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CAUSES OF DEATH OF CHILDREN UNDER FIVE YEARS IN THE UPPER MANYA KROBO DISTRICT USING VERBAL AUTOPSY IN THE EASTERN REGION- GHANA

BY

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DECLARATION

I, Rita Pul-ere Gbarinaa author of this project, do hereby declare that with the exception of references to the literature and works of other researchers which have been duly cited, the work in this project is the result of my original work. It is being submitted for the degree of Master of Public Health in the University of Ghana.

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Rita Pul-ere Gbarinaa (Student) Date

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Prof. Richmond Nii Okai Aryeetey (Supervisor) Date

DEDICATION

I dedicate this work to the Almighty God for bringing me this far and giving me the strength, courage and wisdom that I needed to complete this work. I also dedicate this work to my Mum and Dad Mr and Mrs Gbarinaa K. Titus (late), Aunty Rev. Sr. Philomina Doodaa, My uncle and his wife Mr. and Mrs. Kingsley K Kontuo, my siblings Rainer, Joyce, Jennifer and Reuben Gbarinaa and my cousin Mathias Dongyelle Forson for their support, prayers and encouragement. I say God richly bless you.

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God richly bless you all.

ABREVIATIONS	Meaning
AIDS	Acquired Immune Dificiency Syndrome
ANC	Antenatal Care
BCG	Bacille Calmette-Guerin
CHMC	Community Health Management Team
CHN	Community Health Nurse
DHIMS	District Health Information Management Systems
DK	Don't Know
ENAM	Enhancing child Nutrition through Animal source food Management.
HAART	Highly Active Antiretroviral Therapies
HIV	Human Immunne Virus
ICD 10	International Statistical Classification Of Disease and Related Helath Problems, 10th Revision (ICD-10) 2016
ID	Identity
IMCI	Intermitent Management Of Childhood Illness
IMNCI	Intermitent Management Of Childhood and Neonatal Illness
USAID	United States Agency for International Development
VA	Verbal Autopsy
WHO	World Health Organization

Abstract

Background: Data required to estimate cause of death, disease, and death pattern are rare in sub-Saharan Africa. These data are vital for targeting, monitoring, and evaluating health interventions. **Objective**: To determine the cause of death of children under five years in the Nutrition Links Study, implemented in the Upper Manya Krobo District in the Eastern region of Ghana . **Design**: Data used were generated from verbal autopsy interviews conducted for key informants related to 30 children under five years, who were recruited into the nutrition links project in the Upper Manya Krobo District. The deaths of these children were reported to the project between 2013 and2017. The WHO 2012 verbal autopsy tool was used to interview respondents. District DHIMS data on child mortality was also examined for comparison of mortality rates. **Results**: The district data reported the incidence rate of under-five deaths between 2013 and 2016 as 3.5 per 1000 live births in the Upper Manya Krobo district in the Eastern region-Ghana . The Nutrition links project, however, recorded a total of 27.5 deaths per 1000 infants recruited into the nutrition links project. Malaria was the most common (35,5%) cause of death for children under five years, followed by Human immunodeficiency virus (HIV) disease (22.6%), and pneumonia (9.7%). The rest of the causes of death were unspecified neoplasms (6.5%) accidental poisoning (6.5%), and exposure to noxious substances (6.5%); meningococcal infection, anaemias, and congenital malformations were also diagnosed using verbal autopsy. some of the conditions were classified as Symptoms, signs of abnormal clinical presentation, and unspecified infectious disease. **Conclusions**: Malaria and HIV/AIDS were the main causes of death in children enrolled in the Nutrition Links project and who died between 2014 and 2017. Verbal autopsy data can help understand the causes of mortality in poorly resourced settings where access to timely and accurate mortality data is not available.

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1.0 CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Child death is a public health concern and development challenge. More thn 200 million children under five yers in the developing world world re t risk of not reching their full developmentl potential because they suffer from the negative consequences of poverty,nutritional difficiencies and in adequate learning opputunities. (Atinc & Monday, 2017). Some progress has been made globally. Child malnutrition remains a serious public health problem with enormous human and economic cost (GNP, 2017). Child demise is a tragedy not only to the family, but to the community and the nation at large.

The case is not different in developing countries with most occurring in sub Saharan Africa. Reliable death information on the causes of these deaths is through routine vital registration systems. Moreover, most of these deaths in the under developed world occur at home, thus hospital based medical certification of death is not available. This has vital bearing on resource allotment and a premeditated forecasting, (Oza, Lawn, Hogan, Mathers, & Cousens, 2015) is lost.

Ghana has a similar situation with under-five mortality and has taken a lot of measures to reduce the under-five mortality rate, and as a result has seen a progressive reduction in deaths from 155 to 60 per 1,000 live births between 1990 and 2014 respectively (Wardlaw, You, Hug, Amouzou, & Newby, 2014).Though this did not quite reach the MDG 4 target of 40 deaths per 1,000 live births, it represents an overall reduction of under-five mortality of 58% over the period (MDG, Summit, Goals, & African, 2015).

This reduction is also seen reflecting in the Eastern region of Ghana as nutrition Links Project taking place in the upper Manya Krobo district as tidentified. This project is geared towards improving the nutritional status of children through empowering the mothers and caretakers by improving their lively hood (Colecraft, 2017).

During the period of the study, the project recorded about 31 under five deaths were recorded (across both intervention and control arms). Although these are not related to the intervention, there is an interest in identifying the cause of death (since there are no autopsies for the deaths), as well as the situations leading to the death as these could be helpful in creating a hypothesis.

Scaling up the impact of nutrition interventions is crucial to preventing maternal, neonatal and child deaths. Integrating nutrition-specific interventions into maternal and child health programs should be a priority for reducing morbidity and mortality in children (Vision, 2014).

Adequate maternal and child nourishment in the first 1,000 days ensures healthy mothers and newborns and good growth and development for infants and children. It also decreases vulnerability to infectious diseases and the undesirable cycle of disease and under nutrition that leads to child demise. The direct causes of neonatal deaths are estimated to be preterm birth, severe infections, and birth asphyxia, (Liu et al., 2015)

1.2 Problem Statement

Sub-Saharan Africa has the highest risk of death in the first month of life and is among the regions showing the least progress. These neonatal deaths have, however, seen a more rapid reduction in the under-five mortality rate, with the annual rate of reduction doubling between 1990–2000 and 2000–2011(David & Mullerbeck, 2012).

Mortality plays a vital role in health indicators for measuring a country's health and development. Information on mortality is often scarce in developing countries due to the fact that most deaths go unreported. These unreported deaths make planning on prevention of child mortality difficult. In many developing countries, improvement in vital registration is likely to remain unchanged because of the cost of maintaining and improving systems for the registration of births and deaths (Inoue, Salomon, & Evidence, 2001).

Teenage pregnancies, maternal health, malnutrition, health seeking behavior, short birth intervals and previous child deaths are found to be associated with an increased risk of death in children under-five (Conde-Agudelo, Rosas-Bermudez, Castaño, & Norton, 2012).However, literature on the cause of deaths for these children at the district level which is needed to inform policy makers is lacking.

Nutrition links is a community implementation research being conducted in the Upper Manya Krobo District in the Eastern Region of Ghana and focused on building linkages between nutrition, agriculture, and health (Colecraft, 2017). There has been a stream of deaths of children under five participating in the study. These deaths mostly occur in the homes or on root to the hospital and those that reported at the health facility were either brought in dead, died on arrival or within 24 hours of admission. Autopsies were not done to determine causes of death for the deaths that occurred in the study. This has created a gap of identifying the cause of death of these young ones. A community tool is therefore required to identify the causes of death. The verbal autopsy as a tool will be used to collect information of what caused the death of the under-fives in the study. A modification of the verbal autopsy method is proposed to assist in the identification of non-biomedical causes of death, Allotey P and Reidpath D, (2001).

Under-five mortlity is a significant public health problem, which has to be addressed in the project for the control of child mortality.This study therefore aims to contribute to

filling this research gap using verbal autopsy. It will also be used to by the Ghana health service to institute mesures that will capture all deaths occurring in the Upper Manya Krobo District. This will also result in putting strategies that are going to aid in reducing under-five morbidity and mortality.

1.3 Conceptual framework

The conceptual framework of the study describes the fctors tht leads to causes of child mortality. These are put on headings including: (a) the Health service factors: clinic, health staff and maternal and child health services available in the community . b. Geographical access to health service: the distance from the health facility to the client, the road network to the health facility and the availability of easily accessible transport to the health facility.

Socioeconomic factors also play a vital role in child survival. They includes the the mothers educational and income levels, occupation, health seeking behaviour and religion. Household factors are the immediate environment in which the Child dwells that also has a great influence on the health of children. This is due to their under developed immune system which makes them prone to many diseases and infections. Source of water of the people as it could be a source of infection so access to the child tht can lead to ill health. The sanitary environment, type of house and food security can cause ill health leading to mortality.

Proximate determinants are the biological factors of mother, child and some pre disposing factors to child morbidity. Maternal factors includes age at pregnancy or delivery, maternal nutritional status and health state of mother before or during pregnancy, and infant feeding practices. Child factors include Genetic make-up, term/pre-term delivery, sex , birth order and dietary intake.

Pre-disposing factors causing infant mortality are time of first Antental services received by mother, frequency of ANC attended. Delivery/ birthing factors of of baby includes: neonatal care, facility delivery/ skilled delivery, Complications before, during and after delivery and their management.This is presented in the figure below.

CONCEPTUAL FRAMEWORK

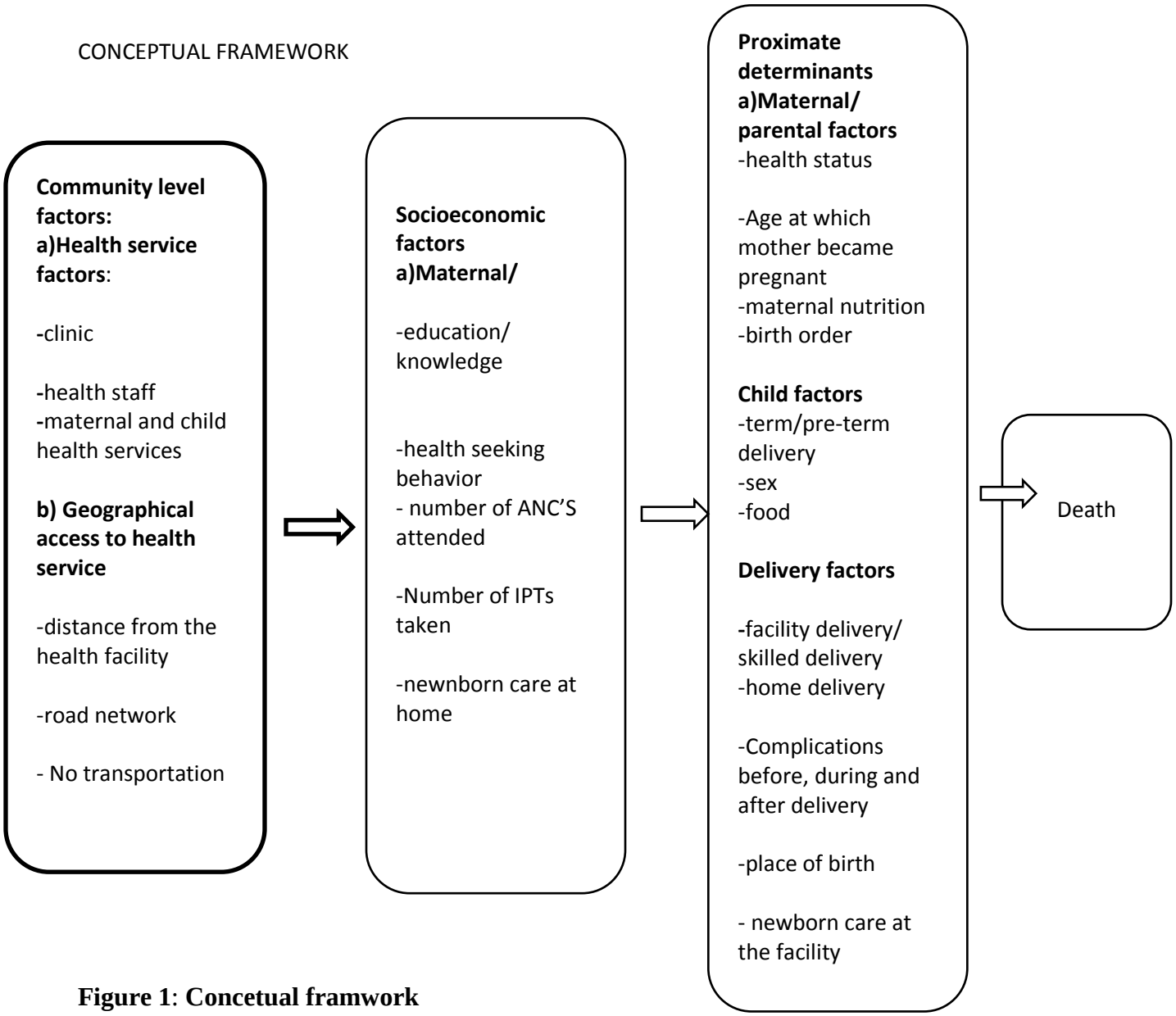


Figure 1: **Concetual framwork**

Adopted from: (Singh, Kumar, & Kumar (2013)

1.4 Justification

The Verbal autopsy is not routinely used in determining the cause of death among under fives in Upper Manya Krobo district. Most deaths occur at home and are therefore not reported hence the need to use a reliable community based tool to help give a more accurate

evidence on causes of underfive mortality to enable the implementation of simple community based interventions can be carried out . The causes of under five mortlity if known can be prevented. If the cause of deaths would guide health personnel in the district to properly target their services towards children below 59 months in deprived communities in the district. The data generated would be relevant in guiding policy- makers in designing of suitable policies to address the incidence of infant mortality in the District. This will also generate useful data that would prompt further research into the subject. The research output will also serve as a guide for resource allocation in the district It is therefore imperative to identify the causes of these deaths and subsequently recommend methods to curb them.

1.5 Rationale of study

This community based tool Verbal autopsy is not usually used in determining the cause of death among chidrenunder five years in the Upper Manya Krobo District. The study will contribute to understanding the causes of death in the district as identified by the ongoing nutrition links project. This will also enable the district health team in the Upper Manya Krobo to address the causes of death. Deaths recorded in the nutrition links project usually occurred at home or children died on arrival at the heath facility. The cause of deaths are not determined for those who died at the health facilities and the deaths that occurred at home are left unreported . Hence the need to try more reliable community based methods to help give a more accurate picture of causes of infant mortality so that appropriate community based interventions can be carried out. The causes of most infant deaths are preventable and avoidable.It is therefore imperative to identify the main factors that lead to these deaths.This research is being conducted to address a research gap identified in the nutrtion links project.

The research output would guide health personnel in the district to provide targeted services to children in specific communities in the District Upper Manya Krobo. It can also generate hypothesis for future implementation research in the area.The data generated would be relevant in guiding policy makers in the designing appropriate policies to address the incidence of infant mortality in the District, to deal with causes of death among the under five population.

1.6 Research questions

1. How frequently does young child deaths occur in the nutrition link communities
2. How frequently do young child deaths occur in the Upper Manya Krobo District
3. What are the key causes of death among young children in the Upper Manya Krobo District
4. What are the causes of deaths of children under five years in Ghana?

What are caregivers' experience of young child death in the Upper Manya Krobo District

1.7 Main objective

The main objective of the study is to determine the causes of death of children under five years in the upper manya krobo district using verbal autopsy

1.8 Specific objectives

The specific objectives of the study include:

1. Estimate the incidence of child deaths in the Upper Manya Krobo District
2. Estimate the incidence of child deaths in the Nutrition Links Study communities
3. Identify the key causes of death of young children in the Upper Manya Krobo District
4. Describe caregiver experience of child death in the Upper Manya Krobo District

2.0 CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter presents a review of related literature and presented in accordance with the objectives of the study.It covers the determination of child mortality, the incidence of child deaths in the Upper Manya Krobo District, prevalence of child deaths in the Links Study communities, key causes of death of young children and a description of caregiver's experience of child death in the Upper Manya Krobo District. Literature will be reviewed from journal articles, books and data electronic source. The literature will consider similar situttion in the world, Africa, sub saharan Africa and Ghana as a whole.

2.1 UNDER FIVE MORTALITY EPIDEMIOLOGY

There has been a two-thirds reduction in the under-five mortality rates between 1990 and 2015; developing countries have made important steps towards reducing child mortality. Over the last 20 years, child mortality rates have fallen considerably, from 87 deaths per 1,000 live births to 51. In absolute terms, this means a drop from 12 to 6.9 million children dying every year (Bay, Miller, & Faijer, 2012). Though there is a rapid decline, this number of child mortality is still considerably huge.

2.1.1 Incidence of child death

Infant mortality data indicate a mortality rate of 170/1000 births. For the 2nd and 3rd years of life the mortality rate is 74/1000 children surviving the first year of live,has probability of having a high survival rate Health Policy Educ.1982.There is a higher mortlity rate in those children under one year as compred with those more thn one year.

2.1.2 Child Survival: Key Facts

Around the world remarkable progress in child survival has been made and millions of children have better survival chances than in 1990. The under-five mortality rate fell to 39 (37, 42) 4 deaths per 1,000 live births in 2017 from 93 (92, 95) in 1990 – a 58 per cent reduction). This is equivalent to 1 in 11 children dying before reaching age 5 in 1990,

compared to 1 in 26 in 2017(Say et al., 2006). In most of the SDG regions the under-five mortality rate was reduced by at least half since 1990. In 74 countries, the underfive mortality rate was reduced by more than two-thirds. Among those countries, 33 low- and lower-middle-income countries achieved a twothirds or more reduction in the under-five mortality rate since 1990 (healthypeople.gov, 2018). The total number of under-five deaths dropped to 5.4 (5.2, 5.8) million in 2017 from 12.6 (12.4, 12.8) million in 1990. On average, 15,000 children died every day in 2017, compared to 34,000 in 1990.

Still, children face widespread regional and income disparities in their chances of survival. Sub-Saharan Africa continues to be the region with the highest under-five mortality rate in the world – 76 deaths per 1,000 live births in 2017 (Lucia Hug, David Sharrow, 2018). This translates to 1 child in 13 dying before his or her fifth birthday – 14 times higher than the average ratio of 1 in 185 in high-income countries and 20 times higher than the ratio of 1 in 263 in the region of Australia and New Zealand. At the country level, the under-five mortality rates in 2017 ranged from 2 deaths per 1,000 live births to 127 the risk of dying for a child born in the highest mortality country was about 60 times higher than in the lowest mortality country (Sankar et al., 2016). All six countries with mortality rates above 100 deaths per 1,000 live births were in sub-Saharan Africa. Continued preventive and curative lifesaving interventions need to be provided to children beyond the neonatal period, particularly in low-income countries, where the mortality rates for children aged 1–4 remain high. Worldwide, children aged 1–4 accounted for 25 per cent of the 5.4 million under-five deaths in 2017, children aged 1–11 months accounted for 29 per cent and neonates for 47 per cent. In highincome countries, where the average under-five mortality rate is low (5.4 deaths per 1,000 live births), children aged 1−4 years accounted for just 15 per cent of all under-five deaths in 2017 (Dalgleish et al., 2018). In low-income countries, with an average under-five mortality rate of 69 deaths per 1,000 live births, children aged

1−4 accounted for 29 per cent of all under-five deaths. With shifting demographics, the burden of child deaths is heaviest in sub-Saharan Africa. The burden of child deaths varies geographically, with most deaths taking place in just two regions. In 2017, half of the deaths among children under age 5 occurred in sub-Saharan Africa, and another 30 per cent occurred in Southern Asia.

More than a third (38 per cent) of all under-five deaths occur in the least developed countries. Due to growing child populations and a shift of the population distribution towards highmortality regions, the share of global under-five deaths that occur in sub-Saharan Africa increased from 30 per cent in 1990 to 50 per cent in 2017 and is expected to increase even further in the next few decades. By 2050, an estimated 60 per cent of under-five deaths will take place in sub-Saharan Africa (IMF, 2013).

In more than a quarter of all countries, urgent action is needed to accelerate reductions in child mortality to reach the SDG targets on child survival (Dogra et al., 2015). Out Of 195 countries analyzed in this report, 118 already met the SDG target on under-five mortality, and 26 countries are expected to meet the target by 2030, if current trends continue. Efforts to accelerate progress need to be scaled up in the remaining 51 countries, two-thirds of which are located in sub-Saharan Africa, in order to reach the SDG target by 2030 (Survey & Indicators, 2017). Among them, 30 countries will need to more than double their current rate of reduction to achieve the SDG target on time. In countries that already achieved the SDG target, efforts to reduce inequity in mortality within country should be intensified. Accelerating progress to achieve the SDG target by 2030 in countries that are falling behind would mean averting almost 10 million underfive deaths compared with the current scenario (Costa, da Silva, & Victora, 2017). On current trends11, about 56 million children under 5 years of age will die between 2018 and 2030, half of them newborns. More than

half of these 56 million deaths will occur in sub-Saharan Africa and approximately 30 per cent in Southern Asia . Meeting the SDG target in the 50 some countries in which acceleration is required would reduce the number of under-five deaths by almost 10 million between 2018 and 2030 (R, 2009). Concerted and urgent action is needed in the countries that are falling behind. Neonatal mortality The first month is the most crucial period for child survival. Globally, an estimated 2.5 million newborns died in the first month of life in 2017 – approximately 7,000 every day – most of whom died in the first week after birth . About 36 per cent died the same day they were born, and close to three-quarters of all newborn deaths in 2017 occurred in the first week of life.12 The global neonatal mortality rate fell from 37 deaths per 1,000 live births in 1990 to 18 in 2017 (You, Hug, & Hill, 2017). Among the regions, the largest declines since 1990 occurred in Eastern Asia with an 84 per cent reduction followed by Europe with a 64 per cent reduction. Neonatal mortality declined globally and in all regions but more slowly than mortality among children aged 1–11 months or children aged 1−4 years in most cases. Globally, the neonatal mortality rate fell by 51 per cent from 1990 to 2017, a smaller reduction in mortality than among children aged 1–59 months (63 per cent) (Costa et al., 2017). Despite declining neonatal mortality levels, marked disparities in neonatal mortality exist across regions and countries. Among the SDG regions, sub-Saharan Africa had the highest neonatal mortality rate in 2017 at 27 deaths per1,000 live births, followed by Southern Asia with 26 deaths per 1,000 live births (Szreter & Mooney, 1998). A child born in sub-Saharan Africa or in Southern Asia is nine times more likely to die in the first month than a child in a high-income country. Across countries, neonatal mortality rates ranged from 1 death per 1,000 live births to 44 deaths (Amiya, Poudel, Poudel-tandukar, Pandey, & Jimba, 2013). The risk of dying for a newborn in the first month of life is about 50 times larger in the highest mortality country than in the lowest mortality country. The burden of neonatal deaths is

also unevenly distributed across regions and countries (Bhutta et al., 2008). Two regions account for almost 80 per cent of the newborn deaths in 2017; sub-Saharan Africa accounted for 39 per cent of all such deaths and Southern Asia accounted for 38 per cent . The burden of newborn deaths stagnated in sub-Saharan Africa. Despite the modest 41 per cent decline in the neonatal mortality rate from 2000 to 2017 in sub-Saharan Africa, the number of neonatal deaths stagnated around 1 million deaths per year due to an increasing number of births (Poel, Hosseinpoor, Jehu-appiah, Vega, & Speybroeck, 2007). In 23 countries in sub-Saharan Africa, the number of neonatal deaths did not decline from 1990 to 2017 even though the rates of neonatal mortality fell over the same period. Demographic risk factors are associated with decreased chances of newborn survival. Children born to the youngest mothers are at the greatest risk of death in the first weeks of life newborns whose mothers are less than 20 years old are about 1.5 times more likely to die in their first month of life compared to children of 20–29 year-old mothers (Rai et al., 2015). Likewise, children born less than two years after their mother's previous birth are 2.7 times more likely to die within the first 28 days of life than children born four or more years after their mother's previous birth (UNICEF, 2006).

Lower under-five mortality is associated with a higher concentration of under-five deaths occurring during the neonatal period. Globally, neonatal deaths accounted for 47 per cent of all under-five deaths, up from 40 per cent in 1990. The share of neonatal deaths among under-five deaths was relatively low in sub-Saharan Africa (37 per cent), which remains the region with the highest under-five mortality rates (UNICEF, 2013). In the region of Europe, which had one of the lowest regional under-five mortality rates, 54 per cent of all under-five deaths occurred during the neonatal period. An exception is Southern Asia, where the proportion of neonatal deaths was among the highest (60 per cent) despite a relatively high under-five mortality rate (WHO, 2013). More countries will miss the SDG

target on neonatal mortality than on under-five mortality, if current trends continue. On current trends, more than 60 countries will miss the target for neonatal mortality by 2030, while 51 countries will miss the target for under-five mortality (Colecraft, 2017). Accelerating progress in these 60 some countries to achieve the SDG target on neonatal mortality would save the lives of 5 million newborns from 2018 to 2030. Based on current trends, 28 million newborns would die between 2018 and 2030, and 80 per cent of these deaths would occur in Southern Asia and sub-Saharan Africa.

2.2 Risk factors of child mortality

The risks factors for high mortality and poor child health that were gathered are: lack of basic hygiene (water, hands, food), high population density and lack of prophylaxis for communicable diseases, (Snow et al., 2012) all of which leads to high transmission of infectious and parasitic diseases, large doses of inoculum in case of infection, and, as a consequence, high morbidity and mortality (Szreter & Mooney, 1998). In addition, most urban populations had low standards of living with poor housing and poor nutrition, and only a tiny minority enjoyed better living standards. As a result, life expectancy was low, and under-five mortality (the probability of dying before reaching 5 years of age) was well above what is now considered high mortality, and could reach values as high as 500 per 1000 Leading causes of death among children were diarrhoeal diseases and acute respiratory infections, which are typical of situations with low hygiene and poor nutrition, (Boschi-Pinto, Lanata, Mendoza, & Habte, 2006) and the so-called childhood diseases, typical of high population densities (measles, whooping cough, smallpox, chickenpox, meningitis, diphtheria, among others). In some places tetanus and all the diseases and hazards associated with poor care at delivery, which primarily affect neonatal mortality in first 4 weeks of life (You et al., 2017).

Very little was known about urban child mortality prior to the sanitary revolution. The few available data indicate very high death rates. In the Roman Empire, life expectancy was about 28 years, which corresponds to an under-five mortality of about 500 per 1000. Very high values of under-five urban mortality are found in historical China, India and Japan, and in Europe (including Russia) in the 18th and early 19th centuries (Lewden et al., 2004). Note that such levels of mortality are rather higher than those found in hunter-gatherer populations studied in the 20th century, such as the Kalahari bushmen (under-five mortality ~350 per 1000), who enjoyed lesser risks associated with communicable diseases, had a much lower population density hindering the transmission of many communicable childhood diseases, and possibly a more balanced diet, (Kyu et al., 2018).

The beginning of the sanitary revolution around 1860, urban mortality in European and American populations was usually higher than rural mortality. This has been documented in a number of places and is labelled 'the urban penalty'. For instance, in England and Wales, in the late 19th century (1889–1891), infant mortality was 2.2 times greater in urban than in rural areas, and even higher in industrial centres (Approaches, Women, Perspectives, Fertility, & Frejka, 1983) . In the USA, infant and child mortality at the turn of the 20th century was also higher in urban than in rural areas. (Armelagos, Barnes, & Lin, 1991). In Sweden, urban mortality was much higher than in rural areas until 1920.This seems to have been a common pattern, although a few exceptions have been documented, such as in France in the 18th century and in China at the beginning of the 20th century. These two situations have common features: a high rural population density and extreme rural poverty, which could explain the very high levels of child mortality in rural areas (Hardy & Ascp, 1980).

The balance between urban and rural child health changed rapidly with the development of the sanitary movement (clean water supply and sewage), the proposal of the germ theory

by Pasteur and Koch, the development of vaccines, improved hygiene, (Hardy & Ascp, 1980), better mother and child care, as well as increased income, better nutrition and better housing following the second phase of the industrial revolution (Heazell et al., 2016). Within a few decades, urban populations enjoyed better health than their rural counterparts, and urban child mortality became lower than in rural areas, and stayed so until now in developed countries. The city was no longer the graveyard of mankind, but concentrated public health and medical innovation, better nutrition and higher socio-economic status (income, education), all of which were associated with rapid changes in personal behavior (Szreter & Mooney, 1998). Similar changes followed in rural areas, but were somewhat delayed, although the gap has tended to narrow in recent years.

The urban situation has remained favourable and child survival has never been higher, reaching, for instance, 99.5% or above in Japan, Sweden and many developed countries. Since 1950, a number of factors have contributed to the continued reduction in child mortality in developed countries. Although the development of vaccines has been the most important, most improvements have been in the area of therapeutic medicine, in particular the development of antibiotics, new medicines and numerous innovative paediatric techniques in both neonatal and general paediatric settings (INOUE et al., 2001).

Developments towards the wellbeing of child health have been seen in countries which have followed the European public health and medical model, despite different economic systems and lower economic growth, such as the former communist and socialist countries like Russia, Central Asia, China, Vietnam, Cuba, Sri Lanka (healthypeople.gov, 2018).

2.2.1The good and bad news

Demographic data show an overall and dramatic mortality decline since 1950 in developing countries in both urban and rural areas, and typically lower urban than rural mortality (Cdc, 2012). For the trends in under-five mortality in sub-Saharan Africa, the continent with the

highest child mortality between 1950 and 2000, under-five mortality was reduced by 57% in both urban and rural areas (Bain, 2014). Mortality declined faster in urban areas until 1980, but then tended to stagnate, whereas it continued to decline steadily in rural areas. The pattern is therefore quite different from the Swedish experience, which is typical of European trends: no difference at baseline since African cities were only beginning to develop in 1900 as opposed to excess urban mortality in Europe at baseline (Mohammed & Vuvor, 2012) earlier and faster decline in urban areas, as opposed to later decline in European cities; no cross-over so far in Africa, as opposed to lower mortality in urban areas after 1920 in Sweden; stagnation in urban areas since 1980 in Africa, as opposed to a continuous decline in Europe (IMF, 2013). The open question of recent years is whether urban mortality will exceed that of rural areas in Africa, again in contrast to the European experience.

The current decline in mortality in Africa is due to the same reasons as in historical Europe, but with a different hierarchy of factors (Khalil et al., 2016) therapeutic and preventive medicine to plays a larger role in Africa. Hygiene and nutrition also playing a smaller role than in Europe at the same level of mortality (Iliev, 2016). The urban or rural divide is also due to the same reasons as in Europe after World War I: the city concentrates health infrastructure (hospitals, clinics), health personnel (physicians, nurses), public health utilities (water and sanitation) and health interventions (vaccinations, prevention against malaria, etc) as well as providing higher socio-economic status (higher income, higher level of education) and better nutrition (Lawn, Kerber, Enweronu-Laryea, & Cousens, 2010). As a result, urban mortality is almost always lower than rural mortality, even at high levels of mortality (Sankar et al., 2016).

In Africa, there are variations in the pattern of urban-rural differentials. According to the Demographic and Health Surveys (DHS) (Makoka, 2013) urban mortality is about 25%

lower than rural mortality, and this is basically the same for Africa, Asia and Latin America (Ramjee & Daniels, 2013) There are however large variations by country. In some countries in Africa like Senegal, urban mortality is almost half that of rural areas, whereas in others there is virtually no difference (Botswana, Mauritania) (Chao, You, Pedersen, Hug, & Alkema, 2018). In Senegal, the large alteration seems to be due to a strong inequity between the two areas: most public health infrastructure and health personnel are concentrated in urban areas and rural areas remain poorly served (Black et al., 2008). In contrast, in Botswana rural areas are better served, leading to smaller variances; in Mauritania, urbanisation is very recent, very rapid and has been propelled by drought, so that the situation of urban areas remains unstable (Rajmil et al., 2014). These situations are due to diverse historical dynamics and different policies (either state policies or private endeavour), and in particular the presence (or absence) of Christian missions in rural areas and state involvement in the cities (ODE, 2013). Similar differences can be found in other continents. In Latin America, some countries have higher urban mortality (Trinidad and Tobago) and some almost equal urban mortality (Dominican Republic) (You et al., 2017): both situations being associated with urban poverty and slums. However, there are also cases where urban mortality is about half that of rural areas (Peru) (Rajmil et al., 2014), because of the high mortality in the latter. In Asia and the Middle East there are also wide variations for various reasons, with small differences between urban and rural areas (Sri Lanka, Uzbekistan) or a large gap (Vietnam, Morocco), either because urban areas are privileged or because rural areas are very remote and deprived (Stroebe, 2001).

There are, however, a number of exceptions to this general situation. First, there were areas with higher urban than rural mortality, and worse nutritional status. This is in the case in urban slums in some countries (D. Rubin, 2011). One of the worst cases in Africa is that of the Nairobi slums which account for about half of the city's population and have been

studied by the African Population and Health Research Centre since 2000. In slums, under-five mortality is now much higher than in rural areas of Kenya, and higher than 20 years ago (D. Rubin, 2011). These slums concentrate all the factors contributing to high mortality: no public water supply or sanitation system, a high population density and appalling housing, poor nutrition, a high prevalence of extreme poverty, insecurity and violence, and low availability of preventive and therapeutic healthcare (Greenwood, 2011). This situation is primarily the result of a deliberate lack of state intervention, justified by the illegal nature of the informal settlements (Bryce, Victora, Habicht, Black, & Scherpbier, 2005), a policy that originates from colonial times and which took a dramatic dimension with the population explosion in the country. Similar situations of excess urban mortality are found in places with huge socio-economic disparities, a high prevalence of extreme poverty and lack of appropriate state interventions, such as the Port-au-Prince slums in Haiti, Mumbai slums in India, Porto-Allegre slums in Brazil, the Manila slums, and probably many others which have not yet been documented (Niño-zarazúa, 2013). Recent data from Sierra Leone (2008 DHS survey) indicate that urban mortality has risen above rural mortality in recent years, primarily because of a worsening economic situation in urban areas, in the context of a dramatic recession following the 1991–2002 civil war (Pedersen & Sawyer, 2018).

Secondly, emerging diseases may also rear the balance between urban and rural areas. This is the case regarding HIV/AIDS which is usually more prevalent in urban areas because cities are prone to more permissive patterns of sexual behavior (UNICEF, 2011). In a number of African countries, HIV/AIDS became the leading cause of child death, and child mortality was often equal or higher in urban than in rural areas before HAART (highly active antiretroviral therapies) (UNICEF, 2011) and PMTCT (prevention of mother to child transmission) programmes were put in place. For instance, according to DHS data, urban

mortality in Zimbabwe, was 40% lower than in rural areas in the 1970s, but essentially the same in 2005 as a consequence of HIV/AIDS (Finlayson, Neumann, Mckleroy, Spink, & Nicole, 2008).

Thirdly, beyond child survival, child health in large cities is affected by emerging health threats apart from communicable diseases (Torpey et al., 2012). The most obvious problems, although poorly documented from a comparative perspective, are environmental, in particular air pollution (with consequences for asthma and other respiratory disorders) and chemical pollution, for example from petrol products and insecticides (Lewden et al., 2004).Cities also present other modern urban hazards such as accidents (road traffic accidents, household accidents) and violence against children (Jong et al., 2012).

There are morbidity problems recently emerged, as a result of changes in diet and life style linked to modernisation. Obesity and type 2 diabetes primarily affect adults, but obesity among children is becoming a problem in some developing countries, as occurring a few decades ago in North America and Western Europe (Sankar et al., 2016). The coexistence of diseases of the past with diseases of modern life is almost ironical in the cities of developing countries one finds cases of child under-nutrition (marasmus, kwashiorkor) in families where mothers are overweight. This is the so-called 'nutrition paradox' where rapid there is changes in life style despite little change in health knowledge and behavior (Lyngstad, 2013).

The dynamics of the urban-rural balance in child health is complicated by migration flows from the countryside to cities, reverse flows from cities to the countryside and circular migration back and forth. Many urban dwellers were born in rural areas, and some rural dwellers spent part of their lives in cities. The health situation of migrants is difficult to

delineate because of the highly selective process of migration. According to recent studies, many migrants from rural to urban areas incline to be better off than non-migrants, and to advantage from their moves (S. S. Rubin, 1999). The reverse might not be true, since those who undertake the reverse journey might be those who cannot prosper in the city. The balance often appears to be country specific, and a variety of situations can be found in developing countries.

As seen through the few examples mentioned here, the drivers of mortality decline and urban mortality multiplied instead of reducing. This may vary over the period . The main factors summarise in historical studies (Dalgleish et al., 2018). One should remember that recent dynamics have been very rapid, and that many different types of situations are found in developing countries.

2.3 Infectious diseases

This brief review of historical trends is particularly relevant for analysing contemporary trends in child health in urban areas of the developing world, and here again the dynamics vary by continent and by country. In Latin America, political independence occurred before the sanitary revolution, and modern health systems were built locally on European models. Similar changes in mortality occurred, although somewhat later and with more contrasting results because of lower incomes and larger economic inequalities, most visible in large cities (Cdc, 2012).

In countries colonised or strongly influenced by Europeans (Africa, the Middle East, South Asia and South-east Asia), modern public health and medical technology as well as economic development policies were introduced by colonial powers (Poulsen, 2018). These policies were applied differently from those that had been implemented earlier in Europe, were less intensive because of shortages of resources and were adapted to local situations, in particular the fight against tropical diseases (Cdc, 2012). With political

independence in the second half of the 20th century, similar policies were followed with varying successes and failures due to the fragility and inexperience of newly established states. In addition, diseases with a major demographic impact emerged, particularly HIV/AIDS, and other classic diseases (eg, malaria) developed resistance to modern medicines, leading to increased mortality (Poulsen, 2018).

2.4 The future of reducing child mortality

The future of child health in urban areas of resource poor settings will depend above all on health, social and monetary policies. Most cases of excess urban mortality in the past were associated with large pockets of extreme poverty, and this seems to be true as well in modern cities of the Third World (Kotecha, Patel, Shah, Katara, & Madan, 2012). It is reported that excess urban mortality and morbidity are the result of lack of state involvement: lack of ecological and sanitary regulations, lack of equipment (water and sanitation), lack of hygiene, lack of health infrastructure and personnel, lack of preventive medicine and lack of health education. Trends in child health will also depend on social and economic policies, and in particular policies aiming at mitigating the effects of extreme urban poverty (Snow et al., 2012).

The successful model developed in Western Europe can be used to improve the condition in developing nations, and in particular to mitigate the awful conditions in the slums. Given the scale of the problem, and the rapid population growth, this will require large-scale concerted efforts, and the creation of appropriate institutions to solve these problems, properly staffed and with proper management skills (Boateng, Danso-appiah, Turkson, & Tersbøl, 2016).

Paediatricians are at the forefront in the fight to improve child health in developing countries. Paediatricians in developed countries can play a role in various ways (Baiden et al., 2006). Firstly, training new generations is of the utmost importance for the future, since

most developing countries lack qualified personnel and expertise (Feudtner, 2007). Secondly, research and development to solve health problems at low cost is also extremely important. The best example of appropriate technology is undoubtedly oral rehydration therapy, developed in the 1970s, which has been very effective in reducing mortality from diarrhoeal diseases in developing countries (Van Den Broeck J1, Eeckels R, 2010). Thirdly, research for improving nutrition at low cost and for treating severe malnutrition in resource deprived settings might be improved. The best example in recent years has been the development of ready to use therapeutic foods (UNICEF, 2006).Fourthly, the prevention of mother to child transmission of HIV could also be reinforced, as well as the management of premature and low birthweight babies. The last is, raising awareness of the quality of the environment, with particular regards to improving water, air, waste disposal and industrial chemicals. The proper functioning of public health and medical services requires peace and urban safety, which are lacking in some large Third World cities.(Anthony & Mullerbeck, 2013).

Child mortality refers to deaths of children under the age of years (59 months). Measured in two ways but all are called under five mortality rate (Adjei & Management, n.d.). They are the age specific mortality rate and the under 5 mortality rates. These measures the risk of death of the under-five but calculated in a different way. Age specific mortality rate of children less than 59 months, divided the total number of children aged 59months per 10,000 per Day (Dalgleish et al., 2018). The second is defined as the probability of dyingbetween birth and five years expressed per 1000 live births. It is not a true rate but a cumulative incidence (London school of hygiene and tropical medicine 2009)

More than 10 million children die each year, most from preventable causes and almost all in poor countries. Six countries account for 50% of worldwide deaths in children younger than 5 years, and 42 countries for 90% (Robert E Black, Saul S Morris, 2003).

Progress of these interventions needs anappreciation of the determinants of child mortality. These determinants include, the most remote level, socioeconomic factors, such as income, social status, and education, which work through an intermediate level of environmental and behavioral risk factors.

However the situation is not that bad in other developed countries like china. In china a retrospective study was conducted to provide preventive advice to attempt to decrease the mortality rates of children (Morris, Cogill, Uauy, Undernutrition, & Group, 2008). Analysing the vital statistics data from 2004 to 2008 from the annual report of maternal and child health in Henan, early neonatal (<7 days), neonatal (< 28 days), infants (< 1 year) and children under-five mortality rates were calculated for each year (UNICEF, 2015). child mortality rates were seen to decreased in all age groups (early neonatal, neonatal, infants and children < 5 years) from 2004 (7.44%, 9.81%, 12.08%, and 14.04% respectively) The changes were more pronounced in the rural areas. However, child mortality remained higher in the rural areas (5.00‰, 5.62‰, 7.22‰ and 9.06‰) than urban areas (3.98‰, 4.74‰, 6.21‰ and 7.30‰) Infants and neonates accounted for a large proportion of deaths in the underfives (84.5% and 67.9%) (David & Mullerbeck, 2012). Among the under-five deaths that were reported in the World health organization report, about 41% occur in sub-Saharan Africa (SSA) (Robert E Black, Saul S Morris, 2003), where regional child death rates ranged from 69.1 to 219.2 per 1000 births in 2005 (Murray et al., 2014).

In sub-Saharan Africa and southern Asia, maternal education seems beneficial for overall under-five mortality as well as for gender equality in mortality chances among young children. The male : female (M:F) ratios for under-five mortality and child mortality are higher among more educated mothers (Morris et al., 2008). In sub-Saharan Africa, the M:F ratios among more educated women approach levels that can be qualified as 'gender neutral' based on estimates from Western countries. In southern Asia, excess female mortality is observed for under-five mortality and child mortality among non-educated mothers, but not among more educated mothers (You et al., 2017). The M:F ratios in the more educated group are still low compared with the estimated thresholds for a 'gender neutral' situation

2.5 Causes of child deaths

The causes of death differ substantially from one country to another, highlighting the need to expand understanding of child health epidemiology at a country level rather than in geopolitical regions. Children in sub-Saharan Africa are more than 14 times more likely to die before the age of 5 than children in developed regions (Ougrin & Chatterton, 2019). The leading causes of deaths in children below five years are acute respiratory infections, notably pneumonia, and diarrhoeal diseases respectively. Pneumonia and diarrhoea alone lead to 1.6 and 1.3 million child deaths per year respectively (Leung et al., 2015). Young children are predominantly susceptible to the negative health implications of diarrhoeal infections, including poor nutritional absorption, dehydration, and susceptibility to infections (Jica, 2018). Prolonged periods of diarrhoea can cause malnutrition and micronutrient deficiencies that increase the risk of contracting pneumonia while impairing children's growth and development (Ougrin & Chatterton, 2019). This leads to the deaths of many of these children.

Principal causes of death in children under 5 years are preterm birth complications, pneumonia, birth asphyxia, diarrhea and malaria. About 45% of all child deaths are linked to malnutrition, (WHO, 2013). The distribution of death among neonates from 0-28 daays are serious infection (33 percent), birth asphyxia (21 percent), prematurity/LBW (11 percent) and Acute Respiratory Iinfection (ARI) (10 percent). Among infants aged 29 days-11 months, ARI causes about 43% of all deaths. About a quarter of the post-neonatal deaths were due to serious infections, and diarrhea of deaths in this age group (Arifeen, Akhter, Chowdhury, Rahman, & Chowdhury, 2004). Among older children (12-59 months), serious infection (37 percent) and injuries (22 percent) are the most important killers.

The good news is that there is evidence of a decline in incidence and mortality rates due to diarrhoea and pneumonia among young children in developing countries.Africa has the highest numbers of deaths per 1,000 live births registered among children aged 5 and younger, (Niño-Zarazúa, 2013).There has been some reduction in child mortality rates lately and attributed to clinical interventions, particularly those devoted to increase the distribution of zinc supplements tablets oral rehydration and rotavirus vaccines,salts solutions to prevent and treat diahorrea, and antibiotics and immunization against haemophilus influenza type B, pneumococcus, measles and whooping cough (pertussis) to treat and prevent pneumonia (Niño-zarazúa, 2013).

The non-clinical interventions such as education and training programmes, and/or improved sanitation, portable water supply, water quality, and hospital equipment also plays a vital role in the reduction of diarreoal and other infections.(Anthony & Mullerbeck, 2013). Handwashing promotion, Malaria control with the use of long lasting insecticide nets, mosquito replants, indoor recidual spraying, kangaroo mother care (Niño-Zarazúa, 2013).

These deaths are predominantly caused by infectious diseases largely amenable to currently available preventive measures and/or treatment (Beaglehole, Frampton, Boden, Mulder, & Bell, 2017). Millennium Development Goal IV is to reduce under-five death worldwide by two-thirds by 2015. However, the likelihood of achieving this is in doubt: current estimates suggest that 44 of 50 developing countries have less than a 20% chance of fulfilling this target, and SSA will not reach it until 2165 (Rutherford, Mulholland, & Hill, 2010).

Among factors suggested to be associated with death in children aged under five is access to adequate health care. It is estimated that 41–72% of new born deaths can be avoided through adequate coverage of current health care interventions (Haines et al., 2007). A cross-country evaluation of Integrated Management of Child Illness interventions (IMCI) concluded that high risk and poor populations require proximal health services to improve health outcomes (Bryce, Boschi-Pinto, Shibuya, & Black, 2005).The continued high rates of deaths that occur at home further suggest the importance of health care access (Rutherford et al., 2010).

There is some evidence that improvements in health services are associated with reductions in child mortality. In Liberia and Zaire, sharp declines in child death (19% and 32%, respectively) coincided with an intensive child health care programme (Ewbank, 1993). The child death rate reduced from 350 to 81 per 1000 live births over a 25-year period in a region of Senegal with the implementation of modern health services (Pison, Ftrape, Lefebvre, & Enel, 1993), and a reduction in child death from 246 to 154 per 1000 live births from 1977 to 1991 in a region of Mozambique was attributed to superior health services (Steyn & Damasceno, 2006).

The results showed that more than 70% of all deaths under five years in Henan province were attributed to five leading causes: disorders relating to short gestation and low

birthweight (LBW), birth asphyxia, congenital malformations, accidents (unintentional injuries) and pneumonia. The order of the five leading causes of death changed during the study period (DAVID & MULLERBECK, 2012). Disorders relating to short gestation and low birth weight (LBW) have, however, been the leading cause of death since 2007 in both urban and rural areas. Further analysis based on age group showed that more than half of neonatal deaths were due to prematurity and/or LBW and birth asphyxia (You et al., 2017). For infants who died between 28 days and 1 year, congenital heart malformations were the leading cause of death between 2004 and 2008 in urban areas, while pneumonia was still the dominating cause of death in rural areas (UNICEF, 2015). Diarrhoea was only on the list in 2004 and 2005. For children aged 1–4 years, accidents (unintentional injuries) were the major cause of death (Affairs, 2017). Congenital heart malformations remained the second leading cause of death for children between 1 and 4 years. Sub-analyses of deaths in the under-fives due to accidents (unintentional injuries) showed that the five most common causes were accidental suffocation, transport accidents, accidental drowning, accidental poisoning and falls (UNICEF, 2011). The importance of the different accident causes varied during the study period, but notably deaths due to transport accidents increased by 40.1%, while accidental poisoning decreased by 30.1% (UNICEF, 2011)

2.6.1 Nutritional factors

Poor nutrition contributes to one-third of child mortality, diminishes cognitive development, and is a major determinant of maternal mortality and poor birth outcomes (Black et al., 2008). Family behaviours related to women with regard to child care and household experience of hardships related to morbidity of major illness and the nutritional status of children (Mashal et al., 2008).

The key issues of child mortality includes under nutrition as an underlying cause of child deaths associated with infectious diseases, the effects of multiple concurrent illnesses, and

recognition that pneumonia and diarrheal remain the diseases that are most often associated with child deaths (Glover-Amengor et al., 2016). Poor nutritional status mainly results in poor absorption of nutrients in the individual's system leading to impaired immunity. Lowered immune system will result in diseases and death (UNICEF, 2013).

A better understanding of child health epidemiology could contribute to more effective approaches to saving children's lives (Robert E Black, Saul S Morris, 2003) . The authors added that, Infants aged 0–5 months who are not breastfed have seven-fold and five-fold increased risks of death from diarrheal and pneumonia. This makes breast feeding and complementary feeding major predictors of child morbidity and mortality as brest feeding protects infants from infection by eliminating the exposure to food and water borne pathogens.Breast milk contains several compounds which increase immunity (Vanderslice, Popkin, & Briscoe, 1994).

Malnourished children, mostly those with severe acute malnutrition, have an elevated risk of death from common childhood illness such as diarrhoea, pneumonia, and malaria, (WHO, 2018).Early malnutrition is linked to poor cognitive functioning and learning capacity, which in the long term leads to lower labour, productivity, and poverty ,Grosse and Roy 2008; Hoddinott et al. 2008.

2.7.2 Improvements in child health

Ghana is often hailed as one of the few Millennium Development Goal (MDG) successes in sub-Saharan Africa; in the last 25 years it has reduced poverty by more than half (UNDP, 2015). In 2015 the UN Food and Agriculture Organization (FAO) awarded Ghana for halving the proportion of hungry people (FAO, 2015). Beyond these, the most recent Demographic and Health Survey has shown that Ghana has halved the proportion of underweight children, as expected by MDG Goal One on hunger indicator 1c (Ghana Statistical Survey, 2014). The evidence provided here suggests that Ghana is making

progress in reducing malnutrition among vulnerable groups. Compared to other countries in the sub-region, this is largely the case. Nevertheless much more could be achieved, given that the absolute number of undernourished people in Ghana remains unacceptably high for a lower middle-income country. It is also important to recognise that challenges to the nutrition situation remain in Ghana, including high rates of sub-optimal child feeding, sub-optimal micronutrient status, household food insecurity (particularly among farm families), and low coverage of nutrition interventions.

Another important concern regarding the nutrition of Ghanaians are the rapidly rising levels of under-five mortality and associated diet-related non-communicable diseases, occurring in an environment that is increasingly promoting consumption of energy-dense. In a nutrition study, 31 under five died so far in the study. Wide gaps in child mortality across sub-groups or areas within countries have been documented, warranting a call for an equity-focused approach to reducing child mortality. Children are at greater risk of dying before age 5 if they are born in rural areas, poor households, or to a mother denied basic education. More than half of under-5 child deaths are due to diseases that are preventable and treatable through simple, affordable interventions. Strengthening health systems to provide such interventions to all children will save many young lives.

A well-established causal relation exists between malnutrition and mortality. Numerous studies have shown that children with poor anthropometric status experience diarrhoea that is more severe and lasts longer; this indicates that they might also experience a higher risk of mortality associated with diarrhoea. A strong and consistent association was observed between nutritional status and mortality from diarrhoea, with higher risks for dysentery.

Findings reported in a case-series investigation from Matlab, Bangladesh, where malnutrition was defined by using a relative's report of recent or severe malnutrition in the

child. In those analyses, malnutrition was associated with 5% of deaths from acute watery diarrhoea, 16% of deaths from acute non-watery diarrhoea, 23% of deaths from diarrhoea occurring after measles, and 45% of deaths from persistent diarrhoea (Boschi-Pinto et al., 2006). A strong and consistent relation was also observed between nutritional status and death from acute lower respiratory infection. A variety of nutrient deficiencies, including protein-energy malnutrition, have also been linked to an increased risk of malaria morbidity (Alexandre et al., 2015).

However, no community-based studies were identified that related nutritional status to mortality among children with slide-confirmed malaria. In one community-based study of nutritional status and all-cause mortality conducted in a region of the Democratic Republic of the Congo (formerly Zaire) where malaria is endemic, an association was observed between severe malnutrition and all-cause mortality but not mild or moderate malnutrition (Van Den Broeck J1, Eeckels R, 2010). Malaria was the most common cause of death among the study participants. Unfortunately, data from this study are of limited use in addressing the relation between nutritional status and mortality from malaria because no blood slides were taken to confirm the diagnosis and data were not presented on the diagnostic specificity of fever for a malaria attack. The clinical signs of severe malaria are similar to pneumonia, septicaemia, and other infectious diseases (Greenwood, 2011). Diagnosing malaria using non-specific indicators, such as fever alone, can be misleading and may mask potential associations with malnutrition. Longitudinal community-based studies that follow children with slide-confirmed malaria will be required to investigate the relation between nutritional status before illness and mortality from malaria.

The evidence for a relation between nutritional status and mortality from measles is less consistent. Although many of the hospital-based studies found an association between

status at admission and risk of mortality, numerous community-based studies have been conducted and nearly all reported no association between nutritional status and mortality. Measles has a characteristic rash, and a validation study in Africa showed that the verbal autopsy method detected measles deaths with greater than 75% sensitivity (Snow et al., 2012) . Therefore, misclassification of measles mortality is unlikely to explain the lack of association observed in the community-based studies in Africa.

In order to address these challenges, multiple research programmes have been or are currently being implemented in order to understand the key drivers of improved nutrition in Ghana. Between 2004 and 2009, the ENAM (Enhancing child Nutrition through Animal source food Management) project – a collaboration between University of Ghana, Iowa State University, and McGill University and supported by the Office of Agriculture and Food Security, Global Bureau, USAID – was implemented across three ecological zones (Colecraft, 2017). The main goal was to enhance access and utilisation of animal source food among vulnerable families with children under five years. Using a community trial design, intervention communities received entrepreneurial and nutrition education plus microfinance to support the establishment of income-generation activities (Marquis & Lartey, 2016).

A key strength of the project was the use of participatory rapid assessment methods to identify the potential interventions to address nutrition (D. Rubin, 2011). Following the success of this intervention study, the Nutrition Links project, supported by the Government of Canada, is currently extending the findings from the ENAM project in a district-wide effectiveness study (Marquis & Lartey, 2016). The Nutrition Links Project is testing the effect of integrated agriculture and nutrition strategies on livelihoods, nutrition and health status of infants in Ghana's Eastern Region.

The Nutrition Links was designed to determine the the effect of intergrated interventions (nutrition, livelihood nd agriculture) on child health and nutrition. The children were followed up from one year for four years. The result is being analyzed. It was concluded that, although agricultural activities are associated with better infant nutritional indicators, interventions are needed to improve infant and young child feeding practices in the Eastern Region.(Aryeetey, 2016).There links project is was to study the link between Agriculture and nutrition.

2.8 Maternal experience of the death

2.8.1 Psychological / Emotional experience

Sustaining meaning in life, upholding emotional well-being, and harmonizing attachments to the living and the deceased are features associated with the psychological (and often private) impact of loss (S. S. Rubin, 1999). In sharing their experience of the deaths, 38.7% were willing to share theirs. The other 61.3% considered the situation so truamatic that, they did not want to talk about it. "*This whole reseach is reminding me of the pain I went through."* A mother said in this study.

There are considerable differences in the mortality experience of children according to the educational attainment of their parents, the birthing position of the child (Dalgleish et al., 2018). The mortality differentials between those with no education and those with a moderate amount of education are negligible, but for three (3) measures of education, children with the most educated parents experience substantially lower levels of mortality (Lewden et al., 2004).

Those households where the mother has had some education tend to have lower female than male mortality rates, this implies that, children of both sexes born into those households experience lower levels of mortality than, children born into households where

neither parent nor only the father is educated(WHO, 2004). The female children do particularly well,(Health Policy Educ. 1982).

The process of conceiving, giving birth, and raising offspring is shared by virtually all living animals. The human experience of this process, however, adds many elements of psychological, social, and meaning construction. At various stages in the life cycle, men and women relate to child-conceiving and child-rearing roles as central to their existence. Of the bonds formed within the family, the parent–child bond is not only particularly strong, it is also integral to the identity of many parents and children . Much has been written about the significance of the parent–child attachment bond as a major organizer of the individual parent's positive sense of self and significant relationships with others (Bowlby, 1980).

Parents of children and adolescents who die are found to suffer a broad range of difficult mental and physical symptoms. As with many losses, depressed feelings are accompanied by intense feelings of sadness, despair, helplessness, loneliness, abandonment, and a wish to die (Sanders, 1999). Parents often experience physical symptoms such as insomnia or loss of appetite as well as confusion, inability to concentrate, and obsessive thinking (Bowlby, 1980). Extreme feelings of vulnerability, anxiety, panic, and hyper-vigilance can also accompany the sadness and despair.

Grieving parents evidence anger as part of the normal reaction to the loss of their child (Bowlby, 1980) . This may be expressed as intense rage or as chronic irritation and frustration. It may be directed at the spouse, at other family members, at the professional staff, at God, at fate, or even at the dead child. Anger may also be directed at the self, creating feelings of self-hatred, shame and worthlessness (Malkinson & Bar-Tur, 2005).

Children take on great symbolic importance in terms of parents' generativity (Malkinson & Bar-Tur, 2005) and hope for the future. All parents have dreams about their children's futures; when a child dies the dreams may die too. This death of future seems integral to the intensity of many parents' responses. Three central themes in parents' experience when a child dies include (1) the loss of sense of personal competence and power, (2) the loss of a part of the self (Lyngstad, 2013), and (3) the loss of a valued other person whose unique characteristics were part of the family system. While guilt and self-blame are common in bereavement, they are especially pronounced following the death of a child. The parent's role competence as the child's caregiver, protector, and mentor is severely threatened by untimely death.

Parents assert that their grief continues throughout their lives, often saying, “It gets different, it doesn't get better.” Words such as “closure” can be deeply offensive. The few studies that have followed parents for years after the child's death support the concept of their preoccupation with the loss of children across the life cycle (S. S. Rubin, 1999). (Smith, Bentley-Edwards, El-Amin, & Darity, 2018) stated the “amputation metaphor”: the vivid sense of a permanent loss of a part of oneself that may be adapted to, but will not grow back. Freud's letter to a friend about the loss of his eldest daughter describes this eloquently:

For years I was prepared for the loss of my sons (in war); and now comes that of my daughter. Since I am profoundly irreligious there is no one I can accuse, and I know there is nowhere to which any complaint could be addressed.The unvarying circle of a soldier's duties and the sweet habit of existence will see to it that things go on as before. Quite deep down I can trace the feelings of a deep narcissistic hurt that is not to be healed (Jones, 2011).

Parents resist the idea that they will recover from their child's death. Rather than resolution, which suggest a return to pre-loss functioning, reconciliation, and reconstitution have been used to describe the post-death period because these terms more adequately reflect the profound changes that take place when a child dies. They express the reality that even the successful mourning process results in a transformation in the person consequent to the death of a loved one (Christ, 2000). Despite traditional assumptions that all bereaved individuals must mourn, prospective studies have shown that considerable numbers of bereaved individuals evidence no overt signs of grieving or of the reconstitutive processes associated with grieving. The question these findings raise is to what extent this type of resilient pattern may also be found among those mourning the death of a child (Smith et al., 2018).

2.8.2 Community level factors of child mortality

In most communities the issue of reporting to the health facility when sick is mainly influenced by poverty and geographical a**c**cess. Ghana has focused on increasing access to health care, since 1997. In its poverty reduction strategy, Ghana planed to increase the percentage of citizens utilizing qualified health personnel when sick from 30% to 50%, (IMF, 2013).This goal among other strategic plans l**e**ad to the birth of the nutrition link intervention project in which some households were assisted financially to go into agriculture. Some went into minor farming nursing,cultivating crops for the family, and the others into poultry farming. During a heavy harvest, some of the goods are sold to support the family. This is to improve the financial and nutritional status of the families involved (UNICEF, 2013).

This goal to improve nutritional status of children aand families through aagriculture remains elusive because of poverty in rural communities, lack of skilled health workers, and lack of quality health providers. Over one third of the country lives over five kilometers

away from the nearest health provider, further hampering access for the rural population Van den Boom, G.J.M et al, 2004. Even for individuals living closer to health providers, financial and cultural barriers sometimes make health services inaccessible. Some individuals use informal health care such as traditional healers, drug peddlers, and drug stores to save time and money. The informal health care products mostly results in deaths especially the young ones because of their low immunity.Their immunity makes them more prone to disease than adults.

Due to inadequate knowledge orthodox health some individuals are not attracted to seek care at the health facility. These issues serve as barriers affecting health seeking behavior in Ghana.

Inconclusion,the causes of under five mortality numerous and most of which from preventable causes. More than have of these deaths occur in the first 28 days of life (Singh et al., 2013). There are many intervention put in place by some institutions in aid of preventing morbidity and mortality among them. Vaccinations and prophylaxis are used to reduce child hood mortalities(Allotey & Reidpath, 2001). For this to be a success, all are to take part in the fight

3.0 Chapter Three

Methodology

3.1Type of Study

Retrospective design was employed in the Study. Parents or care-givers were interviewed to recall the signs and symptom exhibited by the infant before death and what they think caused the death of their child.

3.2 Study population

The study population comprised of all under five deaths which occurred in the nutrition links project from 2013- 2017.

3.3 Study Location/Area

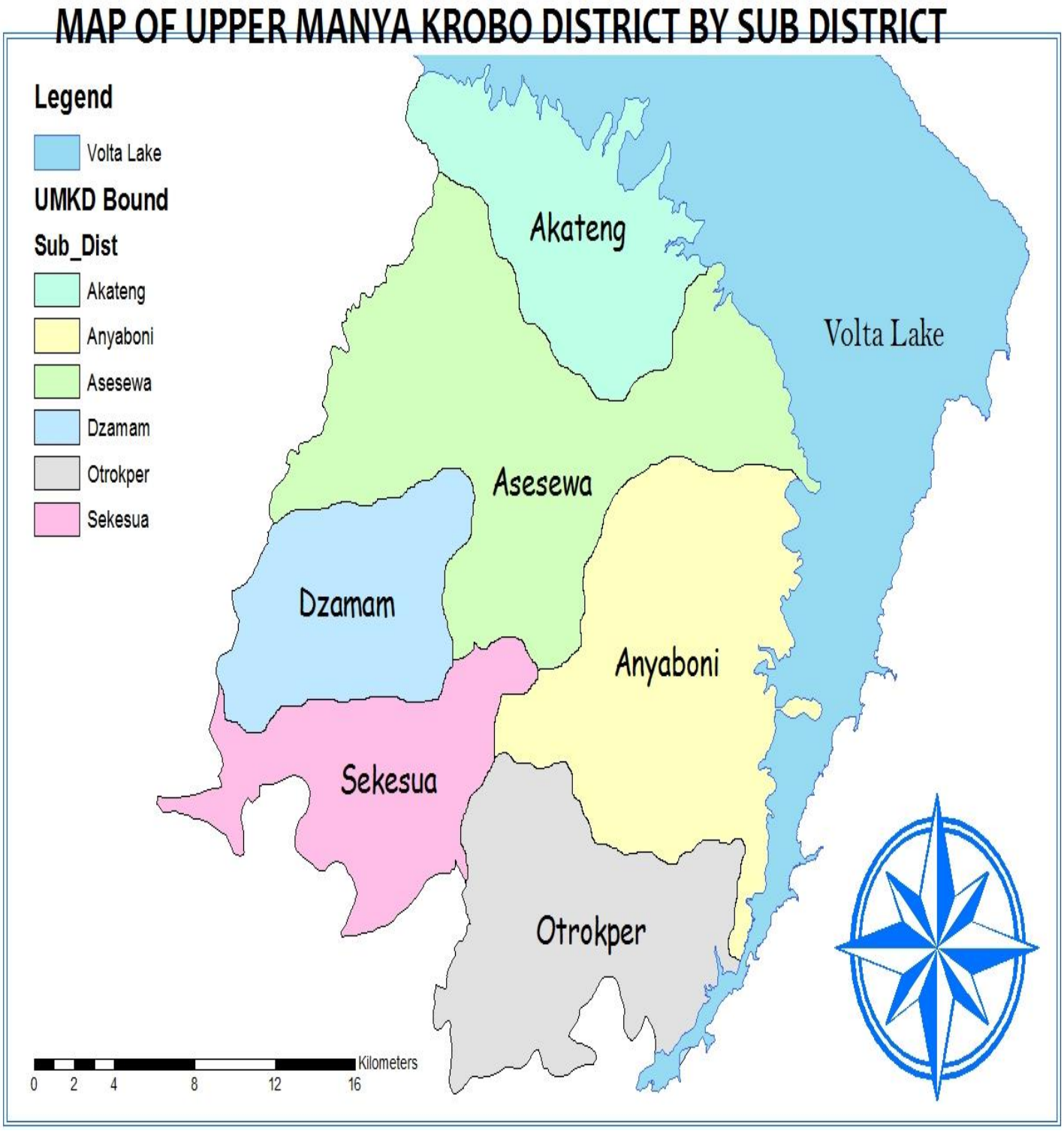
The study was carried out in randomly selected communities in the upper Manya Krobo district in the Eastern region of Ghana. The district is located within latitudes 6^0 20" North and $6^0$50" North and longitudes 0^0 30"West and 0^0 00" West. It covers an area of 885 sq. km constituting 4.8% of the total land area of the Eastern Region.

The nutrition links communities were spreadout in the six (6) sub districts in the district. These includes: Akateng, Dzamam, Asesewa,Otrokper, Sekesua and Anyaboni where the Nutrition Links Project was implemented. The project was carried out in 196 communities out off which the data was collected from 28 of the communities.

3.3.1 Profile of the study area

Upper Manya Krobo District was created in February 2008 from the Manya Krobo District by government instrument. By this, Manya Krobo District was divided along constituency lines into Upper Manya and Lower Manya Krobo District. It shares boundaries with Kwahu North, Fanteakwa, YiloKrobo, and Lower Manya Krobo districts, and the Volta Lake. The district is demarcated into six sub-districts that makes health service delivery easier. The demarcated sub-district are shown in the color coded figure below:

FIGURE 2



MAP OF UPPER MANYA KROBO DISTRICT

3.3.2 Population

Upper Manya Krobo District has six sub districts with an estimated population in 2018 of about 85,810 projected from 2010 Population and Housing Census, with Asesewa as the district capital. There are 198 operational communities following the geographic information survey conducted in 2011. Interestingly, about eight of these communities lie outside the boundary of the district. All communities in the sub districts are served by the Ghana Health Services. Most of these communities are beneficiaries of services of other partners especially Plan GHANA and Nutrition Links project. Plan Ghana, an international child-centred community development organisation, supported the district with funds and training towards improvement of sanitation situation in the Upper Manya Krobo District to ensure that the people live in a clean environment (Debrah & Angmor, 2019).

3.3.3 Occupation

Upper Manya Krobo District is predominantly rural and very deprive in relative terms. The people are mainly farmers and traders. Asesewa, Akateng, Akrusu, and Sekesua are the main trading and market centres. Those along the Volta Lake are mainly fisher-folk.

3.3.4 Settlement

The settlement system in the upper manya krobo district is called Huzar where the houses mostly made of mud are scattered on their farmlands. The villages are made of several compounds with each compound having an average of twenty (20) inhabitants. In each compound (family house) is the compound head, his brothers, wives, children and grandchildren. Inheritance is patrilineal.

3.3.5 Transportation/communication

A greater proportion of the road networks in the district are un-tarred. The main means of transport is by minibuses (Tro-Tro), taxis, large mummy trucks and a few salon cars. The district has one post office at Asesewa , poor mobile networks with.

Table 1 : Types of Sanitation facilities

TYPE OF SANITATION FACILITY	PRIVATE	PUBLIC	SCHOOLS	HEALTH FACILITIES	OFFICES	TOTAL
SEPTIC TANK	60	16	0	1	0	77
KVIP	10586	0	65	3	0	10654
WC	287	0	0	29	25	341
VIP	153	0	1	6	3	163
PIT LATRINE	15389	0	15	0	0	15404
PAN LATRINE	0	0	0	0	0	0
TOTAL	26475	16	81	39	28	26639

Source : District Annual Reports- 2017

3.3.6 Health Services

The District health services are organized around one hospital, three (3) maternity homes, four (4) health centres. The district has thirty Five demarcated CHPS zones with which twenty five (25) of them have Community-based Health Planning and Services (CHPS) compound where health care for minor aailments are rendered.community health nurses are assigned to the CHPS zones. Twenty Five (25) of the zone are fully functional. Services offered include clinical care, prevention of disease and health promotion activities.

Table 2:Distritbution of Health Facilities according to Sub – Districts and types

SUBDISTRICT/TYPES OF HEALTH FCILITIES	HOSPITAL	HEALTH CENTERS/ MATERNITY HOMES	CHPS COMPOUNDS
Asesewa	Asesewa Govt Hospital	Alidor Maternity Home	Asesewa CHPS, Asasehene CHPS, Adensu CHPS, Akohia CHPS, Battor CHPS, Sisiamang CHPS, Konkoney CHPS, Abesre CHPS, Fefe CHPS
Sekesua	NIL	Sekesua Health centre	SekesuaDzamam CHPS, Dawa CHPS, Sutapong CHPS, Osonson CHPS and Terguanya CHPS
Akateng	NIL	Akateng Health Centre	Akotoe CHPS, and Akrusu CHPS
Otrokper	NIL	Otrokper Health centre, Daale Maternity home	Samlesi CHPS, Akatawia CHPS, Aketebour CHPS
Anyaboni	NIL	Anyaboni Health centre	AkokomaSisi CHPS, Apimso CHPS, Bisa CHPS and Fatem CHPS
Dzamam	NIL	NIL	Dzamam CHPS and Nyankumase CHPS

Table 3:Distritbution of Health Facilities according public and private

TYPE OF HEALTH FACILITY	PRIVATE	PUBLIC	TOTAL
HOSPITAL	0	1	1
HEALTH CENTERS	0	4	4
CHPS COMPOUNDS	0	25	25
MATERNITY HOMES	3	0	2
TOTAL	3	30	33

3.3.7 Education

There are several pre-school, primaries, junior high school (JHS), one senior high school (S.H.S) in the district as indicated in Table 4.

Table 4:Education/ Educational Institutions

Type	number	%
Pre School	114	43.2
Primary	111	42.1
JHS	38	14.4
SHS	1	0.4
Total	264	100.0

3.3.7 Key Health Partners and Areas of Support

The district health administration worked with other partners and stakeholders during the year to improve health service delivery . The collaborative efforts contributed to the general performance of the district. The key health partners and their areas of support in Table 5;

Table 5:Key Partners and Areas of Support

Partner	**Areas they support**	**Support provided**
District Assembly	• Transport • Fuel	✓ Fuel support during NID ✓ School Feeding programme
National Control Programs- NMCP, NACP, RHA, Others	• Funds • Equipments • Technical	✓ Funds for programmes etc. ✓ Vaccine fridges, vaccine carriers ✓ Monitoring and supervision

Plan Ghana, ***(Philips Foundation)***	• Community IMNCI • Maternal and Child health (Training, equipments, etc)	• Supported Child health promotion week • Capacity building and equipment for the implementation of the Women and their Children Health (WATCH) project • Support visit and monitoring of activities to communities • Support review and audit meetings
Hunger Project	Infrastructure and monitoring	▪ Support infrastructure development and monitoring to communities
• ***Marie Stopes Int.*** • ***Ipas Ghana*** • ***Engender Health*** • ***Population council***	Reproductive and child health (r3m)	• Family planning campaigns • Renovation of facilities • Donation of family planning equipment
UNICEF	Nutrition	• CMAM
Nutrition Link	Human resources and health systems	• PERFORM project

Source: 2017 District Annual Reports

3.3.8 District Health Services / Administration

TheDistrict Health Administration provides technical and administrative support for health service provision in the district. These include resource mobilization and distribution, planning, training and research programmes. The District Health Administration ensures that services provided are in accordance with the national policies and regional priorities.

Planned activities revolved around the 5 main objectives of the Ministry of Health, which are:

1. To increase geographical and financial accessibility in health to all Ghanaians
2. To provide better quality of care in all health facilities.
3. To improve efficiency at all levels.
4. To foster closer collaboration with communities and other partners
5. To increase resources and to ensure equitable and efficient resource distribution.

The core DHMT comprises of the District Director of Health Services, one public health nurse, two Disease Control Officers, the District Accountant, Health Information Officer, Administrative manager, community health nurse and one driver.

3.4 Variables

The variables of the study will include age (months) at which child died, region, residence, premturity at birth,birth weight, sickling status of the baby, birth interval, birth order and feeding status. These records included date of birth of infants, date of infant deaths and their respective residence addresses.

The parental factors considerd includes the educational status of mother, age at first birth, Marital status, health status of mother before or during pregnancy, occupation and religion of father and mother.

The Sanitation, source of water in the community, toilet facility, biological causes of illnesses leading to the deaths, house hold food security, road network , birth interval, parity,geographical, health seeking behaviour and access to health facility.

3.5 Sampling

The sample included all 31 deaths of under five years that occurred in nutrition link project in the Manya Krobo district form the beginning to the end line study.

The communities above were used because that was where the project and deaths occurred. Thirty-one (31) verbal autopsy questionnaires were completed in the households in which under-five deaths occurred. These included households who were part of the project. Thus from both intervention and non-intervention communities.

3.6 Sample size

Thirty-one (31) caregivers/mothers of deceased infants in the nutrition link project were used for the study. This was obtained through census of infant deaths that occurred among under-fives in the upper Manya Krobo district that were part of the project. Sample size was therefore not determined for this study involved all under five deaths in the nutrition links project. The project had data on all deaths that occurred from when it started between 2014 –2017.

Deaths were recorded in all the sub-districts in the upper Manya Krobo catchment area. Considering the few reviewed number of infant deaths in the project, all the caregivers/mothers of the deceased infants were interviewed. It is therefore important to state that no specific formula was used in the determination of the sample size for the study.

3.6.1 Pretesting

Pretesting of the tool was done in communities in Sisiamang Community which was not part of the project carried out in the upper Upper Manya Krobo District but it has the same characteristics as the study area. The purpose was to ensure consistency, clarity and acceptability of the study questions to the respondents. Through pretesting the pretesting,

it was identified the challenges in understanding some of the terms being asked. A like danger fever, measles were not well understood. The people in the Upper Manya Krobo used different local names to identify these deseses apart from what we learnt from the verbal autopsy data collection training. It allowed for agreement of translation to match with theirs. These local names were identified and used in the data collection. . Assessment of the data from the pretesting, it was clear the tool was feasible for the study.

3.6.2 Data collection techniques/methods & tools

The study adopted a verbal autopsy tool which was design by WHO in 2012 to gather information from parents and care givers whose under five children died between 2013 and 2017 in that participation in the nutrition links project.The household verbal autopsy questionnaire was used. The verbal autopsy data collection tool consisted of a compilation of open and closed ended questions and a narrative portion.

The data was collected electronically using a tablet. After the data collection, the data collected is reviewed with corrections on it done before submitting to the server in Dodowa. The narrative and Open-ended questions were used to collect qualitative data, which were recorded on a narrative sheet. They were coded for use in data analysis. The parents or care givers of the thirty-one deaths were interviewed in a two week period sbetween 6th-16th February, 2018. These data collected included date of birth of infants, date of infant deaths and their respective residence addresses

3.7 Data Processing and Analysis

The signs and symptoms presented by these children before their death were coded using the disease ICD 10 coding book to arrive at the probable diagnosis for the deceased.

To help answer the research questions a univariate analysis was performed using STATA V.14.0 and Excel to describe the counts on each research objective. This helped the study

to get the general picture on the frequency of responses to each research question. Data from the 2017 annual reports of the was used in the calculation of under five mortality rate in the Upper Manya Krobo District and in the nutrition links project.

3.8 Ethical Consideration/Issues

The purpose and the procedure of the study were be explained to the parents or caregiver of the deceased. Verbal Autopsy interview was conducted after obtaining verbal informed consent from the Information sheet prepared in English.

Permission for the study was obtained from the chiefs and opinion leaders and parents/caregivers in the upper Manya Krobo district. The nutrition links project amended their ethical clearance sorted from the Institutional Review Board of the Nuguchi memorial institute, University of Ghana to include the verbal autopsy into the causes of death in the children under five. Clearance was also given by the ethical committee in McGill university in Canada who is involved in the nutrition links project. Government and institutional officials (The District Health Directorate (DHD) in Asesewa), traditional and religious leaders at each level had been communicated. Individual information was accessible only to the research team and is kept confidential

3.9 Limitations

Misreporting of age at death (most mothers doubted the age at death) of their wards. The age given was compared with the age of the endline survey which had disparities. The mothers were contacted and they confirmed the endline data on the age at death was correct.

Recall bias may affect determination of cause of death using VA. It is possible most of the caregivers could not remember exactly what happened at the time of data collection.

CHAPTER FOUR

RESULTS

4.1 RESULTS

A total of 31 questionnaires were fully completed. The results are presented according to their demographics, personal information, maternal information, the socio-demographic and environmental factors that contribute to infant mortality. The results are presented in tables and graphs.

4.1.1 Demographics

The table 6 indicates that All 31 respondents provided consent to be interview. Fourty-Five percent (45.2%) of the respondents interviewed were family members and parents to the decease respectively. Among the respondents, 96.8% lived with the deceased prior to death.

Table 6: Relationship between respondent and deceased

characteristic	Frequency	percentage
respondent relation		
Family member	14	45.2
Friend	1	3.23
Other	2	6.45
Parent	14	45.2
Lived with deceased		
No	1	3.23
Yes	30	96.77

4.2 Population and incidence of child deaths in the Upper Manya Krobo District

From 2013 to 2017, the population of under five increased from 14195 to 15875, over which the total 55 deaths (minimum of 5 and a maximum of 16) were recorded yearly. Table 7 shows the actual numbers of daeths and incidence rate per year.

Table 7: Population and Incidence Of Under-Five Population in Upper Manya Krobo District

Year	Population	Under-five mortality reported	Incidence rate (%)	Deaths per 1000 live births
2013	14195	5	0.04	0.4
2014	14493	10	0.07	0.7
2015	14797	16	0.11	1.1
2016	15426	13	0.08	0.8
2017	15875	11	0.07	0.7
Average Incdence	15875	55	0.35	3.5

Source: District Health Information Manament Systems (DHIMS) (2/9/2018) and (DHD, 2018) **2017 district annual reports.**

4.2.1 BIRTH PLACE OF THE DECEASED

The figure below asesewa recorded the highest child birth place (10) followed by Sekesua (2) with the remaining communities recording birth of one deceased over the period.(2013-2017)

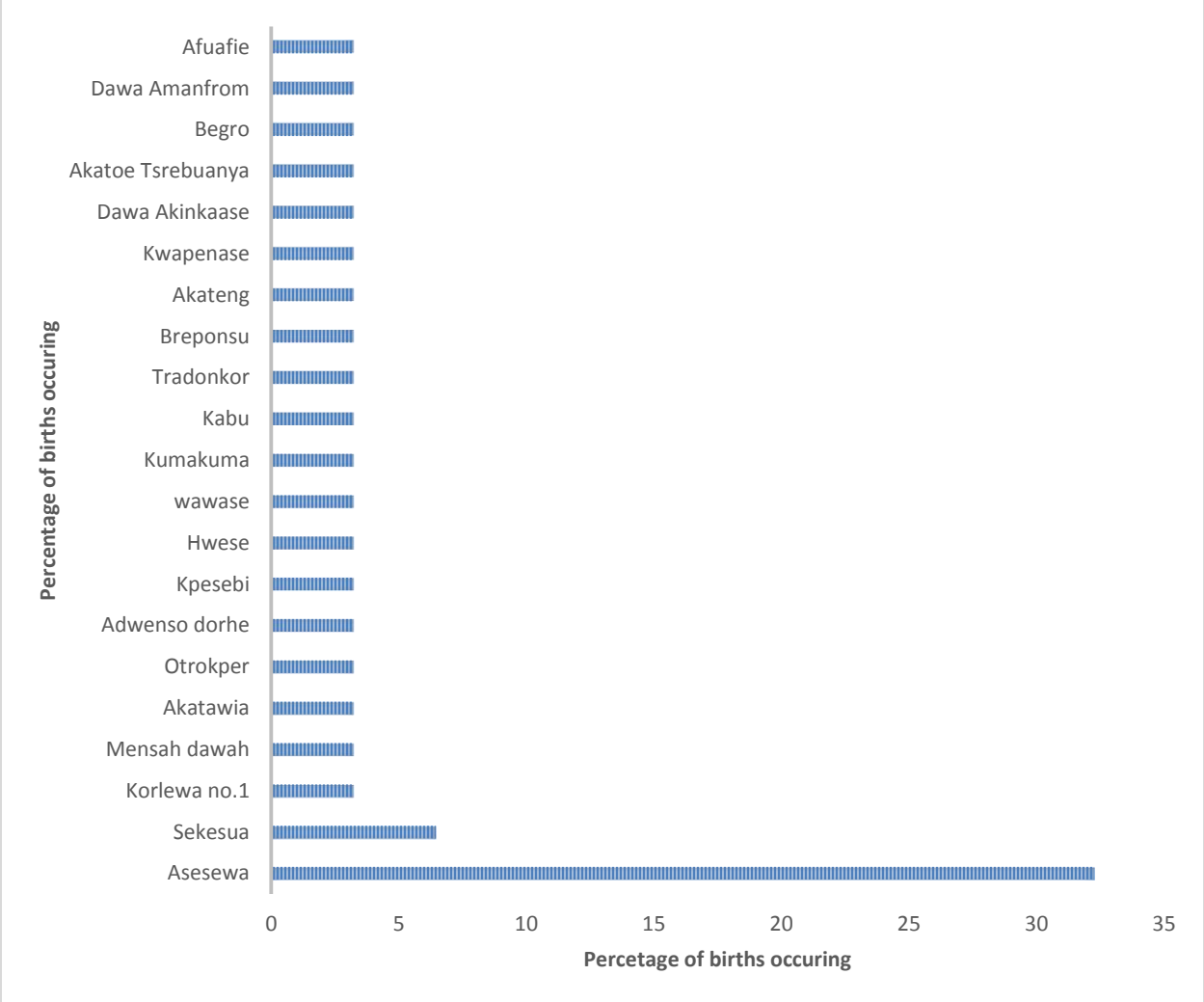


Figure 3: Communities Were deceased were born

In table 8, majority (45.16%) of the respondent indicated that the deceased was born at home, born at home, 35.48% said decease where born at the hospital whiles 6.45% said decease where born on the route to hospital. The majority (74.2%) of deaths occurred among infants between 2-11 months with no deaths among neonates.

The table shows 48.39% of the respondents indicated season of death to be during dry season, 45.16% said it is during wet season whiles 6.45% said they had no idea.Females recorded 64.52% of the deaths with males recording 35.48%. About 87.1% of respondents knew the date of birth of the deceased and 12.9% did not know the date of birth of their deceased children.

Respondents who had the date of death of the deceased available was 64.52 and those that did not have were 35.48%. None of the deceased was a neonate. About 70.97% of the deceased died at home, 22.58% died in the hospital and 6.45% died on the way to the hospital.All the deceased were Ghanaians by birth.Their ethnic groups were made up of 87.1% Ga-Adangwe, 9.68% Ewe and 3.23% from Northern Ghana.

Their deaths were not registered and therefore did not have death certificate.90.3% were on the national health insurance.

Table 8: Detail information about deceased

Variable	Frequency	Percentage
Birth place of deceased		
Home	14	45.16
Hospital	11	35.48
on route to hospital or facility and other	4	12.9
DK	2	6.45
Age category		
Neonate (0-1month)	0	0
Infant (2-11 months)	23	74.2
Child (12-59 months)	5	16.1
No response	3	9.7
Decease mother can read and write	13	41.94
season of death		
Dry (JANUARY-APRIL)	15	48.39
Wet (APRIL - DECEMBER)	14	45.16
sex of deceased		
Female	20	64.52
Male	11	35.48
Where deceased died		
Home	22	70.97
Hospital	7	22.58
On route to hospital or facility	2	6.45
Ethnicity other		
Ewe	3	9.68
Ga-dangme	27	87.1
Northern	1	3.23
death registered		
Does not have National ID (NHIS CARD) available (deceased)	28	90.3
Having national ID card	3	9.7

Figure 4 also shows that Asasewa reported the highest incidence of deaths (7) representing 22.58%, Korlewa and Mensah Dawa recorded same incidence (2 each) thus 6.45% the rest of the communities recorded 1incident each (3.23 %)

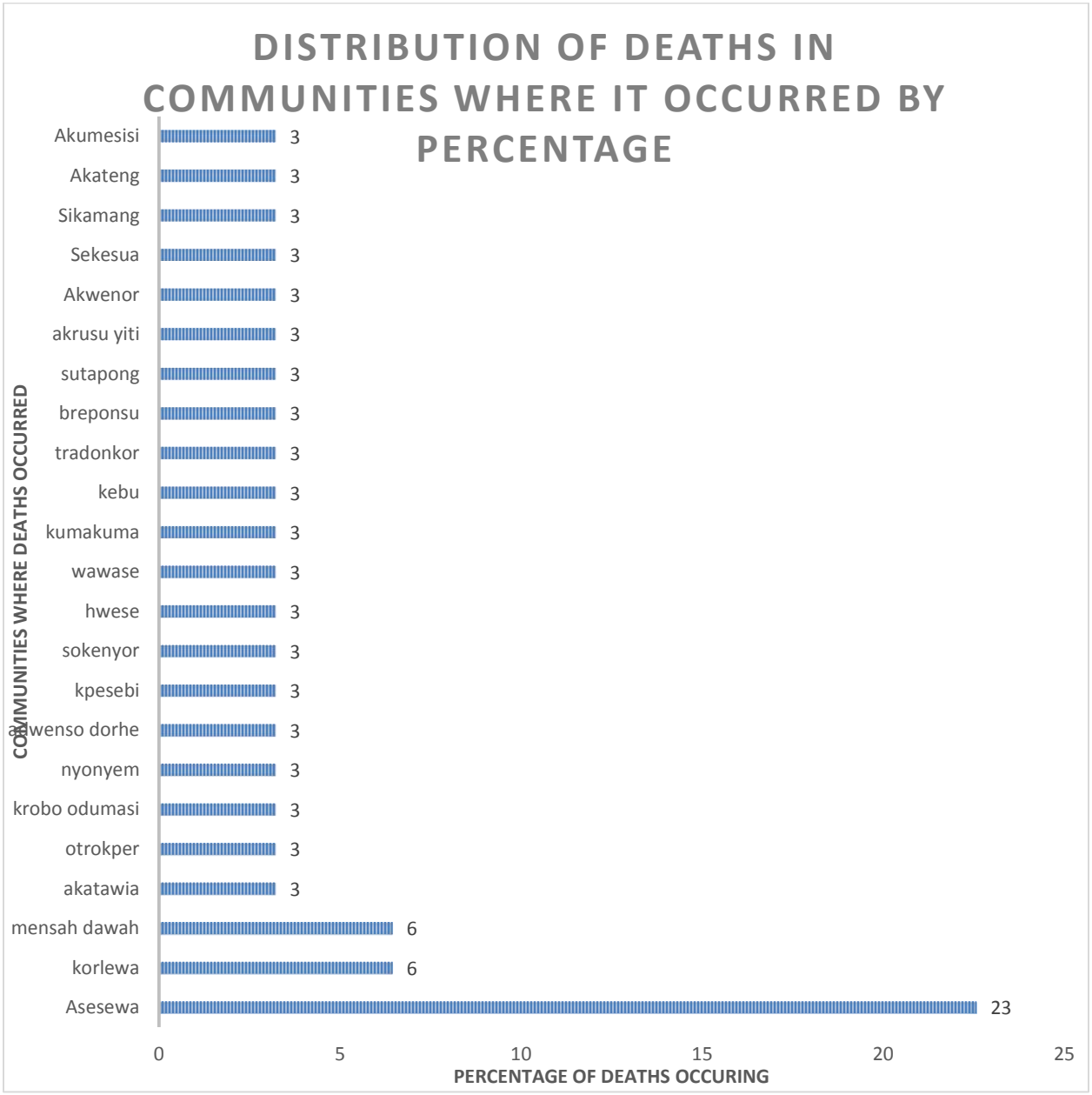


Figure 4: communities death occur

4.3 Estimating the Incidence of child Deaths in the Nutrition Links Study Communities

In Table 9: 41.94% respondence indicated that, deceased mother can read and write whiles 51.61% indicated they cannot read and write. For deceased mother employment status, about 83.87% were into are self employed, 9.68% of the respondent indicated deceased mothers were unemployed whiles 6.45% indicated mothers were mainly government employees.

Table 9:incidence of death recorded in nutrition links project by communities

Sub-district	**Communities**	**Number of children for Nutrition link project**	No of deaths	Incidence rate (%)
Dzamam	Nyonyeaom Afuafie AdwensoDorhe Wawase	125	4	3.2
Sekesua	Sutakpong Breponsu Hwese Sekesua	165	4	2.4
Otrokper	Akatawia Otrokper	95	3	3.2
Akateng	Akateng AkatoeTsrebuanya AkrusuYiti	224	4	1.8
Asesewa	Asesewa Kumakuma	339	5	1.5
Anyaboni	DawaAmanfrom Kabu Mensah Dawa DawaAkwenor DawaApotro Kpesebi Korlewa no. 1 Sikamang	174	11	6.3
Average incidence nutrition links project	All nutrition links communities	1122	31	2.7

FIGURE 5 shows deceased mother`s occupation. In the figure most of the deceased mothers were farmers (16) followed by trading (11). The rest of the deceased mothers were into teaching, seamstress, police assistant. There were a few of them who were not into any occupation (1).

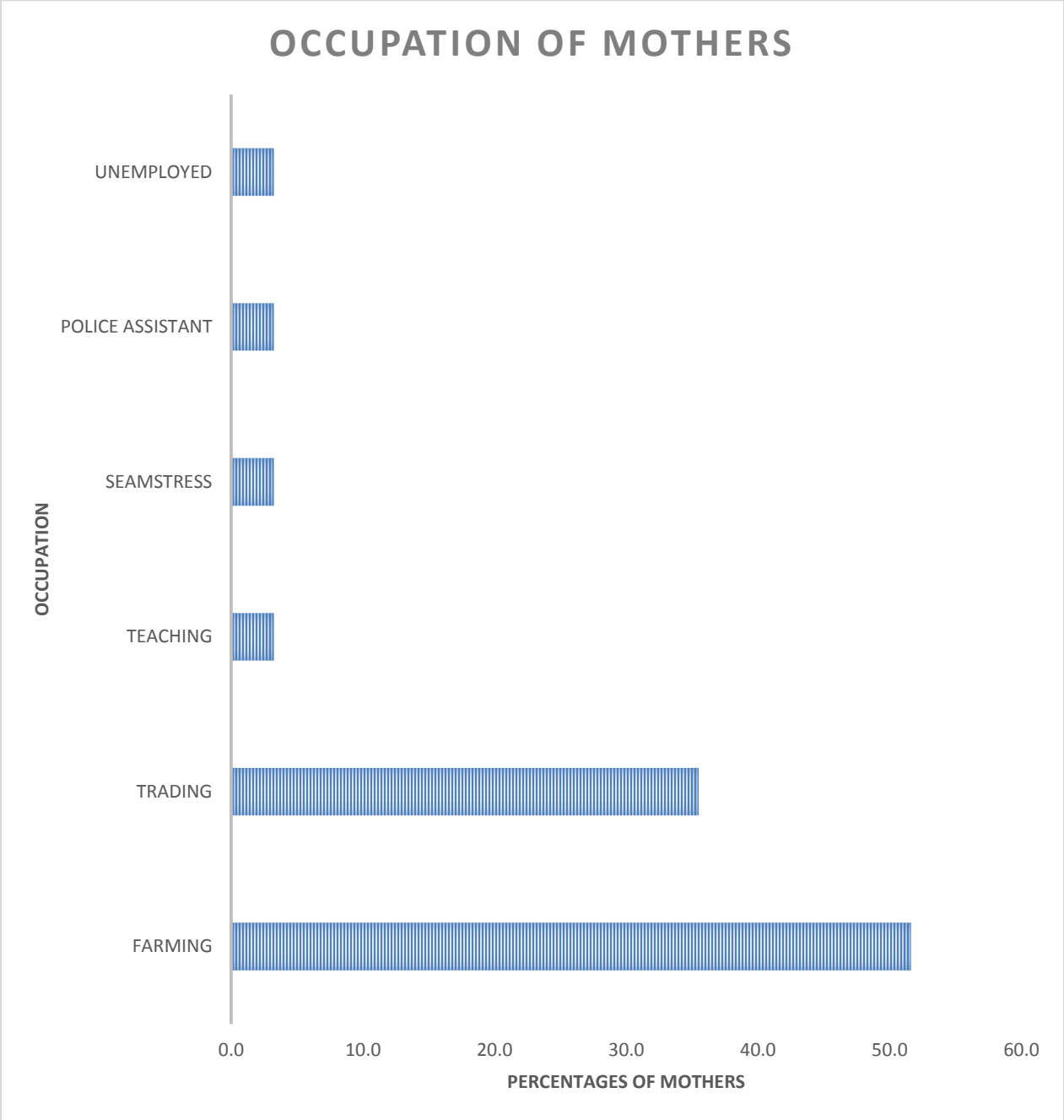


Figure 5: deceased mother`s occupation

The table 10 below shows deceased birth history. In the table, almost all the respondent (93.55%) indicated deceased birth was not multiple whiles 3.23% of the respondents indicating birth was multiple. Child number was also sorted, and 6.45% of the respondents gave no response to that. A majority of them 61.29% indicated the child number was first and 33.26% represented second or later.The table also present that, 77.42% of the deceased mothers were still alive whiles 22.58% of them were no more.

In terms of the usual size of the decease at birth, almost all (93.55%) said the children were of the normal size with 9.68% indicating neonatal childwas 2700 gm, 6.45% indicating it was 2200gm and 3.23% indicating it was 3600gm.For gestational period, the table indicates that 74.19% of the respondents stated the gestational period to be 9 months, 3.23% indicated 10 and 7 months respectively. The rest of the respondents (19.36%) indicated they don't know the gestational period of the decease.

The table also shows that, 19.35% of the respondents said there was complication during the pregnancy and labor respectively whiles majority (77.42%) said, there were no complications. 6.45% did not know whether they had complications or not.

The deceases getational age before their birth recoded that ,74.19% were born at nine (9) months, 19.36% ssaid they didn't know. 3.23% of the mothers delivered at seven (7) and ten (10) months each.

77.42% of mothers did not have any complication during pregnancy while 19.35% had. 3.23% did not know.

Complication during labour and delivery recorded 19.35% and those without complication was 19.36%.

Table 10:Deceased childs birth history

Variable	Frequency:	percentage
birth multiple		
No	30	96.77
Yes	1	3.23
child number		
First	19	61.29
no response	2	6.45
second or later	10	32.26
deceased mother still alive		
no	7	22.58
yes	24	77.42
usual size of deceased at birth		
no	2	6.45
yes	29	93.55
Birth weight in grammes		
<2500	2	6.45
2500-3600	3	9.68
>3600	1	3.23
don’t know	25	80.65

Variable	Frequent	Percentage (%)
Gestational of pregnancy of the deceased		
10	1	3.23
7	1	3.23
9	23	74.19
don't know	6	19.36
complications during pregnancy		
no	24	77.42
yes	6	19.35
Complications during labor		
No	23	74.19
Yes	6	19.35

4.4 Key causes of death of young children in the Upper Manya Krobo District

In Table 11 shows 3.2% of them could not give accounts of the cause of death relating to injury or accident. About 48.4% also said death was sudden whiles 51.6% said death was not sudden. About 97% of the respondents said the deceased neither died through accident nor were they injuries whiles

Table 11:Table 11: How Deceased Died

Variable	frequency	percentage
sudden death		
No	16	51.61
Yes	15	48.39

The figure 6 depicts confirmation of the final diagnose of cause of death by doctors. Malaria recorded the highest (35.5%) cause of death for under five children, followed by Human immunodeficiency virus (HIV) disease (27.6%) and pneumonia (9.7%). The rest of the causes of death were meningococcal infection (3.5%), unspecified neoplasms (6.5%), anaemias (3.5%), congenital malformations, Accidental poisoning by and exposure to noxious substances, Symptoms, signs and abnormal clinical,other (6.5%) and unspecified infectious diseases

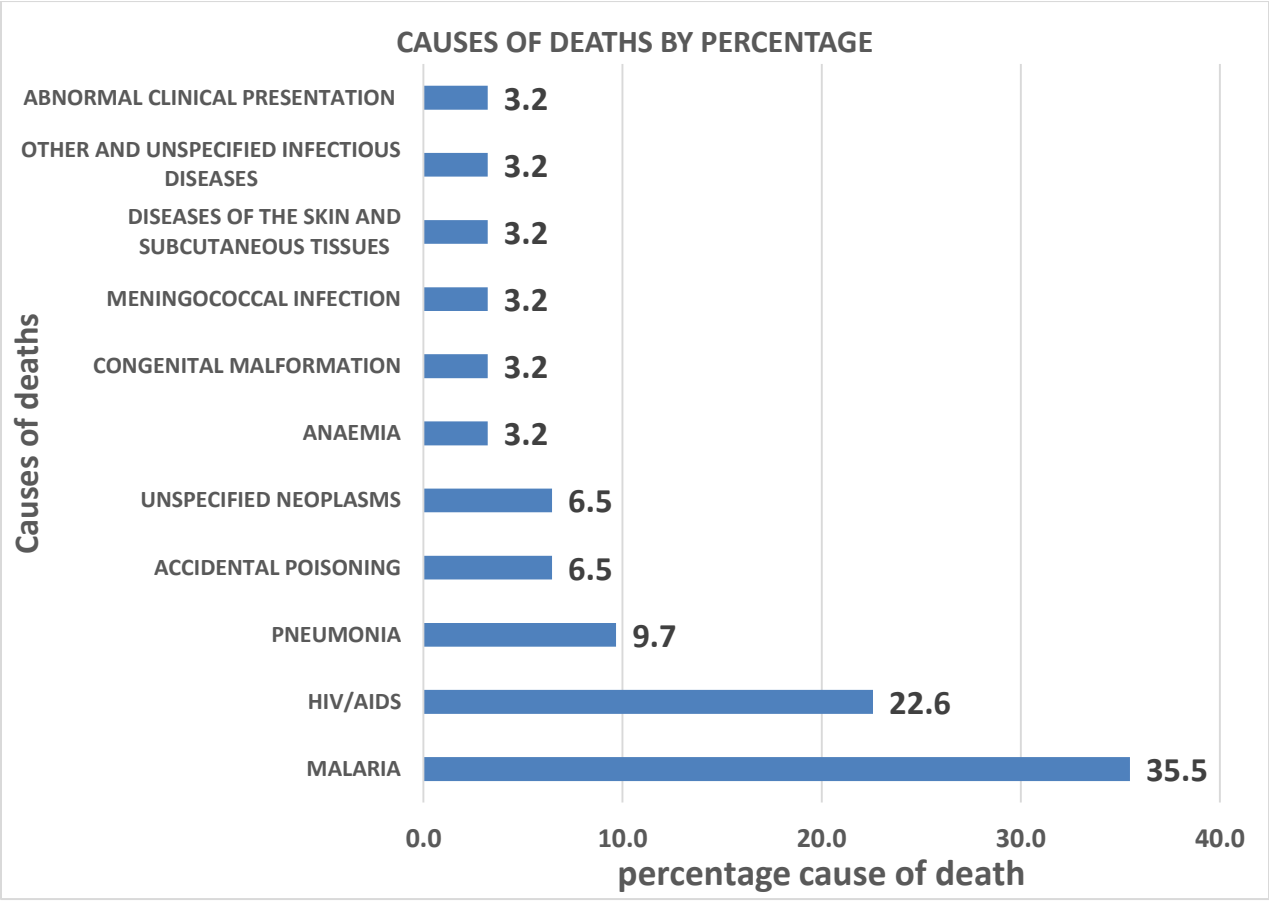


FIGURE 6: (World Health Organization (WHO), 2014)**:** ICD-10 diagnosis distribution among under five in the nutrition links

4.5 Caregiver experience of child death in the Upper Manya Krobo District

4.5.1 Health service utilization

The table 12 shows care givers experiences of child birth and treatment of deceased during the utilization of health service. For treatment of the deceased illness that led to death, 77.42% of the respondents said yes they treated the illness whiles 22.58% said there was no treatment.

The table also indicates that almost all the respondent (80.65%) soughted care outside home whiles the rest of them (16.13% and 3.23%) either did not seek care outside home or they did not even know where care was sought from before deceased died. Again in the table, 51.61% of the respondents said they sought care from government hospital, 22.58% from government health centers or clinic, 3.23% from religious leader and traditional healers respectively whiles 19.35% gave no response to that.

More than fifty percent (67.74%) also indicated cause of death was not declared to them by the health workers whiles only 6.45% indicated a positive response that it was declared to them.

Twenty- eight (28%) percent of the respondents indicated that the deceased mother was diagnosed with HIV, 24% of deceased mothers were HIV negative, with a majority 48% having no knowledge of the deceaeses mothers HIV status. .

4.5.2 Deceased immunization status

The immunization status of deceased was recorded as more than half (52%) of the respondent gave no response to that whiles only few of them (22.58%) shown evidence of all does of Polio, Penta valent, Pneumococcal, Yellow fever and Rota Virus. 9.68% also shown evidence of measles-Yellow Fever, and BCG whiles and 6.45% showed evidence of receiving Vitamin A.

Table 12:Health status of mother nd deceased before death

Variable	Freq	Percentage
treatment of the illness that led to death		
No	7	22.58
Yes	24	77.42
immunization deceased received		
BCG	3	9.68
All Doses Of Polio,Penta Valent, Pneumococcal, Yellow Fever and Rota Virus	7	22.58
Measles-Yellow Fever	3	9.68
Vitamin A	2	6.45
no response	16	51.61
care sought outside home		
No	6	19.36
Yes	25	80.64
facilities care soughted from		
Government health centre or clinic	7	22.58
Government hospital	16	51.61
No response/ don't know	6	19.35
Religious Leader	1	3.23
Traditional Healer	1	3.23
health worker declared cause of death to deceased relatives		
Dk	2	6.45
No	21	67.74
no response	6	19.35
Yes	2	6.45
deceased mother told of having HIV aids by health workers		
Dk	12	48
No	6	24
Yes	7	28

Care givers experience after the death of the child

The deaths were seen to have affected the parents aand caregivers Psychologically and emotional. Some mothers were afraid to have anymore children. As one mentioned that;

> "*The world became so lonely that I even fear getting closure to my husband. I was afraid of getting pregnant, delivering and loosing the child"* she was truamatized greatly"a 26 year old mother at Kabu.

Another mother said;

'The moment I was told my child had died, with disbelif, I called but he didn't respond, I touched his body and his body was colder than normal. I wept and wept. I felt my life had come to an end. Hmmm Sister it wasn't easy seeing his lifeless body lying there motionless ".

Amist tears the fathers of the deceased said it's the fault of my wife who took the child away because of our misunderstanding and now we lost him, a 35 year old man, Anyaboni .

A care giver said their family has never been the way it used to be after the death of the son.

"He (respondent) indicated his mother cooked and they whole family ate including the little one. A little later they all started experincing abdominal pains. My boy started vomiting and running diarrhoea. We decided to send him to the hospital, just then mother (my wife) collapsed. We rushed to them hospital. My boy couldn't make it. He died".

The hardest moment was breaking the news to the mother that he was gone when she gained consuiousness.

This issue has broke my family apart with the accusation that my mother killed her grandson. This has affected her so much that, she fell sick and has not recovered since. She is in the room. It was good you met me, if it were either of the women, I believe it wouldn't have been easy. This death distorted our peaceful home". –"38 year old man at Tsrubuanya"

Another 28 year old mother in asesewa said in tears:

Sister I used a lot of time nd money, I prayed hmmm. What suddened my hert ws tht I still belived she will get well after I was recoring from her lost of her hair, the Dr. told me

she will not lst ny more, aaih it was trumtizing after buying cancer drugs for more thn one year. Imagine how it feels to be told your child is going to die in a few weeks. I will never forget this.

As indicated by a 31 year old woman;

> " *how do I tell my husband about this. This was the fear I had. The hospital staff couldn't even tell me what kill my child*."

> Another lamented *we had a marital problem and I moved to my parents eeeih hmmm my huband blamed me for our daughters death. This worsened the situation.*

This affirms with Sanders (1999) that Parents of children and adolescents who die are found to suffer a broad range of difficult mental and physical symptoms. As with many losses, depressed feelings are accompanied by intense feelings of sadness, despair, helplessness, loneliness, abandonment, and a wish to die(Sanders, 1999). This experiences is not good as it can lead to psychological or economic effects.

> *"The future is blick, I don't know if my children will all die. My only child ooo went away leaving me."*

Financially, they all invested in their wards in one was. During the illness, parent soughted care from the health facilities, herbalist, churches in order to get a cure. This did not there yield any fruits. Thereby making them loose a lot of money.

> "*I went to the hospital with my child, after caring for him for a while, we were asked to sent her to Koforidua, we brough him home to find money. We did not get anyone to borrow us some so we had to resought to local medicine that did not also help till she died."(a* 26 year old mother at Kabu. *)*

The next mother said ;

> *"I sold all I had to take care of her but it didn't yield any fruit, my money for my fish business was used to take care of her. We used all that my husband also had .*

It got to a time that I had to even the animals we rear in order to care for her." A mother of 3 Akatawia.

A 28 year mother of two lamented at Asesewa:

I lost greatly my time, money and strength. She hd a problem with the eye. I sent her to the government hospital. They doctor referred me to koforidua to do some laboratory examination. After the docter reviewed the labortory results, we were referred to Kole Bu. Sister is it esy to go to Kole Bu? Hmmm but I went with the hope tht she will get well. They did futher laboratory examination on her. It ws then I ws told it ws cancer of the eye. Cancer? This smll girl? I was resasured and she was put on treatment. It ws very expensive. Any time I went for review, I had to sent around Ghc 1500.00 but if I don't take care, I may not get my trnspottion back. This continue for about one nd half years. Her sickness drined me too much.

Some parents lost their future expectations as a mother stated that,

"I was afraid of getting pregnant, delivering and loosing the child. Aah madam "(25 year old mother at Akateng)

Most respondents (67.74%) also in Table 13 indicated that it took more than two hours to get to the nearest heath facility during decease illness. Sixty-one percent (61.29%) said they used traditional medicine in the final days of illness. A greater number (87.1%) indicated hospital cost did not prohibit other household payment. Again in the table 14, 63.33% knew how to managed fever in children whiles the rest (36.67%) did not have fair knowledge on how to manage fever.

Table 13: Health service utilization

Variable	Freq	Percentages
take more than two hours to get to the nearest health facility		
Dk	1	3.23
No (use less than 2 hours to health facility)	9	29.03
no response	21	67.74
traditional medicine used in final days		
Dk	2	6.45
no	10	32.26
yes	19	61.29
hospital coast prohibit other household payment		
dk	2	6.45
no	27	87.1
yes	2	6.45
Knowledge on management of fever in children		
No	19	63.33
Yes	11	36.67

CHAPTER FIVE

DISCUSSION

The main purpose of verbal autopsy approach is to describe health at the population level and not at individual level.This chapter discusses the major findings of the study with respect to the objectives. It compares results obtained from the data collected with what is found in literature and shows implications of the results. The study sought to investigate the incidence of under five mortlity in the upper Manya Krobo district and the nutrition links project in the upper Manya Krobo District. It is also to establish the causes of deaths among the children in the nutrition link communities. The study was a Community-based cross-sectional, retrospective study of infants who died in the nutrition link project period (2013-2017). It provided reliable information on the direct cause of neonatal death within the district.

From this study majority of those that gave information about disease children where family members and parents. Family members and parents because it is evident that this group lived with the decease and therefore gave indept information and experiences with the deceased.

The overall four year (2013-2017) incidence of under-five death among 1000 live birth was 55 (3.5) in a district with population of 15875. This figure dispute the projection of the revolutions of mortalities that occur among under-five. Comparing this to the nutrition links project, 31 under five deaths occurred in 1122 population making the incidence of 27.6. Under reporting could be accountable for this gap between these deaths as 35% of the deaths occurred in the study happened at the health facility where as the rest either died at home or on the way to the hospital. The nutrition links had a measure that captured all deaths occurring in the study. One is expected that in the 21th centry, there wont be a record of any incident due to the interventions put in place. As Szreter & Mooney, (1998)

rightly put, with modernization, communities should no longer be a graveyard of mankind, due to concentrated public health and medical innovation, better nutrition and higher socio-economic status (income, education), all of which are associated with rapid changes in personal behaviour(Szreter & Mooney, 1998) . This study's findings endorses therefore Issaka and collegues that there will be a need to consider providing education and health care services in rural areas, when implementing interventions meant to reduce under-five mortality. (Issaka, Agho, & Renzaho, 2016)

All these deaths were from communities in the district. when it compared with other studies, it was ovious in the WHO report that under-five deaths that are reported approximately 41% occur in sub-Saharan Africa (SSA) and are from rural communities (Robert E Black, Saul S Morris, 2003). Therefore the introduction of interventions like that of the nutrition link in rural communities was a loudable idea. Nutritions interventions are seen globally as effective and efficient way of dealing with mortalities most expecially those relating to nutrition defeciencies. This archievement has led to the introduction of a nutrition link projects which major intentions is to help reduce nutrition related mortalities in the study area. It was therefore intereting to find out that even though communities that has the nutrition link projects going on was recorded with higher incidence rate. This findings made the researcher identified that many deaths occuring the communities go unreported. This indictes that there is a lot of missing data. The nutrition links project can help improve reporting of deaths to improve their data capture. It can improve the nutritional status of the children and the family at large which will inturn reduce the mortalities among under-five in the district.

This study found out that, females recorded 64.52% of the deaths with males recording 35.48%. This therefore contradict the statement in a study by Costa et al that due to biological reasons, boys are more likely to die than girls (Costa et al., 2017). Therefore the

detection of gender bases requires knowing the expected relation between male and female mortality rates at different levels of overall mortality, in the absence of discrimination.

About 70.97% of the deceased died at home. This raises concerns about the accessibility of health facilities by the population. As most studies indicated, the continued high rates of deaths that occur at home further suggest the importance of health care access (Rutherford *et al.* 2009). Mostly, failures of spending the last minute of life on earth in the hospital are attributed to the shifts in attitudes about palliative and end-of-life care as they may also be affecting both how these children live and whether they die at home (Feudtner, 2007). However It is estimated that 41–72% of new born deaths can be avoided through adequate coverage of current health care interventions There is some evidence that improvements in health services are associated with reductions in child mortality (Haines *et al.* 2007).

Again the current study found that, most of the deaths were neither through accidents or sudden. It means that majority of the deceased spent time either in the house or hospital before dying. In confirmation of the final diagnose of cause of death by doctors, the study recorded malaria as the most highest (35.5%) cause of death for under five children, followed by Human immunodeficiency virus (HIV) disease (22.6%) and pneumonia (9.7%). Similar results from a a study done in Bangladesh showed that more than 70% of all deaths under five were attributed to five leading causes: disorders relating to short gestation and low birthweight (LBW), birth asphyxia, congenital malformations, and pneumonia. (WHO , 2016).

Compring this study with a study by WHO 2016, to this study, pneumonia was part of the highest cause of deaths just as recorded by WHO 2016 and was ranked the 3rd cause of death in both situations. The differences here is that, while this study had Malaria and

HIV as first and second positions, WHO 2016 had short gestational age and LBW being first, followed by congenital malformations. This could be because the current study recruited babies between 2 months and one year for the study. This could have eliminated neonatal deaths.

For caregiver experience of child death. The study find out majority (77.4%) of care givers treated deceased before they died. Some of the hospital services they received were labortory exmintion, medications, hemotrnsfusion, infusions and other were referred to other facilities for further mngement. Ten percent (10%) of those that were referred had no money and resourhted to traditional healers and churches. Findings indicates that care givers were devastated and faustrated.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1. CONCLUSION

This study determined that the major cause of death in the Nutrition Links Project in the Upper Manya Krobo district were Malaria (35.5%), HIV/AIDS (27.6), and Pneumonia (9.7%). Also, accidental poisoning, and unspecified neoplasms were identified as causes of death.

The study provides information on incidence of death of underfives in the Upper Manya Krobo District as well as in the Nutrition Links Project; we found that in the last five years, 3.5 deaths per thousand live births were recorded at the district level and 27.3 per 1000 among the Nutrition Links Population.

Among the deaths 77.4% sought care from outside the home before their death. Whilst 22.6% did not seek care. About 45.16% the deaths occurred at home and 35.48% at the hospital, and 12.9 on route to the health facility. On the immunization status, 51.61% indicated they did not know their childrens immunition status. They could not also produce the road heath cards, 22.6% were fully immunized before death. They had all their vacines they were suppose to take at age at which they died. 25.81% were not fully immunized at the time of their death. They had only BCG Vaccine in their immunition crds. The BCG prevented them from only tuberculosis. This 22.6% were predisposed to the other preventable diseses.

6.2. RECOMMENDATION

Based on findings of the study, the following recommendations are made:

Ghana health services should consider the following:

- Getting measures to capture all deaths occurring in the Training Stakeholders (including mothers of under years,) on early recognition of sign and symptoms of the major causes of under five morbidity

  Enforcing surveillance on to capture deaths in the communities

The government of Ghana consider:

- training more health staff and building more CHPS centers close to users for early intervention when ill.

The district health directorate needs to contemplate on :

- Embarking on an extensive educational campaign on the need for mothers to ensure insecticide treated mosquito nets usage in order to reduce mortalities reported due to malaria.
- Organizing intergrated management of childhood illnesses (IMCI) or intermintent management of neonatal and childhood illnesses (IMNCI)
- Enhancing the surveillance system to capture all under five deaths.

Ponder on the need for interventions for the causes of deaths

- Education on prevention and management of malaria, HIV/AIDS, Pneumonia and Poisoning especially in young children. health education on the need for early reporting to hospitals

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Appendices

Appendix 1

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH
Established 1979 A Constituent of the College of Health Sciences

University of Ghana

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Legon, Accra

My Reference: DF 22

May 29, 2019

Grace S. Marquis PhD

Dietetics and Human Nutriton

McGill University 21,111 Lakeshore Road,

QC H9X 3V(

RE: Our Study # 027/13-14 **At:** NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH-IRB

Dear Grace S. Marquis PhD:

Meeting Date: 1/10/2018 **At:** NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH-IRB

Protocol Title:

Building capacity of sustainable livelihoods and health through public-private linkages in agriculture and health systems

(Cohort surveys to improve health and well-being of infants, adolescents and their families in Upper Manya Krobo District, Ghana)

This is to advise you that the above referenced Study has been presented to the Institutional Review Board, and the following action taken subject to the conditions and explanation

provided below.

Internal #: 1910

Expiration Date: 9/5/2018

On Agenda For: Procedure

Reason 1: Amendment **Reason 2:**

Description: The PI is requesting the following amendments:

1. To include Rita Pul-Ere Gbarinaa as a student investigator.

2. To determine the causes of reported infant mortalities using verbal autopsy. This will inform the causes of reported infant mortalities to aid health team in the district.

3. To analyze data along side a narrative portion by two trained medical doctors with experience in verbal diagnosis to review questionnaires and separately diagnose using the international classification of diseases, 10th revision, 10 criteria to arrive at the cause of death.

4. To collect and analyse verbal autopsy data.

IRB ACTION: Approved

Condition 1:

Action

Explanation: The amendments to the protocol was approved subject to submitting CV of the student Investigator.

Yours Sincerely,

NMIMR-IRB

IRB Administrator

cc: Anna Lartey PhD , Nutrition and Food Science Department, University of Ghana, Anna Lartey, PhD , Department of Nutrition and Food Science, University of Ghana, Esi Colecraft, PhD , University of Ghana, Department of Nutrition and Food Science, Frances Aboud, PhD. , Richmond Aryeetey, PhD, MPH, University of Ghana, Dept. of

Appendix 2

ADOPTED STANDARD VERBAL AUTOPSY QUESTIONNAIRE (WHO 2016)

DEATH OF A CHILDREN UNDER FIVE YEARS

INDIVIDUAL ID | | | | | | | | | | | |

HOUSEHOLD ID | | | | | | | | |

INSTRUCTION TO INTERVIEWER-introduce yourself and explain the purpose of your visit. Ask to speak to the mother or another adult care giver who was present during the illness that led to death. If it is not possible, arrange a time to revisit the house when the mother or caregiver will be at home. Before interviewing the person, explain to him or her that the participation in the interview is voluntary, He or she can refuse to answer any question and he or she can stop the interview at anytime. Explain to him or her that the information provided is for research purpose only and as such will be kept confidential.

DK- answer means don't know

Ref- answer means refused to answer

No.	Question and filters	Answer	Tick	skip	N/A
10002	Is this An Area Of High HIV/AIDS Prevalence?	High	☐		
		low	☐		
		Very low	☐		
10003	Is this region Of High malaria Prevalence?	High	☐		
		low	☐		
		Very low	☐		
10004	During which season did (s)he die	Wet	☐		
		Dry	☐		
		DK	☐		
	Information on the respondent and background and about the interview				
10007	What is the name of the VA respondent	…….	…… ….	-------	-------
10008	What is the respondent's relationship to the deceased respondent?	Parent	☐		
		Child	☐		
		Other	☐		
		Family member	☐		
		Friend	☐		
		Health worker	☐		
		Public official	☐		

		Another relation	☐		
10009	Did the respondent live with the deceased in the period leading to his/her death	Yes	☐		
		No	☐		
		DK	☐		
		Ref.	☐		
10010	Name of interviewer	……	…… ……	……	……..
10011	Time at the start of interview	hh.mm.24hrs	…… ….	……	……..
10012	Date of interview	Day	☐☐		
		Month	☐☐		
		Year	☐☐		
10013	Did the respondent give consent?	yes	☐		
		No	☐		
	Information on the deceased and vital registration				
10017	What was the first or given name (s) of the deceased?	_____			
10018	What was the surname (family name)of the deceased?	_____			
10019	What was the sex ?	Male	☐		
		Female	☐		
10020	Is the date of birth known?	Yes	☐		
		No	☐ →		10022
		Ref	☐ →		10022
10021	When was the deceased born?	Day	☐☐		
		Month	☐☐		
		Year	☐☐		
10022	Is the date of death known?	Yes	☐		
		No	☐ →		AAAA
		Ref	☐ →		AAAA
10023	When did the deceased die?	Day	☐☐		
		Month	☐☐		
		Year	☐☐		
Age-group	What age group corresponds to the deceased?	Neonate	☐		
		Child			
		Adult	☐		
AAAA	Record the age at the death of the neonate in days , hours or minutes	Days	☐☐		
		Hours	☐☐		
		Minutes	☐☐		
10058	Where did the deceased die?	Hospital	☐		
		Other health facility	☐		
		Home	☐		
		On the rout of the facility /hospital	☐		
		Other	☐		
		DK	☐		
		Ref	☐		
10051	Is there a need to collect civil registration data on the deceased	Yes	☐		
		No	☐ →		10069

10052	What was her/his citizenship/nationality	Citizen by birth	☐		
		Naturalized citizen	☐		
		Foreign national	☐		
		DK	☐		
10053	What was her/his ethnicity?	_____			
10054	Where was her/his place of birth?	_____			
10055	Where was her/his place of residence (the place where the person lived most of the year)	_____			
10057	Where did death occur? (specific country, region, district, Town/village)	_____			
10061	What was the name of the father?				
	Surname _____				
	Other names _____				
10062	What was the name of the mother?				
	Surname _____				
	Other names _____				
	Civil registration numbers				
10069	Is there a need to collect civil registration numbers on the deceased?	Yes	☐		
		No	☐	→	10077
10070	Death registration number/certification	_____			
10071	Date of registration	Day	☐☐		
		Month	☐☐		
		Year	☐☐		
10072	Place of registration	_____			
10073	National identification number of deceased	_____			
	History of injury/accident?				
10077	Did s/he suffer from any injury or accident that led to his/her death?	Yes	☐		
		No	☐	→	10104
		Dk	☐	→	10104
		Ref	☐	→	10104
	Injury and accident detail				
10079	Was it a road traffic accident?	Yes	☐		
		No	☐	→	10082
		Dk	☐	→	10082
		Ref	☐	→	10082
10080	What was his/her role in the road traffic accident?	Pedestrian			
		In car or light vehicle	☐		
		In bus or heavy vehicle	☐		

		On a motorcycle	☐		
		On a pedal cycle	☐		
		Other	☐		
10081	What was the counter part that was hit during the road traffic accident?	Pedestrian	☐		
		Stationary object	☐		
		Car or light vehicle	☐		
		bus or heavy vehicle	☐		
		motorcycle	☐		
		pedal cycle	☐		
		Other	☐		
10082	Was (s)he injured in a non-road traffic accident?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10083	Was (s)he injured in a fall?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10084	Was there any poisoning?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10085	Did (s)he die of drowning?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10086	Was (s)he injured by a bite or sting of a venomous animal?	Yes	☐	→	10088
		No	☐		
		Dk	☐		
		Ref	☐		
10087	Was (s)he injured by an animal bite /insect sting (non venomous)	Yes	☐		
		No	☐	→	10089
		Dk	☐	→	10089
		Ref	☐	→	10089
10088	What was the animal/insect?	Dog	☐		
		Snake	☐		
		Insect/scorpion	☐		
		Other	☐		
		DK	☐		
10089	Was (s)he injured by burns /fire?	Yes	☐		

		No	☐		
		Dk	☐		
		Ref	☐		
10090	Was (s)he subject to violence (homicide, abuse)	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10091	Was (s)he injured by a fire arm?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10092	Was (s)he stabbed, cut or pierced ?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10093	Was (s)he strangled?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10094	Was (s)he injured by a blunt force?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10095	Was (s)he injured by a force of nature?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10096	Was it electrocution?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10097	Did (s)he encounter any other injury?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10098	Was the injury accidental?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		

10100	Was the injury or accident internationally inflicted by someone else?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	VERIFICATION OF POSSIBLE STILL BIRTH				
10104	Did the baby ever cry?	Yes	☐		
		No	☐	→	10109
		Dk	☐	→	10109
		Ref	☐	→	10109
10105	Did the baby cry immediately after birth, even if only a little bit?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10106	How many minutes after birth did the baby first cry (use 999 for never)	minutes	☐☐		
10107	Did the baby stop being able to cry?	Yes	☐		
		No	☐	→	10109
		Dk	☐	→	10109
		Ref	☐	→	10109
10108	How many hours before death did the baby stop crying ?	Hours-	☐☐		
10109	Did the baby ever move?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10110	Did the baby ever breathe?	Yes	☐		
		No	☐	→	
		Dk	☐		
		Ref	☐		
10111	Did the baby breathe immediately after breathe even a little?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10112	Did the baby have a breathing problem?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10113	Was the baby given assistance to breathe at birth?	Yes	☐		
		No	☐		
		Dk	☐		

		Ref	☐		
10114	If the baby didn't show any sign of life, was it born dead?	Yes	☐	-still birth	
		No	☐	-live birth	
		Dk	☐		
		Ref	☐		
10115	Was there any bruises or signs of injury on the childs boby after birth?	Yes	☐		
		No	☐	→	(If live birth, then 10347, if still birth proceed to 10116)
		Dk	☐		
		Ref	☐		
	Note – the following question is to be asked only of still birth, as confirmed by a yes response to 10114. In the case of a live birth (no. to 10114) do not ask 10116 but proceed to 10351.				
10116	Was the baby soft puppy and discolored and the skin peeling away?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	HEALTH HISTORY **Illness duration**				
10351	How old was the baby when the fatal illness started?	Days ……	☐☐		
10408	**Before** the illness that led to the death, was the baby/child growing normally?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10120	For how many days was (s)he ill before (s)he died?	Day	☐☐		
10122	For how many weeks was (s)he ill before (s)he died?	Weeks	☐☐		
10123	Did (s)he die suddenly?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	Medical history associated with final illness				
	General signs and symptoms associated with final illness				
10147	Did (s)he have a fever?	Yes	☐		
		No	☐	→	10153
		Dk	☐	→	10153
		Ref	☐	→	10153
10148	For how many days did the fever last	Days	☐☐		

10149	Did the fever continue until death?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10153	Did (s)he have a cough?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10158	Did (s)he make a whooping sound when coughing ?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10159	Did (s)he have any difficulty breathing ?	Yes	☐		
		No	☐	→	10166
		Dk	☐	→	10166
		Ref	☐	→	10166
10161	For how many days did the difficulty breathing last?	Days	☐☐		
10166	During the illness that led to death, did (s)he have fast breathing?	Yes			
		No		→	10168
		Dk		→	10168
		Ref		→	10168
10167	For how many days did the fast breathing lsat?	Days	☐☐		
10168	Did (s)he have breathlessness?	Yes			
		No		→	10172
		Dk		→	10172
		Ref		→	10172
10169	For how many days did the breathlessness last?	Days	☐☐		
10172	Did you see the lower chest wall/ribs being pulled in as the child breathes?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10173	During the illness that led to death did his /her breathing sound like any of the following….	Stridor	☐		
		Grunting	☐		
		Wheezing	☐		
		No	☐		
		DK	☐		
		Ref.	☐		
10181	Did (s)he have more frequent loose or liquid stools than usual?	Yes	☐		

		No	☐	10188
		Dk	☐	10188
		Ref	☐	10188
10183	How many stools did the baby or child have on the day that loose liquid stools were most frequent?	Stools….	☐☐	
10186	How many days before death did the frequent loose/liquid stools start?	Days	☐☐	
	At any time during the final illness was there blood in the stool?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	
10188	Did (s)he vomit?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	
10189	Did (s)he vomit in the week preceding death?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	
10214	Was (s)he unconscious during the illness that led to death?	Yes	☐	
		No	☐	10219
		Dk	☐	10219
		Ref	☐	10219
10219	Did (s)he have convulsions?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	
10233	During the illness that led to death, did (s)he have any skin rash?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	
10239	During the illness that led to death, did (s)he have areas of the skin turn black?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	
10240	During the illness that led to death, did (s)he have areas of the skin with redness/swelling?	Yes	☐	
		No	☐	
		Dk	☐	
		Ref	☐	

10241	During the illness that led to death, did (s)he have bleed anywhere?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10265	Did (s)he have yellow discoloration of the eyes?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10271	Was the baby able to suckle or bottle feed within the first 24 hours after birth?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10272	Did the baby ever suckle in a normal way?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10273	Did the baby stop suckling?	Yes	☐		
		No	☐	→	10275
		Dk	☐	→	10275
		Ref	☐	→	10275
10274	How many days after birth did the baby start suckling?	Days	☐☐		
10275	Did the baby have convulsins in the first 24hours of life?	Yes	☐	→	10277
		No	☐		
		Dk	☐		
		Ref	☐		
10276	Did the baby have convulsions starting more than 24hour after birth?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10277	Did the baby's body become stiff, with the head arched backwards?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10278	During the illness that led to the death, did the baby have a bulging fontanelle?	Yes	☐	→	10284
	(ask only up to 18 months)	No	☐		
		Dk	☐		
		Ref	☐		

10279	During the illness that led to the death, did the baby have a sunken fontanelle?	Yes	☐		
	(ask only up to 18 months)	No	☐		
		Dk	☐		
		Ref	☐		
10281	During the illness that led to the death, did the baby become unresponsive or unconscious?	Yes	☐		
		No	☐	→	10284
		Dk	☐	→	10284
		Ref	☐	→	10284
10282	Did the baby become unresponsive or unconscious soon after birth, within less than 24hours ?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10283	Did the baby become unresponsive or unconscious more than 24 hours after birth?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10284	During the illness that led to the death, did the baby become cold to touch?	Yes	☐		
		No	☐	→	10286
		Dk	☐	→	10286
		Ref	☐	→	10286
10285	How many days old was the baby when it started feeling cold to touch?	Days …	☐☐		
10286	During the illness that led to death did the baby become lethargic after a period of normal activity	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10287	Did the baby have redness or pus drainage from the umbilical cord stump?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10288	During the illness that led to death, did the baby have skin ulcers or pits?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10289	During the illness that led to death, did the child have yellow skin, palm (hands),or sole of the feet (foot).	Yes	☐		
		No	☐		
		Dk	☐		

		Ref	☐		
10290	Did the baby appear healthy and then just die suddenly?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10347	Was the baby born more than one month early?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	Neonatal and child history, signs and symptoms				
	Neonatal and child questions Part A				
10354	Was the child part of a multiple birth?	Yes	☐		
		No	☐	→	10356
		Dk	☐	→	10356
		Ref	☐	→	10356
10355	Was the child the first, second ,or later in the birth order	First	☐		
		second ,or later	☐		
10356	Is the mother alive	Yes	☐	→	10360
		No	☐		
		Dk	☐		
		Ref	☐		
10357	Did the mother die during or after the delivery?	During delivery	☐	→	10360
10358	How many months after delivery did the mother die?	months	☐☐		
10359	How many days after delivery did the mother die?	Days	☐☐		
10360	Where was the deceased born?	Hospital	☐		
		Other health facility	☐		
		Home	☐		
		On route to he hospital/facility	☐		
		Other	☐		
		DK	☐		
		Ref.	☐		
10361	Did the mother receive professional assistance during the delivery?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10362	At birth was the baby of usual size?	Yes	☐	→	10365
		No	☐		
		Dk	☐		
		Ref	☐		

10363	At birth was the baby very much smaller than usual (weighing under 2.5kg)?	Yes	☐		
		No	☐	→	10365
		Dk	☐	→	10365
		Ref	☐	→	10365
10364	At birth was the baby very much smaller than usual (weighing under 1 kg)?	Yes	☐	→	10366
		No	☐	→	10366
		Dk	☐	→	10366
		Ref	☐	→	10366
10365	At birth was the baby very much smaller than usual (weighing under 4.5kg)?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10366	What was the weight in grammes	Grammes	☐☐		
		DK	☐		
10367	How many months long was the pregnancy before birth?	months	☐☐		
		DK	☐		
10368	Were there any complications in the last part of the pregnancy (defined as the last 3 months befor labour)	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10369	Were there any complications labour/delivery?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10370	Was any part of the baby physically abnormal at the time of delivery?	Yes	☐	→	10376
	(for example body parts too large or too small)	No	☐		
		Dk	☐		
		Ref	☐		
10371	Did the baby /child have swelling or or a defect on the back at time of birth?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		

10372	Did the baby /child have a very large head at the time of birth?	Yes	☐	→	10376
		No	☐		
		Dk	☐		
		Ref	☐		
10373	Did the baby /child have a very small head at the time of birth?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	Neonatal child questions part B				
10376	Was the baby moving in the last few days before the?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10377	Did the baby stop moving in the womb before labour started?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10379	How many days before labour did you or the mother last feel the baby move?	Days	☐☐		
	(maybe the respondent or health worker had examined the mother)				
10380	How many hours before labour did you or the mother last feel the baby move?	Hours	☐☐		
	(maybe the respondent or health worker had examined the mother)				
10382	How many hours did labour and delivery take?	Hours	☐☐		
103 83	Was the baby born 24 hours or more after the water broke?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10384	Was the liquor foul smelling?	Yes	☐		
		No	☐		

		Dk	☐		
		Ref	☐		
10385	What was the colour of the liquior when the water broke?	Green /brown	☐		
		Clear	☐		
		Other	☐		
		DK	☐		
		Ref.	☐		
	How was the baby delivered?				
10387	Was the delivery normal vaginal without forceps or vacuum?	Yes	☐	→	10391
		No	☐		
		Dk	☐		
		Ref	☐		
10388	Was the delivery vaginal,with forceps or vacuum?	Yes	☐	→	10391
		No	☐		
		Dk	☐		
		Ref	☐		
10389	Was the baby delivered via caesarean section?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10391	Did you /the mother receive any vaccinations since reaching adulthood including during pregnancy?	Yes	☐		
		No	☐	→	10394
		Dk	☐	→	10394
		Ref	☐	→	10394
10392	How many doses?	doses	☐☐		
10393	Did the mother receive tetanus toxoid (TT) vaccine?	Yes	☐		
		No	☐		
		Dk	☐		

		Ref	☐		
10394	How many birth, including still births did the baby's mother have before this baby?	Births	☐☐		
10395	During labour, did the baby's mother suffer from fever?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10396	During the last three (3)months of pregnancy, labour or delivery, did the babys mother suffer from high blood pressure?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10397	Did the babys mother have diabetes mellitus?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10398	Did the babys mother have foul smelling vaginal discharge during pregnancy or after delivery?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10399	During the last three (3) months of pregnancy, labour or delivery, did the babys mother suffer from convulsions?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10400	During the last three (3) months of pregnancy, did the babys mother suffer from blurred?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10401	Did the mother have severe anaemia?	Yes	☐		
		No	☐		

		Dk	☐		
		Ref	☐		
10402	Did the baby's mother have vaginal bleeding during the last 3 months of pregnancy but before labour started?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10403	Did the babys bottom, feet, arms, or hand come out of the vagina before the head?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10404	Was the umbilical cord wrapped more than once around the neck?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10405	Was the umbilical cord delivered first?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10406	Was the baby blue in colour at birth?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	HEALTH SERVICE UTILIZATION				
10418	Did (s)he receive any treatment for the illness that led to death?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10419	Did (s)he receive oral rehydration salt?	Yes	☐		

		No	☐		
		Dk	☐		
		Ref	☐		
10420	Did (s)he receive (or need) intravenous fluids (drip) treatment?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10421	Did (s)he receive (or need) a blood transfusion?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10422	Did (s)he receive any treatment/ food through a tube passed through the nose?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10423	Did (s)he receive (or need) injectable antibiotics?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10424	Did (s)he receive (or need) antiretroviral therapy (ART)?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10425	Did (s)he receive (or need) an operationfor the illness?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10428	Had (s)he received immunization?	Yes	☐		

		No	☐		
		Dk	☐		
		Ref	☐		
10429	Do you have the child's vaccination card?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10430	Can I see the vaccination cards?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10431	Note the vaccines here				
	……				
	……..				
	……..				
10432	Was care sought outside the home while (s)he had this illness?	Yes	☐		
		No	☐	→	10435
		Dk	☐	→	10435
		Ref	☐	→	10435
10433	Where or from whom did you seek this care?	Traditional healer	☐		
		Homeopath	☐		
		Religious leader	☐		
		Government hospital	☐		
		Government health center/ clinic	☐		
		Private hospital	☐		
		Community –based practitioner associated with health system	☐		
		Trained birth attendant	☐		
		Private physician	☐		

		Relative, friend (outside the household)	☐		
		Pharmacy	☐		
		Doesn't know	☐		
		Refused to answer	☐		
10434	Record the name and address of any hospital health center or clinic where help was sought..				
	_____				
	_____				
	_____				
10435	Did the health care worker tell you the cause of death?	Yes	☐		
		No	☐	→	10437
		Dk	☐	→	10437
		Ref	☐	→	10437
10436	What did the health worker say?				
	_____				
	_____				
	_____				
10437	Did you health care record cardthat belonged to the deceased?	Yes	☐		
		No	☐	→	10445
		Dk	☐	→	10445
		Ref	☐	→	10445
10438	Can is ee the health records?	Yes	☐		
		No	☐	→	10435
		Dk	☐	→	10435
		Ref	☐	→	10435
10439	Record the date of the most recent /last visit?	Day	☐☐		
		Month	☐☐		
		Year	☐☐		
10445	Has the deceased's (biological) mother ever been tested for HIV	Yes	☐		

		No	☐		
		Dk	☐		
		Ref	☐		
10446	Has the deceased's (biological) mother ever been tested for HIV/AIDS by a health worker?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	Background and context				
10450	In the final days before death, did s/he travel to a hospital or health facility?	Yes	☐		
		No	☐	→	10455
		Dk	☐	→	10455
		Ref	☐	→	10455
10451	Did s/he use motorized transport to get to the hospital or health facility?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10452	were they any problems during admission to the hospital/healthy facility?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10453	Were there any problems with the way s/he was treated (medical treatment, procedures, interpersonal attitude, respect, dignity) in the hospital or health facility?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10454	Were there problems getting medications, or diagnostic tests in the hospital or health facility?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		

10455	Does ir take more than 2 hours to get to the nearest hospital or health facility?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10456	In the final days before death were there any doubts about whether medical care was needed?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10457	In the final days before death, was traditional medicine used?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10458	In the final days before death, did anyone use a telephone or cell phone to call for help?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
10459	Over the course of illness, did the total costs of care and treatment prohibit other household payments?	Yes	☐		
		No	☐		
		Dk	☐		
		Ref	☐		
	Death certificate with cause of death				
10462	Was a death certificate issued?	Yes	☐		
		No	☐	→	10481
		Dk	☐	→	10481
		Ref	☐	→	10481
10463	Can I see the death certificate	Yes	☐		
		No	☐	→	10481
		Dk	☐	→	10481

		Ref	☐	→	10481
10464	Record the immediately cause of death from the certificate (line 1a)				
	_____				
10465	Duration (1a)				
	_____				
10468	Record the second antecedent cause of death from the certificate (Line 1c)				
	_____				
10469	Duration (1c)				
	_____				
10470	Record the third antecedent cause of death from the certificate (line 1d)				
	_____				
10471	Duration (line 1d)				
	_____				
10472	Record the third antecedent cause of death from the certificate (line 1d)				
	_____				
10473	Duration (part 2)				
10476	**NARRATIVE DESCRIPTION** _____ _____				
10479	**Are any of the following words of interest mentioned in the above narrative?**	Asphysia	☐		
		Incubator	☐		
		Lung problem	☐		
		Pneumonia	☐		
		Preterm delivery	☐		
		Respiration distress	☐		
		None of the above words were mentioned	☐		
10481	**Time at end of interview**		☐		

Appendix 3

ADOPTED STANDARD VERBAL AUTOPSY QUESTIONNAIRE (WHO 2016)

DEATH OF A CHILDREN UNDER FIVE YEARS

VERBAL AUTOPSY NARRATIVE DESCRIPTION FORM

Circle appropriately - 1. Under 28 days 2. 28 days to 12 year 3. 12 years plus

INDIVIDUAL ID

HOUSEHOLD ID

1. What symptoms did the child present prior to death? How did the sickness start?

……
……

……
……
……
……

2. Did your child have fever? How did you manage fever in the sick child?

……
……
……
……
……

3. Mother/caregivers experience after child's death?

……
……
……
……