.04]	-2.76***	[-3.39, -2.13]
Activity of daily living												
Independent												
Dependent							1.22***	[.80, 1.64]	1.18***	[.78, 1.58]	1.13***	[.74, 1.52]
Instrumental activity of daily living												
High functioning												
Low functioning							-0.28	[-.74, .18]				
Disability index												
With disability												
Without disability							0.73*	[.13, 1.33]	0.44	[-.12, 1.00]		
Smoking												
Never smoking												
Current/ex-smoker									0.47*	[.11, .82]	0.47*	[.11, .82]
Physical activity												
No												
Yes									1.77***	[1.17, 2.38]	1.89***	[1.29, 2.48]
Elder abuse												
Not experience												
Experience									-0.81***	[-1.19, -.43]	-0.84***	[-1.22, -.47]
R-squared	0.02		0.14		0.18		0.31		0.36		0.35	

Note: *** p <.001, ** p <.01, * p <.05

The regression results also showed that older people who reported son/daughter income (β = -0.80, 95% CI [-1.24, -.35], p<.001) and old age allowance (β = -0.86, 95% CI [-1.32,-0.39], p<.001) as an economic source of living had lower quality of life scores compared to those who reported their own income as their economic source of living. Likewise, older people with fair health status (β = -0.93, 95% CI [-1.31, -0.55], p<.001) and poor health status (β = -2.76, 95% CI [-0.39, -2.13], p<.001) had lower quality of life score compared to those with good health status. Additionally, older people who experienced abuse reported significantly lower quality of life scores (β = -0.84, 95% CI [-1.22, -0.47], p<.001) than those who had never experienced abuse.

Regardless of the additional predictors introduced in each subsequent model, the hierarchical regression revealed a consistent association between some specific factors and quality of life scores across various models. Health service utilization was consistently associated with quality of life scores in Models 1-3; sex was consistently associated with quality of life scores in Models 2-5; education level remained significantly associated with quality of life scores in Models 2-6. Likewise, economic sources and wealth quintile were consistently associated with quality of life scores in Models 3-6. General health status and ADL were consistently associated with quality of life in Models 4-6. Additionally, smoking, physical activity, and elder abuse were consistently associated with quality of life scores in Models 5 and 6. The results pointed out that education level, economic source of living, wealth quintile, general health status, and ADL are important factors influencing the quality of life of older people.

7.11 Discussion

Quality of life is a multidimensional concept that has become a significant social challenge as the aging population increases. The finding of this study shows that the mean total quality of life score was 27.6. This finding has been supported by the study conducted

in the Kavre district (Risal et al., 2020), which revealed a slightly lower mean quality of life score. Looking at the four domains of quality of life, older people reported the highest quality of life scores in the psychological domain and the lowest in the physical domain. The results of this study contrast with the results of a previous study in Nepal (Poudyal et al., 2023), which found that the mean score was highest for the environmental domain and the lowest for the psychological domain. The study found that the highest quality of life scores were for living conditions, and the lowest were for energy for everyday life. These results are consistent with the findings of previous studies (Risal et al., 2020). Higher quality of life scores for living conditions can be attributed to factors such as improved access to roads and transportation, better personal relationships, societal attachment, and support in the living environment. Similarly, in old age, due to poor health conditions and increasing age, there is a feeling of lack of physical energy for daily activities, which may result in a lower quality of life score for energy level.

The results of regression models showed that multimorbidity and health service utilization have a negative association with quality of life scores. Older people with single or multimorbidity have a lower mean quality of life score than those without any morbidity, but the significant association was lost when other sociodemographic characteristics were taken into account in the regression analysis. Likewise, older people who did not use health services had higher quality of life scores than those who did not use health services. However, when health state and functional health factors were included in the model, the significant effect of health service utilization on quality of life disappeared.

The age of older people is negatively associated with the mean quality of life score. The results further revealed that older persons aged 60-69 have a higher quality of life score than those aged 80 and above. This finding is similar to other studies conducted in Nepal (Shrestha et al., 2022), Myanmar (Zin et al., 2020) and Malaysia (Khan & Tahir, 2014).

This can be explained by the fact that as individuals age, their bodies gradually deteriorate and weaken, causing them to suffer from various physical problems and diseases, apart from being at risk of loneliness and social isolation, which lowers their quality of life.

Older males reported a better quality of life than older females, indicating that gender inequalities in quality of life exist. In Nepali society, women have a lower social status than men, and they have limited social and economic opportunities, as well as socio-cultural barriers to working outside of the home and access to health care. As a result, these factors may influence their perception of quality of life. This variable appears to be insignificant when controlling for health behavior factors in the model.

Marital status is significantly associated with quality of life. Married older people have higher quality of life scores than other categories. This is similar to the findings of previous studies from low-and middle-income countries (Lee et al., 2020) and Nepal (Karki et al., 2021). Married people are more likely to enjoy better financial security and socioeconomic status (Lee et al., 2020), are more likely to have supportive and intimate relationships, share their emotions, experiences, and thoughts, are less likely to suffer from loneliness and develop negative feelings (Gutiérrez-Vega et al., 2018), and are generally more satisfied with their lives, which leads to higher quality of life.

Living arrangements have been found to be positively associated with the quality of life of older people. Older people who lived with their spouse have a higher quality of life score than those who lived in other living arrangements. This finding is inconsistent with the previous study (Poudyal et al., 2023), which found no significant differences among older people by their living arrangements. Living with a spouse and the relationship between couples significantly affect the quality of life. A possible explanation for this finding could be attributed to the fact that older people who live with their spouses and families receive significant support from their spouses and family, have sufficient time and

opportunities to participate in social activities, and are less likely to experience adverse effects of loneliness.

The findings of this study revealed that older people who belong to Hill Caste have a higher quality of life score, which is consistent with previous research (Karki et al., 2021), which indicates that Brahman and Chhetri have the highest mean quality of life score in all four domains of quality of life.

Education level is positively associated with quality of life score. This study found that older people with no education had lower mean quality of life scores than those with secondary education. Previous research has found that older people with lower education had a lower quality of life score compared with those with a high school education and above. It is argued that educated older people have better work opportunities, income, social relationships, and living conditions, which result in a higher quality of life score (Zin et al., 2020). Another study illustrated that education attainment might have influenced the quality of life of older people, either directly or indirectly, by improving opportunities for employment, income, health status, and healthier lifestyles (Song & Lee, 2022). This variable is consistently found to be significant when other variables are controlled for in the multivariate regression analysis.

Considering the economic characteristics of older people, working status, economic source of living, state of economic dependency, receiving social security allowance, wealth quintile, and owning a mobile phone have significant effects on quality of life. Similar to previous research (Acharya Samadarshi et al., 2022), this study found that older people who were currently working had a higher quality of life. Economic sources of living were found to have a negative association with quality of life. Older people whose economic source of living is other than their own income are observed to have lower quality of life scores. When all other factors were taken into account, the economic source of living still

significantly affects the quality of life of older people. The results indicated that as economic dependency increases, the quality of life scores tend to decrease, which aligns with previous studies (Krishnappa et al., 2021; Wijesiri et al., 2023). However, the significance disappeared when other variables were taken into consideration in regression analysis, suggesting that other factors play a greater role in the quality of life of older people.

Household wealth status had a highly positive association with the mean quality of life score among older people. Older people who belonged to the richest wealth quintile had a higher mean quality of life score. Previous studies also documented that older people in the lowest wealth quintile have the lowest quality of life scores, while older people in the highest wealth quintile have higher quality of life scores in developing countries. (Mondal, 2021). Another study conducted in rural Viet Nam (Van Minh et al., 2010) revealed that older people in the lowest wealth quintile were more likely to have a poor quality of life and further concluded that improving household wealth status is likely to raise the quality of life of older people. The wealth quintile has been identified as an important factor influencing quality of life because it remains statistically significant after controlling for other variables in the regression analysis.

Older people with their own mobile phones have been observed to have higher mean quality of life scores. Having their own mobile phone allows older people to stay in touch with family members and relatives who are away from them. It can reduce feelings of loneliness and lead to greater life satisfaction in older people. A previous study indicated that mobile phone use significantly positively affects life satisfaction among older people (Sagong & Yoon, 2022).

This study demonstrated a negative association between general health status and the quality of life among older people. The study revealed that older people who reported

fair or poor health status were significantly linked with lower quality of life scores. This finding is consistent with the conclusion that older people with good self-rated health status have a higher quality of life than those with poor self-rated health status (Faiza et al., 2020). A previous study showed that the presence of ADL and IADL limitations has a significant negative association with quality of life (Wijesiri et al., 2023). This study also suggests that older people with IADL limitations (low functioning) have a lower score of quality of life, but this association is not statistically significant. In contrast with previous studies, this study points out that ADL limitation (dependent on ADL) has a significant positive relationship with the quality of life of older people. In general, older people with ADL and IADL limitations are limited in mobility and social participation. They are also at higher risk of developing multimorbidity as well as suffering from various diseases and lack of active life, which may result in poor quality of life for older people.

The quality of life of older people is affected by disability. This study showed that disability level is significantly associated with quality of life and demonstrated a reciprocal relationship between disability level and quality of life scores. This means that the quality of life scores decrease as the level of disability in older people increases.

When considering the health behavior factors, physical activities and elder abuse have a significant effect on the quality of life. It is found that older people who engage in physical activities and do not experience abuse have a higher mean quality of life score. The findings of the study revealed that disability index, smoking, and physical activities are all positively associated with quality of life and elder abuse is negatively associated with quality of life. A study conducted in India (Bramhankar et al., 2023) documented that positive health behaviors such as physical activity positively influence the quality of life of older people.

The government of Nepal provides old-age allowances for older people aged 68 years and above. In addition to this, the government also provides allowances for widows, disadvantaged people, minority groups, and persons with disabilities. This study found that receiving social security allowance and quality of life were negatively associated but not statistically significant. Quality of life is a subjective assessment based on cultural, social, economic, emotional, and environmental contexts. Therefore, quality of life is not merely evaluated only by economic status.

A study conducted in Bharatpur Municipality showed that about 39 percent of older people aged 70 years and above were unsatisfied with the social security allowance provided by the government. Additionally, one in five older people's social security allowance was used by family members (E. N. Poudel et al., 2022), indicating that older people are not able to spend the allowance according to their own wishes. This lack of autonomy may contribute to a decline in the quality of life of older people. Moreover, the dispersal of family members, breakdown of joint and extended family structure, and erosion of traditional support systems have contributed to feelings of loneliness, deteriorating health, and a lack of family care. As a result, older people may not feel satisfied with their quality of life even though they receive a social security allowance. It has been concluded that providing social security alone is insufficient to improve the quality of life of older people or promote healthy aging. To maintain quality of life and promote healthy aging, efforts must be made in multidimensional aspects. Therefore, further explanation is needed to better understand this result.

The subsequent final chapter presents a discussion of significant findings, a summary of findings, conclusions, implications of the study, limitations, and recommendations for further research.

CHAPTER VIII

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

This chapter begins with a summary of the findings, followed by conclusions derived from the results. It also states recommendations, the contribution of the study, and aspects of future research.

8.1 Summary of Findings

Examining the characteristics and health status of older people, the study found that most of the older people (43.4%) were 60-69 years old. More than half of older people were male, with a sex ratio 119. About 57 percent of older people were married, and more than two-thirds (67.1%) lived in joint families. About 62 percent of older people were living with a son/daughter-in-law. In terms of caste/ethnicity, 44 percent of older people belonged to the Hill caste, while the overwhelming majority (86.7%) were Hindu. Most older people (70.5%) had no education, and only 6 percent had completed secondary or higher education.

More than half of older people (57.3%) were not currently working. One-third of older people relied on old age allowance as the main economic source of living. Most older people depended on family members, received social security allowances, and had health insurance. More than 90 percent of older people had their mobile. A significant proportion of older people were in the poorest and middle-wealth quintiles.

The study found that more than half of older people rated their health status as moderate. A significant number of older people had chronic conditions, with over 83.6 percent suffering from at least one chronic disease. Half of the older people suffered from multimorbidity. The most common chronic diseases were high blood pressure, followed by gastritis and gastrointestinal diseases, arthritis, diabetes, osteoporosis, asthma, cataracts/glaucoma, heart disease, high cholesterol, and kidney disease. Over three-quarters of older people were taking medications, while 15.3 percent had been injured in the past 12 months.

Half of older people had difficulty performing at least one ADL difficulties, with 46 percent experiencing controlling bladder and bowel functions. More than two-thirds of older people had difficulty performing at least one IADL. Shopping was the most common IADL difficulty. Likewise, eighty-five percent of older people reported engaging in vigorous or moderate physical activities.

Similarly, seventy percent of older people had at least one difficulty among the six domains, with common difficulties being seeing, followed by walking or climbing steps, remembering or concentrating, hearing, and self-care. The least common functional disability was communicating, and the disability index disclosed that 84 percent of older people had no difficulty. A quarter of older people were current smokers, 30 percent used smokeless tobacco, and one-fourth of older people were current alcohol users.

A study of sociodemographic characteristics, economic characteristics, health status, and health-related behavior is critical to understanding how these variables influence the prevalence of multimorbidity, health service utilization, and quality of life of older people.

With respect to patterns and prevalence of multimorbidity, the study revealed that one-third of older people suffered from single morbidity, while half of older people suffered from multimorbidity. Single morbidity was more prevalent in the 60-69 age group, and multimorbidity was most common in older people aged 80 and above. The males and the Hill Dalit had a significantly higher prevalence of single morbidity, whereas the older females, the Hill Caste and the Hindu, had a higher prevalence of multimorbidity. The older people with basic education, not currently working, relying on their son/daughter's income, not receiving social security allowance, and those from the poorest wealth quintile had a higher prevalence of single morbidity. Likewise, older people with no formal education, those who were currently working, those who relied on old age allowances and social

security allowances, and those from the richest wealth quintile had a higher prevalence of multimorbidity.

The study found that older people with moderate health status, independent in ADL, high functioning IADL, severe difficulty in six domains of disability, and no disability had a higher single morbidity prevalence. The burden of multimorbidity is higher among those older people who had poor health status, were dependent on ADL, had low functioning IADL, had severe difficulty, and were disabled. Non-smokers, non-tobacco users, and never alcohol consumers older people had a higher prevalence of multimorbidity. Multimorbidity was more prevalent among older people who were unable to engage in physical activities and had not experienced elder abuse.

The findings suggested that older people who were currently not working, dependent on old-age allowances, and those with fair or poor health status were more likely to have single morbidity. The older people from the Hill Janajati and without disabilities were less likely to suffer from multimorbidity. Older people with fair or poor health status and those reliant on ADL were more likely to have multimorbidity. Additionally, females and older people who claimed old-age allowance as an economic source of living were more likely to be associated with multimorbidity. Furthermore, older people belonging to the richest wealth quintile were more likely to have multimorbidity.

While examining health service utilization, the study found that 64 percent of older people had utilized health services in the past 12 months. Sixty-one percent had visited a health facility, and 52.9 percent had consulted a doctor and health professionals. Furthermore, older people aged 70-79, older women, married older people, those living in joint families, those from the Hill Caste and Hindu religion, and those without formal education were found to utilize health services more frequently. Older people who have health insurance, are from wealthier households, and have healthcare decisions made by

other family members have a higher prevalence of health service utilization. About half of older people in good health and more than three-quarters of those in poor health status had utilized health services. Older people who suffered from multimorbidity had a higher level of health service utilization. Likewise, health service utilization was high among those older people who performed ADL independently, had low IADL, had functional difficulties, and had no disabilities. The level of health service utilization was found to be higher among older people who had never smoked, used tobacco, or consumed alcohol.

The study revealed that literate older people with no formal education, with health insurance, those in the richest wealth quintile, and those with fair or poor health status were more likely to use health services. Also, older people with multimorbidity and single morbidity had a higher likelihood of using health services. In addition, health behaviors such as smoking, tobacco use, alcohol consumption, and physical activity did not have a significant impact on health service utilization. Older people who had experienced elder abuse were more likely to use health services.

The use of healthcare services was associated with improved access to health services. Better access to health services tends to have a high quality of life, allowing for better management of chronic conditions and overall health.

Examining the quality of life, the study found that the mean total quality of life was 27.6. The psychological domain had the highest quality of life score, followed by the global and environmental domains. The physical domain had the lowest mean quality of life score.

The environment and global domains were strongly correlated, with a correlation coefficient of 0.57. The correlation between the psychological and physical domains was found to be weak. Findings also suggested that all individual items were significantly positively correlated with each other. The strongest correlation was observed between

living conditions and personal relationships, whereas the weakest correlation was found between living conditions and daily living activities.

Older people aged 60-69, married older people, older people living with their spouses from the Hill caste, and those who had completed secondary and higher education had a higher quality of life score. Furthermore, the quality of life scores were significantly higher among older people who were currently working, had their own income as an economic source of living, were not economically dependent, did not receive security allowances, and were in the rich or richest wealth quintiles. Older people with good health status, usage of health services, high IADL functioning, and no disability had higher quality of life scores. Also, older people who engaged in physical activity and had experienced elder abuse had a better quality of life.

The study found that additional variables in the model improve explanatory power. The findings suggested that older people with formal education and higher education, from the middle, rich, and richest quintiles, had a higher quality of life. Furthermore, the results exhibited that older people who were dependent on ADL did not have a disability, were current/former smokers, and engaged in physical activities had a significant positive association with higher quality of life. However, those with fair or poor health status and who experienced elder abuse had a significant negative association with lower quality of life. The findings indicated that education level, wealth quintile, general health status, ADL, smoking habit, physical activity, and elder abuse were all strong predictors of quality of life among older people.

8.2 Conclusion

Older populations are vulnerable, confronting interconnected social, economic, and health challenges, highlighting a need for integrated care strategies, enhanced daily living support, and focused health services. Five out of ten older people have multimorbidity, with

substantial variation in the prevalence among older people according to their sociodemographic characteristics, economic characteristics, health status, and health behavior. Multimorbidity correlates positively with increasing age, education level, and household wealth quintile. The study also found that the poor self-rated health status of older people is associated with a high prevalence of multimorbidity.

Furthermore, ADL and IADL difficulties contribute to a higher prevalence of multimorbidity. Lack of participation in physical activity is associated with a higher prevalence of multimorbidity among older people. Smoking, tobacco use, and alcohol consumption are the risk behaviors that increase the risk of multimorbidity. Additionally, the study found that older people who never smoke, use tobacco, and consume alcohol are associated with a higher prevalence of multimorbidity. This finding requires further examination. Likewise, older people who consume a lower frequency of fruits, vegetables, and beans have a lower prevalence of multimorbidity.

Sex, old-age allowance, wealth quintile, self-rated health status, ADL, and disability are the most important predictors of multimorbidity among older people.

Sixty-four percent of older people have used health services in the last year. This study identified education level, health insurance, wealth quintile, general health status, morbidity condition, and elder abuse as the strongest factors influencing health service utilization among older people.

Among the predisposing factors, health service utilization is higher among older people with literate but no formal education. This highlights that older people who are literate but without formal education are more likely to use health services.

Moving on to enabling factors, older people who have health insurance are more likely to use health services, implying that health insurance has a positive association with health service utilization among older people. The effects of household wealth on the

utilization of health services have been positive. Thus, older people in the richest wealth quintile are significantly more likely to utilize health services. Among the need factors, those who rate their health status as fair or poor are more likely to use health services. Findings indicated that as advancing age, older people are more likely to use health services because they perceive their health status as poor.

This study illustrated that older people with multimorbidity are more likely to use health services because they are more likely to have worse perceived health status. This highlights the need and importance of supporting chronic care and health services for older people in order to reduce the burden of multimorbidity and effectively manage subsequent worse health conditions. Health behavior such as elder abuse, older people who have experienced various forms of abuse are more likely to seek health care services.

The overall quality of life is moderate, with the lowest score in the physical domain and the highest in the psychological domain. Education status, wealth quintile, physical activity, and functional disability are important factors in determining a better quality of life. Being dependent on ADL and current/former smoking are positively associated with quality of life. Efforts are needed to explain this result further. Older people who have rated their health status as fair or poor, have reported son/daughter income and old-age allowance as an economic source of living, and have experienced elder abuse have a negative influence on the quality of life, resulting in lower quality of life.

8.3 Contribution of this Study

This study has made significant contributions to expanding knowledge on multimorbidity, health service utilization, and quality of life of older people, particularly in Kamalamai Municipality, Sindhuli District, and broadly in the context of Nepal. This study focuses on three interrelated themes: multimorbidity, health service utilization, and quality of life. To my knowledge, this study is the first to attempt to inter-link these three variables.

The first contribution is that the study primarily observes patterns and correlates of multimorbidity among older people with respect to sociodemographic, economic, and health-related variables. The analysis is based on the health-ecological model, which has been modified to better understand the factors associated with multimorbidity. The health status of older people and household wealth quintile have been found to be significantly associated with multimorbidity among older people, but this is inconsistent with past studies, even though this could have policy implications.

The second contribution is that the study focuses on the level of health service utilization and the associated factors. The study used a theoretical framework of Andersen's health behavioral model to identify the factors associated with health service utilization. The findings of the study add to the existing body of knowledge on the utilization of health services among older people in Nepal. The study establishes that health insurance from enabling factors, besides general health status and morbidity conditions from need factors, are significant predictors of health service utilization among older people.

The third contribution is that the study observes the quality of life of older people and the factors associated with quality of life. The findings of the study suggest that education level, wealth quintile, and physical activity are associated with a better quality of life, while general health status and elder abuse are negative predictors of quality of life. This finding may assist in policy development by including strategies to improve the quality of life for older people.

Finally, the novel contribution of the study lies in establishing the relationships between three interrelated themes—multimorbidity, health service utilization, and quality of life—by utilizing advanced statistical techniques, including multivariate multinomial logistic regression, multivariate logistic regression, and multivariate hierarchical regression modeling.

8.4 Recommendations

Policy Recommendations

The prevalence of multimorbidity in the study area is high and will continue to increase as the proportion of older people increases and as the level of health service utilization is low. Therefore, every health facility in the study area should have geriatric healthcare services for specialized care for older people and provide proper counseling services for both older people and healthcare providers. Similarly, older people should be encouraged to visit health facilities for regular health check-ups to ensure active and successful aging. Older people with poor health status are more likely to have multimorbidity and use health services, and their quality of life remains low, so older people should be preferred in disease prevention and health programs to promote better health and improve quality of life among older people.

Physical activity promotion strategies should be adopted in the study area to reduce the burden of multimorbidity and improve the quality of life among older people through senior citizen clubs. Health insurance is positively associated with the use of health services among older people. Therefore, the expansion of health insurance coverage should be prioritized to reduce costs and barriers to accessing health services. Older people in the poorest households are less likely to use health services. In order to improve older people's access to and use of health services and their quality of life, there is a need to target the poor or disadvantaged group of older people.

Future Research

This study analyzed the patterns and prevalence of multimorbidity, utilization of health services, and quality of life of older people, and factors associated with multimorbidity, utilization of health services, and quality of life of older people of Kamalamai Municipality, Sindhuli. This study linked sociodemographic, economic, health

status, and health-related behavior factors with multimorbidity, utilization of health services, and quality of life. The findings of this study suggest that there is an inequality in the prevalence of multimorbidity that needs to be addressed to achieve universal health coverage and SDG 3 and ensure healthy lives. Therefore, given the increasing prevalence and burden of multimorbidity, understanding the differentials in multimorbidity and its triggers should be an important issue for further study. This study overlooked the role of family members in older people's health care and health service utilization, particularly inpatient and outpatient care. As a result, there is a need to concentrate on the involvement of family members in the health care of older people, their role in the utilization of health services, and factors that determine the utilization of inpatient and outpatient health care.

This study has used a small sample size. So, a large sample size should be employed to investigate the predictors of multimorbidity, health service utilization, and quality of life of older people. The results of such studies will help in planning for healthy and successful aging. Functional limitations in daily life and disability are the most common concerns among older people, but very little has been known about their magnitude and impact on the older population of Nepal. Thus, there is a need to investigate regarding the extent and impact of functional limitations and disability.

A more comprehensive qualitative study should be conducted that addresses sociodemographic, economic, and contextual variation and could contribute to a deeper understanding of multimorbidity, health service utilization, and quality of life of older people. This study indicates that most of the older people are suffering from various chronic conditions. Thus, a comprehensive study should be conducted to identify the nature and causal relationship between the use of health services, well-being, and the burden of chronic diseases.

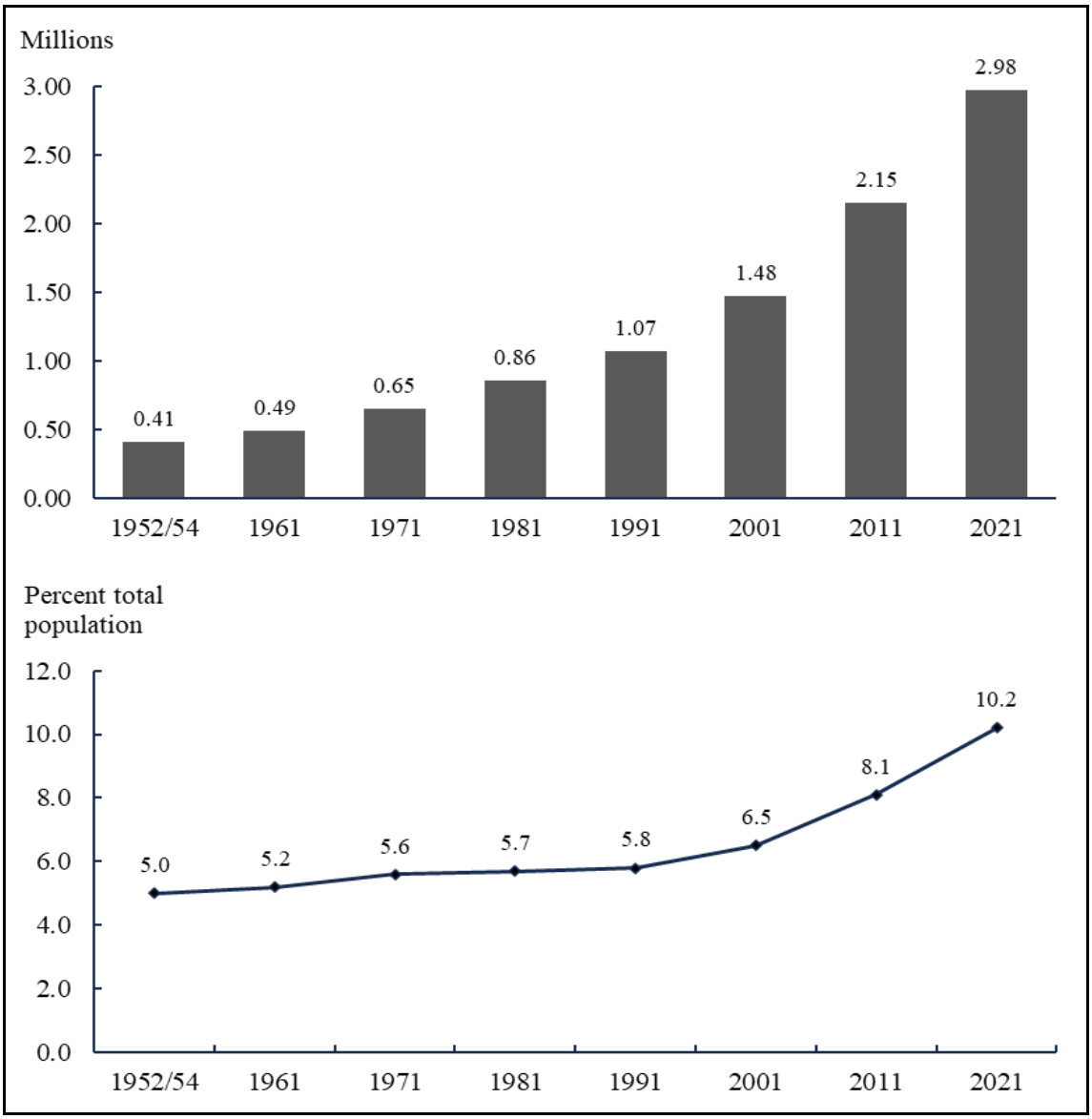
This study focuses on inter-related topics of multimorbidity, health service utilization, and quality of life among older people. Therefore, this study provides an

opportunity for a more in-depth exploration of these issues. A deeper investigation can enhance understanding and provide meaningful insights into multimorbidity, health service utilization, and quality of life among older people.

APPENDIXES

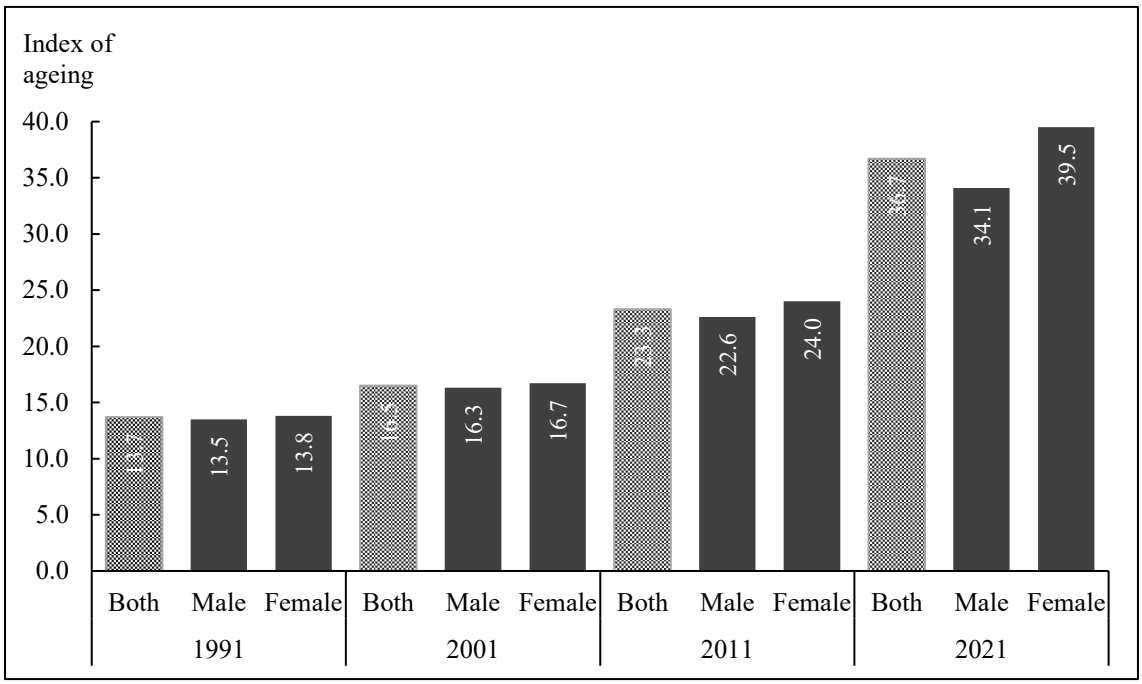
APPENDIX 1: Population 60 Years and Above, Index of Aging, Total Fertility Rate and Life Expectancy at Birth, Nepal

Table A1.1: *Population 60 Years and Above by Size and Percentage of Total Population, 1952/54-2021 Censuses*



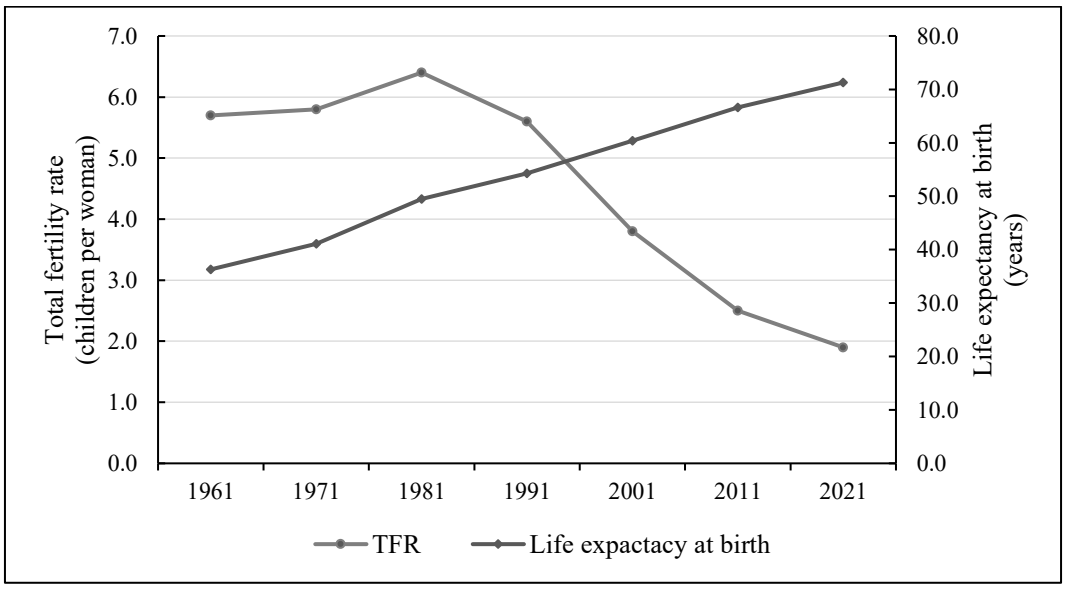
Note: Sourced from CBS (1987), CBS (1993) , CBS (2002), CBS (2012), and NSO (2023).

Table A1.2: *Index of Aging by Sex, 1991, 2001, 2011, and 2021*



Note: Data from the same source as Table 2.1.

Table A1.3: *Total Fertility Rate and Life Expectancy at Birth in Nepal, 1961-2021 Census*



Note: Sourced from CBS (2014), NSO (2025b), and NSO (2025c).

APPENDIX 2: Construction of Household Wealth Quintile

The household wealth quintiles are calculated based on the following key household characteristics and household assets:

Household Characteristics. Sources of drinking water, type of fuel used for cooking, type of toilet facility, the foundation of the house, the main material of the floor, materials of the roof, and material of the wall.

Assets Owned by Household. Radio, television, computer, internet, mobile, fridge, bicycle, motorcycle, watch, chair/table, sofa/daraz, dhiki/janto, fan, livestock, and agricultural land

The construction of the household wealth quintile has been performed in three steps. First, the household characteristics are categorical variables. These variables are converted into binary variables, with responses coded as 0 or 1. The asset ownership variables are all yes/no questions, and they are also encoded as binary variables. Household characteristics and asset ownership are coded as shown in Table 1.

Table A2.1: *Variables Used for Calculating the Wealth Index*

Variables	Improved	Unimproved
Household characteristics		
Sources of drinking water	1 = tap/piped or hand pump/borehole	0 = well or pond or springwater
Fuel used for cooking	1 = biogas or LP gas or electricity	0 = wood or dung
Toilet facility	1 = household flush or household non-flush	0 = community latrine or pit latrine or no toilet
Foundation of house	1= concrete with pillar or cement-bonded bricks/stone	0 = mud-bonded bricks/stone or wooden pillar
Floor material	1 = cement or parquet or polished wood or ceramic tiles/marble or carpet	0 = earth/sand or wood planks
Roof materials	1 = concrete/cement	0 = straw/thatch or galvanized sheet or tiles/slate

Variables	Improved	Unimproved
Wall material	1 = cement bonded bricks/stones or cement blocks or wood/planks or mud bonded bricks/stones	0 = bamboo with mud or metal/galvanized sheet
Household assets		
Radio	1 = Yes	0 = No
Television	1 = Yes	0 = No
Computer	1 = Yes	0 = No
Internet	1 = Yes	0 = No
Mobile	1 = Yes	0 = No
Fridge	1 = Yes	0 = No
Bicycle	1 = Yes	0 = No
Motorcycle	1 = Yes	0 = No
Watch	1 = Yes	0 = No
Chair/table	1 = Yes	0 = No
Sofa/daraz	1 = Yes	0 = No
Dhiki/Janto	1 = Yes	0 = No
Fan	1 = Yes	0 = No
Livestock	1 = Yes	0 = No
Agricultural land	1 = Yes	0 = No

Second, after encoding the selected variables as binary variables, a principal component analysis (PCA) has been performed to generate the wealth index. PCA is a data reduction procedure. PCA involves replacing many correlated variables with a set of principle uncorrelated 'principal components' that can explain much of the variance and represent unobserved characteristics of the population. From the table entitled Principal Components (eigenvectors), the first component (Comp1) has been used as the wealth index because the first component explains the largest proportion of the total variance. Third, assign a wealth index score to each respondent based on their household characteristics and asset ownership. Fourth, after obtaining the wealth index scores, divide the wealth index score into quintiles. The scores have been ranked on a scale from 1 to 5, with 1 representing the lowest quintile, i.e., the poorest quintile or the bottom 20 percent, and 5 representing the wealthiest quintile i.e., the top 20 percent of the respondents.

APPENDIX 3: Kish Grid: Selection of Respondent

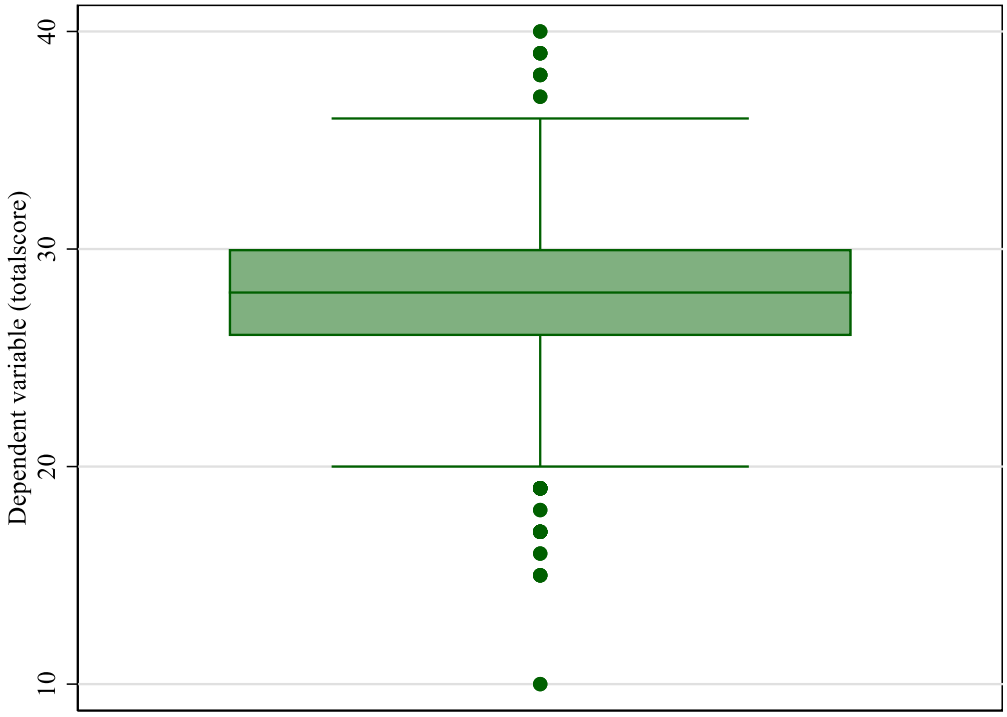
Last digit of the household number	Total number of older persons aged 60 years and above							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	1	2	2	4	3	6	5	4
1	1	1	3	1	4	1	6	5
2	1	2	1	2	5	2	7	6
3	1	1	2	3	1	3	1	7
4	1	2	**3**	4	2	4	2	8
5	1	1	1	1	3	5	3	1
6	1	2	2	2	4	6	4	2
7	1	1	3	3	5	1	5	3
8	1	2	1	4	1	2	6	4
9	1	1	2	1	2	3	7	5

Note: Sourced from (MOHP et al. 2012)

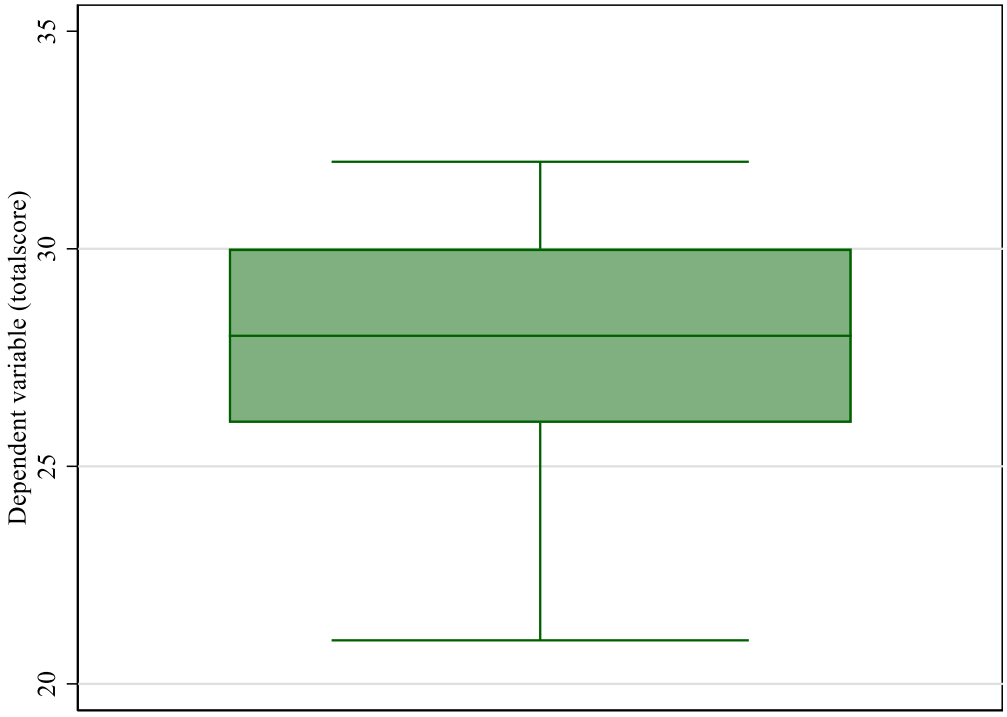
Example: If a household has three older persons aged 60 years and above and the household number is 64. Since the last digit of the household number is 4, go to row 4, and since there are three older people in the household, go to column 3. The number in the cell where row 4 and column 3 intersect is 3. Therefore, the third older person from the roster of older people aged 60 and over is selected as an eligible respondent.

APPENDIX 4: Boxplots, Test of Normality, and Histogram with Normal Curve

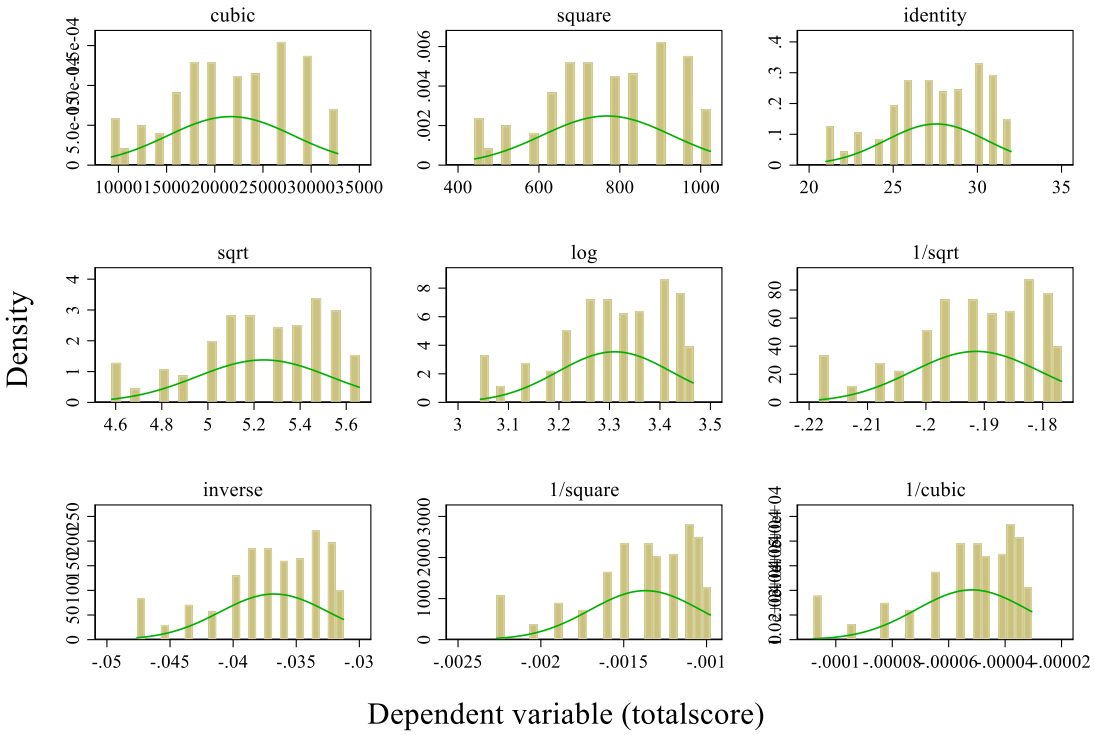
Boxplots of dependent variable showing outliers



Box plot of dependent variable after winsorization

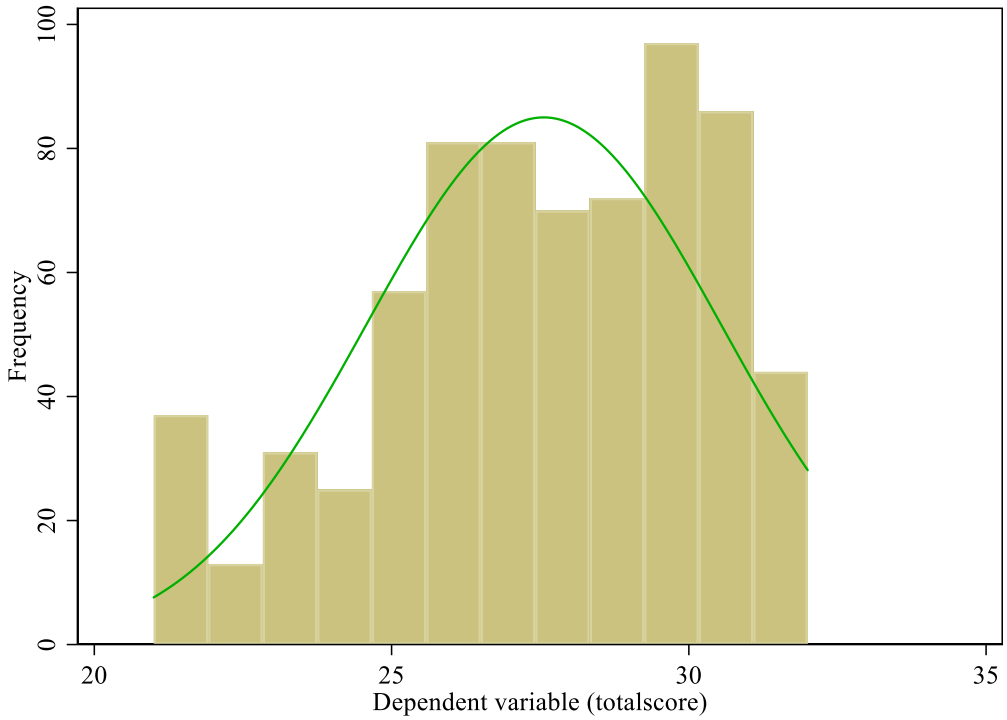


Test of normality: Histograms by transformation



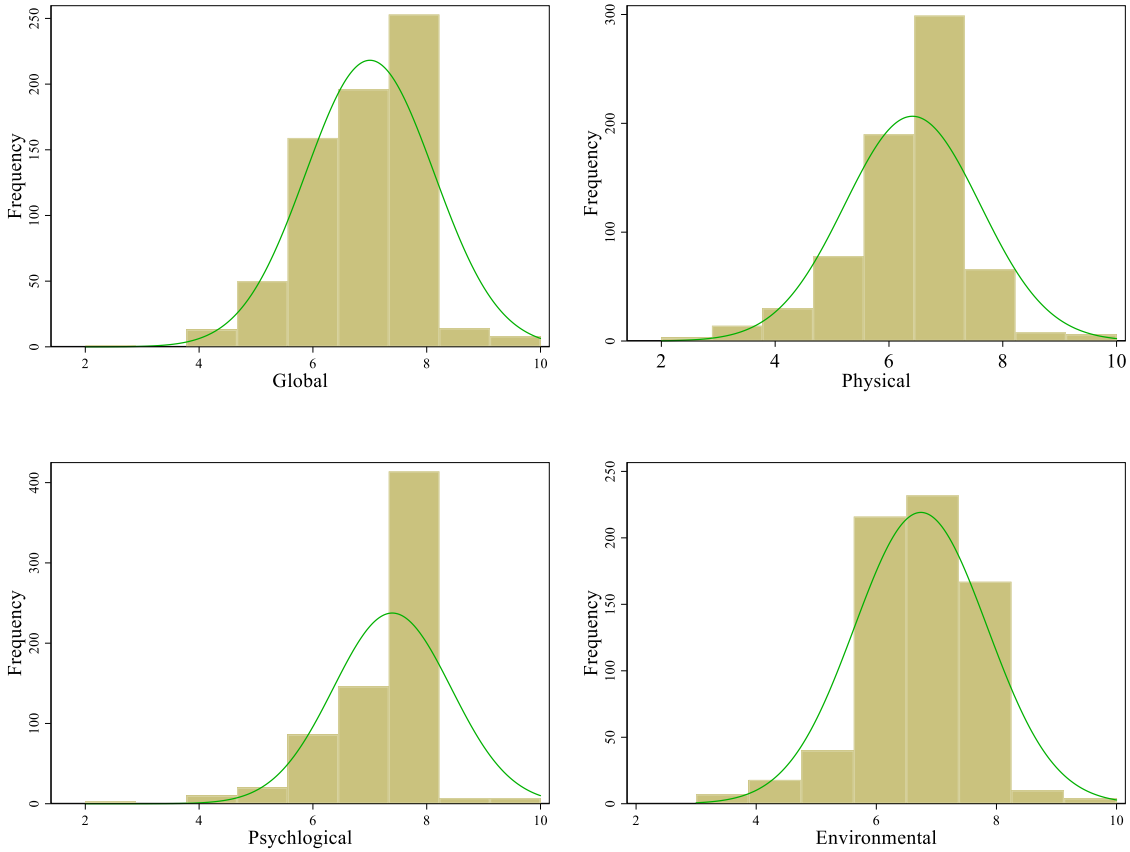
Histograms by transformation

Histogram with normal curve for dependent variable

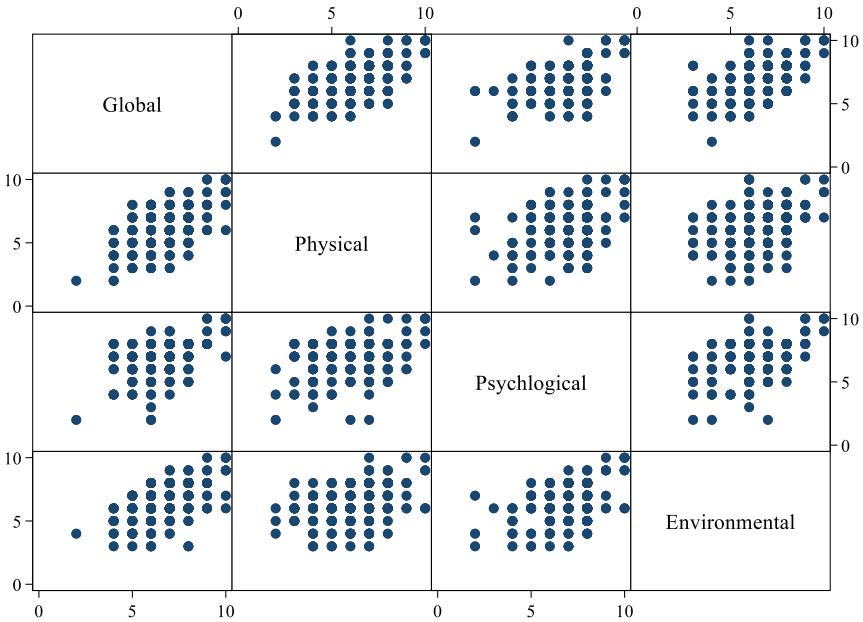


APPENDIX 5: Histogram with Normal Curve and Scatter Plots

Histograms with normal curves for checking normality



Scatter plots for checking linearity



APPENDIX 6: Questionnaire

Tribhuvan University

Faculty of Humanities and Social Sciences

Survey Questionnaire, 2023

MULTIMORBIDITY, HEALTH SERVICE UTILIZATION, AND QUALITY OF LIFE AMONG OLDER PEOPLE IN KAMALAMAI MUNICIPALITY, SINDHULI DISTRICT, NEPAL

Namaskar, my name is _____. I am doing research on multimorbidity, health service utilization, and quality of life of older people living in Kamalamai municipality for Doctor of Philosophy (PhD) studies at Tribhuvan University, Faculty of Humanities and Social Sciences. The study aims to examine the factors affecting on multimorbidity, health service utilization, and quality of life in older people. Your household has been selected for this study. Therefore, I would like to ask you some personal questions regarding your health status, health service utilization, and perception of quality of life. It will take about 30 to 40 minutes to ask and answer questions. This research has no known risks. Your participation is entirely voluntary. All the information you provide will be kept confidential. Your name will not be disclosed to anyone. The information received from you will not be used for any purpose other than this study and will only be published collectively. If you find any questions uncomfortable or difficult and don't want to answer, tell me, and I will skip that question and move on to the next question, or you can stop this interview anytime you want. However, your participation in this study will help us understand the health status and healthcare utilization as well as the quality of life of senior citizens of the society. We look forward to your cooperation in this research. Do you have any questions? Do you have permission to start an interview with me now?

Household information

H01. District

◯ Sindhuli

H02. Municipality

◯ Kamalamai

H03. Ward number

_____

H04. Village/Tole

_____

H05. Household number

_____

H06. Name of household head

_____

H07. Respondent's Name

_____

H08. Interviewer's Name

- ◯ Respondent him/herself
- ◯ Spouse
- ◯ Son/Daughter
- ◯ Daughter-in-law
- ◯ Grandchildren
- ◯ Other family member

H09. Date of interviewed

yyyy-mm-dd _____ hh:mm _____

GPS

_____

latitude (x.y °)

_____

longitude (x.y °)

_____

altitude (m)

_____

accuracy (m)

_____

Senior citizens roster (60 years and over)

ID Code

_____

H10A. Name of older person aged 60 years and above

_____

H10B. Age (Completed year)

_____

H10C.Sex

- ◯ Male
- ◯ Female

Section 1. Household characteristics

Q101. What is the type of ownership of the house?

- ◯ Owned
- ◯ Rented
- ◯ Rent but do not pay rent
- ◯ Institutional

Q102. What is the main source of drinking water for your household?

- ◯ Piped water into a dwelling or to a yard/plot
- ◯ Piped water (public)
- ◯ Tub well/hand pump/borehole
- ◯ Dug well
- ◯ Kuwa
- ◯ Springwater

Q103. What is the main type of fuel for cooking in your household?

- ◯ Wood
- ◯ Dung
- ◯ Biogas
- ◯ LP gas
- ◯ Electricity

Q104. What type of stove does your household mainly used for cooking?

- ◯ Open fireplace
- ◯ Smokeless oven
- ◯ Gas/biogas stove

- ◯ Induction oven
- ◯ Other (Specify)

Q105. What is the main source of lighting in your household?

- ◯ Electricity
- ◯ Solar
- ◯ Biogas
- ◯ Kerosene
- ◯ Other (Specify)

Q106. What type of toilet facility are using in your household?

- ◯ Flush toilet
- ◯ Non-flush toilet
- ◯ Pit latrine
- ◯ Public toilet
- ◯ No toilet facility

Q107A. Does your household have radio?

- ◯ Yes
- ◯ No

Q107B. Does your household have television?

- ◯ Yes
- ◯ No

Q107C. Does your household have computer?

- ◯ Yes
- ◯ No

Q107D. Does your household have internet?

- ◯ Yes
- ◯ No

Q107E. Does your household have telephone/mobile phone?

- ◯ Yes
- ◯ No

Q107F. Does your household have refrigerator?

- ◯ Yes
- ◯ No

Q107G. Does your household have bicycle?

- ◯ Yes
- ◯ No

Q107H. Does your household have motorcycle/scooter?

- ◯ Yes
- ◯ No

Q107I. Does your household have tempo/car/truck/tractor?

- ◯ Yes
- ◯ No

Q107J. Does your household have clock?

- ◯ Yes
- ◯ No

Q107K. Does your household have table/chair?

- ◯ Yes
- ◯ No

Q107L. Does your household have bed?

- ◯ Yes
- ◯ No

Q107M. Does your household have sofa/daraz?

- ◯ Yes
- ◯ No

Q107N. Does your household have dhiki/janto?

- ◯ Yes
- ◯ No

Q107O. Does your household have electric fan?

- ◯ Yes
- ◯ No

Q108. Does this household have owned any livestock, herds, other farm animals or poultry?

- ◯ Yes
- ◯ No

Q109. What is the foundation of house?
(Observed main material of foundation and tick appropriate option)

- ◯ Concrete with pillar
- ◯ Cement bonded bricks/stone
- ◯ Mud bonded bricks/stone
- ◯ Wooden pillar
- ◯ Other (Specify)

Q110. How is the floor of the house?
(Observed main material of the floor of the dwelling and tick appropriate option)

- ◯ Cement
- ◯ Parquet/polished wood
- ◯ Tiles/marbles
- ◯ Carpet
- ◯ Wood planks
- ◯ Earth/sand
- ◯ Other (Specify)

Q111. How is the roof of the house?
(Observed main material of the roof and tick appropriate option)

- ◯ Concrete/cement
- ◯ Tiles/slate
- ◯ Galvanized sheet
- ◯ Straw/thatch

Q112. How is the outer wall of the house?
(Observed main material of the wall and tick appropriate option)

- ◯ Cement, bricks/stone
- ◯ Cement blocks
- ◯ Bricks with Mud
- ◯ Wood/planks
- ◯ Bamboo with mud
- ◯ Stone with mud
- ◯ Galvanized sheet
- ◯ Straw/thatch
- ◯ Other (Specify)

Q113. Does your household have own agricultural land?

- ◯ Yes
- ◯ No

Q114. What is your types of family?

- ◯ Nuclear, couple only
- ◯ Nuclear, couple with unmarried children
- ◯ Joint
- ◯ Alone

Q115. Do you have a separate room?

- ◯ Yes
- ◯ No

Q116. Does your household have a separate kitchen?

- ◯ Yes
- ◯ No

Section 2: Socio-demographic characteristics and health behavior

» A. Demographic and socio-economic characteristics

ID. Selected senior citizen's ID code
(According to senior citizen roster ID code)

_____

Q201. How old are you?

Q202. What is your sex?

- ◯ Male
- ◯ Female

Q203. How long have you been continuously living in this place?

- ◯ Since birth
- ◯ Later

Q204. What is your cast/ethnicity?

- ◯ Chhetri
- ◯ Brahman
- ◯ Tamang
- ◯ Magar
- ◯ Newar

- ◯ Kami
- ◯ Sarki
- ◯ Damai/Doli
- ◯ Majhi
- ◯ Danuwar
- ◯ Sunuwar
- ◯ Gharti/Bhujel
- ◯ Hayu
- ◯ Thakuri
- ◯ Dasnami/Sanyasi
- ◯ Gurung
- ◯ Others (Specify)

Q205. What is your religion?

- ◯ Hindu
- ◯ Buddha
- ◯ Muslim
- ◯ Christian
- ◯ Kirat
- ◯ Other (Specify)

Q206. What is your current marital status?

- ◯ Unmarried
- ◯ Married
- ◯ Widowhood
- ◯ Separated
- ◯ Divorced

Q207. Can you read and write?

- ◯ Yes
- ◯ No

Q208. What is the highest level of education that you completed?

- ◯ No schooling but literate
- ◯ Grade 1 passed

- ◯ Grade 2 passed
- ◯ Grade 3 passed
- ◯ Grade 4 passed
- ◯ Grade 5 passed
- ◯ Grade 6 passed
- ◯ Grade 7 passed
- ◯ Grade 8 passed
- ◯ Grade9 passed
- ◯ Grade 10 passed
- ◯ SLC passed
- ◯ IA/+2 passed
- ◯ Graduate and above

Q209. Are you currently working?

- ◯ Working
- ◯ Stopped working completely
- ◯ Not working but looking for work

Q210. In the last 12 months, what is your main occupation/work?
(Main occupation in the past 12 months)

- ◯ Agriculture
- ◯ Service
- ◯ Business
- ◯ Daily wages
- ◯ Household work
- ◯ Social work
- ◯ Cottage industry
- ◯ Other (Specify)

Q211. With whom, you are living now?

- ◯ Alone
- ◯ Spouse only
- ◯ Son/daughter
- ◯ Son/daughter-in-law
- ◯ Daughter/son-in-law

- ◯ Grandchildren
- ◯ Other family member
- ◯ Relatives

Q212. What is your main economic source for living?

- ◯ Pension
- ◯ Own income
- ◯ Husband/wife support
- ◯ Son/daughter support
- ◯ Son/daughter-in-law support
- ◯ Daughter/son-in-law support
- ◯ Grandchildren support
- ◯ Old age, widowed and social security allowance
- ◯ Other (Specify)

Q213. What is the state of economic dependency?

- ◯ No dependence
- ◯ Partially dependent
- ◯ Fully dependent

Q214. Do you know about the senior citizen services and facilities provided by the government?

- ◯ Yes
- ◯ No

Q215. Have you received any allowances for senior citizens, disabled, widows, backward castes and Dalits?

- ◯ Yes
- ◯ No
- ◯ Don't know

Q216. Who mainly decides how to spend your allowance?

- ◯ Self
- ◯ Self and husband/wife jointly
- ◯ Son/daughter-in-law
- ◯ Son/daughter
- ◯ Someone else

Q217. Do you have health insurance?

- ◯ Yes
- ◯ No
- ◯ Don't know

Q218. What type of health insurance?

- ◯ Community-based
- ◯ Health insurance through employer
- ◯ Social security health insurance
- ◯ Private health insurance
- ◯ Don't know

Q219. Do you have own mobile phone?

- ◯ Yes
- ◯ No

» B. Health behavior

» » Tobacco and smoking

Q220. Have you ever smoking?

- ◯ Yes
- ◯ No

Q221. Do you currently smoke cigarettes or bidi?

- ◯ Yes, every day
- ◯ Yes, some days
- ◯ Not at all

Q222. Do you ever used any form of smokeless tobacco products such as chewing tobacco or snuff, pan masala, gutkha?

- ◯ Yes
- ◯ No

Q223. Do you currently use smokeless tobacco?

- ◯ Yes, every day
- ◯ Yes, some days
- ◯ Not at all

» » Alcohol consumption

Q224. Have you ever consumed alcohol?

- ◯ Yes
- ◯ No

Q225. Do you currently consume alcohol?

- ◯ Yes, every day
- ◯ Once every two or three days
- ◯ Once a week
- ◯ Once or twice a month
- ◯ Less than once a month
- ◯ Do not consume it now

» » Nutrition

Q226. Do you eat banana, mango, apple, orange, etc. fruits according to season?

- ◯ Every day
- ◯ Sometimes
- ◯ Don't eat

Q227. Do you eat vegetable such as potato, cauliflower, cabbage according to season?

- ◯ Every day
- ◯ Sometimes
- ◯ Don't eat

Q228. Do you eat beans, peas or lentils?

- ◯ Every day
- ◯ Sometimes
- ◯ Don't eat

Q229. Do you consume milk and milk product?

- ◯ Every day
- ◯ Sometimes
- ◯ No

Q230. How often do you eat meat or fish or eggs in a month?

- ◯ Every day
- ◯ Once a week
- ◯ Twice a week

- ◯ Once a month
- ◯ Twice a month
- ◯ Vegetarian

Section 3: Health, functional difficulties and functional limitation

» Health and functional difficulty

Q301. In general, how would you rate your health status now?

- ◯ Very good
- ◯ Good
- ◯ Moderate
- ◯ Bad
- ◯ Very bad

Q302. Do you have difficulty seeing, even if wearing glasses?

- ◯ No difficulty
- ◯ Some difficulty
- ◯ A lot of difficulty
- ◯ Cannot do it at all

Q303. Do you have difficulty hearing, even if using a hearing aid?

- ◯ No difficulty
- ◯ Some difficulty
- ◯ A lot of difficulty
- ◯ Cannot do it at all

Q304. Do you have difficulty walking or climbing steps?

- ◯ No difficulty
- ◯ Some difficulty
- ◯ A lot of difficulty
- ◯ Cannot do it at all

Q305. Do you have difficulty remembering or concentrating?

- ◯ No difficulty
- ◯ Some difficulty
- ◯ A lot of difficulty
- ◯ Cannot do it at all

Q306. Do you have difficulty with self-care such as washing all over or dressing?

- ◯ Not difficulty
- ◯ Some difficulty
- ◯ A lot of difficulty
- ◯ Cannot do it at all

Q307. Do you have difficulty communicating using your usual language?

- ◯ No difficulty
- ◯ Some difficulty
- ◯ A lot of difficulty
- ◯ Cannot do it at all

» Activities of daily living, ADL

Q308. Do you have difficulty taking a bath/shower by yourself and do you need assistance?

- ◯ Do not need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

Q309. Do you have difficulty dressing and do you need assistance?

- ◯ Do not need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

Q310. Do you have difficulty using the toilet and do you need assistance?

- ◯ Do not need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

Q311. Do you have difficulty walking around the house and do you need assistance?

- ◯ Do not need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

Q312. Do you have difficulty controlling urination and bowel movements and do you need assistance?

- ◯ No difficulty
- ◯ Partial difficulty
- ◯ Full difficulty

Q313. Do you have difficulty feeding and do you need assistance?

- ◯ No need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

Q314. Do you have difficulty carrying things and do you need assistance?

- ◯ No need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

Q315. Do you have difficulty standing up from a bed or chair, seat down on a chair, and do you need assistance?

- ◯ No need assistance
- ◯ Need partial assistance
- ◯ Need full assistance

» Instrumental activities of daily living, IADL

Q316. Ability to use telephone/mobile phone

- ◯ Operates telephone/mobile on own initiative, looks up and dials number
- ◯ Dials a few well-known numbers
- ◯ Answers telephone/mobile, but does not dial
- ◯ Does not use telephone at all

Q317. Shopping

- ◯ Takes care of all shopping needs independently
- ◯ Shops independently for small purchases
- ◯ Needs to be accompanied on any shopping trip
- ◯ Completely unable to shop

Q318. Food preparation

- ◯ Plans, prepares, and serves adequate meals independently
- ◯ Prepares adequate meals if supplied with ingredients
- ◯ Heats and serves prepared meals or prepares meals, but does not maintain adequate diet
- ◯ Needs to have meals prepared and served

Q319. Housekeeping

- ◯ Maintains house alone or with occasional assistance (heavy work)
- ◯ Performs light daily tasks such as dishwashing, bedmaking
- ◯ Performs light daily tasks, but cannot maintain acceptable level of cleanliness
- ◯ Needs help with all home maintenance tasks
- ◯ Does not participate in any housekeeping tasks

Q320. Laundry

- ◯ Does personal laundry completely
- ◯ Launders small items, rinses socks, stockings, etc.
- ◯ All laundry must be done by others

Q321. Mode of transportation

- ◯ Travels independently on public transportation or drives own car/bikes/scooter
- ◯ Arrange own travel via taxi/tempo, but does not otherwise use public transportation
- ◯ Travels on public transportation when assisted or accompanied by another
- ◯ Travel limited to taxi or automobile with assistance of another
- ◯ Does not travel at all

Q322. Own medications

- ◯ Is responsible for taking medication in correct dosages at correct time
- ◯ Takes responsibility if medication is prepared in advance in separate dosages
- ◯ Is not capable of dispensing own medication

Q323. Ability to handle finances

- ◯ Manages financial matters independently (budgets, writes checks, pays rent and bills, goes to bank)
- ◯ Keep track of income
- ◯ Manages day-to-day purchases, but needs help with banking, major purchases, etc.
- ◯ Incapable of handling money

» Physical activity

Q324. Can you do vigorous-intensity activities such as running, lifting heavy objects, digging, carrying water that cause large increases in breathing?

- ◯ Yes
- ◯ No

Q325. Can you do moderate-intensity activities such as carrying light object, leaning, cooking, washing cloth or dishes that arise heart rate, breath faster and feel warmer?

- ◯ Yes
- ◯ No

Section 4: Morbidity

» Chronic condition

Q401. Have you ever been told by a doctor that you have high blood pressure?

- ◯ Yes
- ◯ No

Q402. Are you taking medications to control high blood pressure?

- ◯ Yes
- ◯ No

Q403. Have you ever been told by a doctor that you have diabetes?

- ◯ Yes
- ◯ No

Q404. Are you taking medications to control diabetes?

- ◯ Yes
- ◯ No

Q405. Have you ever been told by doctor that you have heart diseases?

- ◯ Yes
- ◯ No

Q406. Are you receiving any treatment for heart disease and heart problems?

- ◯ Yes
- ◯ No

Q407. Have you ever been told by doctor that you have arthritis?

- ◯ Yes
- ◯ No

Q408. Are you receiving any treatment for arthritis?

- ◯ Yes
- ◯ No

Q409. Have you ever been told by doctor that you have high cholesterol?

- ◯ Yes
- ◯ No

Q410. Are you taking medication to control high cholesterol?

- ◯ Yes
- ◯ No

Q411. Have you ever been told by a doctor that you have osteoporosis?

- ◯ Yes
- ◯ No

Q412. Are you receiving any treatment for osteoporosis?

- ◯ Yes
- ◯ No

Q413. Have you ever been told by a doctor that you have COPD?

- ◯ Yes
- ◯ No

Q414. Are you receiving any treatment for COPD?

- ◯ Yes
- ◯ No

Q415. Have you ever been told by a doctor that you have gastritis, ulcer or gastrointestinal diseases?

- ◯ Yes
- ◯ No

Q416. Are you receiving any treatment for gastritis/gastrointestinal diseases?

- ◯ Yes
- ◯ No

Q417. Have you ever been told by a doctor that you have cancer or tumor?

- ◯ Yes
- ◯ No

Q418. Are you receiving any treatment for cancer or tumor?

- ◯ Yes
- ◯ No

Q419. Have you ever been told by a doctor that you have liver diseases?

- ◯ Yes
- ◯ No

Q420. Are you receiving any treatment for liver diseases?

- ◯ Yes
- ◯ No

Q421. Have you ever been told by a doctor that you have kidney diseases?

- ◯ Yes
- ◯ No

Q422. Are you receiving any treatment for kidney diseases?

- ◯ Yes
- ◯ No

Q423. Have you ever been told by a doctor that you have depression and anxiety?

- ◯ Yes
- ◯ No

Q424. Are you receiving any treatment for depression and anxiety?

- ◯ Yes
- ◯ No

Q425. Have you ever been told by a doctor that you have cataracts/glaucoma?

- ◯ Yes
- ◯ No

Q426. Are you receiving any treatment for cataracts or glaucoma?

- ◯ Yes
- ◯ No

Q427. Have you ever been told by a doctor that you have oral diseases?

- ◯ Yes
- ◯ No

Q428. Are you receiving any treatment for oral diseases?

- ◯ Yes
- ◯ No

Q429. Have you ever been told by a doctor that you have cervical and breast cancer?

◯ Yes

◯ No

Q430. Are you receiving any treatment for cervical and breast cancer?

◯ Yes

◯ No

Q431. Have you ever been told by a doctor that you have other chronic diseases?

◯ Yes

◯ No

Disease (*Record other chronic diseases)*

_____

Q432. Are you receiving any treatment for?

◯ Yes

◯ No

Q433. In the past 12 months, have you suffered from a bodily injury due to falls, accidents or road traffic accidents?

◯ Yes

◯ No

Q434. Did you get treatment?

◯ Yes

◯ No

Q435. Are you physically disabled due to injuries and accidents?

◯ Yes

◯ No

» Acute disease

Q436. In the past 12 months, have you suffered from health problems such as diarrhea, respiratory problems, fever, burned, etc.?

◯ Yes

◯ No

Q437. What health problems do you mainly suffer from?

◯ Diarrhea

◯ Dysentery

- ◯ Fever/flue
- ◯ Respiratory problems
- ◯ Covid-19
- ◯ Tuberculosis
- ◯ Pneumonia
- ◯ Dengue
- ◯ Urinary tract infections
- ◯ Eye problem
- ◯ Dental problem
- ◯ Skin infections
- ◯ Burn/
- ◯ Injury
- ◯ Other (Specify)

Section 5: Health service utilization

» Health service utilization

Q500. When was the last time that you sought or needed health care services?

- ◯ Year ago
- ◯ Month ago
- ◯ Day ago
- ◯ Not needed yet

Q501. In the past 12 months, have you visited a health facility?

- ◯ Yes
- ◯ No

Q501A. In the past 12 months, where did you go for health care or health checkup when you were sick?

- ◯ District hospital
- ◯ Primary health care center
- ◯ Health post
- ◯ Govt. mobile clinic
- ◯ Pvt. pharmacy
- ◯ Pvt. clinic
- ◯ Pvt./Community hospital

- ◯ Traditional healer (Dhami Jhakri)
- ◯ Treatment at home

Q502. In the past 12 months, have you received any consultation from a doctor or other healthcare professional about your health problems?

- ◯ Yes
- ◯ No

Q502A. Whom did you consult for your health problems?

- ◯ Doctor
- ◯ HA/AHW
- ◯ Nurse/ANM
- ◯ Physiotherapist
- ◯ Pharmacist
- ◯ Vaidya
- ◯ Dhami Jhakri

Q503. What was the main reason you visit to a health facility or received advice in the past 12 months?

- ◯ Chronic disease
- ◯ New cases
- ◯ Routine check-up/follow-up
- ◯ Injury

» Inpatient

Q504. In the past 12 months, have you ever stayed overnight in a hospital or any other medical facility because of the illness or injury?

- ◯ Yes
- ◯ No

Q505. What type of hospital or facility was it?

- ◯ District hospital/Govt. hospital
- ◯ Pvt./Community hospital
- ◯ Health post
- ◯ Pvt. Clinic

» Outpatient

Q506. In the past 12 months, did you receive any health care for an illness or injury from health facility without staying overnight?

- ◯ Yes
- ◯ No

Q507. Where did you mostly visit for health care in the past 12 months?

- ◯ District hospital/Govt. hospital
- ◯ Primary health care center
- ◯ Health post
- ◯ Pvt. pharmacy
- ◯ Pvt. clinic
- ◯ Pvt./Community hospital
- ◯ Traditional healer (Dhami-Jhakri)

» Access to health care

Q508. In the last 3 years, where did you go most often when you felt sick or needed health services?

- ◯ District hospital/Govt. hospital
- ◯ Primary health care center
- ◯ Health post
- ◯ Pvt. pharmacy
- ◯ Pvt. clinic
- ◯ Pvt./Community hospital
- ◯ Traditional healer (Dhami-Jhakri)
- ◯ Did not go anywhere
- ◯ No need to go anywhere

Q509. Who usually makes decision about your health care?

- ◯ Self
- ◯ Self/spouse jointly
- ◯ Son/daughter-in-law
- ◯ Daughter/son-in-law
- ◯ Grandchildren
- ◯ Someone else

Section 6: Elder Abuse

Q601. In the past 12 months, have you ever faced any type of emotional abuse (jealous or angry, hamulate, insult)?

- ◯ Often
- ◯ Sometimes
- ◯ Never

Q602. In the past 12 months, have you ever faced any type of physical abuse (push you, shake you, twist your arm, pull your hair, slape you, kick you, threaten you throw something at you)?

- ◯ Often
- ◯ Sometimes
- ◯ Never

Q603. In the past 12 months, have you ever faced any type of social abuse (restriction of older person's social life?

- ◯ Often
- ◯ Sometimes
- ◯ Never

Q604. In the past 12 months, have you ever faced any type of neglect (leave alone for long time, do not provide necessity such as adequate food, medical care, warmth?

- ◯ Often
- ◯ Sometimes
- ◯ Never

Section 7: Subjective well-being and quality of life

Q701. Do you have enough energy for everyday life?

- ◯ Completely
- ◯ Mostly
- ◯ Moderately
- ◯ A little
- ◯ Not at all

Q702. Do you have enough money to meet your needs?

- ◯ Completely
- ◯ Mostly
- ◯ Moderately
- ◯ A little
- ◯ Not at all

Q703. How satisfied are you with your health?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q704. How satisfied are you with your ability to perform your daily living activities?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q705. How satisfied are you with yourself?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q706. How satisfied are you with your personal relationships?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q707. How satisfied ae you with the living condition of your living place?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q708. Taking all things together, how satisfied are you with your life as whole these days?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q709. How satisfied are you with your social life and social relationship?

- ◯ Very satisfied
- ◯ Satisfied
- ◯ Moderate
- ◯ Dissatisfied
- ◯ Very dissatisfied

Q710. How would rate your quality of life?

- ◯ Very good
- ◯ Good
- ◯ Neither poor nor good
- ◯ Poor
- ◯ Very poor

Q711. Overall, how happy are you with your life?

- ◯ Very happy
- ◯ Happy
- ◯ Neither happy nor unhappy
- ◯ Unhappy
- ◯ Very unhappy

Respondent's mobile number

_____

Time completed interview

hh:mm

_____

Thank you for kind consideration

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