DETERMINANTS OF HEALTH INEQUALITIES AMONG ADULTS IN KOROGOCHO INFORMAL SETTLEMENT, NAIROBI, KENYA

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P97F/21836/2010

A THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN THE SCHOOL OF PUBLIC HEALTH OF KENYATTA UNIVERSITY

MARCH 2014

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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DEDICATION

Dedicated to the memory of my late father, Rev Canon Francis Asije Eboreime, who supported my educational pursuits and would have been proud of this addition to my qualifications

ACKNOWLEDGEMENTS

Many people contributed to the success of this research. My profound gratitude goes to my supervisors, Dr George Ochieng Otieno and Dr Gaudencia Mukolwe Okumbe of the School of Public Health who provided very useful guidance and to Dr Margaret Keraka and other members of staff of Kenyatta University who facilitated the submission of this work.

My immense gratitude goes to Edo State Hospitals Management Board and the Ministry of Health in my home country Nigeria, for the opportunity to pursue this research. The hard work and resilience of the research assistants are acknowledged with thanks. I am grateful to Miss Koch, a community-based organization in Korogocho informal settlement that offered me a room virtually free of charge to hold meetings.

The cooperation of the Chief of Korogocho Location, Chairman of Korogocho Slum Upgrading Program, elders, and residents of Korogocho informal settlement is appreciated. I am grateful to Father John of the Catholic Mission, Coordinators of Makwak Health Center, and Tumaini Clinic, all in Korogocho informal settlement as well as the African Population and Health Research Center.

Finally, my darling husband, Dr Sylvester Oikeh; my lovely children, Ohis, Ihinosen, Okhaifo, and Oiki; my very dear mother, Mrs Felicia Eboreime; my dependable brothers, Engr Ugba Eboreime and Dr Ofunre Eboreime; and my loving sister, Pharm (Mrs) Aina Omo-Ojeonu have been wonderful. Their inestimable love, encouragement, and prayers to God Almighty ensured that this work came to fruition. God has been faithful.

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KEY ABBREVIATIONS AND ACRONYMS

AHRQ	Agency for Healthcare Research and Quality
AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted Odds Ratio
APHRC	African Population and Health Research Center
CBOs	Community-Based Organizations
CHWs	Community Health Workers
CI	Confidence Interval
CSDH	Commission on Social Determinants of Health
DALYs	Disability-Adjusted Life Years
DV	Dependent Variables
EQ-5D	European Quality of Life-5 Dimensions
FBOs	Faith-Based Organizations
FGD	Focus Group Discussion
GoK	Government of Kenya
HDI	Human Development Index
HDSS	Health and Demographic Surveillance Systems
HFA	Health For All
HICs	High Income Countries

HIV	Human Immunodeficiency Virus
IDF	International Diabetes Federation
IMF	International Monetary Fund
IV	Independent Variables
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
KOSLA	Korogocho Spiritual Leaders Association
KSUP	Korogocho Slum Upgrading Program
LEB	Life Expectancy at Birth
LICs	Low Income Countries
LIMCs	Low- and Middle- Income Countries
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
NACC	National AIDS Control Council
NASCOP	National AIDS & STI Control Program
NCDs	Non-Communicable Diseases
NGO	Non-Governmental Organization
NHIF	National Hospital Insurance Fund
NUHDSS	Nairobi Urban Health and Demographic Surveillance System
OXFAM-GB	Oxford Committee for Famine Relief - Great Britain

PCA	Principal Component Analysis
PHC	Primary Health Care
SAPs	Structural Adjustment Programs
SD	Standard Deviation
SEP	Socio-Economic Position
SF-36	Short Form-36
SF-36v2	Short Form-36 version 2
SRH	Self-Rated Health
SSA	Sub-Saharan Africa
TB	Tuberculosis
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UN-HABITAT	United Nations Human Settlements Program
UNHDR	United Nations Human Development Report
VIP	Ventilated Improved Pit latrine
WHO	World Health Organization
WHOQoL	World Health Organization Quality of Life
WHS	World Health Survey

DEFINITION OF TERMS

Adults

Defined in this study as adults within the productive age group between 25 and 59 years, both ages inclusive.

Chronic health conditions

They are conditions of altered health, which are insidious in onset with gradual progression of symptoms and persist for long periods usually three or more months. They consist of the following priority health conditions for the purpose of this study: communicable diseases (HIV/AIDS and Tuberculosis); non-communicable diseases ([NCDs]: Hypertension, Diabetes Mellitus, Bronchial Asthma, mental disorders); and physical disabilities.

Determinants

An umbrella term for demographic, socio-economic, and environmental conditions whose unequal distributions determine health inequalities.

Health inequalities

They are systematic differences in health status and burden of chronic health conditions between individuals and subpopulation groups. Health inequalities are measured as health disadvantage, health gap, and health gradient.

Household

A person or group of people related or unrelated, who live together and who share a common source of food.

Mediators

Are intermediary factors such as material, psychosocial, and behavioral variables through which health determinants could be indirectly linked to health inequalities.

Self-rated health status

This is respondents' self-assessed overall health and well-being on a 5-point Likert scale as very good, good, fair, poor, or very poor in response to the interview question: "How would you rate your current state of health?"

Social gradient in health

The term refers to the stepladder relationship between the inequalities in population health status and the inequalities in social status.

Socio-economic position

Refers to an aggregate of resource and prestige based measures of social class or position linked to income, wealth, occupation, and education of an individual.

Socio-economic status

Is a composite measure of social, economic, and work status. An individual's education is a measure of social status; income of economic status; and occupation, of work status.

Urban informal settlement

Unplanned, urban residential area where there is insecurity of tenure and housing is not in conformity with current urban planning and building regulations.

ABSTRACT

Dearth of actionable evidence of the magnitude, determinants, and mediators of health inequalities in deprived communities has hampered efforts to eliminate invidious health inequalities. The objectives of this study, which set out to bridge the knowledge gap, were to assess the magnitude of health inequalities, identify the determinants of health inequalities, and determine which material, psychosocial, and behavioral factors mediate health inequalities in Korogocho, an informal settlement in Nairobi, capital city of Kenya. Eligible, consenting adults were selected from each of Korogocho informal settlement's nine villages, for this cross-sectional, field-based study, through multi-stage mixed cluster sampling. The independent variables comprised demographic, socio-economic, and environmental determinants while the mediating variables were material, psychosocial, and behavioral factors. Differences in the prevalence of the dependent variables: self-rated health status and self-reported chronic health conditions, were the indicators of health inequalities. Health inequalities were measured in three dimensions: health disadvantage, health gap, and social health gradient using prevalence difference, odds ratio, and concentration curves respectively. Complementary qualitative data were collected from six focus group discussions and key informant interviews. The study population comprised 719 adults aged 25 to 59 years, mean age 34.20 ± 8.68 years with 188 (26.1%) males. Ngomongo village respondents had the highest prevalence of poor self-rated health status (44.3%) while Grogan B village respondents had the highest prevalence (29.7%) of self-reported chronic health conditions. Compared to Korogocho informal settlement, Ngomongo village (Odds ratio [OR], 2.22; 95% CI, 1.44 to 3.44; $P = 0.0003$) and Kisumu Ndogo village (OR, 1.76; 95% CI, 1.06 to 2.93; $P = 0.029$) respondents suffered significant health disadvantage. Varying magnitudes of health gaps and gradients were detected in the villages except in Highridge village where the magnitude of health inequalities was not statistically significant. Social health gradients were most marked within Gitathuru and Kisumu Ndogo villages but not across Korogocho informal settlement. From binary logistic regression, older age (45 to 59 years), female gender, lack of access to health care, and village of residence were the significant determinants of health inequalities. Significant mediators of health inequalities were alcohol intake, lack of voluntary physical exercise, having multiple, concurrent sexual partners, and unprotected sex. Mediators contributed between 10.5% and 14% in females and between 30.3% and 40.4% in males, to health inequalities. The qualitative interviewees attributed ill-health mainly, to environmental pollution, poor sanitation, and poverty. To conclude, despite mass deprivations and concentrated poverty, disaggregated data showed significant magnitudes of health inequalities within and across some villages of Korogocho informal settlement. Most of the identified determinants and mediators of health inequalities were socially constructed and therefore remediable. This study provides needed policy-relevant evidence, which is based on local priorities and should help stakeholders to target policies and design interventions such as social protection, gender mainstreaming, environmental regeneration, and health promotion to eliminate health inequalities and hence leverage aggregate population health. Future large scale, longitudinal studies that incorporate life-courses perspectives are recommended to further validate the findings of this study in other deprived communities in Africa and globally.

CHAPTER ONE: INTRODUCTION

1.1 Background

Reducing health inequalities has been a public health challenge for generations (Victora, 2006). Generally, more developed countries enjoy better health outcomes than less developed countries and the poor in every society have shorter and more unhealthy lives than the rich (Marmot, 2010). For example, a child born in Swaziland, a less developed country in Sub-Saharan Africa (SSA) is thirty times less likely to survive to her 5th birthday than another child born in Sweden, a more developed European country (UNDP, 2013). According to a World Health Report (2003), the probability of a man dying between the ages of 15 and 60 years is much lower in Sweden (8.3%) compared to Zimbabwe (82.1%) and Lesotho (90.2%). Even within the same country, the disadvantaged suffer worse health outcomes compared to the advantaged. Within the country Australia for example, life expectancy at birth (LEB), which is an indicator of health inequalities, is 20 years less for indigenous Australians than for other Australians (Aboriginal and Torres Strait Islander Social Justice Commissioner, 2005). Countries with the widest income inequalities have the worst health and social problems (**Figure 1.1**).

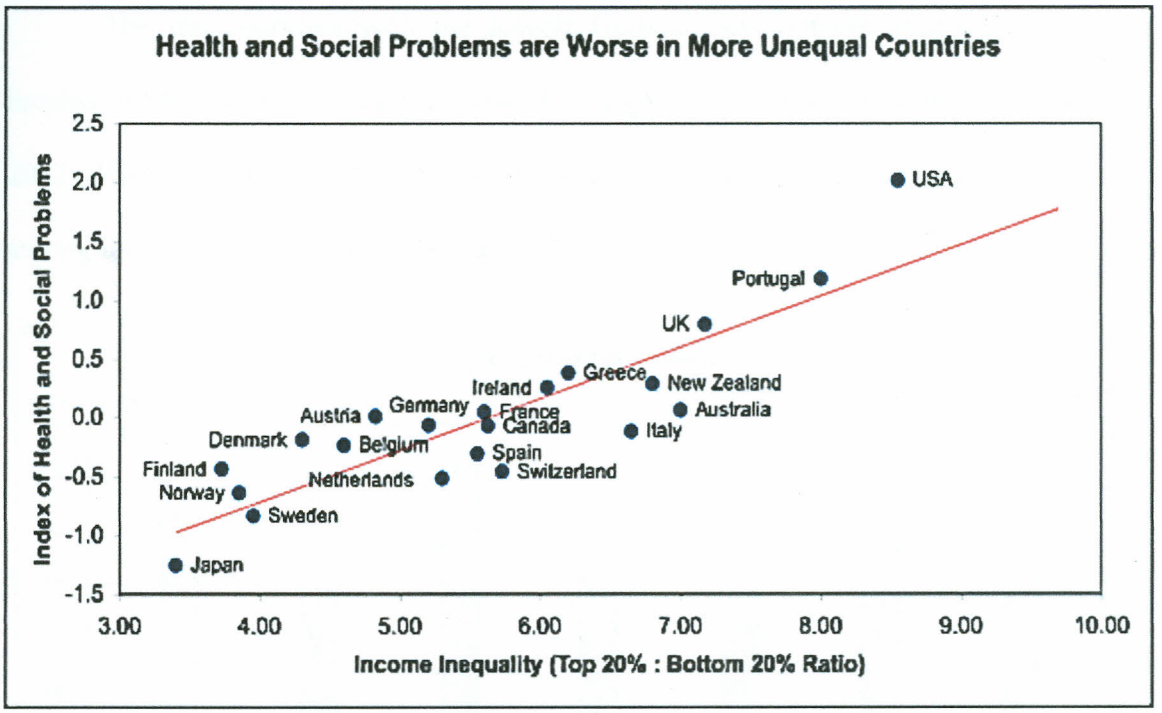


Figure 1.1 Worse Health Problems in More Unequal Countries

Source: The Equality Trust. (2011).

The ten countries with the lowest Human Development Index (HDI) are located in SSA which also had the lowest average HDI of any region in the world in 2013 (UNDP, 2013). Unfortunately, SSA also has the widest income disparities among the regions in the world (**Figure 1.2**).

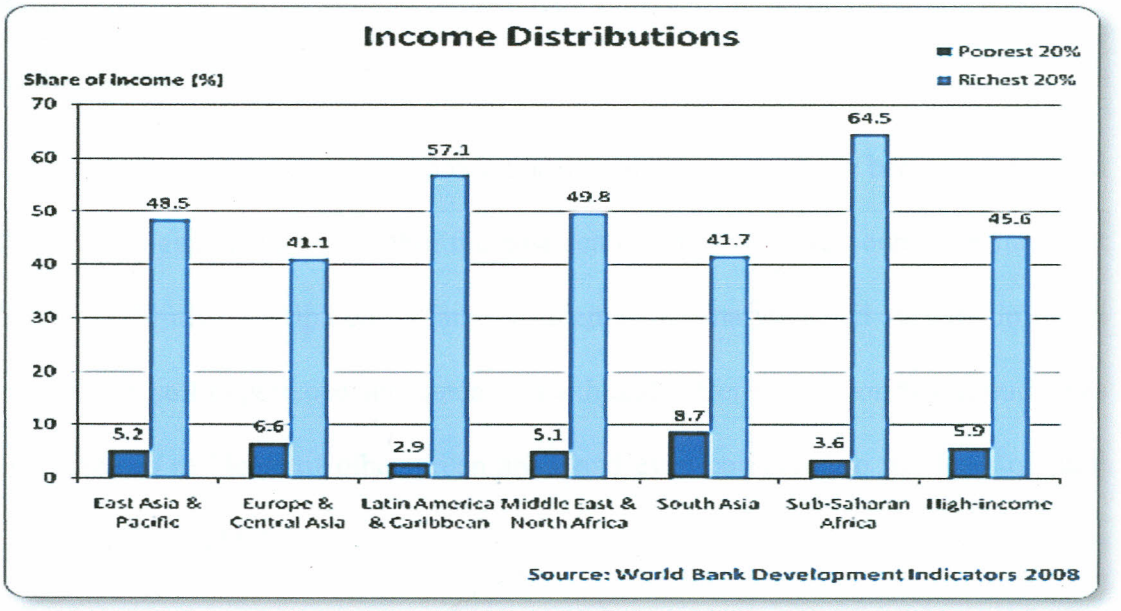


Figure 1.2 Wide Income Disparities Among the Least Developed Regions in the World

Source: The Equality Trust. (2011).

Among the countries in SSA, Kenya has one of the highest income-based, Gini inequality coefficients at 0.529 (UNDP, 2013). A Gini coefficient which is higher than 0.4, is considered a cause for concern. Kenya's richest 10% households control 42% of the total income while the bottom 10% households control less than 1% of the total income (SID, 2004). Many of the poor in the bottom 10% households are found in urban informal settlements, particularly in Nairobi, Kenya's capital city, which has the largest number of such settlements.

Health is an inalienable human right to be enjoyed to the highest attainable standard by everyone irrespective of where one lives or who one is (UN UDHR, 1948). Defined by the World Health Organization [WHO] (1948) as complete physical, mental, and social well-being and not merely the absence of disease, many would agree that health is a useful resource for enhanced productivity and improved quality of life.

Unfortunately, despite improved health outcomes that have been accompanied the technological advances within the past century, the improved outcomes have not been uniformly distributed. Many residents of marginalized urban informal settlements still experience substandard health and suffer from poor health outcomes compared to residents of other urban areas and even compared to residents of rural areas (APHRC, 2002).

But, urban informal settlements are not homogeneous entities (Davies, 2010). Not every poor person lives in urban informal settlements and not every person who lives in urban informal settlements, is poor. People of diverse exposures and vulnerabilities in the life-course reside in and migrate to urban informal settlements for socio-economic and other reasons. It is therefore expected that inequalities, which are a global phenomenon, would also exist in urban informal settlements (Sclar, Garau, & Carolini, 2005).

Health inequalities are a grave social problem that are associated with retardation of societal growth and development (Kawachi, Kennedy, & Wilkinson, 1999), disintegration of social cohesion (Wilkinson, 2005) and high crime rates

(Wilkinson & Pickett, 2009), all of which are characteristic of life in urban informal settlements (UN-HABITAT, 2003).

But, evidence of health inequalities in urban informal settlements is not readily available because national data are not disaggregated to portray the dire situation in urban informal settlements, which are marginalized and excluded from the mainstream of society. Our understanding of health inequalities has been aided by studies from high-income countries (HICs). Health problems in HICs receive a disproportionate amount of research attention compared to health problems in low-income countries (LICs).

Ninety percent of the world's medical research funds are ploughed into research of diseases that affect only 10% of the world's population in HICs, culminating in the so-called "10/90 research gap" (Global Forum for Health Research, 2000). Evidence of the determinants, nature, and magnitude of health inequalities is therefore, sorely lacking from low- and middle-income countries (LMICs) particularly in SSA (Alvarez-Dardet, 2000).

The sparse data from LMICs such as Kenya are usually not disaggregated to reflect the situation in disadvantaged communities such as informal settlements (KNBS, 2010). It would be erroneous to extrapolate the evidence from HICs to LMICs or from advantaged to disadvantaged communities. The contexts differ with respect to exposures to stressors and vulnerabilities to diseases in the life course as well as the resources available to tackle the consequences of health inequalities.

Health inequalities refer to the systematic differences in the health of individuals and subpopulation groups (Kunst & Mackenbach, 1994). When health

inequalities or the synonymous term "health disparities" are driven by social determinants that are deemed to be avoidable, remediable, unfair, and unjust they are regarded as "health inequities" (Dahlgren & Whitehead, 2007). However, the concept of health inequities is normative with regard to social justice and fairness (Daniels, 2006). The concept of health inequities is dynamic and changes according to individual perception and context. This study will dwell on health inequalities, which include health inequities, and are pragmatic and measurable.

Evans and Brown (2003) summarized the determinants of health inequalities with the acronym **PROGRESS,** which stands for **P**lace of residence, **R**ace/Ethnicity, **O**ccupation, **G**ender, **R**eligion/Culture, **E**ducation, **S**ocio-economic status**,** and **S**ocial capital. Kavanagh, Oliver, and Lorenc (2008), extended the acronym to **PROGRESS-plus** to include age, disability, and sexual orientation. All these factors influence health at different levels as illustrated in the classic model (**Figure 1.3**) by Dahlgren and Whitehead (1991).

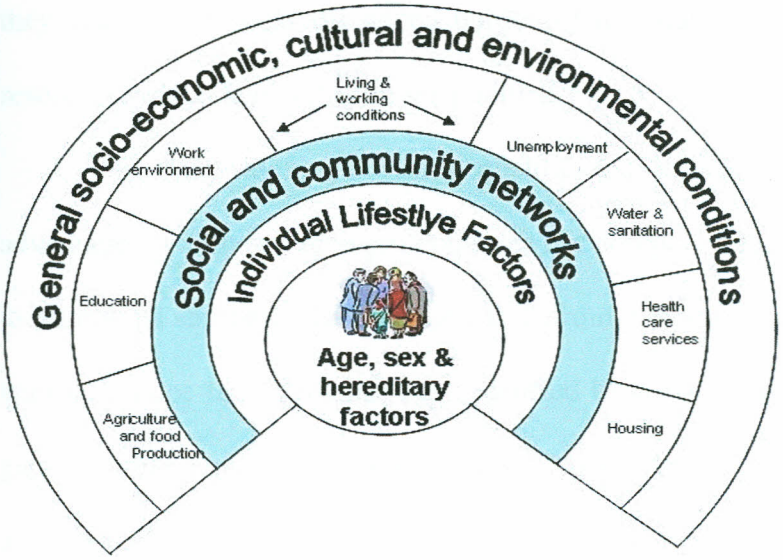


Figure 1.3 Model of Determinants of Health

Source: Dahlgren and Whitehead. (1991).

From the multi-level model, immutable, biologic, and genetic factors are at the core with the surrounding concentric arcs consisting of other proximate or downstream factors such as individual lifestyle and networks. Area-level factors including living and working conditions as well as access to essential amenities such as water and sanitation occupy the subsequent outer arc. The outermost arc comprises distal, upstream or broader determinants of health such as socio-economic and environmental factors, which are general but, structured and remediable by multi-sectorial policies and politics.

The urban poor in burgeoning informal settlements are among the worst affected by inequalities (WHO CSDH, 2008). Not only do the urban poor have to contend with living marginally in socially excluded and precarious communities but

they also have to bear the added burden of unequal allocation of health impacting resources, which lead to health inequalities.

The ever widening health inequalities gap between the disadvantaged and the advantaged within and between countries has compelled the global health community to rethink its strategy. The paradigm shift from biomedical to the social determinants approach since the 1970s has been justified by the narrowing of health inequalities gap in some but not in all countries (World Health Statistics, 2013). The least advantaged in urban areas tend to cluster in urban informal settlements, which are burgeoning in SSA.

UN-HABITAT (2010), estimates that more than half of the world's population will be in urban areas by 2030, and the rate of population growth will be highest in SSA as the consequence of urbanization, industrialization, and globalization. Unfortunately, with a population growth of 4.5% in urban informal settlements in SSA, which is the fastest growing globally and is the least able to cope (UN-HABITAT, 2006), there is compelling need to devise cost-effective means of tackling the health consequences of the demographic and epidemiologic transition through evidence-based policies and interventions.

The demographic transition has been accompanied by epidemiologic transition of diseases with increasing reports of chronic non-communicable diseases (NCDs) among adults, co-existing with infectious diseases in SSA (Nikolic, Stanciole, & Zaydman, 2011). Chronic conditions such as HIV/AIDS, Tuberculosis, Hypertension, Diabetes, Asthma, mental disorders, and physical disabilities are increasingly taking a toll on the health of adults in developing countries necessitating

a paradigm shift in research strategies on health. This also calls for a shift of public health research and practice from advantaged neighborhoods to socially, economically, and environmentally disadvantaged informal settlements where living conditions are marginal, health systems are fragile, and published health data are scarce (WHO CSDH, 2008). It is important for researchers to select crucial health indicators that provide context-specific and comprehensive information relevant to policy makers and other stakeholders.

Specific indicators of health inequality are important because the overall picture of health can mask discrete challenges and points of opportunity to correct priority health problems in different communities. Providing decision makers with a comprehensive picture is crucial to selecting the strategies required to reduce inequalities. This is particularly important given the broad and complex factors that influence health and health inequalities in different contexts. Indicators of health inequality are powerful tools because they enable governments to plan, set targets, monitor progress and evaluate programs such as the upgrading programs to meet public commitments. These programs, which are aimed at improving well-being of residents can inadvertently, widen health inequalities between subpopulation groups.

Recently, WHO Rio Political Declaration on Social Determinants of Health (2011) reiterated the need to shift emphasis from the proximate individual risk factors to the broader structural and social determinants of health. Link and Phelan (1995), distinguish between two types of social determinants of health. The first type includes the social determinants which 'contextualize individual risk factors' such as lack of exercise, alcohol, or smoking. The second type represents the broader fundamental

determinants that underlie health inequalities. The fundamental determinants include interpersonal resources such as the broader socio-economic and environmental conditions that structure the unequal distribution of determinants of health between individuals and subpopulation groups occupying unequal hierarchical positions in the society.

Typical of urban informal settlements, Korogocho, the location of this study and Nairobi's fourth largest informal settlement, is an area of concentrated disadvantage with a large proportion of adults whose health and well-being have not received much attention by researchers. Much of the research in urban informal settlements, have been directed at the so-called vulnerable population groups such as children (Bocquier et al., 2011), adolescents (Kabiru, Beguy, Crichton, & Zulu, 2011), women of reproductive age (Ziraba, Madise, Mills, Kyobutungi, & Ezeh, 2009), and the elderly (Falkingham, Chepngeno-Langat, Kyobutungi, Ezeh, & Evandrou, 2011). But, the productivity of working age adults depends on their well-being and health.

Healthy adults are able to contribute positively to growth and development particularly in a developing market economy such as Kenya. Kenya is committed to local and international prerogatives such as Vision 2030 and the Millennium Development Goals (MDGs), which are aimed at enhancing equitable growth and development. To achieve these commitments, it is imperative to avail current, credible data on the magnitude and determinants of health inequalities to policy makers and decision takers. Evidence-based policies and interventions that address remediable determinants of health and health inequalities would enhance

productivity, health, and well-being of adults and their dependants because health is a useful life resource.

This study was informed by the recommendation of the WHO Commission on Social Determinants of Health (CSDH) in the final report (2008) to the public health community, to address the pervasive and persistent health inequalities that particularly impact residents of disadvantaged communities such as urban informal settlements. Hence, applying a 'social determinants approach,' this study set out to generate evidence for effective and actionable policies and strategic interventions to reduce and possibly, eliminate the invidious health inequalities, which have been the bane of productivity, growth, and development (Grimm, 2010). Providing the much-needed evidence of the magnitude, and distribution of determinants and mediators of health inequalities in marginalized informal settlements such as Korogocho, is of utmost necessity for targeted and cost-effective actions, in the context of competing needs for limited funds in Kenya.

In the rest of this chapter, the research problem, its importance and implications are described in addition to the research questions, hypotheses on which the research is based as well as the objectives of the research. The chapter ends with the roadmap for my research captured in the conceptual framework and based on theoretical framework of social determinants of health inequalities. Next, Chapter Two consists of a review of the relevant literature on the research theme. The procedure through which data were collected and analyzed is described in the third chapter on Methodology while Chapter Four on Results, presents the analyses of quantitative and qualitative data and the interpretation and explanation of my research

findings. Finally, in Chapter Five, the results are discussed, compared, and contrasted with other local and international studies, compelling conclusions are drawn, and pragmatic recommendations for action and further research are proffered.

1.2 Statement of the Problem

Despite pervasive deprivation resulting from systematic underinvestment, there are differences in the exposure and vulnerability of subpopulation groups to socio-economic and environmental determinants that shape invidious health inequalities in Korogocho informal settlement (Gwatkin, 2000). Working age adults are at particular risk of poor health experience from chronic health conditions and their unequal exposure and vulnerability to toxic social living and working conditions lead to inequalities in health. Data from Health and Demographic Surveillance Systems (Emina et al., 2011) showed that health-damaging conditions are rife in Korogocho informal settlement. Neither the distribution of health-damaging conditions nor the allocations of healthful resources are evenly spread across subpopulation groups and villages in the settlement.

But, these toxic social conditions and poor access to healthful resources constitute the major sources or determinants of health inequalities that are eminently remediable with evidence-based policies, programs, and practice (WHO CSDH, 2008). In emerging economies such as Kenya that are undergoing demographic and epidemiological transition, chronic health conditions particularly NCDs and communicable diseases like HIV/AIDS and TB are increasingly being implicated in avoidable deaths, unfortunate loss of healthy workforce, and retardation of economic growth and development (Kyobutungi & Ezeh, 2010).

The prevalence of Hypertension among adults 18 years and older in two urban informal settlements in Nairobi including Korogocho was 12.3% in a cross-sectional population-based survey undertaken by van de Vijver, Oti, Agyemang, Gomez, & Kyobutungi (2013). But in that survey, though 12.7% of women and 12.0% of men had Hypertension, only 14.4% of women compared to 35.7% of men had adequate control of their blood pressures. Morbidity rates are higher in urban informal settlements including Korogocho than other urban and even rural areas. HIV prevalence in Nairobi informal settlements is at least twice the prevalence found among other urban residents and in rural areas (Ziraba et al., 2010). In HIV sero-positive residents in the settlements, the prevalence was higher among males and among respondents who were divorced or separated.

Healthful social resources such as optimal education, gainful employment, earning a living wage necessary for a worker to meet their basic needs, access to essential amenities, and pollution-free environment are available to only a few residents in Korogocho informal settlement. This assertion was confirmed by Amendah, Buigut, & Mohamed (2014) in their analysis of the dataset from the Indicator Development for Surveillance of Urban Emergencies research study conducted in Korogocho informal settlement among four Nairobi slums. They found that though the average age of the main income earner in the households is about 34 years, less than 18% actually had formal employment while the majority (67%) of adults did not have a steady source of income. Similarly, Mudege and Zulu (2011), in their cross-sectional study, found that only 16% of working age adults were in stable salaried employment in Korogocho informal settlement.

A paltry 19% of the men and 12% of the women had attained secondary school education. Less than 6% of households had access to piped water in their homes and only 1% had private toilets with 75% disposing garbage in public spaces or into rivers (Mudege & Zulu, 2011). Housing tenure remains insecure for many (Amnesty International, June 2009). The nearby Dandora Municipal Dumpsite, the heavily polluted Nairobi River, and the harmful broken sewer effluent from the neighboring Kariobangi Estate further compound environmental pollution and adversely impact health of some residents in Korogocho informal settlement.

Undoubtedly, the socially structured and unequal deprivations and exposures have wide implications for health inequalities (Drakopoulos, 2011). There is a dearth of information on the effect of social position of adults on health inequalities in Korogocho informal settlement and other deprived communities. Previous studies have concentrated on health inequalities between different large communities rather than within small, deprived communities such as Korogocho informal settlement (Smith, Olatunde, & White, 2010). Furthermore, research on the health of adults has been neglected in favor of children (Mutisya, Orindi, Emina, Zulu, Yé, 2010), adolescents (Kabiru, Beguy, Crichton, & Zulu, 2011), pregnant women (Fotso, Ezeh, Madise, Ziraba, & Ogollah, 2009), and the elderly (Kyobutungi, Ezeh, Zulu, & Falkingham, 2009). This unfortunate trend is compounded by lack of official health data due to inadequate health care systems from systematic neglect and poorly trained health care providers in Korogocho informal settlement (Zulu et al., 2011).

Total age dependency ratio in Korogocho informal settlement is as high as 62% (Kyobutungi, Ziraba, Ezeh, & Yé, 2008). The trickle down impact of poor health

from ever growing population of working age adults to their dependants at both extremes of age could be detrimental to the society at large. Without context-specific evidence for policies to target interventions that will address the root causes or determinants of health inequalities, the consequences will be dire considering the astronomical population growth in urban informal settlements including Korogocho (UN-HABITAT, 2010). Moreover, productivity, growth, and development of the community in particular and the country in general are not only at risk of stagnation or decline but also, at risk of not meeting local and international development deadlines such as Kenya's Vision 2030 and the MDGs.

If nothing is done urgently to identify the determinants and mediators of health inequalities associated with poor health experience and avoidable morbidity due emerging and potentially devastating chronic health conditions, the consequences could be cataclysmic. Doing nothing could lead to increasing levels of health inequalities, growing incidents of preventable ill-health and diseases which could overwhelm already overburdened health systems and impoverish more households, pushing the households into a "medical poverty trap" due to catastrophic health costs. The negative externalities arising from health inequalities could extend beyond the confines of the informal settlements to more advantaged areas and people. The country would have to contend with potential negative externalities, such as spread of infectious diseases; the consequences of anti-social behavior such as violence and other forms of criminality; and of course, loss of revenue from diminished productivity.

The token generic interventions by the Government of Kenya (GoK) to leverage aggregate population health, which have largely benefited only a few, aggravate existing health inequalities (Schmidt, 2006; Turley, Saith, Bhan, Rehfuess, & Carter, 2013). Generic plans to eliminate health inequalities, are likely to fail woefully and lead to collapse of the already fragile health systems in Kenya. Without evidence-based approaches, poor health outcomes and health inequalities will persist and possibly get worse.

Fortunately, some other developing countries such as Cuba, China, Sri Lanka, Costa Rica, and Kerala State in India have managed to effectively reduce the health inequalities gap with cost-effective, evidence-based policies and interventions (Baum, 2005). Kenya is a developing country with competing needs for scarce resources. Therefore, compelling evidence of the magnitude and nature of the determinants and mediators of existing health inequalities among the vulnerable, disadvantaged, and marginalized population will be a valuable step towards cost-effectively mitigating the adverse impact of poor health and added burden of health inequalities.

According to Blas, Sommerfeld, and Sivasankara Kurup (2011), the drive to achieve global health and development targets will not be of much value where health inequalities thrive. There is urgent need for a change of policy and approach in order to leverage population health and eradicate egregious health inequalities. Evidence-based approach will benefit both the disadvantaged and advantaged through the concept of "proportionate universalism" (Marmot, 2010) where resources are allocated according to felt and expressed need. The noble goals of improving health and eliminating health inequalities can only be achieved if data on the magnitude and

spatial distribution of the type of determinants and mediators of health inequalities are availed (Graham & Kelly, 2004).

Therefore, the purpose of this cross-sectional study is to generate actionable, policy-relevant, and context-based data on the magnitude and the distribution of the determinants and mediators of health inequalities among the vulnerable in a small but typically disadvantaged community using primary data from participatory, field-based, quantitative survey complimented by qualitative interviews.

1.3 Justification of the Study

The justification for this study is hinged on the salience, currency, and window of opportunity for policy makers to reduce health inequalities that affects a large and growing population of the disadvantaged in our society. Evidence provided by this study of the extent and determinants of health inequalities should be of benefit to policy makers, program implementers, and others who have a stake in the design of cost-effective and targeted policies and actions to address the determinants and mediators of health inequalities.

The salience of health inequalities research lies in the devastating consequences on health, well-being, and productivity of people in areas where health inequalities are wide. The evidence provided by this study of additional burden of health inequalities in a deprived area with pervasive poor health experience should help revert the focus of policy makers in local, regional, and the global health and development communities to tackling not only poor health outcomes but also the all-important issue of health inequalities. The aim among others would be for the

government to enact policies to prevent much avoidable morbidity and mortality among the disadvantaged.

Additionally, health inequalities need to be prioritized to reduce unnecessary burden on health care systems, improve quality of life and health, and increase revenue through improved productivity. Inequality makes public institutions both inefficient and unequal in terms of protecting and promoting the needs of those in greatest need. Therefore, this study's findings that are presented in an easily comprehensible and interpretable format should be useful to the government, public institutions, non-government organizations (NGOs), community-based organizations (CBOs), policy makers, decision-takers, and implementers.

In many Western countries, where much work on the determinants of health inequalities has been carried out, there has recently been a resurgence of interest in tackling health inequalities (Mackenbach, 2006). The world is becoming a global village with increasingly seamless boundaries (Davies, 2008). This presents a window of opportunity for developing countries to buy into the current drive to interrogate and confront the protracted and challenging problem of health inequalities which impacts the developing more than the developed countries (Murray, Jamison, Lopez, Ezzati, & Mathers, 2006).

Policy-makers, the public health community, and other researchers in developing countries would benefit from the holistic approach to health inequalities in this study as basis for planning, monitoring, and evaluation of health and development programs. Additionally, the increasing economic impact of health inequalities in developing countries, has aroused the interest of development partners

who are willing to contribute to efforts to rein in health inequalities because of the far-reaching externalities that are associated with health inequalities (Agénor & Canuto, 2013). This therefore presents a window of opportunity to present actionable evidence on health inequalities for agenda setting to help in the design of strategic and targeted interventions through evidence-based policies.

1.4 Significance of the Study

Availing evidence of the nature of health inequalities and the affected subpopulation groups in Korogocho informal settlement, which would help to target interventions to eradicate health inequalities underlies the significance of this study. The evidence provided by this study is not only invaluable for entry points to alleviate the double burden of poor health and unfortunate health inequalities but it is also timely. The Year 2020 deadline for achieving the MDG 7, Target 7D to significantly improve the lives of the rapidly growing population of the urban poor in informal settlements is fast approaching. Furthermore, urban poverty is now considered an urgent public health issue because of the threat it poses to human security (IDEA, 2006).

The findings of this study provide basis for the remediation of health inequalities by public authorities, stakeholders, and other beneficiaries. Subpopulation groups and villages affected by the unequal distribution of the determinants and mediators of health inequalities as revealed by this study in Korogocho informal settlement would benefit if appropriate actions are taken by the policy makers, program planners, community leaders, champions in the community, individuals, and partners (Graham & Kelly, 2004).

Other stakeholders such as advocacy groups, through better understanding of the dynamics of health inequalities elaborated by this study, would be able to adequately articulate the need for change to enhance the health and welfare of the disadvantaged. Evidence advanced by the findings of this study should empower the residents of Korogocho informal settlement and other disadvantaged communities to demand for better living and working conditions to enhance their health experience. In addition, the Media could use the evidence from this study to inform and enlighten the larger society. These benefits would enhance the drive to achieve the lofty aspirations of Kenya Vision 2030.

The limited research in SSA on health inequalities particularly among working age adults will be enriched by the wide dissemination of the findings of my study. I intend to present the academic papers from the findings of this study at national and international forums as well as publish the study's findings in reputable journals. This study's findings will be sent to libraries to expand the sparse bibliography on health inequalities in SSA for the benefit of students, other researchers, the academia, and any other interested parties in future health-related research.

The aim of widely disseminating the findings of this study is to encourage the public health community to focus on the problem of health inequalities in deprived communities in SSA, to fill the knowledge gap, and to provide data for purposes of comparison across regions and monitoring of trends over time. I hope that information revealed by my study will drive the impetus by stakeholders to take action on health inequalities, which would benefit the long-suffering residents of

Korogocho informal settlement and other similarly, disadvantaged communities and lead to improvement of their quality of life and welfare.

1.5 Research Questions

Major

- What are the determinants of health inequalities among adults in Korogocho informal settlement?

Minor

- What is the magnitude of health inequalities within and between subpopulation groups of adults in Korogocho informal settlement?
- What are the socio-economic and environmental determinants of health inequalities among adult subpopulation groups in Korogocho informal settlement?
- Which material, psychosocial, and behavioral factors mediate health inequalities among adults in Korogocho informal settlement?

1.6 Null Hypotheses

- **$H_0$1**: There are no significantly measurable health inequalities between subpopulation groups of adults in Korogocho informal settlement.
- **$H_0$2**: There are no significant systematic differences in the distribution of socio-economic and environmental determinants of health inequalities among adults in Korogocho informal settlement.
- **$H_0$3**: No material, psychosocial, and behavioral factors significantly mediate health inequalities among adults in Korogocho informal settlement.

1.7 Objectives

Main

- To identify the determinants of health inequalities among subpopulation groups of adults in Korogocho informal settlement.

Specific

- To quantify the magnitude of health inequalities within and between subpopulation groups of adults in Korogocho informal settlement.
- To identify the socio-economic and environmental determinants of health inequalities among adult subpopulation groups in Korogocho informal settlement.
- To assess which material, psychosocial, and behavioral factors mediate health inequalities among adult subpopulation groups in Korogocho informal settlement.

1.8 Anticipated Outputs

The expected outputs from this study are:

- Quantification of the magnitude of health inequalities within and between adult subpopulation groups in Korogocho informal settlement.
- Identification of the distribution of socio-economic and environmental determinants of health inequalities among adult subpopulation groups in Korogocho informal settlement.
- Assessment of which material, psychosocial, and behavioral factors mediate health inequalities among adult subpopulation groups in Korogocho informal settlement.

1.9 Theoretical Framework for Social Determinants of Health Inequalities

The theoretical framework of this study draws inspiration from the structural functionalism ideas of the French sociological theorist Emile Durkheim (1858-1917). According to Durkheim's theory, which is quite similar to Max Weber's (1864-1920) interaction theory, society is made up of constituent parts, which he termed social institutions. These institutions function together to try to maintain society's stability. The mechanisms through which the institutions maintain this stability have evolved over time.

Durkheim was concerned with the question of how societies maintain internal stability and survive over time. He sought to explain social stability through the concept of solidarity, and differentiated between the mechanical solidarity of primitive societies where family ties were strong, and the organic solidarity exemplified by much weaker family bonds with complex division of labor and interdependence that characterize the market economy of modern societies.

In essence, Durkheim's theory was that social structures constrain individual actions, similar to the conflict theory of Karl Marx (1818-1883) that emphasizes the differences between individuals and groups in the society based on social structures and conflicts arising from competing interests. Therefore, human actions cannot be fully explained by individual motivations or behaviors alone. My conceptual framework, which is based on this theoretical framework of societal influence on individual behavior, lays emphasis on the broader determinants of health inequalities, which are socially constructed and therefore modifiable and remediable.

1.10 Conceptual Framework for Social Determinants of Health Inequalities

Many factors including demographic characteristics influence the distribution of health inequalities in any society but the current paradigm emphasizes the role played by uneven distribution of socially determined factors on health inequalities between individuals and subpopulation groups (WHO Rio Political Declaration on Social Determinants of Health, 2011). The conceptual framework of this study was adapted from the framework formulated by Solar and Irwin (2007) to guide the CSDH that was set up by WHO in 2005 to identify entry points for action on the social determinants of health. The final report of WHO CSDH was released in 2008.

The working premise of this study's framework, which addresses population health is that social variables are significant determinants of health inequalities but could be related to an individual's material, psychosocial, and behavioral factors acting as mediators. Social variables are largely remediable unlike individual biologic factors such as age and sex, though these biologic factors are also influenced by social context. Social determinants include the socio-economic and environmental determinants and they are operationalized in this study as follows:

Socio-economic determinants

- education
- occupation
- employment
- income
- wealth

Environmental determinants

- access to amenities: water, sanitation, health care
- cooking fuel
- room congestion
- village of residence in Korogocho informal settlement and proximity to Dandora Municipal Waste Dumpsite

The operationalization of the mediator variables was as follows:

Material factors

- material of wall, roof, and floor of dwelling houses
- household assets: radio, television, table, chair, bed, refrigerator, mobile phone, bicycle, motorcycle, car, land, and farm animals.
- ownership of house
- subscription to health insurance

Psychosocial factors

- control or authority at home
- trust of neighbors
- membership of social associations

Behavioral factors

- lifestyle: smoking, alcohol, other substance abuse, physical exercise, sexual activity, unprotected sexual practice, sexual orientation
- nutrition: food, fruits

These variables were chosen based on the research questions that this study aimed to answer while taking the local context into consideration and for uniformity and comparability with other local studies such as Kenya Demographic and Health Surveys (KDHS) and research by the African Population and Health Research Center (APHRC). The conceptual framework is illustrated in **Figure 1.4**.

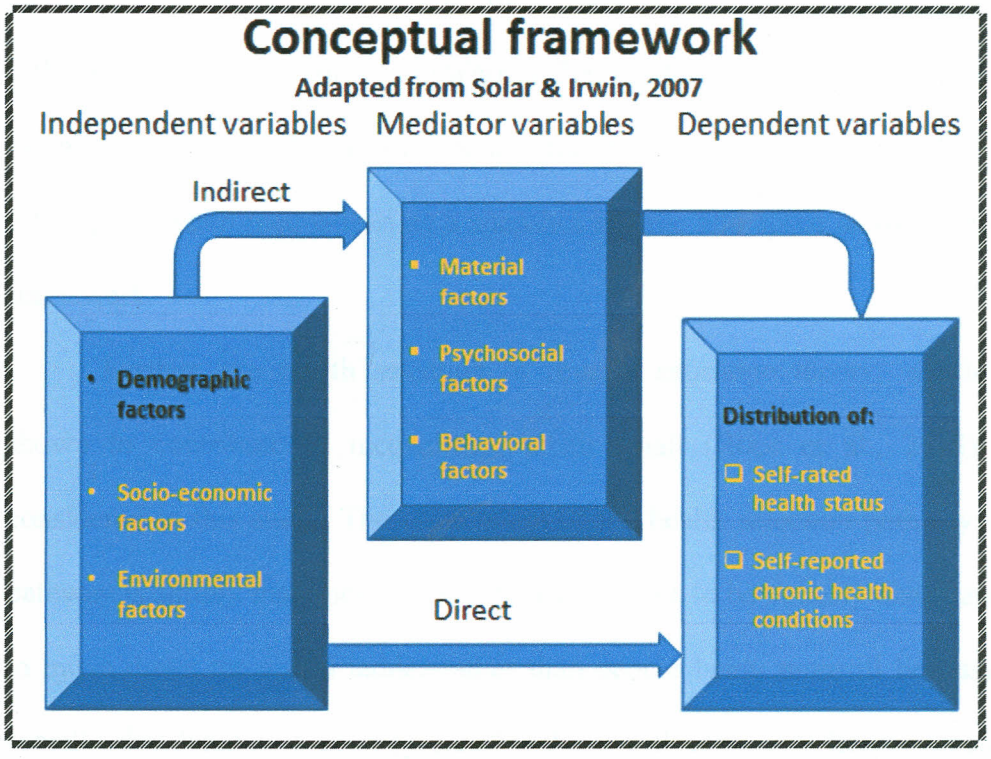


Figure 1.4 Conceptual Framework for Social Determinants of Health Inequalities

The framework suggests that the flow of influence is unidirectional either directly from the independent variables to the outcome or dependent variables of health inequalities or indirectly through one or more of the mediator variables to the dependent variables as conceptualized in the social causation theory (Elstad &

Krokstad, 2003). However, a bidirectional flow is possible in nature as explained later in the health selection or reverse causation theory.

Health inequalities are measured by the distribution of two dependent variables: self-rated health (SRH) status and self-reported selected chronic health conditions. Though not depicted in the diagram, the independent and mediator variables are interdependent and their interactions are complex including the influence of factors in early life (Warren, 2009). However, the cross-sectional design of this study given the constraints of time and resources is only able to feasibly interrogate health inequalities as a snapshot in time and space as mapped out in the framework.

Further, the health selection or reverse causation theory, which has been shown to contribute to inequalities, albeit small (Roos et al., 2013), was not considered in this study. The implication of the health selection pathway or reverse pathway is simply that poor health can make people to be socially disadvantaged and to move down the social ladder rather than people being more ill because they are socially disadvantaged as suggested by the social causation theory which is being researched in this study. In other words, according to the health selection theory, poor health makes people to be less productive and so, they drift down the socioeconomic ladder (The Black Report, 1980).

Macro-economic policies and governance structures moderate resource allocation and distribution but have not been included in this framework for strategic reasons, which are outside the realm of this study. However, policies are vital for action on health inequalities. Marginalized communities such as Korogocho informal

settlement, the location of this study, are usually excluded from the benefits of public policies. The goal of this study is to provide actionable evidence for policy change to effectively tackle the determinants of health and hence, health inequalities in disadvantaged and marginalized communities.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In every society, health experiences and health outcomes differ between individuals and subpopulation groups. Age, sex, and hereditary factors play key contributory roles in the experience of health. These biological and genetic factors are relatively immutable, though some genetic modifications are now possible with recent medical and technological breakthroughs. Unlike biological factors that are not readily modifiable, social factors that have the most impact on health and contribute most to health inequalities are remediable (Marmot & Wilkinson, 2006).

The impact of the potentially remediable social factors that drive health inequalities can be altered by changing not just individual behavior but more importantly, the prevailing conditions in the society that promote unhealthy behavior and structure health inequalities (Wilkinson, 1996). But, much of the literature describing these remediable social determinants of health inequalities, are from the developed countries. The composition and context through which the distributions of social factors influence health inequalities vary from one country to another. Entry points for effective interventions and the resources to mitigate the effects of the factors on health inequalities also differ. There is therefore, need for data from developing countries particularly in disadvantaged communities where the most vulnerable are found and cost-effective mitigation measures are vital.

Braveman and Gruskin (2003) describe health inequalities as "measurable differences in health experience and health outcomes between different population groups according to age, gender, ethnic group, socio-economic status, geographical

area, or disability." The magnitude of health inequalities vary from setting to setting and most health inequalities are socially contrived by unequal allocation and distribution of socio-economic and environmental determinants. But, the determinants are basically remediable through proper, evidence-based social policies, strategies, and political will (Whitehead, Dahlgren, & Gilson, 2001). Though, interest in social determinants of health and health inequalities has been re-ignited in the last few years, the social constructs of health inequalities have been known since the 19th century AD.

2.2 Historical Trajectory

The seminal work by McKeown (1976) provided concrete evidence from the 19th century of the prime role played by improved social and living conditions in markedly reducing mortality rates from communicable diseases in Western countries. The focus shifted from prevention to medicalization of health from the 1950s, following the major medical and technological breakthroughs that produced antibiotics, vaccines, and other effective medical tools.

The 'health sector approach,' which favored biomedical and curative solutions to ill-health through technology-driven, vertical programs targeting specific diseases such as malaria, tuberculosis, and smallpox, was prioritized up to the early 1970s. Unfortunately, only a few notable achievements such as smallpox eradication are associated with this approach. The apparent failure of the 'health sector approach' to significantly affect overall population health, positively and equitably, necessitated a paradigm shift.

This shift followed the Alma Ata Declaration (WHO, 1978) of 'Health For All' (HFA) through Primary Health Care (PHC). Sadly, the equitable and comprehensive health care envisioned by the Declaration was cut short by the unfortunate global economic recession that led to the introduction of the Structural Adjustment Programs (SAPs).

The health sector reforms that accompanied the SAPs, which were introduced by the Bretton Woods institutions, namely the World Bank and the International Monetary Fund (IMF), profoundly aggravated health inequalities, particularly in SSA (Rono, 2002). Following the introduction of SAPs, access to health care services declined sharply among the poor because of the introduction of user fees for health and social services such as water and sanitation (Mbugua, Bloom, & Segall, 1995). Income inequalities aggravated by the low purchasing power and high unemployment rates particularly among the poor manual workers due to neo-liberal market policies of SAPs, also markedly exacerbated health inequalities in LICs (Mwega & Ndulu, 1994).

Kenya is a low-income country in SSA with wide income inequalities that are known to be associated with health inequalities (Benzeval & Judge, 2001). Since the introduction of SAPs, the income gaps between the rich and the poor have widened (Rono, 2002). Kenya is ranked amongst the ten most unequal countries in the world and the fifth in Africa based on the Gini index, a popular measure of income inequality (SID, 2004). Inequality in Kenya has persisted from the time of Josiah Mwangi (JM) Kariuki. JM was a well-respected parliamentarian in first civilian government. Well known for his oratorical skills, JM described Kenya as a country

with ten millionaires and ten million beggars (Simiyu, 2001). The most recent Kenya Demographic and Health Survey (KDHS) of 2008/09 reported glaring regional health inequalities in spite of the improvement in certain indices of population health (KNBS, 2010).

Fortunately, global trend is shifting again to 'HFA' to stem the worrisome tide of worsening health inequalities. Researchers first mooted the 'social determinants approach' in the 1970s (Raphael, 2006) to redirect attention from individual risk factors to the broader social determinants of health, which are modifiable by the more expedient multi-sectorial approach to population health. The public health community led by the WHO has indeed formally adopted this multi-sectorial approach, which involves all sectors of society such as governments, business, civil society organizations, and communities. The WHO CSDH Final Report (2008) recommended a more rational approach to tackling the broader social determinants of population health, which promote atrocious health inequalities particularly in disadvantaged communities.

2.3 Social Determinants of Health Inequalities

Marmot (2007) describes the social determinants of health inequalities as the "causes of the causes" – "the fundamental structures of social hierarchy and the socially determined conditions these structures create in which people grow, live, work, and age." These conditions are constructed by the distribution of money, power, and resources in the society, which are eventually organized by state and institutional policies and politics.

Three iconic UK reports/study: The Black Report (1980), the longitudinal Whitehall Study II (Marmot et al., 1991), and the independent inquiry published as Acheson Report (1998) aptly demonstrated the role of socio-economic position (SEP) in determining health inequalities. The organization of affairs in societies gives rise to forms of social position and hierarchy that stratify population groups according to income, education, occupation, gender, race/ethnicity, and other factors. Where people are placed in the social hierarchy determines the conditions in which they grow, learn, live, work, and age; their vulnerability to ill health; and the consequences of ill health.

Since there are differences from context to context, reducing health inequalities requires context-specific evidence. Identifying causal factors at community level is essential for prioritizing policy options, improving the delivery of basic health services, and boosting the efficient utilization of scarce resources to tackle the root causes of health inequalities. Health inequality is a multi-faceted social phenomenon with multiple causes. The causes differ both within and between communities and require multilevel research at local, national, continental and global levels to determine the causes and extent of inequalities (Kawachi, Subramanian, & Almeida-Filho, 2002).

Unlike poor countries in SSA, the causes of health inequalities in materially well-off member countries of the Organization for Economic Cooperation for Development (OECD) are not due to poor sanitation, lack of clean water or lack of access to health care facilities, but to illnesses caused by life-style factors such as obesity and alcoholism (Wilkinson & Pickett, 2009). Societies with more unequal

income distributions have poorer health outcomes than more egalitarian societies (Subramanian & Kawachi, 2003). Unfortunately, comparatively few studies on social determinants of health inequalities have been carried out in SSA where poor living and working conditions are the rule rather than the exception.

Empirical research of the social determinants of health inequalities is relevant to identify ways of tackling invidious health inequalities through evidence-based interventions and appropriate policy on the determinants in SSA. Contextualizing the social determinants of health inequalities might therefore be useful to build on the work of the CSDH which is directed at strengthening global efforts to achieve better health for the entire world's poorest people and in the poorest places (Eshetu & Woldesenbet, 2011). Conventionally, socio-economic determinants refer to income, education, and occupation.

2.3.1 Income-related health inequalities

SEP is a generic term for a variety of concepts and measures which though inter-related, represents different dimensions in social hierarchy. The most commonly and easily assessed dimensions of SEP are income, education, and occupation (Bartley & Blane, 2008). Income is closely linked to health and it is the SEP indicator that most directly measures material circumstances (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006). Income and accompanying wealth provide access to better social circumstances, including health-promoting conditions such as safe and healthy places to live or access to healthier foods. Adults with lower disposable household incomes are unable to make health-promoting choices for themselves, their families, and their communities.

However, the relationship between income and health is not straightforward. Many factors may explain the relationship between income inequalities and health inequalities at many levels. At the level of the individual, wealth from income-generating activities is associated with health. For instance, people who have higher income and therefore wealthier, are more likely to live in healthier environments, afford better education, eat more nutritious foods, and have better access to quality health care (Deaton, 2003). Some factors such as sanitation and public health measures operate at the level of the community to impact health; yet other factors such as health policies and health care system coverage act at the national level.

The link between income and health is said to hold at individual and national levels (Dorling, 2013). Though similar direct mechanisms might operate at both individual and national levels, it has been suggested that relative rather than absolute income levels might be more important at the level of the individual (Martikainen, Bartley, & Lahelma, 2002). According to the relative income hypothesis, also known as Wilkinson hypothesis, a low position in the social hierarchy may induce psychosocial stress.

Psychosocial stress is linked to some types of behavior that make people vulnerable to ill health and to physiological reactions in the immune system, which directly worsen health (Wilkinson, 1996). The relative income hypothesis has however, been disputed by other researchers (Lynch, Davey Smith, Kaplan, & House, 2000; Eckersley, 2005). Deaton (2001) in a working paper, believes the relationship between income inequalities and health inequalities is indirect. He posits that mechanisms other than income may be acting as a proxy for a wider measure of

socio-economic status and that the causal effect could be due to some other factors such as education.

At the national level, Preston (1975) found that there was indeed a relationship albeit nonlinear, between life expectancy, an indicator of health outcome and real per capita income (**Figure 2.1**).

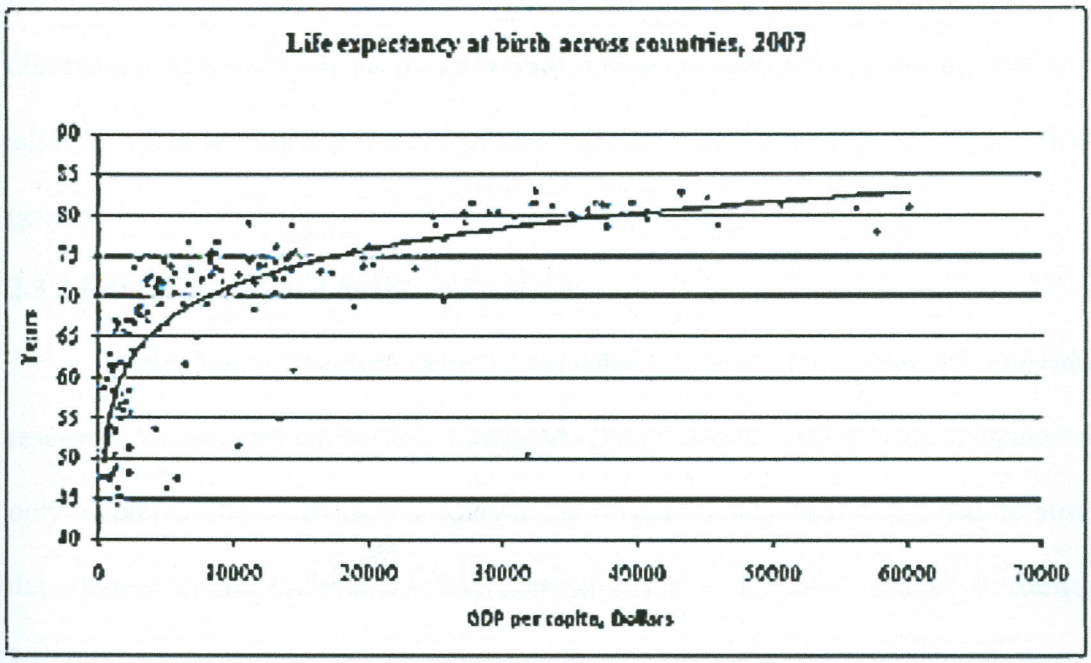


Figure 2.1 Preston Curve Showing the Relationship between National Income and Life Expectancy at Birth

Source: Preston, S. (1975).

From the Preston curve (**Figure 2.1**), on the average, individuals born in richer countries can expect to live longer than those born in poorer countries. The flatter part of the curve suggests that change in life expectancy at higher levels of income is relatively small. In other words, for life expectancy at high-income levels, further increases in income are associated with diminishing returns in terms of life

expectancy. This suggests that the relationship between income and health is stronger in LICs countries than in HICs.

In LICs, adults who are still productive in the labor force are more likely to die compared to HICs where mortality largely affects elderly retirees. The relative importance of income to health clearly varies in different places and at different times. Therefore, relationship between income and health needs to be studied in a disadvantaged community such as informal settlements particularly among productive adults in order to inform policies and interventions which have thus far, been few and generic.

2.3.2 Education-related health inequalities

Education is another generic indicator of SEP that measures individual resources or assets (Galobardes, Lynch, & Davey Smith, 2007). This indicator not only captures the individual's knowledge-related assets but it is also a strong determinant of the individual's future employment and income (Adler & Stewart, 2010). The main advantages of education as a variable are that it is relatively easy to measure and response rates to educational questions tend to be high. It can be obtained from everybody independently of age or working circumstances.

Education is generally available to both women and men, and it is less likely to be influenced by health selection compared to other factors such as occupational class or income. Educational attainment is closely linked to better options for employment and income, which in turn can influence health seeking behaviors and access to healthcare. Having more education and a better job are also linked to

stronger social supports, networks, and norms that support healthy behaviors and discourage behaviors that are capable of harming health.

2.3.3 Occupation-related health inequalities

Occupation as SEP variable is widely used in health inequalities research, particularly where social stratification has traditionally been viewed in terms of the individual's occupation. Unfortunately, unemployed people are often excluded in occupation-based classifications resulting in underestimation of socio-economic differences (Ljung & Hallqvist, 2007). Other groups commonly excluded are retired individuals; people whose work is inside the home (mainly affecting women); students; and people working in unpaid, informal or illegal jobs. However, occupation is a variable that captures more specific job-related factors, such as exposure to certain toxic or physical working conditions, hence would be useful in this study on working age adult health inequalities.

Marmot (2010) in his report, 'Fair Society, Healthy Lives,' proposed the creation of healthy and sustainable living and working conditions where the capabilities of everyone are strengthened through effective, evidence-based strategies for reducing health inequalities. Dahl and Kjaersgaard (1993) in a multi-cohort longitudinal study demonstrated that occupational status is a stronger predictor of health outcomes in Norway, than personal income or education. However, Dahl (1994) emphasized the complex statistical relationships between occupation, income, and education, which together portray social class.

2.3.4 Environmental health inequalities

Apart from socio-economic factors, the spatial context in which individuals live affects health and contributes to health inequalities (Cummins, Curtis, Diez-Roux, & Macintyre, 2007). Health inequalities can be greatly reduced by creating healthier living physical environments with better housing conditions, green public spaces for recreation, enhanced access to essential amenities such as clean water, improved sanitation, health care, and improved air quality that is free from pollution.

The distinct effect of geography on health inequalities is apparent in many places. A comparative and observational study undertaken in Britain by Hacking, Muller, and Buchan (2011), demonstrated higher mortality rates in the northern part of the country compared to the Southern part of the country. These differences in mortality rates were attributed to geography after controlling for compositional factors such as individual poverty and individual characteristics (Hacking et al., 2011).

The use of multi-level modeling techniques in the 1990s showed the added effects of contextual factors and the complex interaction between compositional and contextual factors in the geographical variation of health (Tunstall, Shaw, & Dorling, 2004). The contribution of context or place effects on health inequalities has been quite consistent in multilevel analytic studies (Pickett & Pearl, 2001; Macintyre, Ellaway, & Cummins, 2002). However, Cagney (2006) in his case study of four Chicago neighborhoods concluded that the impact of context appears to vary depending on age, gender, ethnicity, health behaviors, and health experience.

The relative contributions of composition and environmental context may also depend on the type of neighborhood. From longitudinal and ecological studies, it has been shown that people who grew up in socially and economically deprived neighborhoods and physical environments suffer added health disadvantage in later years (Stafford & Marmot, 2003; Ellaway, Benzeval, Green, Leyland, & Macintyre, 2012). **Figure 2.2** shows potential pathways through which environmental characteristics could impact health.

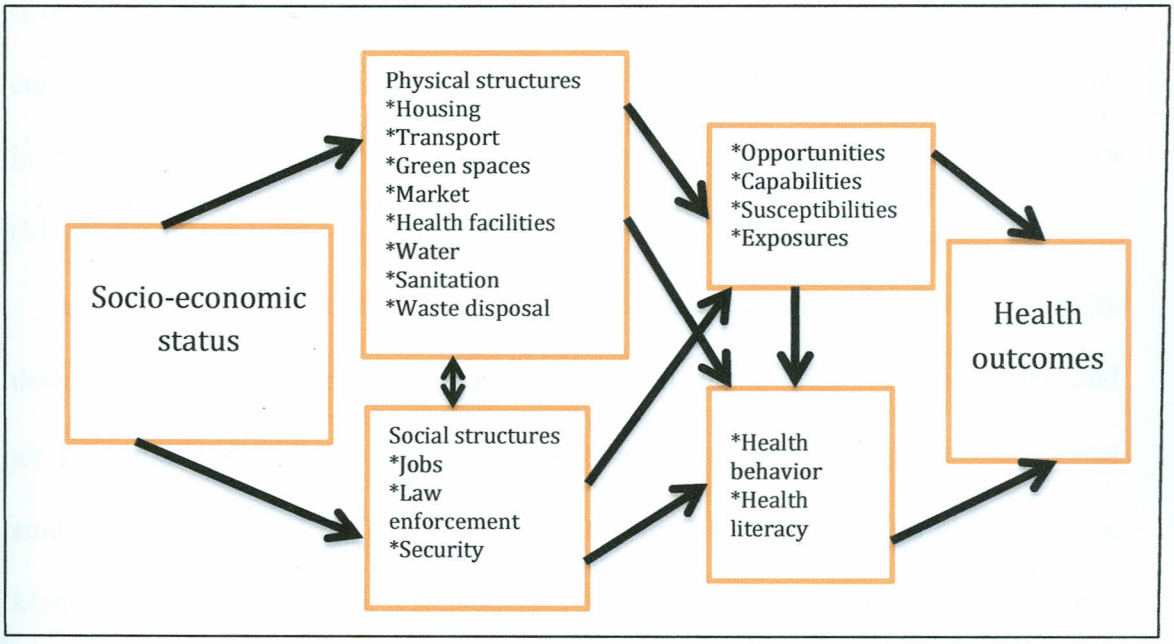


Figure 2.2 Pathways through which Environmental Characteristics Impact Health Adapted from Macintyre, MacIver, and Sooman. (1993).

The causal pathways through which environment influences health include the physical features of the environment; the availability of healthy environment at home, at work, and at play; the provision of essential services; socio-cultural features; and the reputation of the area. Community influences such as the social and demographic

neighborhood characteristics of the places where people live are not yet well understood. However, people of similar socio-economic conditions tend to live near each other. Kimbro and colleagues (2012) proposed that neighborhood characteristics could act via mechanisms of social disadvantage, including access to and availability of useful resources, and social cohesion of neighbors.

Deteriorated neighborhoods such as urban informal settlements facilitate the spread of HIV infection, tuberculosis (TB), and other infectious health conditions (Littleton & Park, 2009). Sequestration of the poor in urban informal settlements is a common scenario in cities worldwide due to high housing costs elsewhere, low income, cultural factors, and historical discrimination as is the case in Kenya (Mitullah, 2003; Mutisya & Yarime, 2011).

Urban informal settlements are usually clustered around environmentally deteriorated areas such as railway track routes, under high-tension power lines, and air pollution hotspots. Korogocho informal settlement, the location of the present study is located close to a polluting landfill site in Nairobi, the capital city of Kenya. Many questions about the health effects of unequal exposures to environmental pollution in these deprived settlements remain (Kawachi & Berkman, 2003).

Exposure to certain air pollutants such as carbon monoxide, sulphur dioxide, and particulate matter have been linked to asthma, cardiovascular problems, cancer and premature death (Pope III & Dockery, 2006). However, according to some research by Schäefer-McDaniel (2009), stress from social and economic conditions seems to exacerbate the effects of pollution. Exposure to the same amount of pollution may harm poor and segregated people more than the better-offs probably

acting through psychological and biological mechanisms (Umberson & Montez, 2010).

According to the "Broken Windows" theory (Kelling & Wilson, 1982), physically deteriorated neighborhoods depicted by unrepaired broken windows and vacant houses suggest that no one cares and that prohibited behaviors are tolerated. On the other hand, Ahern and Galea (2011), found neighborhood collective efficacy or the willingness to help neighbors for the common good to be associated with better mental health outcomes. Residents of neighborhoods with greater collective efficacy are more likely invest in each other and to discourage potential anti-social behaviors. Furthermore, residents of such neighborhoods are also likely to have greater levels of social support and they tend to live longer than those without such relationships.

However, some other factors may moderate the relationship between neighborhoods and health outcomes. According to Ahern and Galea (2011), deteriorated neighborhoods might just be markers of high-risk personalities who conspire together to create disorderly environments and engage in unhealthy behaviors. They contend that it is also possible that neighborhood conditions and residents' behavior could be influenced by a dynamic relationship between people and their environment. For example, the deterioration of a neighborhood might cause good families to leave the neighborhood leaving behind poorly behaved residents who in the absence of counterbalancing forces, actively engage in unwholesome behavior. Moreover, poverty and anti-social behavior overwhelm the ability of people to cooperate for the common good.

But the causal pathways through which contexts determine health inequalities are still poorly understood. Not much is known of the relative contributions of both the social and physical environments in the distribution of health inequalities in urban informal settlements, particularly in SSA. Better understanding of the effect of environment on health inequalities will help to target effective, context-specific interventions to confront environmental health inequalities in disadvantaged communities which have competing needs for limited resources.

2.4 Social Gradients in Health

Unequal distribution of resources and social goods leads to social gradients with different levels of socio-economic and environmental disadvantage among groups, which often translates into health inequalities (Kawachi, Subramanian, & Almeida-Filho, 2002). The tendency is for poorer countries to have worse health outcomes than richer countries and for poorer people within a country to be more ill than the better-offs. In terms of medical care, Hart (1971), coined 'Inverse Care Law' to draw attention to the fact that availability of good medical care tends to vary inversely with the need of the population served.

Social gradient is a global phenomenon seen in LMICs and HICs (WHO CSDH, 2008). Social gradient, which is now well grounded in contemporary research, implies that health runs step-wise, right across the socio-economic spectrum from top to bottom. Therefore, health inequalities affect everyone from the bottom, right through to the higher rungs of the social ladder, and not simply the disadvantaged (Devitt, Hall, & Tsey 2001). Marmot et al. (1991) showed in Whitehall II Study, that social gradient exists whether or not there is pervasive poverty.

Social gradient is interrelated with a variety of socio-economic, environmental, and political factors that have been identified as key determinants of health. These determinants interact with each other at a very complex level to impact directly and indirectly on the health status of individuals and groups at all levels of society. Poor social and economic circumstances affect health throughout life's trajectory. People further down the social ladder run twice the risk of serious illness and premature death compared to those near the top (Devitt, Hall, & Tsey 2001). Morbidity and mortality increase the lower down the social gradients people are, though the magnitude and extent vary in different countries and contexts (Okogie & Shimeles, 2006).

Three theoretical frameworks or perspectives attempt to explain social gradient in health. The health selection or reverse causality perspective holds that health influences social mobility up or down the ladder and hence, determines socio-economic position, instead of socio-economic position determining health. Evidence to support this perspective is however inconclusive (Manor, Matthews, & Power, 2003). But, health selection is not the dominant explanation for health inequalities (Ki, Sacker, Kelly, & Nazroo, 2011). Another perspective, the life-course perspective deals with the manner in which temporal processes across the life-course account for disease trends later in life. With this perspective, the emphasis is on the way social determinants of health operate at every level of development from early childhood to adulthood to influence health and health inequalities later in life (Kaplan, 2003).

The third perspective is social causation of health inequalities. This perspective seems to be the most current, plausible, and widely accepted concept. The

present study adopted this perspective to explain health inequalities because it resonates with the current paradigm of social determinants approach in the public health research and it seems to be the most plausible. The social causation perspective implies that the risk of developing health problems is higher for people in the lower socio-economic groups, and hence, that 'social causation' is the main explanation for socio-economic inequalities in health (Phelan, Link, & Tehranifar, 2010). Social factors are thought to determine health not only directly but also indirectly through intermediary factors or mediators (Siegrist & Theorell, 2006).

The contention is that uneven distribution of mediators between individuals of different SEPs fosters health inequalities (Graham, 2004). Apparently, SEP determines a person's risk behavior and exposure to adverse health-impacting conditions. These mediators influence higher or lower prevalence of health conditions. The main groups of these mediators of health inequalities have been identified as material, psychosocial, and behavioral factors (van Oort, van Lenthe, & Mackenbach, 2005).

2.5 Mediators of Health Inequalities

Different mechanisms have been proposed to explain the mechanistic pathways through which social determinants influence health inequalities. Three of the most widely discussed pathways are the materialist/neo-materialist, psychosocial, and behavioral. Researchers differ in their opinions of which factors are most influential. Some emphasize an individual's material conditions; others stress the importance of social and psychological factors; while yet others identify behavioral/lifestyle choices as the most significant factors.

The protagonists of the materialist/neo-materialist pathway view the differential distribution of health in the population as a consequence of systematic underinvestment in and access to essential services such as health care, education, transportation, food, and adequate housing (Clarkwest, 2008). On the other hand, advocates of the psychosocial pathway, suggest that the perception of relative disadvantage evokes negative emotions such as shame and distrust (Wilkinson, 1996). These emotions are internalized into poorer health through psycho-neuroendocrine mechanisms and stress-induced behaviors such as smoking and substance abuse (Gianaros & Manuck, 2010). The emotions also lead to anti-social behavior, reduced civic participation, and loss of social capital and cohesion in the community (Kawachi & Kennedy, 2002).

Proponents of the behavioral pathway, contend that the poor and disadvantaged have no other choice but to engage in risky behavior imposed by poor socio-economic circumstances (van Oort, van Lenthe, & Mackenbach, 2005). Though the three perspectives are not mutually exclusive, they lay emphasis on different mechanisms. Emphasizing the role of social determinants in health does not negate the effects of individual behavior.

However, the socio- economic environment determines individual behavior. Individual choices not to smoke or eat healthy food depend on people's income, educational attainment, or living circumstances as well as other chronic social stressors. Economic resources and social stressors often impact the extent to which people can make health-promoting choices for themselves, their families, and communities (Rabin, 2011). It is needful to test the merits or demerits of the

approaches in urban informal settlements because of the different policy implications associated with the various perspectives.

Studies have shown that inequalities can be detrimental to growth and development by acting as disincentives to investment (Easterly, 2007). The persisting and growing inequalities between the rich and poor in Kenya have retarded progress towards economic growth and development, which constitute barriers to improvement in population health (Wambugu & Munga, 2009). In recognition of the barriers that inequalities pose, the global community under the auspices of the United Nations committed to the eight Millennium Development Goals (MDGs) to enhance economic growth and development through equitable distribution of resources and services including health (UN MDGs, 2000). MDG 7, Target 7D in particular, stresses the need to improve the lives of residents living marginally in urban informal settlements by the year 2020.

Although the deadline for achieving the MDGs is only a few years away, many African countries lag behind despite their commitment (The MDGs Report, 2010). A large proportion of the marginalized and deprived within the urban informal settlements in Kenya have failed to achieve adequate health improvements (KNBS, 2010). Kenya's aspiration to become a middle-income economy by 2030 (GoK, 2007) can only be realized if health is enjoyed equally across the social spectrum particularly among the most productive adults irrespective of their SEPs.

2.6 Measures of Health Inequalities

There are three principal dimensions of health inequalities for the purpose of devising strategies to address them. The dimensions are health disadvantage, health

gap, and health gradient (Graham, 2004). Health disadvantage refers to the health of the poorest or the most disadvantaged in the community compared to the average while health gap is the difference in health outcome between the socially worst-off and the best-off. Health gradient is a measure of the health differences right across the hierarchy or spectrum of the population from the poorest through the middle rungs of the social ladder to the richest at the very top of the ladder (Marmot, 2004). Unfortunately, our knowledge of the processes through which SEP operates to influence health inequalities is rather limited in deprived communities such as urban informal settlements.

There are many types of measures for assessing health inequalities depending on which dimension of health inequalities is of interest and the resources available for the measurement. The measures are classified as either simple or complex. These measures of health inequalities, in turn are either absolute measures or relative measures. But, there is as yet no universally accepted model for expressing the magnitude of inequalities (Wagstaff, Paci, & van Doorslaer, 1991; Mackenbach & Kunst, 1997; Harper & Lynch, 2005). The major source of controversy in the expression of the magnitude of inequalities lies in the decision to express the magnitude of health inequalities either in absolute or relative terms. Inequality measures are simple if only two groups are compared and complex, if many groups are compared concurrently.

2.6.1 Simple health inequality measures

For simple inequality measures, one group's performance is subtracted from the performance of the other group, which is an absolute difference or if the interest is

in relative difference, a group's performance is divided by the other more advantaged group's performance, i.e. the reference group. Absolute measures are however, easier to gauge. Groups whose performances are being measured can be hierarchical such as ordinal wealth quintiles or non-hierarchical such as gender.

Simple inequality measures are easy to calculate and to understand. Hence, they are used in the majority of inequality reports, which helps for comparisons across studies and to monitor progress over time. These simple measures only take into account, the top (Q5) and bottom (Q1) quintiles of the population under study, which therefore imposes important limitations.

One of the limitations is the sensitivity of these simple measures to changes in the number of people in each stratification category. For example, in the 2008 Nigeria Demographic and Health Survey (Measure DHS, 2009) the ratio of the rich to the poor for coverage with skilled birth attendants was 10.4 based on deciles, but when based on quintiles the ratio became 8.8. Another limitation is that sometimes, the lowest and highest wealth groups will not necessarily have the lowest and highest coverage levels respectively, particularly when overall coverage is high. A typical example is Barros et al.'s (2012) retrospective review of survey data for measles vaccine coverage from 54 countries, where in Bolivia the coverage in the poorest quintile (Q1) was 75% and 67% in the riches quintile (Q5).

2.6.2 Complex health inequality measures

Simple inequality measures are further limited by their inability to capture the intermediate population groups [e.g. Q2 to Q4] (Mackenbach & Kunst, 1997). Complex inequality measures overcome this limitation by using information on the

whole population. Though there are many complex inequality measures, Harper and Lynch (2005) recommended the use of the absolute concentration index or the slope index of inequality. Low and Low (2004) popularized the use of concentration index and slope index of inequality.

The concentration index is similar to the Gini coefficient, which is widely used to measure income inequalities and how much income is concentrated in the richest group. The Gini coefficient is usually expressed in the form of a Lorenz curve with the sample of the population ranked by income on the *x*-axis, and the cumulative distribution of income on the *y*-axis. If everyone in the population has the same income, the Lorenz curve lies exactly over the diagonal and the Gini index is equal to zero, which is similar to the curve of concentration index in **Figure 3.5** on page 100. The area between the diagonal and the observed curve is used to measure the degree of income concentration.

The principle of the concentration curve is similar by ranking individuals according to socio-economic position on the *x*-axis and plotting, say, the health indicator on the *y*-axis. Thus, if every wealth quintile had 20% of the entire health indicator distributed in a population, for example, the line would be exactly on the diagonal, and there would be no social gradient type of health inequality in the population.

In this study, concentration index was employed as a measure of social health gradient because it is one of the most popular measures of inequality in epidemiologic and economic literature. In addition, health gap dimension of health inequalities was assessed with simple measures of inequality (prevalence ratios and differences)

because the goal was to lay a firm basis for comparison with other studies across a wide spectrum.

Lay people such as journalists can easily understand the simple measures of inequality and utilize the information through the media for publicity and to sensitize the public. The simple measures of inequality will also be more relevant to non-technical policy-makers and administrators to identify health inequalities between areas, to inform health and social service needs, and to monitor health care resource allocation among subpopulation groups. Public health researchers and academics on the other hand, will find both simple and complex measures useful.

2.7 Instruments for Quantification of Health Inequalities

Single and multi-item instruments are routinely used to quantify health inequalities in health-related research. The choice of instrument, which can be objective or subjective, depends on the purpose of the study. World Health Organization Quality of Life (WHOQoL), Short Form (SF-36) [SF-36v2 is the newer version], and European Quality of Life in 5 Dimensions (EQ 5D) are some of the objective multi-item instruments of quality of life used in health-related research. Though significant correlations between objective and subjective measures have been reported (Ruggeri, Bisoffi, Fontecedro, & Warner, 2001), most of the report data were derived from the developed world.

A recent study (Olsen, Jensen, Tesfaye, & Holm, 2013) from Ethiopia, a country in SSA reported several limitations with the use of WHOQoL among the indigenous population and did not find conceptual equivalence with regard to social context of the respondents. This implied that the instrument is unsuitable for socially

oriented research in SSA. Subjective, single item self-assessments of health are quite popular measures in population surveys (Bowling, 2005).

Subjective instruments such as self-rated health (SRH) status and self-reported chronic health conditions are the most widely used single global health measures of health status, quality of life, and health-related quality of life (Fayers & Sprangers, 2002). Notwithstanding some limitations of single-item instruments, they have obvious advantages over the multi-item instruments for use in both research and policy due to brevity, reduced burden on the respondents and on the research team, lower costs, and ease of interpretation. The single-item instruments are particularly valuable in cross-sectional studies where only a snap-shot assessment of a theme is desired (Bowling, 2005).

2.7.1 Self-reports as instruments for quantifying health inequalities

SRH has been shown to relate to a number of important health outcomes, such as health risk behaviors (Manderbacka, Lundberg, & Martikainen, 1999), disease states (Krause & Jay, 1994), disability, and mortality (Idler & Benyamini, 1997). SRH has also been shown to be valid and reliable in the developing world and able to independently predict health outcomes when compared to clinical evaluations as well as being sensitive to changes in health status (Smide, Whiting, Mugusi, Felten, & Wikblad, 1999).

The definition of health by the WHO comprises two dimensions. The first dimension relates to physical, mental, and social well-being or quality of life, which can be assessed by SRH instrument. The second dimension concerns disease. Disease can be ascertained by objective anthropometric measures, which however, only

address specific aspects of the human body. Also, anthropometry is not sensitive to specific health problems and is of relatively limited use as indicators of adult health status (Ebomoyi & Iyawe, 2005).

A reliable measure of health that is sensitive to a wide range of health problems is required to examine inequalities in the general health of a population. Though health is a multidimensional concept, mostly, the interest is in a summary measure that incorporates the separate dimensions of health into one construct. The available types of indicators typically available for investigation of health inequalities can be categorized as medical, functional, and subjective (Spinakis et al., 2011). Self-assessed indicators satisfy all three categories (Spinakis et al., 2011). Generally, in non-clinical, epidemiological surveys, self-reports of health conditions have been found to be both valid and reliable in adults (Fleming, 2013).

2.8 Priority Chronic Health Conditions

Chronic health conditions such as HIV/AIDS, TB, Hypertension, Diabetes, Asthma, mental disorders, and physical disabilities are a threat to adult health and well-being particularly in SSA where the incidence continues to rise with dire consequences. Non-communicable diseases (NCDs) are responsible for almost half of the global burden of diseases, while injuries account for 13% and communicable diseases for 39% (Bloom et al., 2011).

Despite the endorsement of important new health goal to achieve 25% reduction in premature NCDs mortality by 2025 (the 25 by 25 goal) at 64th World Health Assembly (WHO, 2011), and the global rhetoric and resolutions, chronic NCDs are yet to command the attention that they deserve particularly in SSA where

they threaten the future of human health and well-being. Compared to other world regions, infectious and chronic diseases disproportionately affect adults in SSA (Young, Critchley, Johnstone, & Unwin, 2009).

The disproportionate burden of chronic diseases in the region presents an opportunity for and challenge to public health practitioners to conduct research particularly among the urban poor whose marginal social contexts predispose them to preventable health conditions (Adeyi, Smith, & Robles, 2007). It is therefore crucial to examine the social determinants of chronic diseases within poor urban settings. Understanding the distribution of these diseases and the underlying social determinants and mediators, is an appropriate starting point for the development and implementation of realistic plan of action to stem the diseases and to address health inequalities by intervening on the determinants (Blas, Sommerfeld, & Sivasankara Kurup, 2011).

Beyond the human tragedy of death and suffering, evidence shows that chronic diseases inflict an enormous burden on the entire economic system through long term health costs, negative effects on productivity and labor supply, and decreased human capital accumulation (Bloom et al., 2011). Chronic diseases cause significant loss in economic production and the burden is greatest in LMICs (Abegunde & Stanciole, 2006). Different patterns of social determinants and mediating factors have been associated with both chronic communicable and non-communicable health conditions. Some of the priority chronic health conditions in Kenya are HIV/AIDS and Tuberculosis, Hypertension, Diabetes, Asthma, Mental disorders and physical disabilities.

2.8.1 HIV/AIDS

In Kenya, 6.3% of the adult population is infected with HIV (KNBS, 2010). HIV/AIDS accounts for 29.3% and 24.2% respectively of mortality and disability adjusted life years (DALYs) in Kenya (KNBS, 2010). Three out of four AIDS-affected households involve the head of household (NACC and NASCOP, 2012), causing immense economic hardship. The Human Immunodeficiency Virus (HIV), an RNA virus, is the causative organism of AIDS.

2.8.2 Tuberculosis (TB)

A World Bank Report published in 2013, put the incidence of TB in Kenya at 298 per 100,000 of the population in 2010, making it one of the highest in the whole world (Dutta et al., 2013). TB is a chronic communicable disease, which puts untold health and socio-economic burden on the poor who may not have access to adequate care. Current strategies would need to be revised if the long-term target to eliminate TB by 2050 is to be achieved (Stop TB Partnership and WHO, 2006). TB is caused by *Mycobacterium tuberculosis.* It is responsible for 6.3% of the mortality in Kenya and 4.8% of the total DALYs in the country (KNBS, 2010).

2.8.3 Hypertension

More than 10 million people in SSA have Hypertension or high blood pressure, which made the African Union to proclaim the disease, one of the continent's greatest health challenges after AIDS (Kluger, 2004). Hypertension is a chronic, non-communicable, cardiovascular disease and a risk factor for other cardiovascular diseases such as stroke and acute coronary syndromes.

Pollitt, Rose, and Kaufman (2005) studied the effect of socio-economic status along life's trajectory, on the risk of cardiovascular disease. They hypothesized that accumulation of psychosocial and physiological experiences and the influence of the environment through the life course interact to influence adult risk profile for cardiovascular diseases. Whether this applies to LICs or the poor in these countries is yet to be proved. A cross-sectional survey across SSA by Hendriks and colleagues in 2012 found a prevalence of Hypertension in rural Kenya to be as high as 19.1%, being one of the highest in SSA. Genetic and social factors have been associated with the disease, but the social gradient among the urban poor remains to be well defined.

2.8.4 Diabetes

The number of people who live in LMICs with diabetes mellitus, a chronic NCD characterized by high blood glucose levels, continues to increase. Conservative estimates suggest that 73% of 285 million people with diabetes worldwide in 2010 live in LMICs (IDF, 2009). Prevalence data from LMICs are few but, suggest that the prevalence of type 2 diabetes, which is more common in adults, tends to be highest among the wealthy (Azevedo & Alla, 2008). Paradoxically, diabetes tends to be highly prevalent in poor urban African populations, affecting up to 15% of adults in this group (Levitt, 2008).

2.8.5 Asthma

The prevalence of Asthma, a chronic respiratory disorder, is increasing in LMICs (Braman, 2006). Worldwide, more than 300 million people have been diagnosed with Asthma and the reported prevalence ranges from 1-18% (Masoli, Fabian, Holt, & Beasley, 2004). There are socio-economic inequalities in asthma

prevalence. Morbidity and mortality rates are higher among the poor, and vary with environmental and occupational exposures (Gold & Wright, 2005). Differential access to medical care also contributes to inequalities in reports of Asthma prevalence (Dumanovsky & Matte, 2007; Bryant-Stephens, 2009). An understanding of the determinants and mediators of Asthma is required to halt the increasing prevalence of Asthma particularly in LMICs where the incidence is rising. In order to reduce the burden of asthma, interventions need to be directed at the underlying determinants and mediators of the inequalities (Greenwood et al., 2011).

2.8.6 Mental disorders

About 14% of the global disease burden is attributed to mental or neuropsychiatric disorders mostly, depression, alcohol-substance abuse, and psychoses (Ngui, Khasakhala, Ndetei, & Roberts, 2010). There are large variations in the distribution of mental disorders between and within population groups with socio-economically disadvantaged people disproportionately bearing the burden of mental disorders. The social cost of mental disorders, which have the highest prevalence in young adults, is enormous (Patel, Simon, Chowdhary, Kaaya, & Araya, 2009).

2.8.7 Physical disabilities

People with physical disabilities, are unable to substantially carry out activities of daily living due to diseases or disorders causing physical impairment, limitation of activity, or restrictions from full participation as depicted in **Figure 2.3**. The disabilities could be congenital (from birth) or acquired during lifetime. There are two main models that are applied to define disability. The first model is medical. The medical model defines disability as physical, mental, or psychological condition

that limits a person's activities (WHO, 2001). The second is the social model of disability, which conceptualizes disability as arising from the interaction of a person's functional status with the physical, cultural, and policy environments (Goodley, 2001).

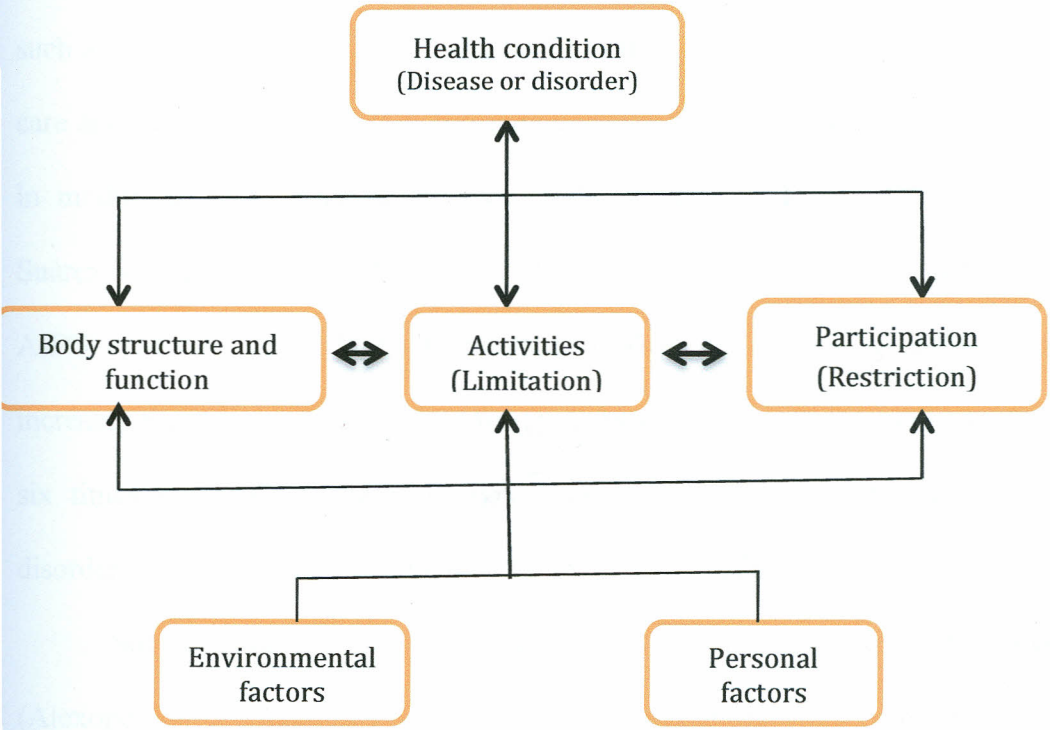


Figure 2.3 Dimensions of Physical Disabilities

Adapted from World Health Organization. (2001).

An environment that is designed for the full range of human functioning and incorporates appropriate accommodations and supports, are necessary for people with functional limitations to fully participate in society. There are social gradients in the prevalence of disabilities (Jenkins & Rigg, 2004). The disabled are usually socially

excluded and have poorer health outcomes than their non-disabled counterparts (Ionescu, 2012). The 2007 Kenya National Survey for Persons with Disabilities (KNSPWD) revealed that 1.7 million or 4.6% of Kenya's population had some form of disability (GoK, 2008). Physical disabilities accounted for 30% of the disabilities that were caused by congenital disorders, diseases or accident/injuries.

Many of the chronic diseases are inter-related and share common risk factors such as smoking, unhealthy diet, physical inactivity, and lack of access to preventive care and health promotion. There are evidence-based interventions that are effective in modifying these risks and subsequently preventing disease (Halpin, Morales-Suárez-Varela, & Martin-Moreno, 2010). TB resurgence has been attributed to the AIDS epidemic (Peto, Pratt, Harrington, LoBue, & Armstrong, 2009). Diabetes increases the risk for TB (Jeon & Murray, 2008). Persons with mental disorders have six times the risk of acquiring HIV/AIDS compared to people without mental disorders (Prince, Walkup, Akincigil, Amin, & Crystal, 2012).

Social gradients have been described for many chronic health conditions (Alexopoulos & Geitona, 2009). In developing countries where the prevalence of these preventable chronic health conditions and risk factors is increasing and the outcomes dismal, there are compelling reasons for research into inequalities in these areas to guide effective, evidence-based interventions.

2.9 Summary of Literature Review

Confronting the growing and abhorrent problem of health inequalities requires context-specific data, which are currently not available from marginalized and deprived urban informal settlements. In SSA, data on the magnitude of health

inequalities are not readily available for planning and monitoring purposes; neither have entry-points for interventions to tackle health inequalities been identified.

Recently, there has been a paradigm shift from the largely unsuccessful biomedical to the more pragmatic social determinants approach by global health and development bodies such as WHO and the World Bank. This calls for research into the role of social determinants in driving health inequalities in developing countries of SSA to bridge the gaps identified in the review of literature.

Furthermore, there has been scarcity of data on health inequalities in small geographical areas and even less so, disaggregation of such data. The poor health experience, increasing prevalence, and dire consequences of both chronic communicable and non-communicable diseases in SSA among the poor compel research into factors that are promoting their emergence and their unequal distribution among subpopulation groups. Moreover, the limitations associated with the use of biophysical and multi-item instruments for collection of quantitative data on health inequalities have been surmounted by the introduction of validated, easy to administer single-item SRH instrument.

With the increasing global use of SRH instrument in health research, it is desirable for studies in resource-constrained communities in SSA to incorporate the use of this reliable and valid instrument for purposes of comparability and replicability of data, more so as health facility-based data are not readily available. Thus, based in one urban informal settlement in Kenya, a SSA country, this study attempted to fill the gaps by availing context-specific, disaggregated data on health

inequalities using reliable, validated, and easy to understand instruments of health research with a social determinants approach.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the study's methodology and explains how I went about achieving the stated objectives. The major objective of the study was to identify the determinants of health inequalities in Korogocho informal settlement. The study also sought to measure the magnitude of the health inequalities among adults aged between 25 and 59 years within and between the nine villages in Korogocho informal settlement. This age cohort was selected because of the apparent research gap and the interest of this study in the potential contribution of this economically productive age group to the growing economy and development of Kenya if their health concerns are properly addressed. The other minor objectives were to identify the socio-economic and environmental determinants and to assess which factors mediate health inequalities in Korogocho informal settlement.

This chapter provides detailed information on the study's research methods and materials used to adequately address the research questions. A description and justification of the research design, study location and sample population are provided. Additionally, sampling for selection of the study participants is described. The process involved in the selection of the required study population size for the quantitative method in this study is outlined. Relevant variables, data collection tools, and analytical techniques employed to achieve the study's objectives are presented. Since the study involved human subjects, appropriate considerations given to logistical and ethical issues, are also presented in this chapter.

3.2 Research Design

This cross-sectional, field-based population study is both descriptive and analytic. A cross-sectional research design was chosen for this study in order to achieve a relatively quick and affordable but objective, snapshot description of the themes of the study (Clough & Nutbrown, 2002; Orodho & Kombo, 2002). Furthermore, the study analyzed the association between the independent variables (IV), mediators, and dependent variables (DV) with inferential statistics.

The aim of the study was to test the hypothesis that the unequal distribution of the multi-level socio-economic and environmental variables as well as mediating factors are responsible for health inequalities among adults in Korogocho informal settlement, the location of the study. The assumption in this cross-sectional study was that the respondents' experience of the exposure variables was essentially unaltered over some period prior to the outcome variables, which are the respondents' self-assessed current state of health and reports of chronic health conditions.

3.3 Variables

The variables used in this study are the independent or status variables (because they were not manipulated) abbreviated as IV, the mediator variables, and the outcome or dependent variables (DV). The IV consisting of individual, household, and neighborhood characteristics, were adapted from the internationally validated World Health Survey Household Questionnaire instrument for low-income countries (2002), and 2008/09 KDHS (KNBS, 2010), for ease of comparability of results locally and internationally (Mugenda & Mugenda, 2003).

3.3.1 Independent variables

The independent variables (IV) comprised demographic, socio-economic, and environmental characteristics. The demographic characteristics were age, gender, marital status, and religion. Though ethnicity is an important determinant of health inequalities (Hodgins & Fox, 2012), data on ethnicity were not collected because Kenyatta University Ethics Review Committee (KU-ERC) disallowed the collection on the grounds that it could "lead to wrong conclusion."

Socio-economic characteristics were operationalized as individual income, wealth index, highest level of individual educational attainment, occupation, and employment status. The internal and external environment were assessed by the level of room congestion; type of cooking fuel; access to drinking water, sanitation facilities, and health care; in addition to subjective opinion of the proximity of residential house to Dandora Municipal Waste Dumpsite.

Data were collected from adult household heads or suitable proxy adult household residents aged between 25 and 59 years who consented to being

interviewed. **Appendix 3.1** is a copy of The Consent Form. Trained research assistants collected quantitative data with the interview schedule developed in English (**Appendix 3.2**), translated to Kiswahili (**Appendix 3.3**), and administered face-to-face to respondents in the respondents' homes.

The following demographic variables were collected:

- Age at last birthday in years as continuous variable. Age was then grouped for some analyses in years as: 25-34, 35-44, 45-54, 55-59.
- Gender was grouped nominally as Male or Female.
- The following were categories of Marital status: Never married, Married, Not married but living together, Separated/Divorced, Widowed.
- The categories of Religion were Catholic, Other Christian, Muslim, No religion, Other.

The socio-economic variables were operationalized as follows:

- Education was assessed as an ordinal categorical variable based on the highest educational level attained.
- Occupation is a widely used indicator of socio-economic position for those who are employed and it refers to the job held or the kind of work performed during the reference period. Occupation was assessed under the following categories: Professional/Technical/Managerial, Clerical, Sales and Services, skilled manual, unskilled manual, domestic service, agriculture, no occupation, and other.
- Employment status was collected as categorical variables: self-employed, employee, or unemployed.

- Individual's monthly income is a measure of the individual's position in the social hierarchy and was assessed as a continuous variable, then arranged in the following ordinal groups in Kenya Shillings (Kshs): <5,000; 5,000 to <10,000; 10,000 to <15,000; 15,000 to <20,000; ≥20,000 .
- Wealth index is a reliable socio-economic status indicator obtained using the household asset items (Wagstaff & Watanabe, 2003). Rutstein & Johnson (2004) compared Wealth Index with more traditional indexes of consumer expenditures and concluded that Wealth Index better was a better indicator of long-term economic status and is also much easier to use.

A relative wealth index was computed from Principal Component Analysis (PCA) based on household assets that were able to effectively discriminate between socio-economically better-off and worse-off individuals. Household assets used for computation of Wealth Index in this study included household ownership of wall clock, radio, television, table, chair, bed, refrigerator, mobile phone, bicycle, motorcycle, and car. Other assets used in the computation of Wealth Index are ownership of land and farm animals; type of cooking fuel as well as dwelling characteristics, such as source of drinking water, sanitation facilities; and type of material used for floor, wall, and roof of residential house.

Following the recommendation by Filmer and Pritchett (2001), PCA was used to assign the indicator weights using SPSS factor analysis procedure. PCA is a multivariate statistical technique that was used to reduce the number of household assets into a single Wealth Index. Based on the Wealth Index derived, households

representing individuals were then, further divided into quintiles from the poorest 20% to the richest 20%, reflecting the different socio-economic status.

The procedure of PCA involved first standardizing the indicator variables by calculating z-scores. Subsequently, factor coefficient scores (factor loadings) were calculated, and finally, for each household, the indicator values were multiplied by the factor loadings and summed to produce the household's index value. In this process, only the first principal component of the factors produced was used to represent the Wealth Index. The resulting sum was a standardized score with a mean of zero and a standard deviation of one.

An important advantage of asset-based measures such as Wealth Index in cross-sectional studies, is that the measures depict an individual's or a household's long-run socio-economic status and therefore, are relatively immune from short-term fluctuations in economic well-being (Gasparini & Gluzmann, 2009). It must be emphasized that income and wealth index tap into different dimensions of socio-economic status (Vyas & Kumaranayake, 2006). The wealth index is particularly valuable for research in developing countries such as Kenya, where reliable data on income and expenditures—the traditional indicators used to measure household economic status, are not readily available.

Environmental variables consisted of the following:

- Number of persons sharing room with the respondent
- Type of cooking fuel
- Health care access
- Drinking water source

- Sanitation facilities
- Village of residence
- Subjective distance from Dandora Municipal Waste Dumpsite.

3.3.2 Mediator variables

The mediator variables consisted of material, psychosocial, and behavioral factors and are explained subsequently.

- Material factors assessed were ownership of house; materials used for the construction of the residential houses; health insurance coverage; and household ownership of wall clock, radio, television, table, chair, bed, refrigerator, mobile phone, bicycle, motorbike, car, land, and farm animals.
- Psychosocial factors were operationalized as control or authority at home, trust of neighbors, and belonging to social associations.
- Behavioral factors were composed of alcohol; smoking; and other substance abuse (*bhang*, *miraa*, cocaine, and *kuber*).

Bhang is an intoxicant prepared from the leaves and seed capsules of the cannabis plant which is smoked, chewed, eaten, or infused and drunk to obtain mild euphoria. *Bhang* is used in Kenya and some other parts of the world for recreation. The other substance of abuse, *miraa* otherwise known as khat, *veve,* and *ngomba* in Kenya, is an amphetamine-like alkaloid derived from a flowering plant whose botanical name is *Catha edulis.*

Miraa is classified as a drug of abuse because it causes psychological dependence though of less severity than alcohol and tobacco. The third substance of abuse cocaine is a highly addictive drug and an extract from the leaves of the coca

plant. Also called "crack" because of its quick action, cocaine is usually snorted, smoked, or injected. It causes physical dependence with powerful withdrawal symptoms. Lastly, the substance of abuse *kuber* is a smokeless chewing tobacco in Kenya, which is mainly used in place of cigarettes. However, *kuber* is quite addictive probably because of its nicotine content. It also contains some substances like delta 9-tetrahydrocannabinol (THC), the active ingredient in cannabis.

- Other behavioral factors were life-style factors such as nutrition, physical activity, and sexual activity.

3.3.3 Dependent variables

There are two main dependent variables in this study. The first is self-rated health (SRH) status. The second is self-reported chronic health conditions, which should have been diagnosed earlier by orthodox health care practitioners such as medical doctors, clinical officers, pharmacists, pharmacy technologists, and nurses. Though some Kenyans, particularly in rural areas seek care from traditional herbal medicine practitioners and other complementary and alternative health care providers, only diagnoses from orthodox healthcare practitioners were accepted for this study. This is because it was considered that only the orthodox practitioners could objectively make definitive diagnoses of orthodox chronic health conditions such as HIV/AIDS, Hypertension, or Diabetes.

- SRH status was solely assessed by the respondent's response to the question: how would you rate your current state of health? The options were: "very good", "good", "fair", "poor", and "very poor." These answers were

subsequently dichotomized into good (very good and good) and poor (fair, poor, and very poor).

SRH is a widely used generic measure of health experience in public health and epidemiological research due to strong associations with other subjective and objective measures of well-being, health outcomes, and mortality (Bayliss, 2012). Robine, Jagger, & The Euro-REVES Group (2003) consider the multidimensional concept of health that is encapsulated in a single global SRH response to be one of the best indicators of health at the individual and population level. There is a close relationship between global SRH and health outcomes and thus SRH is recommended as a reliable health measure for public health research (Subramanian et al., 2009).

- Self-reported burden of chronic health conditions is the second dependent variable in this study. Respondents were asked if during adulthood, they have ever had, been told or given a diagnosis by a health care practitioner, of any of the following priority chronic health conditions: HIV/AIDS, TB, Hypertension, Diabetes, Asthma, mental disorder, or any physical disabilities. The respondents needed to show evidence of diagnosis or treatment, from health facility cards to drugs, or description of complaints, and when or how the diagnosis was made. No biophysical or chemical tests were carried out in this study.

3.4 Location of Study

The study location was Korogocho, an informal settlement in Nairobi, the capital of Kenya.

3.4.1 Introduction

The purpose of this study was to determine if remediable social factors are significant determinants of health inequalities among the urban poor in a disadvantaged area in order to provide the much needed evidence for policy and effective interventions to tackle poor health and health inequalities. Informal settlements are disadvantaged areas in any locality where the urban poor are most likely to be concentrated. Nairobi, the capital city of Kenya has the highest number of informal settlements in Kenya, an East African country, located in SSA (**Figure 3.1**).

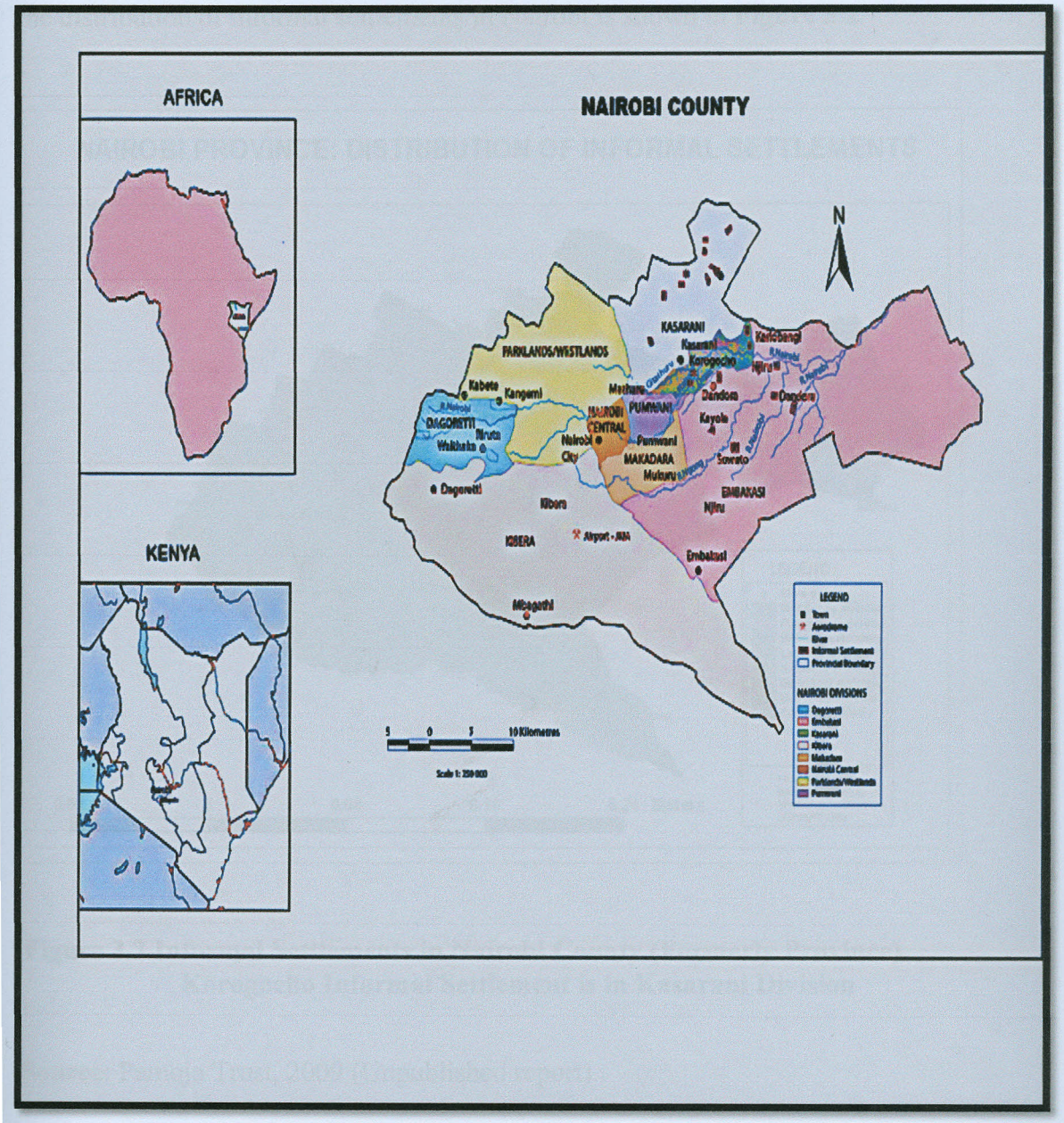


Figure 3.1 Korogocho Informal Settlement, the Study Location in Nairobi County, Kenya, an East African Country

The distribution of informal settlements in Nairobi is shown in **Figure 3.2**.

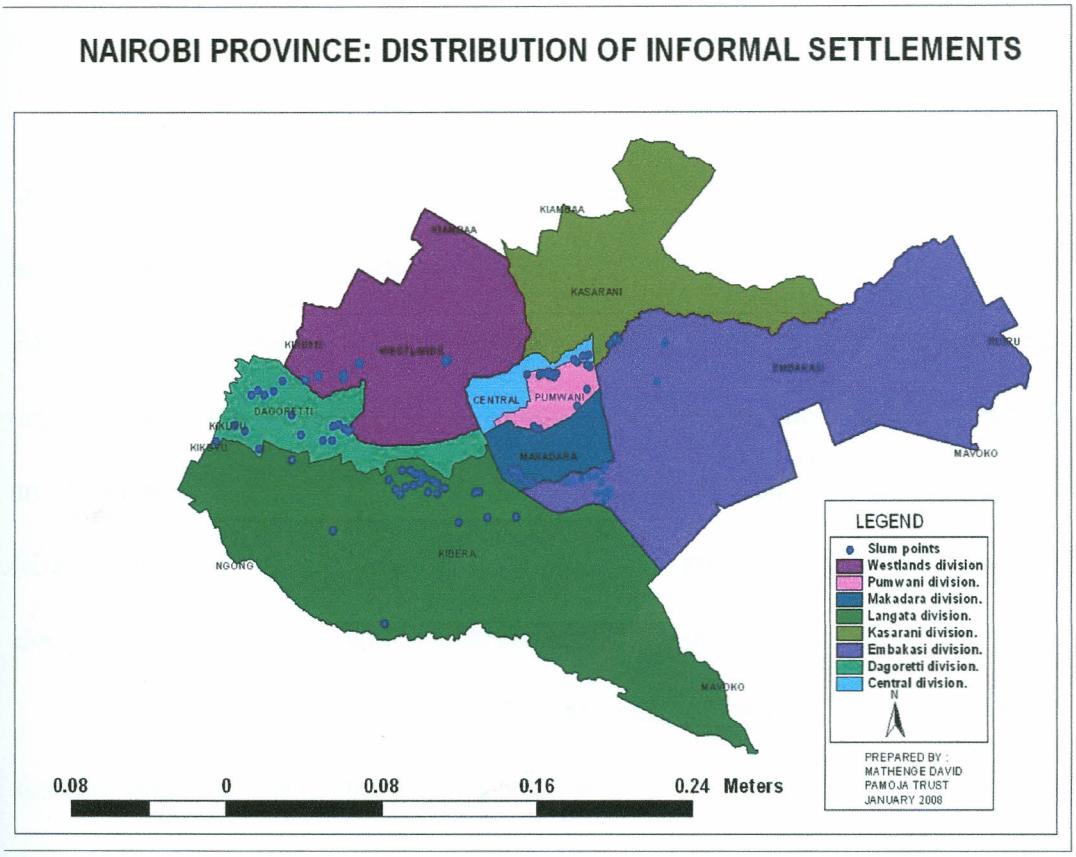


Figure 3.2 Informal Settlements in Nairobi County (Formerly Province). Korogocho Informal Settlement is in Kasarani Division

Source: Pamoja Trust, 2009 (Unpublished report).

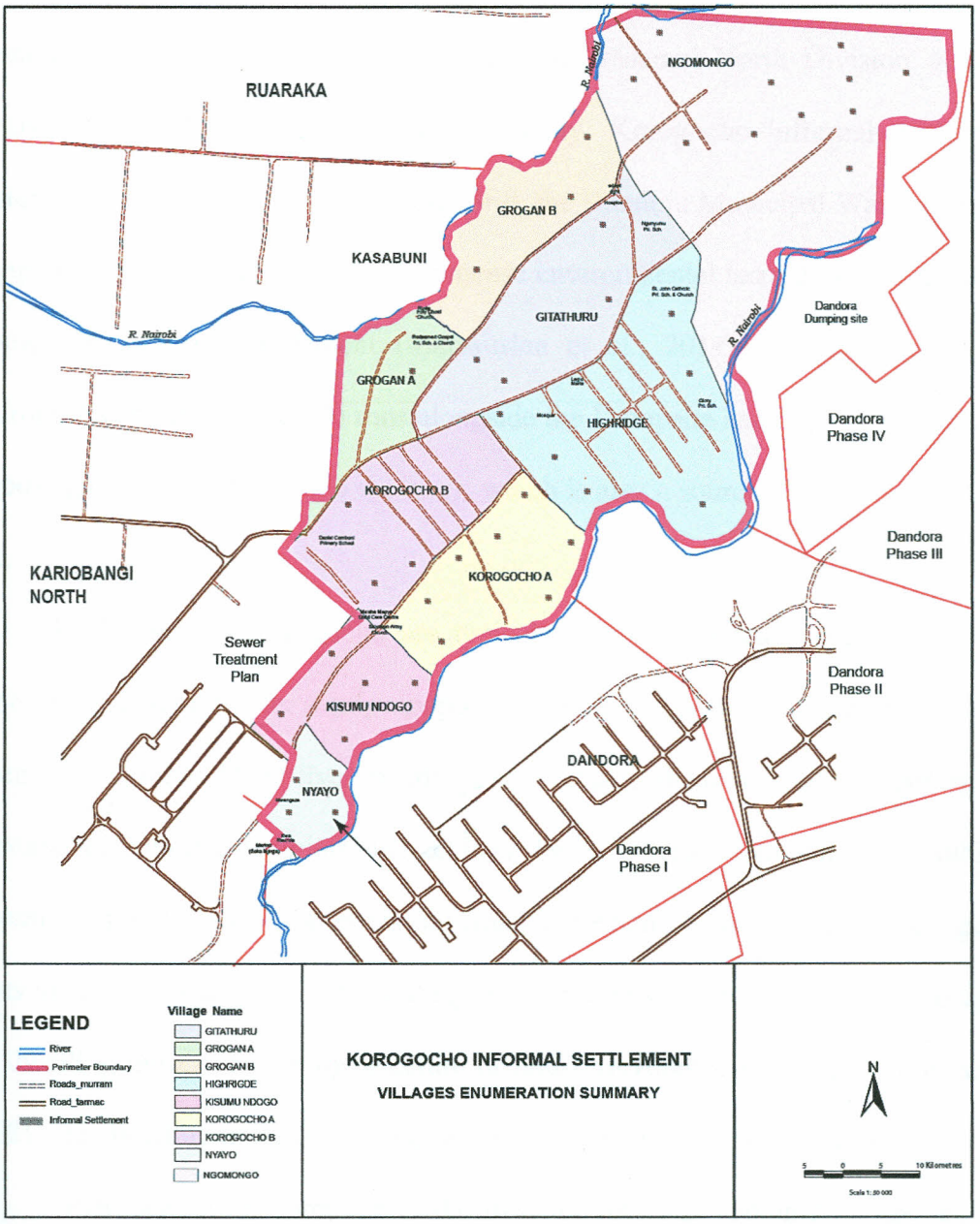
3.4.2. Korogocho informal settlement, the study location

Korogocho is the fourth largest informal settlement in Nairobi after Kibera, Mathare Valley, and Mukuru Kwa Njenga. It has a population of 41,946 from the 2009 Kenya Population and Housing Census (KNBS, 2010). The name 'Korogocho' was adapted from the Kikuyu word —*Kurugucu,* which means worthless or scrap.

Korogocho was strategically chosen because, apart from being one of the largest informal settlements in Nairobi, it typifies the pernicious and socially constructed living conditions that impact the health of the urban poor.

Another justification for the choice of Korogocho is that it is one of two informal settlements in Kenya where enumeration and socio-demographic information are regularly updated every four months since August 2002. The African Population and Health Research Center (APHRC), which is a non-governmental organization (NGO), undertake the enumeration through the Nairobi Urban Health and Demographic Surveillance System (NUHDSS). Of the two informal settlements (Korogocho and Viwandani), Korogocho has a more stable population (Beguy, Bocquier, & Zulu, 2010), which is an advantage for this cross-sectional study.

A unique feature of Korogocho informal settlement, is its composition of sizeable and heterogeneous villages with high proportion of adults and people of diverse socio-economic characteristics (MacAuslan & Schofield, 2011). This diversity allowed this study's assessment of social health inequalities among adults between and within the constituent villages. Korogocho informal settlement sprouted up on government land in 1973 and consists of nine villages (**Figure 3.3**): Gitathuru, Grogan A, Grogan B, Highridge, Kisumu Ndogo, Korogocho A, Korogocho B, Ngomongo, and Nyayo.



Adapted from *The Urban Development Department*
Ministry of Local Government

Figure 3.3 Nine Constituent Villages of Korogocho Informal Settlement

Korogocho informal settlement is located about 12 kilometers from Nairobi's Central Business District. Located in the new Kasarani North Division, Kasarani District, to the North-East of Nairobi County, Korogocho informal settlement's eastern neighbor is Nairobi's largest landfill, the Dandora Municipal Waste Dumpsite (**Appendix 3.4**). The landfill poses immense environmental hazard to the residents of Korogocho informal settlement (MacAuslan et al., 2011). The heavily polluted Nairobi River (**Appendix 3.5**) runs alongside the Dumpsite and some of the villagers dispose garbage and feces into the river, which is also a source of water for domestic use.

Conditions in Korogocho are typical of urban informal settlements world-wide. The settlement has a large population of urban poor with limited access to essential services. They live mostly, in structures made out of temporary and substandard building materials such as iron sheets, otherwise known in Kiswahili as *mabati* (**Appendix 3.6**). Korogocho informal settlement is one of the most congested areas in Nairobi with over 250 dwelling units or rooms per hectare and an average of six dwelling units per housing structure or house (Kyobutungi, Ziraba, Ezeh, & Yé, 2008). The dwelling units are rooms, each of 3 square meters in dimension.

Open spaces in Korogocho, like in other informal settlements, are few and unkept thus, limiting recreation and other forms of leisure for residents. The high levels of violence and crime in Korogocho informal settlement restrict outdoor activities by many residents and undermine social cohesion in the settlement which does not have a police post. There is limited water reticulation and sanitation with

inadequate waste management and road network. Electricity is rare, and usually only through illegal connections.

The tenants have no security of tenure. Structure owners regularly evict tenants for non-payment of rent and this is responsible for a lot of friction in the settlement. Unemployment rates are high in Korogocho informal settlement. Many of the unemployed are young adults who lack the necessary skills and educational qualifications for formal employment. Some of the residents are employed in the formal sector industries in neighboring Babadogo and Ruaraka or at the Industrial Area which is farther afield. They are mostly casual and unskilled workers who are employed in construction and stone-cutting industry. Most of the other residents with some form of employment are in the unregulated, informal market sector.

Residents are involved in many faith- and community-based organizations (FBOs and CBOs) to improve the quality of life and living conditions in Korogocho informal settlement. Some of these are the Korogocho Spiritual Leaders Association (KOSLA) and "People United for New Korogocho" under the leadership of the St. Johns Catholic Church and they are involved in a variety of community projects in Korogocho informal settlement. Miss Koch, a local NGO was founded in 2001 and through many initiatives, has been engaged in the mobilization and empowerment of local residents in Korogocho informal settlement.

In addition, Korogocho Slum Upgrading Program (KSUP), a joint initiative of the GoK and the Government of Italy is in the process of improving the living and working conditions of residents through coordinated support to the community. NGOs such as Concern International, Provide International, Jhpiego, Oxfam-GB

provide social and health services though mainly restricted to maternal and child health. A community-funded health facility, Makwak Health Center also provides avenue for low cost health care though it is under-equipped and understaffed. Tumaini Clinic is one of the few privately-owned health facilities in Korogocho informal settlement. The most common cause of mortality among adults in Korogocho informal settlement is HIV/AIDS, a chronic health condition (Kyobutungi et al., 2008).

For ease of administration, Korogocho Location is subdivided into three sublocations: Nyayo sublocation, comprising Nyayo, Kisumu Ndogo, and Korogocho A villages; Korogocho sublocation consisting of Korogocho B and Highridge villages; and Gitathuru sublocation composed of Grogan A, Grogan B, Gitathuru, and Ngomongo villages. Each village is headed by a village elder. The villages have some distinctive characteristics.

Gitathuru village

Gitathuru is densely populated with a high percentage of muslims. Sanitation in the village is quite poor and the sale of *miraa,* is popular.

Grogan A village

Grogan A is one of the richest villages hence, it is sometimes referred to as 'small Chicago.' The village has an access road.

Grogan B village

The neighboring Grogan B is a close-knit community which allows consanguineous marriages. Illegal alcohol brewing dens are plentiful and crime rate is high, making the village very insecure for outsiders. Youth

groups and criminal gangs abound in the village, which is the most dreaded in Korogocho informal settlement.

Highridge village

The village with the richest residents is Highridge, which is made up almost exclusively of muslims. The village has many access roads and the houses are mainly made of stone walls with only a few mud houses.

Kisumu Ndogo village

Kisumu Ndogo is another close-knit community where security and local justice are assured for residents. The village has access road to the roundabout to Jogoo Road in town and Dandora Bridge (**Appendix 3.7**), a foot bridge that is an initiative of KSUP.

Korogocho A village

Korogocho A village has an access road, which is linked to the tarmacked road to Dandora Bridge. The sale of scrap metal foraged from Dandora Municipal Waste Dumpsite is common in this village where residents are engaged in a lot of trading.

Korogocho B village

Korogocho B is usually referred to as the Chief's Camp because it is the seat of administration of the Location. It is a relatively peaceful village and relatively safe to live in. There are several community initiatives in this village including a radio station managed by Miss Koch organization, Makwak Health Center, a community hall, and KSUP. There are people of diverse socio-economic and cultural characteristics in Korogocho B village.

Ngomongo village

Ngomongo is the village closest to Dandora Municipal Waste Dumpsite. The land on which Ngomongo is situated was bought by a private developer who constructed permanent story buildings made of stones and bricks (**Appendix 3.8**). There are pour-flush toilets and water pipes in the buildings, which unfortunately, do not have water. Rent disputes between tenants and absentee structure owners/landlords are rife. Though the village is technically, no longer an informal settlement, it was included in this study because it is under the administration of Korogocho location. There are access roads but sanitation is quite poor and youth gangs and drug cartels are numerous.

Nyayo village

There are many hotels and kiosks in Nyayo village, which borders the Nairobi River. Residential houses are not very many and are mostly made of mud and *mabati* (iron sheets). An open air market is located in this village, which has many kiosks for sale of used clothes among other items.

3.5 Study Population

Working age adults between the ages of 25 and 59 years were the target population of this study because total age dependency ratio is quite high (62%) in the study location (Kyobutungi et al., 2008), and health issues that affect this cohort will impact negatively on other members of the community who are dependent on them. Additionally, growth and development of Kenya, a developing country rests on the health and productivity of this age cohort, which has not enjoyed much research interest in the past. Previous health research studies in Korogocho informal settlement

have focused on children (Mutisya, Orindi, Emina, Zulu, Yé, 2010), the youth (Kabiru, Beguy, Crichton, & Zulu, 2011), women of reproductive age group (Fotso, Ezeh, Madise, Ziraba, & Ogollah, 2009), and the elderly (Kyobutungi, Ezeh, Zulu, & Falkingham, 2009).

Adults of both genders aged between 25 and 59 years, are the majority in Korogocho and are also, the most economically productive age group but research into their health and well-being has not been prioritized despite the current focus on economic growth and development in Kenya. Adults have health issues that are socially patterned and require urgent attention if their full productivity and contribution to the achievement of Kenya Vision 2030 and other development goals are to be realized.

The study population was drawn from all the nine villages in Korogocho informal settlement in a probability proportional to size (PPS) sampling (see **Table 3.1**) based on the population of the sub-locations, which was available from the Kenya Population and Housing Census (KNBS, 2010). The resulting proportion was then equally divided among the constituent villages in each sub-location. However, the final sample or study population was slightly less than the total calculated number, to which provision had been made for contingencies. Fortunately, the number of voided interview schedules was not enough to make the difference between the expected (calculated) sample and actual sample population, statistically significant in any of the sub-locations (**Table 3.1).**

Table 3.1 Probability Proportional to Size (PPS) Sampling

Sub-location	Expected Sample*		Actual Sample ¶		*P* value†
	n=810	%	n=719	%	
Gitathuru	414	51.05	369	51.32	0.69
Korogocho	203	25.13	189	26.29	0.59
Nyayo	193	23.82	161	22.39	0.48

Note: *Expected number and percent of respondents from each sub-location according to PPS; ¶Actual number and percent of respondents from each sub-location, in final study sample of the population; †P value of the difference between expected and actual sample in each sub-location using chi-square with one degree of freedom

The final sample population consisted of 719 respondents (73.9% female) whose responses to the questions in the interview schedules were complete. The respondents whose interview schedules were voided and therefore excluded from the final sample were not demographically different from the respondents in the final sample, making selection bias unlikely. The following were the selection criteria for participants' eligibility for enrolment in this study:

Inclusion criteria

- Mental alertness
- Adult men and women aged between 25 and 59 years, both ages inclusive
- Voluntary, informed consent to participate in the study by the respondents

- Participants should have lived continuously within the same village in Korogocho informal settlement for a minimum of three months to ensure stability of exposure to social conditions in the village
- Participants must be *de facto* household residents in Korogocho informal settlement

Exclusion criteria

- Persons who are not mentally alert
- People outside the age range of 25 and 59 years
- Refusal to give voluntary consent to participate in the study
- People who have not lived continuously in Korogocho informal settlement for at least three months such as visitors
- Homeless people such as vagrants, street people, and those who are incarcerated outside their households

3.6 Sampling Techniques and Sample Size Determination

Considering the constraints of time and resources available for this cross-sectional study and the goal to generalize the inferences to the target population, a probability and representative sample population was selected that has enough power to generate findings of scientific and statistical significance.

3.6.1 Sampling techniques

As explained earlier, the sample population was selected from each of the villages in Korogocho informal settlement through probability sampling to obtain a suitable and representative sample of the target population (Orodho & Kombo, 2002). A mixed, multistage cluster sampling technique was employed to ensure an adequate

representation of the target population by the sample population and to reduce costs of undertaking the study (**Figure 3.4**).

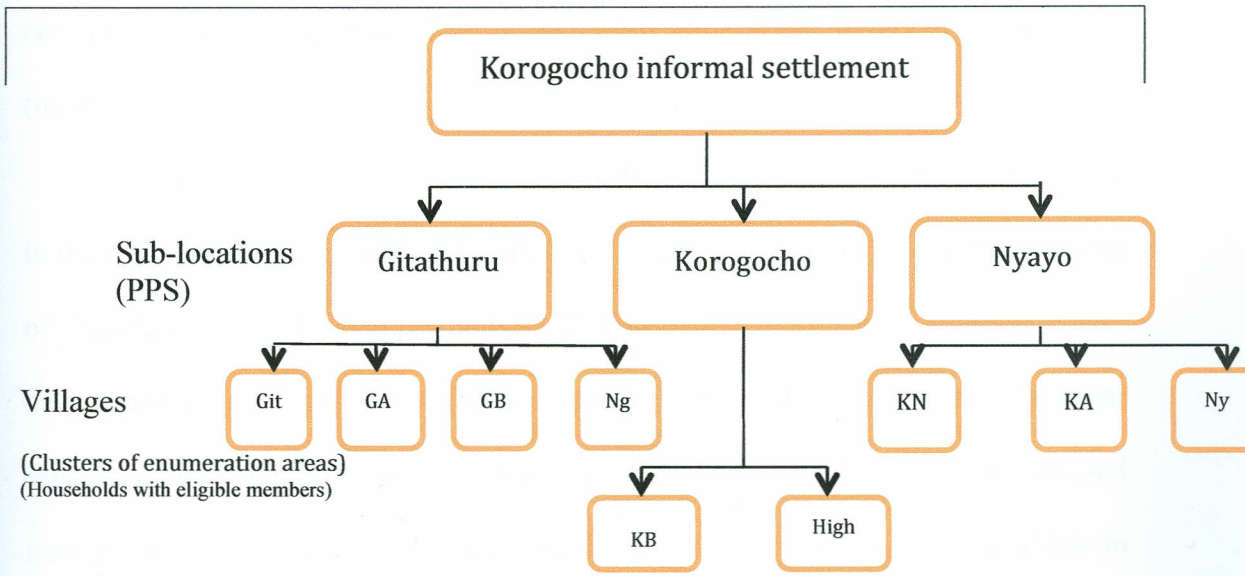


Figure 3.4 Multi-Stage Cluster Sampling of Population in Korogocho Informal Settlement and its Constituent Villages

Legend: Git=Gitathuru; GA=Grogan A; GB=Grogan B; Ng=Ngomongo; KB=Korogocho B; High=Highridge; KN=Kisumu Ndogo; KA=Korogocho A; Ny=Nyayo

The multistage cluster sampling involved a first stage where census enumeration areas (KNBS, 2010) representing clusters, were selected in each of the three sub-locations in Korogocho informal settlement according to PPS based on the available sampling frame of census enumeration areas (**Figure 3.4**). From the simple, randomly selected clusters of census enumeration areas stratified by villages in each sub-location, 150 numbered houses were selected from a total of 7829 at the second

stage through systematic sampling starting with a randomly selected house taking a cue from a landmark in each village. However, out of this number, respondents were eventually interviewed in 132 houses because 6 houses were uninhabited and 12 did not have an eligible householder. There were an average of six dwelling units (rooms) per house.

At the third stage of the sampling, all households within each selected house in the enumeration area that met the eligibility criteria, were selected for interviewing of eligible respondents; one per household. Subsequent houses were selected at pre-determined, regularly numbered interval until the required number of respondents per village had been interviewed. Research assistants made up to three visits, to selected households to interview eligible participants, if the participants were unavailable in previous visits. Only one adult per household who met the eligibility criteria preferably, the household head, was interviewed.

3.6.2 Sample size determination

The determination of sample size is important to have adequate power to test the study's hypotheses and to achieve appropriately significant scientific and statistical inference that is generalizable to the target population (Lenth, 2006). This study employed the widely accepted formula by Magnani (1997), for sample size calculation in cluster design studies. The following are the four steps taken to arrive at an adequate sample size for this study:

Step 1: Base sample size calculation

An adequate sample size for a population-based survey is determined by three main factors: (i) the estimated prevalence of the variable of interest; (ii) the desired level of confidence; and (iii) the acceptable margin of error. The initial stage of the calculation for the determination of an adequate sample size for this study is presented below.

Formula:

$$n_1 = \frac{t^2 \times p(1-p)}{m^2}$$

Legend:

n_1 = required sample size

t = confidence level at 95% (standard value of 1.96)

p = estimated prevalence of the outcome variable (assumed to be 0.5)

m = margin of error at 5% (standard value of 0.05)

Calculation: $n_1 = \frac{1.96 \times 1.96 \times 0.5\ (0.5)}{0.05 \times 0.05}$

= 384.16

Step 2: Design Effect

Cluster sampling for this study required the sample size (n_1) derived at the first stage to be multiplied by the design effect (**D**) to arrive at the new sample size, n_2.

The design effect (**D**) is generally assumed to be **2** for studies using cluster-sampling methodology.

Calculation

$\mathbf{n_2} = \mathbf{n_1} \times \mathbf{D} = 384.16 \times 2$

$\mathbf{n_2} = \mathbf{768.32}$

Step 3: Contingency

The sample size was further increased by 5% to account for contingencies such as non-response, invalid responses, or recording error and arrive at a new sample size ($\mathbf{n_3}$).

Calculation

$\mathbf{n_2} + 5\% = 768.32 \times 1.05 = \mathbf{n_3}$

$\mathbf{n_3} = 806.736 \sim \mathbf{807}$

Step 4: Distribution of Observations

Finally, the new sample size ($\mathbf{n_3}$) was rounded up to the next highest number that is a multiple of the number of clusters (9 villages) surveyed.

Final calculated sample size ($\mathbf{n}$) = **810**

Using the formula above, a final sample size of eight hundred and ten **(810)** was calculated for the study population.

3.7 Pre-Test, Validity, and Reliability of the Research Instruments

Pre-testing plays an essential role in the process of constructing and refining the research instruments (Synodinos, 2003). The research instruments (interview schedule and interview guides) were pre-tested among a representative group of the target population in Korogocho informal settlement. For the pre-test of the quantitative data collection with the interview schedule, five informed and consenting

adult respondents were randomly selected from each of the nine villages in Korogocho informal settlement comprising fourteen males and thirty-one females.

Pre-testing was done in the same location as the main research in order to capture the peculiarities of the residents of Korogocho informal settlement, which I found to be quite different from the previous neighboring pre-test site (Mathare informal settlement). Pre-testing of the interview schedules involved the administration of the research instruments in conditions as similar as possible to the main research. The purpose of pre-testing was to check for inappropriate wording of questions, lack of clarity of instructions, and any other factors that would impede the ability of the instruments to collect reliable and valid data.

Respondents were systematically debriefed to test understanding and adequacy of the research instruments. During debriefing, respondents were asked what they thought each of the questions was asking. The respondents were also asked if there were any words that they did not understand or any words or expressions that they found unacceptable or offensive. Respondents also suggested items that they thought should be included based on their understanding of the theme of the study. The process was iterated and the interview schedule was revised to reflect the corrections. Subsequently, responses by the respondents were compared for internal consistency and hence, reliability.

A reliability coefficient (Cronbach's alpha) of 0.80 with the statistical software package, **SPSS** (originally, **S**tatistical **P**ackage for the **S**ocial **S**ciences, but now **S**tatistical **P**roduct and **S**ervice **S**olutions) was obtained. The interview schedule was therefore deemed reliable enough to be applied for the main research (George &

Mallery, 2003). Respondents who were involved in the pre-test study were excluded from the main research to avoid contamination of responses and data collection. A focus group discussion was also conducted to better understand respondents' beliefs, attitudes, opinions, and experiences.

3.8 Data Collection Techniques

Research depends on data. Data collection techniques are either quantitative or qualitative though a mixture of both techniques is common in research to enrich the data. Both quantitative and qualitative methodological approaches play a critical role in social determinants research. Sociological perspective recognizes the importance of both an objective and a subjective reality in the social world. The central place occupied by quantitative survey methodology in sociological research dates back to the middle of the twentieth century. Some of the constraints of using survey methodology have been the inconvenience involved in the collection, management, analysis, interpretation, and use of large quantities of data obtained by direct interview of respondents through questionnaires or interview schedules. Complicated multivariate statistics might be required for the analysis of the large quantities of data collected.

Moreover, many social variables are difficult to measure and to analyze. For example, socio-economic status of an individual consists of several variables including income, education, and occupation. Determining the relative weight of each of these components can pose a major analytical problem. Thus, when assessing the role of socio-economic status on health outcomes, it might be difficult to determine which mechanism is really at play in the observed relationship between socio-

economic status and health outcomes. However, with the subjective, qualitative approach, a better understanding of the theory and methods concerned with illness behavior could be achieved. Furthermore, qualitative approaches are equally applicable to the understanding of social policy, health systems, and other areas where statistical measurement is difficult or less relevant.

Therefore, a mixed method of research consisting of sequential and complementary collection of qualitative and quantitative data was employed for this study, to complement, enrich, and triangulate the data. The bulk of the study was carried out between August and October 2012 though call-backs continued up until December 2012 to check for reliability of data and to fill any gaps noticed during analysis. The tools of data collection were interview schedules administered to participants who met the eligibility criteria, key informant interviews, and focus group discussions (FGDs). The purpose of the FGDs and key informant interviews with relevant stakeholders was to enable a more robust and compelling understanding of the nature and extent of health inequalities and to seek their recommendations for solutions to the problems (Yauch & Steudel, 2003).

3.8.1 Quantitative data collection method

Structured, closed-ended, interviewer-administered interview schedules in English (**Appendix 3.2**) and the Kiswahili translated version (**Appendix 3.3**) were employed to collect quantitative data in face-to-face interviews in the homes of the respondents and at mutually convenient times. An experienced translator forward translated the Kiswahili version from the English version and then back translated to English by another experienced translator to ensure conceptual and cultural

equivalence. This process was iterated four times until the final version of the Kiswahili interview schedule was accepted to be conceptually and culturally equivalent to the English version when pre-tested.

Content, scope, response format and placement of questions in the interview schedule were carefully considered in relation to the study's research questions during construction by the researcher to enhance reliability and validity of the instrument. Six, well-trained research assistants who live in Korogocho informal settlement and have had practical interviewing experience from their field work experience in previous surveys by NGOs based in Korogocho informal settlement, were recruited and further trained specifically for this study. The advantages of using these particular assistants included familiarity with the terrain and norms of the community, acceptability by the respondents, and better rapport with the respondents.

The interview schedules were discussed with the research assistants extensively and repeatedly until proper understanding was assured. Their interviewing skills were examined and honed to enhance appropriate and unbiased data collection. The research assistants went to the homes of eligible and consenting respondents and asked the respondents questions from the interview schedule in a sequential manner, without bias, and in the preferred language (English or Kiswahili). To check for reliability, different research assistants subjected five randomly selected interview schedules from each research assistant to callbacks. The questions in interview schedules were adapted from the internationally validated World Health Survey questionnaire for Household Surveys in low-income countries (WHO, 2002)

and locally validated questionnaire used for 2008/09 Kenya Demographic and Health Survey (KNBS, 2010).

However, some of the questions in the interview schedules were slightly modified based on responses during pre-testing of the instrument. The changes to the interview schedule as a consequence of the pre-test and prior to the main research included the re-classification of monthly income and inclusion of both kerosene and paraffin as cooking fuel when they refer to essentially the same type of fuel in other communities. Other changes are the selection of household assets for assessment of wealth index to discriminate between socio-economic statuses, factors presumed to affect health in Korogocho, inclusion of *kuber* among substances of abuse, and the inclusion of the option for those who have had sexual intercourse but had since stopped. The participants also suggested some of the chronic health conditions that were of priority to them during pre-testing of the interview schedule, qualitative interview guides for FGDs (**Appendix 3.9),** and key informant interviews **(Appendix 3.10**).

Interviewer-administered schedules were the preferred instruments in this study for quantitative data collection for the following reasons. Many of the respondents were found not literate during the pre-test and so would have had difficulty with the written language either in English or in Kiswahili questionnaires. Furthermore, the desire for a high response rate influenced the choice of interview schedule as the instrument of data collection (Mugenda & Mugenda, 2003). Face-to-face interviews afforded the interviewers the opportunities to observe the characteristics of the household and neighborhood. The face-to-face interviews also

allowed the interviewers to probe the respondents for clarification of answers and in turn, to explain the questions to the respondents. However, this had to be done in the same sequence, wording, and tone to all the respondents, to minimize interviewer bias and variability (Davis, Couper, Janz, Caldwell, & Resnicow, 2010).

3.8.2 Qualitative data collection method

The qualitative arm of the study comprised focus group discussions and key informant interviews. Focus groups were selected through purposive sampling for maximal variation to obtain different perspectives and comprehensive information and for their relevance to the topic being studied. Focus group discussions were used in addition to other research instruments because they are realistic, flexible, quick, inexpensive, and high in face validity (Onwuegbuzie & Collins, 2007). The six different focus group discussions (FGDs) consisted of six to eleven participants in each group **(Table 3.2)**. The participants were adults aged between 25 and 59 years and the moderator (researcher) employed an interview guide (Appendix 3.9) for the focus group discussions. The compositions of the six FGDs are listed in **Table 3.2.**

Table 3.2 Compositions of the Focus Group Discussions

Description	Group composition	Age range (Years)	Gender		Total number
			Men	Women	
Focus Group 1	Males	25 to 44	7	-	7
Focus Group 2	Females	25 to 44	-	11	11
Focus Group 3	Males	45 to 59	8	-	8
Focus Group 4	Females	45 to 59	-	9	9
Focus Group 5	Tenants	25 to 43	4	7	11
Focus Group 6	Landlords	32 to 52	4	2	6

There were four homogeneously sampled groups comprising of two all-male groups aged 25-44 years and 45-59 years and two all-female groups aged 25-44 years and 45-59 years. Two other groups were heterogeneous, comprising mixed male and female tenants whose ages ranged from 25 years to 43 years and the other heterogeneous group of mixed male and female landlords aged between 32 years and 52 years.

Participants at the FGDs were purposively selected by a veteran Korogocho-based social worker from all the nine villages in Korogocho to reflect diverse opinions, thoughts, beliefs, and experiences (Onwuegbuzie & Leech, 2007). The six focus groups consisted of enough participants in each group to allow data and

theoretical saturation of information related to the themes of the research (Onwuegbuzie, 2003). The researcher moderated the discussion using a prepared semi-structured interview guide (**Appendix 3.9**) while a note-taker took notes.

The FGDs lasted between forty-five minutes and one hour and the venue was a quiet, centrally located, and accessible room in Miss Koch Organization, a local NGO in Korogocho informal settlement. There were unobtrusive audio- and video-recordings of the discussions with prior permission and consent of the participants (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). The participants were assured of confidentiality and the recordings were only used to help enhance data analysis. Findings from the FGDs were incorporated into the interview schedules as alluded to earlier and the information from the FGDs was also useful for triangulation of data.

Key informant interviews were held with some stakeholders in their respective offices and organizations in Korogocho using the interview guide in Appendix 3.10. The interviews were also, unobtrusively audio- and video-recorded with the consent of the interviewees. Distractions were minimized and the tapes were played back to the participants to check if they wished for any portion to be edited. Participants were assured that their identities and comments would be treated as strictly confidential (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). The list of key informants who were interviewed for this study is presented in **Table 3.3**.

Table 3.3 Compositions of the Key Informant Interviews

Key informant(s)	Organization/Establishment	Gender
Chief	Korogocho Location	Male
Chairman	Korogocho Slum Upgrading Program	Male
Coordinator	Makwak Health Centre	Male
Village elders	Gitathuru, Grogan A, Grogan B, Highridge, Kisumu Ndogo, Korogocho A, Korogocho B, Ngomongo, Nyayo	Male (8) Female (1)
Community Health Workers (CHWs)	Korogocho informal settlement	Male (5) Female (5)
Field Coordinator	African Population and Health Research Center (APHRC)	Male
Catholic Priest	St John's Catholic Church	Male
Islamic cleric	Korogocho informal settlement	Male
Representative	Miss Koch (CBO)	Female
Representative	Tumaini Clinic	Male
Woman leader	Korogocho informal settlement	Female

The key informants were selected based on their position and influence in Korogocho informal settlement and the deep insight they had about relevant information that was required to enrich this study and achieve the stated objectives (AHRQ, 2012). The key informants provided information either on their role in the community or their ability to illuminate key information that complemented the data

collected with other research instruments. The audio- and video-taped transcripts from qualitative interviews were relayed back to the focus group discussants and key informants to check if their views and opinions were adequately reflected and where necessary, changes were made.

3.9 Logistical and Ethical Considerations

Ethical approval of the study was granted by Kenyatta University Ethics Review Committee (KU-ERC) through a letter with reference: KU/R/COMM/51/44 and dated 30th July 2012 following my application (PKU/031/I27 of 2012). Having satisfied the guidelines for Ethical Conduct of Biomedical Research involving Human Subjects in Kenya (2004), the study was given research clearance and authorization by the Kenya National Council for Science and Technology (NCST) through a Research Permit: NCST/RCD/12A/012/140.

Though the study was observational, it was strictly conducted in accordance with the Declaration of Helsinki (The World Medical Association, 2008), and local regulations because it involved human participants. No invasive procedures were carried out and all the participants provided voluntary, written, informed consent before participation (see Consent Form in **Appendix 3.1**).

The literate participants signed the consent forms while the consent forms were thumb-printed by the illiterate participants after due explanation in a comprehensible language. The participants were assured of anonymity and confidentiality. Participants' privacy was duly respected. Identities of people and involved institutions were also duly protected.

The researcher and trained research assistants conducted the interviews at convenient times and place for the participants. Focus group discussants, key informants, and some needy respondents were offered token compensation for their time and useful contributions to the study (Krueger & Casey, 2009).

Local authorities comprising the Chief of Korogocho location, sub-Chiefs, and elders were consulted and permission obtained before entry into Korogocho informal settlement. Before exit from the community, the cooperation of all the participants was appreciated and the leaders were informed and given feedback on the data collected.

3.10 Data Analysis

Following coding of quantitative data and entry in Microsoft Excel (2010) spreadsheet, the data were cleaned of entry errors and subsequently summarized and analyzed in IBM SPSS Statistics version 20.0 of August 2011. Explanatory variables (demographic, socio-economic, environmental, material, psychosocial, and behavioral factors) and outcome variables (SRH status and self-reported chronic health conditions) were summarized into frequencies, percentages, and means with standard deviation (SD). The associations between explanatory variables (independent and mediator variables) and indicators of health inequalities (SRH status and self-reported chronic health conditions) were examined by bivariate analysis with crude odds ratios (OR) and 95% confidence intervals (CIs). Chi-square was used in the analysis of categorical variables in logistic regression and Student's *t*-test for continuous variables.

Three measures of the magnitude of health inequalities were calculated and quantified in this study. The measures were health disadvantage, health gap, and health gradient. The purpose was to capture the dimensions of health inequalities for a more robust and comprehensive understanding of health inequalities in Korogocho informal settlement (Mnoz-Arroyo & Sutton, 2007).

The magnitude of health inequalities was measured using absolute prevalence differences and relative prevalence odds ratios for the outcome variables (SRH status and self-reported chronic health conditions) and expressed as health disadvantage and health gaps respectively. Concentration curves and associated concentration indexes were employed to estimate the magnitude of health inequalities as social health gradients.

According to Wagstaff, Paci, and van Doorslaer (1991), concentration index is an appropriate measure of health inequalities for at least three reasons. First, it reflects the social gradient in health. Secondly, unlike health gap, which ignores the middle socio-economic groups, concentration index incorporates the entire population and finally, the concentration index is sensitive to variations in the distribution of the population across the socio-economic spectrum. A limitation of the concentration index is the requirement of continuous ranking of an indicator of socio-economic status. The concentration curve was plotted with the cumulative proportion of poor SRH status as indicator of health inequalities on the y-axis against wealth quintiles as indicator of socio-economic status on the x-axis. **Figure 3.5** is an example of a concentration curve.

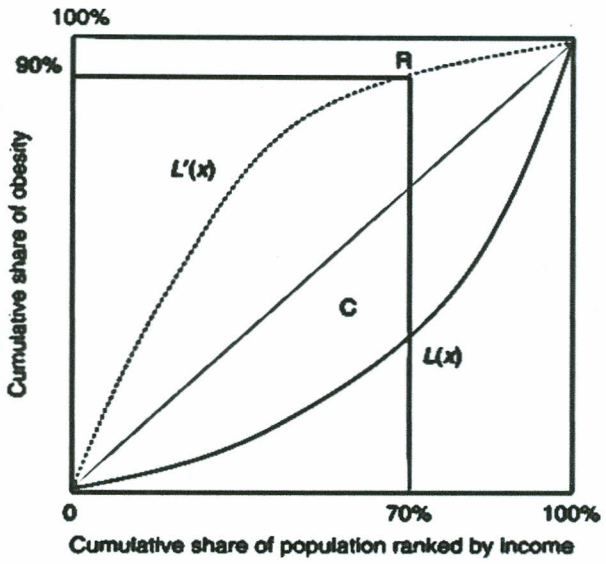


Figure 3.5 Concentration Curve Showing Socio-Economic Gradients in Obesity

Source: Zhang and Wang. (2007).

The same was done for self-reported chronic health conditions, the other indicators of health inequalities against wealth quintiles. If the health variable is equally distributed across socio-economic groups, the concentration curve coincides with the diagonal line of equality. The concentration curve lies below the line of equality if the adverse health variable is concentrated more among the rich which is referred to as pro-poor or progressive health inequality and it is associated with a positive concentration index.

Conversely, the concentration curve lies above the line of equality if the adverse health variable is pro-rich or regressive and hence, more concentrated among the poor. The concentration curve would then be negative. The further from the diagonal or line of equality the curve is, the greater the level of health inequalities.

Twice the area between the diagonal line and the concentration curve is the numerical value of the concentration index calculated from the formula below:

$$C = (p_1L_2 - p_2L_1) + (p_2L_3 - p_3L_2) + \ldots + (p_{T-1}L_T - p_TL_{T-1})$$

Where C is the concentration index, p is the cumulative percent of the sample population ranked by the socio-economic indicator,

L is the corresponding concentration curve ordinate, and

T is the number of socio-economic groups

The health concentration index is a measure of the extent to which health inequalities are systematically associated with socio-economic status. Values of the concentration index range from -1(when all the ill health is concentrated among the poorest or most disadvantaged) to +1(when all the ill health is concentrated among the richest or the most advantaged).

Variables were also subjected to multivariate analysis in this study. Criterion for inclusion of independent and mediator variables in the multivariate binary logistic regression model was $P < 0.20$ obtained at the level of bivariate analysis. The model estimated the adjusted odds ratios (AORs) of the independent associations between the independent variables (socio-economic and environmental determinants), mediators (material, psychosocial, and behavioral factors) and outcome variables (SRH/reported burden of chronic health conditions). At the final stage of logistic regression, both outcome variables were transformed into a single outcome variable. Logistic regression was also used to estimate the level of contribution of the mediators to health inequalities. Generally, except where otherwise stated, the level of

statistical significance was set at two-tailed $P < 0.05$ and 95% confidence intervals (CIs).

Qualitative data analysis was carried out concurrently with data collection from focus group discussions and key informant interviews that were audio- and video-taped. The iterative process of data collection and analysis continued until saturation where no new categories or themes emerged. A grounded theory approach (Glaser & Strauss, 1967) was used to analyze and synthesize the taped interviews after manual transcription and coding. Data was collected from focus groups and key informants until theoretical saturation was achieved. Data collection and analysis were done concurrently and questions were modified to enhance the understanding of emerging themes, which were subsequently used to generate theories through the process of induction. Computer-assisted qualitative data analysis software (CAQDAS) was not used for qualitative data management because of the relatively small data set and because of software limitation of not being able to capture the conceptual part of the analysis (Abdulaziz & Newman, 2010).

CHAPTER FOUR: RESULTS

4.1 Introduction

Complete data from interview schedules of 719 out of 810 (88.8%) consenting adult respondents aged between 25 and 59 years were eligible for further analysis (**Figure 4.1**).

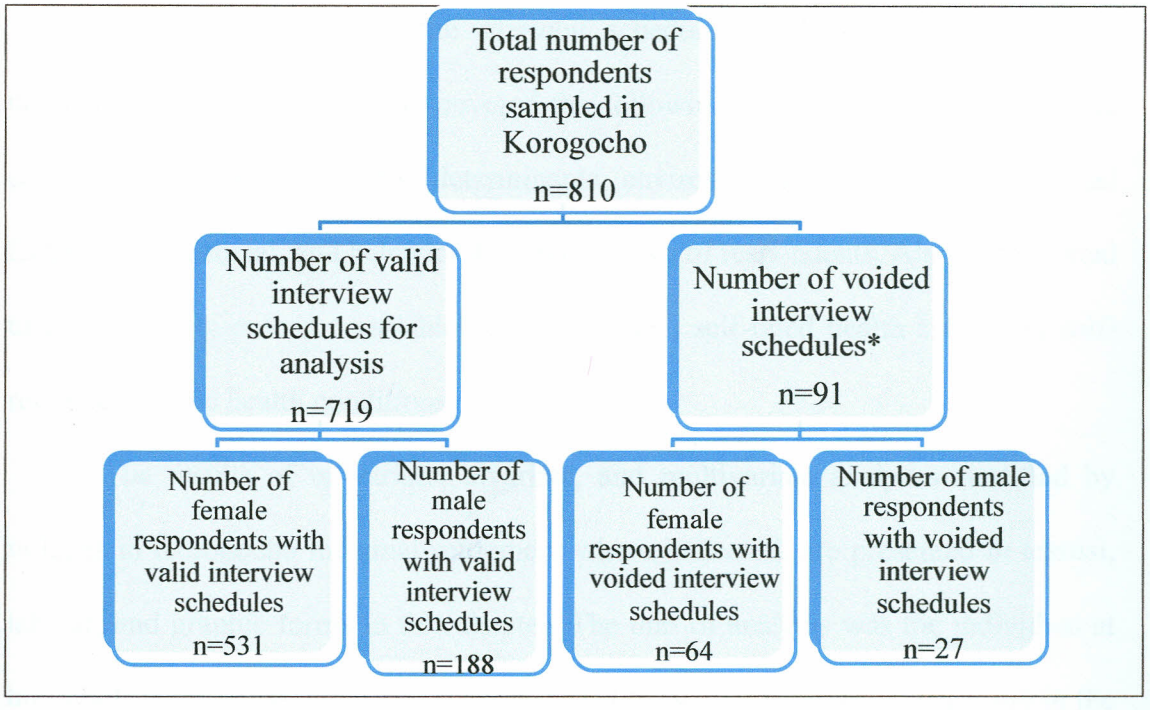


Figure 4.1 Derivation of Sample Population from Valid Interview Schedules

Note: *Most of the voided interview schedules were due to respondents not willing to respond to questions on important variables

The data from the remaining 91 respondents had to be voided because of incomplete or improperly filled interview schedules. There were no significant differences between the demographic characteristics of respondents whose data were further analyzed and those that were voided thereby making selection bias unlikely.

The study population consisted of 188 men (26.1%) and 531 women (73.9%) from all the nine villages in Korogocho informal settlement. Complementary information from six sequential focus group discussions and key informant interviews with stakeholders in the community is also presented. Qualitative interviews are presented in this section as quotes, paraphrased statements, and narratives.

Data were collected in the interview schedule at individual, household, and neighbourhood levels. The data covered the following thematic areas: demographic characteristics, socio-economic determinants, environmental determinants, material factors, psychosocial, and behavioral characteristics of respondents. Also, data related to the following outcome variables were collected: self-rated health status and self-reported chronic health conditions.

The results of univariate, bivariate, and multivariate analyses stratified by villages in Korogocho informal settlement where indicated, are presented in textual, tabular, and graphic forms in this chapter. The unit of analysis was the individual at household level. Some groups of variables had to be merged because numbers in the cells were too few for further analysis.

4.2 Background Characteristics of Respondents

Summary univariate statistics describing the background characteristics of respondents from the quantitative data collected are presented in this sub-section. The background characteristics comprise demographic, socio-economic, environmental, material, psychosocial, and behavioral factors.

4.2.1 Demographic characteristics

The demographic characteristics consisting of age, gender, marital status, and religion of the respondents whose data were eligible for further analyses and henceforth, referred to as the sample population, are captured in **Table 4.1.** Ethnicity was not included as earlier explained on page 64, in Chapter Three on Methodology.

Table 4.1 Demographic Characteristics of Respondents

Characteristics	n=719	%
Age in years		
25 - 34	435	60.5
35 - 44	175	24.3
45 - 54	85	11.8
55 - 59	24	3.4
Current marital status		
Never married	78	10.8
Married	457	63.6
Not married but living together	49	6.8
Separated/Divorced	81	11.3
Widowed	54	7.5
Gender		
Male	188	26.1
Female	531	73.9
Religion		
Catholic	204	28.4
Other Christian	351	48.8
Muslim	129	17.9
No religion	35	4.9

The mean age of the respondents plus or minus the SD was 34.20 ± 8.68 years. On the average in Korogocho informal settlement, male respondents were significantly older than female respondents (mean age of men, 35.87 ± 8.29 years versus (vs.) mean age of women, 33.62 ± 8.67; $P = 0.002$). However, in two of the nine villages: Grogan A and Korogocho B, female respondents were on the average,

older than the male respondents. The highest mean age of respondents was in Gitathuru village (38.58 ± 7.81 years) while Ngomongo village respondents had the youngest mean age (32.47 ± 8.27 years).

Female respondents outnumbered male respondents by almost three times. During focus group discussions, it was generally agreed that adult females were more in number than the adult males because more females than males migrate into Korogocho informal settlement from rural areas and from other areas in Nairobi. Also, females were more likely to remain in the settlement, rather than emigrate. Additionally, since the interviews took place only during the day for security reasons, many of the men were not available in their respective homes during the day because of work and social obligations.

Majority (457; 63.6%) of the respondents were married. Respondents were largely religious (684; 95.1%) and most (351; 48.8%) were non-Catholic Christians which is comparable to the total population in Korogocho informal settlement, suggesting that the study population was representative. Less than 5% of the respondents were atheists or agnostics.

4.2.2 Socio-economic characteristics of the respondents

An assessment of the respondents' socio-economic characteristics is presented in **Table 4.2.** Socio-economic variables were operationalized as highest level of education, employment status, occupation, income, and wealth quintiles, and described on page 65 in Chapter Three on Methodology.

Table 4.2 Socio-Economic Characteristics of Respondents

Characteristics	n=719	%
Highest level of school attended		
None	94	13.1
Primary	476	66.2
Secondary	130	18.1
College	15	2.0
Higher than college	4	0.6
Current employment status		
Not employed*	254	35.3
Employed, but an employee	97	13.5
Employed, self-employed	368	51.2
Occupation		
Nothing	214	29.8
Domestic service	41	5.7
Unskilled manual	97	13.5
Skilled manual	82	11.4
Sales and services	269	37.4
Clerical	3	0.4
Professional/technical/managerial	13	1.8
Average monthly income in Kenya Shillings (Kshs)		
Less than 5 000	599	83.3
5 000 to less than 10 000	90	12.5
10 000 to less than 15 000	15	2.1
15 000 to less than 20 000	6	0.8
20 000 or more	9	1.3
Wealth quintiles		
First (poorest)	43	6.0
Second	23	3.2
Middle	49	6.8
Fourth	193	26.8
Fifth (richest)	411	57.2

Note: *The respondents who belonged to the group "not employed" had not been engaged in any income-generating activity within the three months preceding the date of the interview for this study.

Most of the respondents had little or no formal education and about 80% of the respondents had less than eight years of schooling. Of the respondents who had no formal education, majority of them (85%) were female. The highest proportion of

illiterate respondents was in Highridge village (39.4%). Only a very small number of respondents (4 out of 719; 0.56%) had higher than college education. All the respondents with the highest level of education were aged between 25 and 44 years and 75% of them were men from two of the villages namely, Highridge and Korogocho B. No respondent in the oldest age category (55-59 years) had tertiary education.

Unemployment rate was as high as 35% on the average in Korogocho informal settlement. Unemployment rate was highest (52%) among the youngest age group of 25-34 year olds. Almost one-third of those employed were in the unregulated, informal market sector. Kisumu Ndogo village recorded the highest unemployment rate of 55.7% and Korogocho A village, the least (19.5%). Almost half of the respondents had no formal skills' training. Most of the unemployed were women. Of the unemployed, 92.5% were women compared to 73.9% women in the sample population.

Some key informants and focus group discussants said that many working-age residents do not have employment opportunities in the formal sector. Voicing the frustration of many adults in Korogocho informal settlement, a male member of one the focus group discussions said thus:

> *We are yet to benefit from KSUP. There is still no security of tenure for the poor. Indeed, many of us have to constantly contend with illegal eviction. Most houses are not habitable and unemployment rate is still very high. Capable men and women still roam the streets*

without employment or viable means of livelihood. The only achievement that KSUP can boast of is infrastructural development of some roads which may have benefited the rich with cars but definitely not the very poor among us. Are roads going to put food on the table for households or take care of us when we are ill?

Also, one of the key informants commented thus:

The high rate of unemployment among our people has left them with few options for earning a living. Many of them resort to unhealthy, less safe, and insecure means of livelihood such as prostitution, robbery, extortion, and trade in illicit goods including locally brewed liquor and hard drugs.

Most (84.6%) of the respondents in the professional/technical/managerial occupational class worked as technical staff for the many profit and not-for-profit NGOs that do business within Korogocho informal settlement such as APHRC and Jhpiego. Almost a third of the respondents had no occupation. Many of the respondents were casual workers who earned money only when work was available and got paid only on the days that they managed to secure work. Therefore, their monthly income had to be based on estimates of their daily wages. Almost a quarter of the respondents' households could be described with core poverty indicating that

the households satisfied the three dimensions of poverty: income poverty, material deprivation, and subjective poverty.

More than 95% of the respondents said that they earned less than Kshs 10,000 monthly, the current recommended minimum wage for workers in Nairobi. Gitathuru village had the poorest respondents with all of them estimating their monthly income to be less than Kshs 10,000. The highest earners (Kshs 20,000 or more per month) were from Grogan A, Grogan B, Highridge, Kisumu Ndogo, Korogocho A, Korogocho B, and Ngomongo villages. No respondent in the oldest age group reported earning more than Kshs 10,000 per month. The highest earners were aged between 35 and 54 years. Until March 2009, the retirement age for civil servants in Kenya was 55 years.

Three women in the 25-44 year old focus group openly admitted that they were commercial sex workers and that they needed the resources to help their numerous dependants. The key informants were quite worried about the level of prostitution among the female folk and criminality among the male folk. A man in the 25-44 year old focus group claimed to be a former member of the illegal, extortionist group *Mungiki.* He said:

> *Survival without a job was so difficult for me that I, with many other men in my age group had to join Mungiki for economic survival. Life improved after that with the steady stream of money that we were getting from various illegal deals like extortion until the Police made life very difficult for us again.*

Wealth quintiles were constructed from household ownership of durable items among the respondents and calculated using Principal Component Analysis (PCA), which was explained on pages 66-67, in Chapter Three on Methodology. Though socially and economically disadvantaged, majority of respondents from Korogocho informal settlement belonged to the highest relative-wealth quintile.

4.2.3 Environmental characteristics of the respondents

A description of the characteristics of the respondents' built environment and the distribution of and their access to social amenities is presented in **Table 4.3.**

Table 4.3 Characteristics of Respondents' Living Environment

Characteristics	n=719	%
Number of people sharing a room with the respondent		
No one	58	8.1
One person	64	8.9
More than one person	597	83.0
Type of fuel used for cooking at home*		
Not cooking at home	27	3.8
Charcoal	417	58.0
Kerosene	122	17.0
Paraffin	354	49.2
LPG§/natural gas	4	0.6
Main source of drinking water		
Tank	39	5.4
Well	9	1.3
Purchase water from hawkers	606	84.3
Public tap	6	0.8
Residence/compound/plot tap	44	6.1
Others†	15	2.1
Type of toilet/latrine facility used at home		
No facility/bush/field/'flying toilet'‡	26	3.6
Pit without slab/bucket/hanging toilet or latrine	274	38.2
Pit latrine with slab	241	33.5
Ventilated improved pit (VIP) latrine	62	8.6
Flush/Pour flush	116	16.1
Distance of residence from Dandora Municipal Dumpsite¶		
Very near	46	6.4
Near	240	33.4
Not very far	240	33.4
Very far	189	26.2
Don't know	4	0.6
Received health care when needed in the last year		
No, not at all	38	5.3
Yes, sometimes	385	53.5
Yes, always	173	24.1
Never needed it	123	17.1
Name of village in Korogocho		
Gitathuru	89	12.4
Grogan A	84	11.7
Grogan B	101	14.0
Highridge	99	13.8
Kisumu Ndogo	70	9.7
Korogocho A	41	5.7
Korogocho B	90	12.5
Ngomongo	95	13.2
Nyayo	50	7.0

Note: *Some respondents used more than one type of cooking fuel; No respondent used electricity for cooking; §LPG is liquefied natural gas; †'Others' include river; ‡'Flying toilet' refers to throwing away of feces in polythene bags; ¶Distance from Dandora Municipal Waste Dumpsite was subjectively estimated by the respondents.

In this study, if the respondent shared a room with more than one person, the room was assumed to be congested. More than 80% of the respondents reported room congestion. Congestion was worst among Gitathuru village (93.3%) respondents followed closely by Ngomongo village (91.6%) and Highridge village (85.9%) respondents. The least congested was Nyayo village (64%). The highest case of congestion was in 35-44 year age group and least in 55-59 year age group.

Most of the respondents in Korogocho informal settlement used polluting liquid and solid biomass fuels such as kerosene, paraffin, and charcoal for cooking rather than the more expensive but cleaner and energy-efficient alternatives such as electricity and gas. The highest percentage of charcoal users was in Gitathuru village (82%), and next highest was in Kisumu Ndogo village (72.9%). Ninety-six percent of respondents from Nyayo village used paraffin (the highest), followed by 84.3% of Kisumu Ndogo village respondents, and 69.5% of Ngomongo village respondents.

Only four respondents (0.6%) used gas for cooking and they were residing in Kisumu Ndogo, Korogocho B, and Ngomongo villages. None of the respondents used electricity, a form of clean and energy efficient energy for cooking. Most parts of Korogocho informal settlement are not formally linked to the national electric grid and the cost of electricity is prohibitive. According to one key informant: *"Only a few homes and commercial outfits in Korogocho use electricity, which they probably obtained through illegal connections."*

The main source of drinking water for the majority (84.3%) of respondents was water purchased from hawkers or much less often (6.1%) water piped to the residential plot. A few of the respondents sourced drinking water from tanks, wells, or

the Nairobi River. All Ngomongo village respondents had to purchase water because even though there were water pipes in their buildings, there was no water flowing in the pipes. Out of all nine villages in Korogocho informal settlement, the highest percentage of respondents with piped water in their plot was in Highridge village (38.6%). Apart from Ngomongo; Grogan A and Korogocho B villages reported the least proportion (13.6% each) of respondents with piped water. Only in Gitathuru and Grogan B villages did respondents draw water from wells. Majority (60.2%) of respondents who collected drinking water from tanks were in Korogocho B village.

Pit latrine was the most common type of sanitation facility available to the respondents. More than three-quarters of respondents used pit latrine in some form. The respondents who used pit latrine without slab were the most (38.2%). Those who used pit latrine with slab constituted 33.5% while 8.6% used ventilated improved pit (VIP) latrine. Some 66.1% of respondents with VIP were in Kisumu Ndogo village. Only a few (26 of 719; 3.6%) respondents and they were all from Korogocho B village, admitted that they were still using 'flying toilet' option for disposal of fecal waste. More than half of the respondents who had flush toilets in their homes were in Ngomongo village compared to slightly more than a third of the respondents who had flush toilets in their homes in Nyayo village. The remaining respondents with flush toilets were distributed in Grogan A, Grogan B, Kisumu Ndogo, and Korogocho B villages. No respondents in Gitathuru, Highridge, or Korogocho A villages had flush toilets in their homes.

Most of the respondents (73.2%) estimated that they lived in relatively close proximity to Dandora Municipal Waste Dumpsite. Nearly all (98.8%) of respondents

from Grogan A, unarguably the most westward of villages in Korogocho informal settlement, estimated that they live quite far from the Dumpsite which is part of Korogocho informal settlement's eastern border. Gitathuru, Highridge, and Ngomongo villages are situated to the east of Korogocho informal settlement near Dandora Municipal Waste Dumpsite.

Health seeking behavior was quite good among the respondents. Though only about a quarter of respondents could access health care every time they needed it, more than three-quarters of the respondents received health care at least some of the time when required. From the interviews with key informants, I learnt that health care facilities are few in Korogocho informal settlement. Most of the health care facilities are privately owned and charge user fees, which are unaffordable by the majority of residents in Korogocho informal settlement. The quality of care is essentially suboptimal. This is what the Catholic priest had to say about health care access and affordability in Korogocho informal settlement:

> *There is only one ill-equipped, community health center here and it is located in Korogocho B village. I have been woken up several times at night by the cries of women in labor who are abandoned at the gate of the privately owned hospital in this village because they cannot afford to pay for delivery. Many of them have given birth at the entrance of the hospital. I have had to either plead with the hospital staff to assist if the women are in advanced stage of labor*

or I transport them to Kariobangi or Pumwani Maternity Hospital, some kilometers away from Korogocho informal settlement.

I gathered from the focus group discussions that some patients, who are ill, are too weak to seek medical help by themselves. More than two-thirds of the participants at the 25-44 year old focus group discussion have had some training as community health workers (CHWs). Though volunteers, they are not incentivized by the authorities in Korogocho informal settlement to deliver the basic health care services that they were trained to give. As one of the CHWs said:

Many of us are volunteers who have been trained as CHWs but are not employed by the government. If we are paid like our colleagues in the Millennium Village Project in Sauri and given means of transportation such as bicycles, we would gladly help our people who are ill, to get to health facilities. We are willing to visit households regularly to provide basic medical care and assist in deliveries and health promotion campaigns.

In Grogan A village, 97.6% received health care in the year preceding the interview at least sometimes when they needed it. Similarly, 92.1% of respondents in Gitathuru and 90.2% in Korogocho A villages accessed health care when required some or all the time but much less so by respondents in Kisumu Ndogo village (55.7%), Nyayo village (66%), Grogan B village (66.3%), and Ngomongo village

(68.4%). Grogan B village had the highest number of respondents (14%). All other villages had more than the average proportion of respondents (11.1%) except Kisumu Ndogo, Korogocho A, and Nyayo villages.

Respondents were asked to select from options given, the factor that they thought was the most contributory cause of ill-health in Korogocho informal settlement. From **Figure 4.2**, poor sanitation was indisputably the factor most perceived by majority of the respondents in Korogocho informal settlement as a whole, to be the most contributory cause of ill-health.

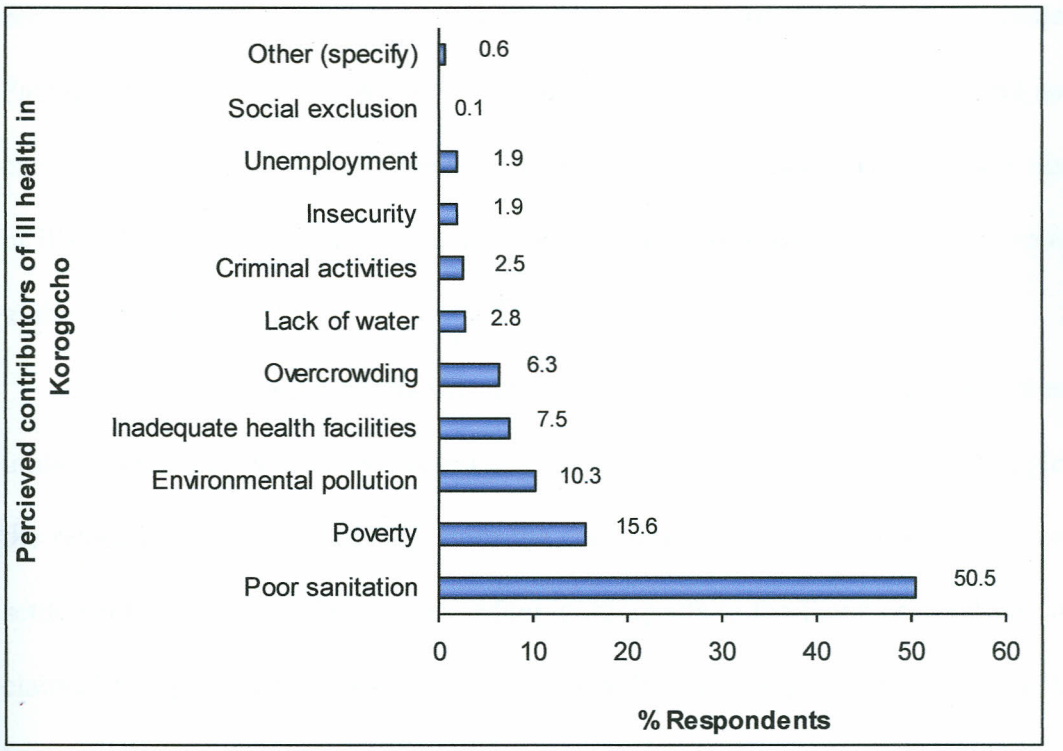


Figure 4.2 Respondents' Perceived Major Contributors to Ill-Health in Korogocho Informal Settlement

Poverty was the second most perceived contributor (15.6%) to ill-health by respondents in Korogocho informal settlement but particularly from Gitathuru village

where 44.9% of the respondents mentioned poverty as the cause of ill-health. Environmental air pollution was the third (10.3%) most attributed association with ill-health particularly by Ngomongo respondents. The factor of inadequate health facilities was mentioned by 7.5% of the respondents and mostly by respondents in Highridge village. The highest proportion (11%) of respondents in any age group who complained of inadequate health facilities was in the oldest age group (55-59 years old).

Lack of water did not rank high, as a contributory factor of ill-health. Pipe-borne water, though mostly purchased, was available to most of the respondents. Factors that depict lack of social cohesion such as criminality, insecurity, and social exclusion did not feature prominently among the respondents as contributory causes of ill-health. However, these three factors along with poverty were of much concern to the key informants.

Pollution from the landfill, Dandora Municipal Waste Dumpsite was of utmost concern to the Catholic priest who has been in the forefront of the struggle for the relocation of the landfill site from the current location near Korogocho informal settlement to a non-residential area. Many participants in the focus group discussions claimed that pollution from Dandora Municipal Waste Dumpsite was damaging their health. A few however, disagreed claiming that they source their livelihood from scavenging at the Dumpsite with no ill effects to their health. A 48-year-old female during the focus group discussion opined as follows:

I have been collecting materials for sale at Dandora (Dumpsite) since I was 18 years old and have never fallen ill. I am not married but living off the proceeds from the Dumpsite has enabled me to live a comfortable life and to feed, clothe, and educate my children.

4.2.4 Material characteristics of respondents

A description of the material assets of respondents comprising ownership of houses/structures/dwelling units, health insurance coverage, and other durable assets in addition to type of material of roofs, walls, and floors, is presented in **Table 4.4.**

Table 4.4 Material Characteristics of Respondents

Characteristics	n=719	%
Own the house/flat/structure that presently live in		
Tenant	584	81.2
No, but not rent paying	70	9.7
Yes	65	9.0
Ownership of*		
Wall clock	143	19.9
Radio	394	54.8
Television	402	55.9
Table	629	87.5
Chair	644	89.6
Bed	658	91.5
Refrigerator	11	1.5
Mobile phone	414	57.6
Bicycle	22	3.1
Motorcycle	3	0.4
Car	3	0.4
Land	23	3.2
Farm animals	16	2.2
Main material of the house floor		
Natural floor (mud/dung/sand)	342	47.6
Rudimentary floor (wood planks)	375	52.1
Finished floor (polished wood/vinyl/tiles/cement)	2	0.3
Main material of the house wall		
Wood/timber	23	3.2
Iron sheets/*mabati*	201	28.0
Mud	261	36.3
Cemented mud	112	15.5
Bricks/stone	122	17.0
Main material of the house roof		
Metal sheets/tin	167	23.2
Grass/thatch	1	0.1
Wood/timber	5	0.7
Iron sheets/*mabati*	502	69.8
Other (specify)†	44	6.2
Own health insurance coverage		
Yes	153	21.3
No	566	78.7

Note: *Some respondents' households owned more than one item. †Other roofing materials e.g. plastic or cardboard

The majority (81.2%) of respondents were tenants. In Ngomongo village, all the respondents, without exception, rented their rooms from absentee landlords who reside outside Korogocho informal settlement. Most (69%) of the respondents, who did not pay rent either because they own the house or family owns the house, were in Grogan B village. From the focus group discussions, I gathered that consanguineous sexual relationships are common in Grogan B village, which is a sort of closed community and where criminality and insecurity are rife.

Houses were made up mainly of non-durable materials. The typical house had some form of mud walls (51.8%), natural (47.6%) or rudimentary floors (52.1%), and iron (*mabati*) roof (69.8%). Less than 1% of respondents lived in houses with thatched roof. Only 17% of respondents lived in houses made of brick or stonewalls. Of all the brick/stone houses, 70.5% were in Ngomongo village, which also accounted for 96.8% of the houses with finished floors.

The most commonly owned household asset was a bed (91.5%), then a chair (89.6%). Gitathuru village had the highest proportion (75.3%) of respondents with television sets while Grogan B village had the lowest (31.7%). Almost 60% of respondents owned a mobile phone though not all were functioning. Only 3.9% of the respondents had wheeled mobility. Bicycles constituted the highest number (22 of 28; 78.6%) of wheeled mobility. Very few respondents had motorcycles (3 of 719; 0.4%) or cars (3 of 719; 0.4%) and they were all in Highridge, Korogocho B, and Ngomongo villages. The highest proportion of respondents who were land owners were in Kisumu Ndogo and Nyayo villages, though the land was upcountry.

More than three quarters of the respondents did not have any form of health insurance coverage. There were no respondents in Gitathuru village who subscribed to health insurance while contrastingly, 75% of Grogan A village respondents had access to health care insurance. White-collar (office) workers had the highest proportion of respondents with health insurance. A mere 7.3% of respondents in domestic service had health insurance coverage paid for by their employers. One hundred and forty-one (92.2%) of 153 health insurance owners subscribed to the public National Hospital Insurance Fund (NHIF) while the remaining (7.8%) subscribed to private health insurance.

4.2.5 Psychosocial characteristics of respondents

The indicator variables of psychosocial characteristics of respondents in this study were control/authority, trust among neighbors, and belonging to social groups or associations in Korogocho informal settlement. **Table 4.5** presents the psychosocial characteristics of the respondents.

Table 4.5 Psychosocial Characteristics of Respondents

Characteristics	n=719	%
Extent of control/authority asserted at home		
None at all	34	4.7
Not much	321	44.7
Much	364	50.6
Generally, trust the neighbors		
Not at all	101	14.0
Yes, but not a lot	339	47.2
Yes, a lot	255	35.5
Do not know/won't say	24	3.3
Belong to an association(s) in Korogocho		
No	469	65.2
Yes, one	228	31.7
Yes, more than one	22	3.1

Generally, a very high proportion (95.3%) of respondents in Korogocho informal settlement reported to be able to assert at least some control/authority at home. Male household heads were more likely than female household heads to report ability to assert control or authority in their households (87.2% vs. 29%). Majority (82%) of respondents in the oldest cohort of 55-59 year olds claimed that they had a lot of authority compared to 43% in the youngest cohort of 25-34 year olds.

Gitathuru village had the highest percentage (61.8%) of household heads interviewed and Highridge village, the least (24.2%). In total, 88.3% of males interviewed said they were heads of households. Majority of respondents who claimed that they had no authority in their households were from Ngomongo village. Every respondent from Grogan A, Korogocho B, and Nyayo villages exerted some control in the household. The proportion of female respondents without authority at home was very high (91.2%). In addition, relatively more respondents who did not

wield any authority at home were in the youngest age category of 25-34 year olds, were non-household heads, and were married.

Majority (82.7%) of the respondents indicated that they trusted their neighbors to some degree particularly in Kisumu Ndogo, Ngomongo, and Nyayo villages. Distrust of neighbors was most prevalent (43.8%) in Gitathuru village. A little more than one-third (34.8%) of the respondents indicated that they belonged to one or more association(s) in Korogocho informal settlement. However, from qualitative interviews, many people said that though they would have liked to be members of some of the social groups in Korogocho informal settlement, they were constrained by lack of finance and spare time for socialization. A 28-year-old female in one of the focus group discussions put it this way:

> *Belonging to an association is not one of my priorities at the moment. With no regular source of income and no obvious benefit from the social clubs around here, I would rather stay on my own and look for gainful employment to enhance my life.*

Ngomongo village (54.7%), Kisumu Ndogo village (42.9%), Nyayo village (36%), and Grogan B village (34.7%) had the highest proportion of respondents who belonged to social groups. From the focus group discussions, it was gathered that respondents in each of the four villages were close-knit with bonding social capital. Grogan A, Highridge, and Gitathuru villages had the least proportion of respondents who belonged to associations in Korogocho informal settlement (12.6%, 17.2%, and

24.4% respectively). On the issue of belonging to social associations, one Highridge respondent commented thus:

> *We are one people here. We look after ourselves and our less privileged brothers and sisters who are not as capable as ourselves. This community is about brotherliness. We do not need to belong to social clubs to carry out our obligations to our family members, friends, and neighbors.*

4.2.6 Behavioral characteristics of respondents

Behavioral characteristics and lifestyle of respondents are presented in **Table 4.6.** The behavioral and lifestyle characteristics of respondents were operationalized as food intake, fruit ingestion, physical exercise, sexual activity, homosexuality, unprotected sex, alcohol, smoking, and other substance abuse. Most of the respondents (97.4%) managed to eat at least one solid meal the day prior to the interview but only 3.5% afforded food at least three times the previous day. However, the nutritive value of the food taken and other food security issues were not investigated.

Table 4.6 Behavioral Characteristics of Respondents

Characteristics	n=719	%
Number of times the respondent ate solid food the day before interview		
None	19	2.6
Once	413	57.5
Two times	262	36.4
Three or more times	25	3.5
Take fruits		
Never	36	5.0
Yes, but less frequent than once a week	190	26.4
Yes, at least once weekly	493	68.6
Voluntarily take physical exercises		
No	435	60.5
Yes, but less frequently than daily	201	28.0
Yes, daily	83	11.5
Ever had sexual intercourse?		
Never	10	1.4
Yes, but not currently	28	3.9
Yes, with one regular partner only	659	91.6
Yes, usually with more than one regular partner	22	3.1
Prefer to have sex with someone of the same sex		
No	703	97.8
Yes	6	0.8
Not applicable*	10	1.4
Ever had unprotected sex (without condom) with a partner to whom you are not married?		
No	554	77.1
Yes	155	21.5
Not applicable*	10	1.4
Ever taken alcohol?		
Never	587	81.6
Yes, but previously	78	10.9
Yes, currently	54	7.5
Ever smoked?		
Never	656	91.2
Yes, but previously	19	2.7
Yes, currently	44	6.1
Type of substance used†		
None	660	91.8
Bhang	24	3.3
Miraa	38	5.3
Cocaine	10	1.4
Kuber	4	0.6
Ever used substance?		
No	660	91.8
Yes	59	8.2

Note: *Not applicable refers to respondents who have never engaged in sexual activity; †Seventeen respondents admitted to abusing more than one type of substance.

Almost half of respondents who went without food the previous day before the interview were from Grogan B village. Male respondents during the FGDs said that food was not their problem because cheap food was readily available in Korogocho informal settlement. One 27-year-old man during one of the focus group discussions commented thus: *"Korogocho (informal settlement) is one of the cheapest places to live in Nairobi. People eat anything including left-over ('ayona') breadcrumbs from the nearby bakery."*

The vast majority (95%) of respondents indicated that they take fruits regularly. Grogan B village had the highest proportion (13.8%) of respondents who did not take fruits, closely followed by respondents from Gitathuru village (12.36%), and Korogocho B village (10%). All the respondents in Grogan A, Kisumu Ndogo, Korogocho A, and Nyayo villages claimed that they take fruits at least some of the time.

Apparently, though many respondents admitted that they are obligated to walk long distances to places outside Korogocho informal settlement, only just over a third voluntarily undertook leisure-related physical exercises. Relatively high proportions of Gitathuru village and Grogan A village respondents (77.5% and 75% respectively) reported regular, voluntary physical exercises. Conversely, 92% of Nyayo village respondents, 84.3% of Kisumu Ndogo village respondents, and 82.1% of Ngomongo village respondents admitted that they did not voluntarily undertake physical exercise. Respondents attributed their unwillingness or inability to undertake voluntary physical exercise during qualitative interviews to having more important things to think about and having to undertake physical exertion mandatorily during the course

of their livelihood activities. Respondents in the oldest age group (55-59 years old) had some additional reasons for not exercising regularly. A 59-year-old woman made one of the most poignant statements below:

> *I am an old woman. Do you expect me to go and be jumping up and down at my age? Even if I had the ability and the time, there is hardly enough space or recreational facilities to do any reasonable exercise. Above all, Korogocho (informal settlement) is very insecure and I would be courting trouble like rape, which is quite common here, if I expose myself unnecessarily. Instead, I prefer to use my time for more rewarding activities to put food on the table for my orphaned grandchildren.*

The vast majority (98.6%) of the respondents had been sexually active at least some of the time. Most (91.6%) of the sexually active respondents said that they had been faithful to their partners. A few (1.4%) of the respondents had never indulged in sexual activity and most (90%) of the virgins had never been married. All the virgins were male and were residing in Highridge village. Almost all the respondents (97.8%) said that they are heterosexual. Less than 3% admitted to being gay (homosexual) or bisexual and they resided in Grogan A, Grogan B, Highridge, Korogocho A, and Nyayo villages. Most respondents (77.1%) practiced safe sex and used condom with partners to whom they were not married. The highest proportion (27%) of

respondents who practiced unprotected sex with casual partners was in 25-44 year old group.

Out of all the respondents, 81.6% claimed to be teetotalers. The villages with the highest proportion of teetotalers were Highridge (96%), Grogan A (94.1%), and Korogocho A (90.2%). Grogan B village (36.6%) and Kisumu Ndogo village (35.7%) had the highest proportions of respondents who had ever taken alcohol. Respondents who were older than 54 years of age had the highest proportion of imbibers of alcohol.

Most respondents (91.2%) said they were averse to smoking cigarettes. The highest percentages of non-smokers were from Ngomongo (97.9%), Korogocho B (96.7%), and Grogan A (96.4%) villages. Respondents who had ever smoked were mostly from Grogan B (18.8%), Nyayo (18%), and Gitathuru villages (13.5%). There were more smokers among men than among women (22.1% vs. 2.7%). The highest percentage of smokers (11.1%) was among the 55-59 year olds and the lowest (4.8%) among the 25-34 year olds.

Common substances of abuse in Korogocho informal settlement other than alcohol and cigarettes were *bhang, miraa,* cocaine, *and kuber.* Only 8.2% of respondents had ever used *bhang*, *miraa*, cocaine or *kuber. Miraa* was the most common (64.6%) and cocaine the least common (17%) among substance abusers. Gitathuru village respondents recorded the highest prevalence of substance abuse at 15.7%, then Nyayo village (10%), Korogocho A village (7.3%), and Highridge village (7.1%). In Ngomongo village, 97.9% of respondents said they had never used any of the named substances. Similarly, 97.6% of Grogan A village respondents and

95.6% of Korogocho B village respondents had never taken any of the named substances. Only in Gitathuru and Grogan B villages, did a higher proportion of female than male respondents abuse one or more of the named substances. Substance abuse in general, was highest (12%) among the oldest respondents (55-59 years age group) but the highest proportion (5.3%) of cocaine use specifically, was in the youngest age group (25-34 years).

4.3 Prevalence of the Outcome Variables

The two outcome variables for this study were SRH status and self-reported chronic health conditions.

4.3.1 Prevalence of self-rated health status among respondents

The exploded pie chart below (**Figure 4.3**) illustrates the proportion of SRH status in ordinal scale among respondents in Korogocho informal settlement.

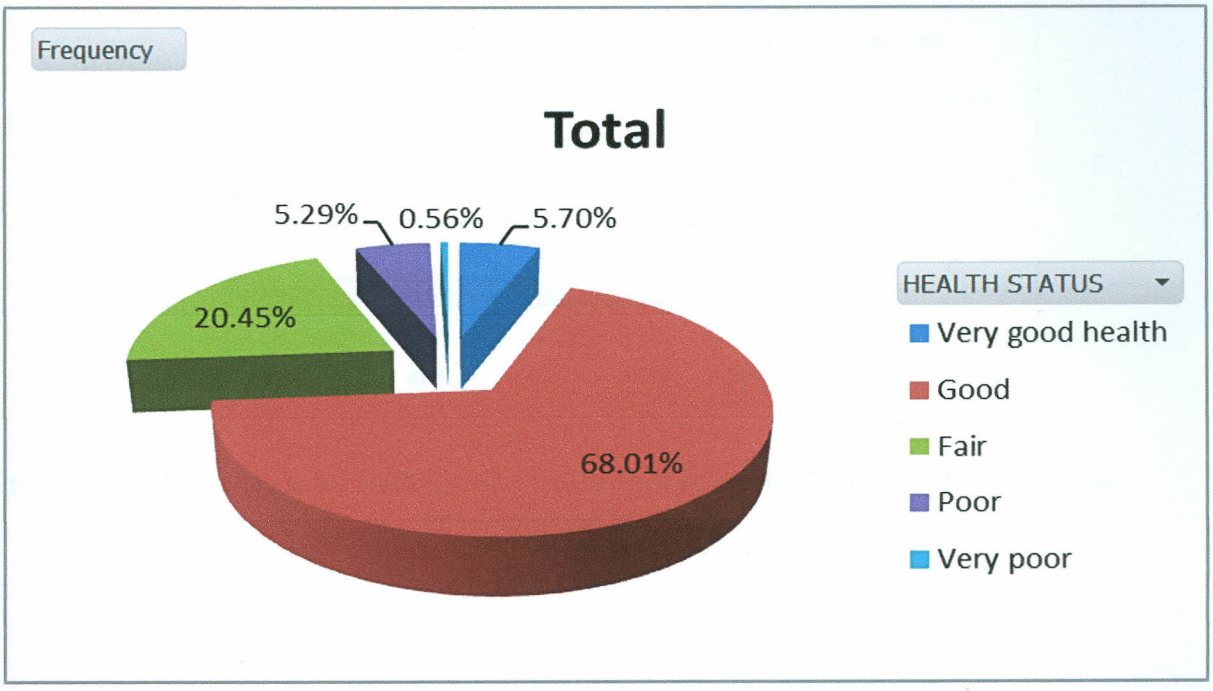


Figure 4.3 Prevalence of Self-Rated Health Status in Korogocho Informal Settlement

Respondents tended to avoid the extremes in their assessment of their health status with very few respondents (n = 45; 6.26%) rating their health status as either very good or very poor. By far, the majority of respondents (n = 489; 68%) in Korogocho informal settlement had good SRH status. The distribution of SRH status in each of the villages is shown in **Figure 4.4**.

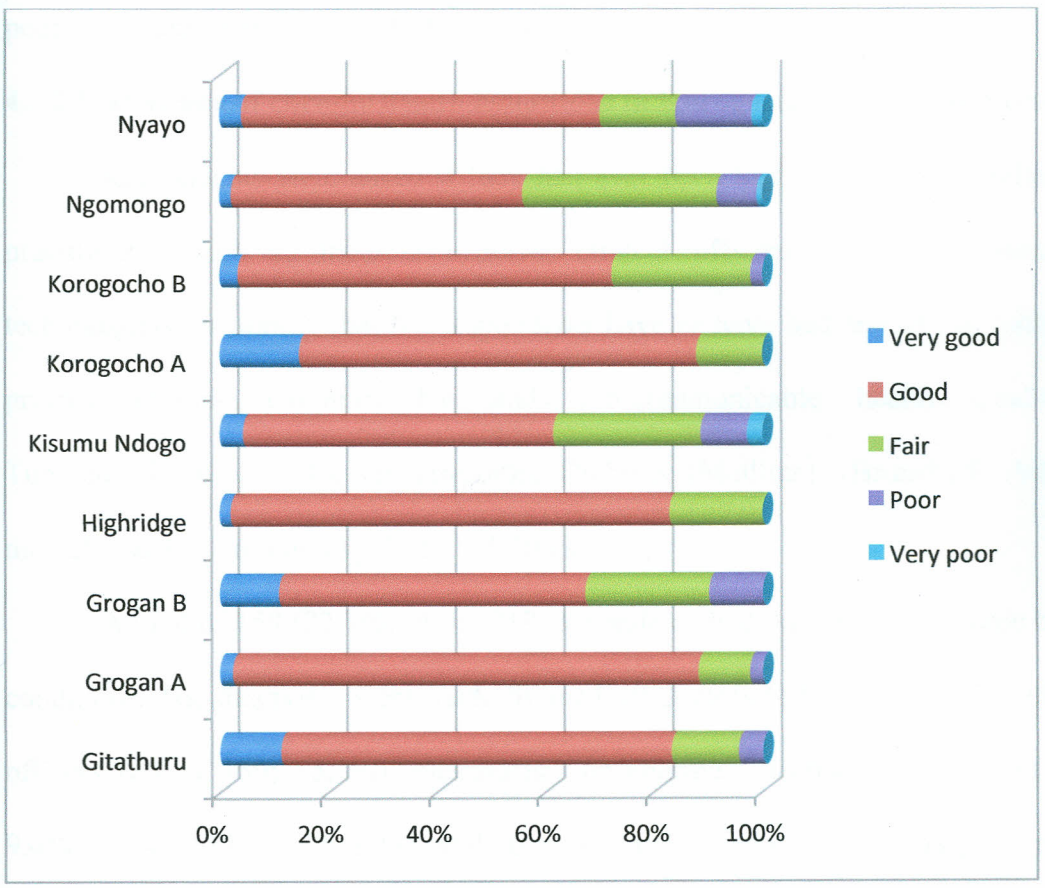


Figure 4.4 Prevalence of Self-Rated Health Status in the Villages of Korogocho Informal Settlement

Only in Gitathuru, Grogan B, and Korogocho A villages did more than 10% of respondents assess their health as very good. Conversely, only in Kisumu Ndogo, Ngomongo, and Nyayo villages did respondents assess their health as very poor.

After dichotomizing SRH status into good (very good and good) and poor (fair, poor, and very poor), the number of respondents who belonged to the good SRH status category (n=530; 73.7%) was almost triple the number of respondents in the poor SRH status category (n=189; 26.3%).

4.3.2 Prevalence of chronic health conditions in Korogocho informal settlement

Respondents were asked if they had ever been told by orthodox health care practitioners such as medical officers, clinical officers, pharmacists/pharmacy technologists, or nurses, that the respondents have or have had any of the following priority chronic communicable and non-communicable health conditions: Tuberculosis, HIV/AIDS, Hypertension, Diabetes (Mellitus), (Bronchial) Asthma, mental disorders, or any physical disabilities.

A total of 159 (22.1%) of the 719 respondents had one or more chronic health conditions. The diagnoses were made by medical doctors (12 of 159; 7.6%); clinical officers (88 of 159; 55.3%); pharmacists or pharmacy technologists (15 of 159; 9.4%); nurses (35 of 159; 22%); and others (only medical card or prescription paper, 9 of 159; 5.7%). The prevalence of each of the seven priority chronic health conditions: TB, HIV/AIDS, Hypertension, Diabetes, Asthma, Mental Disorders, and Physical Disabilities as reported by the respondents in Korogocho informal settlement is displayed in the horizontal bar chart in **Figure 4.5**.

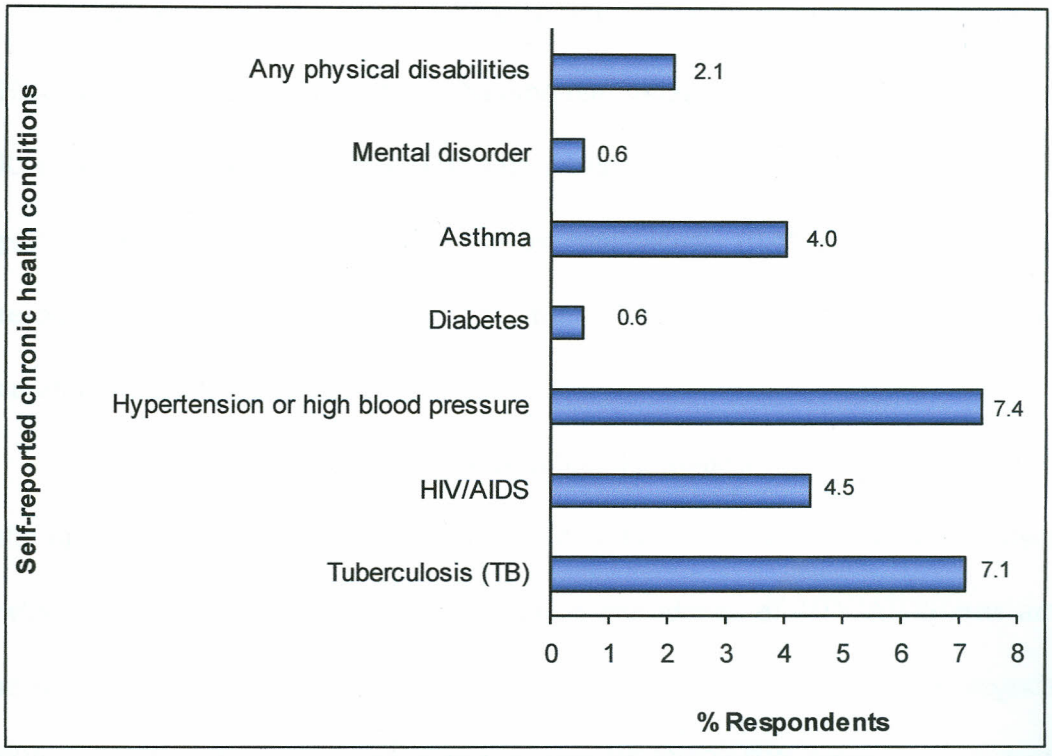


Figure 4.5 Prevalence of Self-Reported Chronic Health Conditions in Korogocho Informal Settlement

Hypertension was the most prevalent (7.4%) chronic health condition reported by the respondents in Korogocho informal settlement. The prevalence of Hypertension, an NCD was higher than the prevalence of TB (7.1%), a chronic communicable disease among respondents in Korogocho informal settlement. Hypertension was most prevalent among Kisumu Ndogo village respondents (15.7%) followed by Nyayo village respondents (10%). As previously stated, lack of voluntary physical exercise and smoking, which are risk factors for Hypertension, were commonly reported by Kisumu Ndogo and Nyayo respondents. The prevalence of Hypertension was above 3% in all the villages.

The highest reported prevalence of TB was among respondents from Grogan B village (13.9%), followed by Ngomongo village (10.5%). No respondent in Korogocho A village reported TB. The group of 35-44 year olds had the highest prevalence (5.9%) of TB and the least prevalence (0.6%) of TB was in the respondents older than 54 years. The third most prevalent (4.5%) chronic health condition was HIV/AIDS.

Grogan B village respondents who had the highest prevalence of TB also had the highest prevalence of HIV/AIDS (11.9%), two chronic communicable diseases, which commonly coexist. The next highest prevalence of HIV/AIDS was among respondents in Ngomongo village (7.4%) followed by respondents in Korogocho B village (6.7%). There was no reported case of HIV/AIDS among respondents in Nyayo and Korogocho A villages. HIV/AIDS prevalence was highest (5.7%) among respondents in the age group 45-54 years followed by 1.3% of 25-34 year olds. There was no report of HIV/AIDS among the oldest age group (55-59 years) and among married respondents.

Asthma was the next most frequently (4%) reported chronic health condition. Ngomongo village respondents had the highest (8.4%) reported prevalence of Asthma followed by Gitathuru (6.7%) and Highridge (5.1%); the three villages closest to Dandora Municipal Waste Dumpsite. Asthma was reported in all the villages in Korogocho informal settlement. The following remark made during one of the focus group discussions by a resident of Ngomongo summarizes the general feeling of residents:

We are really suffering in Ngomongo. The stench and the resulting air pollution from Dandora (Dumpsite) are sickening. Many of us suffer from breathing problems especially asthma. If something is not done urgently about this danger to our collective health, the consequences will be devastating and the government should be blamed.

The reported prevalence of all the other conditions combined was not up to 4% of the total study population in Korogocho informal settlement. Diabetes was reported only in Nyayo (4%) and Grogan B (2%) villages. The prevalence of physical disabilities was highest in Grogan A (4.8%), then Kisumu Ndogo (4.3%) and Korogocho B (3.3%) villages. There were no reports of physical disabilities from Korogocho A and Nyayo villages. Mental disorders, which were mild and associated with substance abuse, had the highest (6%) reported prevalence among respondents from Nyayo village. Korogocho B village was the only other village apart from Nyayo, where respondents reported mental disorders.

Family history of chronic health conditions in general, varied from 4% in Grogan B village to 15.9% in Ngomongo village. Asthma was the commonest chronic health condition among family members. Ngomongo and Gitathuru villages had the highest prevalence of Asthma in family members (26.8% each). The highest prevalence of more than one chronic health condition (co-morbidities) was in the oldest age group (55-59 years: 41.4%); followed progressively by 32.6% in the next

age group (45-54 years); 16.8% in 35-44 year age group; and the least (15.9%) in the youngest age group (25-34 years).

4.4 Association of Exposure Variables with Health Inequalities

The associations of demographic, socio-economic, environmental, material, psychosocial, and behavioral variables with the two outcome variables (SRH status and self-reported chronic health conditions) that are indicators of health inequalities in this study, are presented in this subsection. Odds ratio was the measure of effect size used to determine the bivariate associations between the exposure variables and the outcome variables and presented in the running contingency tables below.

4.4.1 Association of demographic variables with self-rated health status

The association between demographic variables consisting of age, gender, marital status, and religion and the outcome variable: SRH status is presented in **Table 4.7**. Differences in age, marital status, and gender among the respondents in Korogocho informal settlement were significantly associated with health inequalities. However, it was only religion out of the four demographic variables that was not significantly associated with SRH status.

Table 4.7 Health Inequalities from Association of Demographic Variables with Self-Rated Health Status

Variables	Poor (N=189)		Good (N=530)		OR	95% CI		*P* value
	n	%	n	%		Lower	Upper	
Age group in years								
25 - 34	102	23.4	333	76.6	3.27	1.42	7.49	**0.005**
35 - 44	49	28.0	126	72.0	2.57	1.08	6.11	**0.033**
45 – 54	26	30.6	59	69.4	2.27	0.90	1.11	0.082
55 - 59	12	50.0	12	50.0	Reference			
Current marital status								
Never married	11	14.1	67	85.9	3.58	1.54	8.33	**0.003**
Not married but living together	10	20.4	39	79.6	2.29	0.94	5.57	0.067
Separated/Divorced	19	23.5	62	76.5	1.92	0.90	4.08	0.090
Widowed	20	37.0	34	63.0	Reference			
Married	129	28.2	328	71.8	1.50	0.83	2.70	0.180
Gender								
Male	39	20.7	149	79.3	1.50	1.01	2.24	**0.046**
Female	150	28.2	381	71.8	Reference			
Religion								
Catholic	57	27.9	147	72.1	1.01	0.69	1.48	0.947
Other Christian	99	28.2	252	71.8	Reference			
Muslim	26	20.2	103	79.8	1.55	0.95	2.54	0.076
No religion	7	20.0	28	80.0	1.57	0.67	3.72	0.303

Respondents in the oldest age group (55-59 years) had the highest prevalence of poor SRH status. Relative to the youngest respondents aged 25-34 years, the respondents in the oldest age group were significantly more likely to have poor SRH status (OR, 3.27; 95% CI, 1.42 to 7.49; ***P* = 0.005**). Also, the oldest age group was significantly more likely to have poor SRH status than respondents aged 35-44 years (OR, 2.57; 95% CI, 1.08 to 6.11; ***P* = 0.033**). Though the odds of poor SRH status among 55–59 year old respondents was more than twice the odds of respondents' poor SRH status in the 45–54 year age group, the difference was not statistically significant (OR, 2.27; 95% CI, 0.90 to 1.11; $P = 0.082$).

Respondents who were never married were the only group who, when compared to widowed respondents, had significantly better SRH status (OR, 3.58; 95% CI, 1.54 to 8.33; ***P* = 0.003**). The vast majority (83.3%) of never married respondents belonged to the youngest age group (25–34 years). The widowed had the poorest SRH status. Married respondents and the respondents in 'come-we-stay' relationship i.e. not married but living together, did not differ statistically from the widowed in the self-rating of their health status.

The prevalence of poor SRH status was higher among females than among males. The odds of females having poor SRH status were one and a half times the odds of men reporting poor SRH status but the difference was barely statistically significant (OR, 1.50; 95% CI, 1.01 to 2.24; ***P* = 0.046**). Irrespective of whether respondents were religiously inclined or not, the difference in the prevalence of poor SRH status between the groups was not statistically significant, though other (non-Catholic) Christians were most likely to have poor SRH status.

4.4.2 Association of demographic variables with self-reported chronic health conditions

The seven priority chronic communicable and non-communicable health conditions were Tuberculosis, HIV/AIDS, Hypertension, Diabetes (Mellitus), (Bronchial) Asthma, mental disorders, or any physical disabilities. **Table 4.8** presents the association of demographic characteristics with prevalence of self-reported chronic health conditions among respondents in Korogocho informal settlement. Age and current marital status of respondents were significantly associated with prevalence of self-reported chronic health conditions. There was no significant statistical association between gender or religion and prevalence of self-reported chronic health conditions.

Table 4.8 Health Inequalities from Association of Demographic Variables with Self-Reported Chronic Health Conditions*

	¶Present (n=159)		¶Absent (n=560)			95% CI		
Variables	**N**	**%**	**N**	**%**	**OR**	**Lower**	**Upper**	***P* value**
Age in years								
25 - 34	79	18.2	356	81.8	3.47	2.12	5.69	**<0.0001**
35 – 44	35	20.0	140	80.0	3.08	1.75	5.43	**0.0001**
45 – 54	37	43.5	48	56.5	Reference			
55 – 59	8	33.3	16	66.7	1.54	0.60	3.99	0.372
Current marital status								
Never married	11	14.1	67	85.9	5.25	2.28	12.07	**0.0001**
Not married but living together	10	20.4	39	79.6	3.36	1.40	8.08	**0.007**
Separated/Divorced	21	25.9	60	74.1	2.46	1.19	5.11	**0.016**
Widowed	25	46.3	29	53.7	Reference			
Married	92	20.1	365	79.9	3.42	1.91	6.12	**<0.0001**
Gender								
Male	33	17.6	155	82.4	1.46	0.96	2.24	0.081
Female	126	23.7	405	76.3	Reference			
Religion								
Catholic	42	20.6	162	79.4	1.23	0.81	1.87	0.327
Other Christian	85	24.2	266	75.8	Reference			
Muslim	24	18.6	105	81.4	1.40	0.84	2.32	0.195
No religion	8	22.9	27	77.1	1.08	0.47	2.46	0.858

Note: *The selected chronic health conditions were TB, HIV/AIDS, Hypertension, Diabetes, Asthma, mental disorders, and physical disabilities; ¶Denotes presence or absence of the chronic health conditions

Respondents in the 45-54 years age group reported the highest prevalence of chronic health conditions particularly, Hypertension (10.6%), HIV/AIDS (8.2%), Asthma (4.7%), and physical disabilities (5.9%). The 45-54 year olds also had significantly higher odds of reporting chronic health conditions when compared to the younger age groups (45-54 year olds vs. 25-34 year olds, OR, 3.47; 95% CI, 2.12 to 5.69; ***P* < 0.0001**; 45 - 54 year olds vs. 35 - 44 year olds, OR, 3.08; 95% CI 1.75 to 5.43; ***P* = 0.0001**). Though the prevalence of self-reported of chronic health conditions (33.3%) among 55-59 year olds was lower than the prevalence (43.5%)

among 45-54 year olds, the difference was not statistically significant (OR, 1.54; 95% CI, 0.60 to 3.99; $P = 0.372$).

Hypertension was the commonest chronic health condition among all the age groups except the youngest age group comprising 25-34 year olds among whom Tuberculosis was the most common. The 25–34 year olds also reported the highest prevalence of mental disorders that were mostly substance abuse-related mental disorders. Respondents in the oldest age group reported the highest prevalence of co-morbidities. Diabetes was not reported by any of the respondents as a lone health condition except as co-morbidity, commonly with Hypertension and Tuberculosis.

Widowed respondents had the highest odds of reporting chronic health conditions compared to the others. The odds of a widow or widower reporting any of the chronic health conditions were significantly higher than those of respondents who had never been married (OR, 5.25; 95% CI, 2.28 to 12.07; $\boldsymbol{P = 0.0001}$), than those who were married (OR, 3.42; 1.91 to 6.12; $\boldsymbol{P < 0.0001}$), than those who were co-habiting but not legally married (OR, 3.36; 95% CI, 1.40 to 8.08; $\boldsymbol{P = 0.007}$), and than those who were separated or divorced (OR, 2.46; 95% CI, 1.19 to 5.11; $\boldsymbol{P = 0.016}$).

The highest prevalence of HIV/AIDS was among the widowed respondents (9.3%) who also had the highest prevalence of Hypertension and Asthma (9.3% each). Tuberculosis was most reported by the never married respondents. No married respondents reported HIV/AIDS. Females reported higher prevalence of chronic health conditions than males but the difference was not statistically significant (OR, 1.46; 95% CI, 0.96 to 2.24; $P = 0.081$). Females also reported higher prevalence than males, of HIV/AIDS, Hypertension, Diabetes, Asthma, physical disabilities and co-

morbidities in general. However, the prevalence of Tuberculosis and mental disorders was higher in males.

Though other (non-Catholic) Christians reported the highest prevalence (24.2%) of chronic health conditions, there were no statistically significant differences in the prevalence of chronic health conditions when compared to other religious groups. Catholics reported the highest prevalence of Hypertension (6.9%) and non-Catholic Christians reported the highest prevalence of HIV/AIDS (3.1%) and mental disorders (0.6%). The prevalence of Asthma was highest among Muslims (7%) while respondents who do not profess any religious beliefs reported the highest prevalence of Tuberculosis (5.9%) and physical disabilities (2.9%).

4.4.3 Association of socio-economic variables with self-rated health status

The association between the five socio-economic variables and the outcome variable: SRH status is presented in **Table 4.9.** Of all the five socio-economic variables: highest level of education, employment status, occupation, income, and wealth, only occupation was significantly associated with poor SRH status.

Table 4.9 Health Inequalities from Association of Socio-Economic Variables with Self-Rated Health Status

Variables	Poor (n=189)		Good (n=530)		OR	95% CI		*P* value
	n	%	N	%		Lower	Upper	
Highest level of school attended								
None	26	27.7	68	72.3	Reference			
Primary	129	27.1	347	72.9	1.03	0.63	1.69	0.911
Secondary	33	25.4	97	74.6	1.12	0.62	2.05	0.703
Tertiary	1	5.3	18	94.7	6.88	0.87	54.20	0.067
Current employment status								
Unemployed	76	29.9	178	70.1	Reference			
Employee	25	25.8	72	74.2	1.23	0.73	2.09	0.443
Self-employed	88	23.9	280	76.1	1.35	0.95	1.95	0.095
Occupation								
Nothing	61	28.5	153	71.5	1.21	0.76	1.93	0.413
Unskilled manual/domestic services	45	32.6	93	67.4	Reference			
Skilled manual/ clerical/ sales and services	83	23.4	271	76.6	1.58	1.03	2.44	**0.038**
Professional/ technical/ managerial	0	0.0	13	100.0	13.14	0.76	225.98	0.076
Average monthly income in Kenya Shillings								
Less than 5 000	159	26.5	440	73.5	1.01	0.61	1.66	0.980
5 000 to less than 10 000	24	26.7	66	73.3	Reference			
10 000 or more	6	20.0	24	80.0	1.45	0.53	3.99	0.467
Wealth quintiles								
First (Poorest)	11	25.6	32	74.4	1.10	0.54	2.26	0.789
Second	5	21.7	18	78.3	1.37	0.50	3.76	0.548
Third	13	26.5	36	73.5	1.05	0.54	2.05	0.886
Fourth	47	24.4	146	75.6	1.18	0.80	1.75	0.415
Fifth (Richest)	113	27.5	298	72.5	Reference			

Respondents' SRH status was reported as very good, good, fair, poor, or very poor but these categories were eventually dichotomized into good and poor as previously explained in pages 70 and 132 for the purpose of further bivariate analysis. There was social gradient in SRH status among Korogocho informal settlement's respondents with progressively better SRH status in a step-wise manner starting from respondents without any formal education to respondents with progressively higher levels of education.

However, the gradient was not statistically significant though the odds of respondents with no formal education having poor SRH status was more than six times the odds of poor SRH status in respondents who had a minimum of tertiary education (OR, 6.88; 95% CI, 0.87 to 54.20; $P = 0.067$). This could have been because of the very few numbers in some of the cells. For example, only one respondent out of 19 (5.3%) who had tertiary education had poor SRH status. However, even after the cells containing number of respondents with post-primary education were merged into one, the difference was still not statistically significant when compared to the respondents without formal education who had the highest prevalence of poor SRH status.

The highest prevalence (29.9%) of poor SRH status was among the unemployed compared to the prevalence (25.8%) among respondents who were employees and the lowest prevalence (23.9%) among self-employed respondents in Korogocho informal settlement. None of the differences were statistically significant. Seven occupational types were collapsed into four groups for comparison so as to ensure that the numbers of people in the cells were not too few for further analyses

but, some cells still had few numbers. The unskilled workers consisting of petty traders, domestic, and other casual workers had the highest prevalence (32.6%) of poor SRH status. The odds of the unskilled workers having poor SRH status were significantly higher than the odds of skilled workers such as clerks and managers having poor SRH status (OR, 1.58; 95% CI, 1.03 to 2.44; ***P* = 0.038**). No respondents belonging to the group of professional/technical/managerial occupation had poor SRH status, but this was not statistically significant when compared to unskilled respondents (OR, 13.14; 95% CI, 0.76 to 225.98; $P = 0.076$).

The income groups of respondents were reduced from five to three for the purpose of analyses because there were too few people in the higher income groups. The proportion of poor SRH status did not vary much between the three income groups with the highest prevalence being among respondents with estimated monthly income of Kshs 5,000 to less than Kshs 10,000. There were no significant associations between respondents' estimate of their monthly income and the odds of poor SRH status. However, before dichotomization of SRH status into good or poor, there was an obvious gradient across income groups. The number of respondents who had very good SRH status increased in a stepladder fashion from the least to the highest income earners. The prevalence of very good SRH status was 5% in the lowest income learners (less than Kshs 5,000 monthly) through 6.7%, 13.3%, 16.7% in the income groups Kshs 5,000 to less than Kshs 10,000; Kshs 10,000 to less than Kshs 15,000; Kshs 15,000 to less than Kshs 20,000 respectively. The prevalence of very good SRH status was 22.2% in the highest income earners (Kshs 20,000 or more, monthly).

There were no statistically significant associations between the wealth quintiles to which respondents belonged and SRH status. It was counterintuitive to find that the highest prevalence of poor SRH status was among respondents in the fifth (richest) wealth quintile.

4.4.4 Association of socio-economic variables with self-reported chronic health conditions

The analyses of the association between socio-economic variables and the period prevalence of selected chronic health conditions among respondents in Korogocho informal settlement are presented in **Table 4.10.** Of the five socio-economic variables, only occupation of respondents was significantly associated with prevalence of self-reported chronic health conditions.

Table 4.10 Health Inequalities from Association of Socio-Economic Variables with Self-Reported Chronic Health Conditions*

Variables	Present (n=159)		Absent (n=560)		OR	95% CI		*P* value
	n	%	N	%		Lower	Upper	
Highest level of school attended								
None	23	24.5	71	75.5	Reference			
Primary	108	22.7	368	77.3	1.10	0.66	1.85	0.708
Secondary	27	20.8	103	79.2	1.24	0.66	2.33	0.512
Tertiary	1	5.3	18	94.7	5.83	0.74	46.11	0.095
Current employment status								
Unemployed	55	21.7	199	78.3	1.33	0.77	2.27	0.307
Employee	26	26.8	71	73.2	Reference			
Self-employed	78	21.2	290	78.8	1.36	0.81	2.28	0.240
Occupation								
None	42	19.6	172	80.4	1.73	1.05	2.85	**0.031**
Unskilled manual/domestic services	41	29.7	97	70.3	Reference			
Skilled manual/clerical/sales and services	75	21.2	279	78.8	1.57	1.01	2.45	**0.046**
Professional/technical/managerial	1	7.7	12	92.3	5.07	0.64	40.29	0.125
Average monthly income in Kenya Shillings								
Less than 5 000	139	23.2	460	76.8	Reference			
5 000 to less than 10 000	14	15.6	76	84.4	1.64	0.90	2.99	0.106
10 000 or more	6	20.0	24	80.0	1.21	0.48	3.02	0.685
Wealth quintiles								
First (Poorest)	12	27.9	31	72.1	Reference			
Second	4	17.4	19	82.6	1.84	0.52	6.53	0.346
Third	12	24.5	37	75.5	1.19	0.47	3.03	0.710
Fourth	44	22.8	149	77.2	1.31	0.62	2.77	0.477
Fifth (Richest)	87	21.2	324	78.8	1.44	0.71	2.92	0.311

Note: * The chronic health conditions are Tuberculosis, HIV/AIDS, Hypertension, Diabetes, Asthma, mental disorders, and physical disabilities.

There was an educational social gradient in the period prevalence of self-reported chronic health conditions. An inverse relationship was noted between the prevalence of chronic health conditions and level of education. The highest prevalence (24.5%) of self-reported chronic health conditions was among respondents with no formal education. The prevalence decreased as the educational level increased to the highest level of education, i.e. tertiary. Respondents with tertiary

education posted a prevalence of 5.3% of chronic health conditions. But, the difference in prevalence between the various educational levels was not statistically significant.

There were no statistically significant associations between the employment status of respondents and the period prevalence of self-reported chronic health conditions. Employees had higher prevalence (26.8%) of self-reported chronic health conditions than either the self-employed respondents (21.2%) or the respondents who had not been in gainful employment in the preceding three months (21.7%). The highest prevalence of Hypertension and HIV/AIDS was among respondents who are employees but the unemployed were most likely to report more than one chronic health condition (co-morbidities).

Unskilled manual workers had the highest prevalence of self-reported chronic health conditions in general as well as the highest prevalence of Hypertension (12.2%) and physical disabilities (7.3%). There was a statistically significant difference in prevalence of self-reported chronic health conditions when unskilled manual workers were compared to skilled workers (29.7% vs. 21.25; OR, 1.57, 95% CI, 1.01 to 2.45, ***P* = 0.046**) and to respondents without occupation (29.7% vs. 19.6%; OR, 1.73; 95% CI, 1.05 to 2.85; ***P* = 0.031**). Compared to respondents belonging to professional, managerial or technical occupations, the unskilled respondents had more than five times the odds of reporting chronic health conditions but this was not statistically significant (OR, 5.07; 955 CI, 0.64 to 40.29; $P = 0.125$). The only respondent in the professional, managerial/technical group who self-reported a

chronic health condition had HIV/AIDS. The prevalence of Tuberculosis and HIV/AIDS was relatively high among domestic workers.

A social gradient in the prevalence of Tuberculosis was evident. The lowest income group earning less than Kshs 5,000 monthly reported the highest Tuberculosis prevalence of 5.2% compared to the prevalence of 2.2% in the next income group (Kshs 5,000 to less than 10 000). No respondents in the other top income groups earning Kshs 10,000 or more reported Tuberculosis. Respondents in the lowest income group most commonly reported mental disorders. There were however, no statistically significant associations between income and the prevalence of self-reported chronic health conditions.

Respondents who were in the poorest wealth quintile reported the highest period prevalence (27.9%) of chronic health conditions. However, no significant associations between wealth quintiles and prevalence of self-reported chronic health conditions were found.

4.4.5 Association of environmental variables with self-rated health status

The association of environmental variables with health inequalities was subjected to bivariate analysis using poor SRH status as outcome variable. Five of the seven environmental variables were significantly associated with SRH status. The seven environmental variables are room congestion, type of cooking fuel, source of drinking water, type of toilet/latrine facility, subjective distance from Dandora Municipal Dumping Site, access to health care, and village of residence. **Table 4.11** shows the relationship between the environmental variables (except village of residence) and SRH status. The horizontal stacked bar chart in **Figure 4.6** illustrates

the distribution of dichotomized SRH status across the nine villages in Korogocho informal settlement.

Table 4.11 Health Inequalities from Association of Environmental Variables with Self-Rated Health Status

Variables	Poor (N=189)		Good (N=530)		OR	95% CI		*P* Value
	n	%	n	%		Lower	Upper	
Number of people sharing a room with the respondent*								
No one	17	29.3	41	70.7	Reference	0.63	2.08	0.661
One person	13	20.3	51	79.7	1.63	0.71	3.73	0.251
More than one person	159	26.6	438	73.4	1.14	0.63	2.08	0.661
Type of Cooking Fuel								
Use LPG†/natural gas								
No	189	26.4	526	73.6	Reference			
Yes	0	0	4	100	3.24	0.17	60.45	0.431
Use kerosene								
No	147	24.6	450	75.4	1.61	1.06	2.44	**0.026**
Yes	42	34.4	80	65.6	Reference			
Use paraffin								
No	89	24.4	276	75.6	1.22	0.88	1.70	0.240
Yes	100	28.2	254	71.8	Reference			
Use charcoal								
No	69	22.8	233	77.2	1.36	0.97	1.92	0.075
Yes	120	28.8	297	71.2	Reference			
Main source of drinking water								
Tanks or well water	21	38.9	33	61.1	Reference			
Buy from vendor/tap	159	26	453	74	1.81	1.02	3.23	**0.043**
Piped water in residence/compound/plot	9	17	44	83	3.11	1.26	7.67	**0.014**
Type of toilet/latrine facility used at home								
No facility/bush/field/flying toilet‡	10	38.5	16	61.5	Reference			
Pit without slab/bucket toilet or latrine	66	24.1	208	75.9	1.97	0.85	4.55	0.113
Pit latrine with slab	50	20.7	191	79.3	2.39	1.02	5.58	**0.045**
Ventilated improved pit (VIP) latrine	23	37.1	39	62.9	1.06	0.41	2.72	0.904
Flush/Pour flush	40	34.5	76	65.5	1.19	0.49	2.86	0.701
Distance of residence from Dandora Municipal Dumpsite¶								
Very near	15	32.6	31	67.4	Reference			
Near	60	25	180	75	1.45	0.73	2.87	0.284
Not very far	73	30.4	167	69.6	1.11	0.56	2.17	0.768
Very far	41	21.7	148	78.3	1.75	0.86	3.54	0.122
Don't know	0	0	4	100	4.43	0.22	87.57	0.328
Received health care when needed§								
No, not at all	15	39.5	23	60.5	Reference			
Yes, sometimes	80	20.8	305	79.2	2.49	1.24	4.99	**0.010**
Yes, always	67	38.7	106	61.3	1.03	0.50	2.12	0.932
Never needed it	27	22.0	96	78.0	2.32	1.07	5.05	**0.034**

Note: *Room is said to be congested if shared by more than two adults. †LPG is an acronym for liquefied petroleum gas. ‡Flying toilet is a euphemism in Kenya for plastic bags for defecation that are then thrown away after use. ¶Distance is subjective estimation by respondents. §Utilization of and access to health care when needed by respondents within a year of the interview for relative ease of recall

If more than two adults shared a room, the room was said to be congested. The odds of poor SRH status were not significantly different whether or not there was room congestion. Only kerosene out of the four types of cooking fuel that are most commonly used in Korogocho informal settlement was significantly associated with SRH status. Respondents who used kerosene were significantly more likely to have poor SRH status when compared to respondents who did not use kerosene as cooking fuel (OR, 1.61; 95% CI, 1.06 to 2.44; ***P* = 0.026**). Neither the clean but more expensive gas energy, nor paraffin, which is similar to kerosene, was significantly associated with SRH status. Even charcoal, a polluting biomass fuel did not significantly affect SRH status among respondents.

Sources of drinking water were re-categorized into three from the answers given by the respondents to the question in the interview schedule. Each respondent was asked to mention one main source of drinking water. Improved drinking water sources include piped household connection and public standpipe. Respondents who sourced drinking water mainly from storage tanks or wells were more likely to have poor SRH status than either those who bought water (OR, 1.81; 95% CI, 1.02 to 3.23; ***P* = 0.043**) or more significantly, respondents who had piped water in their residence, compound or plot (OR, 3.11; 95% CI, 1.26 to 7.67; ***P* = 0.014**).

Sanitary facilities refer to toilet or latrine types used by respondents for defecation in their homes, where available. Respondents who had no access to formal sanitary facilities in their homes, and improvised with 'flying toilets,' had the highest prevalence (38.5%) of poor SRH status. Compared to respondents who used pit latrine with slab, which is an improved sanitary facility, respondents who do not have

toilets or latrines in their homes had almost two and a half times the odds of poor SRH status (OR, 2.39; 95% CI, 1.02 to 5.58; ***P* = 0.045**). Unlike pit latrine with slab, respondents who used other improved sanitary facilities such as VIP and pour flush toilets did not significantly differ in the prevalence of poor SRH status compared to respondents without access to sanitary facilities in their homes.

Respondents' estimation of the distance of their homes from Dandora Municipal Waste Dumpsite was at best an educated guess. The intention of the question was to find out if the subjective perception of their proximity to the environmentally damaging Dandora Municipal Waste Dumpsite had any effect on their SRH status. There was no significant association between the subjective estimation of distance of residence from Dandora Municipal Waste Dumpsite and prevalence of poor SRH status.

Respondents, who did not receive health care though health care was needed, had the highest prevalence (39.5%) of poor SRH status. Respondents who never received needed health care, were almost two and a half times more likely to have poor SRH status compared to respondents who received health care only some of the time when needed (OR, 2.49; 95% CI, 1.24 to 4.99; ***P* = 0.01**). Similarly, respondents who never received needed health care were more likely also, to have significantly higher prevalence of poor SRH status than respondents who did not receive health care because health care was not needed (OR, 2.32; 95% CI, 1.07 to 5.05; ***P* = 0.034**).

The crude prevalence of poor SRH status among respondents varied widely across the nine villages in Korogocho informal settlement as depicted in **Figure 4.6**.

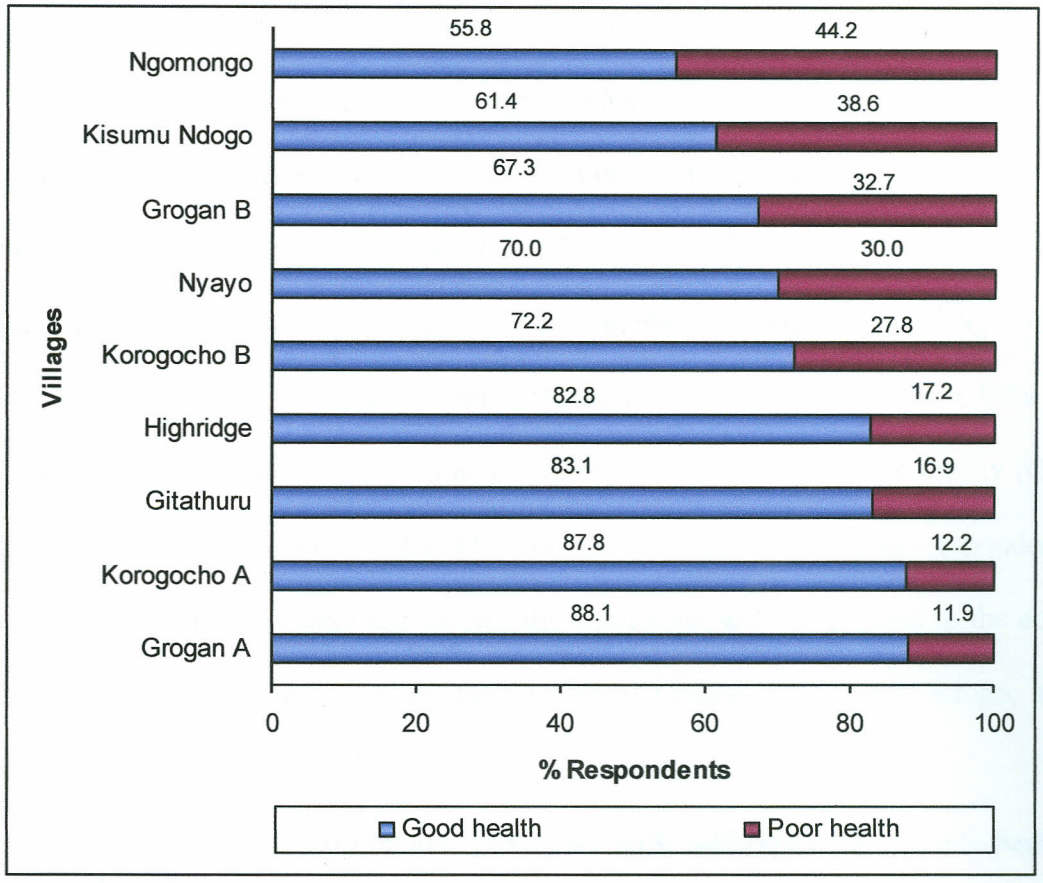


Figure 4.6 Health Inequalities from Prevalence of Poor Self-Rated Health Status in Villages of Korogocho Informal Settlement

Ngomongo village had the highest prevalence (44.2%) of poor SRH status. Ngomongo village respondents were significantly more likely to have poor SRH status than respondents in Gitathuru village (OR, 3.91; 95% CI, 1.97 to 7.77; ***P* = 0.0001**), Grogan A village (OR, 5.86; 95% CI, 2.70 to 12.72; ***P* < 0.0001**), Highridge village (OR, 3.82; 95% CI, 1.97 to 7.40; ***P* = 0.0001**), Korogocho A village (OR, 5.71; 95% CI, 2.06 to 15.81; ***P* = 0.0008**), Korogocho B village (OR, 2.06; 95% CI 1.12 to 3.81; ***P* = 0.021**) and Korogocho informal settlement as a whole entity (OR, 2.22; 95% CI, 1.43 to 3.44; ***P* = 0.0003**). The odds of Ngomongo village respondents having poor SRH status were not statistically significant when compared to the odds of respondents from the remaining three villages: Grogan B, Kisumu Ndogo, and Nyayo having poor SRH status.

4.4.6 Association of environmental variables with self-reported chronic health conditions

As shown in Table **4.12**, none of the following environmental variables: room congestion, types of cooking fuel, source of drinking water, type of sanitary facilities used by respondents in their homes, and utilization of health care was significantly associated with respondents' period prevalence of self-reported chronic health conditions in Korogocho informal settlement. Only subjective estimation of distance of respondents' residence from Dandora Municipal Dumpsite was significantly associated with period prevalence of self-reported chronic health conditions.

Table 4.12 Health Inequalities from Association of Environmental Variables with Self-Reported Chronic Health Conditions

	Present (N=159)		Absent (N=560)			95% CI		
Variables	**n**	**%***	**n**	**%***	**OR**	**Lower**	**Upper**	***P* value**
Number of people sharing a room with the respondent								
No one	15	25.9	43	74.1	Reference			
One person	11	17.2	53	82.8	1.68	0.70	4.04	0.245
More than one person	133	22.3	464	77.7	1.22	0.66	2.26	0.534
Type of Cooking Fuel								
LPG/natural gas								
No	158	22.1	557	77.9	1.18	0.12	11.38	0.889
Yes	1	25.0	3	75.0	Reference			
Kerosene								
No	135	22.6	462	77.4	Reference			
Yes	24	19.7	98	80.3	1.19	0.73	1.94	0.476
Paraffin								
No	80	21.9	285	78.1	1.02	0.72	1.46	0.898
Yes	79	22.3	275	77.7	Reference			
Charcoal								
No	56	18.5	246	81.5	1.44	0.99	2.08	0.050
Yes	103	24.7	314	75.3	Reference			
Main source of drinking water								
Tank/well	14	26.4	39	73.6	Reference			
Buy from vendors	132	21.6	480	78.4	1.31	0.69	2.48	0.415
Tap in residence/compound/plot	13	24.1	41	75.9	1.13	0.47	2.71	0.781
Type of toilet/latrine facility used at home								
Flush/Pour flush	27	23.3	89	76.7	Reference			
Ventilated improved pit (VIP) latrine	14	22.6	48	77.4	1.04	0.50	2.17	0.916
Pit latrine with slab	51	21.2	190	78.8	1.13	0.67	1.92	0.651
Pit without slab/bucket/hanging toilet or latrine	63	23.0	211	77.0	1.02	0.61	1.70	0.952
No facility/bush/field/flying toilet	4	15.4	22	84.6	1.67	0.53	5.26	0.383
Distance of residence from Dandora Municipal Dumpsite								
Very far	37	19.6	152	80.4	1.62	1.03	2.56	**0.037**
Not very far	42	17.5	198	82.5	1.86	1.21	2.88	**0.005**
Very near	68	28.3	172	71.7	Reference			
Near	12	26.1	34	73.9	1.12	0.55	2.29	0.756
Don't know	0	0.0	4	100.0	3.57	0.19	67.28	0.395
Received health care when needed in the last year								
Yes, always	48	27.7	125	72.3	Reference			
Yes, sometimes	79	20.5	306	79.5	1.49	0.98	2.25	0.061
Never needed it	23	18.7	100	81.3	1.67	0.95	2.93	0.074
No, not at all	9	23.7	29	76.3	1.24	0.55	2.81	0.610

There was no significant association between number of persons sharing a room with the respondents and period prevalence of self-reported chronic health conditions in Korogocho informal settlement. None of the four types of cooking fuels was significantly associated with prevalence of chronic health conditions. Compared to respondents who did not use charcoal, a polluting biomass cooking fuel, the odds ratio of respondents using charcoal reporting chronic health conditions, was very nearly statistically significant (OR, 1.44; 95% CI 0.99 to 2.08; $P = 0.050$). Majority of respondents in the villages except in Korogocho A, Korogocho B, and Nyayo used charcoal for cooking.

The association between sources of drinking water or types of sanitary facilities in respondents' homes and period prevalence of self-reported chronic health conditions was not statistically significant. Though subjective, the respondents who considered Dandora Municipal Waste Dumpsite to be very near their residence had significantly higher odds of reporting chronic health conditions compared to those who estimated that they lived very far (OR, 1.62; 95% CI, 1.03 to 2.56; ***P* = 0.037**). Also, those who said they lived very near Dandora Dumpsite were significantly more likely to report chronic health conditions when compared to those who said they did not live very far from the Dumpsite (OR, 1.86; 95% CI, 1.21 to 2.88; ***P* = 0.005**). The vast majority of respondents from Grogan A (83.3%) and Nyayo (74%) estimated that they live very far from Dandora Municipal Waste Dumpsite. Most respondents from Gitathuru (66.3%), Highridge (60.6%), and Ngomongo (83.2%) estimated that they live quite close to the Dumpsite.

No significant association between need for or utilization of health care and the prevalence of self-reported chronic health conditions could be inferred. The period prevalence of self-reported chronic health conditions ranged from 12.2% to 29.7% across villages in Korogocho informal settlement. The prevalence of self-reported chronic health conditions was lowest (12.2%) in Korogocho A village and highest (29.7%) in Grogan B village as depicted in **Figure 4.7**. Respondents' village of residence was strongly associated with period prevalence of self-reported chronic health conditions. The horizontal stacked bar chart in **Figure 4.7** illustrates the period prevalence of self-reported chronic health conditions across the nine villages of Korogocho informal settlement.

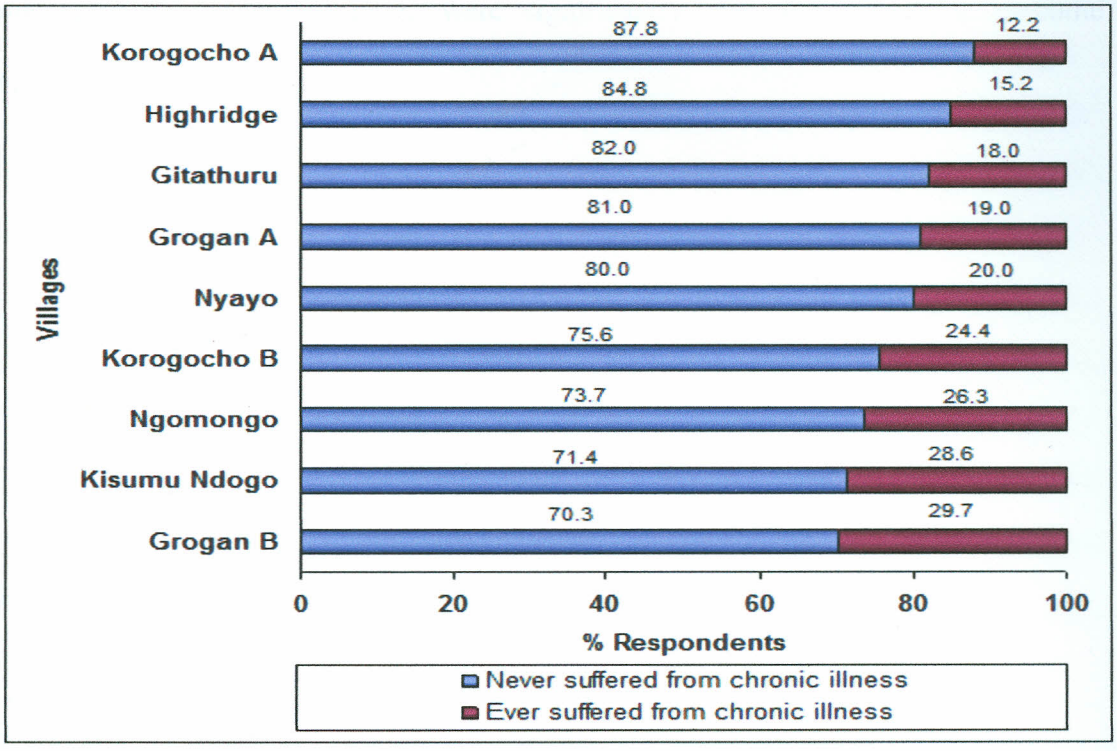


Figure 4.7 Health Inequalities from Period Prevalence of Self-Reported Chronic Health Conditions in Villages of Korogocho Informal Settlement

The respondents from Grogan B village were significantly more likely to report chronic health conditions than were respondents from two other villages: Highridge (OR, 2.37; 95% CI, 1.18 to 4.75; ***P* = 0.015**) and Korogocho A (OR, 3.04; 95% CI, 1.09 to 8.51; ***P* = 0.034**). Though the prevalence of self-reported chronic health conditions in the remaining six villages and Korogocho informal settlement as a whole was lower than the prevalence in Grogan B village, the prevalence odds ratios were not statistically significant.

4.4.7 Association of material factors with self-rated health status

The association between material factors and respondents' SRH status is presented in **Table 4.13.** Only the material of the walls of housing structures and ownership of health insurance were significantly associated with the outcome variable: SRH status.

Table 4.13 Health Inequalities from Association of Material Variables with Self-Rated Health Status

Variables	Poor (N=189)		Good (N=530)			95% CI		
	n	%	n	%	OR	Lower	Upper	*P* value
Own the house/flat/structure that presently live in								
No, rent paying	152	26.0	432	74.0	1.26	0.72	2.21	0.412
No, but not rent paying	17	24.3	53	75.7	1.39	0.65	2.96	0.4
Yes	20	30.8	45	69.2	Reference			
Main material of the floor								
Natural floor (mud/dung/sand)	85	24.9	257	75.1	3.02	0.19	48.87	0.436
Rudimentary floor (wood planks)	1	50.0	1	50.0	Reference			
Finished floor (polished/wood/vinyl/tiles/cement)	103	27.5	272	72.5	2.64	0.16	42.61	0.494
Main material of the wall								
Wood/timber	6	26.1	17	73.9	1.66	0.61	4.50	0.323
Iron sheets/*mabati*	41	20.4	160	79.6	2.28	1.38	3.77	**0.001**
Mud	60	23.0	201	77.0	1.96	1.23	3.12	**0.005**
Cemented mud	37	33.0	75	67.0	1.19	0.69	2.03	0.538
Bricks/Stone	45	36.9	77	63.1	Reference			
Main material of the roof								
Grass/thatch	0	0	1	100	1.91	0.07	49.55	0.697
Wood/timber	0	0	5	100	7.00	0.36	134.61	0.197
Iron sheets/*mabati*	132	26.3	370	73.7	1.77	0.93	3.34	0.081
Metal sheets/tin	40	24	127	76	2.00	0.99	4.04	0.054
Other (specify)*	17	38.6	27	61.4	Reference			
Own health insurance coverage								
No	163	28.8	403	71.2	Reference			
Yes	26	17.0	127	83.0	1.98	1.25	3.13	**0.004**

Note: *Other roofing materials such as carton and plastic sheets

There was no statistically significant association between house ownership and poor SRH status among respondents in Korogocho informal settlement. Floor material did not significantly affect SRH status among respondents. The respondents who resided in houses made of bricks/stones had the highest prevalence (36.9%) of poor SRH status. Respondents who resided in houses with brick/stone walls were more likely to have poor SRH status compared to respondents who resided in houses with iron sheet (*mabati*) walls (OR, 2.28; 95% CI, 1.38 to 3.77; ***P* = 0.001**). Also, the

odds of brick-walled house residents having poor SRH status were significantly more than those of residents in mud-walled houses (OR, 1.96; 95% CI, 1.25 to 3.12, ***P* = 0.005**). More than 90% of Ngomongo village respondents, who are all tenants, resided in brick- or stone-walled houses but brick- or stone-walled houses comprised only 17% of all the respondents' houses in Korogocho informal settlement.

The commonest (51.6%) wall material of houses in Korogocho informal settlement was mud including cemented mud. Mud-walled houses were most common (73.2%) among Korogocho A village respondents. Less than a third of the walls of respondents' houses were made of iron sheets otherwise known as *mabati*. Roofing material of respondents' houses was not significantly associated with SRH status.

Subscription to any type of health insurance by respondents in Korogocho informal settlement was significantly associated with SRH status. Of respondents who did not have health insurance coverage, 28.8% had poor SRH status compared to 17% of respondents who had health insurance coverage (OR, 1.98, 95% CI, 1.25 to 3.13; ***P* = 0.004**). Majority (69.2%) of respondents who had health insurance were professionals/managers/technicians and the insurance was employer-based and National Hospital Insurance Fund (NHIF). Only 7.3% of domestic servants, 21.6% of unskilled manual, and 28.1% of skilled manual workers had health insurance coverage in Korogocho informal settlement. No respondent in Gitathuru village had health insurance coverage. Grogan A village respondents had the highest proportion (75%) of health insurance coverage.

4.4.8 Association of material factors with self-reported chronic health conditions

Shown in **Table 4.14** is the association between material factors and period prevalence of self-reported chronic health conditions among respondents in Korogocho informal settlement. Only material of wall of respondents' houses and health insurance coverage were significantly associated with period prevalence of self-reported chronic health conditions. The other material factors: ownership of respondents' houses, material of floor, and roofing material were not significantly associated with self-reported chronic health conditions.

Table 4.14 Health Inequalities from Association of Material Variables with Self-Reported Chronic Health Conditions

	Present (N=159)		Absent (N=560)			95% CI		*P*
Variables	**n**	**%**	**n**	**%**	**OR**	**Lower**	**Upper**	**value**
Own house/flat/structure that presently live in								
No	139	21.3	515	78.7	1.65	0.94	2.88	0.080
Yes	20	30.8	45	69.2	Reference			
Main material of the floor								
Natural/Rudimentary floor *	78	22.7	266	77.3	Reference			
Finished floor (polished wood/vinyl/tiles/cement)	81	21.6	294	78.4	1.06	0.75	1.51	0.729
Main material of the wall								
Wood/timber	5	21.7	18	78.3	1.32	0.47	3.74	0.598
Iron sheets/*mabati*	54	26.9	147	73.1	Reference			
Mud	46	17.6	215	82.4	1.72	1.10	2.68	**0.018**
Cemented mud	26	23.2	86	76.8	1.22	0.71	2.08	0.478
Bricks/Stones	28	23.0	94	77.0	1.23	0.73	2.08	0.434
Main material of the roof								
Grass/Thatch/ Wood/Timber/Plastic*	13	26	37	74	Reference			
Iron sheets/*mabati*	110	21.9	392	78.1	1.25	0.64	2.44	0.509
Metal sheets/tin	36	1.6	131	78.4	1.28	0.62	2.66	0.51
Own health insurance coverage								
No	135	23.9	431	76.1	Reference			
Yes	24	15.7	129	84.3	1.68	1.05	2.71	**0.032**

Note: *Merged because of very small numbers in some cells

No significant association was found between ownership of respondents' houses and period prevalence of self-reported chronic health conditions in Korogocho informal settlement. There was also no significant association between the floor material of respondents' houses and prevalence of self-reported chronic health conditions in Korogocho informal settlement. Respondents who resided in houses made of *mabati* walls reported the highest prevalence (26.9%) of chronic health conditions. Compared to respondents who resided in houses with mud walls and who had the least prevalence (17.6%) of self-reported chronic health conditions, respondents who resided in houses walled with *mabati* were significantly more likely

to report chronic health conditions (OR, 1.72; 95% CI, 1.10 to 2.68; ***P* = 0.018**). No significant associations were found between roofing materials of houses and prevalence of chronic health conditions in Korogocho informal settlement. Respondents who did not have access to health insurance were more than one and a half times more likely than respondents who subscribed to health insurance to report chronic health conditions in Korogocho informal settlement (OR, 1.68; 95% CI, 1.05 to 2.71; ***P* = 0.032**).

4.4.9 Association of psychosocial factors with self-rated health status

Presented in **Table 4.15** is the association between psychosocial factors and crude prevalence of SRH status among respondents in Korogocho informal settlement.

Table 4.15 Health Inequalities from Association of Psychosocial Variables with Self-Rated Health Status

	Poor (N=189)		Good (N=530)			95% CI		*P*
Variables	**n**	**%**	**n**	**%**	**OR**	**Lower**	**Upper**	**value**
Extent of control/authority asserted at home								
None at all	9	26.5	25	73.5	1.04	0.47	2.30	0.927
Not much	81	25.2	240	74.8	1.11	0.79	1.56	0.560
Much	99	27.2	265	72.8	Reference			
Generally, trust the neighbors								
Not at all	27	26.7	74	73.3	1.64	0.65	4.20	0.298
Yes, but not a lot	71	20.9	268	79.1	2.27	0.95	5.39	0.065
Yes, a lot	82	32.2	173	67.8	1.27	0.53	3.01	0.594
Do not know/won't say	9	37.5	15	62.5	Reference			
Belong to an association(s) in Korogocho informal settlement								
No	106	22.6	363	77.4	1.71	1.21	2.43	**0.003**
Yes, one	76	33.3	152	66.7	Reference			
Yes, more than one	7	31.8	15	68.2	1.07	0.42	2.74	0.885

Belonging to one or more social associations was the only psychosocial factor that was significantly associated with SRH status. The other psychosocial factors were perceived control or authority by respondents in their households and trust between neighbors within Korogocho informal settlement. There was no significant association between respondents' level of control or authority in the household and SRH status. Trust between neighbors did not seem to significantly affect SRH status among respondents in Korogocho informal settlement. Respondents who belonged to an association in Korogocho informal settlement were significantly more likely than respondents who did not belong to any associations to have poor SRH status (33.3% vs. 22.6%; OR, 1.71; 95% CI, 1.21 to 2.43; ***P* = 0.003**). Belonging to social associations in Korogocho informal settlement did not seem to confer any subjective health advantage.

4.4.10 Association of psychosocial factors with self-reported chronic health conditions

Of the three psychosocial factors, only control/authority asserted by respondents in the household was significantly associated with chronic health conditions in Korogocho informal settlement as illustrated in **Table 4.16**.

Table 4.16 Health Inequalities from Association of Psychosocial Variables with Self-Reported Chronic Health Conditions

	Present (N=159)		Absent (N=560)			95% CI		*P*
Variables	**n**	**%**	**n**	**%**	**OR**	**Lower**	**Upper**	**value**
Extent of control/authority asserted at home								
None at all	6	17.6	28	82.4	1.60	0.64	3.99	0.312
Not much	60	18.7	261	81.3	1.49	1.04	2.15	**0.032**
Much	93	25.5	271	74.5	Reference			
Generally, trust the neighbors								
Not at all	23	22.8	78	77.2	1.09	0.63	1.88	0.759
Yes, but not a lot	69	20.4	270	79.6	1.26	0.85	1.86	0.250
Yes, a lot	62	24.3	193	75.7	Reference			
Do not know/won't say	5	20.8	19	79.2	1.22	0.44	3.41	0.703
Belong to an association(s)								
No	91	19.4	378	80.6	1.94	0.77	4.89	0.161
Yes, one	61	26.8	167	73.2	1.28	0.50	3.28	0.611
Yes, more than one	7	31.8	15	68.2	Reference			

The level of control or authority asserted by respondents in the household was significantly associated with self-reported chronic health conditions. Respondents who said that they had much control at home were more likely than respondents who said that they did not have much control at home to report chronic health conditions (OR, 1.49; 95% CI, 1.04 to 2.15; ***P* = 0.032**). More than half of the respondents in Grogan B, Kisumu Ndogo, Korogocho A, Ngomongo, and Nyayo villages said that they asserted much control at home.

No significant association was found between trust among neighbors and self-reported chronic health conditions. Respondents' social capital seemingly acquired from belonging to social associations within Korogocho informal settlement did not seem to be significantly related to reports of chronic health conditions.

4.4.11 Association of behavioral factors with self-rated health status

Voluntary physical exercise, sexual activity, and smoking were the only three out of eight behavioral factors that had significant association with SRH status among respondents in Korogocho informal settlement. As shown in **Table 4.17**, the other five behavioral factors were not significantly associated with SRH status.

Table 4.17 Health Inequalities from Association of Behavioral Variables with Self-Rated Health Status

	Poor (N=189)		Good (N=530)			95% CI		
Variables	**n**	**%**	**n**	**%**	**OR**	**Lower**	**Upper**	***P* value**
Number of times the respondent ate solid food the day before interview								
None	7	36.8	12	63.2	Reference			
Once	118	28.6	295	71.4	1.46	0.56	3.80	0.439
Two times	58	22.1	204	77.9	2.05	0.77	5.45	0.149
Three or more times	6	24.0	19	76.0	1.85	0.50	6.83	0.358
Takes fruits								
No	11	30.6	25	69.4	Reference			
Yes	178	26.1	505	73.9	1.25	0.60	2.59	0.551
Voluntarily take physical exercises								
No	146	33.6	289	66.4	Reference			
Yes, but less than daily	28	13.9	173	86.1	3.12	2.00	4.88	**<0.0001**
Yes, daily	15	18.1	68	81.9	2.29	1.27	4.15	**0.006**
Have sexual intercourse								
Never	3	30	7	70	2.33	0.48	11.44	0.296
Yes, but not currently	9	32.1	19	67.9	2.11	0.67	6.82	0.204
Yes, with one regular partner	166	25.2	493	74.8	2.97	1.26	6.98	**0.013**
Yes, with more than one regular partner	11	50	11	50	Reference			
Ever had unprotected sex (without condom) with a partner to whom respondent was not married								
Never had sex	3	30.0	7	70.0	Reference			
No	148	26.7	406	73.3	1.18	0.30	4.61	0.816
Yes	38	24.5	117	75.5	1.32	0.32	5.36	0.698
Ever taken alcohol								
Never	144	24.5	443	75.5	1.63	0.99	2.69	0.057
Yes, but previously	27	34.6	51	65.4	Reference			
Yes, currently	18	33.3	36	66.7	1.06	0.51	2.20	0.879
Ever smoked*								
Never	168	25.6	488	74.4	3.23	1.29	8.08	**0.012**
Yes, but previously	10	52.6	9	47.4	Reference			
Yes, currently	11	25	33	75	3.33	1.08	10.32	**0.037**
Ever abused any substance†								
No	171	25.9	489	74.1	1.26	0.70	2.24	0.443
Yes	18	30.5	41	69.5	Reference			

Note: *smoked cigarettes. †substances such as *bhang*, *miraa*, cocaine, and *kuber*

No statistically significant association was found between number of times food was ingested by respondents the day prior to the interview and prevalence of poor SRH status. Eating fruits was not significantly associated with SRH status. Significantly more respondents in Korogocho informal settlement who did not voluntarily undertake physical exercise, had a higher prevalence of poor SRH status than respondents who exercised daily (33.6% vs. 18.1%; OR, 2.29, 95% CI, 1.27 to 4.15; ***P* = 0.006**), and also more than the respondents who exercised less frequently than once a day (33.6% vs. 13.9%; OR, 3.12; 95% CI, 2.00 to 4.88; ***P* < 0.0001**).

Many focus group discussants from the age groups younger than 45 years agreed that though physical exercises enhance health and well being, they were too busy looking for means of survival to bother about physical exercises. Others claimed that there are neither open spaces nor recreational facilities in Korogocho and even if there were, the level of criminality was so high in some villages particularly Grogan B village that they would be too frightened to exercise. The older discussants (54 - 59 years) claimed that they were too old and frail to undertake physical exercise.

There were no significant differences in the prevalence of poor SRH status between respondents who regularly engage in sexual activity and the respondents who have never had sex. However, respondents who were unfaithful to their sexual partners were significantly more likely to have poor SRH status than respondents who were faithful to their sexual partners (50% vs. 25.2%; OR, 2.97; 95% CI, 1.26 to 6.98; ***P* = 0.013**). In Grogan A and Highridge villages, no married respondents volunteered sexual infidelity. Only in Grogan A, Grogan B, Highridge, Korogocho A, and Nyayo villages did any respondents admit to being bisexual. No respondents admitted to

being exclusively homosexual. There were no significant differences in the prevalence of poor SRH status between respondents who practiced safer sex and those who engaged in unsafe sex.

No significant differences in the prevalence of SRH status were found between respondents who regularly imbibed alcohol and respondents who were teetotalers. Significant differences in the prevalence of poor SRH status were found between respondents who smoked and respondents who had never smoked cigarettes. Respondents who smoked in the past were more likely to have poor SRH status compared to current smokers (52.6% vs. 25%; OR, 3.33, 95% CI, 1.08 to 10.32; ***P* = 0.037**). Also, respondents who had previously smoked were more than three times more likely to have poor SRH status than respondents who had never smoked (OR, 3.23; 95% CI, 1.29 to 8.08; ***P* = 0.012**). The highest proportion of respondents who had ever smoked was in Gitathuru, Grogan B, and Nyayo villages. Most respondents who had never smoked were in Ngomongo, Korogocho B, and Grogan A villages. There were no significant differences in the prevalence of SRH status between respondents who had and those who had not abused substances such as *bhang*, *miraa*, cocaine, and *kuber* in Korogocho informal settlement.

4.4.12 Association of behavioral factors with self-reported chronic health conditions

Presented in **Table 4.18** are the associations between behavioral factors and the period prevalence of self-reported chronic health conditions among respondents in Korogocho informal settlement. Statistically significant differences were noted between prevalence of self-reported chronic health conditions and the following

behavioral factors: voluntary physical exercise, sexual activity, unprotected sex, and alcohol ingestion.

Table 4.18 Health Inequalities from Association of Behavioral Variables with Self-Reported Chronic Health Conditions

	Present (N=159)		Absent (N=560)			95% CI		*P*
Variables	**n**	**%**	**n**	**%**	**OR**	**Lower**	**Upper**	**value**
Number of times the respondent ate solid food the previous day								
None	2	10.5	17	89.5	2.68	0.61	11.80	0.192
Once	99	24.0	314	76.0	Reference			
Twice	54	20.6	208	79.4	1.21	0.83	1.78	0.310
More than two times	4	16.0	21	84.0	1.66	0.55	4.94	0.366
Takes fruits								
Never	12	33.3	24	66.7	1.92	0.93	3.96	0.079
Yes, but less than once a week	45	23.7	145	76.3	1.19	0.80	1.77	0.394
Yes, at least once weekly	102	20.7	391	79.3	Reference			
Voluntarily take physical exercises								
No	112	25.7	323	74.3	Reference			
Yes, but less than daily	31	15.4	170	84.6	1.90	1.23	2.95	**0.004**
Yes, daily	16	19.3	67	80.7	1.45	0.81	2.61	0.212
Have sexual intercourse								
Never	1	10.0	9	90.0	10.39	1.16	93.30	**0.037**
Yes, but not currently	15	53.6	13	46.4	Reference			
Yes, with one regular partner only	132	20.0	527	80.0	4.61	2.14	9.92	**0.0001**
Yes, usually with more than one regular partner	11	50.0	11	50.0	1.15	0.38	3.53	0.802
Ever had unprotected sex (without condom) with a partner that you were not married to								
Never had sexual intercourse	1	10.0	9	90.0	3.57	0.44	29.00	0.234
No	114	20.6	440	79.4	1.53	1.02	2.30	**0.040**
Yes	44	28.4	111	71.6	Reference			
Ever taken alcohol								
Never	119	20.3	468	79.7	1.97	1.18	3.28	**0.010**
Yes, currently	14	25.9	40	74.1	1.43	0.66	3.08	0.364
Ever smoked*								
Never	143	21.8	513	78.2	1.28	0.45	3.62	0.640
Yes, but previously	5	26.3	14	73.7	Reference			
Yes, currently	11	25.0	33	75.0	1.07	0.31	3.66	0.912
Ever used other substances†								
No	144	21.8	516	78.2	1.22	0.66	2.26	0.523
Yes	15	25.4	44	74.6	Reference			

Note: *Ever smoked cigarettes. †Other substances refer to *bhang, miraa*, cocaine, and *kuber*

No significant association was found between the number of times that the respondents consumed solid food on the day prior to the interview and the period prevalence of self-reported chronic health conditions. There were no statistically significant differences in the prevalence of self-reported chronic health conditions between respondents who took and those who did not take fruits, in Korogocho informal settlement.

Respondents who did not voluntarily undertake physical exercises reported the highest prevalence (25.7%) of chronic health conditions. Compared to respondents who undertook voluntary physical exercise at least sometimes, respondents who could not or would not take physical exercises voluntarily were almost two times more likely to report chronic health conditions (OR, 1.90; 95% CI, 1.23 to 2.95; ***P* = 0.004**). Respondents who did not voluntarily undertake physical exercises were more likely than respondents who voluntarily partook of exercises to report all the chronic health conditions under review except HIV/AIDS. The most prevalent (6.7%) chronic health condition among respondents who did not voluntarily do physical exercises was Hypertension.

Compared to respondents who were currently sexually active, respondents who had stopped sexual activity not only had the highest prevalence of chronic health conditions but also, were almost five times more likely to report chronic health conditions (53.6% vs. 20%; OR, 4.61; 95% CI, 2.14 to 9.92; ***P* = 0.0001**). Also, the odds of respondents who had stopped having sexual intercourse reporting chronic health conditions were more than ten times the odds of respondents who had never had sex (OR, 10.39; 95% CI, 1.16 to 93.30; ***P* = 0.037**).

Among respondents who had never had sex, 80% of them belonged to the youngest age category (25 to 34 years). TB was the only chronic health condition reported by respondents who had never had sex. Respondents who had stopped sexual activity reported the highest prevalence of TB (10.7%), Hypertension (17.9%), and physical disabilities (3.6%) whereas respondents who regularly had sex with more than one partner reported the highest prevalence of HIV/AIDS (18.2%). The highest prevalence (28.4%) of self-reported chronic health conditions was among respondents who had unprotected sex. Compared to respondents who practiced safer sex, respondents who had unprotected sex were significantly more likely to report chronic health conditions (OR, 1.53; 95% CI, 1.02 to 2.30; ***P* = 0.04**). Respondents who engaged in unprotected sex had higher prevalence of all reported chronic health conditions except Diabetes and physical disabilities.

Respondents, who used to imbibe alcohol but had stopped, reported the highest prevalence (33.3%) of chronic health conditions. Respondents who had stopped taking alcohol were almost twice more likely to report chronic health conditions than respondents who had never taken alcohol (OR, 1.97; 95% CI, 1.18 to 3.28; ***P* = 0.01**). Respondents who had stopped taking alcohol had the highest reported prevalence of all the chronic health conditions except mental disorders.

Though respondents in Korogocho informal settlement who had ever smoked cigarettes reported higher prevalence of chronic health conditions than respondents who had never smoked cigarettes, the difference did not reach statistical significance. The prevalence of self-reported chronic health conditions was higher among respondents in Korogocho informal settlement who abused substances such as *bhang*,

miraa, cocaine, and *kuber* than the prevalence of self-reported chronic health conditions among respondents who had never abused the named substances (25.4% vs. 21.8%) but the difference was not statistically significant ($P = 0.523$).

4.5 Magnitude of Health Inequalities

Health inequalities were measured in three dimensions as health disadvantage, health gap, and health gradient. Villages that were at health disadvantage had respondents with higher prevalence of adverse outcome variables than Korogocho informal settlement taken as a whole entity.

Health advantage refers to lower prevalence of the adverse outcome variables among respondents in villages compared to Korogocho informal settlement as a whole. This approach measures pure health inequalities by quantifying the inequalities in measures of health or ill-health across people in villages irrespective of their position in the society's hierarchy. In other words, the characteristics of the individual such as socio-economic status or income are not considered.

Health gaps were derived from the comparison of the prevalence of the adverse outcome variables among the respondents at the lowest rung of the socio-economic ladder to the prevalence of the adverse outcome variables among the respondents at the highest rung of the socio-economic ladder. The middle rungs of socio-economic ladder are not considered in the calculation of health gap.

Health gap is regarded as pro-poor if the prevalence of the adverse outcome variable is higher among the respondents in the highest than in the lowest socio-economic class. Pro-rich health gap occurs when the prevalence of the adverse outcome variable is higher among respondents in the lowest socio-economic class

compared to the highest socio-economic class. Social status, class, and position are used interchangeably in this study. The parameters that were used to classify respondents into highest or lowest socio-economic class in this study are wealth quintiles, level of education, employment status, and income.

Social gradients in health or health gradients were assessed in this study through concentration curves by graphing cumulative percentages of wealth quintiles against the cumulative percentages of the adverse outcome variable. The resulting concentration indexes summarize the relative health inequalities across the entire socio-economic spectrum in the villages in Korogocho informal settlement rather than comparing just the extremes like health gap does. The concentration indexes associated with the concentration curves were used to assess the magnitude of health inequalities along social gradients in Korogocho informal settlement and its constituent villages.

The concentration index is defined as twice the area between the concentration curve and the diagonal, ranging from −1 to +1. The value of the concentration index measures the severity of socio-economic inequality. The larger the absolute value of the concentration index, the greater the inequality. The concentration index is zero when the concentration curve coincides with the 45° diagonal line of equality, indicating that there is no social gradient in the health indicator variables, which in this study, are poor SRH status and presence of self-reported chronic health conditions.

If the curve lies above the diagonal line of equality, then the concentration index is negative and suggests pro-rich or regressive social gradient, which implies

that the adverse health indicator variable is more prevalent among the poorer socio-economic groups. If the concentration curve lies below the diagonal line of equality, the concentration index is positive indicating pro-poor or progressive social gradient and implies that the adverse health indicator variable is more prevalent among the richer socio-economic groups. Concentration curves provide a clear visual depiction of social gradients in health.

4.5.1 Magnitude of health inequalities as health disadvantage in self-rated health status

The magnitude of health inequalities in the prevalence of poor SRH status was measured as health disadvantage among respondents in each village compared to Korogocho informal settlement as benchmark. **Table 4.19** shows the comparative prevalence of poor SRH status among respondents in each of the nine villages compared to the whole of Korogocho informal settlement as reference in the measurement of health inequalities as health disadvantage or health advantage.

Table 4.19 Magnitude of Health Inequalities as Health Disadvantage in Self-Rated Health Status

Village	Poor health status		Odds ratio (OR)	95% Confidence Interval (CI)		*P* value
	n	%		Lower	Upper	
Gitathuru	15	16.85	1.76	0.99	3.14	0.056
Grogan A	10	11.90	2.64	1.34	5.21	**0.005**
Grogan B	33	32.67	0.74	0.47	1.15	0.177
Highridge	17	17.17	1.72	0.99	2.98	0.052
Kisumu Ndogo	27	38.57	0.57	0.34	0.95	**0.029**
Korogocho A	5	12.20	2.57	0.99	6.64	0.052
Korogocho B	25	27.78	0.93	0.57	1.51	0.762
Ngomongo	42	44.21	0.45	0.29	0.70	**0.0003**
Nyayo	15	30.00	0.83	0.44	1.56	0.566
Korogocho informal settlement	189	26.29	Reference			

Though respondents in Grogan B, Kisumu Ndogo, Korogocho B, Ngomongo, Nyayo, and villages had higher prevalence of poor SRH status than all the respondents together in Korogocho informal settlement as a whole, only for Kisumu Ndogo village (OR, 0.57; 95% CI, 0.34 to 0.95; ***P* = 0.029**) and Ngomongo village (OR, 0.45; 95% CI, 0.29 to 0.70; ***P* = 0.0003**) was the health disadvantage statistically significant. On the other hand, Gitathuru, Grogan A, Highridge, and Korogocho A village respondents had a health advantage but the advantage only reached statistical significance in the case of Grogan A village (OR, 2.64; 95% CI, 1.34 to 5.21; ***P* = 0.005**).

4.5.2 Magnitude of health inequalities as health disadvantage in self-reported chronic health conditions

No village in Korogocho informal settlement had statistically significant differences in the period prevalence of self-reported chronic health conditions when compared to the aggregate period prevalence among respondents in Korogocho informal settlement as shown in **Table 4.20**. Respondents from Grogan B, Kisumu Ndogo, Korogocho B, and Ngomongo villages reported higher prevalence of chronic health conditions than the reference population in Korogocho informal settlement as a whole. This means that though these villages had a health disadvantage, none of the differences in prevalence of self-reported chronic health conditions in the villages compared to Korogocho informal settlement as a whole, were statistically significant.

Table 4.20 Magnitude of Health Inequalities as Health Disadvantage in Self-Reported Chronic Health Conditions

Village	Chronic health conditions		OR	95% Confidence Intervals (CI)		*P* value
	Prevalence			Lower	Upper	
	n	%*				
Gitathuru	16	18	1.30	0.73	2.29	0.373
Grogan A	16	19.1	1.21	0.68	2.14	0.52
Grogan B	30	29.7	0.67	0.42	1.07	0.092
Highridge	15	15.2	1.59	0.89	2.83	0.115
Kisumu Ndogo	20	28.6	0.71	0.41	1.23	0.22
Korogocho A	5	12.2	2.04	0.79	5.30	0.141
Korogocho B	22	24.4	0.88	0.53	1.46	0.617
Ngomongo	25	26.3	1.14	0.56	2.32	0.727
Nyayo	10	20	0.80	0.49	1.30	0.358
Korogocho informal settlement	159	22.1	Reference			

Note: * % Prevalence of self-reported chronic health conditions in Korogocho informal settlement and every constituent village

The respondents in the other five villages: Gitathuru, Grogan A, Highridge, Korogocho A, and Nyayo, reported lower prevalence of chronic health conditions than the reference population in Korogocho informal settlement as a whole thereby, putting them at a health advantage which was also, not statistically significant. Only in Grogan B village, which had the highest prevalence of self-reported chronic health conditions, was the prevalence (29.7%) of self-reported chronic health conditions significantly higher than the prevalence (12.2%) in Korogocho A, the village with the lowest prevalence of self-reported chronic health conditions (***P* = 0.034**).

4.5.3 Magnitude of health inequalities as health gaps in self-rated health status

Table 4.21 presents the magnitude of health inequalities measured as health gaps in the nine villages of Korogocho informal settlement, which was analyzed by the socio-economic variables: wealth quintiles, educational level, employment status and average monthly income of respondents. The indicator variable of health inequalities was SRH status. Health gaps were quantified using absolute prevalence difference between the prevalence of poor SRH status in the lowest socio-economic class and the prevalence in the highest socio-economic class in each village as well as in Korogocho informal settlement as an entity. The same was done for relative prevalence ratio by dividing the prevalence of poor SRH status among respondents in the lowest socio-economic class by the prevalence of poor SRH status among respondents in the highest socio-economic class.

Table 4.21 Magnitude of Health Inequalities as Health Gaps in Self-Rated Health Status

Socio-economic Classes	Gitathuru (n=15) %	Grogan A (n=10) %	Grogan B (n=33) %	Highridge (n=17) %	Kisumu Ndogo (n=27) %	Korogocho A (n=5) %	Korogocho B (n=25) %	Nyayo (n=15) %	Ngomongo (n=42) %	All* (N=189) %
Wealth quintiles										
First (Poorest)	0	33.3	33.3	18.2	0	100	100	33.3	0	25.6
Fifth (Richest)	15.9	9.1	23.8	16.7	52.4	12.5	23.5	28.6	46.5	27.5
Prevalence difference†	**-15.9**	**24.2**	9.5	1.5	**-52.4**	**87.5**	**76.5**	4.7	**-46.5**	-1.9
Prevalence ratio‡	**0**	**3.7**	1.4	1.1	**0**	**8**	**4.3**	1.2	**0**	0.9
***P* value**	**0.011**	**0.0001**	0.16	0.852	**0.0002**	**<0.0001**	**0.0001**	0.443	**0.0003**	0.75
Highest level of school attended										
None	11.5	62.5	50	17.9	75	0	66.7	0	100	27.7
Secondary or higher	16.7	6.2	26.7	15.8	26.7	21.4	25	22.2	36.4	22.8
Prevalence difference†	-5.2	**56.3**	23.3	2.1	48.3	-21.4	41.7	-22.2	63.6	4.9
Prevalence ratio‡	0.7	**10.1**	1.9	1.1	2.8	0	2.7	0	2.8	1.2
***P* value**	0.990	**0.011**	0.560	0.855	0.089	0.273	0.893	0.344	0.369	0.256
Current employment status										
No	23.3	21.1	20	25	38.5	50	25	41.7	39.5	29.9
Yes	13.6	9.2	39.4	9.8	38.7	3	28.6	26.3	48.1	24.3
Prevalence difference†	9.7	11.9	**-19.4**	15.2	-0.2	**47**	-3.6	15.4	-8.6	5.6
Prevalence ratio‡	1.7	2.3	**0.5**	2.6	1	**16.7**	0.9	1.6	0.8	1.2
***P* value**	0.289	0.264	**0.033**	0.052	0.983	**0.005**	0.744	0.753	0.402	0.110
Average monthly income in Kenya Shillings										
< 5,000	17.2	12.2	34.4	19.1	34	15.6	29.3	37	47.8	26.5
10,000 or more	100	0	0	0	33.3	0	40	0	42.9	20
Prevalence difference†	**-82.8**	12.2	34.4	19.1	0.7	15.6	-10.7	37	4.9	6.5
Prevalence ratio‡	**0.2**	UD¶	UD¶	UD¶	1.0	UD¶	0.7	UD¶	1.1	1.3
***P* value**	**<0.0001**	0.707	0.743	0.379	0.838	0.755	0.599	0.230	0.939	0.363

Note: *All represents Korogocho Informal Settlement as a whole i.e. all the villages combined. †Prevalence difference is an absolute measure of difference between the prevalence of the outcome variable in the lowest socio-economic class and the prevalence in the highest socio-economic class. ‡Prevalence ratio is a relative measure of health gap as a ratio between the prevalence of the outcome variable in the lowest socio-economic class and the prevalence in the highest socio-economic class. ¶UD stands for undefined because zero denominators are indivisible

The magnitude of health inequalities using poor SRH status as outcome variable was measured with prevalence difference and prevalence ratio for health gap. Statistical significance was based on prevalence odds ratio. Health gaps were not remarkable across villages within Korogocho informal settlement taken as a whole. However, within villages, there were wide and significant health gaps in some of the villages.

Using wealth quintiles as a socio-economic class variable to measure health gaps, prevalence differences ranged from -52.4% in Kisumu Ndogo village to 87.5% in Korogocho A village. Grogan A, Korogocho B, and Korogocho A villages had the widest health gaps using prevalence ratios between the poorest 20% and the richest 20% wealth quintiles (prevalence ratio, 3.7:1; $\boldsymbol{P = 0.0001}$; prevalence ratio, 4.3:1; $\boldsymbol{P = 0.0001}$; and prevalence ratio, 8:1; $\boldsymbol{P < 0.0001}$, respectively).

Counter-intuitively, the gap was reversed and statistically significant in Gitathuru, Kisumu Ndogo, and Ngomongo villages where no respondents in the poorest quintile had poor SRH status compared to a number of respondents in the richest quintile who had poor SRH status. Health gaps in the three villages were therefore pro-poor. However, the prevalence ratio was approximately equal to one in Highridge village and Korogocho informal settlement as a whole, suggesting that there were no health gaps between respondents in the poorest and richest quintiles.

For educational class, the prevalence difference ranged from -22.2% in Nyayo village to 63.6% in Ngomongo village. It was only in Grogan A village that there was a significant health gap ($\boldsymbol{P = 0.011}$) with a prevalence ratio of more than ten between respondents who had no formal education and those respondents who had at

least some secondary school education. Though, the prevalence ratio was almost three in Kisumu Ndogo, Korogocho B and Ngomongo villages, the magnitude of health gap was not statistically significant. The ratio was reversed not only in Gitathuru village but also in Korogocho A and Nyayo villages.

Of note, the prevalence of poor SRH status was almost the same among the illiterate and most educated within Highridge village and across Korogocho informal settlement taken as a whole entity. The widest health gap between the unemployed and the employed was recorded in Korogocho A village where the prevalence ratio of 47:1 was highly significant (***P* = 0.005**) but much less wide in Gitathuru, Grogan A, and Highridge villages. The ratio was reversed in Grogan B village and statistically significant (prevalence ratio, 0.5:1; ***P* = 0.033**). Health gap varied between -19.4% in Grogan B village to 47% in Korogocho A village. Interestingly, the prevalence of poor SRH status was equal or almost equal among the unemployed and the employed in Kisumu Ndogo, Korogocho B, Ngomongo villages and again across Korogocho informal settlement.

Income-related health gap ranged from a prevalence difference of -82.8% in Gitathuru village to 37% in Nyayo village. However, the health gap between the lowest earners (less than Kshs 5,000 monthly) and the highest earners (Kshs 10,000 or more, monthly) was only statistically significant in Gitathuru village (prevalence ratio, 0.2; ***P* < 0.0001**) and it was pro-poor. Korogocho B village was the only other village with pro-poor income-related health gap which was not however, statistically significant. Pro-rich health gaps in Grogan A, Grogan B, Highridge, Korogocho A, and Nyayo villages were not statistically significant probably because of zero

numbers in some cells which could not be adequately corrected for by the SPSS statistical package employed for analyses. Essentially, equal proportions of respondents in Kisumu Ndogo village, Ngomongo village, and across the entire Korogocho informal settlement, had poor SRH status irrespective of whether they earned less than Kshs 5,000 or Kshs 10,000 and above, per month.

A caveat with the use of health gap to measure health inequalities is that it only considers the socio-economic classes at the extremes of the spectrum and ignores the middle groups, which are equally important for policy decisions and for strategic interventions. Hence, another valid measure, which considers all the socio-economic groups: the concentration curve/index was also applied to assess health inequalities in this study.

4.5.4 Magnitude of health inequalities as health gaps in self-reported chronic health conditions

Table 4.22 presents the magnitude of health inequalities measured as health gaps in the nine villages of Korogocho informal settlement, which was analyzed by the socio-economic variables: wealth quintiles, educational level, employment status and average monthly income of respondents. The indicator variable was a composite of self-reported chronic health conditions. Health gaps were quantified using absolute prevalence difference between the prevalence of self-reported chronic health conditions in the lowest social class and the prevalence of self-reported chronic health conditions in the highest socio-economic class in each village as well as in Korogocho informal settlement as a whole entity. The same was done for relative prevalence ratio by dividing the prevalence of self-reported chronic health conditions

among respondents in the lowest social class by the prevalence among respondents in the highest social class.

Table 4.22 Magnitude of Health Inequalities as Health Gaps in Self-Reported Chronic Health Conditions*

Socio-economic Classes	Gitathuru (n=16) %	Grogan A (n=16) %	Grogan B (n=30) %	Highridge (n=15) %	Kisumu Ndogo (n=20) %	Korogocho A (n=5 %	Korogocho B (n=22) %	Nyayo (n=10) %	Ngomongo (n=25) %	All§ (N=159) %
Wealth quintiles										
Lowest	100.0	50.0	33.3	13.6	100.0	0.0	100.0	0.0	0.0	27.9
Highest	17.5	18.2	26.2	13.9	23.8	12.5	19.1	22.9	29.6	21.2
Prevalence difference†	**82.5**	**31.8**	7.1	-0.3	**76.2**	**-12.5**	**80.9**	**-22.9**	**-29.6**	6.7
Prevalence ratio‡	**5.714**	**2.747**	1.271	0.978	**4.202**	**0**	**5.236**	**0**	**0**	1.316
***P* value**	**<0.0001**	**<0.0001**	0.279	0.836	**<0.0001**	**0.018**	**<0.0001**	**0.004**	**0.003**	0.251
Highest level of education										
None	26.9	25	37.5	20.5	25	0	33.3	0	0	24.5
Secondary or higher	0	25	20	10.5	13.3	7.1	20.8	16.7	36.4	18.8
Prevalence difference†	26.9	0	17.5	10	11.7	-7.1	12.5	-16.7	-36.4	5.7
Prevalence ratio‡	UD¶	1.00	1.875	1.952	1.880	0	1.601	0	0	1.303
***P* value**	0.233	0.680	0.621	0.480	0.317	0.698	0.804	0.659	0.222	0.510
Current employment status										
No	26.7	15.8	22.9	16.7	33.3	0	25	25	16.3	21.7
Yes	13.6	20	33.3	13.7	22.6	15.2	24.3	18.4	34.6	22.4
Prevalence difference†	13.1	-4.2	-10.4	3	10.7	-15.2	0.7	6.6	**-18.3**	-0.7
Prevalence ratio‡	1.963	0.79	0.688	1.219	1.474	0	1.029	1.359	**0.471**	0.969
***P* value**	0.128	0.681	0.273	0.683	0.323	0.240	0.948	0.610	**0.043**	0.826
Average monthly income in Kenya Shillings										
< 5,000	18.4	19.5	33.3	15.7	30.0	15.6	25.3	25.9	25.4	23.2
10,000 or more	0.0	0.0	0.0	0.0	33.3	0.0	40.0	0.0	42.9	20.0
Prevalence difference†	18.4	19.5	33.3	15.7	-3.3	15.6	-14.7	25.9	-17.5	3.2
Prevalence ratio‡	UD¶	UD¶	UD¶	UD¶	0.901	UD¶	0.633	UD¶	0.592	1.160
***P* value**	0.503	0.786	0.074	0.604	0.863	0.449	0.403	0.437	0.580	0.254

Note: *Self-reported chronic health conditions refer to TB, HIV/AIDS, Hypertension, Diabetes, Asthma, mental disorders, and physical disabilities. § 'All' refers to Korogocho informal settlement comprising all nine villages together. †Prevalence difference is the absolute measure of the magnitude of health difference between the prevalence of the chronic health conditions in the lowest and highest socio-economic groups. ‡Prevalence ratio is the relative measure of the magnitude of health inequalities from the ratio of the prevalence of chronic health conditions in the lowest socio-economic group compared to the prevalence in the highest socio-economic group. ¶UD represents undefined because prevalence with zero as denominator is indivisible.

There were both pro-rich and pro-poor wealth-related health gaps as measures of health inequalities. The magnitude of health gaps, measured as difference between

the prevalence of self-reported chronic health conditions among the respondents in the poorest wealth quintile and the prevalence among respondents in richest wealth quintile, ranged from -29.6% in Ngomongo village to 82.5% in Gitathuru village. Pro-rich health gaps were highly statistically significant in Gitathuru, Grogan A, Kisumu Ndogo, and Korogocho B villages (all, $\boldsymbol{P < 0.0001}$) but not in Grogan B village ($P = 0.279$) and the whole of Korogocho informal settlement ($P = 0.251$). Pro-poor wealth-related health gaps were statistically significant in Korogocho A village ($\boldsymbol{P = 0.018}$), Ngomongo village ($\boldsymbol{P = 0.003}$), and Nyayo village ($\boldsymbol{P = 0.004}$). The health gap in Highridge village was minimal and was not statistically significant.

Education-related health gaps as measures of health inequalities ranged from -36.4% in Ngomongo village to 26.9% in Gitathuru village. There were pro-poor and pro-rich health gaps within the villages though the gaps were not statistically significant. Health gaps based on employment status varied from -18.3% in Ngomongo village to 13.1% in Gitathuru village. The health gap was only significant in Ngomongo village ($\boldsymbol{P = 0.043}$). Other pro-poor and pro-rich health gaps in the villages and Korogocho informal settlement as a whole were not statistically significant.

Health gaps related to income ranged from -17.5% in Ngomongo village to 33.3% in Grogan B village. There were no statistically significant income-related health gaps and most of the health gaps were pro-rich. Zero prevalence of self-reported chronic health conditions among the richest was common.

4.5.5 Magnitude of health inequalities as health gradients in self-rated health status

The concentration curves for health gradients in all nine villages and Korogocho informal settlement are shown in **Figure 4.8**. Concentration curves for health gradients within and between villages in Korogocho informal settlement were generated by plotting wealth quintiles from the poorest 20% to the richest 20% along the x-axis against cumulative frequencies of poor SRH status along the y-axis for each village and for Korogocho informal settlement as a whole.

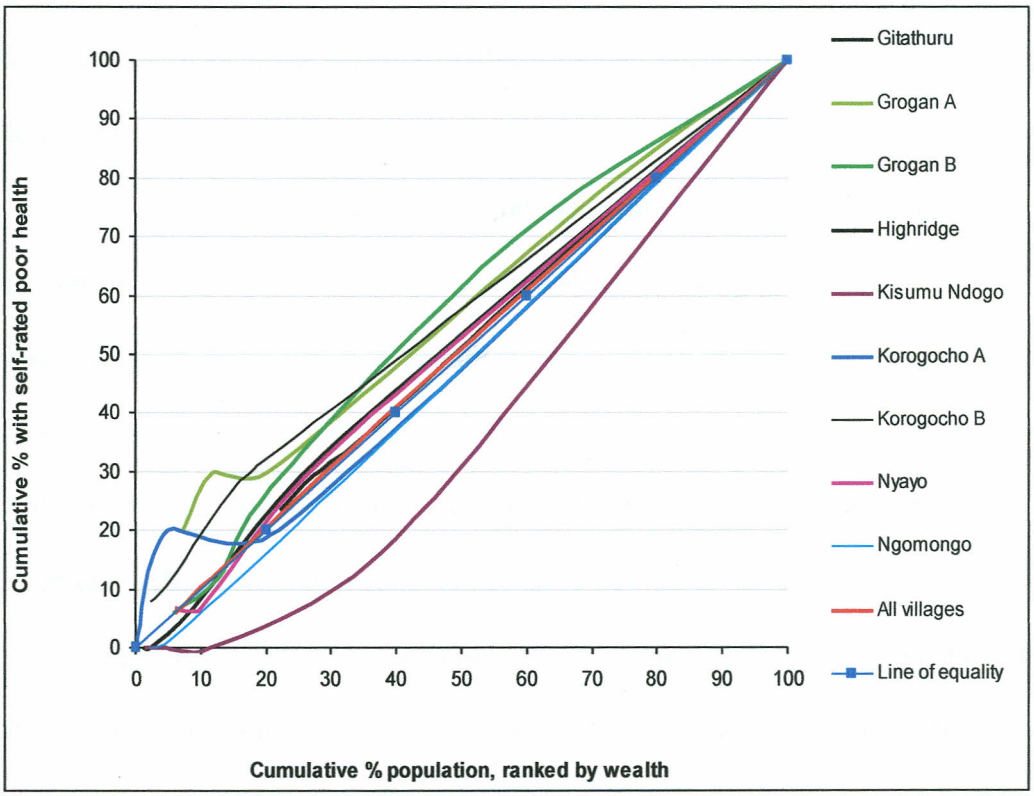


Figure 4.8 Health Inequalities as Wealth-Related Health Gradients in Self-Rated Health Status

The concentration curve for Gitathuru village was slightly above the line of equality and had a concentration index of -0.0292. The curve and index suggest that there were very small wealth-related pro-rich inequalities in SRH status, implying that the poorer respondents were more likely to have poor SRH status than the richer respondents.

Pro-rich wealth-related inequalities in SRH status are illustrated by the concentration curve for Grogan A village, which laid just above the line of equality. There was an initial hump in the curve, which suggested more marked pro-rich social gradient, which however, fell off as the curve sloped towards the richer wealth quintiles. The average concentration index for Grogan A village was -0.1488, which was slightly larger than that of Gitathuru village but in the same direction i.e. pro-rich.

There were also pro-rich health inequalities in Grogan B village from the concentration curve. The concentration index for Grogan B village was -0.1179, which implied small pro-rich health inequalities. Highridge village's concentration curve laid just above the line of equality suggesting pro-rich health inequalities, which were even smaller than those of Gitathuru village. The concentration index for Highridge village was -0.0166.

The most marked social health gradient was in Kisumu Ndogo village from the concentration curve that was far below the line of equality depicting pro-poor health inequalities. The associated concentration index for Kisumu Ndogo village was +0.4360. The concentration curve for Korogocho A village was biphasic with an initial pro-rich hump which then crosses below the line of equality. However,

summative concentration index is -0.0146, which was pro-rich and the least health gradient-type inequality among the villages.

Korogocho B village's concentration curve was also above the line of equality with a concentration index of -0.1329. The health inequalities were pro-rich. The pro-poor concentration curve of health inequalities in Ngomongo village was very narrow with concentration index of +0.0377, which was much less than the social gradient in Korogocho B village. The concentration curve was only slightly below the line of equality. The concentration index for Nyayo village was -0.0158, suggesting pro-rich, but small health gradient.

Summary

There were both pro-poor and pro-rich wealth-related health gradients across villages in Korogocho informal settlement such that on aggregate, the magnitude of health inequalities was only minimal when Korogocho informal settlement was considered as whole entity with a concentration index of -0.0021 but when disaggregated by village, Kisumu Ndogo village (pro-poor) and the following villages: Grogan A, Grogan B, and Korogocho B (pro-rich) had relatively remarkable wealth-related health gradients.

4.5.6 Magnitude of health inequalities as health gradients in self-reported chronic health conditions

The magnitude of health inequalities using wealth-related social gradients in the prevalence of self-reported chronic health conditions is shown as concentration curves of the villages and Korogocho informal settlement as a whole in **Figure 4.9.**

Concentration indexes are the numerical values of social health gradients associated the concentrations curves that were explained earlier in subsection **4.5.5** on page 187.

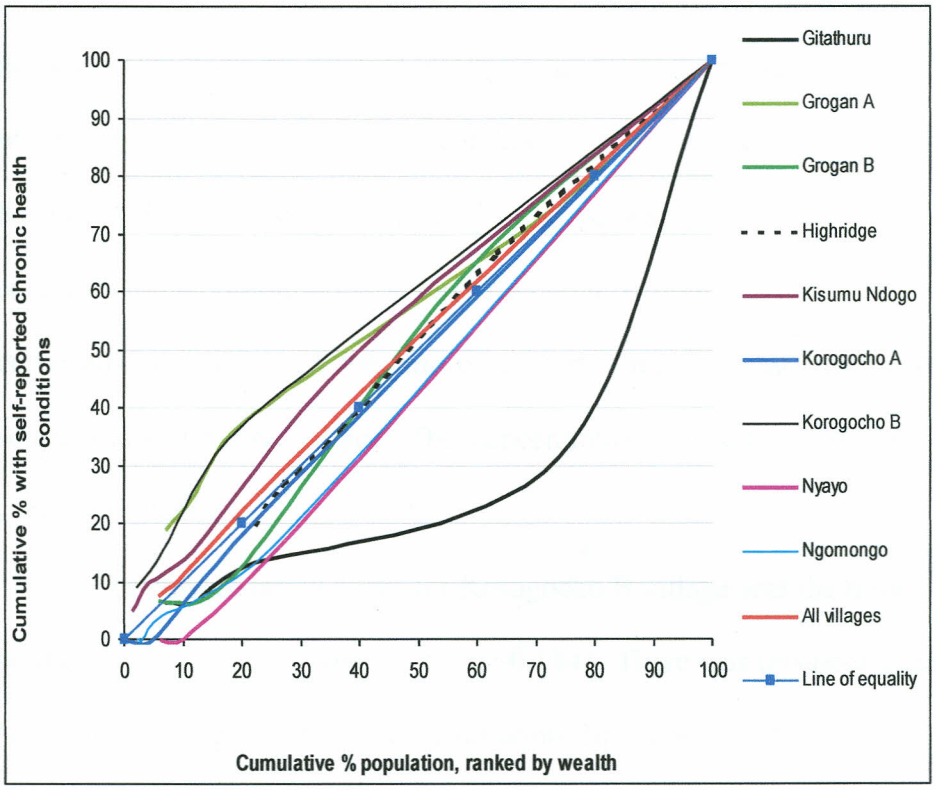


Figure 4.9 Health Inequalities as Wealth-Related Health Gradients in Self-Reported Chronic Health Conditions

The concentration curve for Gitathuru village was the farthest below the line of equality of all the villages, with a concentration index of +0.4291, which suggests marked pro-poor social gradient in self-reported chronic health conditions. Grogan A village's concentration curve was above the line of equality and pro-rich. The concentration index of -0.1473 showed a moderate social gradient in self-reported chronic health conditions among Grogan A village respondents.

The concentration curve for Grogan B village was biphasic with a pro-poor initial phase, which later became pro-rich for the richer wealth quintiles. The concentration curve for Grogan B village was -0.1823. Highridge village's concentration curve just straddled the line of equality, which suggests that there was no obvious social gradient among Highridge village's respondents in the prevalence of self-reported chronic health conditions with concentration index of -0.0037. Kisumu Ndogo village's concentration curve was pro-rich and above the line of equality with a concentration index of -0.1174. Korogocho A village's concentration curve almost overlapped the line of equality showing that there was virtually no social gradient in the village. The concentration index for Korogocho A village's curve was +0.0022.

The concentration curve for Korogocho B village was the most pro-rich social gradient with a concentration index of -0.1843. There was pro-poor social gradient in Ngomongo village with the concentration curve below the line of equality. The accompanying concentration index for Ngomongo village was +0.0939. Nyayo village's concentration curve was pro-poor and below the line of equality with a concentration index of +0.0931. In Korogocho informal settlement as a whole, the health gradient was minimal with a concentration index of -0.0211.

Summary

There were measurable health inequalities in the prevalence of self-reported chronic health conditions in many villages in Korogocho informal settlement. The health inequalities were both pro-poor and pro-rich. Health gaps were most marked in Gitathuru and Ngomongo villages. Social health gradient was most obvious in

Gitathuru village and it was pro-poor (progressive). Nyayo and Ngomongo villages also recorded moderate pro-poor wealth-related health gradients while Korogocho B, Grogan A, and Kisumu Ndogo villages had moderate pro-rich wealth-related health gradients in self-reported chronic health conditions. No statistically significant health inequalities of any of the three dimensions were recorded in Highridge village and in Korogocho informal settlement on aggregate.

4.6 Association between Self-Rated Health Status and Self-Reported Chronic Health Conditions

The two dependent variables were chosen in order to assess the two broad dimensions of health i.e. well-being and absence of disease through SRH and self-reported chronic health conditions respectively. The goal was to effectively provide holistic evidence of health inequalities in a deprived and marginalized community for appropriate policies and interventions. **Figure 4.10** demonstrates the association between the two dependent variables: SRH status and self-reported chronic health conditions among respondents in Korogocho informal settlement. There was a highly significant association between the two dependent variables. Respondents who reported any of the chronic health conditions were more than three times likely to also have poor SRH status (OR, 3.49; 95% CI, 2.41 to 5.07; ***P* <0.001**).

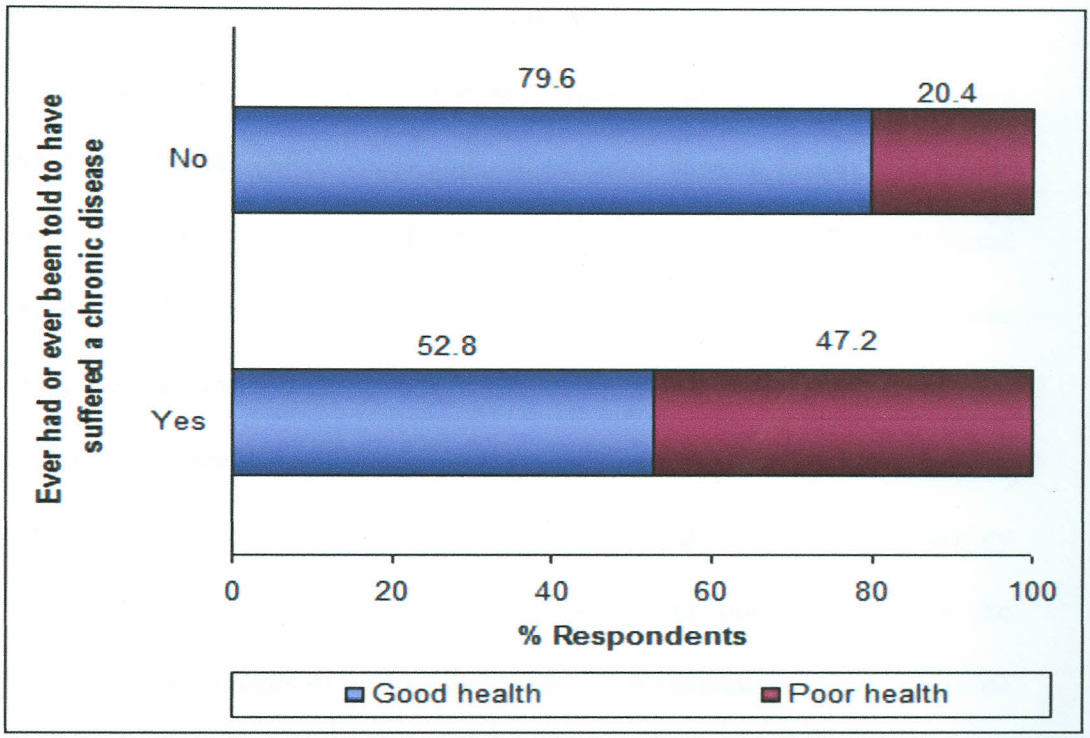


Figure 4.10 Association between Self-Rated Health Status and Self-Reported Chronic Health Conditions

4.7 Determinants of Health Inequalities Using Binary Logistic Regression

Variables were recoded after collapsing, merging, and in some cases deleting categories with limited numbers to ensure adequate number of cases to satisfy the assumptions for analysis with logistic regression. The variables were also tested for multicollinearity, high correlations, as well as outliers so as to enhance the model's goodness of fit. Direct logistic regression analysis was performed to identify the determinants or independent predictor(s) of health inequalities in Korogocho informal settlement.

The independent or explanatory variables (demographic, socio-economic, and environmental variables) that reached statistical level of $P < 0.20$ during bivariate analysis of associations were fitted to a binary logistic regression model. The two health outcome variables (SRH status and self-reported chronic health conditions) were transformed into one health outcome variable. The absence of self-reported chronic health conditions plus good SRH status were computed together into one dummy variable (dummy 0, good health outcome) while poor SRH status and presence of chronic health conditions together became the other dummy variable (dummy 1, poor health outcome). The model tested the ability of the explanatory variables to independently predict poor or good health outcomes among the respondents in all the villages of Korogocho informal settlement as shown in **Table 4.23.**

All the predictor variables were tested in one block using Forced Entry Method, which is the default and recommended procedure in SPSS (Tabachnick & Fidell, 2013). The full model containing all the predictors was statistically significant, chi square $[\chi^2]$ (df = 32, n = 719) = 113.7, $\boldsymbol{P < 0.001}$, indicating that the model was able to distinguish between respondents who had either as poor or good health outcomes (transformed health outcome variable). The whole model explained between 14.6% (Cox and Snell R square) and 21.4% (Nagelkerke R square) of the variance in health outcome, and correctly classified 76.4% of the cases.

Table 4.23 shows that only age, access to and utilization of health care, and village of residence made a uniquely statistically significant contribution to the model controlling for all other factors. The older the respondents, the more likely they were

to have poor health outcome such that for every additional year in age, respondents were 4% more likely to have poor health outcome (Adjusted Odds Ratio [AOR], 1.040; ***P* = 0.001**).

Table 4.23 Logistic Regression Model of Determinants Predicting Health Inequalities in Korogocho Informal Settlement

Predicting variables	B	SE[a]	Wald	df[b]	Sig[c]	Exp(B)[d]	95% CI for Exp(B)[e]	
							Lower	Upper
Demographic variables								
Age (years)	.039	.012	10.937	1	**.001**	1.040	1.016	1.064
Marital status								
Widowed	Reference							
Never married	-.295	.514	.329	1	.566	.745	.272	2.038
Married	-.025	.373	.005	1	.946	.975	.469	2.025
Not married but living together	.029	.519	.003	1	.955	1.030	.372	2.849
Separated/Divorced	-.376	.443	.719	1	.397	.687	.288	1.637
Gender								
Male	Reference							
Female	.523	.299	3.064	1	.080	1.687	.939	3.031
Socio-economic variables								
Occupation								
None	Reference							
Unskilled manual	.380	.355	1.144	1	.285	1.462	.729	2.934
Skilled	-.476	.320	2.219	1	.136	.621	.332	1.162
Income								
Monthly Income above Kshs 5,000	Reference							
Monthly Income below Kshs 5,000	.476	.320	2.219	1	.136	1.610	.860	3.013
Environmental variables								
Cooking fuel								
Kerosene users	.717	.415	2.976	1	.084	2.048	.907	4.622
Charcoal users	.321	.210	2.338	1	.126	1.378	.914	2.078
Health care								
Needed & received health care	Reference							
Needed but received health care sometimes	.875	.444	3.876	1	**.049**	2.399	1.004	5.733
Needed but did not receive health care	.709	.267	7.033	1	**.008**	2.031	1.203	3.430
Village of residence								
Ngomongo	Reference							
Gitathuru	1.415	.432	10.710	1	**.001**	4.116	1.764	9.605
Grogan A	.873	.529	2.725	1	.099	2.395	.849	6.756
Grogan B	1.412	.376	14.123	1	**.000**	4.104	1.965	8.572
Highridge	.638	.365	3.048	1	.081	1.892	.925	3.870
Kisumu Ndogo	1.497	.574	6.795	1	**.009**	4.468	1.450	13.770
Korogocho A	.581	.363	2.558	1	.110	1.787	.877	3.641
Korogocho B	1.425	.461	9.575	1	**.002**	4.160	1.686	10.260
Nyayo	1.146	.554	4.282	1	**.039**	3.146	1.062	9.314

Note: [a]Standard Error; [b]degrees of freedom; [c]Level of significance; [d]Adjusted odds ratio; [e]95% confidence intervals for the adjusted odds ratio

4.7.1 Socio-economic and environmental determinants of health inequalities

From **Table 4.23**, socio-economic variables were not significant determinants of health inequalities in Korogocho informal settlement. However, two of the environmental factors—access to health care and village of residence were significant determinants of health inequalities among respondents in Korogocho informal settlement. Receiving health care only sometimes but not every time health care was needed made respondents significantly more likely to have a poor health outcome (AOR, 2.399; 95% CI, 1.004 to 5.733; ***P* = 0.049**). In addition, not receiving health care at all when needed made respondents most likely to have a poor health outcome (AOR, 2.031; 95% CI, 1.203 to 3.43; ***P* = 0.008**). Residing in any of the villages in Korogocho informal settlement made respondents likely to report poor health outcome, but this was only statistically significant in Gitathuru village (***P* = 0.001**), Grogan B village (***P* < 0.0001**), Kisumu Ndogo village (***P* = 0.009**), Korogocho B village (***P* = 0.002**), and Nyayo village (***P* = 0.039**) in addition to Ngomongo, the reference village. Residence in Grogan A village, Highridge village, and Korogocho A village was not significantly associated with reporting poor health outcome, all other factors being equal.

Upon controlling for age using the selection variable option in SPSS, health care (***P* = 0.035**) and village of residence (***P* = 0.002**) remained significant and independent predictors of the health outcome variable among respondents who were less than 45 years old. Among respondents who were 45 years old or older, only health care (***P* = 0.008**) remained a significant independent predictor of a poor health outcome. Other factors such as gender, marital status, occupation, income, and

cooking fuel were not significantly predictive of health inequalities. There were no differences in the predictor variables when gender was the selection variable.

4.8 Mediators of Health Inequalities

A binary logistic regression analysis was conducted to predict mediators of health inequalities in Korogocho informal settlement using the transformed and combined health outcome variable explained in sub-section **4.7** on page 193. The predictor mediator variables were health insurance subscription, wall material of housing structure, belonging to social associations, and trust of neighbors. Other predictors in the model were alcohol use, taking *bhang*, using cocaine, voluntary physical exercise, and engaging in sexual activity. All the predictors were entered into the model in one block using the Forced Entry Method in SPSS, to assess their predictive ability while controlling for the effects of other predictors in the model. Shown in **Table 4.24** is the logistic regression model for all respondents in Korogocho informal settlement, irrespective of gender. **Table 4.25** shows the logistic regression model for female respondents only, while **Table 4.26** is the model for male respondents only.

Table 4.24 Logistic Regression Model of Mediators Predicting Health Inequalities among All the Respondents in Korogocho Informal Settlement

Predicting mediators	B	SE[a]	Wald	df[b]	Sig[c]	Exp(B)[d]	95% CI for Exp(B)[e]	
							Lower	Upper
Material factors								
Have health insurance	Reference							
Do not have health insurance	.236	.296	.637	1	.425	1.267	.709	2.263
Non-durable wall material	Reference							
Permanent wall material	-.167	.227	.537	1	.464	.847	.542	1.321
Psychosocial factors								
Social capital								
Do not belong to any social association	Reference							
Belong to at least one social association	.231	.204	1.283	1	.257	1.260	.845	1.878
Trust								
Do not trust neighbors	Reference							
Trust neighbors	-.106	.202	.276	1	.599	.899	.605	1.336
Behavioral factors								
Substance abuse								
Kuber	Reference							
Alcohol	.305	.275	1.230	1	.267	1.356	.792	2.323
Bhang	.882	.594	2.207	1	.137	2.416	.755	7.736
Cocaine	.191	.876	.048	1	.827	1.211	.217	6.748
Voluntary exercise								
Take voluntary physical exercises	Reference							
Do not voluntarily take exercises	.753	.256	8.620	1	**.003**	2.123	1.284	3.511
Sexual activity								
Never had sexual intercourse	Reference							
Stopped having sex more than a year ago	.675	.833	.656	1	.418	1.964	.384	10.053
Have sex with only one partner	.062	.509	.015	1	.903	1.064	.392	2.888
Have sex with more than one partner	.873	.529	2.725	1	.099	2.395	.849	6.756

Note: [a] Standard Error; [b] Degrees of freedom; [c] Significance level; [d] Adjusted Odds Ratio; [e] 95% confidence interval

A test of the full model against a constant only model was statistically significant, indicating that the mediators as a set, reliably distinguished between the health outcomes indicative of health inequalities (χ^2=24.096; n = 719; ***P* < 0.0001**). The model as a whole explained between 27.1% (Cox and Snell R square) and 36%

(Nagelkerke R square) of the variance in health outcome, and correctly classified 76.3% of the cases. As shown in **Table 4.24,** voluntary physical exercise was the only mediator that was significantly predictive of health inequalities among all respondents in Korogocho informal settlement, after controlling for other factors. Other mediators such as health insurance coverage, material of wall, belonging to social associations, trust among neighbors, substance abuse including alcohol, and sexual activity did not significantly predict health inequalities

Table 4.25 Logistic Regression Model of Mediators Predicting Health Inequalities among Female Respondents in Korogocho Informal Settlement

Predicting mediators	B	S.E.[a]	Wald	df[b]	Sig.[c]	Exp(B)[d]	95% C.I. for EXP(B)[e]	
							Lower	Upper
Psychosocial factors								
Do not belong to association	-.304	.185	2.700	1	.100	.738	.514	1.060
Trust neighbors	-.031	.181	.028	1	.866	.970	.680	1.384
Control/Authority	-.200	.194	1.062	1	.303	.819	.560	1.198
Behavioral factors								
Stopped having sex	.009	.238	.001	1	.971	1.009	.633	1.608
Sex with more than one partner concurrently	1.003	.441	5.177	1	**.023**	2.726	1.149	6.465
Unprotected sex	2.699	1.057	6.524	1	**.011**	14.862	1.874	117.884
No voluntary physical exercise	.633	.198	10.218	1	**.001**	1.884	1.278	2.778
No alcohol	-.631	.255	6.099	1	**.014**	.532	.323	.878

Note: [a] Standard Error; [b] Degrees of freedom; [c] Significance level; [d] Adjusted Odds Ratio; [e] 95% confidence intervals

As shown in **Table 4.25**, the significant mediators of health inequalities among female respondents were having more than one sexual partner concurrently, unprotected sex, not taking voluntary physical exercise, and alcohol consumption. Female respondents, who had sexual intercourse with more than one sexual partner concurrently, were more than two and a half times more likely to report poor health outcomes (***P* = 0.023**). Unprotected sex (without condom) made females more likely to report poor health outcomes (***P* = 0.011**). Not voluntarily undertaking physical exercises by female respondents made them more likely to report poor health outcomes (***P* = 0.001**). Poor health outcomes were significantly less likely to be reported by female respondents who did not take alcohol (***P* = 0.014**). Mediators contributed between 10.5% and 14% to health inequalities among female respondents in Korogocho informal settlement.

Table 4.26 Logistic Regression Model of Mediators Predicting Health Inequalities among Male Respondents in Korogocho Informal Settlement

Predictors	B	S.E.[a]	Wald	df[b]	Sig.[c]	Exp(B)[d]	95% C.I. for EXP(B)[e]	
							Lower	Upper
Psychosocial mediators								
Belonging to associations	-.026	.420	.004	1	.951	.975	.428	2.218
No trust of neighbors	-.416	.372	1.255	1	.263	.660	.318	1.366
No authority at home	-.611	.558	1.200	1	.273	.543	.182	1.620
Behavioral factors								
Having unprotected sex	.110	.448	.060	1	.807	1.116	.464	2.685
Never had sex		Reference						
Sex with one regular partner	-.903	1.166	.600	1	.439	.405	.041	3.986
Sex with more than one partner concurrently	1.377	1.343	1.052	1	.305	3.964	.285	55.113
Stopped having sex	.523	.806	.421	1	.516	1.687	.348	8.189
Not taking voluntary physical exercise	1.477	.388	14.473	1	**.000**	4.380	2.046	9.374
Alcohol use	.104	.401	.068	1	.795	1.110	.505	2.437
Not using *Bhang*	-1.409	.760	3.433	1	.064	.244	.055	1.085
Not using Cocaine	-.294	.879	.112	1	.738	.745	.133	4.172

Note: [a] Standard Error; [b]Degrees of freedom; [c]Significance level; [d]Adjusted Odds Ratio; [e]95% confidence intervals

Table 4.26 shows that when male respondents were the selection variable, only voluntary physical exercise made a significant contribution to prediction of the health outcome (***P* < 0.0001**) after controlling for other factors in the model. Among males, mediators contributed between 30.3% and 40.4% to the health inequalities. There were no differences in predicting mediators when age was the selection variable, with all other factors in the model, remaining stable.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

There is no gainsaying the negative impact of health inequalities on health, well-being, social cohesion, and economic development particularly in developing countries such as Kenya. But, empirical research of health inequalities within and between component units in small areas, particularly disadvantaged areas in SSA has been very limited (Smith, Olatunde, & White, 2010). Even less available, are spatially disaggregated data on health inequalities by component units. Furthermore, health inequalities are not usually presented holistically in the various dimensions so as to be relevant to policy makers and other stakeholders. The need to measure health inequalities and to identify the multilevel determinants and mediators, in order to plan interventions, set targets, as well as to monitor and evaluate strategies to mitigate health inequalities cannot be over-emphasized.

This study set out to address these gaps by providing comprehensive data on the magnitude and various dimensions of health inequalities. In addition, the study uniquely investigated the determinants and mediators of health inequalities at individual, household, neighborhood levels in Korogocho informal settlement, a relatively small and deprived community. Further, data collection and analyses were disaggregated into component villages in Korogocho informal settlement and into the extent of health inequalities in each village in an easily comprehensible, interpretable, and replicable manner for the benefit of stakeholders and other researchers. This was done to unmask the invidious problem of health inequalities in a marginalized

community and hence, to debunk the notion that urban informal settlements are small and homogeneous areas and therefore unlikely to harbor health inequalities.

The ingenious decision to disaggregate and analyze data by village in this study, rather than aggregate the data based on Korogocho informal settlement as a whole entity, unmasked wide health inequalities within and between the heterogeneous villages. The evidence from this study should be relevant for targeting health-impacting policies and for the implementation of strategic interventions based on local priorities. Disaggregation data of health inequalities in smaller geographic units in Korogocho informal settlement and the comprehensive assessment of the various dimensions of health inequalities are some of the innovative, important, and unique contributions of this study.

The objectives of this cross-sectional and observational study were to measure the magnitude and to identify the determinants and mediators of health inequalities among adults aged from 25 to 59 years in the nine villages of Korogocho informal settlement through the current paradigm of 'social determinants' approach. The findings support paradigm shift from biomedical approach to the social determinants approach, which highlights the significant role played by socially constructed factors particularly the built environment, in the distribution of health inequalities between subpopulation groups.

However, the traditional socio-economic indicators such as education, income, occupation, employment and wealth were not found to be independent determinants of health inequalities in Korogocho informal settlement. Rather, socially constructed environmental parameters played major roles in the distribution of health

inequalities. Through gender analysis, the study unearthed gender-related differences in the mediators of health inequalities in Korogocho informal settlement.

Contrary to expectation, villages in Korogocho informal settlement were heterogeneous in terms of magnitude and the distribution of the socio-economic and environmental conditions that underlie health inequalities. Varying magnitudes of health inequalities assessed by three dimensions of health inequalities: health disadvantage, health gap, and health gradient, were found in the constituent villages of Korogocho informal settlement.

The settlement is a relatively small spatial area of concentrated poverty, which is composed of households that have multiple deprivations (UN-HABITAT, 2010). Majority of the households lacked security of tenure, access to safe water supply, improved sanitation facilities, and shelter made of durable materials. Room congestion was very common in households. Despite the pervasive deprivations, this study found health inequalities of varying magnitude within some of the villages, in the three dimensions of health inequalities but notably, not across Korogocho informal settlement taken an aggregate entity.

More than one of every five respondents in Korogocho informal settlement reported poor health status or at least one chronic health condition in this study. Widely varied health gaps were detected between socio-economic groups within the villages. One of the most intriguing findings in this study was the evidence of consistent health inequalities in all three dimensions in Kisumu Ndogo and Ngomongo villages. Four other villages: Gitathuru, Grogan B, Korogocho B, and Nyayo posted health inequalities in at least two of the three dimensions. But,

paradoxically, Grogan A and Korogocho A villages, which had the best health outcomes, were found to have mainly pro-rich and regressive health inequalities in at least one dimension. Moreover, Grogan A and Korogocho A villages recorded some of the widest health gaps between the worst-off and the best-off socio-economically.

Korogocho A village had not only some of the wealthiest respondents and best social and environmental conditions but also a relatively young population. The finding of wide health inequalities in the context of good aggregate population health is usually associated with economically advanced, capitalist countries in the developed world such as in the United Kingdom (Dorling, 2013). A spatial model developed by Sartorius and Sartorius (2013) to interrogate the impact of poor service delivery on mortality in South Africa, a developing country revealed that inequalities were more widespread in wealthier provinces in spite of lower mortality rates in the wealthier provinces.

The health advantage enjoyed by Grogan A respondents could be attributed to healthy life-styles such as practice of safe sex, low rates of alcohol, regular physical exercises, healthy eating as well as access to health care and low unemployment rate. In their report on improving health outcomes in deprived communities, Tsai et al. (2010) suggested that to improve health outcomes of the worst-off, they should be empowered to make health lifestyle choices within an enabling environment.

Gitathuru, Grogan B, Kisumu Ndogo, Korogocho B, Ngomongo, and Nyayo villages that posted the worst social and environmental conditions also had the worst health outcomes and some of the widest health inequalities, which impose a double burden on the residents. The finding is similar to the situation in poor countries such

as Bangladesh, Ethiopia, Nepal, and Zimbabwe where the investigators using decomposition method, found that health inequalities were more concentrated among the poor but the association varied among the countries (Nawal, Sekher, & Goli, 2013).

Respondents from Korogocho B village and Ngomongo village suffered some of the worst health outcomes despite the infrastructural development that is taking place in the villages under the auspices of KSUP and a private developer respectively. Iweka and Adebayo (2010) reported a similar finding in the upgrading of informal settlements in Lagos, Nigeria where the focus was on infrastructure to the detriment of residents' health and wellbeing. According to Turley et al. (2013), knowledge-driven approaches are necessary to implement policies and upgrading programs in urban informal settlements that are effective and efficient at improving the socio-economic well-being, quality of life, and health of the people. The message here is that programs that are designed to leverage the welfare and health of the population should also focus on reducing health inequalities. The emphasis on one-size-fits-all approach for delivery of development programs needs to be changed to reflect local priorities in a concept of "proportionate universalism" proposed in Marmot's report (2010) on 'Fair Society, Healthy Lives.'

Curiously, no significantly measurable health inequalities were found in Highridge village in any of the dimensions. This remarkable lack of measurable health inequalities of statistical significance in one specific village out of nine villages in Korogocho informal settlement requires some explanation. Though no statistically significant health inequalities were detected in Highridge, the village did not enjoy a

statistically significant health advantage when compared to Korogocho informal settlement as a whole. Since the number of respondents who reported poor health status and chronic health conditions in Highridge village was relatively small, the lack of statistically significant differences between socio-economic groups could be explained by a Type II error (Peck & Devore, 2011). However, in other villages like Grogan A and Korogocho A where the prevalence of the outcome variables was also relatively small, there were still statistically significant health inequalities in at least one dimension, making a Type II error improbable.

Another possible explanation for lack of statistically significant health inequalities in Highridge village is that Highridge respondents collectively under-reported their ill-health particularly since most Highridge respondents alluded to inadequate health care facilities as the most contributory factor promoting ill-health during focus group discussions. Highridge respondents did not have ready access to diagnosis in health care facilities and hence might have under-reported the chronic health conditions, which could be asymptomatic early on in the disease. However, Highridge respondents also reported one of the lowest rates of behavioral risk factors for chronic health conditions that do not require to be diagnosed in health care facilities. Moreover, health-protecting amenities such as pipe-borne water were available to many households in Highridge. In addition, respondents from Highridge village did not also have significant health inequalities based on SRH status, which does not require health care facility-based diagnosis.

Many respondents in Highridge village implied that they trust their neighbors but did not feel that they needed to belong to social associations in order to acquire

social capital. Generally, during focus group discussions, Highridge village respondents agreed that they look after each other irrespective of social class or gender. Therefore, the most plausible explanation for the apparent lack of health inequalities in Highridge village would be general feeling of contentment due to bridging type of social cohesion because of the seeming lack of health-damaging social stratification in Highridge village. It is also possible that some unidentified and unmeasured confounders such as culture and ethnicity might have contributed to the lack of statistically significant health inequalities in Highridge village.

For long, health inequalities within subpopulation groups have been neglected in favor of health inequalities between population subgroups (Slavov & Ho, 2013). The lack of research into the existence of health inequalities within population subgroups in deprived areas such as urban informal settlements have contributed to the slow progress towards achieving development goals in Kenya (Schweitzer, Makinen, Wilson, & Heymann, 2012).

Though health inequalities were found within and between most villages, there were no significantly measurable health inequalities aggregated to the whole of Korogocho informal settlement. This justifies this study's approach of investigating health inequalities between subpopulation groups within and across villages in Korogocho informal settlement. Village disaggregated data showed some remarkably large magnitudes of health inequalities. The lack of significantly measurable levels health inequalities on aggregate in Korogocho informal settlement could be attributed to pro-poor health inequalities in some of the villages being countervailed by pro-rich health inequalities in the other villages. The balance of pro-poor and pro-rich health

inequalities could also account for the relatively low levels of perceptible social gradients in Korogocho informal settlement on average, in addition to the pervasive deprivations in the locality.

Dorling (2010) in his book on the injustice of spatial segregation posits that poorer people are likely to migrate to poorer areas of the city because of social evils such as exclusion by the elites. People with similar socio-economic circumstances tend to live in the same locality (Dorling, 2010). Without disaggregation of data in this study, ignorance of the existence and magnitude of health inequalities within a poor, segregated urban community would have persisted. (Stafford, Nazroo, Popay, & Whitehead, 2008). Similar small spatial distribution of health inequalities has been demonstrated in other segregated geographical settings due to unequal exposure and habituation to adverse socio-economic and environmental factors (Bécares et al., 2012).

The paradigm that explains the determinants of health inequalities has shifted from blaming the individual on biological and behavioral grounds for poor health to the broader determinants of health inequalities due to uninformed policies and practices in the larger society (Katikireddi, Higgins, Smith, & Williams, 2013). Though biological factors such as age and gender still play vital roles in the genesis of health inequalities, it must be pointed out that remediable social constructs actually also influence the biological factors to aggravate health inequalities (Whitehead, 2007).

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Age was found to be a strong determinant of health inequalities in this study. For instance, the older people were more likely to report poorer health experience and

outcomes than younger people. But the broader social determinants in the community also influenced the health disadvantage suffered by older people. The older age group (45-59 years) was more likely to live in less socially protective environments than the younger age group (25-44 years). Older people were poorer, lived in more congested rooms, did less exercise, abused substances more, and had less access to health insurance and care.

The older the respondents, the more likely they were to report poor health outcomes which is in agreement with the findings in adults by Hirve, Juvekar, Lele, and Agarwal (2010) in India, another developing country. In a prospective cohort study of health inequalities in Britain by Chandola, Ferrie, Sacker, and Marmot (2007), they found that self-assessed health slowly declined from early adulthood to old age. However, Sacker and colleagues (2005) found that people from the lower occupational classes tended to age faster in terms of physical health than those from the higher occupational classes suggesting that social factors contributed to the age-related inequalities. Among the reasons usually advanced to account for age-related health inequalities are the long latency period of the effects of unhealthy lifestyle earlier on in life and the cumulative effects of economic and social disadvantage throughout life. Additionally, older people are more vulnerable and are more likely to be exposed over a longer period to health-damaging factors in the social and physical environments (Hoffman, 2005).

From a biologic viewpoint, women and men are differentially vulnerable to certain forms of ill-health. Though women live longer than men, women tend to live less healthy lives than men (Malmusi, Artazcoz, Benach, & Borrell, 2012). This

compares with study's findings, where women had higher prevalence of poor SRH status and chronic health conditions than men, in general. My study also revealed that women's social conditions were worse than the men's social conditions. Women were more likely to have lower levels of education, were poorer, had higher unemployment rates, and were more likely to have less access to social amenities notwithstanding the fact that women exhibited less risky behaviour than men in most of the villages in Korogocho informal settlement. This buttresses the assertion that social constructs as determinants play a pertinent role even in health inequalities related to biological factors.

Similar gender-related differences in SRH status were reported in Sweden and attributed to men's better access to social capital than women (Eriksson, Dahlgren, Janlert, Weinehall, & Emmelin, 2010). Also, in a study by Kyobutungi, Egondi, and Ezeh (2010) in Nairobi informal settlements and in a more comprehensive study in eight Health and Demographic Surveillance System (HDSS) sites within the INDEPTH Network in Asia and Africa including Kenya by Ng and co-workers (2010), men reported better health than women.

However, a study in Brazil, a developing country did not find gender differences in the report of a chronic condition though the study involved older persons who were sixty years of age or older (Blay, Andreoli, Fillenbaum, & Gastal, 2007). This is in keeping with the finding by some other authors reporting from Japan of narrowing or convergence of poor SRH between the genders as people age (Nishi et al., 2012). Gender as opposed to sex, is a social construct that refers to cultural and

historical differences in the roles, attitudes, behaviours, and responsibilities of men and women patterned by societal norms and stereotypes.

More important for policy and decision makers, are the remediable social determinants of health inequalities, which are context-specific. Social determinants are the socio-economic and environmental factors that promote or deter health inequalities (Marmot & Wilkinson, 2006). Education, income, occupation, wealth, and employment status are the usual indicators of socio-economic status in health inequalities research (Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006).

However, in spite of statistically significant association of some of the socio-economic variables with health inequalities, none of these variables were significantly and independently predictive of health inequalities in this study. The finding of statistically insignificant and independent role of socio-economic factors on health inequalities in this study is counterintuitive and contradicts findings from some other studies, which found significant association between socio-economic variables and health inequalities (Yang & Kanavos, 2012; Gunasekara, Carter, & McKenzie, 2013).

Wilkinson (2005) proposed two mechanisms to explain socially constructed health inequalities. The first mechanism is through social comparison in a community that has wide income inequality. The other mechanism entails the perennial conflict experienced in a hierarchically stratified community. Though social gradients were marked within some villages there was no distinct social stratification on aggregate, among the respondents in Korogocho informal settlement. It was therefore not surprising that the socio-economic factors were not significant determinants of health inequalities.

However, contrary to this study's findings, researchers from South Africa, reported strong social gradients in health based on secondary, national data from South African General Household Surveys (Ataguba, Akazili, & McIntyre, 2011). It can be argued that South Africa is a diverse and multiracial society and data from Household Surveys of the whole country would readily capture heterogeneous socio-economic groups allowing for socio-economic-related health inequalities (Mooney & Gilson, 2009).

Socially structured environmental factors particularly, the village of residence, was strongly associated with health inequalities in Korogocho informal settlement. Respondents living in Gitathuru, Grogan B, Kisumu Ndogo, Korogocho B, Ngomongo, and Nyayo villages suffered the worst health outcomes and some of the largest magnitudes of health inequalities. The respondents in these villages were also most likely to be exposed to the worst social living conditions and limited access to health-enhancing essential amenities.

Ngomongo village respondents were particularly irked by the effect of the proximity of polluting Dandora Municipal Dumpsite on their health. These Ngomongo village respondents also had the worst SRH status though they did not have the highest burden of chronic ill-health. Therefore, it could be implied from this research that people's attitude to their neighborhood or residential area affects their perception of health (Mitchell, Gleave, Bartley, Wiggins, & Joshi, 2000).

The findings of this study also demonstrated that place effects impact health. Riley and colleagues (2007), reported similar place effects from their examination of a *favela* (also an urban informal settlement) in Salvador, Brazil. They found that a

large proportion of the residents suffered a variety of chronic communicable and non-communicable diseases due to poor environments and inability to access essential health resources.

An observational study in England reported by Mitchell and Popham (2008) showed that populations exposed to the natural or greenest environments had the lowest levels of socio-economic health inequalities. A pilot study was undertaken in 2007 by Njoroge Kimani and commissioned by the United Nations Environment Program (UNEP) to investigate the public health effects of pollution from Dandora Municipal Waste Dumpsite. The study established a link between environmental pollution and respiratory and other health problems in children and adolescents living or schooling around the Dumpsite.

From my study, the villages nearest Dandora Municipal Waste Dumpsite namely Gitathuru, Ngomongo, and Highridge recorded much higher prevalence of Asthma, a chronic respiratory disorder, than all other villages. One could surmise that environmental pollution, which was one of the greatest health concerns of the participants in this study, is a determinant of Asthma-related health inequalities (Andersen et al., 2012).

It is pertinent to stress that in this present study, distance of village from Dandora Municipal Waste Dumpsite was significantly associated with Asthma, a chronic respiratory health condition though distance from Dandora Dumpsite was not a significant predictor of health inequalities overall. However, though Highridge village is relatively close to the Dumpsite, the health outcome of respondents from the village was not among the worst in Korogocho informal settlement.

The fact that living near or far from the Dumpsite was not significantly associated with SRH status but was significantly associated with burden of chronic respiratory disorders such as Asthma and TB, probably helps to justify the utility of the SRH tool, albeit subjective, in the assessment of overall health in disadvantaged communities just like in advantaged Western countries. But, it is possible that the perception of ill-effects of exposure to environmental pollution was modified by the benefit conferred on residents whose livelihood depends on the Dumpsite. Moreover, the residents might have become habituated to the ill effects of pollution because they cannot do anything about it and have no choice but to live with it (Sauerborn, Adams, and Hien, 1996).

Though, distance from the Dumpsite was not an independent predictor of health inequalities, this lack of statistically significant predictive ability of the variable might have been confounded by other unmeasured factors such as culture and genetic vulnerability (Sharma, Tripathi, & Awasthi, 2011). It could also be argued that there might have been some element of information or measurement bias in the report of the chronic health condition, Asthma, which is an episodic disorder.

Asthma could have been under-reported by some respondents with less severe diathesis due to differential access to quality health care or misdiagnosis. But, the participants in qualitative interviews were quite conversant with the symptoms of Asthma thereby making systematic information bias unlikely. Some respondents who were most economically disadvantaged might have ignored the illness because of unaffordability of health care, a phenomenon that Sauerborn, Adams, and Hien (1996), referred to as 'modifying illness perception.' Nonetheless, Asthma is such an

uncomfortable disorder that sufferers are unlikely to be able to ignore it and anyhow, adequate health care was unavailable for the greater majority of the population in Korogocho informal settlement.

Health care access was significantly predictive of health inequalities in this study. Notably, the respondents from the villages such as Grogan B, Kisumu Ndogo, and Ngomongo who did not have ready access to health care facilities also reported some of the worst health outcomes and widest health inequalities. Contrastingly, respondents living in Grogan A and Korogocho A villages who were availed health insurance and health care reported the best health outcomes though with varying levels of health inequalities. This finding is in keeping with a similar study in South Africa by Mooney and McIntyre (2008) where differential access to health care was found to aggravate existing health inequalities.

On a larger scale, Mutangadura et al. (2007) carried out a review of health inequalities in 10 countries across Africa and found that health inequalities were worst in countries such as Kenya and Malawi where differential access to health care was widest for geographical and economic reasons. But, with the current shift to the 'social determinants' approach to health inequalities research, the contribution of health care and other biomedical approaches to health are often downplayed. Health care might not be a prime factor in HICs where health care access of high quality is almost universal (Navarro et al., 2006). But, in a LIC such as Kenya where out-of-pocket payments for even the most basic health care is out of the reach of the most disadvantaged, this study's finding of the key determining role of health care in the

construction of health inequalities, is critical and has policy implications for enhanced health care access and social protection for the disadvantaged.

Material, behavioral, and psychosocial factors are known to mediate health inequalities in an inter-related but complex manner (Graham, 2004). There is still no consensus regarding the extent to which the mediating factors are able to explain the distribution of health inequalities (van Oort et al., 2005). Research into the mechanisms through which mediators explain socially constructed health inequalities in areas of mass deprivation such as urban informal settlements is still inadequate (Alvarez-Dardet, 2000). This study found that behavioral mediators contributed significantly to health inequalities both in the assessment of well-being through SRH status and the presence of morbidity via self-reported chronic health conditions. However, other mediators: material factors such as ownership of material assets and psychosocial factors such as control, social capital, and trust did not independently explain health inequalities in this study.

A meta-review by Egan, Tannahill, Petticrew, and Thomas (2008), that explored the relationship between psychosocial factors and population health in home and community settings concluded that poor psychosocial environments may be health damaging and contribute to health inequalities. However, they admitted that the reviewed literature, which associated favorable psychosocial environments with better health, was of variable quality and consistency.

The evidence that underpins our understanding of these associations has been the subject of an active debate in public health arena concerning the impact of material and psychosocial factors on health inequalities in Western countries. The

evidence for (Siegrist & Marmot, 2004; Wilkinson, 2005) and against (Muntaner, Lynch, & Davey Smith, 2001) the importance of material and psychosocial factors either singly or in combination, to the mediation of health inequalities in individuals, has been robust.

The antagonists argue that even if psychosocial factors had any role to play in the mediation of health inequalities, the relevance to policy and interventions would still be questionable (Macleod & Davey Smith, 2003). It has also been proposed that the psychosocial perspective should be considered over the life-course of the individual for a more holistic view of any effect on health outcomes later in life (Siegrist & Marmot, 2004). The mediating behavioral factors of health inequalities in this study differed between males and females though voluntary physical exercise was a common mediator in both men and women as well as across age categories. The other mediators among females were alcohol and sexual activity.

Khaw and colleagues (2008) investigated the relationship between physical exercise and specific health outcomes in European adults. They found that both work- and leisure-related exercise significantly reduced cardiovascular and all-cause mortality in European adults. Moore et al. (2012) also reported a strong relationship between leisure-time physical activity and all-cause mortality among men and women in the US. Planning and design of towns and neighborhoods influence safety, access to physical activity, and social interaction between residents.

A report on the health impacts of the built environment undertaken for the Institute of Public Health in Ireland by Lavin, Higgins, Metcalfe, and Jordan (2006), noted that the environment influences health through access to good-quality, well-

maintained public spaces that encourage physical activity among others. Considering that lack of physical exercise is a risk factor for many of the emerging chronic health conditions worldwide but more importantly in SSA, where health systems are fragile and economy frail, the evidence provided by this study is relevant and timely.

The other significant mediators of health inequalities in this study were alcohol and sexual activity in females. Although the quantity, quality, and duration of alcohol consumption among the respondents were not assessed, alcohol was significantly predictive of health inequalities among female respondents. Alcohol is a risk factor for many NCDs which are responsible for increasing incidence rates of morbidity and mortality globally but more so, in SSA where resources to contain the diseases are sorely constrained (Strong, Mathers, Epping-Jordan, & Beaglehole, 2005). Though males were more likely to report alcohol consumption in this study, similar to findings from Malawi by Msyamboza et al. (2011), it was only in females that alcohol was found to be an independent predictor of health inequalities.

It is instructive from this study, that in females but not in males, sexual activity was a significant mediator of health inequalities. Females who had concurrent multiple sexual partners and unprotected sex were most likely to report chronic health conditions. Having multiple sexual partners is a risk factor for chronic diseases such as HIV/AIDS, which had a higher prevalence among females than males in this study. Non-use of condoms for safer sex was significantly associated with higher prevalence of self-reported chronic health conditions, and females were not willing or able to negotiate for safer sex, which I gathered from key informant interviews and focus group discussions.

Reporting from Botswana, Kalichman et al. (2007) found that people who had concurrent multiple sexual partners used condoms less often for protection than individuals who had only one sexual partner. It is plausible that in this study, the higher prevalence of HIV/AIDS in females could be attributable to the more common practice of unsafe sex in females compared to males in this study. Mbulo (2005) in his Zambia-based study also found that females were more likely to have multiple sexual partners when compared to males. Moreover, Mbulo (2005) found that alcohol and sexual promiscuity interacted in females to facilitate the transmission of HIV/AIDS.

5.1.1 Summary of discussion

To summarize, from this study, there were both significant pro-poor and pro-rich health inequalities of varying magnitude in all the villages of Korogocho informal settlement except Highridge village. Environmental determinants of health inequalities were the most significant socially patterned conditions in Korogocho informal settlement. There were gender differences in the types of mediators that contributed to health inequalities. Physical exercise was the only mediator of health inequalities that cut across gender and age groups.

5.1.2 Limitations of study

As expected with empirical research, this study had some limitations. The most obvious are the limitations attributable to the cross-sectional design of this study, which was selected not only because of time and financial constraints but also some other benefits associated with the design. One of the limitations was that it was not possible to determine if the respondents' exposure to socio-economic and

environmental conditions in Korogocho informal settlement preceded the onset of the chronic health conditions thereby constraining inferences about temporal causality.

Also, one cannot rule out recall bias as a limitation of this study's cross-sectional design, which entailed questions that required recall of past events. However, I made efforts to limit periods of recall to the recent past for ease and accuracy of recall. But, the study of multiple exposures and more than one health outcome, which enriched this study was made possible by the cross-sectional design. Also, the cross-sectional design enabled the estimation of crude prevalence of the health outcomes in this study and helped with the generation of hypotheses for future research.

Another limitation of this study was the potential underestimation of the prevalence of chronic health conditions, which are usually asymptomatic early on in the course of the conditions and that in the absence of screening and biophysico-chemical assessment could have been missed. In addition, inaccessibility and unaffordability of orthodox health care services by most residents of deprived urban informal settlement in this study could have led underestimation of the prevalence of the chronic health conditions. Also, since on the average, the quality of health care providers and facilities available to the urban poor might be substandard, there is the possibility of mis- diagnosis and -treatment. Fortunately, this could have applied across the spectrum of generally poor respondents thereby, unlikely to introduce systematic bias.

Another limitation of this study had to do with the relatively small numbers of some responses in cells despite the provision I made for contingencies in my

calculation of sample size for the study and in spite of the high response rate. This could have caused Type II statistical errors in the interpretation of some results. However, I attempted to overcome this shortcoming by complementing the quantitative data with information from the qualitative interviews.

Though not entirely a limitation, concerns have been raised in some quarters regarding the suitability of a subjective tool such as SRH to assess health inequalities in a disadvantaged community with concentrated poverty. But, SRH is one of the most widely used health outcome variables in public health research (Abdulrahim & El Asmar, 2012). Though SRH is a subjective instrument that depends on respondents' self-assessment of their overall general health experience and health-related quality of life, it is a globally accepted concept and has proved to be quite useful in resource-constrained settings and where formal health data from registries and health care facilities are not readily available or credible (Smide, Whiting, Mugusi, Felten, & Wikblad, 1999; Bowling, 2005). SRH has been found to be an easily administered, valid, and reliable measure of health status (Bayliss, 2012).

Though Sen (2002) queried the reliability of SRH tool among the poor in India, a more recent study also in India in similar setting, by Subramanian, Subramanyam, Selvaraj, and Kawachi, (2009) found that SRH was a valid and easy tool, which was reliably able to predict morbidity and mortality in adults. In my study, I combined SRH with a more objective health outcome tool: reports of medically diagnosed chronically health conditions to overcome reservations about the use of SRH.

Females outnumbered males in this study. Research-based surveys from many parts of the developing world usually have a higher proportion of female respondents than male respondents (Zimmer, 2008; Kuper et al., 2010). However, the much higher proportion of females in the study population compared to the target population may have compromised the generalizability of the findings. But other demographic characteristics in this study were similar to the target population suggesting that the study population was probably largely representative of the target population. Furthermore, since this study was carried out in one urban informal settlement, I would advise caution in terms of generalizing this study's findings to other settlements because informal settlements are heterogeneous in composition and context.

Ethnicity was not explored as a determinant of health inequalities in this study because of its divisive nature in a country that only recently experienced a traumatic post-election period (2007/2008) which was probably grounded in ethnicity. The study also did not include work environment, which in relation to occupation, could have been an unmeasured factor in the distribution of health inequalities. However, a good percentage of respondents were not employed and those who were employed were not employed on a permanent basis. Further, employment was not even found to be a significant determinant of health inequalities so pursuing the matter further, would probably not have added much value to the results of this study.

The homeless, incarcerated, and severely mentally disabled were excluded from participating in this study because they were likely to be difficult to trace and unlikely to give coherent responses to questions. Obtaining informed consent from

these adults would also have been almost impossible. Their exclusion could have obscured social gradients and led to underestimation of the magnitude of health inequalities in this study.

5.1.3 Strengths and added value of study

Despite the conceived limitations, this study has many strong points, which enhanced its credibility, replicability, reliability, validity, and generalizability. First, this study used valid tools for data collection. Pre-test of data collection tools in this study enhanced the validity and appropriateness of the tools. Face-to-face, interviewer-administered questionnaires in English and Kiswahili by resident, experienced, and well-trained field assistants ensured the adequacy of the primary data gathered in this study and allowed adequate communication with the study population.

Data from the study population was triangulated to ensure reliability of information and to enrich the study. The study population was selected through probability sampling in order to enhance representativeness and generalizability of the study's findings to the target population in Korogocho informal settlement and probably, to other similar urban informal settlements and disadvantaged communities. This study's methodology was appropriate, understandable, and replicable while the results are comprehensive and presented in a policy-relevant manner.

Engagement with stakeholders ensured that their opinions and feelings were considered and the findings were context-specific, and presented in an easily interpretable manner for effective policy and practice. The study's focus on a small,

marginalized community should help to redirect the attention of policy-makers and the researchers to previously excluded communities.

Additionally, multi-level data were collected at individual, household, and neighborhood levels to encourage the incorporation of local priorities in the design and delivery of evidence-based strategies. Further, the collection of primary rather than secondary data ensured that the data was tailored to achieve the purpose of the study, which was to fill the gaps in context-based evidence of the distribution of the determinants of health inequalities in an urban informal settlement. An important methodological approach whereby data collection and analysis were disaggregated by village enhanced the quality of this study.

This study tackled the important issue of the health of the most productive group of adults but who are socially excluded and unable to fully contribute to the economic growth and development of Kenya, a developing and resource-constrained country in SSA. Moreover, the choice of priority and potentially preventable chronic health conditions for this study highlights the need to urgently address the emerging problem of NCDs to prevent epidemics that could cripple frail health systems and ailing economy, in a system with competing demands for use of resources.

5.2 Conclusions

This observational study set out to assess the magnitude of health inequalities and to identify the determinants and mediators of the health inequalities in an urban informal settlement using a combination of quantitative and qualitative methods. It emerged that despite pervasive poverty and widespread deprivation, there were significantly measurable health inequalities of varying magnitude between villages

and within all the villages in Korogocho informal settlement except in socially cohesive Highridge village.

Counter-intuitively, villages with the best aggregate health outcomes had the most regressive health inequalities while villages with infrastructural upgrades posted the worst health indices. Determinants of health inequalities in Korogocho informal settlement included the traditional biological factors of age and gender. Given the "social determinants" approach of my study, the social determinants of health inequalities were not strictly socio-economic but mainly environmental i.e. health care access and place of residence.

Alcohol ingestion; having multiple, concurrent sexual partners; practice of unsafe sex; and lack of physical exercise, which are known risk factors for chronic health conditions were the main mediators of health inequalities in this study. But, the type and extent of the contribution of the mediators to health inequalities differed between genders. Mediators contributed more to the extent of health inequalities among males than among females in whom there were numerically more mediators.

My study has contributed the much-needed proof of the existence of health inequalities in deprived and marginalized communities in SSA by adapting simple, easy to use, and validated tools of empirical research. Further, the study unearthed hitherto unappreciated heterogeneity of villages within an urban informal settlement in terms of the unequal exposure to environmental determinants of health inequalities and vulnerability of the residents to health-impacting lifestyles.

These findings provide evidence-base for policies and entry points for interventions to tackle egregious health inequalities, which hitherto had been neglected due to dearth of evidence among the urban poor in deprived and marginalized informal settlements. The results from this cross-sectional and observational study in a relatively small community provide compelling evidence for targeting the underlying social constructs of health inequalities and for remediation with policies and strategies guided by local priorities.

The challenge of eliminating health inequalities in this generation particularly, in deprived communities where the most vulnerable contend with the obnoxious double burden of poor health experience and health inequalities, is onerous. It is a task that needs to be accomplished promptly and efficiently to ensure equity, prevent catastrophic medical costs, reduce loss of productivity that a developing country can least afford, as well as avert retardation of the country's economic growth and development. However, larger, prospective, and quasi-experimental studies over the life-course are needed to validate the findings of this study in disadvantaged settings in general.

5.3 Recommendations

The empirical evidence provided by this study calls for a revision of policies and design of interventions to effectively tackle the persistent health inequalities endured by some subpopulation groups. Hence, the following are my recommendations based on the evidence provided by my study, to eliminate or eradicate wide health inequalities through action on the determinants and mediators:

1. The subpopulation groups that experienced the worst health outcomes and suffered health inequalities in the villages of Korogocho informal settlement were the most exposed and most vulnerable to social and environmental deprivation. Therefore, I recommend that small and deprived areas should be mainstreamed into research, policies, and interventions, which should target the disadvantaged. In addition, apart from health impact assessment of projects, there should be particular emphasis on monitoring impact on health inequalities. The government should enforce Health in All Policies (HiAP) across all sectors. Barriers to health care access and utilization should be actively removed through universal health care to reduce health gaps. The services should be of high quality, affordable, accessible, appropriate, and acceptable comprising promotive, preventive, and therapeutic health care services and incorporate access to essential social services. An effective approach to achieving this goal effectively and sustainably would be through co-production, an asset-based approach that draws upon the assets of people and the community. Co-production promotes health and well-being through facilitation and empowerment of people and communities to develop capacities and capabilities to tackle socially constructed issues. Community health workers (CHWs) who unfortunately, have been underutilized represent one of such assets. CHWs need to be empowered to create demand for and to deliver community-based primary health services to the needy. NGOs could emulate Bill and Melinda Gates Foundation that funds *Tupange* project which employs CHWs to extend health services to urban poor communities.

2. Determinants of health inequalities were located in the environment. I recommend that healthy living and working environments should be encouraged through environmental protection and regeneration. For a start, individuals and communities should learn to reduce waste generation through recycling and reuse, as well as to hygienically manage generated waste. Green environmental spaces for physical exercise, recreation, and leisure should be created with the involvement of the communities to encourage their ownership. The government should legislate the relocation Dandora Municipal Waste Dumpsite to a non-residential area and enforce best practices at the landfill and less environmentally damaging waste management. Though age and gender are biological determinants of health inequalities and perceived as immutable, their social constructs encourage differential access to healthful resources such as health care and health supportive environments. I recommend a shift from victim-blaming and individualistic approach to population-based, social approach for scaling up population health and eradicating social health gradients. Policies should be enacted, which ensure equal opportunities, equitable allocation and distribution of resources and services as well as social protection schemes e.g. subsidies, extending health insurance to non-contributors, and old-age pensions for the vulnerable, disadvantaged, and elderly respectively. A strong recommendation would be for gender analysis of strategies and gender mainstreaming into policy actions, programs, and interventions to eliminate gender-related health inequalities. The government and civil society should empower and build human capital for the residents through enhanced skills acquisition in addition to education and employment opportunities and not only focus on infrastructural development.

3. The mediators of health inequalities are behavioral risk factors for avoidable morbidity and mortality associated with emerging and re-emerging chronic health conditions. It should now be obvious that the behaviors and lifestyle are reactions by the urban poor against discrimination, disadvantage, and social exclusion. Upstream actions by the government and allied parastatals that enable equal opportunities, access to social benefits, and social inclusion have been shown to promote healthful lifestyle. My recommendation would be for authorities to adopt social and economic policies and practice at local and national levels that enhance the capabilities of the citizenry and offer equal opportunities for healthful resources. The government and the community should regulate alcohol dens and other avenues of substance abuse. Safe sex needs to be widely promoted particularly among females who should be empowered with opportunities to be self-sufficient and self-assured. Media, advocacy groups, and other stakeholders should help to propagate awareness of the negative effects of social disadvantage. Besides, I recommend a public health policy shift from sole focus on infectious diseases to policies that address eminently preventable chronic health conditions, which are becoming quite prevalent among adults even in deprived communities.

5.4 Future Research

The challenge of health inequalities among the urban poor is huge. To generate more evidence-based policy strategies and to target effective interventions more comprehensively in order to eradicate health inequalities, more studies are needed in future, to bridge the remaining gaps that were not covered by this snap-shot

study of an urban informal settlement. The following are my suggestions for further research:

- Temporal ordering of cause and effect is not possible with cross-sectional studies such as mine, which was only able to determine an association between variables and health inequalities. What is needed in future with available resources is to interrogate the cause-effect relationship between remediable social determinants and health inequalities over the life-course in large, longitudinal, population-based study of the determinants of health inequalities in disadvantaged communities. Further validation of SRH tool in health related research in SSA would be necessary in future.
- The apparent lack of discernible health inequalities within Highridge village is intriguing and should be explored further in future research so as to incorporate the findings into effective planning of public health programs designed to eradicate health inequalities.
- My study's findings of the effects of environmental conditions on health inequalities provide insight for future research on work-related health inequalities among workers in the unregulated, informal sector.
- In order to further enhance understanding of the role of social gradient in health inequalities, research on the health experience of the homeless who constitute a significant proportion of the urban poor, should be undertaken.
- Further research needs to be carried out on the effects of Dandora Municipal Dumpsite on the prevalence of emerging chronic non-communicable diseases among the adult population in neighboring settlements.

- It would be interesting to interrogate the relationship between socio-cultural factors, particularly ethnicity and health inequalities.
- Finally, I suggest that the impact of upgrading programs on health and particularly health inequalities in urban informal settlements should be researched.

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APPENDICES

Appendix 3.1 Consent Form

Consent to participate in research

Title of research: Determinants of Health Inequalities among Adults in Korogocho Informal Settlement, Nairobi, Kenya

I kindly request for your consent to participate in this research that I, Imesidayo Omua Eboreime-Oikeh, a PhD student of Kenyatta University intend to conduct in Korogocho Informal Settlement. The findings will be used to compile my thesis for the award of a degree of Doctor of Philosophy of the School of Public Health.

If you have any questions or concerns about the research, please feel free to contact:

- Imesidayo Omua Eboreime-Oikeh, the researcher. Cell phone number: 0734 385 061 or my university supervisors:

- Dr G. O. Otieno, Department of Health Management and Informatics

- Dr G. O. Okumbe, Department of Environmental Health.

  Both of them are of the School of Public Health, Kenyatta University or
- Kenyatta University Ethics Review Committee, P.O. Box 43844, Nairobi, 00100; Tel: 8710901/12; Fax:8711242/8711575; Email: kuerc.chairman@ku.ac.ke or kuerc.secretary@ku.ac.ke

Purpose of the study

The purpose of the study is to identify any health inequalities and their magnitude among adult residents of Korogocho in order to proffer evidence that would inform policies and interventions to reduce health inequalities and improve aggregate population health.

Processes

If you agree to participate in this study, you will be asked to:

- Answer some questions in a face-to-face interview in your home or any other mutually convenient place
- Participate in a discussion group
- Air your expert opinion and knowledge with respect to informal settlements in general and Korogocho in particular

Potential risks and discomforts
No mortal risks are envisaged. However, depending on you, there might be discomfort with disclosing some personal details, time and energy expended in the interviews and discussions as well as welcoming strangers (researcher and assistants) into your homes or offices.

Potential benefits
Your views and opinions will be heard and could form the basis of demand-responsive actions to address your livelihood and health needs. The social inclusion and well-being of members of your community might be enhanced.

Confidentiality, privacy, and anonymity
Every effort will be made to ensure confidentiality of any identifying information that will be obtained in the course of this study and anonymity. You will be offered the opportunity of listening to and viewing audio- and video-tapes or transcripts of activities and interviews. You have the right to edit them and make corrections. Your privacy will be respected as much as possible during the process of gathering, storing, and handling of information.

Participation and Withdrawal
You can choose to be or not to be involved in this study at any stage. Your involvement is entirely voluntary. Should you opt out at any stage, you will not incur any untoward consequences of any kind.

Rights of research participants
You reserve the right to with-hold or withdraw your consent without any penalties. This study's proposal has been reviewed by the relevant authorities of Kenyatta University and received ethical clearance from the Ethics Review Committee of the same university.

Participant's declaration and consent: I understand the information provided for my benefit by this study's researcher and I give my consent voluntarily to participate in the study.

Name of Participant	Signature or thumb print	Date

Name of Witness	Signature or thumb print	Date

Appendix 3.2 Interview Schedule (English)

Determinants of Health Inequalities among Adults in Korogocho Informal Settlement

Good morning/afternoon/evening. My name is _____ .

I am collecting information on health inequalities among adult residents in Korogocho aged from 25 to 59 years (both ages inclusive) for a PhD degree at the Kenyatta University. Your answers to questions about your health experience and lifestyle as well as knowledge of socio-economic and environmental factors that impact life of Korogocho residents will be written down on this form. Hopefully, action by policy makers and other stakeholders based on the evidence from this study will help to improve aggregate population health and well-being as well as reduce health inequalities particularly in Korogocho but also in Kenya generally.

Please note that:

- Your name will not be written down on this form, so all your answers will be anonymous
- All the answers you give will be completely confidential and will not be shared with anyone other than members of the research team
- Response to the questions will take less than 45 minutes of your time
- If I ask you any questions that you do not wish to answer, just say so, and I will move to the next question. You can stop the interview at any time if you change your mind
- Kindly let me know if there are any questions that are not clear to you, or that you do not understand and I will explain
- You are at liberty to contact the researcher or the supervisors or Kenyatta University Ethics Review Committee if you need further clarification or if you have any concerns (***show the potential respondent the Consent Form information sheet)***.
- Do you have any questions at this stage? ***(Reply to any questions raised)***

Do you agree to participate in this interview? Yes No

(Circle the answer)

Name of interviewer_____

Signature of interviewer_____

Date: **Time:**

I have indicated your choice.

Show the circled answer to the potential respondent for verification and assent. Potential respondents should sign the Consent Form at this stage.

Thank you

Interview schedule

Section 1: Identification

Name of village in Korogocho	
Enumeration area/Cluster number	
House number	
Is the interviewee the household head?	**Yes** ☐ **No** ☐
Number of visits to household for interview	**1** ☐ **2** ☐ **3** ☐
Language used for interview	**English** ☐ **Kiswahili** ☐
Name of interviewer	
Date of interview (day/month/year)	☐☐ / ☐☐ / ☐☐☐☐
Time interview began	☐☐ . ☐☐ **am/pm**
Time interview ended	☐☐ . ☐☐ **am/pm**

Section 2: Background demographic information

Number	Question	Response	Code
1	How old were you on your last birthday?	☐☐	
2	What is your current marital status?	Never married	1
		Married	2
		Not married but living together	3
		Separated/Divorced	4
		Widowed	5
3	Gender?	Male	1
		Female	2
4	Religion?	Catholic	1
		Other Christian	2
		Muslim	3
		No religion	4
		Other (specify)	96

Section 3: Information on socio-economic status, environment and material factors

Number	Question	Response	Code
5	What is the highest level of school you attended? *Circle that which applies: incomplete or completed in addition to the code*	None	1
		Primary (incomplete/completed)	2
		Secondary (incomplete/completed)	3
		College (incomplete/completed)	4
		Higher than college (incomplete/completed)	5
6	Are you currently employed? *If no, state when s/he was last employed*	Yes, self-employed	1
		Yes, but an employee	2
		No	3
7	What is your occupation i.e. what you do for a living? *State exactly what the respondent does for a living*	Nothing	1
		Professional/technical/managerial	2
		Clerical	3
		Sales and services	4
		Skilled manual	5
		Unskilled manual	6
		Domestic service	7
		Agriculture	8
		Other (specify)	96
8	What is your average monthly income in Kenya Shillings? *Write the exact amount*	Less than 5 000	1
		5 000 to less than 10 000	2
		10 000 to less than 15 000	3
		15 000 to less than 20 000	4
		20 000 or more	5
9	Do you own the house/flat/structure that you presently live in? *If not paying rent, state why*	Yes	1
		No, but not rent paying	2
		No, rent paying	3

Number	Question	Response	Code
10	What is the main material of the floor? *Circle respondent's answer but state your own observation as well if different*	**Natural floor** (mud/dung/sand)	1
		Rudimentary floor (wood planks)	2
		Finished floor (polished wood/vinyl/tiles/cement)	3
11	What is the main material of the wall? *State your observation but circle respondent's answer*	Mud	1
		Cemented mud	2
		Wood/timber	3
		Iron sheets/*mabati*	4
		Bricks	5
		Carton/Plastic	6
		Other (specify)	96
12	What is the main material of the roof? *State your observation but circle respondent's answer*	Grass/thatch	1
		Plastic sheets	2
		Cardboard sheets	3
		Wood/timber	4
		Metal sheets/tin	5
		Iron sheets/*mabati*	6
		Tiles	7
		Other (specify)	96
13	What is your main source of drinking water?	**Buying water**	
		Taps	1
		Tanks	2
		Hawkers	3
		Piped water	
		Residence/compound/plot	4
		Public tap	5
		Well water	
		Plot	6
		Public well	7
		Surface water	
		River/stream	8
		Pond/lake	9
		Rain water	10
		Other (specify)	96

Number	Question	Response	Code
14	What type of toilet/latrine facility do you use at home? *If the facility is available in the house/compound, state how many households share the facility*	Flush/Pour flush	1
		Ventilated improved pit (VIP) latrine	2
		Pit latrine with slab	3
		Pit without slab/bucket/hanging toilet or latrine	4
		No facility/bush/field/flying toilet	96
15	How many people do you share a room with in your household?	No one	1
		One person	2
		More than one person	3
16	What do you use for cooking at home? *If no cooking is done in the household, state why*	Electricity	1
		LPG/natural gas	2
		Kerosene	3
		Paraffin	4
		Charcoal	5
		Wood	6
		Straw/shrub/grass	7
		No cooking in household	8
		Other (specify)	96
17	Do you own *If yes, tick (✓) against the item(s) in the code column*	Wall clock?	1
		Radio?	2
		Television?	3
		Table?	4
		Chair?	5
		Bed?	6
		Refrigerator?	7
		Mobile phone?	8
		Bicycle?	9
		Motorcycle?	10
		Car?	11
		Land?	12
		Farm animals?	13
18	How far is your residence from Dandora Municipal Dumpsite? *Also ask the respondent to give an estimate of the distance in units e.g. meters or kilometers*	Very far	1
		Not very far	2
		Near	3
		Very near	4
		Don't know	96

Number	Question	Response	Code
19	What do you consider the most important contributory cause of ill health in Korogocho?	Overcrowding	1
		Poor sanitation	2
		Lack of water	3
		Criminal activities	4
		Inadequate health facilities	5
		Insecurity	6
		Poverty	7
		Unemployment	8
		Environmental pollution	9
		Social exclusion	10
		Other (specify)	96

Section 4: Behavioral/Life-style and psychosocial factors

Number	Question	Response	Code
20	Have you ever taken alcohol? *State type (e.g. spirits, wine, beer), quantity, and duration of alcohol intake where applicable*	Yes, currently	1
		Yes, but previously	2
		Never	3
21	Have you ever smoked? *State type (e.g. cigarettes, cigar, pipe), quantity, and duration of smoking*	Yes, currently	1
		Yes, but previously	2
		Never	3
22	Have you ever used *Just tick (✓) against the substance if ever taken* *Also state if respondent is a current user*	Bhang?	1
		Miraa?	2
		Cocaine?	3
		Kuber?	4
23	How many times did you eat solid food yesterday? *State type of food eaten and if none, politely ask for reason(s) why*	None	1
		Once	2
		Two times	3
		Three times or more	4
24	Do you take fruits? *If never, ask why*	Yes, at least once weekly	1
		Yes, but less frequent than once a week	2
		Never	3

Number	Question	Response	Code
25	Do you voluntarily take physical exercises? *Explain what voluntary physical exercise means and if respondent's answer is no, ask why*	Yes, daily	1
		Yes, but less frequently than daily	2
		No	3
26	Do you have sexual intercourse? *If with more than one regular partner, politely ask why* *If never, ask why*	Yes, with one regular partner only	1
		Yes, usually with more than one regular partner	2
		Yes, but just once	3
		Never **If never, go to number 29**	4
27	Do you prefer to have sex with someone the same sex as you? *In other words, is the respondent a homosexual or not?*	No	1
		Sometimes	2
		Always	3
		Do not know/won't say	96
28	Have you ever had unprotected sex (without condom) with a partner that you were not married to? *If yes, state why*	Yes	1
		No	2
29	How much control/authority do you assert at home? *For any of the answers, state why*	Much	1
		Not much	2
		None at all	3
30	Generally, do you trust your neighbors? *If yes or not at all, state why*	Yes, a lot	1
		Yes, but not a lot	2
		Not at all	3
		Do not know/won't say	96

Number	Question	Response	Code
31	Do you belong to any associations in Korogocho informal settlement? *Explain that the association could be social, religious, cultural, financial (savings such as "merry-go-round"), development-related, or community-based* *If no, find out why*	Yes, one (specify)	1
		Yes, more than one (specify)	2
		No	3

Section 5: Health-related factors

Number	Question	Response	Code
32	What type of health insurance coverage do you have? *Explain the different categories and find out if employer-based or not*	Public health insurance (NHIF)	1
		Privately purchased commercial insurance	2
		Any other type of insurance (specify)	3
		None/Not sure	96
33	During the year 2011 (i.e. last year), did you receive health care when you needed it? *If no, state why*	Yes, always	1
		Yes, sometimes	2
		No, not at all	3
		Never needed it	4
34	How would you rate your current state of health? *Ask respondent for the reason(s) why s/he so rated her/his health*	Very good	1
		Good	2
		Fair	3
		Poor	4
		Very poor	5

Number	Question	Response	Code
35	Do you have or have you ever been told that you have *State if the condition was clinician-diagnosed or not.* *Tick whichever condition(s) the patient reports that s/he has*	Tuberculosis (TB)?	1
		HIV/AIDS?	2
		Hypertension or high blood pressure?	3
		Diabetes?	4
		Asthma?	5
		Mental disorder? (specify if possible)	6
		Any physical disabilities? (specify)	7
		None	96
36	Do you have any family history of TB, hypertension, diabetes, asthma or any mental disorders? *If yes, state which conditions (s) and respondent's blood relationship with sufferer (e.g. father, mother, brother or sister)*	TB	1
		Hypertension	2
		Diabetes	3
		Asthma	4
		Mental disorders	5
		None	6

Interviewer's comments related to the interview

Researcher's comments

END

Appendix 3.3 Interview Schedule (Kiswahili)

Vitu vinavyodhilirisha tofauti za kiafya miongoni mwa watu wazima katika makazi ya Korogocho.

Habari za asubuhi/alasiri/jioni. Kwa majina ni _____

Ninakusanya habari kuhusu tofauti za kiafya miongoni mwa watu wazima wakazi wa Korogocho wenye umri wa kati ya miaka 25 hadi 59 kwa ajili ya shahada ya uzamifu (PhD) katika Chuo Kikuu cha Kenyatta. Majibu yako kuhusiana na uzoefu wako wa kiafya pamoja na mienendo ya maisha na pia ufahamu wa maswala ya kijamii, kiuchumi na kimazingira ya wakazi wa Korogocho yataandikwa kwenye fomu hii. Ni matarajio yetu kuwa, hatua zitakazochukuliwa na watoa sera na washika dau wengine kwa misingi ya ushahidi wa utafiti huu zitasaidia kuendeleza ustawi wa kiafya wa kibinafsi na wa kiwastani hasa katika mtaa wa Korogocho na pia nchini Kenya kwa jumla.

Fahamu kuwa:

- Jina lako halitaandikwa popote kwenye fomu hii, na ndipo majibu yako yote hayataambatishwa kwa yeyote.
- Majibu yote utakayoutpa yatakuwa ya siri na hayatahusisha mtu mwingine yeyote isipokuwa kundi la watafiti.
- Majibu yako kwa maswali yote yatachukua chini ya dakika 45 ya muda wako.
- Iwapo nitakuuliza swali lolote ambalo hungependa kujibu, sema hivyo ili tuweze kusonga mbele kwenye swali jingine linalofuata. Waweza kumkanya mhojaji asiendelee ukiamua kufanya hivyo.
- Tafadhali naomba unijulishe iwapo kuna maswali yoyote ambayo sio wazi kwako ama yale usiyoyaelewa na nitakuelezea.
- Una uhuru wa kuwasiliana na mtafiti au wasimamizi walioorodheshwa hapa chini (Mwonyeshe unayedhamiria kumhoji karatasi hili lenye ujumbe.....) unaweza ukaweka karatasi yenye ujumbe.

Je, una swali lolote kufikia hapa? **(Jibu maswali yoyote atakayouliza)**

Je, unakubali kushiriki katika mahojiano haya? **Ndio** au **La** (Tia mviringo jawabu lililotolewa).

Jina la Mhoji_____

Sahihi ya Mhoji_____

Tarehe: **Saa:**

Nimeonyesha chaguo lako

Onyesha jawabu lenye mviringo kwa mhojiwa mtarajiwa ili aweze kuhakikisha na kuidhinishwa.

Ahsante.

Ratiba ya mahojiano
Sehemu 1: Utambulisho

Jina la kijiji/sehemu ya Korogocho	
Eneo la utafiti/Nambari ya kikundi	
Nambari ya nyumba	
Viambatanishi vya chumba kutumia GPS	
Je, mhojiwa ndiye mwenyeji mkuu?	**Ndio** ☐ **La** ☐
Ziara imekuwa mara ngapi kwenye nyumba kwa mahojiano	**1** ☐ **2** ☐ **3** ☐
Lugha iliyotumiwa katika mahojiano	**Kiigereza** ☐ **Kiswahili** ☐
Jina la mhojaji	
Tarehe ya mahojiano (Siku/Mwezi/Mwaka)	☐☐ / ☐☐ / ☐☐☐☐
Mahojiano yalianza saa ngapi?	☐☐ . ☐☐ **asubuhi/jioni**
Mahojiano yaliisha saa ngapi?	☐☐ . ☐☐ **asubuhi/jioni**

Sehemu 2: Ujumbe asilia

Nambari	Swali	Jawabu	Ishara (Kodi)
1	Je, ulikuwa na miaka mingapi wakati wa sherehe zako za mwisho za kuzaliwa?	☐☐	
2	Hali yako ya ndoa?	Hujaoa	1
		Umeolewa	2
		Hujaoa lakini mwaishi pamoja	3
		Mmetengana/mmetalakiana	4
		Mjane	5
3	Jinsia?	Mume	1
		Mke	2
4	Dini?	Katoliki	1
		Nyingine yeyote ya kikristo	2
		Kiislamu	3
		Kafiri ((Asiye dini)	4
		Dini nyingine yoyote ile (Taja)	96

Nambari	Swali	Jawabu	Ishara (Kodi)
5	Je kiwango chako cha elimu ni kipi? *Weka mviringo kwenye kwenye jawabu lako: kama ulikamilisha au hukukamilisha endana na ishara*	Hapana	1
		Shule ya msingi (Ulikamilisha/hukukamilisha)	2
		Sekondari (Ulikamilisha/ Hukukamilisha)	3
		Chuo (College) (Ulikamilisha/ Hukukamilisha)	4
		Zaidi ya chuo (Ulikamilisha/ Hukukamilisha)	5
6	Je, umeajiriwa kwa sasa? *Kama hujaajiriwa eleza mara yako ya mwisho ulipokuwa umeajiriwa*	Ndivyo, nimejiajiri	1
		Ndivyo,lakini na mwajiri	2
		La	3
7	Kazi yako ni gani? Wewe hufanya nini maishani? *(Taja hasa kile ambacho mhojiwa hufanya)*	Hapana	1
		Mwanataaluma/Mweledi /Meneja	2
		Kazi ya ukarani	3
		Mauzo na huduma	4
		Mwenye ujuzi wa kufanya kufanya kazi fulani ya mikono	5
		Asiye na ujuzi wa kufanya kazi ya mikono	6
		Mhudumu wa nyumbani	7
		Kilimo (ukulima)	8
		Kazi nyingine yoyote (itaje)	96

Sehemu 3: Ujumbe kuhusu maswala yi kijamii, kiuchumi na kimazingira

Nambari	Swali	Jawabu	Ishara (Kodi)
8	Je, mapato yako ya wastani ya kila mwezi ni shilingi ngapi za Kenya?	Chini ya 5 000	1
		Kati ya 5 000 na 10 000	2
		Kati ya10 000 na 15 000	3
		Kati ya 15 000 na 20 000	4
		20 000 au zaidi	5
9	Je, unamiliki nyumba/jengo unaloishi ndani? *Kama hulipi kodi eleza ni kwa nini?*	Ndivyo	1
		La, lakini silipi kodi	2
		La, nalipa kodi	3

Nambari	Swali	Jawabu	Ishara (Kodi)
10	Sakafu imejengwa kwa nyenzo gani? *Weka mviringo kwenye jawabu la mhojiwa na ueleze uliyoyaona mwenyewe iwapo ni tofauti*	**Sakafu ya asilia** (kawaida/mchanga/samadi/matope udongo)	1
		Sakafu iliyoundwa kwa mbao	2
		Sakafu iliyonakishiwa ya (mbao zilizong'arishwa na kupigwa rangi/ngozi ya plastiki/vigae/saruji)	3
11	Je, kuta zimejengwa hasa kwa nyenzo gani? *Eleza uliyoyaona lakini tia mviringo kwenye jawabu la mhojiwa*	Udongo	1
		Udongo uliotiwa saruji	2
		Mbao	3
		Mabati	4
		Matofali/mawe	5
		Katoni/plastiki	6
		Nyingine (eleza)	96
12	Je, paa limejengwa kwa nyenzo gani? *Eleza uliyoyaona lakini tia mviringo kwenye jawabu la mhojiwa.*	Nyasi	1
		Plastiki	2
		Kadi bodi	3
		Mbao	4
		Metali/chuma	5
		Mabati	6
		Vigae	7
		Nyingine yoyote (taja)	96
13	Je, chanzo/asili ya maji yako ya kunywa ni nini?	**Maji ya kununua** Mfereji	1
		Tangi	2
		Wauzaji wa kutembeatembea	3
		Maji ya bomba Kwenye eneo la makazi	4
		Mfereji wa umma	5
		Maji ya kisima kwenye Ploti	6
		Maji ya kisima cha umma	7
		Maji ya juu ya ardhi (mto/	8
		Kidimbwi/ziwa	9
		Maji ya mvua chauzo kingina	10
		Nyingine yoyote (taja)	96

Nambari	Swali	Jawabu	Ishara (Kodi)
14	Je, unatumia choo cha aina gani nyumbani kwako?	Choo cha kufoka maji	1
		Choo cha shimo chenye hewa kilichoendelezwa	2
		Choo cha shimo chenye bamba la jiwe (mbao)	3
		Choo cha shimo bila ya bamba la jiwe au mbao (ndoo iliyoninginizwa)	4
		Hapana choo msitu/uwanjani au choo za kupeperushuwa kwenye karatasi	96
15	Je, unatumia chumba na watu wangapi nyumbani kwako?	Hapana	1
		Mtu mmoja	2
		Zaidi ya mtu mmoja	3
16	Je, unatumia nini kupika nyumbani kwako?	Umeme	1
		Gesi	2
		Kerosini	3
		Mafuta ya taa	4
		Makaa	5
		Kuni	6
		Nyasi	7
		Hapana kupika	8
	Kama hapana kupika eleza ni kwa nini?	Mbinu nyingine yoyote (taja)	96
17	Je, unamiliki:	Saa ya ukutani?	1
		Redio?	2
	Kama ndivyo tia alama (✓) kwenye bidhea kwenye sehemu ya kodi (ishara)	Runinga?	3
		Meza?	4
		Kiti?	5
		Kitanda?	6
		Friji?	7
		Rununu au simu ya mkono?	8
	Lau kama hakuna jaza 96.	Baiskeli?	9
		Pikipiki?	10
		Gari?	11
		Shamba?	12
		Wanyama wa kufugwa shambani (nyumbani)?	13

Nambari	Swali	Jawabu	Ishara (Kodi)
18	Je, makazi yako ni umbali gani kutoka mahali pa kutupia taka (jalala) pa manispaa ya Dandora? *Pia mwulize mhojiwa kukadiria umbali kwa vipimo kama vile, mita, kilomita, fiti nk.*	Mbali sana	1
		Siombali sana	2
		Karibu	3
		Karibu sana	4
		Haijulikani	96
19	Kwa maoni yako, ni nini hasa kinachoathiri afya za wakazi wa Korogocho kwa kiasi kikubwa? *Weka alama (✓) kwenye chaguo lako miongoni mwa sababu ulizopewa*	Kufurika kwa watu	1
		Hali duni ya usafi	2
		Ukosefu wa maji	3
		Visa vya uhalifu	4
		Ukosefu wa vifaa vya kiafya	5
		Ukosefu wa usalama	6
		Umaskini	7
		Ukosefu wa ajira	8
		Uchafuzi wa mazingira	9
		Kutengwa na jamii (utengano wa kijamii)?	10
		Iwapo kuna nyingine (taja)	96
Sehemu ya 4: Mtindo wa maisha na maswala ya kinafsia na kijamii			
20	Je, umewahi kunywa pombe? *Aina gani? (spiriti,divai,pembe ya kawaida k.v. wiski au brandi/divai(mvinyo)/bia) kiasi na muda wa matumizi panapofaa*	Ndivyo kwa sasa	1
		Ndivyo lakini awali	2
		Hapana (sijawahi)	3
21	Je, umewahi kuvuta sigara? Taja aina (kiko, sigareti, ugoro)? *Kiasi na muda wa matumizi eleza*	Ndivyo kwa sasa	1
		Ndivyo lakini awali	2
		Hapana (sijawahi)	3

Nambari	Swali	Jawabu	Ishara (Kodi)
22	Je, ushawahi tumia *Tumia alama (✓) kando ya kile ambacho umetumia. pia eleza kama mhojiwa anatumia dawa kwa sasa.*	Bangi?	1
		Miraa?	2
		Kokeini?	3
		Kuber?	4
23	Jana ulikula chakula dhabiti mara ngapi? *Eleza aina ya chakula. Kama hapana, tafadhali uliza ni kwa nini*	Hapana	1
		Mara moja	2
		Mara mbili	3
		Mara tatu au zaidi	4
24	Je, wewe hula matunda? *Kama sivyo (la) uliza ni kwa nini*	Ndivyo, angalau mara moja kwa juma	1
		Ndivyo, lakini sio mara kwa mara kwa juma	2
		Hapana (la)	3
25	Je, wewe hufanya mazoezi ya viungo kwa hiari? *Eleza maana ya mazoezi ya viungo kwa hiari na iwapo mhojiwa atajibu la, uliza ni kwa nini*	Ndivyo, kila siku	1
		Ndivyo, lakini sio kila siku	2
		La	3
26	Je, wewe hushiriki ngono? *Kama ni na zaidi ya mpenzi mmoja, uliza ni kwa nini* *Kama hapana uliza kwa nini*	Ndivyo, na mpenzi mmoja kila mara	1
		Ndivyo, na zaidi ya mpenzi mmoja kila naposhiriki	2
		Ndivyo, lakini sio kwa sasa	3
		Hapana (la) **Mpaka 29**	4

Nambari	Swali	Jawabu	Ishara (Kodi)
27	Je, unapenda kushiriki ngono na mtu wa jinsia sawa na wewe? *Je, mhojiwa ni basha/msenge?*	La	1
		Wakati mwingine	2
		Kila mara	3
		Asiyejua (hasemi)	96
28	Je, umewahi kushiriki ngono bila kutumia kinga (mpira) na mpenzi ambaye sio wa ndoa? *Kama ndivyo eleza ni kwa nini*	Ndivyo	1
		La	2
29	Je, una mamlaka kiasi gani nyumbani? *Kwa kila jawabu, eleza ni kwa nini*	Mengi	1
		Sio mengi	2
		Hapana mamlaka yoyote	3
30	Kwa ujumla, je unawaamini majirani zako? *Kama ni ndivyo au la, eleza ni kwa nini*	Ndivyo, sana	1
		Ndivyo, lakini sio sana	2
		Siwaamini hata kidogo	3
		Sijui/asiyesema	96
31	Je, wewe ni mwanachama wa shirika lolote Korogocho? *(Eleza kama shirika lako ni la kijamii, kidini, kitamaduni, kifedha (akiba kama vile "merry-go-round") linalohusu maendeleo au la kijamii).* *Kama sivyo, uliza ni kwa nini*	Ndivyo, moja (taja)	1
		Ndivyo, zaidi ya moja (taja)	2
		La	3

Sehemu 5: Maswala yanayohusiana na afya

Nambari	Swali	Jawabu	Ishara (Kodi)
32	Je, unalindwa na bima gani ya afya?	NHIF	1
		Mashirika ya kibiashara ya kibinafsi	2
		Bima kwa misingi yoyote ile (taja)	3
	Zifafanue aina hizi mbalimbali za bima.	Hapana/Hakuna uhakika	96
33	Mwaka jana (2011) je, ulipata huduma zozote za afya ulizohitaji?	Ndivyo, kila mara	1
		Ndivyo, wakati mwingine	2
	Kama ni la, eleza ni kwa nini	La, sivyo sijawahi	3
		Sijawahi kuhitaji	4
34	Je, hali yako ya afya ikoje kwa sasa?	Nzuri sana	1
		Nzuri	2
	Mwulize mhojiwa sababu za hali ya afya yake.	Nzuri (ya kuridhisha)	3
		Mbaya	4
		Mbaya sana	5
35	Je unayo, au umewahi kuambiwa kuwa una magonjwa yafuatayo	Kifua kikuu (TB)?	1
		Ukimwi?	2
		Ugonjwa wa (presha) shinikizo la damu?	3
	Eleza kama hali husika ilithibitishwa na mhudumu wa afya.	Kisukari?	4
		Asma?	5
	Onyesha kwa kutia alama hali ambayo mhojiwa anasema inamhusu	Ugonjwa wa akili (yataje)?	6
		Mapungufu mengine ya kimwili (yataje)?	7

Nambari	Swali	Jawabu	Ishara (Kodi)
36	Je, katika ukoo au familia yako kumekuwa na visa vya au historia ya kifua kikuu, shinikizo la damu, kisukari, asma au ugonjwa wowote wa ukili? *Kama ndio eleza ni maradhi yapi na ni noni katika ukoo ana tatizo hilo (baba, mama, kaka, dada, nk)*	Kifua kikuu	1
		Ugonjwa wa (presha) shinikizo la damu	2
		Kisukari	3
		Asma	4
		Ugonjwa wa akili	5
		Hapana	96

Maoni mengine yoyote kutoka kwa mhoji na mhojiwa yaelezwe hapa

Maoni ya mtafiti

MWISHO

Appendix 3.4 Dandora Municipal Waste Dumpsite

Appendix 3.5 Nairobi River

Appendix 3.6 Iron Sheet (*mabati*) Houses in Korogocho Informal Settlement

Appendix 3.7 Dandora Bridge across Nairobi River in Korogocho Informal Settlement

Appendix 3.8 Story Buildings with Stone Bricks in Ngomongo Village

Appendix 3.9 Interview Guide for Focus Group Discussions (FGDs)

Consent

Hello. I am Imesidayo Omua Eboreime-Oikeh, a student of the Kenyatta University, in the Department of Community Health, School of Public Health. The topic of my study for a PhD degree is: **Determinants of Health Inequalities among Adults in Korogocho Informal Settlement.** In order to gain more insight into health issues in this locality, I would like you to discuss the similarities and differences in your experience, opinions, perception, and knowledge of general health and inequalities as residents of Korogocho informal settlement. Hopefully, policy makers and other stakeholders will consider the evidence provided by this study to help improve aggregate population health and to eradicate any health inequalities not only in this and other settlements but also in Kenya generally.

Kindly indicate your willingness to participate in the discussion by appending your signature to the form provided (See **Appendix 3.2**, page 255 and **Appendix 3.3**, page 264). You have the right to refuse to participate. Allow me to emphasis that you will not suffer any repercussions if you decide not to participate or if you withdraw your participation at any time. Thank you.

Focus groups

The six groups of 6-11 adult participants in each group were purposively drawn from the villages of Korogocho informal settlement as itemized below:

1) Men aged 25-44 years
2) Men aged 45-59 years
3) Women aged 25-44 years
4) Women aged 45-59 years
5) Mixed group of tenants, both males and females aged 25-59 years
6) Mixed group of landlords, both males and females aged 25-59 years

PROCEDURE

Preliminary activities

- Introduction of facilitator/moderator (researcher), note-taker (recorder), and purpose of the focus group discussion (FGD)
- Assurance of confidentiality. Answers will only be used to enhance research findings
- Signed, written consent by participants
- Self-introduction of FGD participants and their demographic characteristics

Record of place, date, and time of FGD by note-taker

- Participants informed of estimated duration of interview/discussion, what is expected of them, and that snacks and non-alcoholic drinks including water will be served

- Permission from participants to audio- and video-record the interview

Discussion

Ground rules for discussion

- Participants told that they can stop the interview at any time if they so wish
- Role of the researcher as moderator explained: to ask questions and seek elaboration, and clarification while remaining neutral and non-judgmental
- Participants encouraged to freely express what they think and how they feel, and reassured with a promise of 'no repercussions' given in relation to any contentious issues raised
- Participants asked to speak individually, one at a time, and not speak over each other
- Participants urged to please treat others in the group as they want to be treated by not telling anyone about what they heard during the discussion
- One hour time limit or slightly more, allowed for the discussion
- Participants afforded the opportunity to ask any questions prior to, during, or after the interview.
- "Ice-breaker" activity for participants to be more at ease with each other and the visitors (researcher and note-taker)

Four groups of questions

- Main question
- Follow-up questions
- Probe questions
- Prompted questions depending on responses to previous types of questions

Main question:

- *What is your opinion of the topic for discussion i.e. general health and health inequalities among adult residents of Korogocho informal settlement?*

Follow-up and Probe questions:

- *In your opinion, what are the common types of health problems among adults in Korogocho informal settlement in general and your village in particular?*
- *In your opinion, are some adults generally more healthy than others? Probe:*
  - *old versus young*
  - *men versus women*
  - *married versus unmarried*
  - *employed versus unemployed*
  - *rich versus poor*
  - *educated versus uneducated*
  - *differences depending on village of residence*
  - *differences related to length of stay in Korogocho informal settlement*

- *From your perception, which of the following might be responsible for the differences in health and disease burden (health inequalities) among residents? Probe:*
  - *individual characteristics*
  - *household characteristics*
  - *poverty levels*
  - *external environment in neighborhood such as sanitation and pollution*
  - *access to health care*
- *What do you do to get better when you are unwell?*
  - *go to a health facility such as hospital, clinic, or drug store*
  - *consult a traditional herbal medicine practitioner*
  - *self-medicate*
  - *do nothing and hope that the illness goes away*

Prompted questions arising from the discussions: Reasons for higher proportion of women, unemployment, electricity, opinions on Dandora Dumpsite, insecurity, etc.

Close

Facilitator summarizes key points of the discussion and video recordings previewed
Participants asked:

- If anything was missed that they would like to talk about?
- What the most important point discussed was?

Any other comments, suggestions, or corrections
Thank you for your participation and contributions.
End of discussion. Snacks, drinks, and monetary compensation distributed.
Note-taker debriefed by facilitator.

Appendix 3.10 Interview Guide for Key Informant Interviews

Key informants:

- Representatives of NGOs, CBOs, FBOs, and public institutions; health care providers; community health workers; community leaders; and champions in Korogocho informal settlement.

Objectives of the Key Informant Interviews (KIIs)

- To identify the structural and social determinants of health inequalities among adults aged between 25 and 59 years old in Korogocho informal settlement, Nairobi and
- To determine entry points for policies and remediating interventions to reduce health inequalities

Consent

Good day. Thank you for agreeing to see me. I am Imesidayo Omua Eboreime-Oikeh, a PhD student of the Kenyatta University, in the Department of Community Health, School of Public Health. The topic of my study for a PhD degree is: **Determinants of Health Inequalities among Adults in Korogocho Informal Settlement.** I wish to get a better understanding of health issues and inequalities among adults, from your expert knowledge and experience of the living and/or working conditions in Korogocho informal settlement. Any suggestions as to how the health of residents and any perceived inequalities can be improved will be appreciated. Hopefully, you and other stakeholders will consider the evidence provided by this study to help improve aggregate population health and to eradicate any health inequalities in this settlement, and others in Kenya.

Kindly indicate your willingness to be interviewed by appending your signature to the consent form provided (See Appendix 3.1, page 253) and by providing the required information in the form below. The interview will last for less than one hour. You will be well within your rights if you decide to decline the interview. I will move on without any hard feelings.

Information form for Key Informants representing NGOs/CBOs/FBOs/Institutions/Agencies/Health Care Providers

Name_____ Title/Position_____
Organization_____ Health-related activities?: Yes ( ) No ( )
Venue and Date of interview_____

Preamble (2 minutes)

- Reiterate purpose of the study
- Permission to audio and video recording of the interview
- Key informant's opinion of the topic of the interview
- Any questions from the interviewee before the interview actually starts?

Background (3 minutes)

- Length of time that interviewee has been working with the agency or organization
- Activities undertaken by the agency or organization with regard to health or welfare of residents and development of informal settlement(s)

Understanding of health and health inequalities (18 minutes)

- What can you say about the health of the average resident of Korogocho informal settlement?
  - *do you think men or women are generally healthier?*
  - *if so, which factors might be responsible for the inequalities?*
- In your opinion, do social factors such as social status, educational status, income, and occupation, influence health and well-being generally?
  - *if so, from your understanding, how do you think these factors influence differences in health experience and outcomes*
- What is your opinion of the impact of environmental conditions and availability of health care facilities on health in Korogocho informal settlement?
  - *are the conditions better in some villages than others?*
  - *if so, which villages are better off and in what aspects?*
  - *what is your opinion regarding the relocation of Dandora Dumpsite*
- Do you have any comments about the current upgrading program in Korogocho?
  - *in your opinion, what is the impact of the program on the lives of the residents, distribution of resources, and the environment?*
- In your opinion, which lifestyles of residents are likely to affect their health
  - *men's lifestyle*
  - *women's lifestyle*
- What would be your advice to your organization, to NGOs, and to the government regarding policies and interventions to improve health of residents and to eliminate any health inequalities

Achievements of the agency/institution/organization represented by the key informant (10 minutes)

Thinking specifically about efforts made thus far to improve living conditions, welfare, and health of residents of Korogocho informal settlements

How effective have the efforts been?

- *Probe: What do you consider to be the achievements or successes of the past efforts? How useful/valuable are these achievements?*
- *Probe for perceived value of specific initiatives; coordination and collaboration with other actors; and positive effects on health and well-being in Korogocho informal settlement*
- *Probe: Please think about what worked and what did not work well and the probable reasons for one or the other outcome. What needs to be improved?*
- *Probe: What do you think are the issues that affect the effectiveness of the initiatives?*

Support available to and required by your agency or institution (5 minutes)

- What support do you know of that is currently available to help you or your agency/institution to function more effectively?
  - *Probe: do you have sufficient funds or right policies?*
  - *Is there any support that is not currently available that would help you function more effectively?*
  - *In your opinion, would the right policies make efforts to improve health and to reduce health inequalities more effective?*

The future (5 minutes)

- What should be done to enhance the effectiveness of your team? What factors would encourage more effective performance?
  - *Probe: Of the factors that you have mentioned, which are the most important?*
  - *Probe: Is there anything that could be done/systems put in place to assist inter-agency work?*

Finally, (2 minutes) is there anything we haven't covered that you'd like to tell me about determinants of health inequalities and how to tackle them? All your responses will be treated as confidential. Summary of interview.

Compensation for time devoted to the interview.

End. Thank you very much for your time

For Community leaders and County officials

Introduction

1. Kindly tell me about yourself.
   Probe:

   a) *How long have you been in Korogocho informal settlement/county government?*
   b) *How long have you been in your current position?*

About Health and Inequalities

2. Do you believe that chronic health problems like TB, HIV/AIDS, Hypertension, Diabetes, Asthma, mental disorders, and physical disabilities are becoming quite common in the community?
   Yes ( ) No ( )
   If yes:

   a) *What have you seen or heard that leads you to believe this?*
      1. *Examples:*
         a. *Hospital or health facility records.*
         b. *Lack of physical activity among people, such as exercise or recreation.*
         c. *Unhealthy lifestyles.*
         d. *Increase in outdoor pollution.*
         e. *More stress lately.*

3. Have policies been proposed or enacted in the community to prevent emerging health problems?
   Probe: Are there any proposed interventions related to:
   a) *Active Living:*
      1. *Promote healthy leisure activities*
      2. *Ensure security and safety in the community*
      3. *Provide recreational facilities at little or no cost*
      4. *Control alcohol dens*
      5. *Improve living and working conditions*
      6. *(specify other active living strategies that are being considered)*
   b) *Health promotion:*
      1. *Encourage safer sex*
      2. *Avail condoms*
      3. *Increase awareness of dangers of substance abuse*
      4. *Increase healthy food options in local convenience stores*

5. *Improve indoor and outdoor pollution*
6. *Enhancing sanitation and hygiene*
7. *(specify other healthy promoting strategies that are being considered)*

4. Have any policies directed at improving health and well-being in the community been effective?
   Probe:
   a) *If yes, how?*
   b) *If no, what are the possible reasons?*

5. How vocal and active do you feel residents are about community issues that relate to health?
6. Is there anything else about policies that can improve health generally in the community that you would like to share?

   - Are there certain neighborhoods or villages that have unmet needs related to health and health care access?

7. What policies or procedures does the government have in place to:

   a. *Remove barriers to equal access to essential services among the disadvantaged in the community?*
   b. *Mainstream gender in policies*
   c. *Provide social protection for the vulnerable such as the widowed, elderly, and socially excluded?*
   d. *Ensure equitable resource allocation and distribution*

8. In your view, who opposes the adoption of policies related to equitable distribution of healthful resources in the community?
   Probe:
   a) *Who do they represent?*
   b) *Which reasons do you think they have for opposing equity-promoting policies?*
   c) *Do you think this individual/group is knowledgeable about equity and health issues?*

THANK YOU for sparing valuable time to participate in this interview.