



LUND UNIVERSITY

School of Economics and Management

Masters in Economic Demography

Socio-economic determinants of under-five mortality in urban and rural areas in
Tanzania

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Under-five mortality in rural and urban areas in Tanzania is of critical national concern as is also the case in other developing countries. Within Tanzania, mortality rates vary greatly by region, with some regions having much higher mortality rates than others. The government of Tanzania has made substantial progress in reducing the under-five mortality rate. Despite the strategies introduced by the Government to reduce the under-five mortality rate, the rate is still higher in rural areas than urban areas. The main objective of this study is to determine which socioeconomic and environmental factors influence under-five mortality in rural and urban areas. Binary Logistic Regression is used for this analysis. Results from this study show that aged of mothers older than 40years, working mothers, birth interval, unimproved sources of water and mothers who never breastfeeding has significant impact on the probability of death in both urban and rural areas. The study recomended that Tanzania would benefit from educational campaigns on breastfeeding, child spacing and family planning.

Keys words: Socio-economic factors, Tanzania, rural, urban, under-five mortality

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1.0 INTRODUCTION

Despite the world decline in child mortality, the levels of under-five mortality still remain too high in low and middle income countries (SDG, 2017). In order to reduce the mortality rate, proven interventions and strategies with high impact need to be implemented to help to achieve the goal of reducing under-five mortality. This study will aim to determine the socio-economic factors that influence under-five mortality in rural and urban areas in Tanzania. In this study the socio-economic factors have been defined as the wealth of the household, whether the mother is working or not and the level of the mother's education. These factors appear to have an impact on under-five mortality in many countries in Sub-Saharan Africa. According to Mosley and Chen (1984), all socioeconomic determinants should operate through proximate determinants in order to influence the child mortality.

The proximate determinants used in this study are demographic and geographic factors (sex of the child, birth interval and the place of the residence), health-seeking behavior (place of delivery and breastfeeding) and hygienic factors (type of toilet facilities and source of water). This study used secondary data from the Tanzania Demographic Health Survey 2015/2016 while the analysis of this data will be carried out by logistic regression which will establish the impact of the socio-economic determinants on the level of under-five mortality.

1.1 Research Problem

The reduction in under-five mortality is a world-wide target and, according to the UNICEF report (2013), some of the poorest countries in the world, in terms of total national income, have made the greatest progress in child survival (Bangladesh, Ethiopia, Liberia, Malawi, Nepal, Timor-Leste and Tanzania). However, despite this decrease, under-five mortality is still an issue throughout the world.

For the purpose of this research, I will focus on under-five mortality: "mortality among children less than five years of age" (Sullivan & Tureeva, 2004, p. 77). This definition includes neonatal mortality; post neonatal mortality, infant mortality and child mortality (see Chapter 2). Mortality rates quoted in the text are all expressed in the number of deaths per 1000 live births.

In Africa, for example, the risk of a child dying before reaching five years of age is about 74 per 1000 live births (World Health Organisation, 2019a). This rate is eight times higher than that in Europe (9 per 1000 live births) (World Health Organisation, 2019a). A child in Sub-Saharan Africa is approximately 15 times more likely to die before reaching the age of 5 than a child in developed countries (World Health Organisation, 2018).

Statistics made available through the National Bureau of Statistics–Ministry of Finance in Tanzania, show that there is a difference in under-five mortality rates depending on the sex of the child and whether the child lived in a rural or an urban area. According to the 2012 census, the

average under-five mortality rate in Tanzania was 66.5 (URT, 2015). The average mortality rate for male children over the whole country was higher at 72.7, compared to the rate for females at 60.2. Further, the under-five mortality rate in urban areas was above average, at 71.2, while rural areas were a little below average at 65.9 (URT, 2015). Male children had a higher mortality rate than females both in rural and urban areas (URT, 2015).

Table 1.1: Rural and Urban Under-Five Mortality by Sex in Tanzania, according to the 2012 census (URT, 2015)

	Total	Male	Female
Tanzania	66.5	72.7	60.2
Rural	65.9	71.8	59.9
Urban	71.2	78.4	63.8

Within Tanzania, mortality rates vary greatly by region, with some regions having much higher mortality rates than others (see Table 1.2). However, why there are big differences across the country is still not known.

Table 1.2: Five regions in Tanzania with highest under-five mortality (URT, 2015)

Regions	Under-5 Mortality(sq₀)		
	(Deaths per 1000 live births)		
Administrative	Total	Male	Female
Tanzania	66.5	72.7	60.2
Kagera	93.9	100.3	87.2
Iringa	90.7	100	82.2
Rukwa	81.2	87.6	74.6
Pwani	75.4	83.1	67.4
Dar es Salaam	72.3	79.5	64.9

Socioeconomic factors such as breastfeeding have been studied with results showing that early initiation and exclusive breastfeeding indicators were substandard and below the national targets for Tanzania (Victor, Baines, Agho & Dibley, 2010). Other studies showed that education was a contributing factor as mothers with no education reported a child mortality rate of 14.6%, mothers with only primary education reported a rate of 11.1% and those with higher education reported a rate of only 5.3% (P<0.001) (Susuman & Hamisi, 2012). Moreover, short birth intervals were strongly related to mortality rates (Susuman, Hamisi & Nagarajan, 2016).

While measures are being taken to try and lower the under-five mortality rates in Tanzania, very little is known about the socioeconomic and environmental factors that may have an impact on the under-five mortality rates in urban and rural areas in Tanzania. For example, it is not certain whether breastfeeding, education, employment, frequency of birth, etc., have an impact on under-five mortality rates. Therefore, this research seeks to explore these issues in order to determine the factors that affect both urban and rural areas in terms of under-five mortality rates.

1.2 Research Aim

The aim of the study is to determine which socioeconomic and environmental factors influence under-five mortality in urban and rural areas in Tanzania.

In order to address this issue, the following research questions will be addressed:

What are the socioeconomic and environmental determinants of under-five mortality in urban and rural Tanzania?

Is there a difference between the rural and urban determinants of under-five mortality in Tanzania?

1.3 Research Purpose

There is some disagreement in the literature as to whether urban or rural areas have a higher under-five mortality rate, although all studies agree that infant mortality rates are higher in urban areas. The aim of this study is to describe the socioeconomic and hygiene factors that influence the under-five mortality rate in rural and urban areas in Tanzania. This study will also provide the answer to the question of which areas (urban and rural) have higher mortality rates. In order to shed light on the contributing factors to under-five mortality in Tanzania, comparing rural and urban areas, this research will draw on the Mosley-Chen framework, as it is considered to be the most comprehensive framework for analyzing under-five mortality.

This quantitative research is based on a population of under-fives at risk in Tanzania. The data was drawn from the Tanzania Demographic and Health Survey (TDHS) (2015-2016) which was a national study. Four hypotheses will be tested using a binary logistic regression analysis. The findings of this study will provide information for policy makers and health planners on how to reduce under-five mortality, in order to achieve the sustainable development goals as defined by the United Nations (2015)

1.4 Outline of the thesis

The first chapter describes and presents this research. The second chapter presents the literature and theoretical review, the conceptual model drawing on Mosely and Chen which will be used as the basis for the operational framework, and presents the research hypotheses. Chapter 3 explains the methodology, data used, explanations of the variables included in the regression, models

used, limitations of the study, and the validity and reliability of this study. Chapter 4 presents the results and an analysis of the findings. Chapter 5 will discuss the results, and then Chapter 6 will conclude the thesis by summarising the main points, and present the implications of the study along with the main contributions and areas for further research.

2.0 Theoretical and Literature Review

This chapter will explain the background of the study, outline the theories behind it, describe the conceptual model used as the basis for the operational framework, and the list the research hypotheses. It then presents the review of the literature related to factors influencing under-five mortality.

2.1 Background of the study

The reduction in under-five mortality is a world-wide target of the Millennium Development Goals (MDG). Target 4.A of the MDG was to “reduce by two-thirds, between 1990 and 2015, the under-five mortality rate” (World Health Organization, 2019b, online). According to the World Health Organization (2019b), in 2015, death rates in under-five children dropped from “12.7 million in 1990 to 6.3 million in 2013” (online). At the end of the MDG period, the new agenda for Sustainable Development Goals (SDGs) was adopted and seventeen SDGs were accepted and agreed upon by the top global leaders (United Nations, 2015). According to Sustainable Development Goal 3, number 3.2, the target is to “end preventable deaths of newborns and children under 5 years of age” (United Nations, 2018, online). It is a target for all countries to ensure that they reduce their neonatal and child mortality rates by the end of 2030 (United Nations, 2018). Some countries have succeeded in reducing the rate of child mortality by very large percentages; for example, China has been able to reduce under-five mortality from 28.4% in the 1950s to 1.3% by 2013 (Roser, 2018). Despite this decrease, under-five mortality is still an issue throughout the world.

Tanzania is among those countries that have had some success in reducing child mortality. It has the largest population in East Africa but it has the lowest population density (World Fact Book Report, n.d.). Referring to the report, one-third of the population in Tanzania lives in urban areas. Moreover, two-thirds of the populations are under the age of twenty-five years.

2.2 Theoretical review

For the purpose of this study, three related theories are reviewed: gender stratification theory, development state theory and modernization theory. In order to provide a comprehensive theoretical review, it is important to define the terminology used in this study. This study uses four terms which refer to periods of a child’s life and affect their survival. These terms are child mortality, under-five mortality, infant mortality and neo-natal mortality. According to Sullivan & Tureeva (2004), child mortality, infant mortality, neo-natal mortality and under-five mortality are all expressed in deaths per 1000 live births, except child mortality which is expressed as deaths per 1,000 children surviving to age one

- *Neo-natal mortality is defined as the probability of dying in the first month of life.*

- *Infant mortality (1q0)* is defined as the probability of dying between birth and the first birthday.
- *Under-five mortality (5q0)* is defined as the probability of dying between birth and the fifth birthday.
- *Child mortality (4q1)* is defined as the probability of dying between the first and the fifth birthday.

2.2.1 Gender stratification theory

The theory aims to have a "broad cross-cultural and historical application and represents a further development of previous versions" in relation to accumulating the knowledge, skills, and facts of the "dynamics and determinants of gender relations" (Blumberg, 1984, p. 25). According to Wang (2014), cited by Frey and Cui (2016), many scholars have supported this theory and argue that improving women's status, by providing them with education and other means, will increase women's ability to access socioeconomic resources, knowledge and skills on how to provide their children with sufficient nutrition and care, resulting in reduced child deaths. In connection to this theory, I also expect that educated mothers may have fewer children and delay the interval between births, as well as increasing the use of family planning which should result in improving the health of the child and lowering all forms of mortality mentioned above.

2.2.2 Development state theory

Development state theory contends that developed states can more easily promote human well-being and lower infant mortality (Frey & Cui, 2016). According to Frey and Field (2000), developed states can "operate in ways that increase human well-being: they engage in redistributive efforts (such as the provision of educational, public health, and other services) that help meet the basic needs of the poor" (p. 219). In my view, developed states may share the wealth of their development with their society; this sharing will lead to an improvement in the income of people in that society and their children's health.

2.2.3 Modernization theory

Modernization theory reveals that industrialization and economic growth may result in improved education, health facilities and nutrition which results in a reduction in infant and under-five mortality (Frey & Cui, 2016). According to Frey and Cui (2016), industrialization and economic growth may bring a higher standard of living and advanced medical technology which may lead to a lower mortality rate.

2.3 Literature review

2.3.1 Mothers' education

According to Hobcraft, McDonald and Rutstein (1984), education of the mother has been treated as a proxy indicator of socioeconomic status. A mother's education is thought to be associated with a greater probability of seeking advice or even treatment from a healthcare provider for a child with symptoms of any disease (Stallings, 2004). According to Root (2001), a well-educated mother cannot reduce the risk of other factors which are beyond her control but her knowledge may help her to use health services more effectively than a mother who is not educated. Further, he says that socioeconomic factors including education may have a greater effect on mortality than morbidity. Child mortality was higher for women with lower education than women with higher education both in urban and rural areas (Haines, Avery & Strong, 1983). Haines, Avery and Strong (1983), revealed that mothers with four or more years of education had fewer children than mothers with a lower level of education.

Jain (1985) also revealed that the level of a mother's education was particularly important for both the level of, and trends in, infant and child mortality in many countries. Investigating the trends and differential mortality in Kenya, Jain concludes that "child survival is primarily determined by the social and economic resources in the child's family" (1985, p.423). Further, he explains that a mother's education and some indicators such as poverty levels are among the factors included in these social and economic resources. Another study was done in India; the results showed that there was a decrease in the level of infant mortality in rural areas with an increase in the level of a mother's education (Jain, 1985). According to Jain (1985), there was a decrease in the death rate from 145 per 1000 live births among mothers with no education, to 101 per 1000 live births among mothers with some education, and 71 per 1000 live births among mothers with at least primary education.

Woldemicael (2001) has done a study of diarrhoeal and related gastrointestinal illness among young children. His study results show that the prevalence of diarrhoeal morbidity varies according to the level of the mothers' education. He explains that the prevalence is lower among the children of more educated mothers (secondary level or above) than among children with mothers of lower education (primary) or no education.

Several studies have shown a positive correlation on the levels of education. A study which was conducted in Nigeria indicates that a mother's education is among the major factors which affect health-related decisions in society and influence the better allocation of resources within a society (Caldwell, 1979). The author states that education gives a mother the confidence and capability to manipulate the modern world, like explaining issues related to healthcare, using better ways to protect her children from communicable diseases and increasing the use of modern medical practices. Further, he explains that there is evidence showing that maternal

education has played a major role in determining the level of infant and child mortality. However, very little effort has been made to explain this phenomenon and it always seems that maternal education is simply a reflection of the standard of living. On the other hand, a mother's education could also be operating in a negative way. This can be confirmed by Caldwell (1979), who explains that educated mothers are more likely to work in occupations where they are separated from their children and leave the child in the care of less educated people like nursemaids.

The household socioeconomic level has an impact on under-five mortality. Hobcraft, McDonald and Rutstein (1984), who studied socioeconomic differences in neonatal, post-neonatal, and child mortality for 28 countries, revealed that there were steady reductions of risk in neonatal mortality with an increasing level of mother's education, except for the group with no education or those who attended between one to three years of education in Colombia. Further, they explain that in these countries, seven or more years of education for a mother led to a 50% drop in the mortality rate compared to those who did not attend school (i.e. those with no education). It can be concluded that even a low level of education can be associated with an improved chance of child survival.

2.3.2 Working mothers

There has been an increase of the number of women in the labor market around the world. This can be confirmed by Ortiz-Ospina and Tzvetkova (2017), who revealed that there has been an increase in female participation in labor markets since 1980. According to the World Development Report (2012), as cited by Ortiz-Ospina and Tzvetkova (2017), this global trend gradually increased over the same period from 50.2 percent to 51.8 percent. A mother's occupation has been found to be associated with child health. Kishor and Parasuraman (1998) show that employed mothers had a negative effect on children's health. Further, they explain that their study done in India showed that working mothers were more likely to experience an increased mortality rate in infants and young children. Mothers who work far away from home breastfeed their children less; they should have jobs which allow them to take their children to work or they should be allowed to feed the child during working hours at home (Blau, Guilkey & Popkin, 1996). The authors say that mothers who work at home have been considered as mothers who are not employed because they would take care of and feed the child while working at home.

Another study done by Nair, Ariana and Webster (2014), showed that mothers who work for a long time without feeding their baby faced problems such as pain and swelling of the breast due to not being able to feed their child for a long time. According to Blau, Guilkey and Popkin (1996), an employed mother may not be able to breastfeed as easily as if she was not employed, therefore she may employ a childcare provider. They explain that childcare providers who

substitute for the employed or working mother may be more likely to use contaminated water in preparing infant formula, which may lead to a greater risk of diarrheal disease and finally death.

The study conducted in Kenya shows that child mortality is higher for mothers who are working in farming compared to those mothers who work in other sectors (Mustafa & Odimegwe, 2008). Working mothers are affected by the nature of employment, for example, a mother who works in the agricultural sector has not enough time to care for her children (Mustafa & Odimegwe, 2008). Mustafa and Odimegwe (2008), say that women working in the agricultural sector are at risk when taking care of their children due to different reasons such as socio-demographics, lack of nutrition and limited, or lack of, accessibility to health facilities in the rural areas. In my experience, if better arrangements for their working hours are made, working mothers would be able to provide care for a child but if they work for a long duration, it may affect the health of their children and their nutritional status.

2.3.3 Wealth

There are various methods in which wealth, the socioeconomic status of the household and living standards can be measured. Income, expenditure and consumption are three common measurements used to measure the socioeconomic status of the household (WFP, 2017). According to WFP (2017), the living standard of the household can be measured by the wealth index. The wealth index can be calculated by using data on household-owned items, such as animals kept, type of materials used for building housing, the source of water available and type of toilet (WFP, 2017). The wealth index is created by the Principal Component Analysis (PCA) and can provide results about poorer and wealthier households but cannot conclude who is actually poor and wealthy (WFP, 2017).

The study done by Susuman and Hamisi (2012) revealed that households with the highest wealth quantile in Tanzania have the lowest under-five mortality rate, about 101 per 1000 live births, compared to households with the lowest wealth quantile which have the highest under-five mortality of 129 per 1000 live births. Further, they realized that the strong association of higher under-five mortality rate with low socioeconomic status was most apparent in rural areas. Another study done in Tanzania showed that poor children are more likely to be exposed to the risk of disease due to inadequate water and sanitation, poor housing conditions and they also have lower resistance to infectious diseases due to diets deficient in one or more micronutrients (Nattey, Masanja & Klipstein-Grobusch, 2013).

Socioeconomic status of the household has been found to be associated with child mortality. According to Antai (2010), low socioeconomic status is associated with health problems like an increase in chronic diseases and low birth weight (Antai, 2010). Poverty reduction and economic development are considered as major challenges that can affect child health (Pritchett & Summers, 1996). According to Pritchett and Summers (1996), about half a million child deaths

in developing countries in 1990 were solely due to poor economic performance during the 1980s. Further, they explain that if the country's economic situation is strong, it may increase the average income of the people, increase the capital for investments, improve infrastructure, and create positive outcomes for individuals as well as better health for workers which results in higher productivity. Hobcraft, McDonald and Rutstein (1984), as cited by Pritchett and Summers (1996), revealed that the results of correlates of infant and child mortality from a survey of 24 countries show that there was a decline in mortality for children at various age levels. They explain that the falls were due to changes in factors related to the income of the household, such as parent occupation or parent education.

The difference in income between a poor household and a rich household may create a gap in the health condition of the children in those households. This can be confirmed by Edeme, Ifelunini and Okereke (2014), who revealed that children from poorer families have worse health compared to children from richer families and the infant mortality rate appears to be inversely related to socioeconomic status. They further explain that by considering the level of population, the real level of poverty cannot fully explain the worse health outcomes of a particular household; this is because once the family can meet their basic needs, income seems to play an increasing role in determining the health outcomes of that family. There is a relationship between income level and education, as households with lower income are also associated with a lower level of education, and a lower level of education is associated with greater exposure to disease.

2.3.4 Hygiene factors

The study aims to investigate the hygiene factors which influence under-five mortality. For the purpose of this study, two environmental factors will be considered, and these are the sources of water and the type of toilets used by the household. The impact of the environment on health is influenced by a broad range of elements and health behaviors. For example, avoiding contamination from the place where the child living is an important measure for preventing a child's health deterioration which may cause their death (Rutstein, 2000). In developing countries, the decrease in mortality has come about due to public health measures which include improved environmental health, such as improved water sources, improved sanitation systems, trash and garbage collection and lastly, decreasing food contamination (Rutstein, 2000). The Millennium Project Task Force on water and poor sanitation has called the lack of sanitation and water in these regions a "silent humanitarian crisis" (Bartram, Lewis, Lenton, & Wright, 2005, p. 810).

a) Source of water

The source of drinking water is among the factors which influence child mortality. The United Nations' Millennium Development Goals (MDG) target 7C aimed to enhance the health of the world's population with access to safe water, which is to be achieved in different parts of the

world (United Nations, 2010). According to the report from the United Nations (2010), the target seems to be difficult to achieve due to poor management in terms of improving the water supply. For example, sub-Saharan Africa is expected to have high rates of urbanization resulting in many urban dwellers in developing countries and this will lead to poor management of the water supply. As a result, people will continue to face challenges like a lack of water supply and sanitation services (Potts, 2012).

According to the United Nations (2017) report in 2015, 2.7 million died during the first twenty-eight days of their lives. The majority of them died from diseases associated with inadequate and poor water supply, poor sanitation, poor hygiene and unimproved infrastructure (United Nations, 2017). It is estimated that about 2 billion people in the world are living in countries with water stress; in Northern Africa, people experience water stress levels above 60 percent (United Nations, 2017). Also, about 159 million people, 58% of those who live in sub-Saharan Africa, still use drinking water from surface water sources (World Health Organisation, 2017). About 748 million people are still not using improved sources of drinking water and it is expected that water demand for manufacturing will increase by 400% between 2000 and 2050 worldwide (UN Water, 2015). In order to improve the access to water and sanitation in developing countries, these countries have also become an integral part of the United Nations' Sustainable Development Goal (SDG), Goal 6, with the aims of ensuring access of clean water and sanitation (United Nations, 2017).

A study made by Mahmood (2002) shows that households with an improved source of water connected in their houses have a lower under-five mortality rate than those households which depend on wells (unimproved water) for drinking water. This means that improved sources of water are less likely to be contaminated, avoiding the spread of water-related diseases, such as infectious diseases like cholera and reducing the prevalence of typhoid fever in children. Also, a study done by Mutunga (2007) in Kenya has revealed that access to clean water and sanitation led to a reduction in child mortality risk by 34% in rural areas.

In my experience, water contamination may also be avoided by using clean containers to collect the water. Even if the water is taken from an improved source, problems will sometimes occur when collecting water using dirty containers and improper storage, which can cause contamination with infectious bacteria.

b) Type of toilets (Sanitation facilities)

According to Mosley and Chen (1984), a family's environmental condition can determine the level of environmental contamination and the infectious agents that children could be exposed to. The type of water source used in the family can be a measure of the level of water contamination, while the type of toilet facility may measure faecal contamination (Mosley & Chen, 1984). It is estimated that about half of the population in developing countries have

suffered from one of the main diseases caused by inadequate water supply and sanitation, and approximately 90 percent of the population suffers from diarrhoeal diseases which are the second main causes of death among children under five (Mohan, 2005; Wagstaff, Bustreo, Bryce, Claeson & WHO-World Bank Child and Poverty Working Group, 2004). These diseases are mainly caused by the use of unimproved sources of drinking water, and poor and unimproved sanitation (Mohan, 2005; Wagstaff et al. 2004).

Statistics show that about 32 percent of the global population, or about 2.3 billion people, do not have access to improved sanitation (World Health Organisation, 2017). According to the World Health Organisation (2017), about 1,748 million people still use unimproved toilets such as bucket latrines and pit latrines and the remaining 600 million people use improved shared toilets with other households (World Health Organisation, 2017). The use of shared toilets with other households may be a better way in the short-term, especially in low-income urban areas.

The study made by Klaauw and Wang (2004) in India revealed that access to toilet facilities can reduce the under-five mortality rate. They say that post-neonates in households with no toilet facilities experience a higher risk of death compared to those households with a toilet facility. Further, they explain that policy experiments in India show that the rate of infant and child mortality can be reduced by improving the family income and environmental characteristics.

2.3.5 Place of delivery

It is a fact that it is safer to deliver babies at health facilities, for both the mother and the child. Mothers who deliver at health facilities tend to have higher child survival rates. The evidence from the study done by Ettarh and Kimani (2013) revealed that women who deliver at health facilities have a lower probability of reporting death than those women who do not deliver at health facilities. Further, at health facilities, they experience a much higher level of delivery care compared to that found outside of health facilities. For example, at home, mothers usually use unskilled birth attendants and poor equipment which may lead to the death of their child. A study done in India also supports this argument, arguing that women who deliver at health facilities could receive health advice from professionals “and may thus be less likely to progress quickly to the next conception” (Whitworth & Stephenson, 2002, p. 2118). Several studies confirmed that there is a higher possibility of child survival when a mother delivers at the hospital rather than at home. The study done by Mahmood (2002) in Pakistan revealed that health centers are assumed to be a safer delivery environment and a baby has a lower risk of contracting an infection, hence a child born in health centers should be in better health than a child born at home.

2.3.6 Place of residence

The place of residence has an impact on under-five mortality. The place of residence of the household has an impact on survival status and nutritional status. This can be confirmed by the study done by Mahmood (2002), who revealed that parents who live in urban areas mostly receive better health services than those who live in rural areas. Further, he explains that more primary health services are available in urban areas than in rural areas. According to Mahmood (2002), rural areas are characterized by poor health services and shortage of skilled staff. The study done in Tanzania by Susuman and Hamisi (2012) showed that child mortality is more likely to appear in rural areas than in urban areas. Also, the results of the study undertaken by Ettarh and Kimani (2013) revealed that the probability of under-five mortality is associated with the place of residence, specifically in rural areas as opposed to urban areas.

2.3.7 Sex of the child

The differences in mortality rate between males and females are associated with biological and genetic factors (Pongou, 2013). According to Pongou (2013), due to biological weakness, males are more at risk of disease and premature death than females during infancy. However, male firstborns are more likely to survive than female firstborns in the neonatal period. However, a study done in India shows that “excess female mortality and a preference for sons has existed for centuries” (Pande, 2003, p. 396). According to Pande (2003), female mortality in India as a whole was 42 per 1000 live births which is 43% greater than the mortality rate for boys (29.4 per 1000 live births). Also, other studies from countries like China and India show that female children are more likely to die than male children (United Nations, 2011). Another result from the study which was done in Nigeria showed a significantly higher risk of under-five death for male children compared with female children (Ezeh, Agho, Dibley, Hall, & Page, 2015). In several countries of sub-Saharan Africa, the results of studies investigating the difference in mortality by sex have shown that male children have a higher chance of death than female children before the age of five (Boco, 2015).

2.3.8 Birth interval

Several studies have been done to find out the most favourable birth interval and determine the relationship between birth intervals and mortality (Rutstein, 2005). Rutstein (2005) reveals that there are different ways in which birth intervals might affect childhood mortality. Further, he explains that shorter birth intervals related to severe pregnancy complications increase morbidity during pregnancy and increase the risk of infant and maternal death. The study found that relatively short intervals are associated with higher stillbirth rates while moderate intervals lead to lower rates (Rutstein, 2005). According to the author, the results obtained from the study show that under five mortality reduced from 280 per 1000 live births for children with a birth interval less than 2 years to 174 per 1000 live births for children with a birth interval of 4 or more years.

According to Whitworth and Stephenson (2002), there is a greater risk of post-neonatal mortality following a short preceding interval. However, “if the older sibling died in infancy, no association remained” (p. 2109).

The evidence from Bangladesh showed that preceding intervals starting with miscarriage or abortion had a greater effect on child survival than those starting with live birth (DaVanzo, Hale, Razzaque & Rahman, 2008). DaVanzo et al. (2008) further explain that;

because they are shorter, pregnancies that end in a miscarriage or induced abortion should be less depleting than those that end in full-term birth, while pregnancies that end in a stillbirth may be less depleting than those that end in a live birth because there is no breastfeeding after a stillbirth, and also there is no live child from this previous pregnancy to ‘compete’ for parental resources with the index child (p.132).

Mustafa and Odimegwe (2008) also reveal that short birth intervals, especially ones of less than 2 years, teenage pregnancies and previous child deaths are associated with an increase in infant and child mortality.

2.3.9 Breastfeeding

Breastfeeding is the most natural way to feed the baby and provides all the nutrients which a baby needs. Several studies have shown the impact of breastfeeding on child survival. The study done by DaVanzo et al. (2008) shows that a mother who breastfeeds for longer and starts using supplementary food increases the chances of her infant’s survival. Further, they explain that breastfeeding during the first year increases the chances of reducing infant and child mortality. The results of another study done by Mahmood (2002) show that an increase in breastfeeding was associated with a reduction in post-neonatal mortality and also reduced under-five mortality by more than 62%. In addition, Mahmood (2000) explained that it is also very important to know the age at which supplementary food starts to be used in order to predict post-neonatal mortality. He said that a delay in starting the use of supplementary food will increase the risk of post-neonatal mortality. Further, he explains that breastfeeding has an impact on the health and nutritional status of both mother and child. Mahmood (2000) also revealed that “the survival status of the previous child is observed to be associated with the length of the birth interval as well as with breastfeeding status” (p.729).

2.3.10 Age of the mother

Age of the mother is considered one of the determinants of gestational risk and under-five mortality (Ribeiro, Ferrari, Sant’Anna, Dalmas, & Giroto, 2014). Gestational is the time period between conception and birth (Ribeiro et al. 2014). Ribeiro et al. (2014) revealed that mothers aged younger than 15 years or aged 35 above have experienced a higher risk of child mortality. Further, they explain that in the world, estimated that 25 per cent of women have their first baby

before the age of 20years, where the high percentage of these women are in developing countries. On the other hand, a higher risk of the morbidities during the pregnancy have appeared to the mothers who have more than 35years. The pregnant mother at that ages suffers from diseases such as “diabetes mellitus and hypertension, with repercussions to the fetus and the newborn, as well as an increased incidence of diseases of genetic origin, miscarriages and multiple pregnancies resulting from assisted fertilization” (Ribeiro et al. 2014, p.382). The results from the study done by Rutstein, (2000) revealed that the percentage of births to mothers who have 35 years or above was associated with higher infant mortality rates while the percentage increases of births to mothers aged 18years was also associated with higher neonatal deaths but lower under-five mortality rate.

2.4 Conceptual Framework

The framework seeks to address the relationship between child mortality and health interventions on one hand and, on the other hand, socioeconomic and intermediate variables (proximate determinants) (Mosley & Chen, 1984).

According to Mosley and Chen (1984), proximate determinants are factors that influence the risk of disease and the outcome of those diseases affecting an individual. The authors state that child mortality and morbidity link with other sets of determinants such as national policy and planning, education systems, sanitation and safe water supplies, maternal education, disaster management, improvement of infrastructure, food security and output from agriculture and other production sectors. Mosley and Chen (1984) identify the sets of proximate determinants or intermediate variables that influence the risk of morbidity and mortality. They further explain that all socioeconomic determinants should operate through these variables in order to influence the rate of child survival.

Mosley and Chen (1984) have also identified five groups of proximate determinants (see Figure 2.1). These are maternal factors (age at birth, birth interval, parity), environmental contamination (water pollution, insect vector, food, skin, soil, inanimate objects), nutrient deficiency (vitamins, mineral, protein, calories and micronutrients), injury (injuries which are related to disabilities, accidents) and personal illness control (personal preventive measures and medical treatment) (Mosley & Chen, 1984). These first four factors (maternal factors, environment contamination, nutrient deficiency and injuries) may influence whether a child stays healthy or becomes sick, while personal illness control may influence a child’s illness through preventive measures or the rate of recovery through treatment. The consequences of sickness are either faltering growth or mortality.

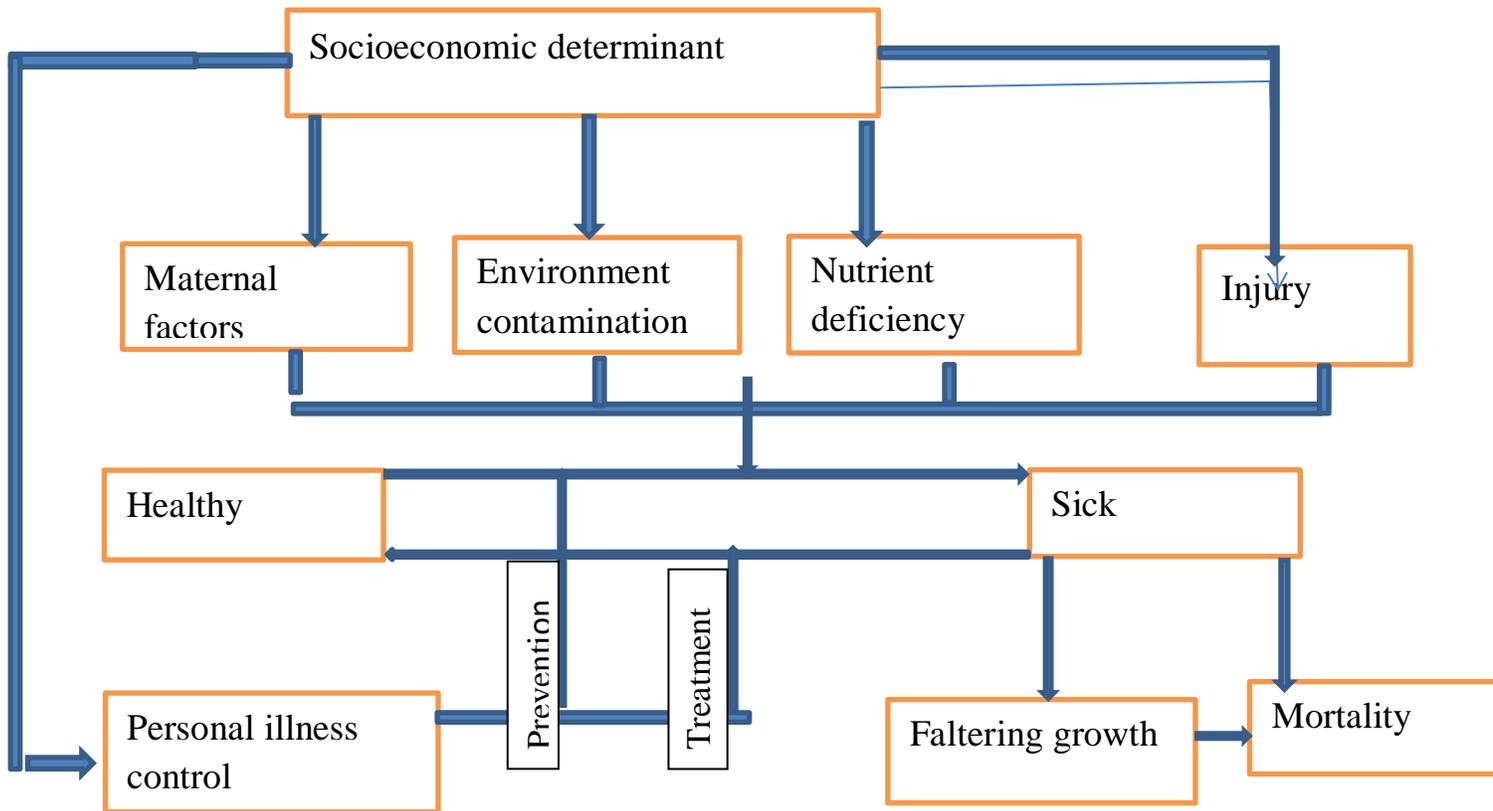


Figure 2.1: Operational Conceptual Model of the five groups of proximate determinants on the health dynamics of the population (Mosley and Chen, 1984)

2.5 Operational framework

Figure 2.2 below is an illustration of the modified operational framework to be adopted in this study. This framework demonstrates how the conceptual framework in Figure 2.1 is applied to the selected variable in the study of under-five mortality. The variables in this study will be based on the information collected from TDHS (2015-2016). The independent variables are: mother's education, mother's occupation, a wealth of the family, birth interval, source of water, place of residence, place of delivery, type of toilets of the household and age of the mother. The dependent variable is dichotomous: that is under-five children, either alive or dead at the time of the survey. The study does not include injuries, nutrient deficiency and personal illness control that are mentioned in the Mosley and Chen model because this study did not collect such information during the survey. Mother's education, Working mothers, wealth of the family, birth interval, source of water, type of toilets and age of the mother may affect under-five mortality. For example, according to Stalling (2004), a mother's education is thought to be associated with a greater probability of seeking advice or even treatment from a health care provider for a child with symptoms of any disease. This means that an educated mother will find it easier to acquire knowledge concerning the health of their children compared to an uneducated mother. Also,

Caldwell (1979) revealed that education gives mother confidence and an ability to manipulate the modern world, like explaining issues related to healthcare

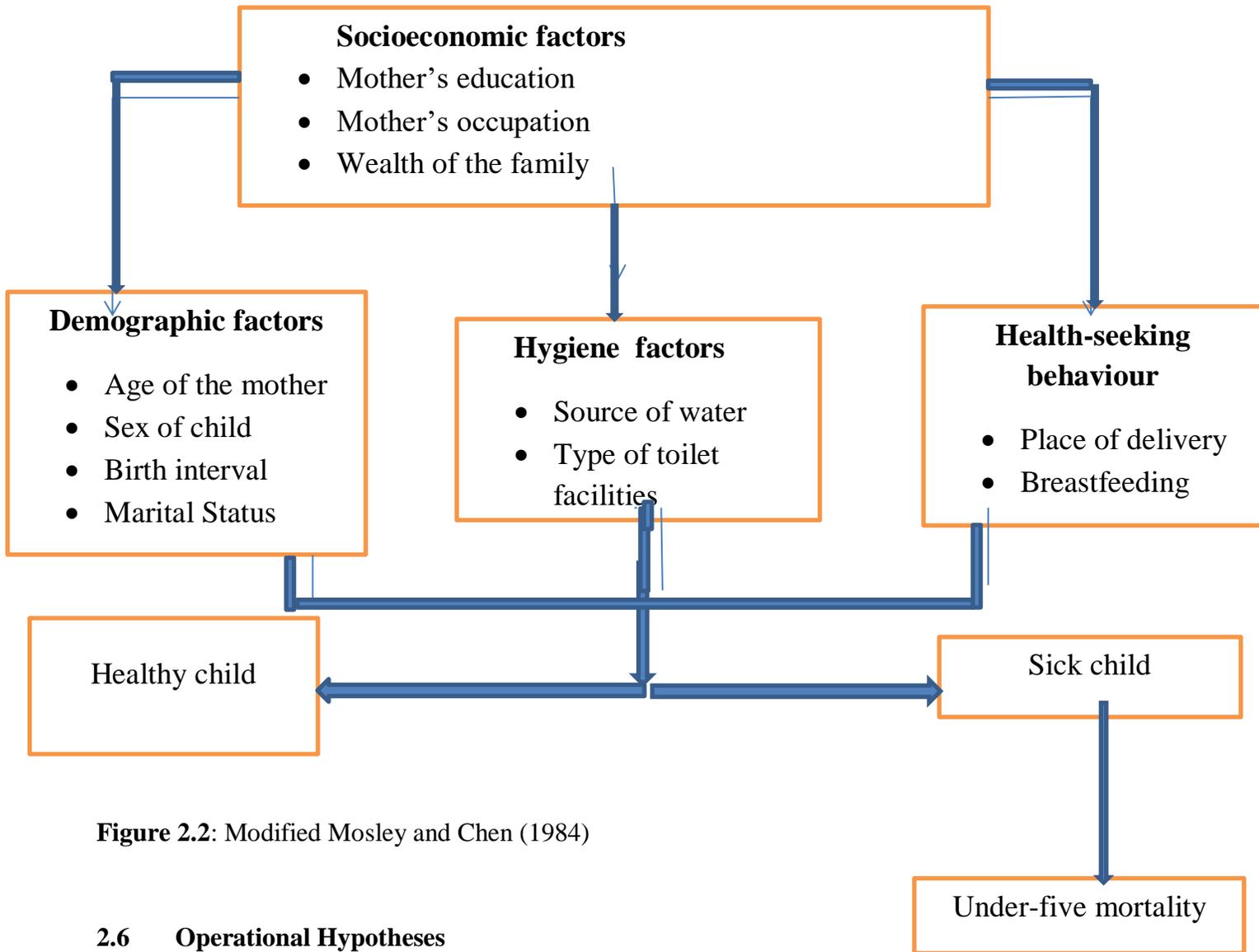


Figure 2.2: Modified Mosley and Chen (1984)

2.6 Operational Hypotheses

Based on theoretical approaches, the hypotheses to be tested are grouped into four; Socioeconomic factors, Demographic and Geographic factors, Health-seeking behaviour and Hygiene factors. The study's basic expectations are the following:

1. Socio-economic factors influence the rate of under-five mortality (*Hypothesis 1*). In this hypothesis, the study will test the association between wealth, working mothers and mother's education, and under-five mortality.

2. Demographic and geographic factors influence the probability of under-five mortality (*Hypothesis 2*). This study will test the association between gender, birth interval and the place of residence, and under-five mortality.
3. Health-seeking behaviours can reduce the chances of under-five mortality (*Hypothesis 3*). The study will investigate the association between breastfeeding and the place of delivery, and under-five mortality.
4. Improved hygiene factors can reduce under-five mortality (*Hypothesis 4*). The study will investigate the relationship between the type of toilets used and sources of water, and under-five mortality.

2.7 Summary

In view of the above, it is evident that the socioeconomic determinants have a negative influence on under-five mortality. Several studies showed that under-five mortality was more likely to occur in the household with a lower level of education, lower level income, and working mothers. This study will attempt to find out the socioeconomic and hygiene factors that influencing the under-five mortality rate in both rural and urban Tanzania.

3.0 Methodology

3.1 Research Approach

This study used the quantitative research approach for testing theories by examining the relationship between the variables. Binary logistic regression analysis was used to measure and analyse the variables and present the relationship mathematically. The approach was based on the analysis of the theories discussed as well as previous studies. The aims of this approach are to come up with conclusions that will either support or weaken the theory and literature.

3.2 Research design

Research design can be defined as the total process of data collection, analysis and interpretation, aimed at achieving the relevant research purpose (Kothari, 2004). The procedures include what a researcher will do, from writing the objectives, formulating the hypotheses, creating the research methodology and the final analysis of data. The study adopted quantitative approaches and used the cross-sectional data from the Tanzania Demographic Health Survey 2015-2016.

3.3 Study design and Sampling

The study utilized the Tanzania Demographic and Health Survey 2015-2016 datasets. A representative sample of 13,376 was selected for the TDHS. The sample was selected from the 2012 Tanzania Population and Housing Census. The samples were carried out into two stages: the first stage was selecting 608 clusters and the second stage was selecting 22 households from each cluster. The Tanzania Demographic and Health Survey drew on national information on demographic and health indicators, both for urban and rural areas in the mainland and for the island of Zanzibar. The sample allowed an estimation of indicators for each of the 29 regions.

Data gathered from all women aged 15-49, who were either permanent or temporary residents in the household, were included in the 2015-2016 TDHS samples. This study employed a sample of 3000 women, who were selected at random from the dataset file. The sample includes the number of live births that the interviewed women had given in the year preceding the date of the survey. The selection of this sample was based on allowing at least one full year of exposure for all the children. This means that the study has included information on all the children under five years old at the time of the survey. The sample of 3000 observations includes 2,715 births and 285 deaths before the fifth year of life, which gives the under-five mortality rate.

3.4 Validity and reliability

The study used the data collected from a reliable source, the Tanzania Demographic Health Survey (TDHS), and the type of sampling technique chosen is random sampling. The statistical

methods and the selected regression model are applied in many studies. The theories and literature review applied in this study are used to select variables and also used to compare the results found in this study. The previous studies were used to investigate the relevance and significance of the results obtained.

3.5 Data analysis

3.5.1 Binary Logistic Regression Analysis

Logistic regression analysis is a statistical tool for determining the relationship between the different explanatory variables or independent variables, which can either be categorical or continuous, and dependent variables, which are binary (dichotomous) (Ekström, Esseen, Westerlund, Grafström, Jonsson, & Ståhl, 2018). Further, Ekström et al. (2018) explain that this method can be used to represent binary responses such as yes/no and presence/absence. The categorical outcome or dichotomous variable can predict the outcomes where there is a binary choice. The study was based on the socioeconomic and environmental variables, where the outcomes of these variables were in categories.

3.5.2 Binary Result

The equation predicts the probability of P as a result of the values of independent variables. The value of P has a value between 0 and 1. If the results of explanatory variables are binary, then the logistic regression uses the probability of response (Ekström et al. 2018).

Odds Ratio

Odds of an event can be defined as the ratio of the probability that an event can occur to the probability that it cannot occur (Ekström et al. 2018).

Let P be the probability of an event to occur, then the probability that it cannot occur will be (1-p) then the corresponding odd will be $(\frac{P}{1-P})$.

Logistic regressions are equal to the probability of an event occurring divided by the probability of an event not occurring.

Let the independent (explanatory) variable be x and the dependent (response) variable be p.

Therefore, when writing an equation, P and X will be equal to $p = \beta_0 + \beta x$, since the probability of an event should fall between 0 and 1, and the value of x will give the value $\beta_0 + \beta x$, which means that it does not fall between 0 and 1. The solution to this problem is to apply a natural logarithm

(Ekström et al. 2018). A natural log odd is a linear function of the independent (explanatory) variable.

Logit (P) at a given independent variable, the logistic function will be

$$\text{Logit (P)} = \ln(\text{odds}) = \ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X + \beta_2 X + \dots + \beta_p X_p$$

Where: β_0 is a constant number and β_p are coefficients

X_p is Independent variables

P is the outcome (dependent variable)

This is the simple logistic model

Therefore $\text{Logit (P)} = \beta_0 + \beta_1(\text{Wealth}) + \beta_2(\text{Working}) + \beta_3(\text{Education}) + \beta_4(\text{Toilet}) + \beta_5(\text{Water}) + \beta_6(\text{Sex}) + \beta_7(\text{Birth Interval}) + \beta_8(\text{Breastfeeding}) + \beta_9(\text{place of residence}) + \beta_{10}(\text{age of the mother})$

3.6 Explanation of Variables

3.6.1 Dependent Variable

The outcome of the variable is the risk of death of a child before reaching their fifth year (under-five mortality rate). According to Sullivan & Tureeva (2004), the under-five mortality (5q0) is: the probability of dying between birth and the fifth birthday. The under-five mortality rate is the main dependent variable in this study. The study intends to measure the risk of the child dying before reaching their fifth birthday. The number of deaths recorded in the age interval from 0-59 months will be classified as 1 for dead and 0 for alive.

3.6.2 Independent variables

The independent variables are socio-economic factors, demographic factors and two proximate determinants (birth interval, place of delivery, place of residence and sex of the child). Socio-economic variables are wealth, mother's occupation, and mother's education. The Wealth Index is an approach established by the World Bank to determine the socioeconomic level of the household in a ranked order. The data collected from asset-owned households are combined into proxy indicators such as the Wealth Index (WFP, 2017). According to WFP (2017), the Wealth Index is frequently used in reports and analyses based on the data set from DHS (Demographic Health Survey) and other reports, and it is used to rank households into quantiles. The Wealth Index measures the relative wealth or poverty of households and cannot give any conclusion as

to who is absolutely poor or rich (WFP, 2017). Wealth is a factor which influences under-five mortality. This study aims to measure the association between wealth and under-five mortality. This variable has five categories, identified as: poorest, poorer, middle, richer and richest. The mother's occupation determines the availability of the time and care she can offer her child. This variable intends to find the relationship between the occurrence of child death and a mother who is either working or not working. The two categories used are *yes* for working mothers and *no* for mothers who are not working. A working mother may be less likely to experience under-five mortality. However, working mothers are sometimes not able to breastfeed as easily as mothers who are not working.

A mother's education has usually been used as the main indicator of socioeconomic status in international surveys. This variable refers to the level of education that the mother has attained. The three categories are; no education, primary education, secondary and above level. It is expected that parents with no education will experience higher risks of under-5 mortality compared to those with secondary schooling and above.

Types of toilet facility refer to the methods used by the household to dispose of human excreta. Respondents were asked whether or not they used an improved toilet for disposal of human excreta. This study intended to measure the association between the under-five mortality rate and household with either improved or unimproved type of toilets. It is expected that households without any form of facility (unimproved) for human waste disposal will tend to have high under-five mortality rates compared to those with facilities.

Source of water refers to the source of water used for drinking in the household. The variable can be categorized into improved and unimproved sources of water. Improved water sources and clean water help to avoid the spread of water-borne diseases, such as cholera. An unprotected source of water likely increases the chance of under-five mortality. This study intended to measure the relationship between the household source of water used and the occurrence of under-five mortality.

Place of residence refers to the place where the household lived at the time of the interview and this can be divided into four categories: mainland rural, mainland urban and Zanzibar.

Place of delivery refers to the place where the mother delivers the child. This variable can be categorized into three groups: public health facilities, private health facilities and those who deliver at home.

Birth interval refers to a difference in months between the current birth and the previous birth. This variable is categorized into two groups: the interval of more than 24 months and less than 24 months. The shorter birth intervals (<24) are related to severe pregnancy complications, increased morbidity during pregnancy and finally death. However, long intervals of more than five years are related to a slight increase in child mortality. Sex of the child refers to the

biological difference between male and female offspring. The sex of the child influences child mortality. According to Pongou, (2013), due to biological reasons, male children are more likely to die than female children.

Breastfeeding is the feeding of a young child or babies with milk from the mother’s breast. The study needs to investigate the relationship between the mothers who are never and ever breastfed, and under-five mortality rate. Age of the mothers is one of the determinants that influence under-five mortality rate. The study will investigate the relationship between under-five mortality and the age of the mothers. Age of the mothers divided into three group; 15-29, 30-39 and 40-49s.

Table 3.1 Classification of water sources and toilet facility based on World Health Organisation /UNICEF guidelines (World Health Organisation /UNICEF, 2013).

Variable	Improved	Unimproved
Water source	Piped water connection to the family/household, public taps or standpipes, tube wells or boreholes, protected dug well, protected spring and rainwater collection	Unprotected dug well, unprotected spring, the cart with small tank or drum, surface water and bottled water
Sanitation facility	Flush system, piped sewer system, septic tank, Ventilated Improved Pit latrine (VIP) and pit latrine with the slab.	Bucket, pit latrine with no slab, hanging toilet, bush or field, shared public facility and no facilities

Note: N.B. sanitation refers to the toilet facility.

3.6.3 Variable Description and Classification

Table 3.2: Variable Description and Classification

	Variable	Variable Code	Variable Code Description	Variable Classification	Role of Variable
1	Child dead	Recoded	Whether the child was dead or alive at the time of interview.	Live == 0 Dead ==1	Dependent
2	Mother level of education	v106	Highest educational level	No education ==1 Primary level ==2 Secondary and above==3	Socio-economic (Independent Variable)
3	Working Mothers	V714	Whether the respondent is currently working	Not Working==0 Working == 1	Socio-economic (Independent Variable)
4	Wealth	V190	Brief explanation of the wealth index	Poorer ====1 Poorest===2 Middle====3 Richer == 4 Richest ===5	Socio-economic (Independent Variable)
5	Environment factor <ul style="list-style-type: none"> • Source of Water • Type of Toilet 	V113 v116	The major source of drinking water for members of the household Type of toilet facility in the household	Unimproved ==0 Improved == 1 Unimproved ===0 Improved =====1	Socio-economic (Independent Variable)
6	Sex	B4	Sex of children	Female== 0 Male =1	Proximate determinant-Maternal factor

7	Birth interval	B11	Birth interval is calculated by looking at the difference in months between the current birth and the previous birth.	Less than 24 months =0 More than 24 months=1	Proximate determinant-Maternal factor
8	Place of residence	SREG1	Place of residence for the household	Mainland rural==1 Mainland urban==2 Zanzibar==3	Proximate determinant-Maternal factor
9	Place of delivery	M15	Place where mother delivers her baby	Other home=1 Public health facilities=2 Private health facilities=3	Proximate determinant-Maternal factor
10	Breastfeeding	M5		Never breastfeeding=1 Ever breastfeeding=2	Proximate determinant-Maternal factor
11	Age of the mothers	V013		15-29years 30-39years 40-49years	Proximate determinant-Maternal factor

3.7 Univariate, Bivariate and Multivariate analysis

In this study, STATA was used as a tool of analysis. STATA was used in running the univariate, bivariate and multivariate analysis.

3.7.1 Univariate Analysis

The univariate analysis was conducted for the purpose of describing the background characteristics of the dependent and independent variables. The univariate analysis gives the result of frequencies and percentage distributions for each variable. This is a method of summarizing the variables used in the study.

3.7.2 Bivariate Analysis

The bivariate analysis is the second stage of analysis, made by finding to what extent the dependent variable (under-five mortality) relates to each independent variable. The relationship between the independent and dependent variables can be calculated by Pearson's Chi-square test. Pearson's Chi-square test was used to identify the association between the dependent variable and each independent variable.

3.7.3 Multivariate Analysis

The third stage of the analysis is multivariate logistic regression. At this point, all the independent and dependent variables were subjected to one model. Also, this was done to determine the extent to which all the independent variables have an impact on under-five mortality. The logistic regression analysis determined the nature of the relationship between each independent variable and the dependent variable in the presence of the other independent variables.

3.8 Limitations of the study

- The information on child survival was obtained from mothers aged 15-49. This technique has a potential selection bias because, in order for a child to be reported, the mother must be a member of the study population at the time of the survey. If it happens that there is a death in the household but no mother is present, this will affect the reporting process.
- The Demographic Health Survey does not allow or show the attributes of child illness to specific causes of death; hence the study cannot show how the risk factors contribute to mortality directly

4.0 Results

4.1 Univariate Analysis results

4.1.1 Frequencies distribution of study population

A total of 3,000 children were selected as a sample from the 13,376 children interviewed. Table 4.1 shows that 285 children (10%) died before the age of five years while 2,715 children (90%) were alive at the time of the survey.

In terms of mothers' education, the results show that there were 754 families with no education (25%), 1,858 with a primary level of education (62%), 388 with a secondary and above level of education (13%). Mother's working status, the survey shows that about 496 (17%) mothers were not working while 2,504 (83%) mothers were working.

The wealth status result shows that there were 663 households in the poorest category (22%), 594 poorer households (20%), 622 middle-income households (21%), 641 richer households (21%) and 480 households in the richest category (16%).

The hygiene factors were divided into two categories; source of water and type of toilets used. For the sources of water, the study examined the households who used improved and unimproved, and in terms of the type of toilets, the study examined also houses which used improved toilets and unimproved toilets. In terms of sources of water, the survey showed that 1,245 households (42%) used unimproved sources of water, 1,755 (58%) used improved sources of water. The results of the survey into the type of toilets used showed that 2,546 (85%) used unimproved toilets, 454 (15%) used improved toilets.

The results regarding the place of delivery show that 60 households (7%) used homes as the place of delivery, 507 (61%) attended public health facilities and 258 (32%) attended private health facilities.

The study examined the place of residence of the household and the results show that 1,943 households (65%) lived in rural areas, 589 (20%) were in urban areas, 468 (17%) were in Zanzibar.

The results of gender status show that 1,461 (49%) were female and 1,539 (51%) were male. Birth interval results show that there were 616 children (20%) who were born within 24 months of a sibling and there were 2,384 children (80%) born more than 24 months after a sibling.

The results of breastfeeding show that there were 35 mothers who never breastfed (4%) and 782 mothers who always breastfed (96%) while the result of mothers age at birth show that

735(24.50) were at the age of 15-29years, 1,166(38.87) were at the age of 30-39years and 1,099 were at the age of 40-49years.

Table 4.1: Results of frequencies and percentages distribution

	Variable	Variable classification	Frequencies	Percentage
1	Under five Mortality rate	Alive	2,715	90.50
		Dead	285	9.50
		Total observation	3,000	100.00
2	Mother level of education	No education	754	25.13
		Primary level	1,858	61.93
		Secondary and above	388	12.93
		Total observation	3,000	100.00
3	Working mothers	Not working	496	16.53
		Working	2,504	83.47
		Total observation	3,000	100.00
4	Wealth	Poorest	663	22.10
		Poorer	594	19.80
		Middle income	622	20.73
		Richer	641	21.37
		Richest	480	16.00
5	Hygiene factors	Total Observation	3,000	100.000
		Unimproved	1,245	41.50
	• Source of Water	Improved	1,755	58.50
		Total Observation	3,000	100.00
	• Type of Toilet	Unimproved	2,546	84.87
		Improved	454	15.13
Total Observation		3,000	100.00	
6	Place of delivery	Homes	60	7.27
		Public health facilities	507	61.45
		Private health facilities	258	31.27
		Total Observation	825	100.00
7	Place of residence	Rural	1,943	64.77
		Urban	589	19.63
		Zanzibar	468	16.60
		Total observation	3,000	100.00
8	Gender of the child	Female	1,461	48.70
		Male	1,539	51.30
		Total observation	3,000	100.00
9	Birth interval	Less than 24 months	616	20.53

		More than 24 months	2,384	79.47
		Total observation	3,000	100.00
10	Breastfeeding	Never breastfeeding	35	4.28
		Ever Breastfeeding	782	95.72
		Total observation	817	100.00
11	Age of mother at birth	15- 29years	735	24.50
		30-39years	1,166	38.87
		40-49years	1,099	36.63
		Total observation	3,000	100.00

4.2 Bivariate analysis results

4.2.1 Mother's education and under-five mortality

The results for the association between a mother's education and under-five mortality are statistically significant at 95% confidence level with Chi-square of 8.73 and P-value of 0.013 and are presented in Table 4.2. A higher percentage of mortality cases (10.3%) have been reported in children born to mothers who have no education, compared to mothers who have a secondary and above level of education (5%) or a primary education (10%). Mothers who have a secondary and above level of education have fewer mortality cases reported. These results have been reported by several studies who revealed that the higher level of education associated with lower mortality (Haines, Avery & Strong, 1983).

Table 4.2: Associations between mother's education and under-five mortality

Variables for Mother's Education	Under-five Mortality Probability (%)	
	Dead	Alive
No education	10.34	89.66
Primary	10.01	89.99
Secondary and above	5.41	94.59

Mother's education	P value	X ²
	0.013	8.7303

4.2.2 Working mothers and under-five mortality

The results show that working mothers have a reported level of under-five mortality of 10% compared to mothers who are not working (7%) (See Table 4.3). The result also observed to have statistically significant association to under-five mortality at 95% confidence level with Chi-square of 5.60 and this may be due to fact that mothers who are working do not have enough

time to care for their children and breastfeed them, so they have to use alternative ways of feeding them, such as cow's milk, which does not contain sufficient nutrients compared to breast milk.

Table 4.3: Working mothers and under-five mortality

Variables for Mother's Occupation	Under-five Mortality Probability (%)	
	Dead	Alive
Not Working	6.65	93.35
Working	10.06	89.94

Working mothers	P value	X ²
	0.018	5.60

4.2.3 Mother's household wealth and under-five mortality

The wealth status shows a great influence on the probability of under-five mortality as presented in Table 4.4. The richest and richer households are reported to have a 9% and 8% probability of under-five mortality respectively compared to the poorest (13%) and poorer households (9%). The results suggest that babies born to mothers from the poorest and poorer households experience higher mortality rates compared to those who are born into middle income, richer and the richest households. The analysis shows that the variable has a statistically significant relation to under-five mortality at a confidence level of 95% with Chi-square of 9.32 and P-value of 0.053

Table 4.4: Association between mother's household wealth and under-five mortality

Variables for Mother's Wealth	Under-five Mortality Probability (%)	
	Dead	Alive
Poorest	12.52	87.48
Poorer	9.09	90.91
Middle	8.52	91.48
Richer	8.74	91.26
Richest	8.13	91.88

Mother's Wealth	P value	X ²
	0.053	9.32

4.2.4 Sources of water and under-five mortality

The source of water has an impact on the health of the child. The results from Table 4.5 show that higher child mortality appeared in households who used an unimproved source of water (11%), while the lowest mortality rates were reported in households who used improved sources of water (8%). The result also has a statistically significant relation to under-five mortality at a confidence level of 95% with Chi-square of 8.24 and P-value of 0.004

Table 4.5: Source of water and under-five mortality

Variables for Source of Water	Under-five Mortality Probability (%)	
	Dead	Alive
Unimproved source of water	11.33	88.67
Improved source of water	8.21	91.79

Source of Water	P value	X ²
	0.004	8.24

4.2.5 Type of toilets and under-five mortality

The type of toilet a family has also played a great role in under-five mortality. The results show that a child born into a family that uses unimproved toilets is more likely to die than those who were born into families with access to improved toilets. There was a 10% probability that children under five born into families with unimproved toilets would die, with a lower mortality rate of about 8% for those families who used improved facilities (see Table 4.6). The results of this study showed otherwise because the variable had no statistically significant association to under-five mortality at chi-square 0.7945 and P-value of 0.373.

Table 4.6: Association of type of toilets and under-five mortality.

Variables for Type of Toilets	Under-five Mortality Probability (%)	
	Dead	Alive
Unimproved facilities	9.70	90.30
Improved facilities	8.37	91.63

Type of Toilets	P value	X ²
	0.373	0.7945

4.2.6 Place of delivery and under-five mortality

The study shows that the place of delivery has an effect on child mortality rates. Private health facilities have reported lower mortality rates (probability of 3%) compared to public health facilities and home with the probability is 6% and 5% respectively. The result show there was no statistical significance associated with under-five mortality chi-square of 3.5740 and p-value of 0.167.

Table 4.7: Place of delivery and under-five mortality

Variables for Place of Delivery	Under-five Mortality Probability (%)	
	Dead	Alive
Home	5.00	95.00
Public health facilities	6.31	93.69
Private health facilities	3.10	96.90

Place of Delivery	P value	X2
	0.167	3.5740

4.2.7 Mother's place of residence and under-five mortality

The results show that there was no significant relationship between the place of residence and under-five mortality (Table 4.8). The rural areas reported a 9.98% probability of child mortality, lower than urban areas (10.19%). Zanzibar have lowest under-five mortality than both rural and urban areas in Tanzania.

Table 4.8 Association between places of residence and under-five mortality

Variables for Place of Residence	Under-five Mortality Probability (%)	
	Dead	Alive
Rural	9.98	90.02
Urban	10.19	89.81
Zanzibar	6.62	93.38

Place of Residence	P value	X2
	0.069	5.3564

4.2.8 Gender of the child and under-five mortality

The results from the table show that male children are more likely to die than female children. Male children have a higher mortality rate (10%) than female children (9%) (see Table 4.9). There was no significant relationship between the gender of the child and under-five mortality

Table: 4.9 Association between Sex of child and under-five mortality

Variables for Sex of Child	Under-five Mortality Probability (%)	
	Dead	Alive
Female	8.69	91.31
Male	10.27	89.73

Sex of Child	P value	X2
	0.142	2.1590

4.2.9 Birth interval and under-five mortality

An under-five mortality rate of 13% has been reported in children born less than or equal to 24 months (≤ 24) after a previous birth, while those children born more than 24 months after their sibling (>24) showed a lower mortality rate of 9%. The result is statistically significant at a confidence level of 95% with Chi-square of 12.00 and P-value of 0.001 (see Table 4.10).

Table 4.10: Association between Birth interval and under-five mortality

Variables for Birth Intervals	Under-five Mortality Probability (%)	
	Dead	Alive
≤ 24 months	13.15	86.85
>24 months	8.56	91.44

Birth Intervals	P value	X2
	0.001	12.00

4.2.10 Breastfeeding and under-five mortality

Duration of breastfeeding as one of the factors affecting under-five mortality. The results were observed to have a statistical significance with a P-value of (0.000) and X^2 (103.6465). Table

(4.11) shows that 43% of those children who were never breastfed died, while the probability of mortality for those children who were always breastfed is only 4%.

Table 4.11: Association between breastfeeding and under-five mortality

Variables for Breastfeeding	Under-five Mortality Probability (%)	
	Dead	Alive
Never breastfed	42.86	57.14
Always breastfed	3.58	96.42

Breast Feeding	P value	X2
	0.000	103.6465

4.2.11 Age of the mother and under-five mortality

The results show that there is statistical significance between the age of the mothers and under-five mortality, with chi-square of 20.86 and p-value of 0.000. The results, also show that 7% of deaths were born by the mothers who were the aged 15-29years, 8% of deaths were born by the mothers aged 30-39years where 13% of deaths were born by the mothers aged 40-49years.

Table 4.12: Association between the age of the mothers and under-five mortality

Age of mother at birth	Under-five Mortality Probability (%)	
	Dead	Alive
15-29years	6.53	93.47
30-39years	8.49	91.51
40-49years	12.56	87.44

Age of the mothers	P value	X2
	0.000	20.86

4.3 Multivariate analysis of risk factors for under-five mortality results

Table 4.13, show the results of five models generated by the logistic regression analysis. To a large extent, factors such as demographic and geographical factors all have a considerable impact on health. In this study, these factors have been added to all models. In each case model I evaluate the effect of the demographic and geographical factors on under-five mortality. After that, socio-economic factors were entered into the model and the results are presented in Model II. Model II evaluates the impact of demographic and geographical factors while controlling the socio-economic factors. Health seeking behaviours were entered into the third model (Model III)

and hygiene factors are in Model IV. Model V is the combination of all proximate determinant as suggested by Mosley and Chen (1984).

Model I shows that the results for birth interval were observed to be statistically significant. The results for children born with a birth interval of greater than 24 months show that they are less likely to die by 40% (odds ratio of 0.6016). In terms of the sex of children, the results show that male children are more likely to die. It is reported that the increasing rate for male children to die is 21% (odds ratio of 1.2157). Regarding the age of the mothers, the results for the age groups (30-39) and (40-49) show that a child was more likely to die before reaching the age of five years. The association was statistically significant for a child born to mothers aged 40-49 this indicates that the age of the mother has an important influence in under-five mortality, they were 9%(2.0937) more likely experiences under-five mortality.

The results highlight the different risk factors of under-five mortality based on place of residence. In mainland rural areas, the results show that a child with a family who lives in rural areas is 8% more likely to die than a child living in urban areas (odds ratio =1.086183). However, in Zanzibar the results were statistically significant and have a declining rate of 41% (odds ratio 0.5880).

Model II assesses the impact of demographic and geographical factors after controlling the socioeconomic variables. When a mother's level of education is primary or secondary and above, their educational level shows that the odds ratio of under-five mortality has been reduced by 1% (odds ratio 0.9991) for mothers with a primary level of education, and 37% (odds ratio 0.6305) for mothers with a secondary and above level of education. These results reveal that mothers with a secondary and above level of education are less likely to have children who die under 5 years old compared to those with a primary level of education.

The wealth status shows less influence on the chance of survival for under-five children. The results are statistically significant for the children born in the poorer and middle-income households. Children born in poorer households showed the lowest under-five mortality; the results show that there is a reducing rate of deaths by 31% (odds ratio 0.6952). Middle-income households have slightly fewer deaths (33% (odd ratio= 0.6660)) compared to richer and the richest households.

Regarding the relationship between the socioeconomic status measured by a mother's occupation and under-five mortality, the results showed that children of mothers who are working had the highest rate of under-five mortality. It is reported that children of working mothers have an increased rate of 46% (odds ratio=1.4621) under-five mortality. This association between working mothers and under-five mortality was statistically significant. The model, after controlling for socio-economic factors, shows that the results of birth interval and age of the mothers are still statistically significant with a reduced rate of 39%(0.6125) for children born with an interval more than 24 months and an increased mortality rate of 97% for a child born with a mother aged 40-49years.

Model III assesses the impact of health-seeking behaviours, demographic and geographical factors. The results of breastfeeding as one of the factors affecting under-five mortality were still

observed to be statistically significant. With mothers who always breastfed, the results show a high reduction rate of under-five mortality. It is reported that the reduction rate of under-five mortality is 95% (odds ratio of 0.05043). This reduction rate was too high, it might be due to a small number of observation in this variable. Regarding the place of delivery, the results showed that the children of mothers who delivered in public health facilities were more likely to experience under-five mortality than those children whose mothers delivered at private health facilities. However, private health facilities show a higher reduction rate of 28% (odds ratio 0.71557) while the children of mothers who delivered in public health facilities show the increasing rate of 46% (odds ratio of 1.4669). Also, the results of the ages of the mothers and gender of the child in this model were statistically significant. The results show that male children were more likely to die with an increasing rate of 99% while the child born with a mother aged 40-49 years has an increasing rate of 45% to die before reaching five years.

Model IV assesses the impact of hygiene factors which have been categorized into two groups: a source of water and type of toilet used by the family. The results of the source of water show that households who use improved sources of water were less likely to experience under-five mortality than households who use unimproved sources and the results are statistically significant. It is reported that households that use improved sources of water have a 29% (odds ratio of 0.7130) reduction rate in under-five mortality. The results regarding the type of toilets used by families show that children in households who used improved types of toilets were less likely to die. It is reported that the households who use improved toilets had a reducing rate of 3% (odds ratio of 0.9752).

Model V is the logistic regression of a combination of the socioeconomic and all proximate variables (intermediate) as suggested by Mosley and Chen (1984). Mosley and Chen (1984) suggest that socioeconomic variables should operate through the proximate variables in order to influence the rate of child survival. The results of the logistic regression of model V show the changing pattern in the factors associated with under-five mortality. For example, the birth interval (more than 24 months), gender of children (male), place of residence (Zanzibar), the age of the mothers (40-49 years), socio-economic factors (poorer and middle), status of working mothers (working mothers) and hygiene factors (improved sources of water) were among the factors which were statistically significant and had an impact on under-five mortality. In Model V, the gender of the child (male), the age of the mothers (44-49) and the level of breastfeeding (always breastfed) were the factors which proved to be statistically significant. Other factors were not significant but these might be due to the low number of observation presented by this model, which is based on 817 observations compared to other models which have 3,000 observations. The male child in this model has a higher risk, about 96%, of dying before reaching the age of five years followed by children who were born to mothers aged 40-49 years, which have an 85% risk of mortality. The breastfeeding results in this model show the higher reduction rate of child mortality. The results show that mothers who always breastfed have a reduced rate of 97%. The high reduction rate might be due to the fact that human milk contains antibodies that help the child to fight off virus and bacteria.

Table 4.13: Models with multiples independent variables

Hypothesis	Model 1	Model II	Model III	Model IV	Model V
Demographic and geographic factors					
Birth interval					
Less than 24 months	1.0000	1.0000	1.0000	1.0000	1.0000
More than 24 months	0.6016**	0.6125**	0.7570	0.6072**	0.7550
Gender of the child					
Female	1.000	1.000	1.000	1.000	1.000
Male	1.2157	1.2049	1.9970*	1.2065	1.9686*
Age of the mothers					
15-29years	1.0000	1.0000	1.0000	1.0000	1.0000
30- 39years	1.3456	1.2825	1.677136	1.3601	1.5536
40- 49years	2.0937**	1.9739**	3.4518*	2.1379**	3.8592*
Place of residence					
Urban areas	1.0000	1.0000	1.0000	1.0000	1.0000
Rural areas	1.086183	1.212523	1.1437	1.2300	1.1687
Zanzibar	0.5880**	0.7872.	0.5362	0.7043	0.6494
Socio-economic factors					
Mother's level of education					
No education		1.0000			1.0000
Primary education		0.9991			0.9520
Secondary and above		0.6305			1.2728
A wealth of the household					
Poorest		1.0000			1.0000
Poorer		0.6952*			0.3512
Middle		0.6660*			0.8265
Rich		0.7788			0.4939
Richest		0.7429			0.9419
Status of Working mothers					
Not working mothers		1.000			1.0000
Working mothers		1.4621*			1.8605
Health seeking behaviours					
Breastfeeding					
Never breastfeeding			1.0000		1.0000
Ever breastfeeding			0.05043**		0.03685**
Place of delivery					
Others home			1.0000		1.0000

Public facilities			1.4669		1.2814
Private facilities			0.71557		0.5760
Hygiene factors					
Sources of water					
Unimproved sources				1.0000	1.000
Improved sources				0.7130*	0.6101
Type of toilets used					
Unimproved toilets				1.0000	1.0000
Improved toilets				0.9752	1.0144
Number of observation	3,000	3,000	817	3,000	817
R2	0.0224	0.0293	0.1839	0.0257	0.2113
P-value	0.0000	0.0000	0.0000	0.0000	0.000

Keys:*p≤0.05; **p≤0.001

4.3 Summary

The fitted multivariate regression models have been generated as suggested by Mosley and Chen (1984) who revealed that socioeconomic factors always operate with intermediate variables (proximate determinants). There is a losing of the observation on model III and V, this small number of observation obtained has an impact on some of the results. All models were statistically significant with a p-value of 0.000. The model show changing after operates with proximate determinants. The results of these models have shown statistical significance for a male child, children born to mothers aged above 44 years and mothers who always breastfed. There is higher mortality for a male child, higher mortality for a child born to mothers aged more than 44 years old and a higher reduction rate of mortality for mothers who always breastfed. These results will be discussed in the next chapter.

5.0 Discussion of findings

This study aimed to identify the socioeconomic factors of under-five mortality in Tanzania. The study found a very wide variation in the level of under-five mortality in relation to socioeconomic variables and intermediate variables both in rural and urban areas. By examining these factors, this study will provide the answers to the following hypotheses.

5.1 Hypothesis 1: Socio-economic factors influence the rate of under-five mortality

5.1.1 Mothers' education

The results of this study revealed that a child born into a family who had a primary or secondary and above level of education was less likely to die than a child born into a family with no education. Children born to mothers with a secondary and above level of education seem to have a higher reduction rate of under-five mortality. Several studies have revealed that a mother's education has a positive impact on under-five mortality. The study done by Stallings (2004) revealed that a mother's level of education is associated with a greater probability of seeking advice or even treatment from a healthcare provider for a child with symptoms of certain diseases. The results of this study were also supported by the study done by Haines, Avery and Strong (1983) who said that child mortality was higher for women with lower education than women with higher education both in urban and rural areas. This is due to the fact that a mother's education helps her to use knowledge and skills to the benefit of the child's health and its survival. Also, the three theories mentioned in Chapter 2 explain the importance of education for women which results in the reduction of under-five mortality.

5.1.2 Working mothers

Working mothers have a greater impact on under-five mortality in both rural and urban areas. The results of this study show that a child with a mother who is working is more likely to die than a child with a mother who is not working. Mothers who are working do not have enough time to care for their children compared to mothers who are not working. This can be confirmed by the study done by Kishor and Parasuraman (1998) who found that whether a mother was working or not was associated with their child's health. They further explain that working mothers were more likely to experience an increased mortality rate in their infants and young children. They reveal that in India, children born to working mothers in rural areas have a 14% higher chance of mortality compared to mothers who are not working.

5.1.3 Wealth status of a household

The results also show the consistent relationship between the wealth index and under-five mortality. The result of Model II and Model V show a reduction in the under-five mortality rate for families who have a high income. The results from Model II showed that poorer and middle-income households had lower under-five mortality rates and the association was statistically significant. The bivariate results also showed that higher mortality rates occurred in the poorest households. The results are supported by Susuman and Hamisi (2012) who revealed that households with the highest wealth quantile in Tanzania have the lowest under-five mortality

rate. It is well known that due to a shortage of income, poor children are more likely to be exposed to diseases and may also be less resistant to becoming infected (Antai, 2010). All these three socioeconomic factors are supported by several studies and have also been explained by theories such as gender stratification theory, development state theory and modernization theory.

5.2. *Hypothesis 2: Demographic and Geographic factors can influence the probability of under-five mortality*

5.2.1 The gender of the child

This study also set out to examine deaths by gender, and whether the sex of child influences the probability of under-five mortality. The results of the gender of the child were statistically significant in model III and model V. The result of both model showed that a male child is more likely to die than a female child. This result is consistent with the results obtained from the Tanzania Population and Housing census 2012 which showed that a male child has a higher probability of death than a female child. Another result from the study which was done in Nigeria showed a significantly higher risk of under-five death for male children compared with female children (Ezeh, Agho, Dibley, Hall, & Page, 2015). Boco, (2015) also revealed that in several countries of sub-Saharan Africa, the results of studies investigating the difference in mortality by sex have shown that male children have a higher chance of death than female children before the age of five.

5.2.2 Shorter birth intervals

The results from Model II show that birth intervals are statistically significant. A short interval (< 24 months) was significantly associated with increased under-five mortality compared to an interval of more than 24 months. The results of this study have also been supported by Rutstein (2005), who explains that shorter birth intervals are related to severe pregnancy complications and increased morbidity during pregnancy and also increase the risk of infant and maternal deaths. In addition, the study done in Bangladesh by DaVanzo et al. (2008) explains that preceding intervals starting with a miscarriage or abortion had a greater effect on child survival compared to those starting with live birth.

5.2.3 Age of the mother

It is generally expected that a child born to a young mother aged less than 18 years and those born to mothers aged over 40 experience higher child mortality than those born to mothers aged 20-39. The result of this study shows that a child born to a mother aged 40-49 have a significant association with higher under-five mortality rates. A study done by Ribeiro et al. (2014) revealed that mothers aged younger than 15 or aged 35 and above have experienced a higher risk of child mortality. These results were also supported by another study done by Rutstein, (2000) who revealed that the percentage of births to mothers who were 35 years or above was associated with higher infant mortality rates while the percentage increase of births to mothers aged under 18 was also associated with higher neonatal deaths but lower under-five mortality rates.

5.2.4 The place of residence

This study examined the difference in rates of under-five mortality between rural and urban areas in Tanzania by looking at the place of residence. The results from the bivariate analysis showed that urban areas experience a higher mortality rate than rural areas. However, the results from all models showed that rural areas experience higher mortality rates than urban areas. A child who lives in Zanzibar is less likely to die than a child living in rural areas. The results are supported by studies done by Mahmood (2002) and Susuman and Hamisi (2012), who revealed that families who live in urban areas mostly receive better health services than those who live in rural areas. In urban areas, people expect to have more health centers which are assumed to be safer as places for delivery with a baby having fewer chances of becoming infected, whereas in rural areas there is a lack of these benefits. Also, another result of the study undertaken by Ettarh and Kimani (2013) showed that the probability of under-five mortality is associated with the place of residence, specifically in rural areas.

5.3. Hypothesis 3: Health-seeking behaviours can reduce the chances of under-five mortality

5.3.1: The place of delivery influences under-five mortality

The place of delivery also has a great influence on rates of under-five mortality. The results revealed that mothers who deliver at private health facilities experienced lower under-five mortality than public facilities. It is known that mothers who deliver at health facilities expect a higher survival rate for their children than mothers who deliver at home. The results of this study revealed that women who deliver at health facilities have a lower chance of reporting deaths than women who deliver at home. There are several possible reasons for this. One of the reasons could be that health facilities have much better resources to support a child's health than you would find in a typical home. Another reason could be due to the health advice given to mothers in health facilities. The study done in India by Whitworth and Stephenson (2002) supports this argument that women who delivered in health facilities may have received contraceptive advice from health workers which made it more likely that they would delay the next conception. Therefore, we expect that a child born in health facilities should be in better health than a child born at home.

5.3.2: Breastfeeding

The results of breastfeeding showed it to be significant to Model I and Model V. The results show that the mothers who always breastfed reported fewer mortality cases compare to mothers who never breastfed. Breastfeeding is one of the most important factors influencing the survival of children beyond the age of five. This can be confirmed by a study done in Bangladesh by DaVanzo et al. (2008) who said that longer breastfeeding improves infant survival rates. In this study, it was revealed that children who were always breastfed experience very lower under-five mortality rates. Model III showed a reduction rate of 95% while Model V showed a reduced rate of 97%. The higher reduction rate obtained it might be due to fact that, mothers who breastfeed their baby increase the child's chances of survival and this is because the nutrients obtained from breastfeeding are much better for a child's health than other ways of feeding such as using the

animal-derived milk but also this higher reduction it might be due to small number of observation in this variable.

5.4 Hypothesis 4: Improved hygiene factors can reduce under-five mortality

Hygiene factors also influence under-five mortality. In this study, two hygiene factors were employed: the source of water and type of toilets. The results show that children of families who use improved sources of water were less likely to die compared to those born into families who use unimproved sources of water. UN reports (2017) revealed that poor water supply, sanitation and poor infrastructure contributed about 2.7 million child deaths during the first eight days of their lives. Mahmood (2002) also revealed that families who used improved sources of water reported lower under-five mortality rates than families who use unimproved sources of water. Also, the results into the type of toilets used showed that families who used improved toilets have fewer reported cases of under-five deaths compare to families which use the unimproved type of toilets. These results can also be supported by Klaauw and Wang (2004) and the World Health Organisation (2017) who revealed a reduction in under-five mortality for those families who used improved toilets.

5.5 Summary

The results show that breastfeeding, birth interval, source of water, the mother's age and whether the mother was working or not all had a significant impact on the probability of death as shown in bivariate and multivariate analysis. Chapter 6 will discuss these variables and will give recommendations for the policymakers in the government of Tanzania on how to reduce the under-five mortality rate

6.0 Conclusion

6.1 Research Aim and Objectives

The study aimed to examine the impact of socioeconomic factors that determined the under-five mortality rate in rural and urban areas in Tanzania. In order to achieve this aim, the study was guided by two objectives: 1. the socioeconomic and hygiene determinants of under-five mortality in urban and rural Tanzania and, 2. the difference between the rural and urban determinants of under-five mortality in Tanzania. The socioeconomic factors examined in this study included; the mother's education, the mother's occupation and the wealth of the household. Four hypotheses were proposed in this study. To meet the objectives and test these hypotheses, the data from the Tanzania Demographic Survey 2015-2016 were used. At the bivariate level, Pearson's Chi-square test was used to identify the association between the dependent variable and each independent variable. In addition, a multivariate analysis was used to identify the independent variables which influence under-five mortality.

The results of the bivariate and multivariate analyses had similar results with few variations. Both bivariate and multivariate analysis give the great evidence risk of mortality associated with the aged of mothers older than 40years, working mothers, birth interval, unimproved sources of water and mothers who never breastfeeding this is per the 2015-2016 TDHS data. The results regarding the rural and urban differences showed that rural areas still have higher deaths than urban areas. As discussed in Chapter 5, this result could be due to the fact that there is still a large population in rural areas where people tend to consult traditional services before visiting health services for treatment. Model V which showed the relationship between under-five mortality, socio-economic and all proximate determinants. The determinants of this model explained 21% ($R^2 = 0.2113$) of the variations in under-five mortality. The lower percentage obtained in model I (2%), model II (2%), model III(18%) and model IV (3%) could be due to the fact that the socio-economic variables usually worked together with proximate determinants, as explained by Mosley and Chen (1984). Therefore, model V, after combining the socioeconomic and all proximate determinants, produced a percentage of 21% which support that socioeconomic determinants worked together with proximate determinants.

6.2 Practical implications

This study has established that under-five mortality incidence in Tanzania was influenced by demographic, hygiene and socioeconomic factors. The great evidence risk of mortality that has identified in this study was aged of mothers older than 40years, working mothers, birth interval, unimproved sources of water and mothers who never breastfeeding.

These findings provide the information to health planner and policymakers responsible for reducing the rate of child mortality in Tanzania. Therefore a recommendation from the results of

this study is that Tanzania would benefit from educational campaigns on child spacing and family planning. It is also important for the government if it should take action to provide a clean water supply in order to reduce under-five mortality.

Regarding the working mothers, the increased mortality might be due to lack of enough time to care for their babies and breastfed them. The results from the bivariate analysis have shown that mortality rates were higher with mothers who never breastfed. According to the maternity leave policy in Tanzania, supported by Act 33(1), “employees shall give notice to the employer of her intention to take maternity leave at least 3 months before the expected date of birth and such notice shall be supported by a medical certificate” (URT, 2004, p.28). The Act also states that the employer is to provide maternity leave at any time from four weeks before the expected date of the birth. In such cases, maternity leave after birth is given only for two months, which is not enough for a mother to care for her baby and breastfeed. Also, the law states that if an employee is breastfeeding, the employer must allow her to feed the baby for a maximum of two working hours per day (URT, 2004). In my view, this two-hour period may not be enough because some employees may need up to one hour to reach home and return to work. I believe that Act 33(1) needs to be amended

6.3 Future Research

This research was not able to cover all the factors that influence under-five mortality in Tanzania. However, further research in this area that covers all influences would benefit the country and policymaking. This research was able to present qualitative measures of mortality rates for the under-fives but having an understanding of the reasons why from a qualitative perspective would further benefit research and Tanzania.

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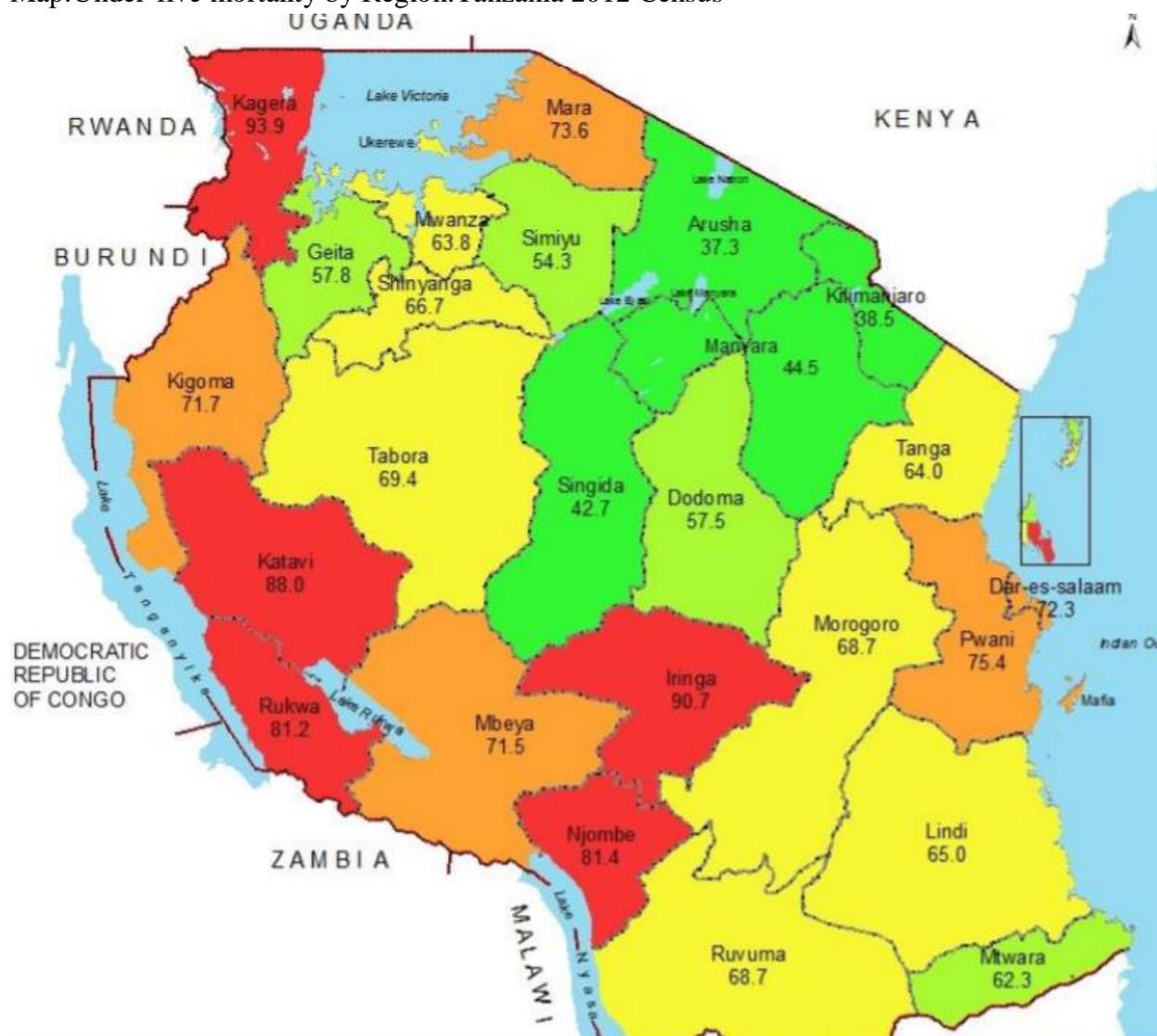
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Map: Under-five mortality by Region: Tanzania 2012 Census



Source URT (2015)