TRENDS IN MAJOR CAUSES OF MORTALITY AMONG CHILDREN AGED 5-14 LIVING IN SELECTED URBAN INFORMAL SETTLEMENTS IN NAIROBI

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS POPULATION STUDIES, DEPARTMENT OF ECONOMICS, POPULATION AND DEVELOPMENT STUDIES, UNIVERSITY OF NAIROBI

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DECALARATION

This research project is my original work and has not been presented for award of a degree in the University or any other University.

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This research project has been submitted for examination with my approval as the University supervisor.

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DEDICATION

This research project is dedicated to my family, colleagues at the African Population and Health Research Center (APHRC) and the Population Studies and Research Institute fraternity for their persistent encouragement and support during my studies.

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My sincerest gratitude goes to my supervisor Professor Alfred Agwanda Otieno from the Department of Economics, Population and Development Studies for his invaluable support right from the development of the research proposal to writing the research project. My appreciation also goes to Dr. Maurice Mutisya and Naomi Njenga from APHRC for reviewing the research project and for encouragement.

Finally, to my caring, loving, and supportive family, my wife Winfred Wangari and son Ethan Muhia, for providing a conducive environment for me to complete my work. My heartfelt thanks.

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ABSTRACT

This study sought to investigate the trends in major causes of mortality among children aged 5-14 living in the urban informal settlements of Korogocho and Viwandani. Although the risk of dying for this age group is one-fifth of the risk for children under five, a significant number still die annually. In 2016, for instance, one million children were reported to have died.

The cause of death data among children aged 5-14 was derived from verbal autopsy interviews conducted in the Nairobi Urban Health and Demographic Surveillance System from January 01, 2003 to 31 December 31, 2016. The causes were categorized into 20 main items and further summarized into 4 sources, that is, from communicable diseases, non-communicable diseases, external causes, and unspecified causes and annual cause-specific mortality causes also calculated by age and sex .

Results indicated that the three major causes were injuries (19%), respiratory tract infections (10%) and HIV/AIDS (10%). Communicable diseases contributed the largest proportion of mortality (48%), followed by external causes (20%) and non-communicable diseases (13%). The major causes of death among male children aged 5-14 were injuries, tuberculosis and HIV/AIDS at 20%, 10% and 9% respectively while among female children, the causes were meningitis (12%), respiratory tract infections (12%), HIV/AIDS (11%) and other non-communicable (11%).

This study is important in informing targeted public health interventions for this age group. For instance, focusing on male deaths caused by injuries and especially by road traffic accidents. On the other hand the study underscores the need for integrated interventions for closely related diseases such as HIV and tuberculosis or RTIs and meningitis which are key caused of death for children aged 5-14.

1 CHAPTER ONE: INTRODUCTION

1.1 Study Background

Findings from the burden of disease studies indicate that although communicable diseases are still the leading cause of mortality globally, a gradual epidemiologic transition is underway designated by the rise in non-communicable diseases (Lopez & Mathers, 2006; R. Lozano et al., 2012; Colin D Mathers & Loncar, 2006; Osano, Were, & Mathews, 2017). The epidemiologic transition postulates that all societies advance through three stages characterized by variations in mortality, disease patterns and survival (A. R. Omran, 1971; Abdel R Omran, 2005). At the “age of pestilence and famine" stage, mortality is high and fluctuating which impedes sustained population growth and results in low life expectancy of between 20-40 years. This phase is also marked by an increase in infectious diseases. The second stage is the "age of receding pandemics" and is characterized by mortality decline, sustained population growth and increasing life expectancy. The last stage is the "age of degenerative and man-made diseases" characterized by an increase in mortality associated with degenerative diseases, cardiovascular diseases, cancer, violence, and accidents.

This transition can be observed in the systematic analysis for the global burden of disease by R. Lozano et al. (2012) which showed that of all the 52.8 million deaths globally in 2010, about 25% were cumulatively attributed to communicable, maternal, neonatal, and nutritional causes. This was a major improvement from 34% observed in 1990. During the same period, non-communicable diseases were shown to be on the rise, accounting for nearly two-thirds of all deaths worldwide. On the other hand, injury-related deaths contributed to about 10% of the deaths, an increase from about 9% in 1990. This transition has been attributed to various reasons including rapid urbanization, medical advancements in the prevention and treatment of communicable

diseases, nutritional factors, behavioral and biological factors (Marquez & Farrington, 2012). For example, advancements in managing HIV/AIDS have been linked with increased non-communicable illnesses such as cardiovascular disease due to increase life expectancy for persons living with HIV (Tseng et al., 2012).

Although developed nations have experienced the epidemiological transition, there exist significant variations in causes of mortality at regional, sex and age levels. In developing countries, for instance, communicable diseases are still the primary cause of deaths, compared to developed countries (Rafael Lozano et al., 2012; Colin D Mathers & Loncar, 2006; G. C. Patton et al., 2009). Some of the common communicable diseases, especially among children include malaria, pneumonia, diarrhea, HIV/AIDS and tuberculosis (Burton et al., 2011; MacIntyre & de Villiers, 2010; Sanders, Fuhrer, Johnson, & Riddle, 2008).

1.1.1 Causes of Death – A case of Urban Informal Settlements

This section will focus on results from a study by Mberu, Wamukoya, Oti, and Kyobutungi (2015) that utilized verbal autopsy data from two urban informal settlements to estimate the trends in causes of death among adults aged 15 year and above. The study found that the three main causes of mortality were tuberculosis, injuries, and HIV/AIDS. When desegregated by sex, injuries were the main cause of mortality for men at 30%, then tuberculosis at 25% and HIV/AIDS at 12%. On the other hand, the leading causes of death for females were tuberculosis (29%), HIV/AIDS (25%), other causes (13%) and cardiovascular diseases (11%). The study also uncovered an interesting trend in the main causes of death where HIV/AIDS was the leading cause of death in 2003 and later surpassed by tuberculosis in 2012. Deaths as a result of injuries were also on the rise, with a

90% increase observed within the 10 years. In 2011, overall deaths attributed to injuries were at their highest, accounting for about 37%. During this period, cardiovascular diseases also emerged as key contributors to mortality.

When examined by age, injury-related deaths accounted for about 69% of deaths among men aged 15-19 and persisted as a major cause at ages 30–34. This however changed at age 35 and above where tuberculosis overtook injuries as a primary cause. Although deaths related to injury accounted for about 25% of the deaths for women age 15-19, tuberculosis and HIV/AIDS remained major contributors of death for all age groups. However, disparities were also seen within the causes of death themselves. For example, while HIV/AIDS related deaths are consistently higher for women compared to men, from ages 50 and above, the deaths among men become higher.

In addition, deaths related to communicable diseases also reduced by 13 percentage points from 66% between 2003 and 2012. However, deaths due to non-communicable causes and injuries increased by about 15 percentage points and 11 percentage points respectively.

Generally, the main types of injury-related deaths were assaults at 54%, road traffic accidents at 20%, and exposure to smoke/fire/flame at 14%. Furthermore, death from intentional self-harm among women accounting for 10% (half that of men) of injury-related deaths also stood out.

1.2 Statement of the Problem

Out of the estimated 6.3 million deaths among children and young adolescents in 2017, about one million of them occurred in children aged 5-14 years (IGME, 2018). Evidence also indicates that the majority (98%) of the deaths within this age group occur in low and middle-income countries

with 55% of them occurring in sub-Saharan Africa (IGME, 2018; Masquelier et al., 2018). In addition, the likelihood of children aged 5 years to die between ages five and fifteen is estimated to be 17 times higher compared to high-income countries, at 18.4 deaths per 1000 children (Masquelier et al., 2018). There has also been little focus on mortality for children above five years partly because of the few numbers of death compared to children under five years. Although the risk of death for children 5-14 is one-fifth of the risk for children under five, one million children dying annually is still significant (UN IGME, 2017). The skewed attention is also visible in the millennium development goals and sustainable development goals that have largely focused on reducing under-five mortality (UN, 2015, 2018). Further, the limited data has resulted in poor planning for this age group. For instance, despite a significant proportion of children aged 5-14 years dying from lower respiratory tract infections, guidelines on the management of pneumonia emphasize on children under five years (World Health, 2013).

Furthermore, the lack of quality data on mortality which is critical for policy, planning and addressing the health needs of a population, is also a key issue affecting developing countries and especially in sub-Saharan Africa. Ideally, these data should be accessible, reliable, accurate, relevant and complete. However, mortality information just like other demographic events – fertility and migration – are widely unavailable in most developing countries due to lack of robust vital registration systems (Kyobutungi, Ziraba, Ezeh, & Ye, 2008; Rafael Lozano et al., 2012). This notwithstanding that these countries account for more than two-thirds of the global mortality cases (Mberu et al., 2015). As a result, countries are not only finding it challenging to formulate and prioritize mortality reduction interventions but are also unable to reliably measure their progress against desired mortality indicators (Rafael Lozano et al., 2012).

The state of affairs worsens for marginalized populations such as the urban poor. Extant literature indicates that urban informal populations experience poor health outcomes compared to urban and rural populations (Mberu, Haregu, Kyobutungi, & Ezeh, 2016; UNICEF, 2010). The situation is made worse by the fact that parents and guardians in slums who are mostly engaged in the informal sector, are more likely to have poor health-seeking behaviour which dampens health gains in child survival (Taffa, Chepngeno, & Amuyunzu-Nyamongo, 2005). As a result of poor health outcomes in urban areas, there have been calls to have policies and resources directed to these areas in a bid to avoid worsening of urban mortality and morbidity (Gould, 1998).

Additionally, despite the availability of antiretroviral therapy (ART) and a myriad of effective prevention interventions, HIV remains a major challenge globally, with sub-Saharan Africa bearing the greatest burden of the disease (Maina et al., 2014). In 2017, about 36.9 million people were estimated to be living with HIV globally. During the same period, 1.8 million people were newly infected with HIV while 940,000 died from AIDS-related illnesses (UNAIDS, 2018). In Kenya, it was estimated that about 1.5 million people were living with HIV and about 53,000 (8,000 being children aged 0-14 years) were newly infected. Additionally, there were about 28,000 HIV related deaths in 2017 (UNAIDS, 2017a). Children are however more disadvantaged due to their limited ability to independently access health services. Studies indicate that a large number of children who contract HIV through mother-to-child transmission seek treatment for the first as adolescents when their health has already deteriorated (Bakanda et al., 2011; Evans et al., 2013) mainly because of inadequate child-friendly testing services and because caregivers are hesitant to have their children tested. This could explain why in 2016 only less than half of all children living with HIV globally were on ART and why HIV was the seventh primary cause of mortality for

children age 10–14 years in 2015, and the ninth leading cause of mortality for adolescents (UNAIDS, 2017b). To implement effective HIV programs, there is a need to have reliable data that reflects a country's current HIV epidemiology (Kimanga et al., 2014). Noting that young people are born in the era of HIV it will be important to examine the extent to which these group also suffer from the incidence of this disease.

1.3 Research Questions

The study sought to answer the following study questions:

i. What are the main causes of mortality among children aged 5-14?
ii. Are there sex variations in mortality linked to the various causes?
iii. What are the age differences in mortality causes among children aged 5-14?
iv. Have the major causes on mortality changed overtime?

1.4 Objectives of the study

The overall objective of the study was to investigate the trends in major causes of mortality among children aged 5-14 living in the urban informal settlements of Korogocho and Viwandani.

The specific study objectives were:

i. To examine the causes of death among children aged 5-14 in Korogocho and Viwandani.
ii. To establish trends in mortality causes among children aged 5-14 in Korogocho and Viwandani.
iii. To establish the mortality rate for children aged 5-14 in Korogocho and Viwandani.

1.5 Justification of the Study

This study aimed to investigate the trends in major causes of mortality among children aged 5-14 in two Nairobi slums, using verbal autopsy (VA) data from the NUHDSS. Verbal autopsies are

used to document causes of death data by interviewing relatives or caregivers of the deceased about the event that led to their death. For some countries, VA is the only viable information source for the cause of death data (Soleman, Chandramohan, & Shibuya, 2006) and therefore they are an important tool for informed decision making and planning especially for countries with inadequate vital registration systems.

Considering that the chances for children aged 5 in sub-Saharan Africa to die before their fifteenth birthday (19 deaths per 1,000 children) is higher than in developed countries (1.1 deaths per 1,000 children), this study will add to the knowledge and evidence needed to better cater to this age group in terms of public health interventions (UN IGME, 2017). Furthermore, in Africa, children aged 0-14 years accounted for about 41% of its population (UN, 2017). It is also projected that sub-Saharan Africa will contribute to the largest increase in the population aged 0-14 years by 2030. Therefore, it is imperative to increase investment in generating evidence for informed planning for this age group (Osano et al., 2017).

With the gains made in reducing under-5 mortality, it is expected the improved survival rates among these age-group will increase the number of children above five years. For instance, in Kenya, under-5 mortality was reported to be 52 deaths per 1000 live births compared to 115 death per 1000 live births in 2003 (KNBS, 2014). In addition, research indicates that improving children's well-being at an early stage results in better health outcomes later in adulthood (Hayward & Gorman, 2004).

1.6 Limitation of the Study

A key limitation of the study was the incomplete verbal autopsy records where about 7% of deaths were not assigned causes with about 8% of verbal autopsies not done, thus reducing the number of cases that could be analyzed. The implication is that the proportions of the causes of death could be higher than what was reported. However, the longitudinal nature of the data was a strength in that allowed for trend analysis of the major causes of death.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter begins by discussing the importance of estimating the major causes of mortality. It further highlights the availability, completeness and quality of mortality data globally and specifically zeroing in on mortality data for marginalized populations to justify why it is critical to study urban informal populations. With the status discussed, the chapter goes ahead to highlight the need of having alternative sources of mortality information in cases where the vital registration systems are unreliable. Lastly, the chapter also touches on the determinants of mortality including, age, sex, education, economic development, residence, and sexual reproductive health and rights.

2.2 Importance of determining major causes of death

As governments endeavor to make informed decisions and plan for their citizen's health, one of the key issues taken into consideration is the priority health needs of the population. However, these can only be known by undertaking a comprehensive assessment of the major causes of mortality and morbidity in a country. Also, planning for cost-effective interventions geared towards reducing the disease burden requires a comparative assessment of the magnitude of disease and injury burden (Lopez & Mathers, 2006). For instance, George C Patton et al. (2009) found that the global priorities on adolescent health, focusing on HIV/AIDS and maternal mortality were vital but necessarily sufficient to comprehensively prevent mortality since intentional and unintentional injuries were significant contributors, accounting for more than 40% of mortality for this age-group. Furthermore, Gore et al. (2011) postulate that studies on the leading causes of morbidity and mortality are especially important for young people since they tend to be neglected in global health discourses, mainly due to the perception that they are healthy. Therefore, studies focusing on young people play a critical role in advocating for increased public health attention.

2.3 Availability, completeness and quality of mortality data

It is estimated that only 30% of mortality cases have reliable cause of death data (Murray & Lopez, 1997). The situation is worse for developing countries which despite accounting for more than two-thirds of mortality globally, have unreliable and in some cases nonexistent vital registration systems (C. D. Mathers, Fat, Inoue, Rao, & Lopez, 2005). According to WHO (2007), incomplete vital registration is evident in almost 9% of the countries, which is worrying considering their usefulness in planning and decision making.

2.3.1 Mortality data for marginalized populations

Regrettably, the incompleteness is sometimes caused by no-coverage of some marginalized populations such as those living in urban informal settlements (UNDP, 2006). For instance, although Kenya has made significant gains on key demographic and health indicators as indicated in the recent KNBS (2014) report, the limited coverage of urban informal settlements has led to discrepancies in reporting (Mberu et al., 2015). This thus means these populations fail to enjoy the fruits of public health policies formulated by the government.

2.3.2 Alternative cause of death information

As a result of the inadequacies with mortality data and shortfalls with vital registration systems, most developing countries are now turning to alternative sources, especially through verbal autopsy and health and demographic surveillance systems (Oti & Kyobutungi, 2010). These platforms provide the much-needed information on the status of vital demographic events (births, deaths and migration) and thus enhancing estimation of disease burdens and informed health planning (Korenromp, Williams, Gouws, Dye, & Snow, 2003; Morris, Black, & Tomaskovic, 2003).

2.4 Determinants of mortality

2.4.1 Age

Extant literature indicates that age is one of the key determinants of mortality and thus the need to study mortality causes for different age groups instead of aggregating. The downside of aggregating is that some age groups may be perceived as healthy and thus being neglected from the public health planning, programs and interventions. This is one of the reasons why there are deliberate steps to study and understand the burden of disease among young people (Gore et al., 2011; G. C. Patton et al., 2009; UN IGME, 2017).

2.4.2 Sex

In the study of mortality one of the important factors considered when looking at the cause, levels and trends is sex (Cornell et al., 2012; De Wet & Odimegwu, 2017; Mberu et al., 2015; Mikkola, Gissler, Merikukka, Tuomikoski, & Ylikorkala, 2013). For instance, injuries-related deaths are profound among men, but further investigations into the type of injury reveal that self-inflicted injuries are highest among females (Mberu et al., 2015).

2.4.3 Education

From the available evidence, there is no doubt that education plays is an important determinant of both child and adult mortality. For instance, Caldwell (1979) found that of all the socio-economic factors affecting mortality, maternal education was the "single most significant determinant" of child mortality. As a result, he went ahead to recommend that maternal education be considered as a stand-alone determinant instead of a proxy for general socio-economic change. Additionally, mortality was found to be particularly lower in cases where the mother was better educated than the father. Some studies have also shown education to have a causal impact on mortality (Lleras-

Muney, 2005). However, the relationship is not so direct, as highlighted by Goldman and Smith (2002) who found that educated individuals were more likely to adhere to treatments for diabetes and HIV/AIDS as well as better manage chronic diseases (Goldman & Lakdawalla, 2001). The relationship can also be looked at using a psychology lens where the lack of education is associated with poor mental outcomes such as stress, depression and hostility (Adler et al., 1994). Other studies explain the association by stipulating that education results in access to higher income and occupation and consequently better health outcomes (Lleras-Muney, 2005).

2.4.4 Economic development

Although economic development results in reductions in morbidity and mortality from communicable diseases (Beaglehole & Bonita, 2004), nutrition issues, and maternal factors, on the downside, mortality from injuries tend to rise mostly among young people and especially the male population. These are mostly due to violence, suicide, burns, and road traffic accidents (Blum & Nelson-Mmari, 2004; Cropper & Kopits, 2003; Patton et al., 2012; Sawyer et al., 2012; Viner et al., 2011). In addition, Patel, Flisher, Hetrick, and McGorry (2007) point out that increased access to psychoactive substances might result in poor mental health outcomes.

2.4.5 Residence (Urban, Rural)

A detailed examination of mortality indicates that mortality differentials exist between rural and urban populations. Generally, rural populations are said to be worse off in terms of their health outcomes (Gartner, Farewell, Roach, & Dunstan, 2011; Sastry, 1997). However, this urban advantage tends to disappear when the urban poor are considered (Mberu et al., 2016). The differentials are not explained by just being a resident, but rather due to factors such as availability of health services, and the demographic structure. For example, the age distribution in rural areas

is usually skewed toward the older ages which could spell out higher rates of mortality (Miller, Stokes, & Clifford, 1987).

2.4.6 Sexual reproductive health and rights outcomes

Another crucial phenomenon to look at is the contribution of teenage pregnancy to adolescent mortality (George C Patton et al., 2009). Teenage pregnancies are relatively high in developing countries such as Africa due to the high incidences of early marriages (Mayor, 2004). Unfortunately, coupling the high incidences of teenage pregnancies and the poor health services in these developing countries results in high maternal mortality (Nour, 2006).

3 CHAPTER THREE: DATA AND METHODS

3.1 Introduction

This chapter describes the study area and population where the mortality data was collected; the demographic surveillance system that facilitated the collection of verbal autopsy data; the interpretation of verbal autopsy data; data analysis; and ethical considerations.

3.2 Study Context and Data Collection

The cause of death data for this study is generated from the NUHDSS which collects longitudinal data on demographic events including mortality, fertility, migration and key socio-economic and health indicators. The NUHDSS has been running in two urban slums in Nairobi (Korogocho and Viwandani) since 2002 and targets just over 70,000 residents in about 28,000 households (Emina et al., 2011; Mberu et al., 2015).

Verbal autopsy involves conducting interviews with a reliable respondent on the circumstances that lead to the death of the NUHDSS member. Two sets of questionnaires are administered depending on the age of the deceased, that is, for children under-5 and individuals aged five years or older. The questionnaire collects background information about the deceased (such as date of birth, date of death, sex and residency) and health history before their death (Mberu et al., 2015).

3.3 Interpretation of Veral Autopsy Data

3.3.1 Physician Review

This approach involves assigning of likely causes of death by three separate physicians using the verbal autopsy data. The probable cause of death is only allocated (guided by the International Classification of Diseases) where two or more physicians agree, otherwise, they have to meet and

agree on an amicable cause. Where they do not agree, the cause is coded as 'unknown' and 'indeterminate' where it cannot be established (Kyobutungi et al., 2008).

3.3.2 The InterVA Model

The information on the circumstances that resulted in the demise of the target NUHDSS member is used to develop indicators that point out to three probable causes of death by utilizing Baye's theorem highlighted below (Peter Byass, Huong, & Van Minh, 2003).

$$P(C/I) = \frac{P(I/C) \times P(C)}{P(I/C) \times P(C) + P(I/!C) \times P(!C)}$$

Where 'C' is the cause of death; 'I' is the indicators (circumstances that resulted in death); 'P(C|I)' is the probability of cause of death provided with respective indicators; and 'P(!C)' is the probability of no cause of death.

This model is computer-based and the cause of death data is generated by feeding a set of 100 indicators from completed VA questionnaires. Compared to the physician review approach, the InterVA model is much faster, cheaper and consistent and thus more preferred (Bauni et al., 2011; P. Byass, Kahn, Fottrell, Collinson, & Tollman, 2010; Fottrell & Byass, 2010; Oti & Kyobutungi, 2010; Weldearegawi, Melaku, Dinant, & Spigt, 2015). This study will therefore use data from the InterVA model.

3.4 Data Analysis

The data analysis methods were informed by a similar study looking at mortality causes for adults in urban slums (Mberu et al., 2015). During data analysis, the causes were first categorized into 22 specific causes, then further collapsed into 15 broad categories again including indeterminate cases and VA not done. For instance, deaths caused by road traffic accidents, accidental falls, accidental

drowning and submersion, accidental exposure to smoke, fire & flames and contact with venomous plant/animal were all classified as injuries in the broad category. Also, acute cardiac disease, stroke and other and unspecified cardiac diseases were collapsed into cardiovascular causes of death. Lastly, the general category included causes of death resulting from communicable causes, non-communicable and external causes. In all categories, the cases where the cause could not be determined and where the VA was not done were also included in the analysis to provide a comprehensive picture. A description of the categories is shown on Table 3.1.

Table 3.1: Categorization of Causes of Death

SPECIFIC CAUSES	BROAD CAUSES	GENERAL CAUSES
Acute respiratory infections (inclding pneumonia)	HIV/AIDS related deaths	Communicable disease
HIV/AIDS related deaths	Asthma	Non-communicable disease
Diarrhoeal diseases	Cardiovascular	External cause
Malaria	Diarrhoeal diseases	Indeterminate (had InterVA symptoms)
Measles	infectious diseases	VA not done
Meningitis and encephalitis	Injuries	
Pulmonary tuberculosis	Malaria	
Other and unspecified infect diseases	Severe malnutrition	
Other and unspecified neoplasms	Meningitis	
Severe malnutrition	Malignancies	
Acute cardiac disease	respiratory tract infections	
Stroke	Tuberculosis	
Other and unspecified cardiac diseases	Other communicable diseases	
Asthma	Other non-communicable diseases	
Acute abdomen	Other external cause	
Epilepsy	Indeterminate (had InterVA symptoms)	
Road traffic accident	VA not done	
Accidental fall		
Accidental drowning and submersion		
Accidental exposure to smoke, fire & flames		

Contact with venomous plant/animal		
Other and unspecified external cause		
Indeterminate (had InterVA symptoms)		
VA not done		

Results were then presented as percentages for each cause of death by taking into consideration the sex and age of the respondent to find out if there were any variations within the two categories. The annual trends covering January 01, 2003 and December 31, 2016 were also presented for each cause. Finally, the mortality rate for the target group was calculated and presented by sex and age-group (5-9 and 10-14 years).

3.5 Research Ethics

Although this study utilized secondary data, the African Population and Health Research Center was granted ethical approval by the Kenya Medical Research Institution's National Ethics Review Committee to undertake data collection activities in the NUHDSS (see appendix A). Informed consent was also sought from all respondents to ensure that they well informed about the study and that data was collected voluntarily and confidentially (see appendix B)

4 CHAPTER FOUR: MORTALITY CAUSES AND TRENDS

4.1 Introduction

This chapter highlights the causes of death for children aged 5-14 from January 2003 to 31 December 2016. To begin with, the characteristics of the target population are given to show the number of children aged 5-14 in the study area, mortality cases reported during the study period and the number of verbal autopsy interviews completed. Results are presented in terms of overall, broad and general causes. Since injuries were a major cause especially for male children, the results also highlighted the key types of injuries as well as the annual trends for injury related deaths. Finally, the mortality rate and age-specific mortality rates was estimated.

4.2 Characteristics of study population

Overall, there between 2003 and 2016, there were 195,079 children aged 5-14 living in the NUHDSS (98,117 female and 96,962 male). The number of children aged 5-14 increases from 2003 (10,633) to 2011(15,698) and then decreased to 14,937 in 2013. However, an increase in the population was noted in the preceding years, where in 2016 the number of children was 16,149 as shown in *Figure 4.1*. Out of these, a total of 178 mortality cases for children aged 5-14 were reported during this period. Verbal autopsy interviews for 157 (88%) cases were completed with the InterVA successfully assigning the cause of death for 145 (92%). Of the successfully assigned cause of death cases, 78 (54%) were male and 67 (46%) female. In total, 12 mortality cases could not be assigned a cause of death (indeterminate).

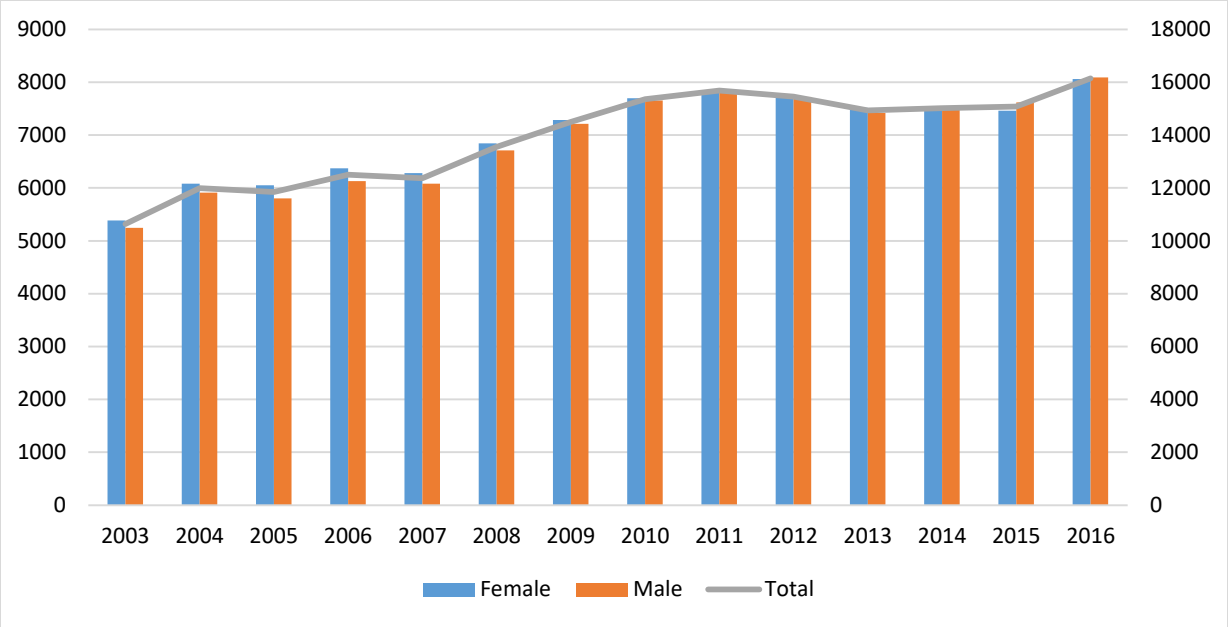

Figure 4.1: Children aged 5-14 in the NUHDSS, January 2003 to 31 December 2016

4.3 Overall causes of death

The primary causes of death, over the 14 years are illustrated in Figure 4.2. Overall, the three main causes of death for children aged 5-14 were injuries, respiratory tract infections and HIV/AIDS accounting for 15%,10% and 10% respectively.

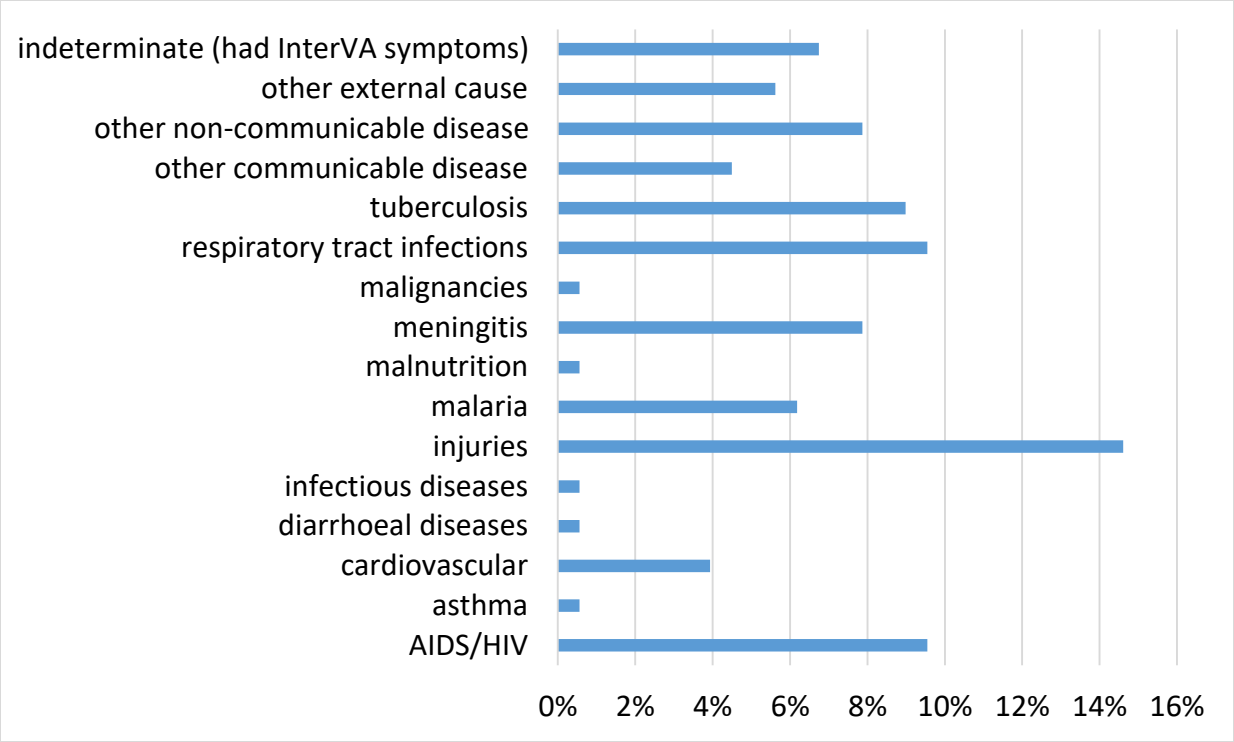

Figure 4.2: Causes of death among all children aged 5-14, 01 January 2003 to 31 December 2016

The highest number of deaths were reported in 2003, 2005, 2007 and 2010 with 18, 29, 14 and 14 deaths respectively, with the lowest numbers being reported in 2004, 2012 and 2016 at 6, 8 and 8 deaths respectively as indicated in Figure 4.3.

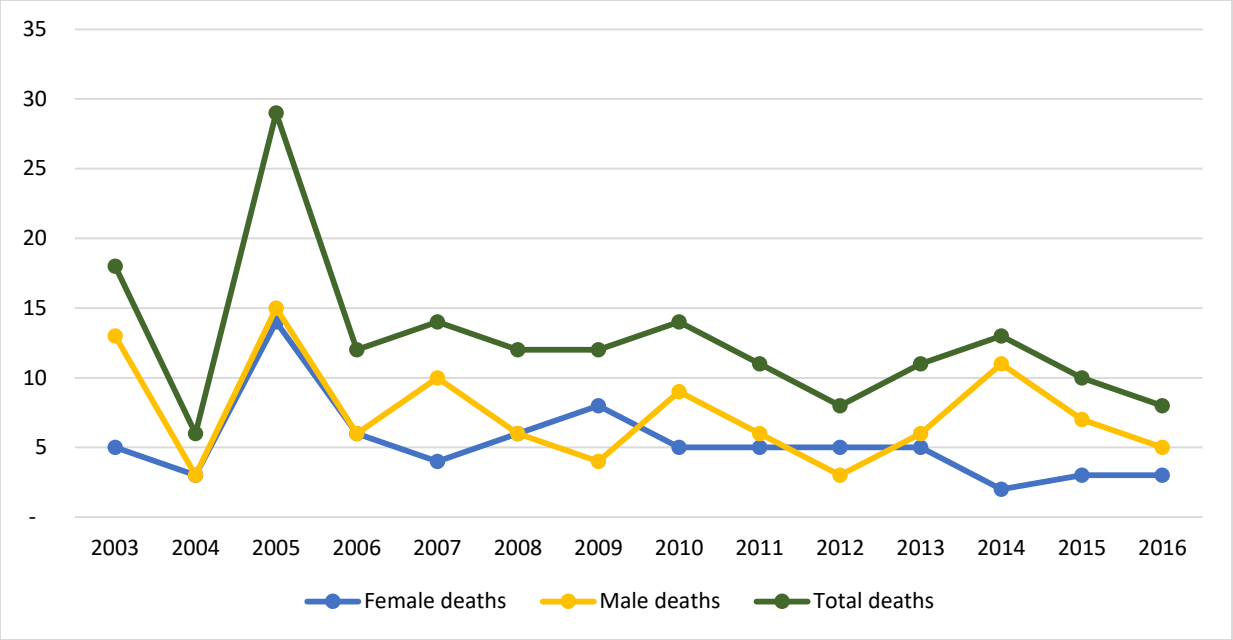

Figure 4.3: Annual trends in number of deaths for children aged 5-14, 01 January 2003 to 31 December 2016

In terms of general causes of death (Figure 4.4), deaths caused by communicable diseases contributed the largest proportion of deaths (48%) over the years, followed by external causes (20%) and lastly non-communicable diseases (13%), with rest being indeterminate causes (7%) or VAs not done (12%). However, there was a gradual decrease for all causes of death from 2003-2016.

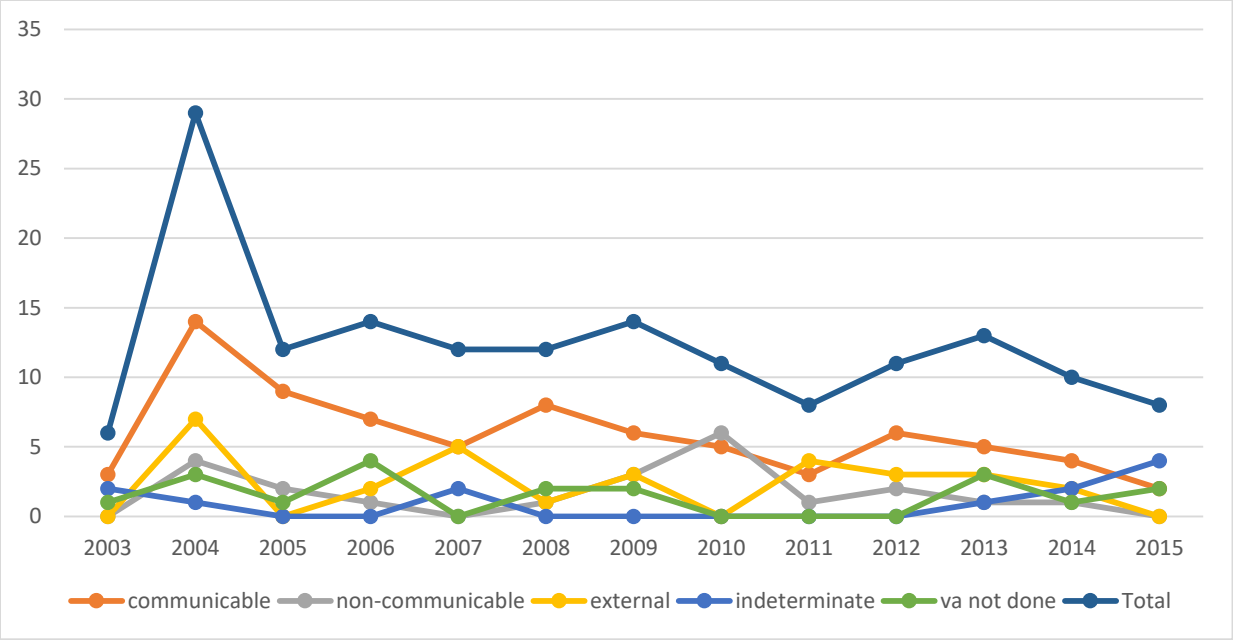

Figure 4.4: Annual trends in general causes of deaths for children aged 5-14, 01 January 2003 to 31 December 2016

Further categorization by general cause of death (*Figure 4.5*) revealed that deaths related to communicable diseases had gradually reduced over time by 8 percentage points from 2003 to 2016. On the other hand, deaths associated with non-communicable diseases have an irregular pattern with abrupt increases and decreases. For instance, there was an increase of 26 percentage points in non-communicable disease related deaths from 2008 to 2011. Despite the uneven pattern of deaths caused by external causes during the study period, there was a 17 percentage point drop from 2003 to 2016. The number of deaths whose cause could not be determined also experienced a substantial increase of 33 percentage points from 2003 to 2016.

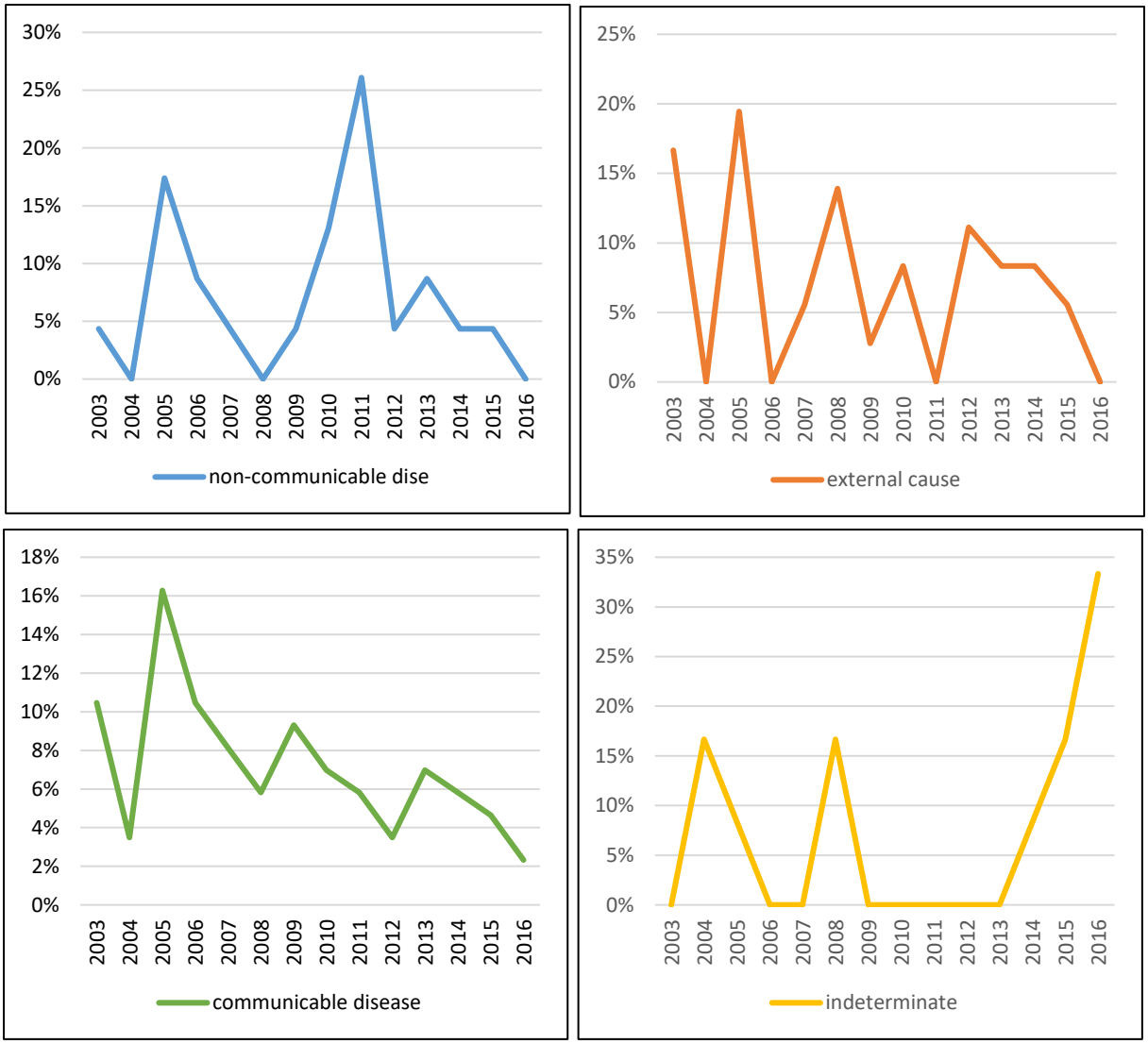

Figure 4.5: Patterns of general causes of deaths for children aged 5-14, 01 January 2003 to 31 December 2016

4.3.1 Injury-related deaths

A further breakdown of the 26 deaths caused by injuries (Figure 4.6) pointed out that half the deaths were caused by road traffic accidents followed by accidental drowning and submersion (23%) and exposure to smoke, fire and flames by accident (19%).

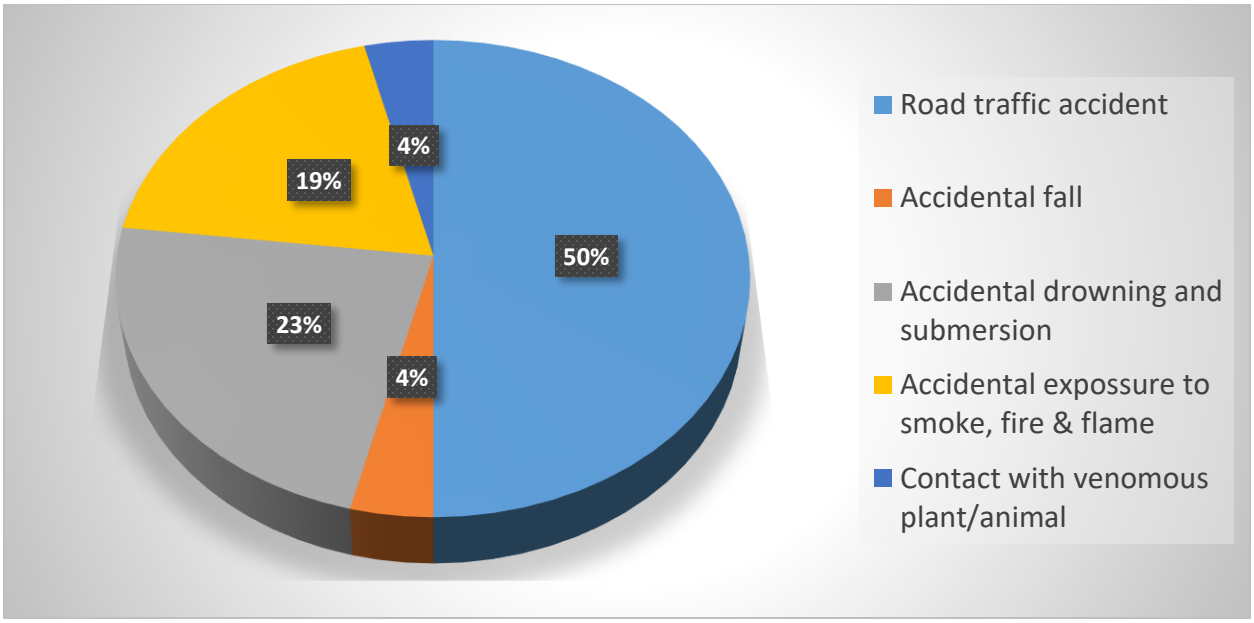

Figure 4.6: Particular causes of injury deaths, January 2003 to 31 December 2016

In terms of annual trends (Figure 4.7), the highest number of injury deaths were reported in 2003, 2005 and 2014 at 5, 6 and 3 deaths respectively. The rest of the years except 2004, 2006, 2011 and 2016 recorded between 1 and 2 injury-related deaths. Moreover, of the 26 injury-related deaths, 80% were among male children.

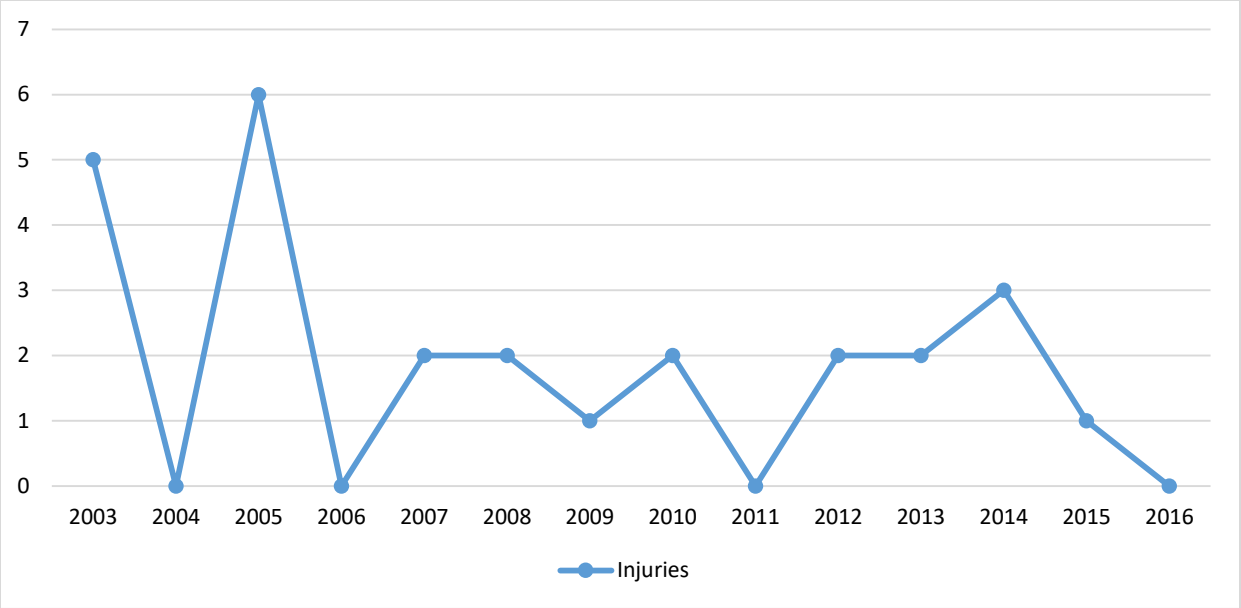

Figure 4.7: Annual injury-related deaths among children aged 5-14, January 2003 to 31 December 2016

4.4 Major causes of death by sex

The major death causes for male and female children varied considerably. As shown in Figure 4.8, the leading causes of death among male children aged 5-14 were injuries, tuberculosis and HIV/AIDS at 20%, 10% and 9% respectively while among female children, the causes were meningitis (12%), respiratory tract infections (12%), HIV/AIDS (11%) and other non-communicable (11%).

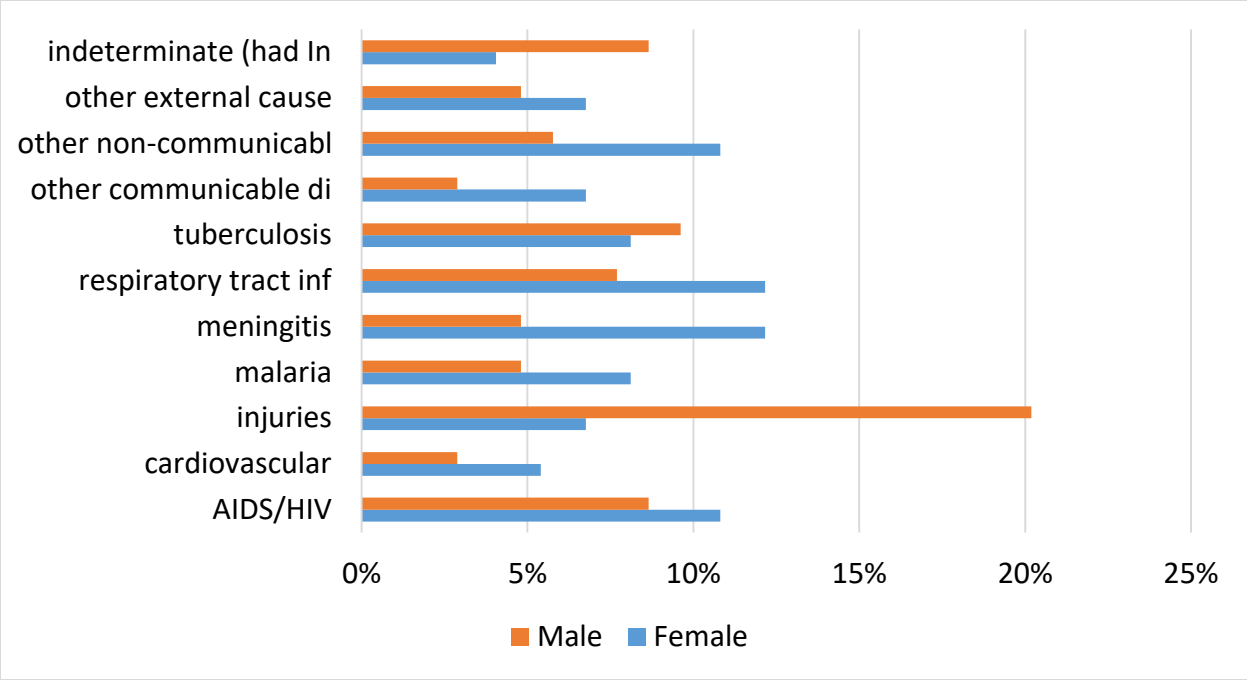

Figure 4.8: Major causes of death by sex, January 2003 to 31 December 2016

4.5 Major causes of death by age group

When the causes of death were stratified by five-year age groups of 5-9 and 10-14, injuries, HIV/AIDS and respiratory tract infections topped the list as the three major causes in both age groups as indicated in Figure 4.9. More deaths were generally reported for children aged 5-9 at 115 deaths compared to 63 for children aged 10-14. However, there were disparities in the particular causes of death between the two age groups. For instance, other external causes of death accounted for 10% of deaths in children aged 10-14 compared to 3% in children aged 5-9. In addition, deaths caused by tuberculosis accounted for 11% and 8% for children aged 10-14 and 5-9 respectively. Another key difference was observed in deaths caused by malaria at 8% (10-14) and 5% (5-9). On the other hand, there were more deaths caused by other communicable diseases for children aged 5-9 at 5% compared to 3% for children aged 10-14. There were also unique causes of death that were only recorded for either of the age-groups with deaths caused by

malnutrition, infectious diseases and diarrheal only being observed in children aged 5-9 while malignancies and asthma-related deaths were only recorded for children aged 10-14. However, only one case was captured for each of the unique causes of death.

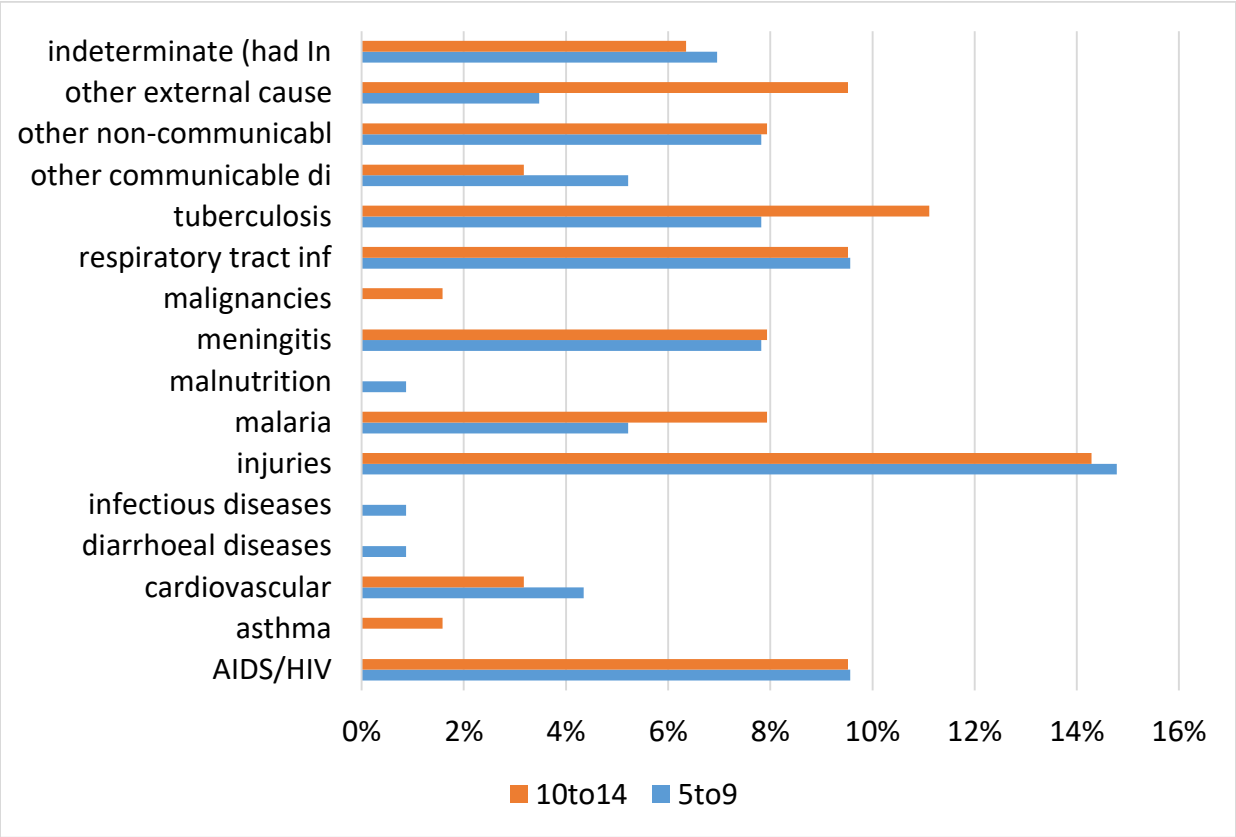

Figure 4.9: Major causes of death by age group, 01 January 2003 to 31 December 2016

4.6 Mortality rate

The mortality rate is an important measure of death incidences in a population during a specific period. The crude mortality rate is estimated by dividing the number of deaths by the population size (usually the mid-year population as of June 30th or July 1st) and presented per 1,000 or 100,000 people as shown below.

$$MR = \frac{\textit{Deaths during a given time period}}{\textit{Population which the deaths occurred}} \times \textit{1,000 or 100,000}$$

In most cases when estimating mortality rates, the mid-year population is used and it refers to the population as of 30 June or 1 July. The mid-year population is however deficient in that it is not an exact average of the number of people living in a given area during the entire year. In addition, it may also not be accurate in instances where the population is characterized by considerable population fluctuations such as migration (UN, 1952) as is the case for urban informal settlements. Since the NUHDSS is longitudinal, person-years were used as the denominator instead of the mid-year population. Person years provide a more accurate estimate of the number of children aged 5-14 living in the study site during a particular year. The formula was thus revised as indicated below.

$$MR = \frac{\textit{Deaths during a given time period}}{\textit{Person-years (representing population which the deaths occurred)}} \times \textit{1,000 person-years}$$

In this case, the total population of children aged 5-14 between 2003 and 2016 was 195, 079 who cumulatively contributed to 97,782.99 person-years. With 178 deaths occurring during the 14 years the overall crude MR for children aged 5-14 was estimated to be 1.82 deaths per 1,000 person-years. Whereas the mortality rate was relatively stable over the years, there was a considerable increase in 2007 where 23.89 deaths per 1.000 person-years were recorded (Figure 4.10).

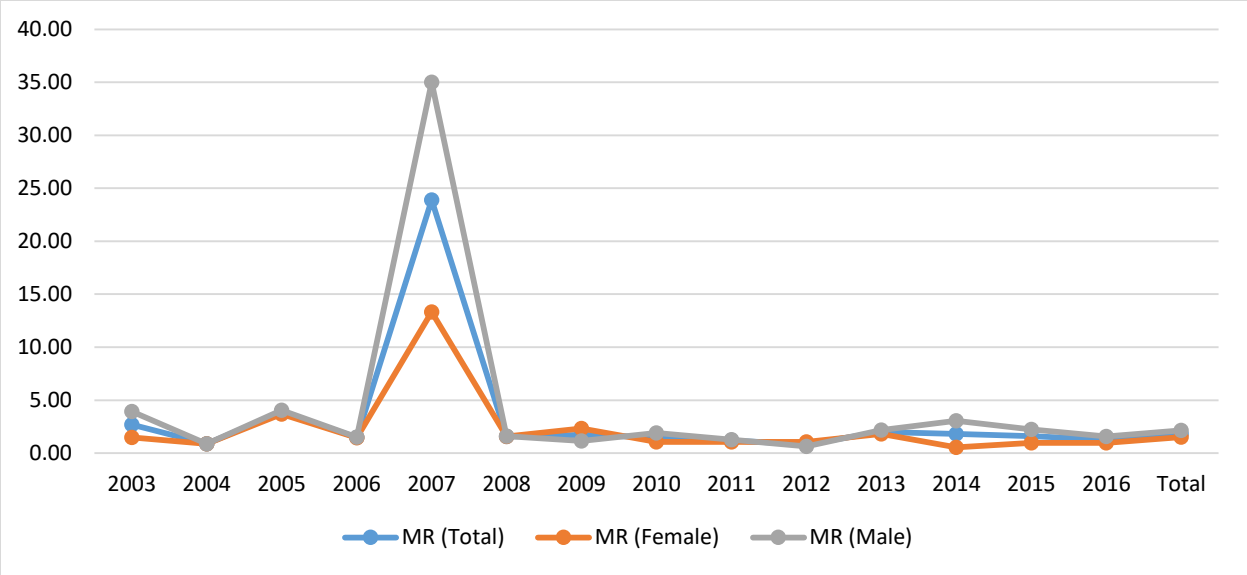

Figure 4.10: Mortality rate for children aged 5-14, 01 January 2003 to December 2016

In addition, as indicated in Figure 4.10, male children aged 5-14 had a higher mortality rate of 2.13 deaths per 1,000 person-years compared to that of female children at 1.51 deaths per 1,000 person-years.

4.6.1 Age-specific mortality rate

Here the age-specific mortality rate for children aged 5-9 and 10-14 was calculated. Children aged 5-9 years had a slightly higher mortality rate (1.85 deaths per 1,000 person-years) compared to children aged 10-14 years (1.76 deaths per 1,000 person-years). Further analysis indicated that disparities within specific ages with higher mortality rates at age 5 (3.46), 10 (2.91) and 13 (2.24) as indicated in Figure 4.11.

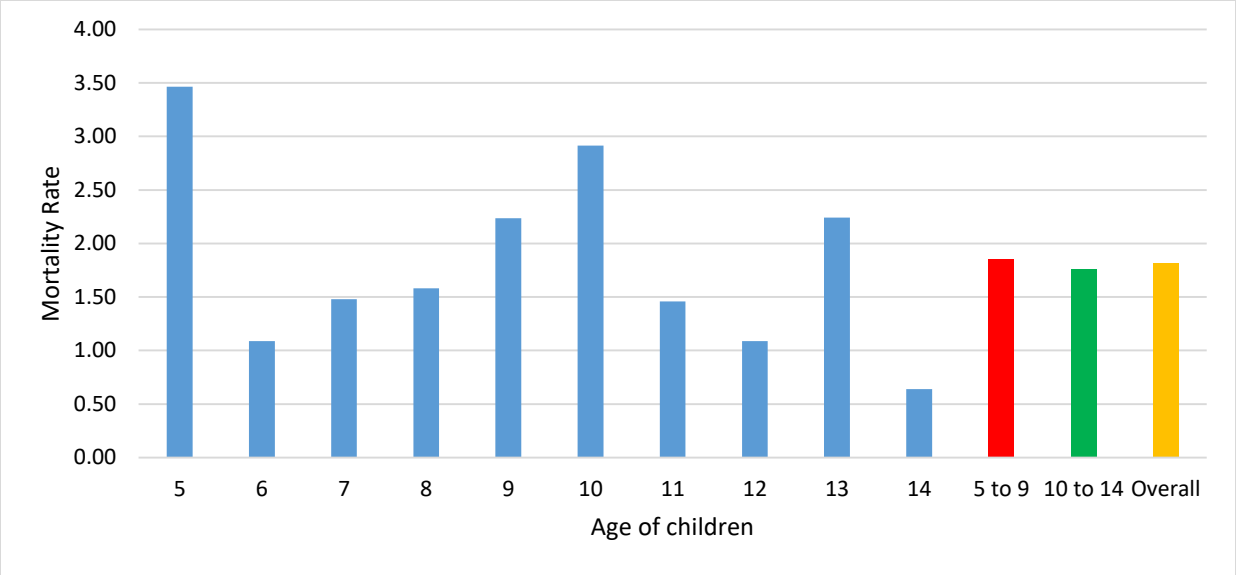

Figure 4.11: Age-specific mortality rates per 1,000 person-years, 01 January to 31 December 2016

5 CHAPTER FIVE: DISCUSSION

This study sought to understand the trends in causes of death for children aged 5-14 in Nairobi's informal settlements from 2003 to 2016 to provide evidence that can be used to inform the decisions taken in planning for the health of this marginalized population. Overall the study found out that the three leading causes of death for children aged 5-14 were injuries (15%), respiratory tract infections (10%) and HIV/AIDS (10%).

The fact that the leading causes of death arise from preventable and communicable diseases, could be an indication of the poor access and health-seeking behavior where individuals seek medical assistance when it is too late or cannot access health services due to low income (Osano et al., 2017). This is especially so for urban informal settlements that are disadvantaged by the growing urban poverty which predisposes them to higher rates of morbidity and mortality compared to privileged urban areas and even rural areas (Fotso, 2007; Gould, 1998). A study by Kimani, Ettarh, Kyobutungi, Mberu, and Muindi (2012) found that only 10% of residents in Korogocho and Viwandani were participating in the National Health Insurance Fund program and less than 1% had private insurance, underscoring the inequitable access to health care among the poor and marginalized populations.

The results also showed sex variations, with injuries being the main cause of death for male children compared to meningitis in female children. There were three times as many deaths related to injuries among male compared to female children. This was consistent with other studies on mortality for adults and young people in both urban and rural settings (Mberu et al., 2015; Osano et al., 2017; Phillips-Howard et al., 2012). Injuries associated with road traffic accidents could be

explained by motorcycle accidents which have become a key issue in many developing countries (Phillipo L. Chalya et al., 2013; Phillipo L Chalya et al., 2010; Ndwiga, Mbakaya, & Kiiyukia, 2019)

Respiratory tract infections (RTIs) as a leading cause of death among children was an interesting finding considering that a similar study on the causes of adult mortality found that RTI related deaths were more prominent in adults who were 50 years and above (Mberu et al., 2015). The same study also found that since 2005, deaths arising from respiratory tract infections have been increasing, suggesting the need for public health interventions. The increase in RTIs could be explained by the exposure to air pollution which is extensive in the two study sites. A study by Egondi, Muindi, Kyobutungi, Gatari, and Rocklöv (2016) found that residents in the two study sites were continuously being exposed to exceedingly high levels of hazardous air pollution which result in high burdens of morbidity and mortality. A qualitative study also highlighted that the major pollutants in these study sites were reported to be industries and burning of garbage at the dumpsite (Muindi, Egondi, Kimani-Murage, Rocklov, & Ng, 2014).

Deaths related to RTIs were also found to be high among female children in the two study sites. The high incidence of RTI related deaths could also be linked to the high incidence of meningitis among female children. A study in Bukina Faso found a strong association between RTIs and meningitis and therefore suggesting RTIs as co-factors for the occurrence of meningitis (Mueller et al., 2017).

HIV/AIDS was featured as a leading cause of death for both male and female children with little sex variation, unlike in adults where some studies found twice as many deaths among females than males (Mberu et al., 2015). These results could be explained by high rates of mother-to-child transmission coupled with the fact that the majority of children who contract HIV through this MTCT tend to seek treatment later in life and their health status has worsened (Bakanda et al., 2011; Evans et al., 2013). Also, the stigma related to HIV may result in low testing and consequently poor knowledge regarding transmission, prevention, care and treatment (Tenkorang & Maticka-Tyndale, 2013).

The contribution of tuberculosis as a primary cause of death may be explained by the high incidences of HIV/AIDS related deaths due to limited access to antiretroviral therapy (ART) and other health-care services for marginalized populations such as those in the slums (CDC, 2010; Shah, 2010). In another study by CDC (2008), HIV prevalence was found to be about 90% among tuberculosis patients in some parts of sub-Saharan Africa.

6 CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This study sought to investigate the mortality causes and trends among children aged 5-14 living in the Nairobi Urban Health and Demographic Surveillance System. This section covers a summary of the research findings, the conclusion and recommendations for policy and further research.

6.2 Summary of findings

A total of 178 mortality cases for children aged 5-14 were reported during this period, with verbal autopsy interviews for 157 (88%) cases completed. The InterVA successfully assigned the cause of death for 145 (92%) cases. The three main causes of death for children aged 5-14 were injuries (19%), respiratory tract infections (10%) and HIV/AIDS (10%). Deaths caused by communicable diseases contributed to the largest proportion of deaths (48%), followed by external causes (20%) and non-communicable diseases (13%). Furthermore, deaths related to communicable diseases had gradually reduced over time by 8 percentage points from 2003 to 2016. Road traffic accidents (50%) were the major contributor of injuries, followed by accidental drowning and submersion (23%) and accidental exposure to smoke, fire and flames (19%). In addition, 80% of the injury-related deaths were among male children. In terms of sex, the major causes of death among male children aged 5-14 were injuries, tuberculosis and HIV/AIDS at 20%, 10% and 9% respectively while among female children, the causes were meningitis (12%), respiratory tract infections (12%), HIV/AIDS (11%) and other non-communicable (11%). When results were categorized by age group, the major causes of death among male children aged 5-14 were injuries, tuberculosis and HIV/AIDS at 20%, 10% and 9% respectively while among female children, the causes are meningitis (12%), respiratory tract infections (12%), HIV/AIDS (11%) and other non-

communicable (11%). During the 14-year study period, the mortality rate for children aged 5-14 was estimated to be 1.82 deaths per 1,000 person-years. Although the mortality rate was relatively stable over the years, there was a considerable increase in 2007 where 23.89 deaths per 1,000 person-years were recorded.

6.3 Conclusion

Although there is a tendency for many studies on mortality to focus on children under-5 and adults aged 15 years and above, this study underlines the need to also invest resources in exploring the causes of mortality for children aged 5-14. Although the few mortality cases for this age group compared to other age groups are the main reason for the disinterest, this study points out that the data limitation in capturing the causes of death could explain the few numbers. If ignored, the few numbers may mask the magnitude and need for interventions to avert mortality for this age group.

Further, the study showed that were considerable reductions in deaths across board from 2003-2016, deaths related to communicable diseases (especially HIV, RTIs, tuberculosis and meningitis) still remain significant. However, injuries and especially from road traffic accidents and accidental drowning and submersion also feature as key causes of death for children aged 5-14 years in urban informal settlements.

6.4 Study recommendations

The following are policy and research recommendations informed by study findings.

6.4.1 Policy recommendations

With the study indicating that children aged 5-14 are dying from closely associated diseases such as HIV and tuberculosis or RTIs and meningitis, there is need for integrated interventions for more effectiveness in reducing the mortality cases. Fior instance, evidence from randomized clinical

trials shows that early interventions of antiretroviral therapy (ART) improves the survival of HIV-infected patients with TB (Manosuthi, Wiboonchutikul, & Sungkanuparph, 2016).

The sex variations highlighted by the study also call for targeted interventions to prevent specific causes of death that affect either of the sexes more. For instance, public health interventions can focus on male deaths caused by injuries and especially by road traffic accidents.

Moreover, the study highlights that more effort is required to to not only reduce mortality among children aged 5-14, but also ensure that they benefit from health policies and interventions as much children under fives years.

The study also underscores the need for coordinated efforts by various stakeholders to effectively avert some of the leading causes of death among children aged 5-14. For instance, the Ministry of Health and the Ministry of Environment, Water and Natural Resources can work together to control pollution in the study areas which may be responsible for deaths related to RTIs.

6.4.2 Further research

There is a need for more research to better understand why meningitis is more prevalent in female children compared to male children aged 5-14 and the association of the disease with RTIs in the NUHDSS.

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Appendix A: Ethical Approval for the NUHDSS protocol

KENYA MEDICAL RESEARCH INSTITUTI

P.O. Box 54840-00200, NAIROBI, Kenya
Tel:(254) (020) 2722541, 2713349, 0722-205901, 0733-400003, Fax: (254) (020) 2720030
E-mail: director@kemri.org, info@kemri.org, Website.www.kemri.org

KEMRI/RES/7/3/1 February 8, 2019

TO: **CLAUDIOUS CHIKOZHO, (PRINCIPAL INVESTIGATOR)**
THE DIRECTOR OF RESEARCH, APHRC,
NAIROBI.

Dear Sir,

RE: **NON-SSC 271 A *(RESUBMISSION -REQUEST FOR ANNUAL RENEWAL AND PROTOCOL DEVIATION)*: NAIROBI URBAN HEALTH AND DEMOGRAPHIC SURVEILLANCE SYSTEMS(NUHDSS)**

Reference is made to your letter dated February 5, 2019. The KEMRI Scientific and Ethics Review Unit secretariat acknowledges receipt of the revised application on February 06, 2019.

Thank you for the continuing review report for the periods:

1. **1st January 2011 to 31st December 2011.**
2. **1st January 2012 to 31st December 2012.**
3. **1st January 2013 to 31st December 2013.**
4. **1st January 2014 to 31st December 2014.**
5. **1st January 2015 to 31st December 2015.**
6. **1st January 2016 to 31st December 2016.**
7. **1st January 2017 to 31st December 2017.**
8. **1st January 2018 to 13th December 2018.**

This is to inform you that the Committee determined that the issues raised by the expedited review team of KEMRI Scientific and Ethics Review Unit (SERU) in the letter dated **January 7, 2019** are adequately addressed.

Consequently, the study is granted approval for implementation effective this day, **February 08, 2019** for a period of **one (1) year**. Please note that authorization to conduct this study will automatically expire on **February 7, 2020**. If you plan to continue with data collection or analysis beyond this date, please submit an application for continuation approval to SERU by **December 27, 2019**.

You are required to submit any proposed changes to this study to SERU for review and the changes should not be initiated until written approval from SERU is received. Please note that any unanticipated problems resulting from the implementation of this study should be brought to the attention of SERU and you should advise SERU when the study is completed or discontinued.

You may continue with the study.

Yours faithfully,

ENOCK KEBENEI
THE ACTING HEAD
KEMRI SCIENTIFIC AND ETHICS REVIEW UNIT

Appendix B: NUHDSS consent form

African Population and Health Research Center

AFRICAN POPULATION AND HEALTH RESEARCH CENTER

NAIROBI URBAN HEALTH AND DEMOGRAPHIC SURVEILLANCE SYSTEM (NUHDSS) PROJECT

Informed Consent Procedures in Kiswahili

Maelezo na Madhumuni ya Utafiti: Shirika la African Population and Health Research Centre (APHRC) linafanya utafiti unaoniiwa kuchukua muda mrefu katika mitaa-banda Nairobi ili kuelewa vile umaskini katika sehemu za mjini huadhiri na huadhiriwa na hali ya afya ya watu. Shabaha ya utafiti huu ni kuweza kukusanya na kuchanganua maoni ili kutoa elimu/habari juu ya vile haya mambo huadhiriana. Hizi habari zitapewa wanaounda sera ambao huenda wakaanzisha miradi ifaayo ambayo inakusudiwa kuinua hali ya maisha ya wakaazi wa jamii hii na wakaazi wengine wa jamii zingine kama hii. Matokeo ya utafiti huu yatajadiliwa na washikadau mbali mbali kama vile jamii hii, serikali na vitengo vyak na shirika zingine.

Mpangilio wa Utafiti: Utafiti huu unafanywa katika baadhi ya vijiji viliomo kwenye mitaa-banda ya Korogocho na Viwandani, ambako tumekuwa tukifanya utafiti unaohusisha kutembelea jamii mara kwa mara tangu mwaka wa 2002. Kila nyumba katika jamii hizi mbili ambapo tunafanya huu utafiti itatembelewa kila baada ya miezi sita na majadiliano kufanywa na wakaazi ambao wamekubali kushiriki katika huu utafiti. Kama mkaazi ni wa umri wa chini ya miaka kumi na nane au hayuko wakati wanaokusanya habari/maoni wanapowatembelea, tutapata habari hizi kutoka kwa mzazi/mlezi au jamaa zake ambao ni watu wazima. Wakusanya habari/maoni watatembelea kila nyumba katika hizi jamii kila miezi minne ili kuangazia kama kila mmoja wa watu wa familia tutakazo andikisha bado yuaishi katika nyumba ambako tulimuandikisha au amehama. Ujumbe tukusanyao huwa unaambatana na kama jamaa bado wapo katika nyumba tulipowaandikisha mara ya kwanza au wamehama au kuna jamaa wageni ambao huenda walikuja katika hii jamii baada ya wakusanya habari/maoni walikuwa washapitia awali. Kwa vipindi fulani sana sana baada ya miaka miwili tutakusanya habari kuhusu bidhaa wakaazi wa hizi jamii walizonazo za nyumbani na pia kuwepo kwa huduma na pia habari kuhusu harakati wafanyao wakaazi wa hizi jamii ili kujikimu kimapato.

Adhari na Manufaa: Kwa kushiriki katika utafiti huu, wewe hutapewa pesa au bidhaa zozote. Pia hutagharimika kifedha au kwa njia yoyote. Vile vile, hakutakuwa na faida yoyote ya moja kwa moja kwako wewe wala kwa jamii/familia yako bali wakaazi wa eneo hili wanatarajiwa kufaidika kutokana na matokeo ya utafiti huu ambao utafahamisha serikali na wanaounda sera kwa minajili ya kubuni miradi ya manufaa kwa eneo hili katika siku zijazo. Hakuna madhara yoyote utakayopata kutokana na utafiti huu ingawa huenda maswali na majadiliano ya utafiti yatachukua kati ya robo saa na nusu saa zako. Muda wa haya majaadiliano utategemea ni habari gani tutakuwa tunakusanya kutoka kwa familia yako

African Population and Health Research Center

Haki za Washiriki: Kuhusika kwako katika utafiti huu ni kwa hiari yako na wala hutaadhirika au kudhulumiwa kwa vyovyote vile. Hata baada ya kukubali kushiriki katika utafiti huu, waweza kujiondoa wakati wowote unapoona huwezi kuendelea.

Kuweka habari siri: Tutafanya kila juhudi kuweka kama siri utambulisho wako na habari zote ambazo utatupa. Maafisa watakao watembelea kukusanya habari katika utafiti huu hawatatoa habari zozote unazotupa kwa mtu mwingine yeyote ila kwa maafisa husika pekee wa APHRC. Wewe hutatambulishwa kwa vyovyote vile katika matokeo wala ripoti zitakazochapishwa kuhusu utafiti huu. Wakati wa mahojiano, tutafanya kila jitihada kuhakikisha kuwa mazungumzo baina yetu yanafanyika faraghani na pia katika wakati unaofaa kusudi kusiwe na uwezekano wa watu wengine kuweza kuyasikia mazungumzo hayo. Ukionelea usiri wa majadiliano yetu umevunjwa kwa kuwepo kwa watu wengine, uko huru kuahirisha majadiliano hadi wakati utakaoonelea unafaa au kuenda katika sehemu/chumba kingine ambako hakuna yeyote atakayeyasikia majadiliano yetu.

Mawasiliano: Kama una maswali au mashaka yoyote hivi sasa ama katika siku zijazo kuhusu utafiti huu ama uhuru wako wa kushiriki katika huu utafiti, waweza kuwauliza maafisa wowote wanaohusika na utafiti huu hapa. Pia waweza wasiliana na Dr. Claudious Chikozho, Mkurugenzi wa Utafiti, APHRC Sanduku la Posta 10787-00100 Nairobi au umpigie simu kwa nambari +254-20-400-1000. Pia waweza wasiliana na Mwenyekiti, Scientific and Ethics Review Unit, KEMRI, Sanduku la Posta 54840-00200 Nairobi au umpigie simu kwa nambari +254-717-719-477.

Sasa ningependa kujua kama ungependa kuhusika/kuhojiwa katika utafiti huu. Yes/No

Ridhaa au thibitisho ya kushiriki katika utafiti huu

Nimeelezwa kwa kina habari iliyonakiliwa hapo juu. Pia nimepewa nafasi ya kuuliza maswali yote niliyokuwa nayo, na maswali yakajibiwa na nikaridhika. Hivyo basi ninatoa kibali changu cha kushirika katika utafiti huu

Jina la mhusika	
Sahihi/Alama ya kidole cha mhusika aliye na umri wa mtu mzima.	
DD/MM/YYYY	

KAMA HAOONI, NI MLEMAVU, HAYUKO SAWA KIAKILI AU HAJUI KUSOMA NA KUANDIKA

Nimeshuhudia kusomwa sahihi kwa fomu ya idhini ya mshiriki, na amekuwa na nafasi ya kuuliza maswali. Mimi nathibitisha kwamba ametoa ridhaa kwa uhuru.

African Population and Health Research Center

Jina la shahidi	
Sahihi/Alama ya kidole cha shahidi	
DD/MM/YYYY	

Thibitisho kutoka kwa mtafiti/anayechukua kibali

Nimetoa habari kwa ukamilifu kwa mhusika mtarajiwa, kulingana na uwezo wangu, na nimehakikisha kwamba mhusika ameelewa mambo yafuatayo:

1. Mhusika ataalikwa kuhusika katika mahojiano yatakayotumia net book(kompyuta kibao).
2. Kuhusika katika utafiti huu ni kwa hiari ya mhusika na wahusika wana uwezo wa kukataa kuhusika au kujiondoa katika mahojiano haya kwa wakati wowote.
3. Kuhusika katika utafiti huu ni kwa hiari ya mhusika na wahusika wana uwezo wa kukataa kuhusika au kujiondoa katika mahojiano haya kwa wakati wowote.
4. Mahojiano haya yatachukua muda usiozidi dakika sitini.
5. Habari zitakazotolewa zitawekwa kwa siri.

Ninakiri kwamba mhusika mtarajiwa amepewa nafasi ya kuuliza maswali aliyokuwa nayo kuhusu utafiti huu, na maswali yote yakajibiwa vyema na kulingana na uwezo wangu. Ninatoa hakikisho kwamba mhusika hajashurutishwa kutoa kibali cha kuhusika katika utafiti huu, na kibali cha mzazi kimetolewa kwa hiari yake,na ridhaa amepewa kwa uhuru na kwa hiari.
Nakala ya Fomu hii ya Ridhaa imepewa mshiriki.

Jina la mtafiti/anayechukua kibali	[
Sahihi ya mtafiti/anayechukua kibali	
DD/MM/YYYY	

MSHIRIKI AMEKUBALI KUHOJIWA 1
MSHIRIKI HAJAKUBALI KUHOJIWA. 2
MWISHO

Appendix C: NUHDSS Verbal Autopsy Questionnaire for 5 years and above

AFRICAN POPULATION AND HEALTH RESEARCH CENTER (APHRC)
NAIROBI URBAN HEALTH AND DEMOGRAPHIC SURVEILLANCE SYSTEM (NUHDSS)
VERBAL AUTOPSY FORM FOR PEOPLE 5 YEARS AND OLDER

A. BACKGROUND

GET AND CONFIRM RESPONSES FOR A.4 TO A.10 FROM DEATH REGISTRATION FORM

A.1. START TIME [ ][ ][ ][ ]

A.2. FIELD WORKER'S CODE [ ][ ][ ][ ]

A.3. DATE OF INTERVIEW [ ][ ][ ][ ][ ][ ][ ][ ]

A.4. NAME OF DECEASED PERSON .....

A.5. ID OF THE DECEASED PERSON [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

A.6. HOUSEHOLD ID [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

A.7. DATE OF BIRTH OF THE DECEASED PERSON [ ][ ][ ][ ][ ][ ][ ][ ]

A.8. DATE OF DEATH [ ][ ][ ][ ][ ][ ][ ][ ]

A.9. SEX OF THE DECEASED PERSON (F=Female; M=Male) [ ]

A.10. ID OF ROOM WHERE (NAME) USED TO SLEEP [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

A.11 COMPUTE AGE IN YEARS (CHECK A.7 & A.8) [ ][ ][ ]

B. RESPONDENT PARTICULARS

B.1. What is your **full** name?.....

B.2. DOES RESPONDENT STAY IN THIS HOUSEHOLD? (1= YES; 2=NO) **[IF 2 SKIP TO B.4]** [ ]

B.3. RESPONDENT'S LINE NUMBER IN HOUSEHOLD LISTING **[SKIP TO B.5]** [ ][ ]

B.4. RECORD ID OF ROOM WHERE RESPONDENT SLEEPS [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.5. What is your relationship to (NAME OF DECEASED)? **(CODE SHEET A[2])** [ ][ ][ ]

B.6. Were you taking care of (NAME) at the time of his/her illness or death?
(0=N0; 1=YES, THROUGHOUT ILLNESS DURATION;
2=YES, FOR PART OF THE ILLNESS DURATION) [ ]

C. RESULT OF INTERVIEW **(CODE SHEET A[7])** ..... [ ]

SECTION 1: OPEN HISTORY

1.1. Please tell me the area or town where (NAME) died.

P)..... D).....L)...../V/E).....

RECORD THE CODE FOR AREA/TOWN WHERE DEATH OCCURRED (CODE SHEET A[5]) ☐

1.2. Did (NAME) die in a house, health facility, en route to health facility or elsewhere? (HS=HOUSE; HF=HEALTH FACILITY; RT=EN ROUTE TO HEALTH FACILITY; OT=ELSEWHERE, SPECIFY ☐☐

1.3. Please, tell me about the circumstances that surrounded the death of (NAME)

PROBE FOR MORE DETAILS: WAS THERE ANYTHING ELSE?

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1.4	**FOR EACH OF THE SYMPTOMS/CONDITIONS LISTED BELOW, CIRCLE THE CORRESPONDING LETTERS ON THE RIGHT IF MENTIONED IN Q. 1.3, OTHERWISE LEAVE IT UNCIRCLED. DO NOT READ OUT WHAT IS CONTAINED IN THIS LIST.**	
	a. Accident	a.
	b. HIV/AIDS	b.
	c. Born Premature	c.
	d. Cholera	d.
	e. Coma	e.
	f. Complicated Delivery	f.
	g. Cough	g.
	h. Diarrhoea	h.
	i. Difficult Breathing	i.
	j. Dysentry	j.
	k. Fever	k.
	l. Fit/Convulsion	l.
	m. Injury	m.
	n. Jaundice	n.
	o. Kwashiorkor	o.
	p. Malaria	p.
	q. Malformation	q.
	r. Marasmus	r.
	s. Measles	s.
	t. Meningitis	t.
	u. Multiple Birth	u.
	v. Pneumonia	v.
	w. Rapid Breathing	w.
	x. Rash	x.
	y. Stiff Neck	y.
	z. Tetanus	z.
	aa. Tuberculosis (TB)	aa.
	ab. Typhoid	ab.
	ac. Very small at birth	ac.
	ad. Very thin	ad.
	ae. Vomiting	ae.
	af. Others (specify)	af.
1.5a	Did (NAME) have an illness around the time he/she died? (1=YES; 2=NO; 8=DON'T KNOW)	☐
1.5b	Did (NAME) have an injury around the time he/she died? (1=YES; 2=NO; 8=DON'T KNOW)	☐
1.6	For how long was (NAME) ill/injured before he/she died? RECORD D=DAYS; M=MONTHS; Y=YEARS ; N= NO DURATION GIVEN 97=REFUSAL; 98=DON'T KNOW	☐ ☐☐

1.7. Was health care sought while (NAME) was sick/injured? (1=YES; 2=NO; 8=DON'T KNOW) ☐

[IF THE ANSWER IS 2 OR 8, SKIP AND READ INSTRUCTION JUST BEFORE Q. 1.10]

1.8. Where was care sought? (CIRCLE ONLY THOSE METIONED)

a	Government Hospital	a.
b	Private not for profit Hospital (e.g. Missionary or muslim founded charity hospitals_)	b
c	Private for profit Hospital	c
d	Government health center/dispensary/clinic(including city council clinics)	d
e	Private health center/Clinic Not for Profit	e
f	Private health center/Clinic- For profit	f.
g	Traditional healer	g
h	Religious healer	h.
i	Pharmacy/Drug seller/Store/Market	i
j	Other (specify)	j

1.9 If care was sought from more than one source, which of them was the first? ☐☐☐

(INDICATE SOURCE USING Q.1.8 AND LETTER ABOVE E.g 1.8f, 1.8d e.t.c)

[CHECK Q. 1.5a. IF ANSWER IS 2 OR 8, SKIP TO INSTRUCTION JUST BEFORE Q. 1.11]

1.10 What illness do you think (NAME) had/died of? **[CIRCLE THOSE MENTIONED AND PROBE i.e. "ANY OTHER"?]**

a.	HIV/AIDS	a.
b.	Cholera	b.
c.	Dysentry	c.
d.	Diarhoea	d.
e.	Kwashiokor	e.
f.	Malaria	f.
g.	Marasmus	g.
h.	Measles	h.
i.	Pneumonia	i.
j.	Tetanus	j.
k.	Typhoid	k.
l.	Tuberculosis (TB)	l.
m	Other (specify)	m

CHECK Q. 1.5b. [IF ANSWER IS 2 OR 8, SKIP TO Q. 1.12]

1.11. What caused the injury?

CIRCLE THOSE MENTIONED AND PROBE "ANY OTHER". DO NOT READ OUT

a.	Vehicle accident	a.
b.	Fall	b.
c.	Drowning	c.
d.	Poisoning	d.
e.	Alcohol/Drug overdose	e.
f.	Shooting	f.
g.	Bite or sting by venomous animals	g.
h.	Burn (scald/flame)	h.
i.	Strangulation	i.
j	Cuts/stab	j
k	Assault by blunt object	k
L	Other (specify).....	L

1.111 Was the cause of the injury accidental or intentional?

1=Accidental; 2=Intentional; 3=Don't know ☐

1.12. What was the most immediate cause of death (in Q.1.10 or Q1.11)?

RECORD THE QUESTION NUMBER AND LETTER FOR THE IMMEDIATE CAUSE (e.g., 110g or 111g) ☐☐☐☐

1.13. How long did (NAME) survive the immediate cause above (Q1.11) before death? (1=LESS THAN 24 HRS; 2=1 DAY OR MORE; 8=DON'T KNOW) ☐

[CHECK: IF THE ANSWER IN 1.5b IS 1 AND ANSWER IN 1.5a IS EITHER 2 OR 8, SKIP TO SECTION 4]

SECTION 2: ALL DEATHS

2.1. Did (NAME) have any of the following before he/she died? (1=YES; 2=NO; 8=DON'T KNOW)

a. Hypertension ☐
b. Diabetes ☐
c. Epilepsy ☐
d. Tuberculosis (TB) ☐
e. HIV/AIDS ☐
f. Heart disease ☐
g. Kidney disease ☐
h. Other (specify)..... ☐

2.2. Did (NAME) have fever? (1=YES; 2=NO; 8=DON'T KNOW) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.3]

a. How many days did the fever last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐
b. Was the fever 1=Severe; 2=Mild; 8=Don't know? ☐
c. Was the fever 1=Continuous; 2=On & off; 8=Don't know? ☐
d. Did (NAME) experience backpain and myalgia (muscle pain)? (N/Y/D) ☐

2.3. Did (NAME) have a rash? (1=YES; 2=NO; 8=DON'T KNOW) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.4]

a. How many days did the rash last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐
b What did the rash look like? (1=MEASLES RASH; 2=RASH WITH CLEAR FLUID; 3=RASH WITH PUS; 4=OTHER (SPECIFY).....8=DON'T KNOW ☐
c. Where was the rash located? (1=ON FACE; 2=ON BODY TRUNK; 3=ON THE MOUTH; 4=OTHER(specify): ..... 8=DON'T KNOW) ☐
d. Was the rash painful? (1=YES; 2=NO; 8=DON'T KNOW) ☐
e. Did he/she have sore eyes? (1=YES; 2=NO; 8=DON'T KNOW) ☐

2.4. Had (NAME) lost weight before death? (1=Y; 2=N; 8=D) **[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.6]** ☐

2.5. Was the weight loss **1**=Severe; **2**=Moderate; **8**=Don't know)? ☐

2.6. Did (NAME) have swelling in any part of the body? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.7]

a. Did he/she have swelling around ankle? (1=Y; 2=N; 8=D) ☐
b. Did he/she have puffiness of the face? (1=Y; 2=N; 8=D) ☐
c. Did he/she have swelling in the armpit? (1=Y; 2=N; 8=D) ☐
d Did he/she have swelling in the groin ? (1=Y; 2=N; 8=D) ☐
e Did he/she have other swelling? (1=Y; 2=N; 8=D), (Specify).....] ☐

2.7. Did (NAME) have dark colored urine (like coca-cola)? (1=Y; 2=N; 8=D) ☐

2.8. Did (NAME) look pale (anaemic)? (1=Y; 2=N; 8=D) ☐

2.9. Did (NAME) have yellow eyes? (1=Y; 2=N; 8=D) ☐

2.10. Did (NAME) have cough? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.11]

a. How many days did the cough last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

b. Was the cough productive (sputum)? (1=Y; 2=N; 8=D) ☐

c. Did (NAME) cough blood? (1=Y; 2=N; 8=D) ☐

2.11. Did (NAME) have shortness of breath? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.13]

2.12. How many days did the breathlessness last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

2.13. Did (NAME) have chest pain ? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.14]

a. Where was the pain? (1=UPPER LEFT; 2=LOWER LEFT; 3=UPPER RIGHT; 4=LOWER RIGHT; 5=CENTER; 6 =WHOLE CHEST; 8=DON'T KNOW) ☐

b. Was the pain 1=Continous; 2=On and off; 8=Don't know? ☐

2.14. Did (NAME) have diarrhoea? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.15]

a. How many days did the diarrhoea last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

b Was the diarrhoea 1=CONTINOUS; 2=ON & OFF; 8=DON'T KNOW? ☐

c On the average, how many times did he/she pass stool a day? (98=DON'T KNOW) ☐☐

d Did (NAME) pass blood in the stool? (1=Y; 2=N; 8=D) ☐

2.15. Did (NAME) have vomiting? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.16]

a. How many days did the vomiting last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

b. Was the vomiting 1=Continuous; 2=On & off; 8=Don't know? ☐

c. How many times did he/she vomit a day? (8=DON'T KNOW) ☐

d. What did the vomitus look like? (1=WATERLY FLUID; 2=YELLOW FLUID; 3=COFFEE COLORED FLUID; 4=BLOODY; 5=FOOD PARTICLES; 6=OTHER(specify).....8=DON'T KNOW ☐

2.16. Did (NAME) have abdominal pain? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8", SKIP TO Q. 2.17]

a. What was the type of pain? (1=CRAMP; 2=DULL ACHE; 3=BURNING PAIN; 4=OTHER..... 8=DON'T KNOW) ☐

b. Was the pain 1=Continuous; 2=On & off; 8=Don't know? ☐

c. How many days did the pain last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

d. Where exactly was the pain? (1=LOWER ABDOMEN; 2=UPPER ABDOMEN; 3=ALL OVER ABDOMEN; 4=OTHER(specify): .....; 8=DON'T KNOW) ☐

e. Was the abdominal pain 1=Relieved by meal; 2=Increased by meal; 3=Did not change with meal; 8=No idea if related to meal intake)? ☐

2.17. Did (NAME) have distension of abdomen? (N/Y/D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.18]

a. Was the distension of the abdomen painful? (1=Y; 2=N; 8=D) ☐

b. What was the type of pain? (1=CRAMP; 2=DULL ACHE; 3=BURNING PAIN; 4=OTHER..... 8=DON'T KNOW)

c. Did the distension develop 1=Rapidly; 2=Slowly over time; 8=Don't know? ☐

d. How many days did the distension of the abdomen last? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

2.18. Did (NAME) have any hard swelling in the abdomen? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.20]

2.19. Where exactly was the swelling? (1=RIGHT UPPER ABDOMEN; 2= LEFT UPPER ABDOMEN; 3=LOWER ABDOMEN; 4=OTHER (specify.....); 8=DON'T KNOW) ☐

2.20. Did (NAME) have difficulty in swallowing? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.22]

2.21. How many days did he/she have difficulty swallowing? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

2.22. Did (NAME) have headache? (1=Y; 2=N; 8=D) ☐

2.23. Did (NAME) have stiff neck?) (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.25]

2.24. For how many days did (NAME) have stiff neck? (21=21 AND MORE 98=DON'T KNOW) ☐☐

2.25. Did (NAME) experience uncounciousness? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.27]

2.26. Did the uncounciousness start 1=Suddenly; 2=Slowly over a few days; 8=Don't know? ☐

2.27. Did (NAME) have fits? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.28]

a. How many days did he/she have fits? (21=21 AND MORE 98=DON'T KNOW) ☐☐

b. When the fits were most frequent, how many fits per day did she/he have? (98=DON'T KNOW) ☐☐

c. Between fits, was he/she 1=Awake; 2=Unconscious; 8=Don't know? ☐

2.28. Did (NAME) have difficulty in opening the mouth? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.30]

2.29. For how long did (NAME) have difficulty opening his/her mouth? (21=21 AND MORE; 98=DON'T KNOW) ☐☐

2.30. Did (NAME) have stiffness in the whole body? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.31]

a. How many days did the body stiffness last? (21=21 AND MORE 98=DON'T KNOW) ☐☐

b. Did the stiffness develop 1=Rapidly; 2=Slowly over time; 8=Don't know? ☐

2.31. Did (NAME) have paralysis? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.32]

a. Where was the paralysis? (1=BOTH LEGS; 2=ONE LEG; 3=BOTH LEGS AND ARMS; 4=ONE LEG AND ONE ARM; 5=FAILED TO CONTROL URINE/FECES; 6= ONE ARM; 8=DON'T KNOW) ☐

b. How long did the paralysis last? (21=21 AND MORE 98=DON'T KNOW) ☐☐

2.32. Was there a change in the amount of urine just before death? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 2, SKIP TO Q. 2.33]

a. How much urine did the deceased pass per day? (1=TOO MUCH; 2=TOO LITTLE; 3=NO URINE AT ALL; 8=DON'T KNOW) **[IF ANSWER IS "3" SKIP TO Q. 2.32.C]** ☐

b. Was (NAME) passing urine, 1=More Frequently; 2=About Normal Frequency; 3=Less than normal frequency; 8=Don't know)? ☐

c. How long (in days) did the change in urine amount last? (21=21 AND MORE 98=DON'T KNOW) ☐☐

2.33. Did (NAME) stop passing stool before death? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.35]

2.34. How many days did the person stop passing stool before he/she died? (21=21 AND MORE 98=DON'T KNOW) ☐☐

2.35. Did (NAME) have any surgery/operation? (1=Y; 2=N; 8=D) **[IF ANSWER IS 2 OR 8, SKIP TO Q. 2.36]** ☐

a. How many days before (NAME'S) death did she/he have the surgery? (21=21 AND MORE 98=DON'T KNOW) ☐☐

b. Where did (NAME) have the surgery? (1=HOSPITAL; 2=HEALTH FACILITY WITHIN THE SLUM; 3=OTHER HEALTH CENTRE OUTSIDE THE SLUM; 4=HOME 6=OTHER.....; 8=DON'T KNOW) ☐

2.36. Did (NAME) ever complain of heart problem? (1=Y; 2=N; 8=D) ☐

a. Did (NAME) complain of tiredness during physical activity? (1=Y; 2=N; 8=D) ☐

b. Did (NAME) complain of tiredness while lying down? (1=Y; 2=N; 8=D) ☐

c. Was (NAME) waking up during the night due to shortness of breath? (1=Y; 2=N; 8=D) ☐

d. Did (NAME) ever complain of sudden rapid heart beats lasting for some minutes? (1=Y; 2=N; 8=D) ☐

2.37. Did (NAME) have any abnormal growth in any part of the body excluding the abdomen? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO SECTION 3]

2.38. Did the growth persist until the time of death? (1=Y; 2=N; 8=D) ☐

SECTION 3: PREGNANCY RELATED DEATHS

CHECK QUESTIONS A.9 & A.11:
IF DECEASED IS MALE, FEMALE (YOUNGER THAN 12 YEARS OR 50 YEARS AND ABOVE), PLEASE SKIP TO SECTION 4.

3.1. Was (NAME) pregnant at the time of her death? (1=Y; 2=N; 8=D) **[IF ANSWER IS 1, SKIP TO Q. 3.3]** ☐

3.2 Did she die within 6 weeks after end of the pregnancy ? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 1 SKIP TO INSTRUCTIONS BEFORE Q. 3.23; OTHERWISE SKIP TO SECTION 4]

3.3 How many months was she pregnant? ☐☐

PROBE TO MAKE AN ESTIMATE **[IF PREGNANCY WAS MORE THAN 5 MONTHS (20 WEEKS), SKIP TO Q. 3.11]**

DEATH BEFORE 20 WEEKS (5 MONTHS) OF PREGNANCY

3.4 Was the pregnancy diagnosed or visible? (1=Y; 2=N; 8=D) ☐

3.5 Was there any interference with the pregnancy (may be to terminate it)? (1=Y; 2=N; 8=D) ☐

3.6 Did she have vaginal bleeding? (1=Y; 2=N; 8=D) ☐

3.7 a. Did (NAME) have a high-grade fever? (1=Y; 2=N; 8=D) **[IF ANSWER IS "N" OR "D", SKIP TO Q. 3.8]** ☐

b. Was the fever, **1**=Continuous; **2**=On & off; **8**=Don't know? ☐

3.8 Did she have vaginal discharge with bad smell? (1=Y; 2=N; 8=D) ☐

3.9 Did she have lower abdominal pain? (1=Y; 2=N; 8=D) ☐

3.10 In your opinion, was this pregnancy a timely/wanted one? (1=Y; 2=N; 8=D) ☐

[SKIP TO SECTION 4]

DEATH AFTER 20 WEEKS (5 MONTHS) OF PREGNANCY

3.11. Did (NAME) have increased blood pressure (if measured only)? (1=Y; 2=N; 8=D) ☐

3.12. Did she complain of body swelling (legs, fingers, face, etc) which started during pregnancy? (1=Y; 2=N; 8=D) ☐

3.13. Did she complain of visual problems? (1=Y; 2=N; 8=D) ☐

3.14. Did she have any convulsions (non-epileptic fits not seen before pregnancy) within 1 week of her death? (1/2/8) ☐

3.15. Was she diagnosed with malaria before her death? (1=Y; 2=N; 8=D) ☐

3.16. Was she diagnosed to have anemia? (1=Y; 2=N; 8=D) ☐

3.17. Did she have a recurrent painful vaginal bleeding while pregnant that continued until time of death (1=Y; 2=N; 8=D) ☐

3.18. Was there a history of caesarian section during previous pregnancies? (1=Y; 2=N; 8=D) ☐

3.19. Did she have labor pains before she died? (1=Y; 2=N; 8=D) ☐

[IF ANSWER IS 2 OR 8, SKIP TO Q. 3.21]

3.20. Was the labor prolonged (>24 hours in women delivering for the first time and >8-10 hours in repeat pregnancies)? (1=Y; 2=N; 8=D) ☐

3.21. Did she die before the baby was delivered? (1=Y; 2=N; 8=D) ☐

3.22. Did she have any previous complicated delivery? (1=Y; 2=N; 8=D) ☐

[SKIP TO SECTION 4]

DEATH WITHIN 42 DAYS (6 WEEKS) AFTER DELIVERY/PREGNANCY ENDING

3.23. What was the outcome of the pregnancy? (LBR=Livebirth; STB=Stillbirth; MIS=Miscarriage; ABT=Abortion) ☐☐☐

3.24. How many days/weeks before her death did the delivery occur/pregnancy end?
RECORD D=DAYS, W=WEEKS IN 1st BOX AND DURATION IN LAST 2 BOXES ☐☐☐

3.25. Where did the delivery occur/pregnancy end? (1=Hospital; 2=Health facility within the slum; 3=Other health facility outside slum; 4=Home; 5=Other……; 8=Don't know) ☐

CHECK Q. 3.23. [IF ANSWER IS "MIS" OR "ABT", SKIP TO SECTION 4]

3.26. Was the labor prolonged (>24 hours in women delivering for the first time and >8-10 hours in repeat pregnancies)? (1=Y; 2=N; 8=D) ☐

3.27. What was the mode of delivery? (1=SPONTANEOUS NORMAL VAGINAL DELIVERY; 2=VACUUM/FORCEPS; 3=CEASAREAN SECTION; 8=DON'T KNOW) ☐

3.28. Did she bleed heavily after birth? (1=Y; 2=N; 8=D) ☐

CHECK QUESTION 3.27. [IF ANSWER IS 3, SKIP TO Q. 3.30]

3.29. Was the placenta delivered within 1 hr after childbirth (1=Y; 2=N; 8=D) ☐

3.30. Did she have high-grade fever after delivery? (1=Y; 2=N; 8=D) ☐

'3.31. Did the lochia change smell? (1=Y; 2=N; 8=D) ☐

3.32. Did the deceased have increased blood pressure (if measured only) (1=Y; 2=N; 8=D) ☐

3.33. Did she have any convulsions (body spasms that were not seen before pregnancy) within one week of her death? (1=Y; 2=N; 8=D) ☐

3.34. Did she have any previous complicated delivery? (1=Y; 2=N; 8=D) ☐

SECTION 4: TREATMENTS AND RECORDS

I would like to ask a few questions about any drugs that (NAME) may have received during the illness that led to his/her death

4.1. Did (NAME) receive any of the following drugs before his/her death:

a. Antibiotics? (1=Y; 2=N; 8=D) ☐

b. Antimalarials (e.g., Chloroquine, Fansidar, Quinine, Artemisinin, etc)? (1=Y; 2=N; 8=D) ☐

c. Painkillers/Fever reliever (e.g., Aspirin, Paracetamol, Ibuprofen, etc)? (1=Y; 2=N; 8=D) ☐

d. Others (specify) ..... ☐

4.2. Do you have any health records that belonged to (NAME)? (0=NO; 1=YES, SEEN; 2=YES, BUT NOT SEEN; 8=DON'T KNOW) ☐

[IF ANSWER IS "0", "2" OR "8", SKIP TO Q. 4.3]

	Date	Weight (KG)
a. Date and most recent Weight on health records	☐☐☐☐☐☐☐☐	☐☐☐
b. Date and 2nd most recent Weight on health records	☐☐☐☐☐☐☐☐	☐☐☐
c. Date of last entry on the medical record	☐☐☐☐☐☐☐☐	

d. Record what is written on the medical record

.....

.....

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4.3. Was a death certificate issued? (0=NO; 1=YES, SEEN; 2=YES, BUT NOT SEEN; 8=DON'T KNOW) ☐

[IF ANSWER IS "0", "2" OR "8", SKIP TO Q. 4.5]

4.4. Record the information below from the death certificate:

a. Immediate cause of death .....

b. Underlying cause of death .....

4.5 RECORD ANY GENERAL COMMENTS.....

.....

4.6. END TIME ☐☐☐☐

9 OFFICE/FIELD CHECK DETAILS

9.1 FIELD SUPERVISOR/TEAM LEADER CODE ☐☐☐☐

9.2 DATA ENTRY CLERK'S CODE ☐☐☐☐