



COLLEGE OF BUSINESS AND MANAGEMENT SCIENCES

SCHOOL OF ECONOMICS

SOCIAL DETERMINANTS OF HEALTH STATUS IN UGANDA

BY

ATUGONZA RASHID

2016/HD06/1203U

**A DISSERTATION SUBMITTED TOWARDS THE PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF
ARTS IN ECONOMICS OF MAKERERE UNIVERSITY**

DECEMBER 2019

DECLARATION

I, **ATUGONZA RASHID** hereby declare that this dissertation titled “Social Determinants of Health Status in Uganda” is my own work and that all the sources, I have used or quoted have been acknowledged.


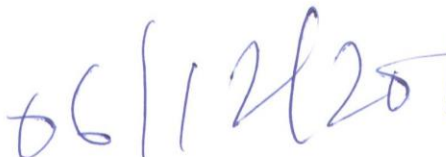
Signature:  Date: 06/12/2019
The signature is a cursive, handwritten name in blue ink. The date is written in blue ink as 06/12/2019.

Name of the author: **ATUGONZA RASHID**

CERTIFICATION

The undersigned certify that they have read this dissertation titled “Social Determinants of Health Status in Uganda” in the process of guiding the author and thereby recommend it for submission to the Directorate of Research and Graduate Training of Makerere University in the partial fulfillment of the award of the degree of Master of Arts in Economics of Makerere University.

Signed..........Date..........
DR. FRED MATOVU

Signed..........Date..........
DR. BRUNO LULE YAWE

ACKNOWLEDGEMENT

During the course of this research, I have received significant help from a number of people whose input was helpful in accomplishing this work. First and foremost, my sincere thanks and praise go to the Almighty Allah for the precious gift of life accorded to me.

Secondly, I owe my utmost gratitude to my supervisors; Dr Bruno Lule Yawe and Dr Fred Matovu for their time and unrelenting support without which this work would have been naught.

I am greatly indebted to my parents Kamugisa Swaibu and Kaahwa Beatrice for granting me moral and financial support during my studies. I also owe a great deal of debt to Aunt Enid and Uncle Charles for their moral and material support.

I would like to give my gratitude to Dr. Faisal Buyinza, Dr Francis Wasswa and Dr Ibrahim Mukisa, Dr Kilimani Nicholas, Dr Ibrahim Okumu and the entire School of Economics at Makerere University for their support during the entire period of my studies. I also appreciate the company of my classmates Sunday Nathan, Musimenta Hannington, Roosevelt Prowd without forgetting Vivian, Kahunde, Devis, and Patricia for their support.

Any errors and shortcomings in this study remain solely my own responsibility and should not be associated with any one of the above acknowledged individuals or institutions.

DEDICATION

To my lovely parents Kamugisa Swaibu and Kaahwa Beatrice, my brothers and sisters.
Without their unconditional love and encouragement, I would not have come this far.

ABSTRACT

Health status of individuals of great significance both because of the direct utility that health can provide and the productivity gain as a result of good health. The purpose of the study was to empirically establish the key factors influencing health status in Uganda. Specifically, examining the relationship between health status and socio-demographic, economic, lifestyle and environmental factors. Government of Uganda has been investing in health through acting on key Social Determinants of Health (SDH) such as household income and infrastructure as marked in the HSDP 2015/16-2019/20. However, evidence shows heavy burden of disease. The relationship between health status and the above SDH is not clear. Therefore, this necessitated the need to investigate the SDH. The study used Uganda National Household Survey (UNHS) 2016/17 data. The study was based on the SDH framework to examine SDH Status. Four logistic regressions models were estimated i.e. model I, II, III and IV focusing on individuals aged 0-5, 6-14, 15-59 and 60+ years respectively. The study used adjusted Wald test to test for individual Statistical significance of the regression coefficients and Hosmer-Lemeshow (HL) test, to assess the goodness of fit.

In reference to demographic factors the study establishes that Females aged 6-14, 15-59 and 60+ years were 1.29, 1.25, and 1.4 times more likely to be in poor health when compared to the males at $P < 0.01$ respectively. Individuals aged 6-14 from male headed household were 1.2 times more likely to be in poor health at $P < 0.01$ when compared to those from female-headed households. Rural residents aged 0-5, 6-14 and 15-59 were 1.5, 1.52, and 1.3 times more likely to be in poor health when compared to urban residents at $P < 0.01$ respectively. Likewise, the married aged 15-56 and 60+ years were 1.6 and 1.7 times more likely to be in poor health when compared with individuals not married at $P < 0.01$ respectively. Concerning economic factors, individuals with no formal education aged 6-14 years were 1.2 times more likely to be in poor health at $P < 0.01$ when compared to individuals with secondary level of education. Similarly, individuals aged 6-14 whose mothers have no formal education were 1.1 times more likely to be in poor when compared to those whose mothers have attained secondary level of education at $P < 0.01$. At $P < 0.05$ the unemployed aged 60+ were 1.6 times more likely to be in poor health when compared to those employed. Regarding lifestyle factors, current and past alcohol consumers aged 15-59 were 1.3 and 1.9 times likely to be in poor health at $P < 0.01$ when compared to individuals that do not consume alcohol respectively. Current smokers above 15-59 and 60+ years were 1.8 and 1.4 times more likely to be in poor health when compared to the non-smokers at $P < 0.01$ respectively. As for environmental factors, individuals aged 0-5- and 6-14 using water from unimproved sources were 1.3 and 1.2 times more likely to be in poor health when compared to those that use water from improved sources at $P < 0.01$ and $P < 0.05$ respectively. Individuals aged 0-5 using poor and intermediate quality toilet facilities were 1.7 and 1.5 times more likely to be in poor

health when compared to those that use high quality toilet facilities at $P < 0.01$ and $P < 0.05$ respectively. Individuals aged 6-14 residing in mud and poles houses and houses whose floor material made of earth were 1.2 and 1.3 times more likely to be in poor health when compared to those that reside in brick houses and houses whose floor material made of cement at $P < 0.01$ respectively.

The study findings show that females above 6 years are more likely to be in poor health when compared the males. Therefore, considerable emphasis should be put on health interventions for women. Education of girls and employment opportunities for women will also promote gender equality and more broadly improve upon their health. Interventions to prevent people from smoking and alcohol consumption must also be undertaken or strengthened. More efforts should also be put in promoting health lifestyles especially among the young people. Also, policies should be aimed at closing the gap in health conditions between urban and rural inhabitants through balanced economic and social development to increase the level of income, education and decreasing unemployment amongst people living in the rural areas. From the results, children aged 6 to 14 years whose mothers have no formal education are more likely to be in poor health. Therefore, education especially for the girls should be a priority to enable mothers gain knowledge and skills to be able to make better healthy choices. To address the health problem among unemployed individuals aged 60+ years, it is necessary to put in place insurance scheme for the elderly to ease their access to health care. Regarding the environmental factors, there should be establishment of clear institutional responsibility and specific budget lines for water & sanitation, and ensuring that public sector agencies working in health, in water resources and other utility services work together better to enhancing quality infrastructure (piped water to homes, toilets connected to sewers or septic tanks).

Key Words: Social Determinants of Health, Health Status.

TABLE OF CONTENTS

DECLARATION	i
CERTIFICATION	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
ABSTRACT.....	v
TABLE OF CONTENTS.....	vii
LIST OF TABLES	ix
LIST OF FIGURES	x
ACRONYMS	xi
CHAPTER ONE: INTRODUCTION	1
1.1 Background to the Problem.....	1
1.2 Statement of the Research Problem	3
1.3 Objectives of the study	4
1.4 Research question.....	4
1.5 Justification and Significance of the study.....	4
1.6 Organisation of the study	4
CHAPTER TWO: LITERATURE REVIEW	6
2.1 Introduction.....	6
2.2 Theoretical literature	6
2.3 Empirical literature.....	16
2.4 Summary	20
CHAPTER THREE: METHODOLOGY.....	21
3.1 Introduction.....	21
3.2 Social Determinants of Health framework.....	21
3.3 Measures of Health Status.....	24
3.4 The Concept of the Model.....	25
3.5 Variables Description and Expected signs	26
3.6 Model specification.....	31
3.7 Data source.....	33
3.8 Data analysis	33
CHAPTER FOUR: PRESENTATION AND INTERPRETATION OF RESULTS	36
4.1 Introduction.....	36
4.2 General Characteristics of the population	36
4.3 Descriptive Analysis	36

4.4 Model evaluation.....	42
4.5 Results	43
4.6 Interpretation of Results	43
4.7 Discussion of the study findings	49
CHAPTER FIVE: CONCLUSIONS AND POLICY RECOMMENDATIONS	52
5.1 Introduction.....	52
5.2 Summary of the Study.....	52
5.3 Conclusion	53
5.4 Policy Recommendations.....	54
REFERENCES.....	57
APPENDIX.....	64

LIST OF TABLES

Table 1.1: Key Health Indicators of East African Countries as per 2016/17	3
Table 3.1: Variable Definition	26
Table 4.1: General Characteristics of the Population	36
Table 4.2: Descriptive statistics	38
Table 4.3: Adjusted Wald tests Assessing significance of the Regression coefficients	42
Table 4.4: Hosmer and Lemeshow Goodness of Fit Statistics	42
Table 4.5: Results.....	44

LIST OF FIGURES

Figure 3.1: Social Determinants Framework	23
--	-----------

ACRONYMS

AIDS	:	Acquired Immune Deficiency Syndrome.
AIS	:	AIDS Indicator Survey.
CDC	:	Center for Disease control.
CSDH	:	Commission on the Social Determinants of Health.
GoU	:	Government of Uganda
HIV	:	Human Immune Virus.
HMIS	:	Health Management Information System
HSSP	:	Health Sector Strategic Plan.
IMR	:	Infant Mortality Rate
MDG	:	Millennium Development Goals.
MoH	:	Ministry of Health
NCDs	:	Non-Communicable Diseases.
NMR	:	Neonatal Mortality Rate
NTDs	:	Neglected Tropical Diseases
SDH	:	Social Determinants Health.
SES	:	Social Economic Status
TB	:	Tuberculosis
UBOS	:	Uganda National Bureau of statistics
UNAIDS	:	United Nations Joint Program on HIV/AIDS.
UNHS	:	Uganda National Household Survey
UPHIA	:	Uganda Population-Based HIV Impact Assessment
WHO	:	World Health Organization
PLHIV	:	People Living With HIV
UNGA	:	United Nations General Assembly

CHAPTER ONE: INTRODUCTION

1.1 Background to the Problem

Health is defined as “a state of complete physical, mental and social well-being and not merely the absence of disease” (World Health Organization, 1948). Health status of individuals is not only of great significance not only because of the direct utility that health can provide but also because of the productivity losses and large indirect costs caused by ill-health which places demands on already strained health systems and family support networks (Strauss et al., 1993). Health is determined by a number of factors which may be biological, socioeconomic, psychosocial, behavioral, or social in nature. Social determinants have always played a vital role in our health and overall well-being. Social Determinants of Health (SDH) are defined as conditions in which people are born, grow, live, work and age, and the wider set of forces and systems shaping the conditions of daily life (Marmot, 2008).

The basic principle of public health is that all people have a right to health (Mann et al., 1999). However, dissimilarities in the incidence and prevalence of health conditions amongst groups usually prevail and these are referred to as health disparities (Braveman, 2006). Most health disparities affect marginalized groups because of socioeconomic status, race/ethnicity, sexual orientation, gender, disability status, geographic location, or some combination of these. Individuals in such groups not only experience poorer health but also tend to have less access to the social determinants (e.g., healthy food, good housing and education, safe neighborhoods among others) that support health (Ramirez et al., 2008).

According to the Uganda Health Sector Development Plan (HSDP) 2015/16-2019/20 addressing SDH such as household income and infrastructure/ transport could improve health outcomes. However, before the implementation of HSDP 2015/16-2019/20, Uganda had embraced Millennium Development Goals (MDGs), to eradicate extreme poverty and hunger, achieve universal primary education, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability among others by the year 2015. Indeed, by 2015 there was achievement in terms of universal access of treatment for HIV/AIDS and reversal of the incidence of malaria and other major diseases. However, improving maternal health remained stagnant, while reversing the spread of HIV/AIDS and reduction of under-five mortality were, not achieved and missed narrowly

respectively (Republic of Uganda, 2015).

There has been stagnation in Neonatal Mortality Rate (NMR) at 27 per 1,000 live births (UBOS, 2016). With one year remaining this performance still falls short of the HSDP target of 16 per 1,000 live births. The Infant Mortality Rate (IMR) stands at 43 per 1,000 (UBOS, 2016) which is a substantial improvement from IMR of 54 per 1,000 live births (UBOS, 2012). Regarding the Under Five Mortality Rate there has been a substantial reduction from 90/1,000 live births (UBOS, 2012) to 64/1,000 live births (UBOS 2016).

However, according to the Annual Health Sector Performance Report 2017/2018, malaria still remains the leading cause of illness for all ages accounting for 29.5% of all OPD attendances followed by pneumonia at 26.9% followed by urinary tract infections at 4.5% and intestinal worms at 4%. The same report shows that the leading causes of mortality among all ages were malaria (11%), pneumonia (9.1%), anemia (6.9%), other neonatal conditions (5.3%) and premature baby (5%). The 2015 National TB prevalence survey puts the incidence of TB at 234/100,000 population for all TB cases and a much higher TB prevalence of 253/100,000 population, than the earlier reported estimate of 159/100,000 population based on the 2015 WHO Global TB report.

The MoH, (2017) Uganda Population-Based HIV Impact Assessment (UPHIA) indicates a highest HIV prevalence of 14% among men aged 45-49 years and 12.9% among women aged 35-39 years higher than the national prevalence of 6%. In the year 2017, New HIV infections were estimated to be 50,000 (UNAIDS, 2018), of these, adults aged 15 years and above accounted for 42,400 (84.8%) while children 0-14 years accounted for 7,600 (15.2%). Notably, women are still disproportionately affected, with females aged ≥ 15 years accounting for almost half (48%) of the new infections while men aged ≥ 15 years accounting for over one third (36.8%) in 2017. Cause of death by Non-Communicable Diseases (NCDs) increased from 25.3% in 2010 to 32.9 in 2016 (World Bank, 2017)

According to the World Bank (2019), by the year 2016/17, Uganda's life expectancy was 60 only above that of Burundi (57). Uganda's HIV prevalence (5.9) was highest in the region. Uganda has a higher prevalence of stunting height of children under five (29), only below Rwanda (38) and Burundi (55.9). Within the East African region Neonatal mortality (27) was highest in Uganda while for under 5 mortality rate Uganda is only below Tanzania and Burundi. Uganda has a maternal mortality ratio of 336/100,000 live births above Rwanda

(253) and slightly above Burundi (334). Uganda has quite a high infant mortality rate of 35.4 compared to that of Kenya and Rwanda at 33.6 and 28.9 respectively as noted in Table 1.1.

Table 1.1: Key Health Indicators of East African Countries as per 2016/17

	Kenya	Uganda	Tanzania	Rwanda	Burundi
Mortality rate, infant (per 1,000 live births)	33.6	35.4	38.3	28.9	42.5
Maternal mortality ratio (per 100,000 live births)	360	375	556	253	334
Under 5 mortality rates (per 1,000 live births)	49	64	67	50	78
Mortality rate, neonatal (per 1,000 live births)	22	27	21.7	20	23
Prevalence of stunting, height for age (% of children under 5)	26	29	25	38	55.9
Prevalence of HIV, total (% of population ages 15-49)	4.8	5.9	4.5	2.7	1.1
Life expectancy at birth, total (years)	67	60	66	67	57

Source: *World Bank Development Indicators*

In September 2015, world leaders adopted the 2030 Agenda for Sustainable Development with the goal to end poverty, improve health, reduce inequality and address climate change by 2030 (UN, 2015). Sustainable Development Goals (SDGs) offer a unique prospect on addressing SDH to improve the health and wellbeing of the people. While SDG 3 aims to “ensure healthy lives and promote wellbeing for all at all ages”, fundamental health targets are also embedded in other goals. The necessity to address SDH for improved health outcomes originates from the Constitution of the World Health Organization (WHO, 1946). Therefore, better health outcomes can’t be achieved by only taking action in the health sector alone and failure to take action on SDH implies that the overall well-being and health of the population will remain poor.

1.2 Statement of the Research Problem

Over the years, Government has struggled to achieve better health for the people in Uganda to enhance their quality of life and productivity (MoH II, 2010). This is evidenced through acting on key SDH such as household income, education and water as it is marked in Health Sector Development Plan (HSDP) 2015/16 - 2019/20. However, evidence shows that health indicators still show a heavy burden of disease disproportionately born especially by children and women. It is not clear whether the above SDH significantly affect health status. This is due to the fact that malaria still remains the highest cause of morbidity and mortality especially among the children below 5 years of age (UBOS, 2017). Cause of death by NCDs increased from 25.3% in 2010 to 32.9 in 2016 (World Bank, 2017). Uganda remains a high-

burden country with an estimated PLHIV population of 1.32 million (MoH, 2017). Therefore, understanding the actual SDH that significantly affect health status is critical. Probably, the interventions undertaken are not targeting the most significant factors. Thus, this necessitates a study in to SDH to empirically establish the key factors influencing health status in Uganda.

1.3 Objectives of the study

The overall objective of this study is to empirically establish the key factors influencing health status in Uganda. Specifically, this study sought to examine the relationship between health status and socio-demographic; economic; lifestyle as well as environmental factors.

1.4 Research question

The specific research question that this study sought to answer are as follows

- i How do socio-demographic, economic lifestyle and environmental factors determine health status in Uganda?

1.5 Justification and Significance of the study

The study contributed to the existing literature on the effect of social determinants on health status which will help in developing of integrated policy approaches in order to address the complexity of health inequities in Uganda.

The study provides an empirical groundwork on social determinants by linking them with the individual health status of different age groups. In addition, the empirical findings fill the gap about what was currently known about social determinants of health, this will help in establishing the whole of society targets towards the reduction of health inequities.

This study is also expected to stimulate further research on social determinants of health in Uganda since the study suggests areas of further research. Furthermore, the findings can act as empirical literature for future studies on social determinants of health in Uganda.

1.6 Organisation of the study

This study is organized into five chapters. The first chapter introduces the background to the statement of the problem, objectives of the study, research questions and justification of the study. The aim of Chapter one is to provide background information about Social determinants of health and health status in Uganda.

Chapter two comprises the review of both the theoretical, empirical literature related to the research topic. The purpose of Chapter 2 is to give an overview of the literature review on the different approaches to Social Determinants of health. The chapter also outlines a summary of what has been observed in the empirical literature and identifies weaknesses and gaps which have been filled by this study.

Chapter three deals with research methodology. The chapter explains the methodology adopted by the study to examine the relationship between social determinants and the health status in Uganda. It presents the different measure of health, the model used in the analysis and the derivation of logit model as well as the model specification. The chapter further presents estimation techniques.

Chapter four presents the study finding. This chapter presents the empirical results on the Social Determinants of Health status in Uganda that is the general characteristics of the population, descriptive analysis and the logistic regression results. This chapter further presents the interpretation of results and discussion of the findings.

Chapter five presents the summary and major conclusions drawn from the study as well as policy recommendation derived from the study findings. In this chapter we further present areas for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter provides theoretical and empirical review on SDH. It also provides a summary of what has been observed in the literature review and identifies weaknesses and gaps which have been filled by this study.

2.2 Theoretical literature

This thesis is framed through multiple theoretical perspectives, which serve to examine the impact of SDH on health inequalities. The guiding framework used throughout the thesis, from development through analysis and interpretation, is the social determinants of health (SDH) framework, which provides an understanding of the factors that affect health and inequalities. There are four theories that are effective in the study of health inequalities and their causes, these are the behavioural theory, materialist theory, psychosocial theory and life-course theory. Each of these approaches the SDH from a different angle, but may be used in conjunction to provide a well-rounded and holistic understanding of this issue. These theories are situated and encompassed by the SDH framework and are used in this thesis as a collective.

2.2.1. The Behavioural theory

The behavioural theory of health inequalities acknowledges the ways that individual or community attitudes and behaviours affect health status and health outcomes. Through this perspective, a connection is made between an individual's place within the social hierarchy and their behaviour through their personal attributes, or cultural identities (Bartley, 2004). This theory typically assesses individuals who have a low income, or have a low social or economic status as being unable to cope with their situation and lacking the intelligence and resilience to overcome their situation (Bartley, 2004). In this theory, behaviour and personality are then considered the primary indicator of resulting health status, and those with negative health behaviours or attitudes are more likely to experience poor health (Hampson et al., 2007). The behavioral theory utilizes educational attainment, as associated with income and Social Economic Status (SES) to explain health inequalities, thus relying on three social determinants of health to demonstrate the reason why poor health is more prevalent among certain groups or populations.

Educational attainment is a core component of this theory, and a core SDH. A clear link has

been made between education level and health behaviour (Bartley, 2004). Level of educational attainment, or the last completed level of education, has been associated with longevity through lifestyle choices and behaviours such as maintaining healthy diets and physical activity, as well as with income level (Adler et al., 1999). Typically, individuals with a low income and social status also have a low educational attainment level and may have difficulty understanding and complying with public health initiatives and recommendations (Bartley, 2004). In comparison, individuals who have achieved higher levels of education and have greater employment qualifications are found to maintain healthier diets and more active lifestyles (Bartley, 2004). This aspect of the behavioural theory is supported by studies that have shown that greater intelligence through higher educational attainment is a primary determinant in achieving better health status, when compared with SES (Bartley, 2004).

Public health programs or services utilizing this theory have typically focused on addressing the negative health behaviours of individuals, social groups or communities. Most contemporary public health interventions primarily emphasize behaviours and their role in the health of individuals (Marmot, 2007). Many of these programs have worked to address health inequalities by educating the public, or a specific group within the public, on more health-positive behaviours or practices (Raphael, 2002).

While it is important to address behavioural factors in many cases, it is also important to contextualize behaviour, and its causes. Marmot (2007) states that behaviour is socially patterned and determined by factors present within society, and represents SDH. Therefore, public health action and policy must address the structural drivers behind differences in behaviour within populations; otherwise it is not effective to target the behaviour itself (Marmot, 2007). Therefore, targeting upstream social determinants such as social, or even community structure could provide an understanding as to how behaviours and attitudes are shaped.

While educational attainment and achievement is a good marker for adult health, it is not the only factor that can be considered in affecting health behaviour or coping (Marmot et al., 1997). Some critiques of the behavioural theory exist, drawing attention to the ways that this theory tends to focus on negative traits and characteristics of individuals or groups. Raphael (2002) states that this theory places blame on individuals of lower health status, or those who experience illness as being responsible for their situation by taking part in high-risk activities and behaviours. The theory views smoking, alcohol consumption, and the inability to afford a

high-quality diet as the choice of the individual to put themselves at risk.

One of the strongest critiques of this theory is that it fails to take into account the material factors that influence health as well as the social factors that serve to protect or worsen material effects on health (Raphael, 2002). A second major doubt with the behavioural theory is that it neglects to acknowledge the causes of such negative behaviours and the social and structural causes of inequalities. The behavioural theory acknowledges and addresses only downstream determinants of health, which take place at an individual-level, without considering the determinants that take place on a structural, or political-historical level.

While educational attainment can be considered an upstream determinant, as a social resource, the behavioural theory regards educational attainment as an individually determined factor. However, when considering educational attainment, there are social forces that restrict or complicate the completion of education, such as racism within the education system, or culturally inappropriate teaching methods, and these are not addressed within the behavioural theory. The behavioural lens narrows its focus onto the individual and avoids turning around to view how society and social forces affect behaviour.

2.2.2. The Materialist theory

Within the SDH framework, the materialist approach identifies conditions of living as determinants of health (Raphael, 2006). Using this approach towards understanding health inequalities, researchers can look at how material conditions, largely through income distribution, affect the quality and quantity of SDH for individuals and populations. Material conditions are often dependent on the type of social structure and organization of the setting in which a person lives and has no control over (Bartley, 2004; Marmot, 2007). Material determinants of health include housing, employment, work environment and SES, all of which are dictated by upstream determinants of health such as income (and income distribution) and social and health policies, and therefore require SDH approach when addressing inequalities.

Physical, social, educational and developmental issues and inequalities can be determined by material SDH such as housing conditions, employment status and working conditions (Raphael, 2006). These material factors are most often linked to SES, particularly through income. Income and living conditions are largely determined through the government and labour market, and the economic opportunity that it offers to people (Marmot, 2007). Therefore, work and employment are the starting points for several determinants of health (Marmot et al., 2008).

Work is often considered to be a protective determinant of health. Employment provides financial security and social status, as well as self-esteem and can protect against physical and psychosocial hazards (Marmot et al., 2008). Unemployment can lead to physical and mental problems, including depression, poor coping behaviours such as drinking or smoking and increased suicide rates (Mikkonen & Raphael, 2010). Most importantly, unemployment leads to material deprivation and poverty by eliminating income (Mikkonen & Raphael, 2010).

Poverty, as an outcome of negative material conditions, has significant, lasting effects on health. It is well documented that countries with high rates of poverty have poorer health (Raphael, 2002). It is economic inequality, and unequal distribution of income across the population that fuels the rise in poverty levels, and increases the income and health disparities between those with high SES and low SES (Raphael, 2002). Bartley (2004) states that individuals with low incomes experience poor health and have lower life expectancies than others, demonstrating how structural conditions affect the quality of material factors, which can be found to determine health status and serve to cause health inequalities.

Health inequalities exist not only between the rich and the poor, but also along a social spectrum, known as the social gradient of health. Marmot (2007) writes that simply focussing in the gap in health between the highest and lowest socioeconomic statuses fails to acknowledge all of the people in between, along the gradient. The lower the SES, the lower an individual's health status, and this occurs consecutively down the gradient between the top SES and the bottom (Kawachi et al., 2002, Marmot et al., 2008). The social gradient of health focuses on the worse health of those with a lower SES, which is measured by income, employment and education, finding that health inequalities are not simply explained by the conditions of disadvantage such as lack of nutrition, adequate housing, or healthcare (Kawachi et al., 2002). Poverty has continuously been named as the cause of the cycle of inequality that affects those at the bottom of the social ladder (Mikkonen & Raphael, 2010).

Housing and homelessness are SDH that are closely intertwined with income and poverty. The growth of poverty particularly within urban centres, has come with an increase in substandard housing for low-income families (Bryant et al., 2011). Housing and home environment are critical determinants of health, where the interaction between income and housing has caused an inequality in health risk, as households experiencing material deprivation are often living in dangerous conditions that may take effect on their health in

both the short- and long-term (Bryant et al., 2011).

Marmot et al. (2008) include shelter, clean water and sanitation as basic human rights, and determinants for healthy living. Availability and access to effective healthcare services is another determinant that is affected by social and political structuring. This is an especially important determinant for individuals of minority, who may have alternative beliefs about health and health-related traditions. Availability of healthcare services is a single factor, which pales to the larger issue of access to adequate care (Newbold, 1998).

Within the materialist approach, exposure to certain material ‘hazards’ have been identified as a factor influencing health inequalities. Material hazards include those present in the home, but most often are attributed to the workplace. Working conditions represent one of the major challenges to health, including the nature of the employment itself, and the availability of work (Marmot, 2007; Marmot et al., 2008). Adverse working conditions are found to cluster among low-wage and low-status occupations and expose workers to greater physical hazards (Marmot et al., 2008).

Similarly, Bartley (2004) writes that individuals of lower social class and SES are more likely to be exposed to material hazards due to inadequate or dangerous workplaces, or residence in unsafe or polluted neighbourhoods. Individuals with few influential contacts within their social network, and few workplace or educational qualifications are often unable to secure safe, well-paid jobs and are more likely to be chronically exposed to negative health hazards (Bartley, 2004). This is due to the fact that low-wage jobs often associated to increased chance of an accident, or exposure to harmful substances and extreme temperatures (Bartley, 2004).

While many high-income countries have taken action to reduce physical and chemical hazards in the workplace, a large segment of the population continues to work in precarious environments (Marmot, 2007). Furthermore, working conditions are shifting, even in high-income countries, towards less job security and less control over work duties, seriously affecting the health and wellbeing of the population (Marmot, 2007). For example, temporary workers have a higher mortality than permanent workers, and the mental health of workers in precarious settings suffers far more than those working in a more comfortable environment (Marmot et al., 2008). Therefore, not only do material conditions alter physical health, but also affect mental health and wellbeing.

2.2.3. The Neo-Materialist theory

Additionally, a neo-material approach to health inequalities looks at how health inequalities within a population result from the ways that economic and social resources are distributed in society (Raphael, 2006). The neo-materialist theory states that poor health and large disparities in income between the rich and poor result when a government invests little into public infrastructure and the social determinants of health, and when governments fail to distribute income equitably across the population (Raphael, 2006).

This theory provides a combination of the effects of material circumstances with the social factors that affect the quality of SDH, including the amount and types of social provisions made to the population through policy, such as education, transportation and healthcare (Raphael, 2006). Research has shown that social democratic, egalitarian countries, such as most Nordic countries, experience the best health due to an equitable distribution of material resources and income (Raphael, 2006). Individuals and communities do not have direct control over how resources will be distributed, and therefore health outcomes and inequalities cannot be blamed on the individual, but rather the underlying cause must be addressed in order to reduce these health issues.

The SDH are affected by all social structures, particularly governments, social and economic policies, not only health policies, as they determine the distribution and quality of the SDH across the population (Marmot et al., 2008, Bryant et al., 2011). Health systems are another social determinant of health that is out of the control of individuals. Both national and local health systems of disease control and health service provision are important determinants of health, particularly among socially disadvantaged populations (Marmot, 2007).

The healthcare system is a SDH itself, and demographic factors are all associated with access, experience and the benefits from healthcare (Marmot et al., 2008). This raises the importance of changing health systems to make them responsive to the needs of the population, especially the segment of the population that suffers the worst level of health (Marmot, 2007). Because health systems are a determinant of health, policies and programs should acknowledge and address the other SDH, and effectively address the drivers of poor health (Marmot, 2007). This is of critical importance when considering health inequalities experienced by individuals and populations that are significantly affected by such policies and the way that society distributes resources.

2.2.4. The Psychosocial theory

The psychosocial approach to the SDH identifies the structure of the social hierarchy and the

relationships between individuals and communities as determinants of health. This approach uses two mechanisms to health inequalities, examining them at both an individual- and community-level perspective. This theory argues that health inequalities are constructed based on individuals' perception of their place within the social hierarchy in the population (Raphael, 2006). Additionally, inequalities and disparities in health status result due to other psychosocial factors such as social support, control, autonomy and balance between home and work life (Bartley, 2004). Therefore, while perceptions of place in the hierarchy take place at the individual level, it is upstream and distal determinants such as social policy and the persistence of colonialism that cause individuals to view themselves in low standing.

On an individual level, inequitable societies cause individuals to compare themselves to other members of their society that are higher within the social hierarchy, which in turn bring up feelings of worthlessness that promote stress and poor health through psychobiological pathways (Raphael, 2006). These individuals may try to compensate for these feelings and stress by overworking, making rash decisions and taking up health-negative behaviours such as smoking and increased alcohol consumption in an attempt to cope (Raphael, 2006).

At the community level, the psychosocial theory states that social cohesion among members of society is reduced when the social hierarchy is reinforced and maintained through policies that ignore or reduce the quality of the SDH (Raphael, 2006). Individual esteem and social connectedness, and cohesion are psychosocial determinants of health that, when inequality is reinforced through society and policy, serve to worsen the health status among low-income, impoverished or minority groups that make up the bottom rung of the social ladder.

The psychosocial approach focuses on the concept of social support, a SDH, which is defined as the number and strength of the social relationships that an individual has. Social support is the supportive behaviours and resources (material or emotional) of social ties and networks (Richmond & Ross, 2008). Social support operates not only on individual and community levels, but also on structural, political and economic levels. Social support is considered to be health-protective against health-negative stresses and can help to limit the ill effects of stressors (Bartley, 2004).

Many long-term studies have found that individuals that have good relationships with family and friends, and those who participate within their community are more likely to have greater life expectancies than those socially isolated, however, these findings may not prove that

psychosocial pathways of health inequalities exist (Bartley, 2004). Further, individuals that have more advantaged positions within the social hierarchy have shown to receive greater levels of social support from their networks beyond their immediate family, indicating that individuals with higher SES have better health due to their extended social networks, in addition to having better education and income (Bartley, 2004). Bryant, et al (2009) stated that social support and social capital work to shape the ability to cope with life situations.

Social support has been found to be affected by income and other material aspects, and education (Richmond et al., 2007). This demonstrates the interactions between the SDH, that no one determinant stands alone, without affecting or being affected by another. McDonnell et al., (2009) state that an individual that has many social contacts, and strong relationships within both their immediate and extended networks are more likely to have better health and better access to healthcare. Therefore, strong social support and capital reduces health inequalities, however, societies with unequal material conditions, income and resource distribution, are found to have less social capital.

Like the materialist theory, the psychosocial theory takes a look at inequalities related to employment and working conditions such as demands, strains and control. Many studies have shown that low control in the workplace and high stress lead to increased blood pressure and other negative outcomes (Bartley, 2004). In particular, stress in the workplace, involving high psychological demands, having low control over tasks and not being adequately rewarded for effort, is associated with many indicators of illness (Marmot et al., 2008). It is often individuals with limited qualifications and poor education that take on low-paying, menial and high-stress jobs. Individuals with low SES have poor working conditions with little chance of moving up to higher-authority positions.

Therefore, people who are disadvantaged and have low status are more likely to exhibit a greater number of psychosocial risk factors and experience reduced health status (Bartley, 2004). This is also the case with individuals of minority, who begin work in a low position in the social hierarchy. Occupations that offer more control are given to more privileged and better-educated individuals, who are likely to have began with a higher-class status and will continue to experience a better level of health (Bartley, 2004). It is evident that there are multiple elements within the psychosocial approach to the SDH that are critical to understanding health status, which work well when done so in combination with the other approaches and determinants.

2.2.5. The Life-course theory

The final perspective that is used to assess health inequalities using the SDH is the life-course theory. The SDH that drive health disparities, take effect on the developmental trajectories of individuals over the course of their entire life (O'Campo, 2012). Therefore, using this approach to understanding health inequalities is critical to examine how adult health is determined by exposures to and experiences of the SDH from the pre-natal period through adulthood. The life-course theory acknowledges many SDH. Similar to the other theory, the life-course perspective links health outcomes with the place in the social and economic hierarchy, which depend on intermediate determinants, or the political and cultural environments where the individual or community is located (Bartley, 2004). This theory looks at the SDH effects on health outcomes at all stages of life.

The life-course theory identifies three different effects to health outcome based on exposures and experiences. Latent effects are experiences in early life of a biological or developmental nature, these are also known as critical periods, where childhood serves as the period where exposures and hazards are most influential to adult health (Bartley, 2004; Kawachi et al., 2002). Pathway effects are the experiences that set individuals on a track towards certain health outcomes; they are events that end up determining health later in life (Raphael, 2006; Kawachi et al., 2002). For example, Raphael (2006) states that children that enter the school system with poor verbal skills tend to have lower educational outcomes and poor employment opportunities in adulthood, which leads to low income and subsequent poor health.

The third health effect within this theory is cumulative effects, which lead to health outcomes based on an individual's accumulation of advantage and disadvantage through life (Raphael, 2006). Cumulative effects combine latent and pathway effects in that early life experience and life trajectories both determine the levels of advantage or disadvantage experienced by individuals, based on their social status (Raphael, 2006). These three effects look at the engagement between the individual and various SDH to determine health outcomes.

The life-course theory easily blends in SDH framework, where heavy emphasis is placed on early childhood development. The SDH are of particular importance to the health of children, where not only do negative living conditions affect health in childhood, but also threaten health into adulthood, with the early onset of illnesses such as diabetes and cardiovascular

disease (Raphael, 2012). The Commission on the Social Determinants of Health (CSDH) identified the importance of early child development including physical, cognitive, linguistic, social and emotional development, as critical in reducing health inequities (Marmot et al., 2008). Marmot et al., (2008) writes that action on child development should look into physical, cognitive and language, and social and emotional factors that have influence on health, all of which are dependent of economic circumstance and the environmental conditions in which the child lives.

Housing, living conditions, safe neighbourhoods, sanitation levels, access to clean water, access to social services including education and child care are all social determinants of child health that must be addressed in early years (Marmot, 2007). Early childhood development initiatives should take action on the SDH, however, the economic and social resources available to parents determine the quality of these initiatives (Mikkonen & Raphael, 2010). This brings the life-course into union with the material and psychosocial theory, where income and resource distribution play significant effect on health outcome. Again, it is the upstream determinants, like social resources that determine these outcomes, and the distal determinants, like existing individualist discourses that limit this critical determinant.

Therefore, the use of the life-course theory in examining health status allows for an understanding of how the social determinants affect health within each phase of life, and how they set the stage for positive or negative health outcomes later in life (Raphael, 2006). Health has been predicted by the effects of early life experiences on the mental, behavioural and physical development of children, and that the experiences up until the age of six have the greatest effect on adult health (Braveman et al., 2011). Advantage and disadvantage within the SDH have been shown to have cumulative effects over the life course, and children that are raised in a socially disadvantaged household are more likely to experience poor health and continue to live disadvantageously in adulthood (Braveman et al., 2011). Kawachi et al, (2002) support that the life-course is crucial to understanding the cause of health status, through many determinants, supporting use of the life-course and SDH framework.

Therefore, this study will specifically be based on the Behavioural theory which focuses on Individuals attitudes and behaviours (Bartley 2006), as well as the Materialist theory which focuses on Conditions of living e.g. housing, work, SES etc. (Raphael, 2006) have guided the selection of variables used in this study

2.3 Empirical literature

In this chapter, a review of current literature will be provided aimed at offer the current understanding of health inequalities based on the Behavioral theory and the Materialist theory which will guide this study.

2.3.1. Behavioral Determinants of Health

According to the behavioral theory, behaviour and personality are then considered the primary indicator of resulting health status, and those with negative health behaviours or attitudes are more likely to experience poor health (Hampson et al., 2007). Among these include the lifestyle factors such as smoking and alcohol consumption.

Indeed, lifestyle factors such as smoking and alcoholism have been linked to poor health. A number of studies have been carried out on the relationship between Smoking and health status. Smokers are at a higher risk of suffering the adverse effects of smoking in their physical health (Doll et al, 1994). Cayuela et al. (2007) and Díez et al. (2010) found that smokers were in poor health than non-smokers. Alcohol is linked both to the course and incidence of disease. Alcohol consumption has detrimental effects on hypertension, cardiac dysrhythmias and haemorrhagic stroke (Rehm et al., 2010). The higher the consumption of alcohol, the greater the risk of cancer even the consumption of two drinks per day causes an increased risk for some cancers, such as breast cancer (Hamajima et al., 2002).

Educational attainment is also a core component of this theory, and a core SDH. A clear link has been made between education level and health behaviour (Bartley, 2004). Educational attainment is linked with health in three interrelated ways first, Education has been associated to better health through increased health knowledge and healthy behaviors of individuals' (Berkman et al., 2011, DeWalt and Hink, 2009). Second, education is linked to employment opportunities, which are the foremost determinants of the economic resources that influence health. Thirdly, education can enhance health through psychological and social factors, with greater education linked to higher social standing, greater perceived personal control, and increased social support. Parents with low levels of education may be less able to invest in the health of their children, and this may have long-reaching implications for the adult outcomes of the child (Cunha and Heckman, 2007; Almond and Currie, 2011).

Using the demographic and Health survey 2006, Bbaale (2014) examined the relationship between maternal education and child nutritional status in Uganda and found that once the

socio-economic factors are controlled for, the significance of maternal education, especially primary and secondary levels, in influencing child nutrition status decays but post-secondary education persists. According the findings if mothers are exposed to the same socio-economic conditions, it is education of the mother beyond secondary level that generates a difference in the child nutrition outcomes. The findings further show that mothers having white collar, agriculture, and blue-collar jobs are associated with poor child nutrition status compared to their counterparts who are not working. Other factors found to be important in inducing child nutrition outcomes include household environment, autonomy of mothers, utilization of modern healthcare facilities, and location.

Marital status is also one of the determinants considered under the behavioral theory basing on the fact that a spouse may play an important role in monitoring and encouraging healthy behaviors such as good eating habits and regular exercise, as well as in discouraging unhealthy ones such as smoking or heavy drinking (Umberson, 1987). Recent research consistently indicate that marriage reduces heavy drinking and overall alcohol consumption, and that effects are similar for young men and young women, and for both African Americans and whites (Duncan et al, 2006). Studies of marriage and smoking reveal no consistent pattern of results, suggesting that marriage may have little or no influence on this behavior.^{8,11,12,13} Also, several rigorous studies find that marriage leads to modest weight increases for both men and women typically averaging less than five pounds (Lee et al, 2005)

Numerous studies within demographic research have also emphasized that health and mortality outcomes for married persons are better than for unmarried persons (Hu and Goldman., 1990) and this is particularly the case for men (Gove, 1973 and Ben-Shlomo et al., 1993). Subsequent research has sought to explore the extent of ‘marriage selection’ by which healthier persons are selected into marital unions, while less healthy individuals either remain single or more likely to become separated, divorced or widowed (Joung et al., 1998 and Martikainen et al., 2005). Research has also examined the extent to which marriage provides ‘protection’ against adverse health outcomes, through modified health behaviour and social networks arising from the union (Verbrugge, 1979).

2.3.2. Materialist Determinants of Health

The materialist theory identifies conditions of living as determinants of health (Raphael, 2006). Some of the material determinants of health include housing, employment, work environment and Socio-Economic Status (SES), all of which are dictated by upstream

determinants of health such as income (and income distribution) and social and health policies, and therefore require SDH approach when addressing inequalities.

A number of researchers have written about materialistic determinants of health, Studies have shown a correlation between income and poor health and mortality (Mirowsky & Ross, 2001 and Macinko et al., 2003). Hutchinson (2001), using early household data and looking at child sickness found that health status responds positively to welfare in Uganda.

Quantitative evidence from the general population highlighted in several meta-analyses and literature reviews points to the health benefits of work and the detrimental impacts of unemployment. Some psychologists ascribe to the theory that work provides relationships and social connections; a time structure on the working day; the assignment of social status; regular productive activity; and the opportunity to engage in collective efforts greater than could be achieved alone (Jahoda, 1982). The stress of trying to pay bills and feed and clothe a family on an inadequate household income generates psycho-physiological distress, malaise and susceptibility to disease (Montgomery et al, 1999).

Ansari et al. (2003) synthesizes literature on the social determinants by describing three widely reported components that are described as socio-economic determinants, psychosocial risk factors and community and societal characteristics. While on the other hand according to Schulz et. al., (2005) SDH comprise of contextual factors such as neighborhoods or communities as well as individual factors. Social and economic factors are associated to health and well-being, and inequalities in social and economic circumstances also contribute to inequalities in health (Schulz et. al., 2005).

Auchincloss et al. (2002) finds that residents of rural counties were at greater risk for health problems compared to residents of urban areas, contrary to this, Phaswana et al. (2013) finds that residing in urban areas is linked to poor health in South Africa. Urban areas are associated with inactive lifestyles and poor dietary habits (Hosseinpoor et al., 2012). Rural residents engage in active lifestyles which increases their physical activity, lowers the risk of obesity and hypertension and therefore improves their survival rates (Fantahun et al., 2009). In regards to age advanced age (old aged) has been associated to reduced immune response against illnesses and NCDs (Phaswana et al., 2013 and Ward & Schiller, 2013).

Several studies have also shown that, poverty is a pivotal SDH, functioning both directly and indirectly to compromise health status (Scott and Wilson, 2011). Numerous studies (e.g.,

Lynch & Kaplan, 2000 and Robert & House, 2000) have found that the non-poor do better on most measures of health status than their poor counterparts. Poor people are especially disadvantaged with respect to healthy lifestyles, since they are more likely to get involved in greater unhealthier eating and drinking practices, cigarette consumption, and lower levels of participation in exercise across adulthood (Cockerham, 2005).

While women generally experience poorer health than men, the pattern of gender differences in health is varied (Arber & Cooper, 1999). Women have lower rates of mortality but, paradoxically, report higher levels of depression, distress, and a variety of chronic illnesses than men (McDonough & Walters, 2001). In terms of social factors, researchers pose two general hypotheses to account for gender-based inequalities in health. The differential exposure hypothesis suggests that women report higher levels of health problems because of their reduced access to the material and social conditions of life that foster health (Ross & Bird, 1994). The differential vulnerability hypothesis, on the other hand, suggests that women report higher levels of health problems because they react differently than men to the material, behavioural and psycho-social conditions that foster health (McDonough & Walters, 2001). It is often presumed that female headed households are poorer than male-headed households and are less able to invest in health of children (World Bank, 2001).

Lawson (2004) adopted a reduced form demand approach to analyse the key determinants influencing the health status of individuals in Uganda particularly examining the importance of wealth, relative to other key determinants, by employing both self-reported and anthropometric sickness measures. According to the study findings increased wealth is strongly associated with increased health status, especially for pre-school aged children, but other factors are potentially as important.

A study by Bayard et al. (2009), explored SDH amongst internally displaced people in northern Uganda. The findings indicated a number of key SDH. However, the study had 21 participants and a larger sample may have yielded additional perspectives. Ssewanyana & Kasirye (2012) investigated the determinants of health inequalities through a combination of decomposition and regression analysis and found out that household welfare remains a key determinant of child health status and inequalities in health. The findings also show that individual maternal education matters more in enhancing child health than community knowledge about health. However as noted above the study only focused on child health.

Obuku et al. (2012) identified deficiencies and determinants of the public health knowledge about Tuberculosis (TB) among slum dwellers of Wobulenzi, Lira and Makindye urban centres in Uganda. Lack of awareness and knowledge about TB is a well described barrier to seeking TB diagnostic and treatment services. However, sampling was restricted to extremely poor unplanned settlements which may not be representative of slums. In addition, those who reportedly never heard of TB were left out in the final analysis. Consequently, knowledge of TB may have been overrated, thus limiting the generalizability of these results.

Harper (2012) carried a qualitative research on the Social Determinants of Health for Uganda's Indigenous Batwa Population. The results show that Batwa people are amongst the most vulnerable populations in the world with limited access to key social determinants of health, like education, clean water, employment and food, among others. However, this study is merely qualitative and does not show the extent to which the limited access to social determinants of health affect the Batwa.

2.4 Summary

A number of studies have examined the factors influencing health outcomes. However, there is limited evidence on the social determinants of health in Uganda. Most of the previous research has been focused on Child health, yet other age groups within the population also matter. Moreover, some of the previous studies are coupled with limited sampling bias as noted above which makes generalizability difficult. Moreover, all the studies that have been done in Uganda were not guided by the SDH framework in selecting the variables. Therefore, the proposed research shall target the entire population to provide an empirical groundwork on social determinates through using data obtained from national survey to select a representative sample and uses the SDH framework which is further explained in section 3.2 under the methodology to select SDH variables. The SDOH framework provides a broad approach to the study of SDH. This framework has been found to be useful to understand health inequalities because it considers health inequalities from multiple avenues, including the behavioural, material, psychosocial and along the lifecourse. but is narrowed here to draw attention to the behavioral and materialistic theories.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter explains the methodology adopted by the study to examine the relationship between social determinants and the health status in Uganda. It presents the Social Determinants of Health framework, the measures of health used, the model used in the analysis and the model specification. The chapter further presents estimation techniques.

3.2 Social Determinants of Health framework

The social determinants of health framework is used as the guiding framework of this thesis. This framework is based on research by several health scholars to find specific factors by which people of different SES experience health and illness (Raphael, 2006). The SDH framework allows an understanding of health and illness based on the systems and structures that individuals and communities live within, and deems health to be intrinsically connected to social context (Marmot et al., 2008). Therefore, not only does the SDH framework apply to health at an individual level, but also to communities and populations at large (Raphael, 2006).

The SDH framework provides an understanding on the cause of health status. It was the World Health Organization's Commission on the Social Determinants of Health (CSDH) in 2007 that drew global attention to the SDH and how they must be utilized to reduce health inequities (Marmot, 2007). Further, the SDH framework considers how the inequitable distribution of the SDH causes health inequalities to persist (Bryant et al., 2011). It is important that health and illness in this discussion is not simply understood from a Western, biomedical model where health is defined as the absence of a clinically recognized disease. Instead, it is crucial that the social determinants of health and illness, and their quality within populations and places be considered.

Within SDH literature, there are 11 key social determinants of health. Raphael (2006), these include upstream determinants such as, education, employment, early life conditions, healthcare services, social support, housing and income distribution. Upstream determinants, these are all regulated or influenced by the control of dominant forces. Therefore, the distribution of these resources and their provision to the population is in the hands of officials. Often, some populations are neglected or do not receive the same resources.

By understanding the ways in which health is determined through the social determinants of health, we can begin to understand the ways in which health inequalities are determined and how they come about. With this knowledge we will be able to make decisions on the best ways to address and approach health inequalities in policy and practice. Here the SDH framework serves a guide to direct research on health inequalities, but the SDH alone do not state why health inequalities exist, they indicate where they exist, and how they may arise. This is why it is necessary within this thesis to integrate the leading theories on health inequalities in to the SDH framework.

There five leading theories that examine health status, and so it is important to understand these leading theory, and the way they interact with and affect the SDH. These theories include the behavioural theory, the material theory, neo-materialistic theory, the psychosocial theory, and the life course theory. Each of these five theories relies on one or more SDH to explain the cause of differential health outcomes, or health inequalities among certain groups of people within a population. They also provide an explanation for how inequalities in turn, affect the SDH.

From the above narrative health determinants can be political, global, social, economic, cultural, biological, behavioral, physical, and environmental as shown in figure 3.1 below and indeed there is growing discussion in the literature supporting the psychosocial impact of these determinants on individual health status (Harris et al., 2002). Therefore, each of these approaches to the SDH can be used independently to understand health inequalities. However, simply relying on one or another would restrict a holistic, well-rounded understanding of health inequalities and their cause. Each theory falls within the SDH framework, and helps to understand how health inequalities result from social determinants on the proximal, intermediate, and distal levels.

Furthermore, many scholars on the subject of health argue for and encourage the use of SDH framework when studying health and inequalities (Newbold, 1998; Waldram et al., 2006; Graham & Stamler, 2010). This framework is especially useful here because it can be integrated with five different theories that assess health status based on the SDH. Therefore, these five approaches are integrated under the SDH framework on page 23 to allow for a deepened understanding of SDH among the Ugandan population.

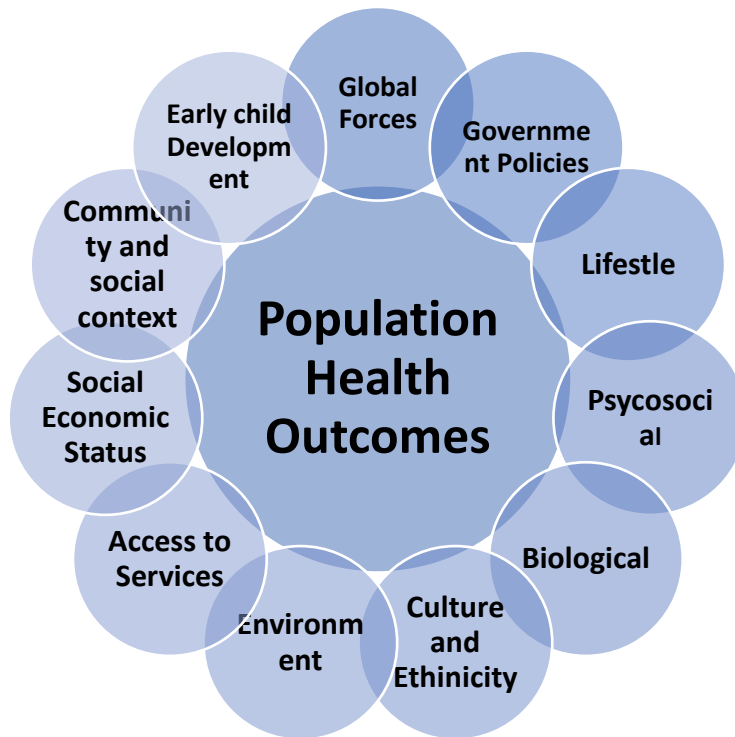


Figure 3.1: Social Determinants Framework

<i>Global Forces</i>	World economics, markets & trade, environmental conditions etc.
<i>Government t Policies</i>	Economic, welfare, housing, taxation, local regional national priorities, public safety initiatives etc.
<i>Lifestyle</i>	Diet & nutrition, tobacco, alcohol & another drug use etc.
<i>Psychosocial</i>	Self-esteem, isolation, level of control, stress, depression, anger etc.
<i>Biological</i>	Age, gender, genes etc.
<i>Culture & Ethnicity</i>	Social & cultural traditions, belief, attitudes, values & norms etc.
<i>Environment</i>	Air, water, noise, housing, workplace, transport systems etc.
<i>Access to Services</i>	Education, health care, transport, housing, leisure, recreational facilities etc.
<i>Socio Economic Status</i>	Wealth, income, education, occupation, employment etc.
<i>Community & Social Context</i>	Social networks, community connectedness, social capital, social exclusion etc.
<i>Early Child Development</i>	Biological embedding, sensitive periods, endocrine & immune system, nurturing & attachment, parental styles etc.

Therefore, SDH framework was chosen as the guiding theoretical framework for this thesis as it acknowledges the deep complexities that affect the health of people specifically the Behavioural theory which focuses on Individuals attitudes and behaviours (Bartley 2006), as well as the Materialist theory which focuses on Conditions of living e.g. housing, work, SES etc. (Raphael, 2006) have guided the selection of variables used in this study

3.3 Measures of Health Status

Measuring health is crucial to evaluate and compare variations within and across countries, both in a specific time period or over time. At country level, health measures can be used to ascertain health disparities, track population trends, measure trends in the incidence and prevalence of diseases over time, and build broad cooperation around a measure of population health. Health measures are classified in to both macro- and micro-level health measures.

Life expectancy, mortality rates and infant mortality are the most commonly used macro-level measures of population health.. However, it is important to note that uptake of these measures is limited at country level (Oortwijn et al., 2006). Micro-level health measures include Self-assessed health measures aim at presenting health status, limitations in daily activities, and quality of life from the individual's perspective. Self-assessed health instruments can either measure disease specific or generic health. Disease-specific measures are developed to assess the subjective health of patients with particular conditions (e.g. chronic conditions, cancers), whereas generic measures are used to measure general health among the population as a whole.

Several self-assessed health measures are separated into two distinct classes: health profiles and measures of utility (Haywood et al., 2005). The health profile measure is a single question indicator. Respondents are asked to rate their general health over a specified range of possibilities, or reporting the level of limitation in activities of daily living due to physical and/or mental conditions. These measures are commonly used in studies investigating subjective health and are present in most surveys. Measures of utility are commonly used in economic evaluation analysis and capture aspects related to both health and quality of life (Dolan et al., 1995; Drummond et al., 2005).

One of the main concerns behind the use of self-assessed health measures is its reliability as a good predictor of the objective health status as a whole. Many cross-national studies have demonstrated that self-assessed indicators are better predictors of mortality than medical records, denoting that these measures capture other important influences of mortality beyond objective measures (Mackenbach et al., 2002; McGee et al., 1999).

However, due to its subjective nature, self-assessed health can be influenced by a variety of factors that impact perceptions of health. Specifically, the association between self-assessed

health and mortality is often mediated by geographic location, psychosocial factors e.g. social integration, stress, gender, age, and socioeconomic position (Kievit et al., 2005; Lindeboom & Van Doorslaer, 2004; Sen, 2002). Thus, self-reported health is not only a function of actual health status, but also of individuals' or population groups' perceptions of health. For example, people in different age groups tend to use different threshold levels for assessing health (Lindeboom & Van Doorslaer, 2004; Groot, 2000). Nevertheless, the extent of the bias has yet to be well-substantiated (Mackenback et al., 2002).

Most countries collect a variety of health information using both a macro- and micro measures of health, to measure the health of their populations, evaluate health system performance, and make cross-country comparisons. Each of these measures is characterized by methodological strengths and weaknesses as noted above. This study used self-reported health measure much as it has some methodological weaknesses as noted above. Self-assessed health is commonly used in national and cross-national comparisons because of its broad availability. Several studies have established a strong association between self-assessed health and mortality Measures of self-assessed health have also been found to be predictive of changes in functional ability and life satisfaction. (Mackenback et al., 2002; McGee et al., 1999; Idler & Benjamin, 1997).

3.4 The Concept of the Model

The empirical analysis was based Uganda National Household Survey (UNHS) 2016/17 data set using Maximum likelihood estimation method. STATA 13 statistical package was used to analyse the data. The dependent variable (health status) used in the empirical analysis is binary, analyzing the factors determining whether someone is ill or not. The variable observed and explained, called H_i , is a dummy variable, and the probability that it assumes the value 1 was estimated by the logistic regression representation which is further explained in section 3.3 under data analysis.

Due to the dichotomous nature of the dependent variable, estimation of dummy dependent variable, the study adopts a logistic regression model in analysis because of its comparative mathematical simplicity and it assumes that the error term follows a logistic cumulative distribution (Gujarati, 2003).

An understanding of the age in assessing populations' health is important since the health status differs across different age brackets. Grossman (1972) found out that when people get

old, their stock of health depreciates at a faster rate. Therefore, in this study four logistic regressions of different age groups are estimated in order to understand the SDH that affects each category of the population that is 0-4, 5-14, 15-59, 60+.

3.5 Variables Description and Expected signs

Variables were selected based on framework for analyzing the social determinants of health. The variables were further selected depending on data availability for Uganda.

Table 3.1: Variable Definition

Variable	Definition
Health Status (HLT)	Dummy variable for health status of an individual, taking 0 for the Not sick and one for the sick
Gender (GENDR)	Dummy variable for an individual's gender status, takes 0 if the individual is male (reference category), and 1 for females
Marital Status (MSTATUS)	Marital status of an individual taking on zero not married (reference category) and one for the Married
Alcohol Consumption (ALCHL)	Dummy variable for alcohol consumption taking on 0 for Currently consuming alcohol, 1 In the past and 2 for Never consumed (reference category)
Poverty (PVTY)	Dummy variable for poverty represented by 0 for the poor and 1 for the Non-poor (reference category)
Smoking (SMK)	Dummy variable for smoking taking on 0 for Currently smoking, 1 in the past and 2 for Never consumed (reference category)
Education (EDUC)	Dummy variable for individuals' level of Education, takes 0 for No formal Education, 1 for Primary and 2 for Secondary+ (reference category)
Employment (EMPLT)	A dummy variable for Employment, takes 0 if the individual is Employed (reference category) and 1 for the Not Employed
Residence. (RESID)	Dummy variable for residence represented by 0 for Urban (reference category) and 1 for Rural
Mother's Education (MAEDUC)	Dummy variable for Mothers education level (0=No formal Education, 1=Primary and 2=Secondary+ (reference category)
Household Head Gender (HHGED)	A dummy variable for household head gender (0=Male 1=Female, (reference category)
Age (AGE)	Continuous variable representing Age of the respondents in years.
Water Source (WTR)	Dummy variable for water source represented by 0 for improved source (reference category) and 1 for unimproved source.
Energy source (ENGY)	Dummy variable for energy source represented by 0 for clean source (reference category) and 1 for unclean source.
Toilet Facility (TLT)	Dummy variable for toilet facility represented by 0 for High 1 for intermediate and 2 for Poor
Housing conditions- Wall material (WAL)	Dummy variable for material used for wall construction represented by 0 for bricks (reference category) and 1 for mud and poles.

Variable	Definition
Housing conditions- Floor material (FLR)	Dummy variable for material used for floor construction represented by 0 for cement (reference category) and 1 for earth

Dependent variable

The study uses health status (HLT) as a dependent variable and it is derived from the question in the UNHS 2016/17 asking household members, whether they did suffer from any illness or injury 6 month prior to the study. The responses are “Yes” or “No” coded 1 and 0 respectively.

Control Variables

Gender (GENDR): Gender refers to the array of society-determined roles, personality traits, attitudes, values, behaviors, relative power and influence that society ascribes to the two sexes¹. Gender is the sex of the respondent coded as 0 for male and 1 for female.

Marital Status (MSTATUS): Marital status is the marital status of the respondent coded from as 0 to 4 in the following order: monogamous, polygamous, Divorced, never married and widows/widowers. The categories are derived from question in the UNHS 2016/17 asking the respondent’s present marital status. In the analysis, marital status is further divided into two categories that is the Married (Married polygamous and monogamous) and not married (Divorced, never married and widows/widowers). According to the social causation theory, marriage has a health promoting or a health protective effect, while the unmarried state would have adverse health effects (Wyke and Ford, 1992). A positive relationship between being married and health status is expected.

Employment (EMPLT): The analysis is based on whether someone is employed or not employed. This variable is based on the question in the UNHS 2016/17 asking the respondent whether he/she worked for a wage, salary, commission or any payment in kind, including doing paid domestic work in the period prior to the study.

Education (EDUC): Education is a measure of the highest level of education attained by the respondent. This variable is coded 0 to 2 in the following order: no education, primary education and secondary education and above. The education level is only considered for individuals in the age groups 6-14, 15-59 and 60+ years. In line with Grossman’s theoretical model on health, education is an important factor which affects health. Education increases

¹ www.un-instraw.org/en/index.php?option=content&task=view&id=37&Itemid=76

efficiency in health production, and thus returns on health are likely to be higher for the more educated (Grossman, 1972). It is therefore expected that the relationship between education and health status will be positive.

Poverty (PVTY): The analysis of poverty is based on the poverty statistics for the UNHS 2016/17. The analysis takes in account two categories that is the poor (below the poverty line), and the non-poor (above the poverty line). Poverty is coded 0 for the poor and 1 for the non-poor.

Mother's Education (MAEDUC): Education level of the mother is a categorical variable measured by the level of formal education attained by the mother. The variable is categorized as follows: No formal education, primary and those above secondary education levels. The analysis of the relationship between Mother's education level and health status is focused on children (0-5 year, and 6-14) three categories are considered i.e. The relationship between Mother's Education Level, and health status of the child is expected to be positive.

Smoking (SMKG): The relationship is done based on three categories i.e. Current smoker, Past Smokers and Non-smoker across two age groups of 15-59 years as well 60 & above. The three categories are derived from the question in the UNHS 2016/17 asking whether the respondent has in the past used any tobacco products such as cigarettes, cigars, pipes, shisha or smokeless tobacco. Specifically, current smokers were identified as those who smoke cigarettes every day, or some of the days, and non-smokers were identified as those who never smoke and past smokers are those who smoked in the past but stopped. The relationship between smoking and health is expected to be negative.

Alcohol Consumption (ALCHL): Analogous to Smoking alcohol consumption is also analyzed considering three categories that is those who Currently drink alcohol, those that used to drink alcohol in the past and those that do not drink alcohol at all. The three categories are also derived from the UNHS 2016/17, which asked whether the respondent currently consumes or consumed any alcohol in the past. The relationship between Alcohol Consumption and health is expected to be negative.

Residence (RESID): Residential status is categorized into two categories that is those who reside in rural and urban areas. The influence of residential status on health has remained inconclusive in the empirical literature. However, three types of explanations in reference to place of residence and variations in health have been put forward that is compositional, contextual, and collective (MacIntyre et al., 2002). Compositional focuses on the characteristics of individuals in particular places. Contextual refer to opportunity structures in the social and local physical environment such as good housing and social services. While collective on the other hand draw focus on socio-cultural and historical features of communities (MacIntyre et al., 2002). With reference to contextual effects, negative neighborhood factors such as violence, noise, traffic and low neighborhood socioeconomic status increase the risk of poor health (Kim et al., 2013). The relationship between residential status and health is therefore expected to be ambiguous.

Household Head Gender (HHGED): The Gender of household head is defined as a dummy variable. A value of zero and one will be assigned to a male and female household heads respectively. Through this variable, we expect to establish if there is a relationship between gender of a household head and the health status of the child. The influence of gender on health status of the child has remained inconclusive in the empirical literature. Therefore, the variable is ambiguous.

Age (AGE): This is a continuous variable which captures the age of the individuals in complete years. Since at young age and elderly age most individuals have higher chances of illness, hence the probability of poor health is expected to be high. The study therefore uses age squared to capture this effect of age on health status. Grossman (1972) found out that when people get old, their stock of health depreciates at a faster rate. Therefore, in this study we expect the health status of young people to be better compared to that of old people.

Water Source (WTR): Water source is categorized in to two that is improved and unimproved sources. In line with the WHO/UNICEF Joint Monitoring Programme (JMP) standard categorization of drinking water sources, an “improved” drinking water source is one that, by nature of its construction and when properly used, adequately protects the source from outside contamination, Water sources considered as improved include piped water, public taps, boreholes, protected springs/wells, gravity flow schemes, rain water and bottled water. Unprotected wells/springs, rivers/lakes/streams, vendors and tanker trucks were considered unimproved water sources. A number of studies relating water sources and health

have been done for instance Sharma et al. (1996) found out that the primary causes of many childhood illnesses and poor health in Kenya, Uganda and Tanzania are water-related. Plate et al. (2004) also indicate that using surface water as a primary or secondary water source exposes children to greater risk of diarrhoeal disease than using only improved sources such as wells. Therefore, in this study it is expected that unimproved water sources will have a negative impact on an individual's health status.

Energy source (ENGY): Energy source is categorized in to two the clean energy sources that do not produce smoke (solar, gas, electricity (national grid)) and biogas) and the unclean energy sources that produce smoke (charcoal, firewood & grass and kerosene.). Studies have found approximately 40% of the world population is exposed to health damaging air pollution from the combustion of fuels for household uses with larger proportions in developing countries and in women and children (Van Vuuren et al., 2012). According to Smith et al. (2013) lack of access to clean fuels and electricity in the world's poor households is a particularly serious risk for health. From our study therefore it expected that clean sources of energy would improve the health of people through reduced exposure to smoke from unclean sources of energy.

Toilet Facility (TLT): We categorized toilet facilities into three broad categories of different supposed 'quality': poor if an individual reported no access to a toilet facility; intermediate if an individual reported access to a Pit latrine or VIP latrine; and high if an individual had access to a flush toilet. A number of studies have been done on the quality of toilet facility and health for instance Fink et al (2011) found strong protective effects of high-quality toilet facilities for neonatal, post-neonatal and child mortality risks, as well as for risks of diarrhoea and stunting. A study by Kwarteng et al. (2015) also revealed that improper disposal of wastes and inadequate toilet facilities were responsible for poor sanitations and sanitation related diseases cholera, malaria, diarrhoea. From our study we therefore expect that poor access to health facilities will have a negative impact on health.

Housing conditions-Wall material (WAL) and Floor material (FLR): The 2016/17 UNHS collected data on housing and household characteristics pertaining to types of dwelling, building materials used for roofing, walls and floors, among others. We used the wall and floor building materials to analyse the impact of housing conditions and health status. The wall material is categorized in to bricks and mud & poles. While floor is categorized in to cement and earth. Housing is one of the basic human needs that have a profound impact on

health of an individual and indeed Poor housing conditions are associated with a wide range of health conditions, including respiratory infections, asthma, lead poisoning, injuries, and mental health (Krieger & Higgins, 2002). We therefore expect that poor housing conditions (mud and pole walls as well as earth floors) to be in poor health

3.6 Model specification

To analyze effect of social determinants on health status, a model where health status is functionally related to social determinants was estimated. Specification of this relationship is an essential requirement in determining the direction and magnitudes of the effects of social determinants on health status. The relationship between health and its determinants is highly non-linear (Musgrove, 1987; Murray and Chen, 1993). The most common nonlinear specifications are logit and probit model (Jones, 2013).

3.6.1 The Logit Model

In this study a simple logit model was used, with the dependent variable Y being a categorical measure of self-assessed health. The model assumes that P_i is the probability of an individual being sick while $1 - P_i$ is the probability of an individual not being sick. The model was further specified by considering that Y_i cannot be observed but what is observed is the outcome of $Y = 1$ if the individual is sick and $Y = 0$ if the individual is not (Maddala1983). This can be expressed as follows:

$$Y_i = \begin{cases} 1 & \text{with } P(y_i=1) = P_i \\ 0 & \text{with } P(y_i=0) = 1-P_i \end{cases} \quad 3.1$$

The probability that Y takes the value of 1 given X vector is given by:

$$P_i = E(Y = 1/X) = \frac{e^{(\beta_0 + \beta'X)}}{1 + e^{(\beta_0 + \beta'X)}} \quad 3.2$$

The probability that Y takes the value of 0 given X vector is given by:

$$1 - P_i = E(Y = 0/X) = \frac{1}{1 + e^{(\beta_0 + \beta'X)}} \quad 3.3$$

The logit model can be interpreted in terms of odds ratios. Odds are defined as the ratio of two probabilities P and $1 - P$ i.e. the probability of success divided by the probability of failure, given x . Let $x = (x_1, \dots, x_n)$ be a vector of n predictors and let $\pi(x) = P(Y = 1 | (x_1, \dots, x_n))$ be the probability of success given x . We now define the odds as.

$$\Omega = \frac{P(Y=1|(x_1, \dots, x_n))}{P(Y=0|(x_1, \dots, x_n))} = \frac{\pi(x)}{1-\pi(x)} \quad 3.4$$

Subsequently, the success probability takes values between 0 and 1, the odds takes values from zero to plus infinity. The probability of success is greater than the probability of failure if the odds ratio is greater than one (> 1). Considering x explanatory variables, the log odds of having $y = 1$ is modeled as a linear function of the explanatory variables as:

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 x_1 + \dots + \beta_n x_n \quad 3.5$$

Where $0 \leq \pi \leq 1$, β_0 is the intercept and $\beta_1 \dots \beta_n$ are the regression coefficients of the explanatory variables

3.6.2 Empirical model

With reference to the Logit model above the following econometric model is used to estimate the social determinants of health status in Uganda.

Model 1: 0-5 Years

$$\text{Logit}(P(Y_i = 1)) = \ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 \text{GENDR} + \beta_2 \text{MAEDUC} + \beta_3 \text{HHGED} + \beta_4 \text{PVTY} + \beta_5 \text{RESID} + \beta_6 \text{AGE} + \beta_7 \text{WTR} + \beta_8 \text{ENGY} + \beta_9 \text{TLT} + \beta_{10} \text{WAL} + \beta_{11} \text{FLR} + \varepsilon_i \quad 3.6$$

Model 2: 6-14 Years

$$\text{Logit}(P(Y_i = 1)) = \ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 \text{GENDR} + \beta_2 \text{MAEDUC} + \beta_3 \text{HHGED} + \beta_4 \text{PVTY} + \beta_5 \text{RESID} + \beta_6 \text{AGE} + \beta_7 \text{WTR} + \beta_8 \text{ENGY} + \beta_9 \text{TLT} + \beta_{10} \text{WAL} + \beta_{11} \text{FLR} + \varepsilon_i \quad 3.7$$

Model 3: 15-59 Years

$$\text{Logit}(P(Y_i = 1)) = \ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 \text{GENDR} + \beta_2 \text{MSTATUS} + \beta_3 \text{ALCHL} + \beta_4 \text{SMKG} + \beta_5 \text{PVTY} + \beta_6 \text{EDUC} + \beta_7 \text{EMPLT} + \beta_8 \text{RESID} + \beta_9 \text{AGE} + \beta_{10} \text{WTR} + \beta_{11} \text{ENGY} + \beta_{12} \text{TLT} + \beta_{13} \text{WAL} + \beta_{14} \text{FLR} + \varepsilon_i \quad 3.8$$

Model 4: 60+ Years

$$\text{Logit}(P(Y_i = 1)) = \ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 \text{GENDR} + \beta_2 \text{MSTATUS} + \beta_3 \text{ALCHL} + \beta_4 \text{SMKG} + \beta_5 \text{PVTY} + \beta_6 \text{EDUC} + \beta_7 \text{EMPLT} + \beta_8 \text{RESID} + \beta_9 \text{AGE} + \beta_{10} \text{WTR} + \beta_{11} \text{ENGY} + \beta_{12} \text{TLT} + \beta_{13} \text{WAL} + \beta_{14} \text{FLR} + \varepsilon_i \quad 3.9$$

Where $\text{Logit}(P(Y_i = 1))$ is the log odds of the individual i being sick,

ε_i . Is the error term, $\beta_0 =$ Intercept, $\beta_x =$ Regression coefficient of the independent variables.

3.7 Data source

Uganda has a relatively rich source of data upon which micro econometric analysis can be based; Uganda national Bureau of statistics (UBOS) has conducted several Cross-sectional surveys. This study was based on Uganda National Household Survey (UNHS) 2016/17 since it provides an excellent source of SDH data based on demographic information and socioeconomic characteristics. The data was also used because of its easy accessibility, availability and for it being the most recent household survey.

3.8 Data analysis

The statistical analysis was done in two levels based on a sample of 37,947. However, weighting is a technique will be used to adjust the results of a survey and bring them in line with what is known about the population. First a descriptive analysis will be computed. Secondly, a statistical regression model to identify significant determinants of health status will be used.

3.8.1 Descriptive analysis

Summary statistical analysis which includes percentages and frequencies for predictor variables to examine the sample distribution was done.

3.8.2 Estimation Techniques

Since the dependent variable is binary in nature taking the value of one or zero, the study uses the logit model as specified above. The model uses maximum likelihood method to test for significance and assess the validity of the model because its functional form is non-linear. Generally maximum likelihood is the commonly used method of estimating the parameters of a logistic regression. The sample likelihood function is defined as the joint probability function of random variables specifically, suppose (x_1, x_2, \dots, x_n) are n independent random observations and y_i is the Bernoulli random variable the probability function of y_i is given as:

$$(y = y_i) = \pi^i y_i (1 - \pi)^{1-y_i}, y_i = 0, \text{ or } y_i = 1, i = 1, 2, \dots, n \quad 3.10$$

Since y is assumed to be independent, the joint probability function or likelihood function is given by $\log(y_1, y_2, \dots, y_n)$ and the log likelihood function is given as:

$$L(\beta_0, \beta_1, \dots, \beta_p) = \sum_{i=1}^n y_i (\beta_0 + \beta_1 x_1 + \dots + \beta_p x_n) - \sum_{i=1}^n \ln\{1 + \exp(\beta_0 + \beta_1 x_1 + \dots +$$

Dummy variables were used since some of the variables that were selected are categorical variables that require special attention in regression analysis. Unlike dichotomous or continuous variables, categorical variables cannot be entered into the regression equation just as they are. Categorical variables represent data which is divided into groups. Examples of categorical variables are race, sex, age group, and marital status. It is often more useful to categorize such variables into a relatively small number of groups this will be done through the use of dummy variables. Dummy variables are used when a researcher wants to compare other groups of the predictor variable with one specific group of the predictor variable. Often, the specific group is called the reference group or category.

3.8.3 Evaluation of a logistic regression model

Good statistical models describe the data well while still being as simple as possible. This section shows how the overall evaluations of the model; Multicollinearity test, statistical test of individual predictors; and the goodness-of-fit was done.

Multicollinearity Test

Correlation coefficients can tell whether there is linear relationship between two variables that is a correlation coefficient above 0.7 signifies a strong correlation coefficient and therefore a strong relationship. This study used pairwise correlation to test the presence of Multicollinearity.

Statistical significance of regression coefficients: Adjusted Wald test

The adjusted Wald test was used to evaluate the significance of the logistic regression coefficients since the usual Wald test does not work under complex survey analysis. One possible justification for using the adjusted Wald test is that it is sufficient for large samples (Hosmer et al, 2013). Particularly, we tested the hypothesis $H_0: \beta_j = 0$ regarding the significance of a single coefficient by calculating the ratio of the estimate to its standard error. The adjusted Wald statistic is therefore calculated as:

Let W_j denote the Wald statistic for testing all the P slopes coefficients.

$$W_j = \frac{\hat{\beta}_j^2}{[SE(\hat{\beta}_j)]^2} \quad 3.12$$

Where $\hat{\beta}_j$ represents the estimated coefficient β , and $SE(\hat{\beta}_j)$ is the standard error. The

adjusted Wald statistic is

$$F = \frac{(S-P+1)}{SP} W \quad 3.13$$

Where $s = (\sum_{k=1}^K m_k) = K$ is the total number of sampled primary sampling units minus the number of strata. The p value is computed using the F distribution with p and $(s - p + 1)$ degrees of freedom as $\Pr[F(p, s - p + 1) \geq F]$. If the estimated value of the slope is small and its estimated variability is large, then we cannot conclude that the slope is significantly different from zero and vice-versa (Afifi et al., 2004).

Goodness-of-fit statistics: Hosmer-Lemeshow (HL) Test

H-L is another a diagnostic test frequently used to evaluate the goodness-fit of the logistic regression model (Cokluk, 2010; Archer and Lemeshow, 2006). The HL test helps to examine whether the observed proportions of events are similar to the predicted probabilities of occurrence in subgroups of the model population. The HL test is assessed by dividing the predicted probabilities into deciles (10 groups based on percentile ranks) and then computing a Pearson Chi-square that compares the predicted to the observed frequencies in a 2-by-10 table. The value of the statistic is:

$$H = \sum_{k=1}^g \frac{(O_k - N_k)^2}{N_k(1 - N_k/n_j)} \quad 3.14$$

Where n_j is the number of observations in the k^{th} group, O_k is the observed number of cases in the k^{th} and N_k expected number of cases in the k^{th} group. To show a good-fit of the model to the data, the H-L test must produce a p-value of more than 0.05.

CHAPTER FOUR: PRESENTATION AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter presents the general characteristics of the population, descriptive analysis and the logistic regression results. In this chapter further presents the interpretation of results and discussion of the findings.

4.2 General Characteristics of the population

This sub-section presents the general characteristics of the population in line with the variables considered for this study is presented in table 4.1

Table 4.1: General Characteristics of the Population

Variable	Percentage (%)	Variable	Percentage (%)
Health Status		Poverty	
Not sick	71.6	Poor	22.2
Sick	28.4	Non-Poor	77.8
Gender		Education	
Male	47.7	No formal Education	23.8
Female	52.3	Primary	47.4
Marital Status		Secondary+	28.9
Not-Married	72.2	Maternal Education	
Married	27.8	No formal Education	24.9
Alcohol		Primary	18.3
No	89.3	Secondary+	56.8
Currently	9.2	Gender of Household Head	
In the past	1.5	Female Head	30.8
Smoking		Male Head	69.2
No	96.9	Employment	
Currently	2.5	Not Employed	85.4
In the past	0.6	Employed	14.6
Residence		Material for construction (wall)	
Rural	74.3	Bricks	66.5
Urban	25.7	Mud and poles	33.5
Water Source		Material for construction (Floor)	
Improved	78.4	Cement	61.3
Unimproved	21.6	Earth	38.7
Toilet Facility		Energy source	
High	3.3	Clean	37.9
Intermediate	8.8	Unclean	62.1
Poor	87.9		

Averages of continuous variables

Variable	Mean
Age	20.5

4.3 Descriptive Analysis

The descriptive analysis provides the statistics of independent variables with respect to dependent variable across overall population and the different age groups under consideration i.e. 0-5 years; 6-14 years; 15-59 years as well as 60 years and above. The table showing the descriptive analysis is shown in table 4.2.

I. Socio-demographic characteristics and health status

Health status and Gender

From table 4.2 it is observed that the health status was generally poor among the female in across all age groups. It is also observed that poor health increases with age among the female sex, with the females aged 60 years and above registering the highest percentage of sickness at 19.3 %. Among the males the highest percentage of sickness was also reported among the individuals aged 60 years and above (14.8%). From the analysis therefore one can conclude that females are more likely to be sick compared to males.

Health status and marital status

Sickness was reported most among the individual not married at 18.4 percent among individuals aged 15-59 and 21.4 percent among individuals aged 60 years and above. On the other hand, amongst the married sickness was more amongst those aged 60 years and above (12.7%).

Gender of household head

From table 4.2 it is important to note that children from households headed by men across the two age groups reported sickness at 19.9% for those aged 0-5 years and 20.4% for those aged 6-14 years while on the other hand children from households headed by females only 9.1% and 8.5% from 0-5 year and 6-14 years reported sickness respectively.

Health Status and Residential Status

The result table in table 4.2 shows that across all the age groups sickness was more among people in rural areas than those in urban areas. Of those who reside in rural areas sickness was more among individuals aged 60 and above (26.6%) followed by individuals aged 0-5 and 6-14 years (23.1%). From this analysis therefore, one can conclude that people residing in rural areas are more likely to be in poor health.

Table 4.2: Descriptive statistics

		Health status per age group							
		0-5 years		6-14 years		15-59 years		60 and above	
Variable	Category	Sick (%)	Not sick (%)	Sick (%)	Not sick (%)	Sick (%)	Not sick (%)	Sick (%)	Not sick (%)
Gender	Male	14.7	35.3	12.4	34.9	12.3	34.8	14.8	34.6
	Female	14.9	36.7	16.5	36.2	16.1	36.9	19.3	31.3
Poverty	Poor	06.3	15.1	06.7	15.9	06.5	15.7	08.3	14.5
	Non-poor	22.8	55.8	22.2	55.2	21.9	55.9	25.7	51.4
Gender of household head	Male head	19.9	48.4	20.4	49.4				
	Female head	09.1	22.5	08.5	22.1				
Maternal Education	No formal Educ	07.4	17.4	08.1	16.4				
	Primary	05.1	12.7	05.4	13.3				
	Secondary+	16.7	40.2	15.4	41.4				
Residence	Rural	23.1	51.4	23.1	51.4	22.2	51.8	26.6	48.9
	Urban	05.9	19.6	05.8	19.7	06.2	19.8	07.5	16.9
Education	No formal Educ			06.8	17.3	06.9	16.5	08.8	17.7
	Primary			14.3	32.6	13.4	34.3	15.8	29.5
	Secondary+			07.9	21.2	8.1	20.9	9.4	18.7
Marital Status	Not-Married					18.4	53.4	21.4	47.6
	Married					09.9	18.2	12.7	18.3
Smoking	No					26.9	69.8	32.8	65.1
	Currently					01.2	01.5	01.1	0.6
	In the past					0.2	0.4	0.2	0.3
Alcohol consumption	No					24.5	65.1	22.4	47.1
	Currently					03.1	05.6	10.9	18.2
	In the past					0.7	0.9	0.8	0.6
Employment	Employed					04.1	10.6	04.8	11.8
	Not Employed					24.3	61	29.3	54.1
Water Source	Improved	21.9	56.9	21.9	56.1	21.9	56.7	25.6	51.7
	Unimproved	07.2	14	06.9	15	06.4	14.9	08.5	14.2
Energy source	Clean	10.7	28.2	11.1	27.1	10.7	27.2	11.5	22.4
	Unclean	18.4	42.7	17.8	44.1	17.7	44.4	22.6	43.5
Toilet Facility	High	0.7	02.7	0.9	02.4	0.9	02.4	0.8	02.1

		Health status per age group							
		0-5 years		6-14 years		15-59 years		60 and above	
Variable	Category	Sick (%)	Not sick (%)	Sick (%)	Not sick (%)	Sick (%)	Not sick (%)	Sick (%)	Not sick (%)
	Intermediate	25.5	62.2	25.4	62.6	25.1	62.9	29.3	58.2
	Poor	02.9	05.9	02.6	06.1	02.5	06.3	03.9	05.7
Material for construction (wall)	Bricks	18.6	48.3	18.4	47.5	18.9	47.9	20.8	43.5
	Mud and poles	10.3	22.6	10.5	23.6	09.5	23.7	13.2	22.4
Material for construction (Floor)	Cement	17.8	42.4	16.9	43.7	17.5	44.5	21.1	42.6
	Earth	11.3	28.5	12.1	27.4	10.9	27.1	13	23.3

II. Economic characteristics and health status

Health status and unemployment

Table 4.2 shows that among the unemployed, 24.2% and 28% of the individuals aged 15-59 years as well 60 + years reported sickness respectively while among the employed only 4.1% and 4.8% in the age groups of 15-59 and 60 + years reported sickness respectively. This therefore signifies that employed people are healthier compared to unemployed people.

Health Status and Poverty

Descriptive analysis table 4.2, shows that sickness was more among the non-poor as compared to the poor across all the age groups and highest among non-poor aged 60 years and above (257%). It is further observed that among the poor, sickness was highest among individuals aged 60 years and above (8.3%). These results show little discrepancy in the health status across the different age groups. However, these results are inconclusive.

Health status and Education

From the descriptive analysis in table 4.2 it is observed that sickness was highest amongst those with primary level education and lowest among individuals with no formal education. Amongst individuals aged 6-14 and 15-59 years with primary level education, 14.3% and 13.4% reported sickness respectively while 15.8%. of those with primary level education aged 60+years reported sickness. For those with no formal education only 6.8%, 6.9% and 8.8% amongst age groups 6-14, 15-59 and 60+ years reported sickness respectively.

Health status and Mothers Education level

From table 4.2. we observe that children whose mothers have attained secondary level education and above were reported to have more sickness than children whose mothers have only attained primary education and those with no formal education at 16.7% and 15.4% for 0-5 years, and 6-14 years respectively. From this result one can conclude that mothers with secondary level education are better informed knowledgeable when it comes to health aspects and are able to identify the different types of illnesses than those with primary level and no formal education. However, at this level of analysis we cannot make a final conclusion on the effect of the mother's education on the health of a child.

Life Style Factors and health status

Health status and Smoking

From table 4.2 sickness was more among those who do not smoke followed those who are currently smoking and highest among those aged 60+ years (32.8%). However, we cannot conclude that non-smokers are good health compared to the other categories

Health status and Alcohol Consumption

From Table 4.2 sickness is more among individuals that do not consume alcohol at 24.5% and 22.4% among those aged 15-59 and 60+ respectively. These are followed by those currently consuming alcohol at 3.1% and 10.9% among those aged 15-59 and 60+ respectively. However, these results are also inconclusive.

Environmental Factors and health status

Health status and Water Source

Descriptive analysis table 4.2, shows that among those using unimproved water sources, poor health was more among those aged 60+ years (8.5%) as well as those aged five years and below (7.2%). It is further observed that among the individuals using improved sources, sickness was highest among individuals aged 60+ years (25.6%). These results show little discrepancy in the health status across the different age groups. However, we cannot conclude based on these results.

Health status and Energy source

From table 4.2, it is observed sickness was more amongst individuals using unclean energy sources across all age groups. Specifically, sickness was more among individuals aged 60+ years (22.6%) as and those aged five years and below (7.2%). It is further observed that among the individuals using improved sources, sickness was highest among individuals aged 60 years and above (18.4%).

Health status and Toilet Facility

As observed from table 4.2, sickness was more among individuals using intermediate toilet facilities and highest among individuals aged 60+ years (29.3%). However, it is important to note that among individuals using poor quality toilet facilities sickness was generally among those aged 60 years and above followed by individuals aged 0-5 years at 3.9% and 2.9% respectively.

Health status and Housing conditions

From table 4.2, amongst individuals staying in mud and poles houses sickness was more among those aged 60+ years (13.2%) and those aged 6-15 years (10.5%). Also, individuals staying in brick houses, sickness was highest among individuals aged 60+ years (20.8%). We further observe that sickness was more among those aged 60+ years (13%) and those aged 6-15 years (12.1%) staying in houses with earth floor. Conversely, individuals staying in houses with cement floors, sickness was highest among individuals aged 60+ years (21.1%).

4.4 Model evaluation

In order to be confident about the results out model evaluation was done by testing for multicollinearity through pairwise correlation as presented in appendix A, Statistical significance of individual regression coefficients was also tested using the adjusted Wald test to check if there is any problem that would make the analysis meaningless. From Appendix all the correlation coefficients are below 0.7 which implies that there is no multicollinearity. From table 4.3 it is observed that the F statistic is highly significant across all the four models. The p-value is less than the generally used criterion of 0.05, so we are able to reject the null hypothesis, indicating that the coefficients are not simultaneously equal to zero. This therefore implies including these predictors results in a statistically significant improvement in the fit of the model. Also, goodness of fit test was done using Hosmer-Lemeshow (HL) test in order to assess how well the model fits the data. From table 4.4 the HL across all the four models gives a p-value above 0.05 which indicates no evidence of poor fit of the model except for the model of 60+ which is slightly below 0.05. This implies that the models are correctly specified.

Table 4.3: Adjusted Wald tests Assessing significance of the Regression coefficients

Model	F-Test Statistic	P-value
0-5 years	3.77	0.0014
6-14 years	6.10	0.0000
15-59 years	7.46	0.0000
60 and above	2.62	0.0006

Table 4.4: Hosmer and Lemeshow Goodness of Fit Statistics

Model	Number of observations	F-adjusted test statistic	Prob > F
0-5 years	37947	1.417	0.180
6-14 years	37947	1.846	0.060
15-59 years	37947	1.292	0.241
60 and above	37947	2.091	0.031

4.5 Results

In this section the analysis is conducted using the logistic regression method of analyzing survey data. The results are reported using odds ratios as shown in Table 4.5. From the results gender has a significant relationship with health status across the different age groups except for those under 0-5 years. Gender of household head only has a significant relationship with health amongst individuals aged 6-14 years. It is important to note that age is only significant among individuals aged 60 and above.

Education level (no formal Education) significantly affect the health of those aged 0-5 years. Maternal education (no formal Education) is significantly affects health for children between 6-14 years. Rural residence has a significant relationship with health across all age groups except amongst individuals aged 60 years and above. Employment status (non-employed) is as well statistically significant among individuals aged 60 years and above. There is a significant relationship between ill health and individuals not educated aged 6-14 years.

Alcohol (current) consumption significantly affects health for people aged 15-59 while alcohol consumption (in the past) significantly affects health status across the two age groups (1-59 years and 60+ years). Smoking (current smokers) significantly affects health across the two age groups (1-59 years and 60+ years).

Unimproved sources of water significantly affect health of individuals in the aged 0-5 and 6-14 years. Regarding the toilet facility individuals using intermediate and poor-quality toilet facilities between 0-5 years had their health significantly affected. On the housing conditions, residing in a mud and poles house significantly affect individuals aged 6-14 years and those aged 60+ years. On the other hand, residing in houses whose floor is made of earth significantly affect individuals aged 6-14 years and those aged 60+ years. However, it is important to note that the sources of energy have no effect on health status.

4.6 Interpretation of Results

The results shown in table 4.5 confirm that there is a relationship between SDH and health status in Uganda. This research establishes socio-demographic, economic, lifestyle and environmental factors have a significant impact on health as interpreted below based on the Odds ratio. An odds ratio greater than 1 indicates that poor health or illness is more likely to occur.

Table 4.5: Results

Age category	Model 1:0-5 years		Model 2: 6-14 years		Model 3: 15-59 years		Model 4: 60 and above	
Variable	Coeff	Odds ratio	Coeff	Odds ratio	Coeff	Odds ratio	Coeff	Odds ratio
Gender								
Female	0.042 (0.566)	1.043 (0.566)	0.251*** (0.001)	1.286*** (0.001)	0.224*** (0.001)	1.251*** (0.001)	0.355** (0.007)	1.427** (0.007)
Poverty								
Poor	0.019 (0.802)	1.019 (0.802)	0.054 (0.449)	1.056 (0.449)	0.054 (0.365)	1.056 (0.365)	0.131 (0.385)	1.139 (0.385)
Gender of Household Head								
Male head	0.231 (0.703)	1.23 (0.703)	0.084** (0.069)	1.181** (0.069)				
Maternal Education								
No formal Education	0.028 (0.673)	1.028 (0.673)	0.272*** (0.002)	1.053*** (0.002)				
Primary	0.041 (0.995)	1.041 (0.995)	0.085 (0.206)	1.089 (0.228)				
Residence								
Rural	0.388*** (0.001)	1.474*** (0.001)	0.417*** (0.001)	1.518*** (0.001)	0.289*** (0.001)	1.336*** (0.001)	0.081 (0.635)	1.084 (0.635)
Education Level								
No formal Education			0.171*** (0.004)	1.187*** (0.004)	0.065 (0.279)	1.067 (0.279)	0.031 (0.834)	1.032 (0.834)
Primary			0.051 (0.465)	1.053 (0.465)	0.017 (0.971)	1.021 (0.971)	0.099 (0.518)	1.104 (0.518)
Marital Status								
Married					0.473*** (0.001)	1.606*** (0.001)	0.508*** (0.002)	1.662*** (0.002)
Alcohol consumption								
Currently					0.254*** (0.010)	1.289*** (0.010)	0.211 (0.140)	1.235 (0.140)
In the past					0.674*** (0.001)	1.962*** (0.001)	0.872* (0.090)	2.392* (0.090)
Smoking								
Currently					0.597*** (0.002)	1.816*** (0.002)	1.389** (0.016)	4.012** (0.016)

Age category	Model 1:0-5 years		Model 2: 6-14 years		Model 3: 15-59 years		Model 4: 60 and above	
Variable	Coeff	Odds ratio	Coeff	Odds ratio	Coeff	Odds ratio	Coeff	Odds ratio
In the past					0.213 (0.472)	1.237 (0.472)	0.121 (0.384)	1.031 (0.384)
Employment								
Not Employed					0.130 (0.234)	1.130 (0.234)	0.451** (0.016)	1.569** (0.016)
Water Source								
Unimproved	0.254*** (0.001)	1.289*** (0.001)	0.145** (0.024)	1.159** (0.024)	0.085 (0.101)	1.089 (0.101)	0.102 (0.469)	1.107 (0.469)
Energy source								
Unclean	0.087 (0.202)	1.091 (0.202)	0.029 (0.632)	1.030 (0.632)	0.004 (0.937)	1.039 (0.937)	0.0347 (0.811)	1.035 (0.811)
Toilet Facility								
Intermediate	0.392** (0.015)	1.480** (0.015)	0.097 (0.488)	1.102 (0.488)	0.095 (0.464)	1.099 (0.464)	0.193 (0.635)	1.213 (0.635)
Poor	0.532*** (0.004)	1.702*** (0.004)	0.136 (0.377)	1.146 (0.377)	0.076 (0.618)	1.079 (0.464)	0.409 (0.396)	1.505 (0.396)
Construction Material (wall)								
Mud and poles	0.104 (0.135)	1.110 (0.135)	0.193*** (0.002)	1.212*** (0.002)	0.023 (0.645)	1.023 (0.645)	0.270** (0.049)	1.311** (0.049)
Construction Material (Floor)								
Earth	0.099 (0.181)	1.105 (0.181)	0.259*** (0.002)	1.296*** (0.002)	0.049 (0.353)	1.051 (0.353)	0.272* (0.064)	1.313* (0.064)
Age								
Constant	-1.8102*** (0.000)	0.164*** (0.000)	-1.925*** (0.000)	0.146*** (0.000)	-1.741*** (0.000)	0.175*** (0.000)	-2.088*** (0.000)	0.1.24*** (0.000)
Number of strata	15		15		15		15	
Number of observations	37,947		37,947		37,947		37,947	
Number of PSUs	293		293		293		293	
Population size	37,060,616		37,060,616		37,060,616		37,060,616	
Sub-population. no. of observations	7,793		10454		17,989		1,711	
Sub-population. Size	7,657,395		10,114,392		17,589,643		1,699,186	
Standard errors in parentheses *** p<0.01 **p<0.05, * p<0.1								

I. Socio-demographic characteristics and health status

Gender

Females aged 0-5 years are 1.04 times more likely to fall sick when compared to the males while those 6-14 years are 1.3 times more likely to fall sick when compared to the males. Females aged 15-59 and 60+ years are 1.25 and 1.43 times more likely to fall sick when compared to the males respectively.

Marital Status

From table 4.5 married individuals aged 15-59 are 1.6 times more likely to fall sick when compared to individuals not married under the same group at $P < 0.01$. Similarly, for individuals aged 60 years and above, the married are 1.7 times more likely to fall sick when compared to their counterparts who are not married at $P < 0.01$.

Gender of Household Head

Children aged 6-14 years from male headed households are 1.18 times more likely to be in poor health when compared to those from female headed households at $P < 0.05$. Though not significant children aged 0-5 years from male headed households are 1.2 times more likely to be in poor health when compared to those from female headed households.

Residential status

Individuals residing in rural areas aged 0-5 and 6-14 years are 1.47 and 1.52 times more likely to be in poor health when compared to those residing in urban areas at $P < 0.01$, respectively. Also, Individuals residing in rural areas aged 15-59 are 1.34 times more likely to be in poor health when compared to those residing in urban areas at $P < 0.01$.

Age

The study found a significant relationship between age and health status. As shown in table 4.5 there is a significant relationship between age and health status of individuals aged 60 year at $P < 0.1$ and above while for other age groups the results show an insignificant relationship.

II. Economic characteristics and health status

Employment Status

Unemployed individuals aged 60+ years are 1.6 times more likely to be in poor health when compared with those employed at $P < 0.01$. Though not significant individuals not employed aged 15-59 years are 1.13 times more likely to be sick when compared with those employed.

Education Level

Individuals with no formal education aged 6-14 years are 1.06 times more likely to be in poor health when compared with those that have attained secondary+ level education at $P < 0.01$. Though not significant individuals aged 15-59 and 60+ years are 1.13 and 1.03 times more likely to be in poor health when compared to their counterparts with secondary+ level education respectively. Conversely, individuals with primary level education aged 6-14, 15-59 and 60+ years are 1.05, 1.02 and 1.1 times more likely to be in poor health when compared to individuals with secondary+ level education respectively.

Mother's Education Level

From table 4.5 children aged 6-14 years whose mothers have not attained formal education are 1.05 times more likely to be in poor health when compared to those with mothers with those that have attained secondary+ level education at $P < 0.01$. Though not significant children aged 0-5 years whose mothers have not attained formal education are 1.03 times more likely to be in poor health when compared to those with mothers with those that have attained secondary+ level education. While children 0-5 and 6-14 years whose mothers have obtained education up to primary level are 1.04 and 1.09 more likely to be in poor health compared to those with mothers with those that have attained secondary level education and above respectively.

III. Life Style Factors and health status

Smoking

Individuals currently smoking aged 15-59 are 1.82 times more likely to be sick when compared to non-smokers at $P < 0.01$. It is further observed that current smokers aged 60 years and above are 4 times more likely to be in poor health when compared to the non-smokers at $P < 0.05$. Though not significant individuals that smoked in the past under the aged 15-59 and 60+ years are 1.2 and 1.03 times more likely to be in poor health when compared to the non-smokers respectively.

Alcohol consumption

Individuals aged groups 15-59 years currently drinking and those that consumed alcohol in the past are 1.29 and 1.67 times more likely to fall sick when compared to those that do not drink alcohol at $P < 0.01$ respectively. Individuals that consumed alcohol in the past aged 60+ years are 2.39 times more likely to be in poor health compared to those that do not drink alcohol at $P < 0.1$. Though not significant the results further indicate that currently alcohol

aged 60+ years are 1.23 times more likely to be in poor health compared to those that do not drink alcohol.

IV. Environmental Factors and health status

Water Source

From table 4.5 it is observed that individuals using water from unimproved sources aged 0-5 years are 1.3 times more likely to be in poor health when compared to those that use water from improved sources at $P < 0.01$ while individuals aged 6-14 years using water from unimproved are 1.2 times more likely to be in poor health than those using water from improved sources at $P < 0.05$. Though not significant the results show that individuals that use water from unimproved sources aged 15-59 years and 60+ years are 1.09 and 1.1 times more likely to be in poor health when compared to those that use water from improved sources.

Toilet Facility

Children aged 0-5 years using intermediate toilet facilities are 1.48 times more likely to be in poor health when compared to those use high quality toilet facilities at $P < 0.05$. Children aged 0-5 years using poor quality toilet facilities are 1.7 times more likely to be in poor health when compared to those use high quality toilet facilities at $P < 0.01$. Though not significant, individuals aged 6-14 years using poor and intermediate quality toilet facilities are 1.15 and 1.1 times more likely to be in poor health when compared to those use high quality toilet facilities respectively. For individuals aged 15-59 and 60+ years using intermediate toilet facilities are 1.1 and 1.2 times more likely to be in poor health when compared to those use high quality toilet facilities respectively. Individuals aged 15-59 and 60+ years using poor quality toilet facilities are 1.08 and 1.5 times more likely to be in poor health when compared to those use high quality toilet facilities respectively.

Housing conditions

Individuals staying in mud and pole houses aged 6-14 years are 1.21 times more likely to be in poor health when compared to those that stay in brick houses respectively at $P < 0.01$. Similarly, individuals staying houses whose floor is made of earth aged 6-14 years are 1.29 times more likely to be in poor health when compared to those that stay whose floor is made of cement houses respectively at $P < 0.01$. On the other hand individuals aged 60+ staying in mud and pole houses are 1.3 times more likely to be in poor health when compared to those that stay in brick houses respectively at $P < 0.05$, while individuals of the same age bracket staying houses whose floor is made of earth are 1.3 times more likely to be in poor health

when compared to those that stay whose floor is made of cement houses respectively at $P < 0.1$. Though not significant individuals sleeping in mud and pole houses aged 0-5 years and 15-59 years are 1.1 and 1.02 times more likely to be in poor health when compared to those that stay in brick houses respectively. On the other hand, individuals staying in houses with earth floor sleeping aged 0-5 years and 15-59 years are 1.1 and 1.05 times more likely to be in poor health when compared to those that stay houses with cement floor houses respectively.

4.7 Discussion of the study findings

The major objective of the study was to empirically establish the key factors that influence health status in Uganda. Specifically, this study sought to examine the relationship between health status and socio-demographic characteristics; economic characteristics; lifestyle factors as well as environmental factors. The results from the study are consistent with a huge and growing body of evidence showing that Social Determinants of health actually have an impact on health status.

I. Socio-demographic characteristics and health status

The finding show that females aged 6 years and above are more likely to be in poor health when compared with their male counterparts. These results are in line with a study, by Denton et al. (2004). Women report higher levels of depression, psychiatric disorders, distress, and a variety of chronic illnesses than men (Baum & Grunberg, 1991; McDonough & Walters, 2001; Verbrugge, 1985). This is not surprising that even the UNHS 2016/17 report shows that the females were more likely to suffer from illness or injury compared with their male counterparts (30% and 26% respectively).

From the study individuals aged 6-14 years from male headed household are more likely to be in poor health when compared with their counterparts from female headed households. These results are contrary to Muhammad (2001) findings. However some studies have found that children in female-headed households may actually be better off in terms of health than their counterparts in male-headed units (Blumberg, 2018; Engle, 1995; Oppong, 1997).

Individuals residing in rural areas were found to be in poor health across all age groups. The results conform to the studies carried out number of researchers for instance according to Eberhardt and Pamuk, (2004) residents of rural areas are in poor health than residents of more urbanized areas and even went ahead to identify some the factors related to rural health

disparities which include but not limited to demographic and socioeconomic characteristics and health risk factors. Residents of rural areas are at a greater risk for health problems compared to residents of urban areas (Auchincloss et al., 2002).

Still from our results married individuals aged groups 1-56 and 60+ years also are more likely to in poor health when compared to their counterparts not married. These results are contrary previous findings by Rahman (1993) and Hu & Goldman (1995). However, the results reaffirm Bookwala (2005) findings that that uncaring and unhelpful spousal behaviours was linked to poorer health and such behaviours overshadowed positive spousal behaviours in contributing to poorer health. In Uganda's case it could be attributed to the rampant intimate partner violence for instance the Uganda 2016 DHS found that 58.4% of married women reported ever having experienced emotional, physical or sexual violence from a spouse, and 39.6% had experienced it within the past year.

II. Economic characteristics and health status

The findings show that individuals aged 6-14 years with no formal education are more likely to be in poor health, these findings are consistent with Tariku et al (2018). In line with the same findings similar studies that have found out that educated people are less likely to engage in risky behaviors such as drinking alcohol, smoking and are more likely to have healthy behaviors related to exercise and diet (Mokdad et al., 2004 and Garrett, 2013).

Still from the findings Children aged 6-14 years whose mothers have not attained maternal education are more likely to be in poor health. The study is line with a number of studies which shows that parental education can empower a caregiver to maximize the resources and acquire the knowledge required to adopt good child nutrition practices for health of children (Milkulencak, 1999 and Webb & Lapping, 2002).

From the findings, unemployed 60+ years were found to more likely be in poor health when compared to those employed, this reaffirms the earlier findings by Ramachandran et al, (1982).and Sidik et al, (2004). The similar association was reported by other studies as well (Cummins et al., 2005, Benach & Muntaner 2007), which found unemployment being linked with low self-esteem and mental health problems.

III. Life Style Factors and health status

Smokers aged 15 years and above were more likely to be in poor health compared to those that do not smoke, the findings are in line with Rehm et al., (2010). A number of studies have also found out similar results, for instance Doll et al, (1994) found out that heavy smokers

have more risk of suffering the adverse effects of smoking in their physical health. Similarly, smoking has been associated with a higher prevalence of mental disorders (Castro et al., 2010; Schmitz et al., 2003).

Individuals aged 1-59 and 60+ years who had consumed alcohol in the past reported a significant relationship between alcohol consumption and health status. Current alcohol consumers above 15 years were found to be in poor health compared to the those that don't consume alcohol and those that smoked in the past. The results are consistent to the findings of Castro et al., (2010). The results are also in line with other studies that have been carried out in the past for instance Rehm et al., (2010) linked alcohol to both incidence of disease and the course of disease. Alcohol consumption has detrimental effects on hypertension, cardiac dysrhythmias and haemorrhagic stroke (Rehm et al., 2010).

IV. Environmental Factors and health status

Unimproved water sources significantly affect individuals below 14 years which matches a number of studies relating water sources and health for instance Sharma et al. (1996) found out that the primary causes of many childhood illnesses and poor health in Kenya, Uganda and Tanzania are water-related. Similarly, Plate et al. (2004) also indicates that using secondary water source exposes children to greater risk of diarrhoea disease than using only improved sources such as wells.

Also, Individuals below 5 years using poor and intermediate quality toilet facilities also were found to be in poor health. These findings are in line with a number of studies for instance Fink et al. (2011) found a linkage between of poor-quality toilet facilities and risks of diarrhoea and stunting. Additionally, Kwarteng et al. (2015) revealed that improper disposal of wastes and inadequate toilet facilities were responsible for poor sanitations and sanitation related diseases cholera, malaria, and diarrhoea.

Still from the results, individuals aged 6-14 and 60+ years residing in houses whose wall material is made of mud and pole houses and floor material is made of earth were found to be in poor health. The studies conform to Krieger & Higgins, (2002) findings that Poor housing conditions are associated with a wide range of health conditions, including respiratory infections, asthma, lead poisoning, injuries, and mental health.

CHAPTER FIVE: CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary and major conclusions drawn from the study as well as policy recommendation derived from the study findings. In this chapter we further present areas for further research.

5.2 Summary of the Study

The first chapter introduces the background to the problem, the statement of the problem, objectives of the study, research questions and justification of the study. Over the years, Government has struggled to achieve better health for the people in Uganda to enhance their quality of life and productivity. This is evidenced through acting on key SDH such as household income and infrastructure as it is marked in Health Sector Development Plan (HSDP) 2015/16 - 2019/20. However, evidence shows that health indicators still show a heavy burden of disease disproportionately born especially by children and women. For instance, malaria still remains the highest cause of morbidity and mortality especially among the children below 5 years of age (UBOS, 2017). Therefore, understanding the actual SDH that significantly affect health status is critical. Probably, the interventions undertaken are not targeting the most significant factors. Thus, this necessitates a study in to SDH to empirically establish the key factors influencing health status in Uganda.

Chapter two comprises the review of both the theoretical and empirical literature related to the research topic. The purpose of Chapter 2 is to give an overview of the literature on the different approaches to Social Determinants of health such as Social disadvantage approach, Life course approach and Health equity approach. The chapter further outlines a summary of what has been observed in the empirical literature and identifies weaknesses and gaps which have been filled by this study.

Chapter three deals with research methodology. The chapter explains the methodology adopted by the study to examine the relationship between social determinants and the health status in Uganda. It presents the different measure of health, the model used in the analysis and the derivation of logit model as well as the model specification. The chapter further presents estimation techniques. The study adopts a logistic regression model to estimate. Four logistic regressions of different age groups are estimated in order to understand the SDH that

affects each age category of the population that is model I II III and IV. Model I was focused on individuals aged 0-5 years; model II 6-14 years; Model III 15-59 years while Model IV focused on individuals aged 60 years and above. The study used the adjusted Wald test for individual Statistical significance of regression coefficients and Hosmer-Lemeshow (HL) test, to assess how well the model fits the data.

Chapter four presents the study finding. This chapter presents the empirical results on the determinants of Health status in Uganda that is the general characteristics of the population, descriptive analysis and the logistic regression results. In this chapter further presents the interpretation of results and discussion of the findings. The major objective of the study was to empirically establish the key factors influencing health status in Uganda. Specifically, this study sought to examine the relationship between health status and socio-demographic characteristics; economic characteristics; lifestyle factors as well as environmental factors. A combination of socio-demographic characteristics; economic factors; lifestyle factors and environmental factors affect the health status of individuals. Lifestyle factors were found to be more significant amongst individuals aged 15 years and above. Social demographic factors affect all age groups though more significant amongst individuals aged 5 years and above. Economic factors were found to be significant amongst age groups 6-14 and 60+ years, While Environmental factors mostly affect individuals aged below 14 years.

Chapter five presents the summary and major conclusions drawn from the study as well as policy recommendation derived from the study findings. In this chapter we further present areas for further research.

5.3 Conclusion

Demographic factors such as gender, marital status residential status and gender of household head are so imperative in determining health status. As observed from above gender of household head has a significant relationship with health for individuals aged 6-14 years. Location (rural Residence) has a significant relationship with health across all age groups. Marital status also has a significant relationship with health for age groups 1-56 and 60+ years.

Economic factors such as education level, maternal education and employment have also been identified as determinants of health with maternal education (no formal Education) significantly affecting health for children between 6-14 years. Employment status (non-

employed) is as well statistically significant affecting individuals aged 60+ years.

Lifestyle factors such as alcohol consumption and smoking are also critical in determining health with current alcohol consumption significantly affecting health for people aged 15-59 while alcohol consumption in the past significantly affects health status amongst individuals aged 1-59 years and 60+ years. Smoking (current smokers) significantly affects health across the two age groups (1-59 years and 60+ years).

Environmental factors such as water source, toilet facility and housing conditions also significantly affect health status. As observed from the finding, unimproved water sources significantly affect individuals aged 14 years and below. Poor and intermediate quality toilet facilities also were also found significantly affecting the health of children 5 years and below. While poor housing conditions affect individuals aged 6-14 years and those aged 60+ years.

5.4 Policy Recommendations

As evidenced from the study women aged 6 years and above are more likely to be in poor health when compared to men. To achieve greatest health gains among women, national and donor investment strategies should give considerable emphasis to health interventions for women. Education of girls to at least secondary level and employment opportunities for women will promote gender equality and more broadly improve upon their health.

Alcohol consumption and smoking generally affects health of people aged 15-59 and 60+. Therefore, Interventions to prevent people from smoking and alcohol consumption must be undertaken or strengthened, interventions that can be effective in achieving this include increases in the price of tobacco products and alcohol, mass media anti-smoking advertising, smoke-free policies, smoking and alcohol curricula in schools, restrictions on marketing opportunities for the tobacco and alcohol industry. Although Uganda has enacted policies regulating smoking in public places, Uganda's tobacco control programme efforts need to focus on implementation and enforcement of these policies that are in place. More efforts should also be put in promoting health lifestyles especially among the young people health professionals can also help in giving advice, guidance and answers to questions related to tobacco and alcohol consumption use and their health effects.

From the study findings individuals residing in rural areas are more likely to report poor health when compared to urban residents. Therefore, policies should be aimed at closing the gap in health conditions between urban and rural inhabitants through balanced economic and social development. Policies should concentrate on increasing the level of income, education and decreasing unemployment amongst people living in the rural areas through focusing on the agricultural sector and small private businesses.

The results show that mother's education (no formal education) significantly effects of children aged 6 to 14 years. Therefore, education especially for the girls should be a priority since from the study findings children whose mothers have attained at least primary level education are less likely to be in poor health compared to the mothers with no formal education. It is important to note that through education, mothers gain knowledge and skills that make them more able to make healthy choices (Grossman, 2006).

The study shows that individuals not employed aged 60 years and above are more likely to be in poor health when compare to those employed. It is important to note that at that age, the elderly may struggle to afford soaring health care costs – just as their income is shrinking. In order to improve the health status of such individuals it is necessary to have an insurance scheme for the elderly to ease their access to health care.

As observed from the results, environmental factors such as water source, toilet facility and housing conditions significantly affect health status. There should be establishment of clear institutional responsibility and specific budget lines for water & sanitation, and ensuring that public sector agencies working in health, in water resources, and other utility services work together better to enhancing quality infrastructure (piped water to homes, toilets connected to sewers or septic tanks). Additionally, it should be noted that in 2016, the government approved the Uganda National Housing Policy that seeks to promote the progressive realization of adequate housing for all by 2022 but not much has been done. The government should therefore re-focus on the implementation of the housing policy to ensure increase access to affordable and quality housing for all income groups.

It is clear from the evidence gathered that addressing SDH is crucial. However, addressing SDH requires interventions across multiple sectors that is health, education, housing and urban development, water and environment, agriculture, gender labour and social development, and trade. Because the government is best placed to coordinate the various

initiatives needed to bring about large-scale change, it is essential to mobilize political will and commitment from the very outset, i.e. establishing the prerequisites for the success of the interventions. In this regard, government ministries are encouraged to coordinate not only to support health care systems that are more responsive to health needs, but also to create the enabling social conditions for the people.

Limitations of the study

The study is based on cross sectional data however; panel data analysis could have provided better insights into the relationship between SDH and health over time. Nevertheless, for such analysis the availability of panel data is required. The study does not also put into consideration the severity of sickness which when put in to consideration could produce more insightful results.

Areas of Further Research

The study used cross sectional data to establish the key factors influencing health status in Uganda. Further research can be conducted in the same area but utilizing panel data get a better understanding of the relationship between SDH and health over time. Further research could also put into consideration the severity of sickness to obtain more insightful results.

REFERENCES

- Adler, N. E., Marmot, M., McEwen, B. & Stewart, J. (Eds.). (1999). *Socioeconomic status and health in industrialized nations: Social, psychological, and biological pathways*. New York: New York Academy of Sciences.
- Afifi, A., May, S., & Clark, V. A. (2003). *Computer-aided multivariate analysis*. CRC Press.
- Ansari, Z., Carson, N. J., Ackland, M. J., Vaughan, L., & Serraglio, A. (2003). A public health model of the social determinants of health. *Sozial-und Präventivmedizin/Social and Preventive Medicine*, 48(4), 242-251.
- Arber, S., & Cooper, H. (1999). Gender differences in health in later life: the new paradox? *Social science & medicine*, 48(1), 61-76
- Archer, K. J., & Lemeshow, S. (2006). Goodness-of-fit test for a logistic regression model fitted using survey sample data. *The Stata Journal*, 6(1), 97-105.
- Auchincloss, A. H., & Hadden, W. (2002). The health effects of rural-urban residence and concentrated poverty. *The Journal of rural health*, 18(2), 319-336.
- Bartley, M., (2004). *Health Inequality: An Introduction to Concepts, Theories and Methods*. Cambridge, U.K.: Blackwell.
- Baum, A., & Grunberg, N. E. (1991). Gender, stress, and health. *Health Psychology*, 10(2), 80.
- Benach, J., & Muntaner, C. (2007). Precarious employment and health: developing a research agenda. *Journal of Epidemiology & Community Health*, 61(4), 276-277.
- Ben-Shlomo, Y., Smith, G. D., Shipley, M., & Marmot, M. G. (1993). Magnitude and causes of mortality differences between married and unmarried men. *Journal of Epidemiology & Community Health*, 47(3), 200-205.
- Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: an updated systematic review. *Annals of internal medicine*, 155(2), 97-107.
- Blumberg, R. L. (2018). Introduction: engendering wealth and well-being in an era of economic transformation. In *Engendering wealth and well-being* (pp. 1-14). Routledge.
- Bookwala, J. (2005). The role of marital quality in physical health during the mature years. *Journal of aging and health*, 17(1), 85-104.
- Braveman, P. A., Kumanyika, S., Fielding, J., LaVeist, T., Borrell, L. N., Manderscheid, R., & Troutman, A. (2011). Health disparities and health equity: the issue is justice. *American journal of public health*, 101(S1), S149-S155.
- Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. *Public health reports*, 129(1_suppl2), 19-31.
- Braveman, P., Egerter, S. & Williams, D.R. (2011). The Social Determinants of Health: Coming of Age. *Annual Review of Public Health*, 32, 381–398. doi:10.1146/annurev-publhealth 031210-101218.
- Bryant, T., Leaver, C., & Dunn, J. (2009). Unmet healthcare need, gender, and health inequalities in Canada. *Health Policy*, 91, 24–32.
- Bryant, T., Raphael, D., Schrecker, T. & Labonte, R. (2011). Canada: A land of missed opportunity for addressing the social determinants of health. *Health Policy*, 101, 44–58. doi: 10.1016/j.healthpol.2010.08.022
- Castro, M. R. P. D., Matsuo, T., & Nunes, S. O. V. (2010). Clinical characteristics and quality of life of smokers at a referral center for smoking cessation. *Jornal brasileiro de pneumologia*, 36(1), 67-74.

- Cayuela, A., Rodríguez-Domínguez, S., & Otero, R. (2007). Deteriorated health-related quality of life in healthy male smokers. *Archivos de Bronconeumología ((English Edition))*, 43(2), 59-63.
- Cockerham, W. C. (2005). Health lifestyle theory and the convergence of agency and structure. *Journal of health and social behavior*, 46(1), 51-67.
- Cokluk, O. (2010). Logistic Regression: Concept and Application. *Educational Sciences: Theory and Practice*, 10(3), 1397-1407.
- Cummins, S., Stafford, M., Macintyre, S., Marmot, M., & Ellaway, A. (2005). Neighbourhood environment and its association with self-rated health: evidence from Scotland and England. *Journal of Epidemiology & Community Health*, 59(3), 207-213.
- Denton, M., Prus, S., & Walters, V. (2004). Gender differences in health: a Canadian study of the psychosocial, structural and behavioural determinants of health. *Social science & medicine*, 58(12), 2585-2600.
- DeWalt, D. A., & Hink, A. (2009). Health literacy and child health outcomes: a systematic review of the literature. *Pediatrics*, 124(Supplement 3), S265-S274.
- Doll, R., Peto, R., Wheatley, K., Gray, R., & Sutherland, I. (1994). Mortality in relation to smoking: 40 years' observations on male British doctors. *Bmj*, 309(6959), 901-911.
- Duncan, Greg, Bessie Wilkerson, and Paula England (2006). "Cleaning Up Their Act: The Effects of Marriage and Cohabitation on Licit and Illicit Drug Use." *Demography*, vol. 43, no. 4, Nov., pp. 691-710.
- Eberhardt, M. S., & Pamuk, E. R. (2004). The importance of place of residence: examining health in rural and nonrural areas. *American journal of public health*, 94(10), 1682-1686.
- Elder, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In *Handbook of the life course* (pp. 3-19). Springer, Boston, MA.
- Engle, P. (1995). Father's money, mother's money, and parental commitment: Guatemala and Nicaragua. *Engendering Wealth and Well-Being: Empowerment for Global Change, Rae Lesser Blumberg y otros (comps.), Boulder, Westview.*
- Fantahun, M., Berhane, Y., Högberg, U., Wall, S., & Byass, P. (2009). Ageing of a rural Ethiopian population: who are the survivors?. *Public Health*, 123(4), 326-330.
- Fink, G., Günther, I., & Hill, K. (2011). The effect of water and sanitation on child health: evidence from the demographic and health surveys 1986–2007. *International journal of epidemiology*, 40(5), 1196-1204.
- Flaskerud, J. H., DeLilly, C. R., & Flaskerud, J. H. (2012). Social determinants of health status. *Issues in mental health nursing*, 33(7), 494-497.
- Garrett, B. E., Dube, S. R., Winder, C., Caraballo, R. S., & Centers for Disease Control and Prevention. (2013). Cigarette smoking—United States, 2006–2008 and 2009–2010. *MMWR Surveill Summ*, 62(Suppl 3), 81-4.
- Goldman, N., Korenman, S., & Weinstein, R. (1995). Marital status and health among the elderly. *Social science & medicine*, 40(12), 1717-1730.
- Gove, W. R. (1973). Sex, marital status, and mortality. *American journal of sociology*, 79(1), 45-67.
- Grad, F. P. (2002). The preamble of the constitution of the World Health Organization. *Bulletin of the World Health Organization*, 80, 981-981.
- Graham, H. & Stamler Leeseberg, L. (2010). Contemporary Perceptions of Health from an Indigenous (Plains Cree) Perspective. *Journal of Aboriginal Health* 6(1), 6-17.
- Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political economy*, 80(2), 223-255.
- Gujarati, D. (2003). N, 2003, Basic Econometrics, “. *New York: McGraw-Hill*, 363-369.

- Hamajima, N., Hirose, K., Tajima, K., Rohan, T., Calle, E. E., Heath Jr, C. W., ... & Koetsawang, S. (2002). Collaborative Group on Hormonal Factors in Breast Cancer. *Br J Cancer*, 87(11), 1234-1245.
- Hampson, S. E., Goldberg, L. R., Vogt, T. M., & Dubanoski, J. P. (2007). Mechanisms by which childhood personality traits influence adult health status: educational attainment and healthy behaviors. *Health Psychology*, 26(1), 121.
- Harper, S. (2012). Social determinants of health for Uganda's indigenous Batwa population.
- Harris E, Sainsbury P, Nutbeam D (2002) Perspectives on health inequity *Journal of Epidemiology & Community Health* ;56:80.
- Hosseinpoor, A. R., Bergen, N., Kunst, A., Harper, S., Guthold, R., Rekve, D., ... & Chatterji, S. (2012). Socioeconomic inequalities in risk factors for non-communicable diseases in low-income and middle-income countries: results from the World Health Survey. *BMC public Health*, 12(1), 912.
- Hu, Y., & Goldman, N. (1990). Mortality differentials by marital status: an international comparison. *Demography*, 27(2), 233-250.
- Hutchinson, P. (2001). Combating illness. *Uganda's Recovery: The Role of Farms, Firms, and Government*, 407-9.
- Jahoda, M. (1982). *Employment and unemployment: A social-psychological analysis* (Vol. 1). CUP Archive.
- Jones, A. M., Rice, N., d'Uva, T. B., & Balia, S. (2013). *Applied health economics*. Routledge.
- Joung, I. M., Van De Mheen, H. D., Stronks, K., Van Poppel, F. W., & Mackenbach, J. P. (1998). A longitudinal study of health selection in marital transitions. *Social science & medicine*, 46(3), 425-435.
- Kawachi, I., Subramanian, S. V., & Almeida-Filho, N. (2002). A glossary for health inequalities. *Journal of epidemiology and community health*, 56(9), 647-652.
- Kim, E. S., Park, N., & Peterson, C. (2013). Perceived neighborhood social cohesion and stroke. *Social science & medicine*, 97, 49-55.
- Krieger, J., & Higgins, D. L. (2002). Housing and health: time again for public health action. *American journal of public health*, 92(5), 758-768.
- Kwarteng, A. B., Williams Agyemang-Duah, F. A., & Agyemang, E. (2015). Assessing sanitation conditions and its impacts on the health status of urban dwellers in Abuakwa, Ghana. A Cross sectional survey. *facilities*, 5(17).
- Lawson, D. (2004). *Determinants of Health Seeking Behaviour in Uganda-Is It Just Income and User Fees That Are Important?* (No. 1650-2016-135978). Lawson, D. (2004). *Determinants of ill health in Uganda: Is it just the wealthy that more healthy?* (No. 04/09). CREDIT Research Paper.
- Lee, Sunmin, Eunyoung Cho, Francine Grodstein, Ichiro Kawachi, Frank B. Hu, and Graham A. Colditz (2005). "Effects of Marital Transitions on Changes in Dietary and Other Health Behaviours in U.S. Women." *International Journal of Epidemiology*, vol. 34, pp. 69-78.
- Lynch, J., & Kaplan, G. (2000). *Socioeconomic position* (Vol. 2000, pp. 13-35). Social epidemiology. New York: Oxford University Press.
- Macinko, J. A., Shi, L., Starfield, B., & Wulu Jr, J. T. (2003). Income inequality and health: a critical review of the literature. *Medical Care Research and Review*, 60(4), 407-452.
- Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: how can we conceptualise, operationalise and measure them? *Social science & medicine*, 55(1), 125-139.
- Marmot, M., & Commission on Social Determinants of Health. (2007). Achieving health equity: from root causes to fair outcomes. *The Lancet*, 370(9593), 1153-1163.

- Marmot, M., Friel, S., Bell, R., Houweling, T. A., Taylor, S., & Commission on Social Determinants of Health. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. *The lancet*, 372(9650), 1661-1669.
- Marmot, M., Ryff, C. D., Bumpass, L. L., Shipley, M., & Marks, N. F. (1997). Social inequalities in health: next questions and converging evidence. *Social science & medicine*, 44(6), 901-910
- Martikainen, P., Martelin, T., Nihtilä, E., Majamaa, K., & Koskinen, S. (2005). Differences in mortality by marital status in Finland from 1976 to 2000: analyses of changes in marital-status distributions, socio-demographic and household composition, and cause of death. *Population studies*, 59(1), 99-115.
- McDonnell, O., Lohan, M., Hyde, A. & Porter, S. (2009). *Social Theory, Health & Healthcare*. New York: Palgrave MacMillan.
- McDonough, P., & Walters, V. (2001). Gender and health: reassessing patterns and explanations. *Social science & medicine*, 52(4), 547-559.
- McDonough, P., Walters, V., & Strohschein, L. (2002). Chronic stress and the social patterning of women's health in Canada. *Social Science & Medicine*, 54(5), 767-782.
- Metz, C. E. (1978,). Basic principles of ROC analysis. In *Seminars in nuclear medicine* (Vol. 8, No. 4, pp. 283-298). WB Saunders.
- Mikkonen, J., & Raphael, D., (2010). *Social determinants of health: The Canadian facts*. Toronto, Ont.: York University School of Health Policy and Management
- Milkulencak, M. (1999). A critical link. Interventions for physical growth and psychological development. A Review (pp. 32-34)
- Mirowsky, J., & Ross, C. E. (2001). Age and the effect of economic hardship on depression. *Journal of health and social behavior*, 132-150.
- Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *Jama*, 291(10), 1238-1245.
- Montgomery, S. M., Cook, D. G., Bartley, M. J., & Wadsworth, M. E. (1999). Unemployment pre-dates symptoms of depression and anxiety resulting in medical consultation in young men. *International Journal of Epidemiology*, 28(1), 95-100.
- Muhammad Rizwan (2001) Social and Economic Determinants of Child Health: The Case Study of Pakistan. *Journal of Economics and Sustainable Development* Vol.5, No.11, 2014 42
- Murray, C. J., & Chen, L. C. (1993). In search of a contemporary theory for understanding mortality change. *Social Science & Medicine*, 36(2), 143-155.
- Musgrove, P. (1987). The economic crisis and its impact on health and health care in Latin America and the Caribbean. *International Journal of Health Services*, 17(3), 411-441.
- Newbold, K. B. (1998). Problems in search of solutions: health and Canadian aboriginals. *Journal of community health*, 23(1), 59-74.
- O'Campo, P. (2012). Are We Producing the Right Kind of Actionable Evidence for the Social Determinants of Health? *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. doi:10.1007/s11524-012-9695-5
- Obuku, E. A., Meynell, C., Kiboss-Kyeyune, J., Blankley, S., Atuhairwe, C., Nabankema, E., ... & Ndungutse, D. (2012). Socio-demographic determinants and prevalence of Tuberculosis knowledge in three slum populations of Uganda. *BMC public health*, 12(1), 536.
- Oppong, C. (1997). 'African family systems and socio-economic crisis'.in Aderanti Adepoju (ed) *Family, Population and Deveolpment in Africa* (London: Zed) 158-82.
- People, H. (2010). 2000. *Healthy People in Healthy Communities: A Systematic Approach to Health Improvement*.

- Phaswana-Mafuya, N., Peltzer, K., Chirinda, W., Kose, Z., Hoosain, E., Ramlagan, S., ... & Davids, A. (2013). Self-rated health and associated factors among older South Africans: evidence from the study on global ageing and adult health. *Global Health Action*, 6(1), 19880.
- Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications. *Journal of health and social behavior*, 51(1_suppl), S28-S40.
- Plate, D. K., Strassmann, B. I., & Wilson, M. L. (2004). Water sources are associated with childhood diarrhoea prevalence in rural east-central Mali. *Tropical Medicine & International Health*, 9(3), 416-425.
- Productivity Commission. (2007). Australia's health workforce. *Productivity Commission, Government of Australia Research Reports*.
- Rahman, O. (1993). Excess mortality for the unmarried in rural Bangladesh. *International Journal of Epidemiology*, 22(3), 445-456.
- Ramachandran, V., Menon, M. S., & Arunagiri, S. (1982). Socio-cultural factors in late onset depression. *Indian journal of psychiatry*, 24(3), 268.
- Raphael, D. (2006). Social Determinants of Health: Present Status, Unanswered Questions, And Future Directions. *International Journal of Health Services*, 36(4), 651-677
- Raphael, D., (2002). Addressing health inequalities in Canada. *Leadership in Health Services*, 15(2), 1-8.
- Reading, C. L., & Wien, F. (2010). *Health Inequalities and the Social Determinants of Aboriginal Peoples' Health*. National Collaborating Centre for Aboriginal Health.
- Rehm, J., Baliunas, D., Borges, G. L., Graham, K., Irving, H., Kehoe, T., ... & Roerecke, M. (2010). The relation between different dimensions of alcohol consumption and burden of disease: an overview. *Addiction*, 105(5), 817-843.
- Richmond, C. A., & Ross, N. A. (2008). Social support, material circumstance and health behaviour: Influences on health in First Nation and Inuit communities of Canada. *Social Science & Medicine*, 67(9), 1423-1433
- Richmond, C. A., Ross, N. A., & Egeland, G. M. (2007). Social support and thriving health: a new approach to understanding the health of indigenous Canadians. *American Journal of Public Health*, 97(10), 1827.
- Robert, S. A., & House, J. S. (2000). Socioeconomic inequalities in health: An enduring sociological problem. *Handbook of medical sociology*, 5, 79-97.
- Roberts, B., Odong, V. N., Browne, J., Ocaka, K. F., Geissler, W., & Sondorp, E. (2009). An exploration of social determinants of health amongst internally displaced persons in northern Uganda. *Conflict and health*, 3(1), 10.
- Ross, C. E., & Bird, C. E. (1994). Sex stratification and health lifestyle: consequences for men's and women's perceived health. *Journal of Health and Social Behavior*, 161-178.
- Rudolph, L., Caplan, J., Ben-Moshe, K., & Dillon, L. (2013). *Health in all policies: a guide for state and local governments*. Washington (DC): American Public Health Association.
- Schmitz, N., Kruse, J., & Kugler, J. (2003). Disabilities, quality of life, and mental disorders associated with smoking and nicotine dependence. *American Journal of Psychiatry*, 160(9), 1670-1676.
- Schulz, A. J., Zenk, S., Odoms-Young, A., Hollis-Neely, T., Nwankwo, R., Lockett, M., ... & Kannan, S. (2005). Healthy eating and exercising to reduce diabetes: exploring the potential of social determinants of health frameworks within the context of community-based participatory diabetes prevention. *American journal of public health*, 95(4), 645-651.

- Scott, A. J., & Wilson, R. F. (2011). Social determinants of health among African Americans in a rural community in the Deep South: an ecological exploration. *Rural Remote Health, 11*(1), 1634.
- Sharma, N. P., Damhaug, T., Gilgan-Hunt, E., Grey, D., Okaru, V., & Rothberg, D. (1996). *African Water Resources; Challenges and Opportunities for Sustainable Development* (No. 331).
- Sidik, S. M., Rampal, L., & Afifi, M. (2004). Physical and mental health problems of the elderly in a rural community of Sepang, Selangor. *The Malaysian journal of medical sciences: MJMS, 11*(1), 52.
- Smith, K. R., Frumkin, H., Balakrishnan, K., Butler, C. D., Chafe, Z. A., Fairlie, I., & McMichael, A. J. (2013). Energy and human health. *Annual Review of public health, 34*, 159-188.
- Strauss, J., Gertler, P. J., Rahman, O., & Fox, K. (1993). Gender and life-cycle differentials in the patterns and determinants of adult health. *Journal of Human Resources, 7*91-837.
- Tariku, E. Z., Abebe, G. A., Melketsedik, Z. A., & Gutema, B. T. (2018). Prevalence and factors associated with stunting and thinness among school-age children in Arba Minch Health and Demographic Surveillance Site, Southern Ethiopia. *PloS one, 13*(11), e0206659.
- Uganda (2000). *Health Sector Strategic Plan I*. Ministry of Health.
- Uganda (2005) *Health Sector Strategic Plan II*. Ministry of Health.
- Uganda (2010). *Uganda AIDS Indicator Survey: Uganda Second National Health Policy, Promoting People's Health to Enhance Socio-economic Development*. Ministry of Health
- Uganda (2012). *Uganda AIDS Indicator Survey: Key Findings 2011.-2012*, Calverton, Maryland, USA: MOH and ICF International
- Uganda (2013). *Uganda National Household Survey (UNHS) 2012/13*, Uganda Bureau of Statistics
- Uganda (2015) *Health Sector Development Plan 2015/16–2019/20*. Ministry of Health.
- Uganda (2016). *The National Population and Housing Census 2014 – Main Report*, Uganda Bureau of Statistics
- Uganda (2016). *Uganda HIV AND AIDS country progress report July 2015-June 2016* Uganda AIDS Commission
- Uganda (2017). *Uganda Population Based HIV Impact Assessment Study (UPHIA) 2016-2017*. Ministry of Health, Kampala, Uganda.
- Uganda Bureau of Statistics (UBOS) and ICF. (2017). *Uganda Demographic and Health Survey 2016: Key Indicators Report*. Kampala, Uganda: UBOS, and Rockville, Maryland, USA: UBOS and ICF.
- Uganda Bureau of Statistics (UBOS) and ICF International Inc. (2012). *Uganda Demographic and Health Survey 2011*. Kampala, Uganda: UBOS and Calverton, Maryland: ICF International Inc.
- Uganda. (2010). *Health Sector Strategic & Investment Plan: Promoting People's Health to Enhance Socio-economic Development: 2010/11-2014/15*. Ministry of Health.
- Uganda. (2015). *Millennium Development Goals (MDGS) Report 2015*. Minister of Finance, Planning and Economic Development
- Uganda. (2018). *Annual Health Sector Performance Report Financial Year 2017/18*. Ministry of Health.
- Umberson, Debra (1987). "Family Status and Health Behaviors: Social Control as a Dimension of Social Integration." *Journal of Health and Social Behavior*, vol. 28, no. 3, pp. 306-319

- United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. Resolution passed by the General Assembly on 25 September 2015. New York: United Nations. 40 pp.
- van Vuuren, D. P., Nakicenovic, N., Riahi, K., Brew-Hammond, A., Kammen, D., Modi, V., & Smith, K. R. (2012). An energy vision: the transformation towards sustainability—interconnected challenges and solutions. *Current Opinion in Environmental Sustainability*, 4(1), 18-34.
- Verbrugge, L. M. (1979). Marital status and health. *Journal of Marriage and the Family*, 267-285.
- Verbrugge, L. M. (1985). Gender and health: an update on hypotheses and evidence. *Journal of health and social behavior*, 26(3), 156-182.
- Vuk, M., & Curk, T. (2006). ROC curve, lift chart and calibration plot. *Metodoloski zvezki*, 3(1), 89.
- Waldram, J. B., Herring, A., & Young, T. K. (2006). *Aboriginal health in Canada: Historical, cultural, and epidemiological perspectives*. University of Toronto Press
- Ward, B. W., & Schiller, J. S. (2013). Peer Reviewed: Prevalence of Multiple Chronic Conditions Among US Adults: Estimates from the National Health Interview Survey, 2010. *Preventing chronic disease*, 10.
- Webb, P., & Lapping, K. (2002). *Are the Determinants of Malnutrition the Same as for 'Food Insecurity'? Recent Findings from 6 Developing Countries on the Interaction Between Food and Nutrition Security* (No. 06). Friedman School of Nutrition Science and Policy.
- World Bank (2019). International Economics Dept. Development Data Group. *World development indicators*. World Bank.
- World Health Organization. (1946). The constitution of the world health organization. *WHO chronicle*, 1, 29.
- World Health Organization. (1995). *Global strategy on occupational health for all: the way to health at work, recommendation of the Second Meeting of the WHO Collaborating Centres in Occupational Health, 11-14 October 1994, Beijing, China* (No. WHO/OCH/95.1. Unpublished). Geneva: World Health Organization.
- World Health Organization. (2009). Health inequities in the South-East Asia Region: selected country case studies.
- Wyke, S., & Ford, G. (1992). Competing explanations for associations between marital status and health. *Social science & medicine*, 34(5), 523-532.

APPENDIX

Pairwise correlation Coefficient

Pairwise correlations: Model 1: 0-5 years

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) GENDER	1.000									
(2) MOTHEDUC	0.001	1.000								
(3) HHGED	0.001	0.005	1.000							
(4) PVTY	0.010	-0.015	-0.010	1.000						
(5) RESID	-0.01	0.006	0.001	0.036	1.000					
(6) WATER	-0.005	0.001	0.002	-0.007	-0.003	1.000				
(7) ENERGY	0.014	-0.021	-0.013	0.015	-0.010	0.110	1.000			
(8) TOILET	0.001	-0.021	0.015	-0.023	0.012	0.039	0.034	1.000		
(9) WALL	0.001	0.006	0.014	-0.003	0.010	0.208	0.280	-0.016	1.000	
(10) FLOOR	0.002	-0.016	-0.010	-0.015	0.004	-0.150	-0.497	-0.031	-0.421	1.000

Pairwise correlations Model 2: 6-14 Years

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) GENDER	1.000										
(2) MOTHEDUC	-0.012	1.000									
(3) HHGED	-0.002	0.003	1.000								
(4) PVTY	0.000	0.000	-0.004	1.000							
(5) RESID	0.001	0.009	-0.008	0.054	1.000						
(6) EDUL	-0.018	-0.000	-0.015	-0.011	0.011	1.000					
(7) WATER	0.022	-0.015	0.005	-0.005	0.011	-0.007	1.000				
(8) ENERGY	0.003	-0.031	0.012	-0.004	-0.005	0.020	0.080	1.000			
(9) TOILET	-0.008	-0.018	0.005	-0.004	-0.008	-0.005	0.027	0.042	1.000		
(10) WALL	0.013	-0.014	0.033	-0.025	0.003	-0.010	0.203	0.254	-0.012	1.000	
(11) FLOOR	-0.000	0.003	-0.019	-0.006	-0.007	0.000	-0.132	-0.465	-0.051	-0.419	1.000

Pairwise correlations Model 3: 15-59 years

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) GENDER	1.000												
(2) MSTATUS	0.012	1.000											
(3) ALCHL	0.030	-0.040	1.000										
(4) SMK	0.033	-0.015	0.384	1.000									
(5) PVTY	-0.012	-0.005	-0.004	0.009	1.000								
(6) EDUL	0.010	-0.003	0.008	-0.002	0.003	1.000							
(7) EMPLT	0.080	-0.211	0.095	0.073	0.010	0.002	1.000						
(8) RESID	-0.011	0.005	-0.013	-0.035	0.048	0.003	0.130	1.000					
(9) WATER	0.001	0.030	-0.001	0.001	0.010	0.000	-0.019	-0.001	1.000				
(10) ENERGY	0.003	0.011	-0.006	-0.006	-0.010	0.013	-0.002	0.012	0.079	1.000			
(11) TOILET	-0.004	0.012	0.010	0.005	0.002	-0.007	-0.001	0.003	0.051	0.029	1.000		
(12) WALL	0.001	-0.003	-0.002	0.004	-0.006	0.008	0.002	0.001	0.200	0.257	-0.007	1.000	
(13) FLOOR	0.017	-0.003	-0.000	0.001	0.004	0.002	-0.010	-0.017	-0.152	-0.495	-0.025	-0.430	1.000

Pairwise correlations Model 4: 60+ Years

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) GENDER	1.000												
(2) MSTATUS	-0.008	1.000											
(3) ALCHL	0.014	0.052	1.000										
(4) SMK	0.011	-0.040	0.185	1.000									
(5) PVTY	0.026	-0.034	-0.002	-0.007	1.000								
(6) EDUL	0.026	-0.005	0.029	-0.008	-0.058	1.000							
(7) EMPLT	0.090	-0.203	0.038	0.098	-0.001	0.042	1.000						
(8) RESID	-0.016	0.021	-0.018	-0.064	0.040	0.034	0.145	1.000					
(9) WATER	0.001	0.014	0.038	-0.079	-0.001	-0.013	0.005	-0.006	1.000				
(10) ENERGY	0.015	-0.007	-0.033	0.007	-0.014	0.055	-0.028	0.045	0.084	1.000			
(11) TOILET	-0.027	-0.051	-0.024	-0.003	0.024	0.011	-0.011	0.003	-0.008	0.028	1.000		
(12) WALL	-0.006	0.023	-0.037	0.011	-0.024	0.012	-0.018	-0.024	0.164	0.254	-0.050	1.000	
(13) FLOOR	-0.022	0.028	0.026	-0.046	0.048	-0.042	0.009	0.032	-0.118	-0.495	-0.019	-0.440	1.000