Addis Ababa University
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THE INFLUENCE OF WOMEN EMPOWERMENT ON UNDER-FIVE MORTALITY IN ETHIOPIA

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This is to certify that the thesis prepared by Yohannes Alamerew Entitled; **" The influence of Women empowerment on Under five mortaliy in Ethiopia"** and submitted in partial fulfillment of the requirements for the degree of Master of Science in Population Studies (Reproductive Health) complies with the regulations of the university and meets the accepted standards with respect to the originality and quality.

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Contents

List of Tables

List of Figures

Acronyms and Abbreviations

ANC	Antenatal Care
CSA	Central Statistical Agency
CWEI	Cumulative Women Empowerment Index
DC	Delivery Care
DHS	Demographic and Health Survey
EAs	Enumeration Areas
EDHS	Ethiopian Demographic and Health Survey
EPHC	Ethiopia Population and Housing Census
FGD	Focus Group Discussion
ICF	Inner City Fund
MCH	Maternal and Child Health
MDG	Millennium Development Goals
PRB	Population Reference Bureau
ROC	Receiver Operating Characteristics
SDG	Sustainable Development Goals
WDMI	Women Decision Making Index
WFMI	Women Freedom of Movement Index
WSEI	Women Self-esteem Index
U5M	Under-five mortality
UN	United Nations
UNPD	United Nation Population Division
WB	World Bank
WHO	World Health Organization

CHAPTER ONE

Abstract

The main objective of this study is to investigate the influence of women empowerment on under-five mortality in Ethiopia for children born five years preceding 2016. The EDHS 2016 survey conducted by central statistical agency was the source of data for analysis. This study adopted the Mosley and Chen (1984) approach to analyze the effect of women's empowerment on under-five mortality. Births that occurred in the five years preceding EDHS 2016 survey were analyzed in relation to the survival of the child and women empowerment dimensions such as women's decision making, women's self-esteem and women's freedom of mobility. Other independent variables namely; environmental, socio-economics, bio-demographic and healthcare were used as control variables. Binary logistic analyses were used to determine how each of the components of women's empowerment affects under-five mortality after controlling for the effects of other factors. The study reveals that under-five mortality was significantly associated with the two women's empowerment dimensions namely; women's decision making index and women's self-esteem index. Women's decision making power is inversely related to under-five deaths while women's self-esteem has direct positive association with under-five deaths.

Key words: Under-five mortality, women's empowerment, women's decision making, women's self-esteem, women's freedom of mobility

Introduction

Studies focusing on investments in children in less developed countries have demonstrated the importance of women's status as a determinant of child's outcomes (e.g. Haddad *et al*., 1997; Quisumbing 2003; Shroff *et al*., 2009). Moreover, previous research has included women's status as a relevant factor in explaining health inequalities among young children (Desai and Alva 1998; Kishor 2000, Smith *et a*l., 2003, Basu and Koolwal 2005, Shroff *et al.,* 2009). Women's lower status is associated with less control over resources, lower decision-making power in the household and children's affairs; less access to health services, more mobility and time constrains (Smith *et al*., 2003). These factors shown and also relate to women's ability to provide care and demand health services for their children.

In a setting with important gender imbalances and poor health outcomes like Ethiopia, it is relevant to better understand how maternal status can help in improving children's chances of surviving. In fact, under-five mortality rate dropped from 166 per thousand in 2000 to 67 per thousand in 2016 as shown in the Ethiopian Demographic and Health Survey (EDHS) (Central Statistical Agency [Ethiopia] 2017). Despite the recent progress, Ethiopia still figures among the countries with poorest child health indicators.

1.1. Background

The relevance of women's status for children's health has been well discussed in the literature. Studies have demonstrated that higher women's status is correlated with child's better nutrition (Smith *et al.,* 2003; Frost *et al*., 2005; Guha-Khasnobis and Hazarika 2006; Ackerson and Subramanian 2008), higher levels of immunization (Desai and Alva 1998; Basu and Koolwal 2005), and lower child mortality (Mason 1984, Caldwell 1986, Basu and Koolwal 2005).

For the study of child mortality specifically, Das Gupta (1990) argues that analyzing the association of women's status and child mortality is an important addition to the framework proposed by Mosley and Chen (1984) to the study of child survival whose framework integrates the medical and social approaches to the study of child mortality. They identify five groups of proximate determinants of child's health: factors related to the mother (age, parity, and birth interval), environmental contamination, deficient nutrition, injury, and personal illness control (Mosley and Chen 1984). These proximate determinants are subject to the influence of socioeconomic and contextual characteristics, such as household wealth and individual productivity (education and occupation). According to Das Gupta (1990), the framework implies that socioeconomic characteristics would be responsible for explaining mortality differences across households within the same community because these households would have the same community-level conditions and would be influenced by the same culture. Because women's status is a complex and multidimensional concept, empirical work on its effects on child's health outcomes has taken various approaches depending on the aspect of status being analyzed. Thus, the seminal work by Caldwell (1979) on Nigeria brought attention to the importance of mother's education for the survival of children. According to Caldwell (1979), maternal education increases mother's ability to interact with modern world, including interaction with medical personnel. Moreover, mother's education shifts the power structure of the family, giving

educated women greater control over decisions regarding their children (Caldwell 1979). Since Caldwell's work (1979), a considerable body of research has demonstrated the relevance of mother's education to child mortality. Studies have shown that more educated mothers would have better practices in child feeding and care, as well as a number of skills related to health, socioeconomic aspirations, and interpersonal behaviors that could affect child's survival chances (LeVine *et al*., 1994, Frost *et al*., 2005).

However, as shown by Desai and Alva (1998), the relationship between mother's education and child's health is context-dependent and is frequently attenuated by household socioeconomic status and community characteristics. For instance, the effect of mother's education can be hard to capture in settings with very low levels of formal schooling and little variability of educational level (Jani et al., 2008). In fact, Hobcraft (1993) shows that the effect of maternal education on child mortality is the weakest in sub-Saharan Africa compared with the Americas, Asia and North Africa. He argues that the weaker effect of maternal education on child mortality may be due to several factors, such as the lower penetration of formal education in sub-Saharan countries; the poorer health infrastructure, which inhibits educated mother's ability to take advantage of their human capital; and poorer data quality (Hobcraft, 1993).

Studies that examine child's health outcomes and women's status frequently use proxy measures of status instead of its determinants (education, employment, socioeconomic status). Freedom of movement has been shown to be related to higher levels of use of health services (Bloom, Wypij *et al*., 2001, Shroff *et al*., 2009). Studies looking at women's control over household resources suggest that women's control over assets is important for household food security and consequently for child's health because they are more likely to invest in health care and nutrition (Roushdy 2004, Shroff *et al*., 2009).

The literature on the role of women's autonomy for child outcomes has often argued that investments in children depend on intra-household resource allocation. However this could be affected by gender inequalities in the household. In this regard, studies have shown that in families in which women have higher decision-making power the proportion of resources devoted to children is greater than in families where women do not play an important role in the decision-making process (Duraisamy and Malathy 1991; Handa 1996).

According to Eswaran (2002), the difference in the optimal allocation of resources regarding children for mothers and fathers is due to the fact that women have to bear most of the costs associated with childrearing. They suffer a considerable income loss during pregnancy, childbirth and childrearing because they might become unavailable for work. Moreover, they incur in health risks during childbearing, especially in developing countries. In this sense, the benefits of having children are equally shared by the couple, but the costs related to it are disproportionately borne by women. As Eswaran (2002) argues, because of the difference in the cost and benefits of having children between men and women, men would be more inclined to have more children because of the negligible share of costs in bearing children and small costs of raising them. In contrast, women, anticipating the risk of child mortality would try to invest more in healthcare and other aspects related to improving the survival chances of the children already born. Therefore, an increase in women's decision-making autonomy should reduce child mortality.

Moreover, as pointed out by Desai and Johnson (2005), women's decision-making power is related to child's health in ways other than resource allocation. According to the authors, health-enhancing behaviors such as better hygiene, treatment procedures, feeding practices and routine vaccination depend on decisions on time allocation. Women with higher decision-making autonomy may be better able to determine if the child is being given a proper diet, as well as have easier access to health care without having to ask for permission of the husband or mother-in-law. Hence, authors noted, they are able to address the child's needs more efficiently. The authors analyzed the association between women's decision-making autonomy and several children's health outcomes in 12 different countries, and found that mother's higher decision-making power is related to lower levels of child mortality.

Moreover, child mortality was found to be negatively affected by mother's ability to access health services (Desai and Johnson 2005). Apart from using direct indicators of women's decision-making autonomy, studies have also looked at characteristics that depict source of power within marriage, such as customs regarding marriage and partner's characteristics. Adato, Mindek, and Quisumbing (2000) find that characteristics of husbands and wives are the most important predictors for decision-making patterns in six communities in Mexico. Besides the effect of extra-household structures and gender beliefs, bargaining power within the household

would be highly related to the human and physical capital each one brings to the marriage (Adato *et al*., 2000). Wives have higher decision-making power when there is a small age and educational difference between spouses (Adato *et al*., 2000). Kishor (2000) findings on women's empowerment and child's health in Egypt suggest that small age difference between partners were associated with higher chances of survival for children.

Living arrangements characteristics such as co-residence with in-laws and type of relationship (cohabitation, marriage, casual) have an effect on the marriage's balance of power (Blanc 2001). The practices of patrilineal and patrilocal residence, in which a son remains at his father's residence after marriage but a married daughter moves into her husband's family household, may reduce women's decision-making ability because marital kin have authority over family decisions (Warner *et al*., 1986, Balk, 1997, Yount 2005). On the other hand, patrilineal marriage systems could enhance marriage stability because it transfers her reproductive power to her husband's family through payment of bride wealth (Gaje-Brandon 1993, Arnaldo 2004). In such systems, divorce is more difficult because bride wealth has to be returned in case of separation Ogbu (1978) argues that bride wealth is a form of legitimation of marriage in some African societies, and it is a practice that would enhance rather than diminishes the status of women in that context. The degree of marital commitment could affect women's decision-making power, and consequently affect child's health. In their work using Brazilian data, Rao and Greene (1991) argue that women rarely opt for a consensual union, but stay in less stable arrangements because their partners will not agree to a legal marriage. Desai (1992)'s study on child's health and family structure in Latin America and West Africa shows evidence of the negative relationship between union instability and child's health. According to the study, children living in consensual unions, outside of unions, and in polygamous marriages are more likely to have poorer health than children in formal unions (Desai, 1992).

1.2 Statement of problem

Infant and child mortality is one of the most important development indicators and measure of well-being of the society. That is the reason why the United Nations 2030 agenda for sustainable development goals (SDG goal 3) targeted to reduce under-five mortality to at least as low as 25 per 1000 live births by 2030 as one indicator to ensure healthy lives and promote well-being for all at all ages.

And as policy direction most governments and non-governmental organizations in developing countries are working to reduce the number of children who die prematurely of preventable infectious and parasitic diseases. The government of Ethiopia has formulated a number of strategies that provide a framework for improving child health. One of the priorities in the Health Sector Development Plan (HSDP) IV is improving child health, with a goal to reduce the under-five mortality rate from 68 per 1,000 live births in 2015 to 30 per 1000 live births in 2019/20 (National Planning Commission, 2015).

Past studies conducted in Ethiopia by Alemayehu Y.K. *et al.* in 2015 using DHS data to identify the social determinants of under-five mortality showed that empowering mothers with education and making them productive for improving their income are important aspects for reducing under-five mortality. Another study by Tariku *et al.* in 2013 to analyze the social determinants of under-five mortality showed that empowering mothers with education and making them productive for improving their income are the most important aspects for reducing under-five mortality.

Other researchers who attempts to investigate the effects of women empowerment on infant mortality in Bangladesh also showed that three measures of empowerment (level of education, participation in household decisions and autonomy in movements) contribute significantly to the reduction of infant mortality rate. But women employment is associated with increased mortality for infants (Hossain, 2015).

But all the previous studies in Ethiopia and some developing countries did not covered some measures of women's empowerment such as women's self-esteems measured through the justification of wife-beating scale and women's freedom of mobility as determinants of under-five mortality. Therefore this study tries to examine the effect of different measures of women's empowerment as measured by (household decision making index, self-esteem index and freedom of mobility index) including the traditional empowerment variables (e.g., education, employment) and other factors categorized as socio-economic, bio-demographic and environmental variables on under-five mortality in Ethiopia.

1.3. Objective of the study

General objective

The general objective of this study is to investigate how women's empowerment influences under-five mortality in Ethiopia.

Specific objective

- To describe the existing status (prevalence, level, etc.) of women's empowerment and under-five mortality and
- To analyze the effect of measures of women's on under-five mortality.

1.4. Research Questions

The hypotheses tested in this study were:

- How women's household decision making power, self-esteem and freedom of mobility influence under-five mortality in Ethiopia?
- Do women's education and employment status influence under-five deaths?
- What is the relationship between socio-economic, environmental, geographic and bio-demographic factors with under-five mortality?

1.5. Scope and Limitations

This research only covers women's currently married or living in cohabitation with their partner/husband. The results are only limited to national level as the samples are inadequate to make regional level analysis. Due to missing values in EDHS2016 data some proximate determinant factors of under-five mortality are omitted from our analysis.

The information on child survival was obtained from mothers. However, 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. Thus, either death or emigration of the mother can affect the reporting coverage.

- Incorrect dating of the births can distort the data, particularly if the errors vary with the survival status of the child

CHAPTER TWO

Literature Review

Introduction

The purpose of this chapter is to present the review of literature on conceptual framework, theoretical issues and empirical reviews used to explain women's empowerment, socioeconomic, environmental, bio-demographic and health determinants of under-five mortality. Finally, it also presents summary of the reviewed literatures as a basis for analysis of the study.

2.1. Conceptual Framework for the analysis of under-five mortality

According to Mosley and Chen (1984), all social and economic determinants of child mortality necessarily operate through a common set of biological mechanisms, or proximate determinants, to exert an impact on mortality. In this framework, a set of proximate determinants or intermediate variables that directly influence the risk of morbidity and mortality are identified. All social and economic determinants must operate through these variables to affect child survival.

2.2. Theoretical Review of Literature

In the new global economy, women's empowerment has become a central issue for countries to be able to achieve development goals such as economic growth, poverty reduction, health, education and welfare (Golla *et al*., 2011).

In all developing countries, women are not equal to men in legal, social, and economic rights. Gender inequalities are pervasive in access to and control of resources including inequalities in economic opportunities, political power and decision making (World Bank, 2003). Several explanations including the socio-biology theory (Wilson, 1975) have been put forward to explain the subordinate position of women in many societies. These theories believed that sex and gender differences shape human behavior including reproductive behavior of men and women.

The term 'empower' means to give lawful power or authority to act (Parvin et al., 2004). It is the process of acquiring some activities of women. The main elements of empowerment have been defined as agency (the ability to define one's goals and act upon them), awareness of gender power structures, self-esteem and self- confidence (Kabeer, 2001). Empowerment is a process

which enables women to meet both their practical and strategic needs and increases women's political power, consciousness about them and strengthens women's self-confidence (Khan, 2006; and Mason and Smith, 2003). Kabeer et al. (1999) said that empowerment means the process which requires change at different levels and in different dimensions: change at the individual level and change in their 'inner' sense of self or in their access to material resources and relationships within the family and household. Empowerment also refers to the equitable representation of women in decision-making structures, both formal and informal, and their voice in the formulation of policies affecting their societies (Lopez-Claros et al., 2005).

Women empowerment consists of greater access to knowledge and resources, greater autonomy in decision making to enable them to have greater ability to plan their lives, or to have greater control over the circumstances that influence their lives and free from shocks imposed on them by custom, belief and practice (GU, 2005). Women empowerment means the participation of women in household decision making process and contribution to the family income (Hossain and Jaim, 2011; and Yusuf, 2010).

2.3. Empirical Review of Literature

2.3.1. Women empowerment and under-five mortality

A study from Nepal suggests that women's empowerment and spousal violence appear to have important implications for the health of women and their children (Tuladhar *et al*., 2013). Another finding from research in Nigeria showed that women who were empowered in the economic, social, and political dimensions had improved reproductive health outcomes; empowered women had fewer children and used different methods of reproductive health (Kritz *et al*., 2000). In Ethiopia, research examining the net effect of women's autonomy on their health seeking behavior showed that women's autonomy was significantly positively associated with their use of maternal health services, even after adjusting for other individual and household variables (Woldemicael *et al.*, 2010).

2.3.2. Socioeconomic factors and under-five mortality

The relationship between socioeconomic factors and childhood mortality has been well established by several studies, namely: Cleland (1990), Hobcraft et al. (1984), Hobcraft (1993) and Machado and Hill (2005). The framework adopted from Mosley and Chen (1984) in this

study uses mother's education, mother's employment, wealth status and household size as socioeconomic factors which might influence child survival. Some selected socio-economic factors will be discussed in more detail below.

Mother's Education

Research shows that access to educational opportunities plays a critical role in improving one's economic status, hence improving children's chances of survival (Mosley & Chen, 1984; Kanmiki *et al*., 2014). Young children from mothers with formal and higher education (secondary, tertiary) are 45% and 76% respectively, less exposed to having their children die before the age of five compared to uneducated mothers (Kanmiki *et al*., 2014; Amouzou & Hill, 2004).

Additionally, mothers who have no formal education are more likely to remain unemployed, to get pregnant at a younger age, to have more babies, and to have little access to family planning programs and medical care during pregnancy – therefore, they are less knowledgeable regarding the health and well-being of their children (Cornelius Nattey *et al*., 2013; El-Zanaty, 2001; Sartorius *et al*., 2010). In Egypt only 17% of uneducated mothers receive maternal care regularly; while close to 80% of educated mothers with formal or higher education receive maternal care (Cornelius Nattey *et al*., 2013). That being the case, mothers with higher level of education are mostly employed and are also able to influence child survival status by making the right choices related to nutrition, hygiene and illness prevention treatment (Cornelius Nattey *et al*., 2013).

Furthermore, a person's level of education is also associated to their employment status and income level. Mothers who work away from home could be at a higher risk of having their child die before the age of five, as they are unable to care for their children. This has been found to negatively contribute to child survival status (Hobcraft *et al*., 1984; Kishor and Parasuraman, 1998). While this is the case, mothers who are able to care for their children and breastfeed regularly have been found to be less exposed to under-five mortality (Mihrshahi *et al*., 2008). The demand and value of education and employment has become increasingly over the years, with more and more women relocating to seek such opportunities. As a result, such mothers may not be able to breastfeed their children regularly.

Mother's Employment Status

Work status of the mother is likely to affect child survival in both directions. The need to work, especially outside the home, may affect survival chances directly, simply by preventing the mother from caring for the infant. This may have substantial effects through lack of proper feeding and particularly breastfeeding early in life (Hobcraft *et al*., 1984). However, a working mother can also be associated with high family income which can increase a child's survival.

As observed by Ibrahim and his Colleagues' (1994), observed that non-farming mothers in a household with fewer children were more active than farming mothers in using oral rehydration therapy (ORT). They concluded that mothers who had more time to give to child care were more likely to use ORT.

Kishor and Parasuraman (1998) found that mother's employment had a negative effect on the child survival, if the mother works away from home for cash, lives in urban area, or lives in the South of India. In my view this could mean that it is the mother's absence rather than employment status which affects the child. If the mother works, but commutes from where the child resides, the outcome might be different. Short *et al.* (2002) identified that both work compatibility and work intensity reduce women's involvement in child care in China. However, they also pointed out that, if women with intensive work demands provide less child care, this does not necessarily hinder children's physical and psychological development. This is because in China, relatives or other members of the household assist in child care. Child care is not exclusively left to the mother. Alternative child caregivers such as grandmothers can reduce a mother's burden greatly.

In India, Krishnaji (1995) showed that working mothers experience a greater child loss than non-working mothers in respect of both male and female children. Generally, a narrower gender differential in child mortality among working mothers was observed in most of the states, however in the north and the north-west, the work status of women had a greater impact on male children than on girls. To explain the case in the north and North West, Krishnaji argued that it is because in general there is a strong bias against girls in these states. The male children of non-working mothers are the best protected among all categories so that the withdrawal of this

protection by working mothers - if what is observed can be described so - has a greater impact for boys.

Wealth Status

Wealth and gender equality do not go hand in hand easily. On the one hand, household wealth is a source of empowerment as it brings education, exposure to media and exposure to networks of intellectuals, but on the other hand, wealthier households are more likely to be strongly attached to patriarchal gender norms. Griffis (2015) revealed in his dissertation that, household wealth is an important factor related to both infant and child mortality — infants and children born to women in wealthier households tend to have lower mortality. Wealth can increase control over and access to resources, particularly health resources.

2.3.3. Biological and Maternal determinants of under-five mortality

Mosley and Chen (1984) identified birth order, birth interval and age of the mother as factors which influence child survival. Studies conducted by Hobcraft *et al.* (1985), Rutstein (2000) and Davanzo *et al*. (2004) showed the association of these factors to child survival. In addition to the above mentioned factors, the sex of the child, type of birth, size of child at birth and number of births in last five years was also considered in the current study. Each factor is discussed below.

Sex of child

A study conducted in India revealed that female children are more at risk (52%) of dying before reaching five years of life compared to their male counterparts, due to high preference for health care services given to boys (Claeson *et al.,* 2000). A girl child is only taken to healthcare facilities when illness is at advanced stage, while the reverse is true for their male counterparts (Claeson *et al.,* 2000).

Furthermore, male children are also shown preference with regards to food and feeding practices such as provision of nutritious foods - practices that may impact on female mortality superseding that of male mortality (Chen *et al*., 1981; Arokiasamy, 2002). In Africa and historically male children have been generally perceived as the future leaders and the heads of the households (Claeson *et al*., 2000; Krishnaji, 1995).

Another study conducted in India revealed sex differentials among under-five mortality, particularly among working versus not-working mothers – where working mothers experienced

more male child mortality compared to their female counterparts (Krishnaji, 1995). The researcher justified that although more preference is given to male children in India, working mothers may have withdrawn such favoritism which may have had a significant influence on male children being exposed to mortality. However, a study conducted by Sartorius et al (2011) revealed that male children are at a higher risk of under-five mortality than female children. Studies conducted in other parts of Africa found similar results, that male children were more likely to die before the age of five than females (Ssewanyana and Younger, 2007; Charmabagwala *et al*., 2004). In a study conducted by Richards *et al*., (2011), the researchers concluded that high favoritism towards female children may be due to traditional beliefs that bride money can bring wealth to the family. Biologically, female children are also known to live longer than their male counterparts (Ssewanyana and Younger, 2007).

Although the literature has shown that socioeconomic factors such as such as employment, income and education; and demographic factors such as maternal age, race and sex of the child are significant predictors for under-five mortality, there have also been some contradicting findings on the association between some socioeconomic and demographic factors and under-five mortality in Africa.

Size of child at birth

The birth weight of the child is one of the main predictors of infant and child mortality (Eberstein, Nam & Hummer, 1990). Their study shows that low birth weight infants and children show higher risks for mortality than infant and children with normal birth weights. Another study by Solis and colleagues' (2000) revealed that, birth weight has a curvilinear relationship with mortality such that lighter and heavier babies tend to have a higher risk of mortality.

Type of birth

A study conducted in Jordan by Cornelia Kaldewei (2010) showed that an additional risk factor for an infant's survival is being born as part of a multiple delivery. Another study conducted in England and Wales also reveals that multiple births tend to be preterm and of low birth weight, which means that multiple birth babies are at increased risk of being stillborn or of dying in the first year of life than singletons (Botting *et al.*, 1987).

Birth order

High mortality has been associated with being the first born and with high birth order. Hobcraft *et al.* (1985), showed a clear excess of neonatal mortality for the first births and first born children continued to be at a disadvantage during the remainder of infancy. However, contrary to the general belief, there was no clear evidence of excess mortality for children of birth order four to six, nor even for those of order seven and higher, once the other factors in the regression model were controlled. This could suggest that mortality associated with births of high orders may be predominantly caused by other factors like birth intervals.

However, it should be noted that the outcome of the first birth could be associated with the age of mother rather than the order. Hobcraft (1991) concludes that delaying the first birth until a woman is at least 18 years of age might reduce the risk of death for first born children by up to 20 percent on average and up to 30 percent in a few countries. Other researchers like Mohamed, et al. (1998) linked the death of the first born to low birth weight.

Birth Interval

A number of studies have demonstrated increased mortality risks among children born after short birth intervals. Some of these studies have investigated possible pathways through which preceding birth intervals may affect childhood survival.

Boerma and Bicego (1992) provided possible pathways through which the relationship between preceding birth intervals and child survival might be affected, identifying prenatal and postnatal mechanisms. As far as prenatal mechanisms are concerned, it is believed that women with a short interval between two pregnancies have insufficient time to restore their nutritional reserves, which might affect fetal growth. These researchers mentioned several studies which revealed increased risk of intrauterine growth retardation for shorter inter-pregnancy intervals. Both intrauterine growth retardation and prematurity lead to low birth weight, which is a strong determinant of infant mortality.

Postnatal mechanisms include poor nutrition of the mother, which may lead to impaired lactation and the inability to provide adequate care for the children.

Sibling competition may also have an effect on the survival of the child. The results of Boerma and Bicego's (1992) study suggest that prenatal factors are more significant than

postnatal factors. Hobcraft and Colleagues' (1985) concluded that short child spacing could be the dominant source of most of the apparent increase in risks at high birth orders and higher ages of the mother. Children born at very short intervals after preceding births (1 to 17 months) are about twice as likely to die as those born after intervals of 24 to 47 months: those born after 18-23 months experience an excess risk of about one-third (Hobcraft,1991).

Davanzo *et al.* (2004) summarize mechanisms that have been hypothesized to possibly contribute to the detrimental effect of a short birth interval on childhood survival as; (a) behavioral effect associated with competition among siblings, (b) the inability (or lack of desire) to give a child adequate attention if his or her birth came sooner than desired; and, (c) disease transmission among closely spaced siblings. Hobcraft *et al.* (1985) in their quest to answer whether child spacing effects are real or artifactual, discussed the complex web of potential associations between breastfeeding, mortality and subsequent pregnancy. They concluded that the most plausible mechanism for the deleterious effect of short previous interval is maternal depletion. This results in a small baby, perhaps with increased risk of prematurity. Low birth weight is associated with very poor survival chances.

Some studies showed that the effects of birth spacing disappear if women attend prenatal care. For example Mahmood (2002), showed that for mothers with shorter previous birth intervals who have used prenatal care, their babies are significantly more likely to have better survival chances during the neonatal period than those mothers with the same short birth interval who did not receive prenatal care for the index child. This was earlier suggested by Boerma and Bicego (1992).

Maternal Age

Maternal age at first birth is crucial for understanding and predicting mortality risks of under-five children (Ayotunde *et al.,* 2009). Children born to younger mothers (whose age at first birth is below 20 years) are at a higher risk (52%) of dying before reaching five years of life (Ayotunde *et al*., 2009). Another study conducted in Ghana showed a significant association between infant mortality and mothers who were teenagers at first birth (Ssewanyana and Younger, 2007). Similar findings were also observed in another study, although no association was observed between under-five mortality and mothers above the age of 34 years (Hobcraft *et al*., 1984).

Some of the explanations given for high infant and under-five mortality rates among younger mothers relate to the fact that such mothers (less than 20 years) are most likely to give birth to children that experience preterm birth, low birth weight and asphyxia, conditions that falter child growth (Patton *et al.,* 2009). Furthermore, adequate knowledge regarding pre- and post-natal health practices among teenage mothers is minimal (Heaton & Amoateng, 2007). Such practices such as proper medical attention and feeding practices are critical to under-five survival and development status. Proper pre-natal and post-natal health care significantly decrease under-five mortality (Heaton & Amoateng, 2007).

Contrary to such findings, a study in Ghana found that children born from older mothers (whose age at first birth was 35 years and above) were more at risk of dying before reaching five years of survival (Kamniki *et al*.,2014). Mothers whose age at first birth were 35 years and above were also found to experience more under-five deaths compared to younger mothers in a study conducted by Charmabagwala *et al.,* (2004). While this is alarming, the risks become worse for under-5 children of mothers with lower levels of education, low income, live in rural areas and who are unemployed (Singh and Tripathi, 2013; Ayotunde *et al*., 2009). Comparing such contradicting findings from different studies suggest that in some settings both younger and/or older mothers may be expected to more likely experience under-5 mortality compared to mothers in the age group 20-34.

The living conditions among large families are likely to weaken child health due to malnutrition, insufficient parental attention given to children and poor illness recognition among under 5 children (Heaton & Amoateng, 2007). Infections are likely to spread easily as well among family members in such close proximity settings.

2.3.4. Environmental and Geographic factors and Under-five Mortality

Environmental conditions have long been considered to have a significant influence on mortality. These include access to sanitation, source of drinking water, source of energy and type of dwelling. Some of these factors are so interlinked that they will be discussed together rather than individually. For example Ezzati and Kammen (2002) argued that to understand the health effects of exposure to indoor smoke so that appropriate interventions and policies can be designed and implemented is a complex phenomenon. Studies conducted by Anderson *et al.* (2002) and Wichmann and Voyi (2006) have shown a strong association

with access to clean water, sanitation, clean source of energy and with infant and child mortality.

The South African Demographic and Health Survey (SADHS) report of 1998 showed childhood mortality differentials caused by socio-economic, demographic, environmental and high-risk fertility behavior. For environmental factors, source of drinking water, sanitation, housing materials and source of energy were investigated. Child mortality rates, more than doubled where the source of drinking water was other than piped water. Where poor sanitation existed child mortality rates are higher. The report also showed that there was a relationship between material used for the dwelling and source of energy with child mortality. Child mortality increased more than three times where other materials other than block/bricks are used for housing and also other sources of energy other than electricity were being used. But for this research we only considered access to sanitation and place of residence as environmental factor, because most environmental variables collected in EDHS 2016 were in poor quality and having many missing values.

Source of water and access to sanitation

Increased risk of potentially fatal diarrhea diseases is expected among households with no clean drinking water and/or with no safe sanitation. Some studies like Mahmood (2002) have shown a relationship between access to clean water and sanitation to under-five mortality. Anderson *et al.* (2002) in their study of black and colored populations showed a hierarchy of needs in which without clean water, sanitation matters little. In their analysis they considered household social economic characteristic, access to and use of health care, environmental conditions and age of the mother.

Place of Residence

Children born and raised in sufficiently resourced urban areas are less likely to experience deaths when compared to children born and raised in inadequately resourced rural areas (Bbaale, 2011). Furthermore, in sub-Saharan Africa, more than a million under-5 children die every year due to drinking unsafe water and poor sanitation (Ester *et al*., 2011; Sartorius *et al.*, 2011). In rural areas, only 30% and 54% of the residents have access to basic sanitation and clean drinking water, respectively (Ester *et al*., 2011). Alternatively, urban residents have 52% and 83% of basic sanitation and clean drinking water, respectively (Ester *et al*., 2011).

Studies conducted by Woldemikael (2001), Wang (2003), and Azab *et al*., (2014) revealed that children residing in the rural areas are at higher risk of being infected with diseases such as diarrhea, compared to their urban counterparts. Such diseases have been known to influence child survival in Sub-Saharan African countries. In Ethiopia been a disproportionately high number of cases of deaths associated with diseases such as diarrhea in rural area. This may be due to differences in the provision of healthcare services and the burden of disease between urban and rural residents - hence it is importance of accounting for demographic factors such as place of residence when looking at socioeconomic differences in Sub-Saharan African countries vice/vise under-five mortality.

Although many studies have found under-five mortality to be significantly associated with rural geographical place of residence, there have been some researchers who have found contradicting results to these. For example, the findings from a study conducted by Amouzou and Hill (2004) found that under-five children from semi-urban disadvantaged backgrounds are highly exposed to dying before reaching five years of survival compared to those residing in rural areas.

2.3.5. Nutrition and health seeking behavior and under-five mortality

Breastfeeding

Worku (2011) revealed that under-five children who are not breastfed for at least first six months of life are 3.09 more times likely to die compared to their breastfed counterparts. He also noted that, although mother's inability to breastfeed their children has been largely attributed to mothers working away from home, the literature shows that uneducated mothers, mostly from rural areas, are unaware of the benefits of exclusive breastfeeding on their child's survival (Worku, 2011).

Place of Delivery

Place of birth indicates whether a child was delivered at home, at a hospital or health center, through a traditional birth attendant, or at a different location (other). Mortality is significantly reduced for children born in a hospital or health center in Malawi (Bolstad & Manda, 2001).

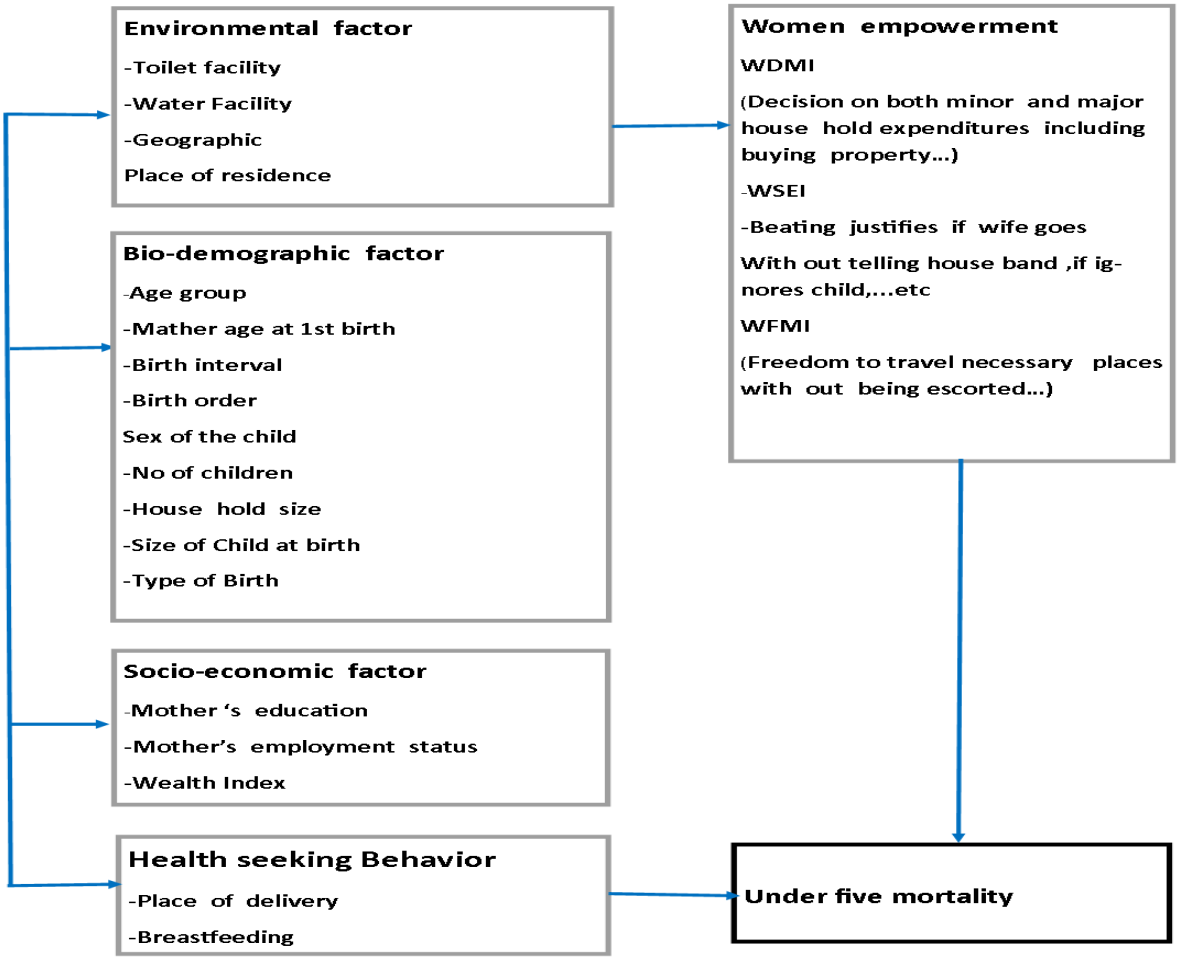
2.4. Synthesis of the reviewed Literature

This chapter proposed a conceptual framework for use in the analysis and reviewed various studies dealing with under-5 mortality rates. The conceptual framework considers socioeconomic, environmental, biological, maternal, nutrient deficiency and health-seeking

behavior factors as determinants of child mortality. A review of some empirical researches dealing with the relationship between women's empowerment, socio-economic and proxy indicators and under-five mortality was also conducted. The connection between women's empowerment, socioeconomic, environmental, geographic and bio-demographic factors and under-five mortality has been established in many studies. This study aimed to examine the association between women empowerment and under-five mortality in Ethiopia; hence the adoption of Mosley and Chen's (1984) framework is appropriate.

Figure 2.4.1, below describes how under-five mortality is affected through women empowerment, demographic, socioeconomic, environmental and maternal factors.

Figure 2.4.1: Conceptual Framework of the study



Source: Adopted from Mosley and Chen (1984).

CHAPTER THREE

Methodology

This chapter focuses on the approach, design and methods used for conducting the study. Preparations of the data for analysis and models employed for the analysis are discussed. The chapter also presents the strategy used in the analysis of the data, including the operational definitions of the independent and dependent variables.

3.1. Research Approach

This study follows a quantitative research approach for testing the proposed hypothesis by examining the relationship between the independent and dependent variables.

3.2. Research Design

This study is an analytical cross-sectional study through the analysis of secondary datasets of the 2016 Ethiopian Demographic and Health Survey.

3.3. Research Methods

3.3.1. Sample Sizes and Selection Techniques

The Ethiopian Demographic and Health Survey (EDHS 2016) is a representative sample survey to provide both regionally and nationally level reporting. The 2016 EDHS survey contains information for all ever-married women aged 15-49 residing in the selected households. A sample of 9784, those who were ever-married of age group 15-49 and have given birth in last five years and appropriate for our analysis in terms of our objective have been selected. The EDHS survey provides useful statistics that can be used to determine changes in key areas of development in Ethiopia, including maternal and child health, domestic violence, education and poverty reduction. The 2016 Ethiopian Demographic and Health Survey (EDHS) is the fourth Demographic and Health Survey conducted in Ethiopia. It was implemented by the Central Statistical Agency (CSA) at the request of the Federal Ministry of Health (FMoH). The data collection took place from January 18, 2016, to June 27, 2016.

The EDHS survey data were collected using stratified two-stage cluster sampling design. Ethiopia Population and Housing Census (PHC), which was conducted in 2007 by the Ethiopia Central Statistical Agency was used as frame to select the primary sampling units or enumeration areas (EAs). Hence the sample data is not an identical and independently distributed (iid) sample and observations are selected using non-simple random sampling technique. Non-simple random sampling, which is well known as complex survey sampling, consists of various probabilities of selections at different levels. The weight to each individual is inversely proportional to the probability of selection. Sampling weights that come with the survey data are used in estimation, instead of simple random sampling weight. The weight series is rescaled following EDHS manual. In the first stage, a total of 645 EAs (202 in urban areas and 443 in rural areas) were selected with probability proportional to EA size (based on the 2007 PHC) and with independent selection in each sampling stratum.

In the second stage of selection, a fixed number of 28 households per cluster were selected with an equal probability systematic selection from the newly created household listing. All women age 15-49 and all men age 15-59 who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to be interviewed. One can find the full information regarding the sample design and selection procedures from the survey report (Central Statistical Agency [Ethiopia], 2017).

3.3.2. Data Collection Technique

EDHS Woman's Questionnaire was used to obtain women's related variables such as Background characteristics (including age, marital status, and education), Birth history and childhood mortality, women decision making variables, self-esteem variables and freedom of mobility variables. The information collected by Household Questionnaire was also used to obtain information on characteristics of the household's dwelling unit, such as source of water, type of toilet facilities, and other characteristics, as well as on ownership of various durable goods used for computing wealth index.

3.3.3. Variables of the Studies

Dependent Variable

Under-five mortality (i.e. death before reaching the fifth birthday) was the outcome variable considered in this study to examine, in overall, the risks of death during the first five years of life. It is dichotomized into 'under-five mortality' (it is assigned a value 1) and 'under-five survival' (it is assigned a value of 0).

Independent variables

The major independent variables used for this study are women empowerment variables. Women's empowerment is a complex concept that is often difficult to operationalize. Most studies of women's empowerment and under-five mortality so far have only examined a single or a few aspects of empowerment. In the model used for analysis of this study, the components of women's empowerment used as independent variables to see its influence on under-five mortality were; women's household decision making index, women's self-esteem index and women's freedom of mobility index. In addition to this we also included the old women's empowerment variables such as education and employment status as independent variables that have been considered in most previous studies. The computations of each of the three main empowerment indexes are presented as follows:

Women's Decision-Making Index (WDMI): Decision alone or jointly

According to EDHS2016 women's questionnaire the five household decisions making questions collected from respondents were: who usually decides for using or not using contraception method, person who usually decides on respondent's health care, person who usually decides on large household purchases, person who usually decides on visits to family or relatives and person who usually decides what to do with money husband earns. The main response categories for each of the above five questions were: (1) respondent alone, (2) respondent and husband/ partner, (3) respondent and other person (4) husband/partner alone, (5) someone else and (6) other

Therefore, for the purpose of this research different decisions were labeled according to who took the decision; any decision that was taken by the respondent herself was labeled (2). A decision that was jointly taken by the respondent and her husband or by the respondent and another person was labeled (1). Finally, other possible options mentioned earlier were labeled (0).

WDMI is the decision-making index which was obtained by adding the scores obtained from responses to different questions about household decision-making. WDMI index ranges from 0 to 10, "0" scoring indicates that a women is do not participate in all types of household decision making, a scoring of "10" for index means a women is fully empowered regarding all household based decisions.

Women's self-esteem index (WSEI): Wife beating

The five questions of women's self-esteem collected from respondents using EDHS2016 women's questionnaire were, Beating justified if wife goes out without telling husband, Beating justified if wife neglects child, Beating justified if wife argues with husband, Beating Justified if wife refuses to have sex with husband and Beating justified if wife burns food. The responses to each of the above five questions were categorized as (1) yes and (2) no.

For the purpose of this study we recoded the responses as: agreement with any of the five reasons into (0) while rejection of wife beating for any of the five reasons into (1). Others were coded (0).

WSEI is the self-esteem index which was obtained by adding scores of different responses about respondents' attitudes toward justifying for wife beating. WSEI index ranges from 0 to 5, "0" scoring indicates that a women self-esteem is low as beating was justified by agreement all of the five reasons, a scoring of "5" for this index means a women is fully empowered regarding its self-esteem.

Women freedom of mobility index (WFMI): Getting permission

Women's freedom of mobility was measured using four questions based on EDHS2016 women's questionnaire getting medical help for self: getting permission to go alone, distance to health facility, getting money for healthcare and not wanting to go alone. The responses to the above questions were (1) big problem and (2) not a big problem. But for this analysis responses of "a big problem" for any of the four questions regarding freedom of getting medical help was coded (0) while "not a big problem" responses were coded (1).

WFMI is the freedom of mobility index which was obtained by adding scores of different responses about respondents' freedom of movement. WFMI index ranges from 0 to 4, "0" scoring indicates that a women's freedom of mobility is low at the lowest state based on the four

questions measuring freedom of mobility, a scoring of "4" for this index means a women is fully empowered regarding its freedom of mobility.

Evaluations that do not require the presentation of results in one unique measure of empowerment can still apply the same approach and employ the same tools, without taking the step of combining the data into a single composite index. In the computation of women's empowerment indexes used as independent variables, we adopted the approach followed by authors in previous studies such as by (Simone *et al.*, 2017)

Other independent variables considered to be used in the logistic regression model to see their relationship with under-five mortality were categorized in to environmental (such as toilet facility and source of drinking water), healthcare (place of delivery and duration of breastfeeding), socioeconomic (such as, education, employment status and wealth status), bio demographic(such as sex of child, size of child at birth, type of birth, number of births in last five years, household size, birth order, birth interval and mothers age at first birth) and geographic (such as place of residence).

Data Cleaning and Quality

Before conducting different analyses techniques employed in this study, the EDHS 2016 data have been cleaned in order to ensure its appropriateness for analysis. Even though the EDHS 2016 collected several variables which measures women empowerment, we did not included some variables due to large number of missing values. Out of the total 10641 observations containing information about under-five children, some observations of the outcome variable for women who are not currently married or living in cohabitation with their partners were dropped since they are not applicable for household level factors of under-five mortality. Other observations like children whose mothers were visitors are also excluded from the analysis as they are not applicable for household level factors. Therefore, the final analysis of our study was based on 9784 observations.

3.3.4. Data analysis techniques

Binary logistic Regression

Logistic regression estimates the odds of a certain event occurring. In using logistic regression model the dependent variable should be a dichotomous or binary variable. Hence, in this study it was used to predict under-five deaths. Logistic regression can be used to predict whether an

event will occur or not using a set of independent predictor variables. Furthermore, it can be used to explain the percent of variance in the dependent variable which is explained by a specific predictor variable.

This is usually explained in terms of an odds ratio. The logistic equation may be written as follows;

Equation 3.3.1:

$$\pi(x) = \frac{e^{\alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_i x_i}}{1 + e^{\alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_i x_i}},$$

Where $\pi\ (x)$ is the probability that the response $y = 1$

α is the equation constant and

β_i is the coefficient of the predictor x_i

In the logistic regression analysis if the estimated odd ratio of any of the dummy variables is greater than 1, it signifies that the probability of occurrence of the outcome event (i.e. under-five mortality) given that category of the variable is higher than the probability of the event occurring in the presence of the reference category of that variable. However, if the estimated odd ratio is less than 1, then the probability of the event occurring given that variable category is less than the event occurring given the reference category for that variable. For our study the significant level was set at 5% (i.e., $P < 0.05$).

The advantage of a logistic regression model is that the independent variables don't have to be normally distributed. Secondly, it does not assume a linear relationship between the independent and dependent variables. However, logistic regression is sensitive to high correlations among the predictor variables. This is referred to as multicollinearity. Pallant (2005) recommends that multicollinearity problems should be checked before logistic regression analysis.

Assumptions of Logistic Regression

Sample Size

The number of cases in the sample and the number of predictors (independent variables) in the model are very important. If the sample size is small, but have a large number of predictors, there will be problem with the analysis (including the problem of the solution failing to converge). This is common when there are categorical predictors with limited cases in each category. To

deal with this problem descriptive statistics was conducted on each predictor and those with limited numbers were collapsed or deleted.

The Problem of Multicollinearity

Multicollinearity occurs when one or more of the independent variables in the model can be approximately determined by some of the other independent variables. When there is multicollinearity, the estimated regression coefficients of the fitted model can be highly unreliable. There is need to check for high intercorrelations among predictor (independent) variables. Ideally, the predictor variables will be strongly related to the dependent variable but not strongly related to each other. Collinearity diagnostics can be conducted to test for multicollinearity.

Outliers

There is a need to carefully look out for outliers or cases that are not well explained by the model. In logistic regression terms, a case may be strongly predicted by the model to be one category but in reality be classified in the other category. These outlying cases can be identified by inspecting the residuals, an important step if there are problems with the goodness of fit of the model.

3.4. Ethical considerations

This study involved a secondary analysis of anonymised data from the EDHS 2016. The EDHS survey was conducted strictly under the Ethical rules and regulations of world health organization (WHO). Informed consent was obtained from respondents during the data collection process of EDHS2016. The researcher was also obtained formal approval to use the data from central statistical agency of Ethiopia.

CHAPTER FOUR

Results and Discussions

This chapter will describe the three types of analysis that were performed. Firstly, the descriptive results are presented and discussed; secondly we present determinants of women empowerment using multivariate regression model, followed by the results from the logistic regression analysis performed to see the association between under-five mortality with women empowerment and other important covariates.

4.1. Descriptive analysis of variables

The Frequency distributions and percentages were used to show the distribution of children dead according to the various categories of the study variables. The frequencies give the first hand picture of preliminary findings of the study

The explanatory variables include a set of variables most commonly used by past studies with the addition of some women empowerment category. That is, different dimensions of women empowerment are included along with other variables to see if they explain under-five mortality. All explanatory variables are divided into six categories: (i) Women empowerment; (ii) Environmental (iii) Healthcare; (iv) Bio-demographic; (v) Socio-economic; and (vi) Geographic.

The following tables provide specification and descriptive statistics of the dependent and explanatory variables used in the analysis.

Table 4.1.1 Survival of under-five children for the birth cohorts (2012-2016), n=9784

	Un-weighted	Weighted
Alive	9,215	9,257,352
Dead	569	526,648
Total	9,784	9,784,000
Under-five mortality rate	58.2	53.8

Table 4.1.1 describes the un-weighted and weighted distribution of under-five children survival for births between (2012 and 2016). The data indicates only for those children where their mothers are currently married or living in cohabitation with their partner. The descriptive measures for both un-weighted and weighted data indicated that under-five mortality rates were 58.2 and 53.8, respectively.

Table 4.1.2: Description of Background Characteristics of Respondents

Variables	Freq.	Percent	Variables	Freq.	Percent
Mother's Education			**Women's age group**		
No Education	6357	65.0	15-19	333	3.4
Primary	2429	24.8	20-24	1989	20.3
Secondary or Higher	998	10.2	25-29	2935	30.0
Total	**9784**	**100.0**	30-34	2186	22.3
Toilet facility type			35-39	1561	16.0
Unimproved Facility	8212	83.9	40-44	598	6.1
Improved Facility	1572	16.1	45-49	182	1.9
Total	**9784**	**100.0**	**Total**	**9784**	**100.0**
Drinking Water Source			**Duration of breast feeding**		
Unimproved Source	3950	40.4	Never breastfed	525	5.4
Improved Source	5834	59.6	Ever or currently breastfeeding	9259	94.6
Total	**9784**	**100.0**	**Total**	**9784**	**100.0**
Type of birth			**Preceding Birth interval**		
Single Birth	9522	97.3	Pr. birth interval was 13+	9385	95.9
1st of multiple	131	1.3	Pr. birth interval was 13 or under	399	4.1
2nd of multiple	131	1.3	**Total**	**9784**	**100.0**
Total	**9784**	**100.0**	**Wealth index**		
Mother's age at her first birth			Poorest	3677	37.6
Mother was 18+ at 1st birth	6024	61.6	Poorer	1677	17.1
Mother was <18 at 1st birth	3760	38.4	Middle	1358	13.9
Total	**9784**	**100.0**	Richer	1219	12.5
Sex of Child			Richest	1853	18.9
female	4732	48.4	**Total**	**9784**	**100.0**
male	5052	51.6	**Under 5 mortality**		
Total	9784	100.0	Alive	9215	94.2
Birth Order			Dead	569	5.8
Mother had 1 or 2 births	3505	35.8	Total	9784	100.0
Mother had 3 or more births	6279	64.2	**Mother's Employment Status**		
Total	**9784**	**100.0**	Not Working	5939	60.7
No of births in last five years			Worked in the Past	1399	14.3
3 or more births	1458	14.9	Currently Working	2446	25.0
1 or 2 births	8326	85.1	Total	9784	100.0
Total	**9784**	**100.0**	**Size of Child at Birth**		
Place of delivery			Average	4101	41.9
Health Facility	2830	28.9	Very large or larger than av.	3008	30.7
Home or elsewhere	6954	71.1	Very small or smaller than av.	2675	27.3
Total	**9784**	**100.0**	**Total**	**9784**	**100.0**
Place of Residence					
urban	1723	17.61			
Rural	8061	82.39			
Total	**9784**	**100.0**			

Table 4.1.2, shows the frequency distribution of each of the proximate determinants and the outcome variable used in this study. The result shows that 65.0 percent out of the total

percentage of the under-five mothers had no education, while 24.8 percent and 10.2 percent reported that they had primary and secondary or higher education respectively. Further, 60.7 percent reported they were not working, 14.3 percent reported they were worked in the past while 25.0 percent have been working during the survey. Most of the children (37.6) were lived in households where their income is in the poorest wealth quintile, while 17.1, 13.9, 12.5 and 18.9 percent were poor, middle, richer and richest wealth quintile respectively. Among the children large proportion (82.4 percent) were living in rural areas and smaller proportion (17.6 percent) were living in urban areas. The proportion of the under-five mothers ages 15-19,20-24, 25-29, 30-34, 35-39, 40-44 and 45- 49 years 3.4, 20.3, 30.0, 22.3, 16.0, 6.1 and 1,9 percent respectively. Large proportions (61.6 percent) of the under-five children's mothers were 18+ years of age at first birth while the remaining (38.4 percent) were under 18 years of age. Ninety-five percent of the children were reported to have ever been breastfed, while about 5 percent had never been breastfed. Out of this total, 59.6 percent drank water from improved source (e.g. pipe water, bore hole, covered well) and 40.4 percent from non-improved source (e.g. uncovered well, stream/pond).

Among the children, 35.8 percent were reported as birth order 1 or 2, while 64.2 percent were reported to fall within birth order 3 or above. Seventy-one percent of them were delivered at home or elsewhere, while only 29 percent were delivered at health facility. About 85.1 percent of the under-five mothers reported that they had only 1 or 2 births within the previous five years before the survey, while 14.9 percent reported that they had 3 or more births. Among total children 97.3 percent were single birth, while 1.3 and 1.3 were 1^{st} of multiple births and 2^{nd} of multiple births respectively. Out of these children 48.4 are females. Looking at their sizes at first birth 41.9 percent were average size, while 30.7 and 27.3 were very large or larger than average and very small or smaller than average sizes respectively. The majority (95.9 percent) of under-five children were born with 13+ months of preceding birth interval, while the remaining (4.1 percent) were born under 13 months of preceding birth interval. Sixteen percent of the children were from households where improved toilet facility was used for sanitation, while 84 percent were from households where non-improved facility was used. Finally, the table shows that 94.2 percent (9,215) out of the total number of under-five children sampled in the survey were reported alive as at the time the information was collected, while 5.8 percent (569) were reported dead. In total, information was elicited on 9784 under-five children in the survey.

4.2. Description of Women's Empowerment

Women's empowerment: is a process of personal and social change through which women gain power, meaningful choices and control over their lives. In this research woman empowerment is conceptualized as women's participation in major household decision, their attitude towards gender role and their freedom of movement.

The following figures describe the sampling distribution of under-five mortality by the three measures of women's empowerment.

Figure 4.2.1: Sampling distribution of under-five mortality rate by responses of the five women decision making items (n=9784, not weighted)

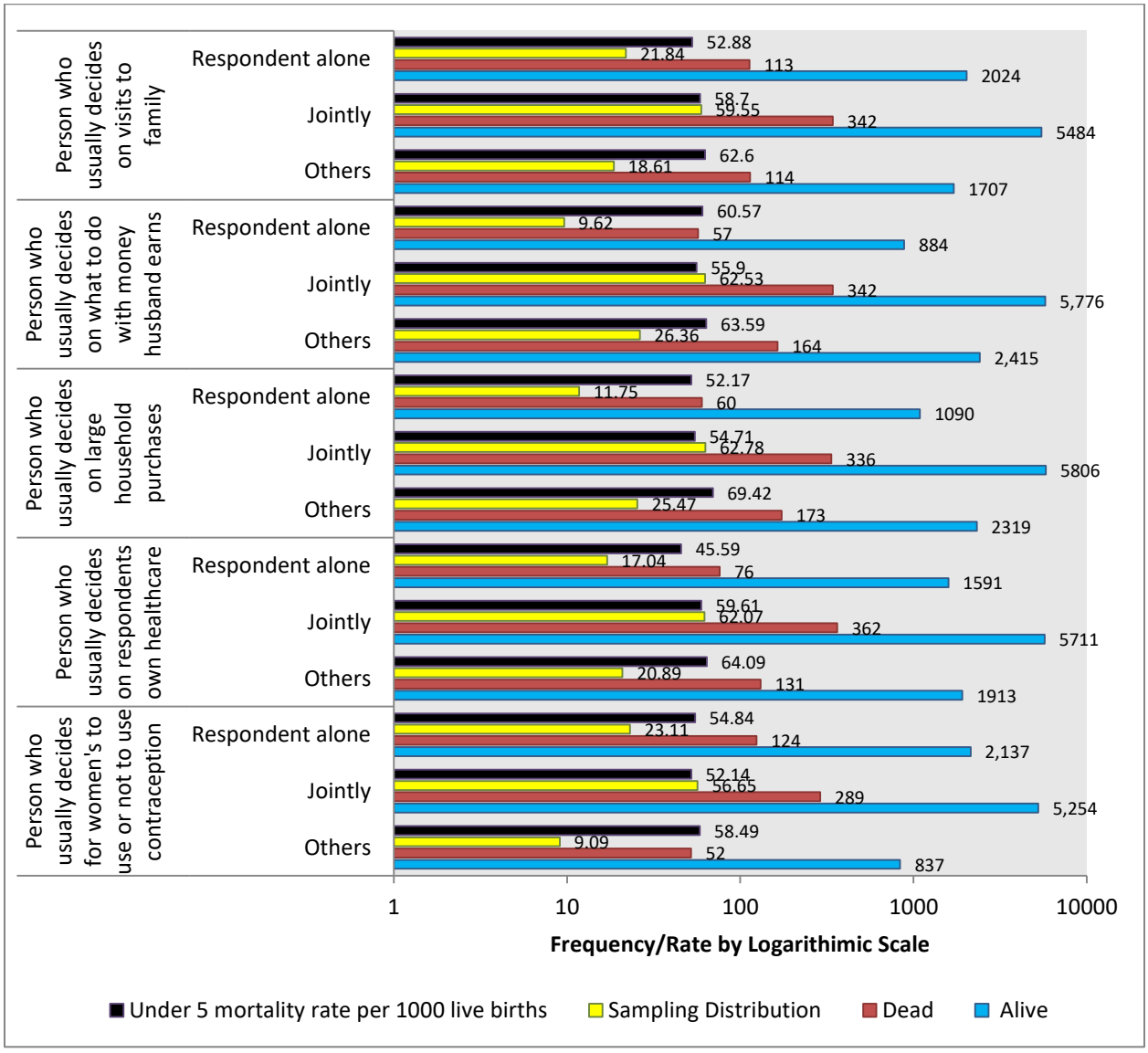
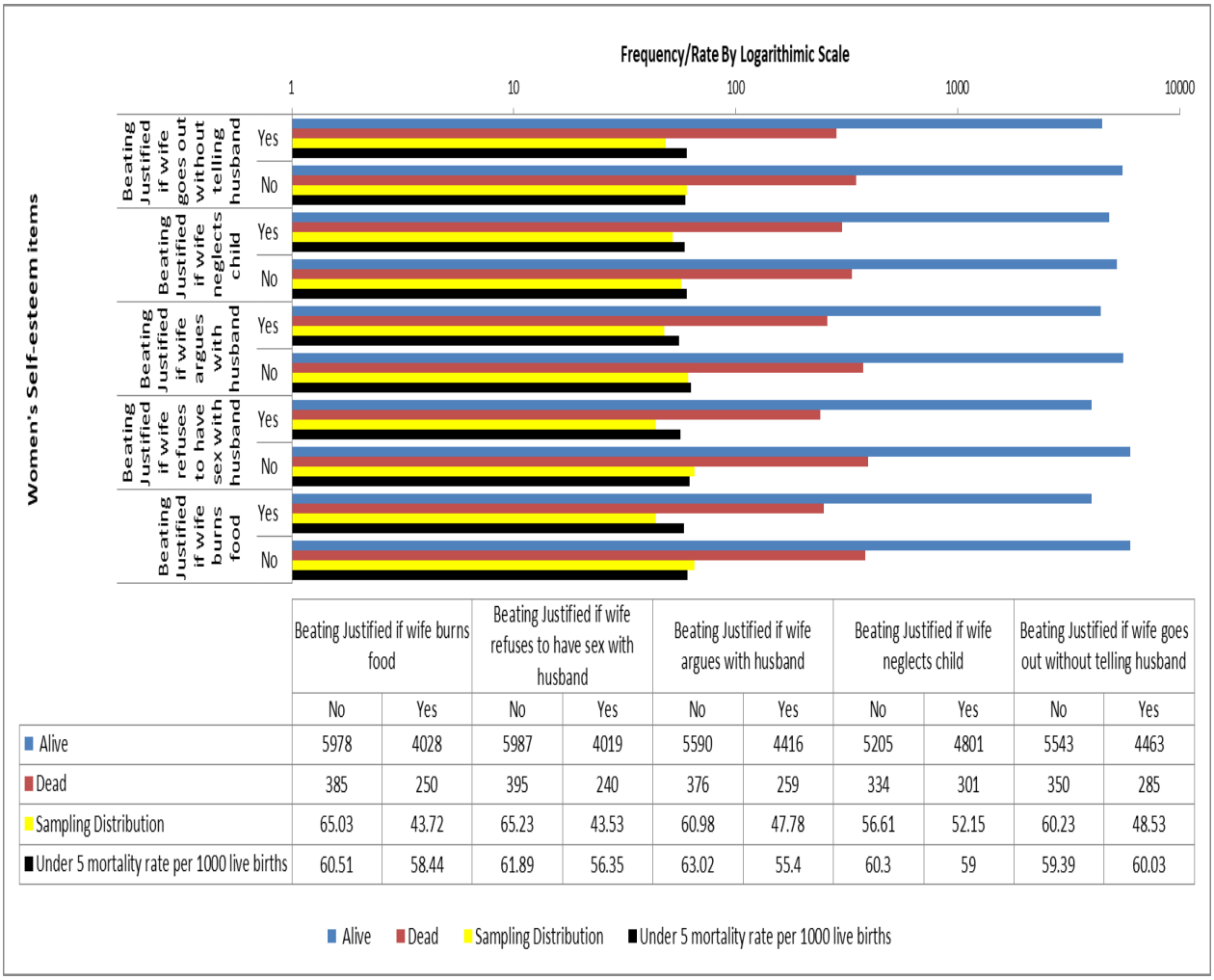


Figure 4.2.1: above describes that there is a general decreasing trend in under-five mortality rate if women's have some autonomy in household decision making processes. The figures clearly indicated that there is an association between women's decision making variables and under-five mortality.

Figure 4.2.2: Sampling distribution of under-five mortality rate by responses of the five women self-esteem items (n=9784, not weighted)

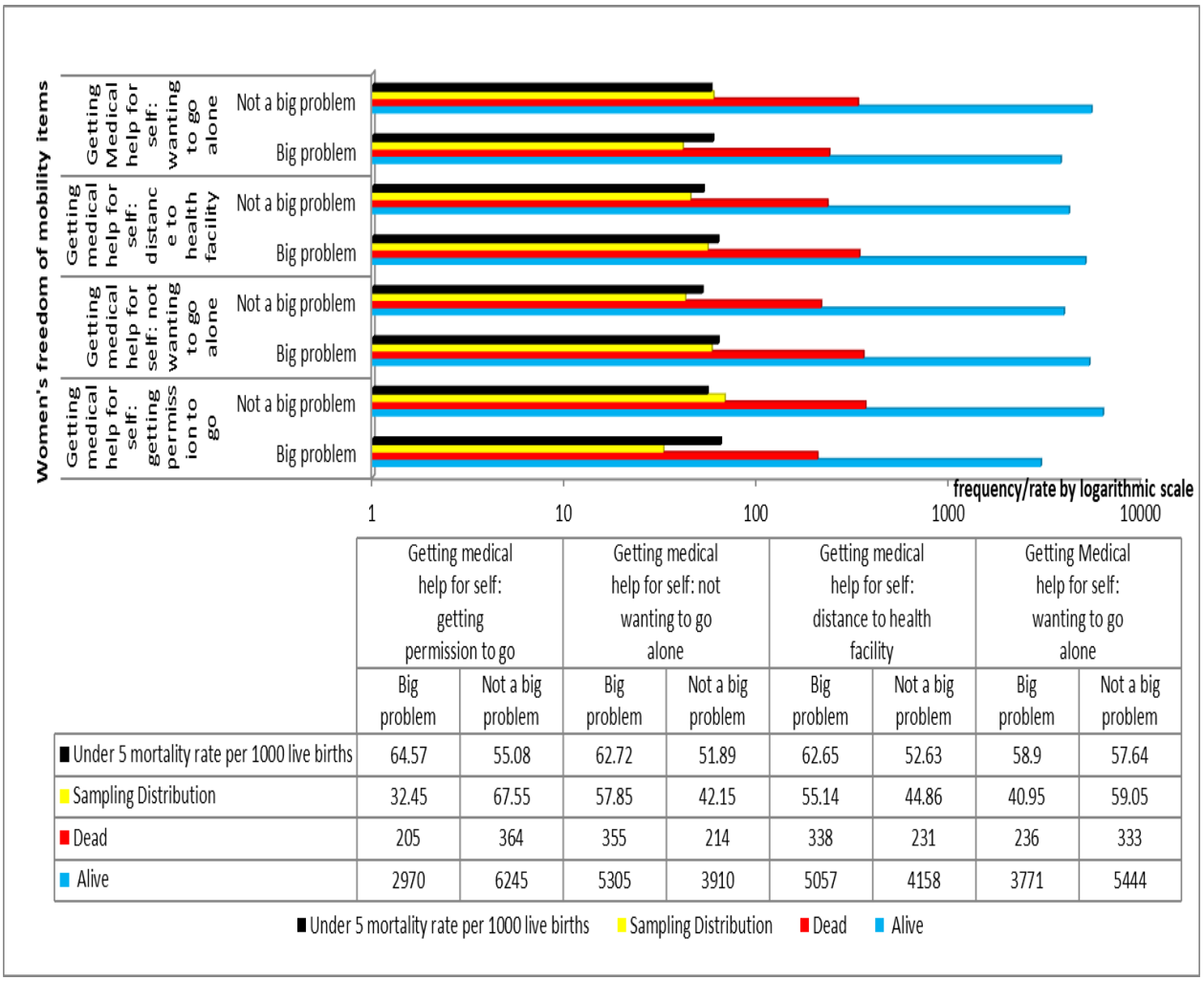


	Beating Justified if wife burns food		Beating Justified if wife refuses to have sex with husband		Beating Justified if wife argues with husband		Beating Justified if wife neglects child		Beating Justified if wife goes out without telling husband	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Alive	5978	4028	5987	4019	5590	4416	5205	4801	5543	4463
Dead	385	250	395	240	376	259	334	301	350	285
Sampling Distribution	65.03	43.72	65.23	43.53	60.98	47.78	56.61	52.15	60.23	48.53
Under 5 mortality rate per 1000 live births	60.51	58.44	61.89	56.35	63.02	55.4	60.3	59	59.39	60.03

Figure 4.2.2 above shows the sampling distribution of under-five mortality by the responses of the five women's self-esteem items. The figures indicate that there was a slightly higher values of under-5 mortality rate for the response category "no" compared with "yes" responses for variables "Beating justified if wife burns food", "Beating justified if wife refuses to have sex with husband", "Beating justified if wife argues with husband" and " Beating justified if wife neglects child'. But the under-five mortality rate seems slightly lower for response category "no"

compared with "yes" responses for variable "Beating justified if wife goes out without telling husband". The figures generally tell us that there was a positive relationship between women's attitudes towards gender role and under-five mortality. In other words, women's who have positive attitudes towards gender role tends to increase under-five mortality rate slightly compared to those of negative attitudes.

Figure 4.2.3: Sampling distribution of under-five mortality rate by responses of the four women freedom of mobility items (n=9784, not weighted)



	Getting medical help for self: getting permission to go		Getting medical help for self: not wanting to go alone		Getting medical help for self: distance to health facility		Getting Medical help for self: wanting to go alone	
	Big problem	Not a big problem	Big problem	Not a big problem	Big problem	Not a big problem	Big problem	Not a big problem
Under 5 mortality rate per 1000 live births	64.57	55.08	62.72	51.89	62.65	52.63	58.9	57.64
Sampling Distribution	32.45	67.55	57.85	42.15	55.14	44.86	40.95	59.05
Dead	205	364	355	214	338	231	236	333
Alive	2970	6245	5305	3910	5057	4158	3771	5444

Under 5 mortality rate per 1000 live births Sampling Distribution Dead Alive

As indicated in Figure 4.2.3, the under-five mortality rate of children for women's who responded to all the four women's freedom of mobility indicators a "Big Problem" were higher compared to women's who responded "Not a Big Problem". The descriptive statistics clearly tells us that individual indicators of women's freedom of mobility are inversely related with

under-five deaths. That means women's with no big problem regarding their freedom of movement intends to reduce under-five children mortality.

4.3. Bivariate Analysis

Table 4.3.1 shows the cross tabulation analysis between the selected environmental, healthcare, demographic and socioeconomic indicators and under-five mortality. Pearson chi-square tests were conducted to evaluate the association between each of the independent variables and the dependent variable i.e., under-five mortality. In this study among several variables toilet facility, mother's education, place of delivery, sex of child, size of child at birth, type of birth, births in last 5 years, preceding birth interval, mother's age at first birth and breastfeeding have strong significance association with under-five deaths. Under-five mortality declines as mother's level of education improves, ranging from 6.5% percent for mothers who have no education to 4.1% for those who have secondary or higher education respectively

Toilet facility is another factor that strongly associated with under-five deaths. Under-five deaths decline for children residing in a household using improved toilet facility 3.4% compared with those children residing in households using unimproved toilet facility 6.4%, (Chi-square = 21.008 on 1 d.f; P = 0.000).

Male children are more vulnerable for under-five mortality 6.8% compared with females 4.9% (Chi-square = 15.886 on 1 d.f; P = 0.000). Size of child at birth has a significant association with under-five deaths (Chi-square = 10.067 on 2 d.f; P = 0.007). Under-five mortality was higher for very large or larger than average 6.1% and very small or smaller than average 6.8% compared with average sized children during their 1st birth 5.0%. Another factor that strongly associated with under-five mortality was type of birth. Mortality rate increases as type of birth increases from single birth 5.5% to multiple births 24.2% (Chi-square = 114.645 on 2 d.f; P = 0.000). There is a strong association between number of births in last five years and under-five child deaths (Chi-square = 168.806 on 1 d.f; P = 0.000). As the number of births increases from 1 or 2 births to three or more under-five mortality was increased from 4.6% to 13.3% respectively. Among demographic factors, preceding birth interval was another factor associated with under-five child mortality (Chi-square = 53.735 on 1 d.f; P = 0.000). Under-five deaths were lower for children born at 13+ month's birth interval or first 5.5% compared with those born less than 13 months preceding birth interval 14.3%. Another demographic factor significantly associated with

under-five deaths is mothers age at first birth (Chi-square = 4.053 on 1 d.f; P = 0.044). Under-five deaths was less frequent for mothers who were 18+ at 1st birth 5.5% compared with mothers under 18 years of age 6.5%. Looking for the association between breast feeding and under-five mortality, the result suggests a strong association between breastfeeding and under-five mortality. Mortality rate increases for children who never breastfed 33.0% compared with those of currently or ever breastfed children 4.3% (Chi-square = 756.341 on 1 d.f; P = 0.000).

Finally the bivariate analysis shows that place of delivery is another factor that was associated with and under-five mortality (Chi-square = 21.525 on 1 d.f; P = 0.000). Under-five deaths are higher for children who were delivered at home or everywhere 6.6% compared with those children delivered at health facility 4.2%.

Table 4.3.1: Bivariate relationship between underlying factors and under-five mortality

Variables	**Under 5 mortality**		**Chi-square**	**P-value**
	Alive	**Dead**		
Mother's Education				
No Education	6015 (93.5%)	417 (6.5%)	12.773	.002*
Primary	2330 (94.9%)	125 (5.1%)		
Secondary or Higher	962 (95.9%)	41 (4.1%)		
Toilet Facility				
Unimproved Facility	7777 (93.6%)	529 (6.4%)	21.008	.000*
Improved Facility	1530 (96.6%)	54 (3.4%)		
Mothers age at 1st birth				
Mother was 18+ at 1st birth	5753 (94.5%)	336 (5.5%)	4.053	.044*
Mother was <18 at 1st birth	3554 (93.5)	247 (6.5%)		
Sex of Child				
female	4559 (95.1%)	236 (4.9%)	15.886	.000*
male	4748 (93.2%)	347 (6.8%)		
Number of Births				
Mother had 1 or 2 births	3332 (94.1%)	208 (5.9%)	0.004	0.952
Mother had 3 or more births	5975 (94.1%)	375 (5.9%)		
Number of births in last five years				
3 or more births	1276 (86.7%)	195 (13.3%)	168.806	.000*
1 or 2 births	8031 (95.4%)	388 (4.6%)		
Place of Delivery				
Health Facility	2735 (95.8%)	119 (4.2%)	21.525	.000*
Home or elsewhere	6572 (93.4%)	464 (6.6%)		
Breastfeeding				
Never breastfed	361 (67.0%)	178 (33.0%)	756.341	.000*
Ever or currently breastfeeding	8946 (95.7%)	405 (4.3%)		

Variables	Under 5 mortality		Chi-square	P-value
	Alive	Dead		
Preceding birth interval				
Preceding birth interval was 13+ or first birth	8959 (94.5%)	525 (5.5%)	53.735	.000*,b
Preceding birth interval was 13 or under	348 (85.7%)	58 (14.3%)		
Mother's Employment Status				
Not Working	5625 (93.9%)	364 (6.1%)	0.962	0.618
Worked in the Past	1335 (94.3%)	81 (5.7%)		
Currently Working	2347 (94.4%)	138 (5.6%)		
Size of Child at Birth				
Average	3896 (95.0%)	205 (5.0%)	10.067	.007*
Very large or larger than average	2826 (93.9%)	182 (6.1%)		
Very small or smaller than average	2493 (93.2%)	182 (6.8%)		
Type of birth				
single birth	9098 (94.5%)	528 (5.5%)	114.645	.000*,b
1st of multiple	109 (82.6%)	23 (17.4%)		
2nd of multiple	100 (75.8%)	32 (24.2%)		

4.4. The influence of women's empowerment on under-five mortality

4.4.1. Regression Assumptions

The main assumptions of logistic regression model are no high collinearity between the independent variables, outlying observations and adequate sample sizes for categories of factor variables.

With regard to the above assumptions we used correlation matrix to check for multicollinearity among the independent variables (the underlying factors). The pairwise correlation coefficients result shows that there was no high collinearity between the independent variables. That is, none of the coefficients was up to or greater than 0.1. Therefore, there was no need to drop any of the variables used in the final model. Regarding the outliers for continuous variables used in the model we analyzed that there is no observations that affects the results of the model. We also performed bivariate analysis and found that some response categories for factor variables have fewer or no observations at all for the analysis to be made. In order to resolve this issue we merged those response categories having fewer observations with other responses and those without observations at all are also omitted from our analysis.

4.4.2. Logistic Regression Results

Before fitting the logistic regression model we considered several factors to be included in the model in addition to the women empowerment variables. In order to achieve this we fitted

independent logistic regression models with one independent variable at a time. After a serious of trials we arrived at the following two models. The first model includes toilet facility, household size, place of delivery, sex of child, size of child at birth, type of birth, births in last 5 years, birth order, birth interval, mother's age at first birth, breastfeeding, education and employment variables excluding the three women empowerment indexes such as: decision making index, self-esteem index and freedom of mobility index. In the second model (full model) we included the women empowerment variables in addition to the variables used in model 1.

Evaluation of the Models

Table 4.4.1: Summary of the two models

	Model-1	Model-2
Number of obs	9784	9784
LR chi2(20)	327.48	810.96
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1820	0.1889
Log likelihood	-1755.757	-1741.028

Table 4.4.2: Likelihood ratio test between Model-1 vs Model-2

```
Likelihood-ratio test                                 LR chi2(3)  =     20.72
(Assumption: model 1 nested in model 2)               Prob > chi2 =    0.0001
```

The logistic regression model was assessed to evaluate its fitness to the data using different methods. We first run the differences between the log-likelihood ratio of model 2 and model 1 to test the extent to which the women empowerment dimensions account for the relationship between the underlying factors and under-five mortality. The difference in the log-likelihood ratios have a chi-square distribution with degrees of freedom equal to the number of additional parameters due to the three women empowerment dimensions in the full model. The level of significance determined the extent to which these variables had explained the outcome variable. The result of the likelihood ratio test indicated that model 2 is superior over model 1.

The two tests, (omnibus test and Hosmer-Lemeshow test) which were used to evaluate logistic regression model shows the data fitted both models well. In both models the omnibus test suggests a good fit. It shows a high significant figure of (Pearson Chi sq. =9596.02: P

value=0.000). The Hosmer and Lemeshow test results (Chi sq. = 11.51: P value=0.1747) also supports the omnibus test results. Hosmer-Lemeshow results are interpreted differently from the Omnibus test. For the Hosmer-Lemeshow Goodness of Fit Test the poor fit is indicated by a significance value less than 0.05 .

Another measure of goodness-of-fit test is a receiver operating characteristics curve. A receiver operating characteristic (ROC) curve is a plot of sensitivity as a function of 1- Specificity for the possible cutoffs π_0. This curve usually has a concave shape connecting the points (0, 0) and (1, 1). The higher the area under the curve, the better the predictions will be using the model. The ROC curve is more informative than the classification table, since it summarizes predictive power for all possible π_0. For our logistic regression model the area under the ROC curve is 0.7833 which indicates a better predictive power.

Model 1 (basic model) assesses the impact of environmental, socio-economic, healthcare, bio-demographic and the old women empowerment variables. The logistic regression analysis result indicates Toilet facility, Household size, Employment status, Place of delivery, Sex of child, Size of child at birth, Type of birth, Number of births in last five years, Birth order, Birth interval and Breastfeeding which have significant impact on the under-five mortality (see Table 4.4.3) below.

In model 1 (basic model) children in households with improved toilet facility were 0.453 times less likely to die before the age of five compared to those children from households with unimproved or no toilet facility controlling for other variables. Children residing in large size households are less likely to die than those children living in smaller size households. A unit increase in household size will reduce the odds of under-five mortality by a factor of 0.722 after adjusting for other factors included in the model.

Male children are 1.533 times more likely to die before their 5^{th} birthday as compared with females after controlling for other variables. Children where their sizes at birth were large/very large and small/very small are 1. 494 and 1.293 times more likely to die before their 5^{th} birthday as compared with those children with an average sizes respectively. Children who were 1^{st} of a multiple births and 2^{nd} of a multiple births are 2.126 and 5.534 times more likely to die before age of 5 compared with those of single birth children respectively.

Children with their mother had 1 or 2 births in last five years were 0.341 less likely to die compared to those children from a mothers who gave birth to 3 or more children in last five years after controlling for other variables. The odds of a child dying before the 5^{th} birthday were 1.556 times more likely for mothers who gave 3 or more births compared to children's from a mother with only one or two children in their life time controlling for the remaining variables. Children with their preceding birth interval less than 13 months were 1.493 times more likely to die compared to those children with their preceding birth interval were 13+ months or first birth after controlling for other variables included in the model. Children who ever or currently breastfeeding were 0.071 times less likely to die before age of five compared to those children who never breastfed controlling for other variables included in the model.

Children born at home or elsewhere were 1.457 times more likely to die before age of 5 compared to those children who were born at health facility controlling for women empowerment variables. Children's where their mother is usually working were 1.294 more likely to die before age of 5 compared to those children where their mother is not working controlling for the remaining variables.

Model 2 (full model) assesses the impact of environmental, socio-economic, healthcare, bio demographic and women empowerment variables. The logistic regression analysis result shows toilet facility, household size, sex of child, size of child at birth, Type of birth, number of births in last five years, birth order, breast feeding, place of delivery, employment status, decision making index and self-esteem index which have significant impact on the under-five mortality (see Table 4.4.3).

As already shown in the above table for the full model children in households with improved toilet facility were 0.447 times less likely to die before the age of five compared to those children from households with unimproved or no toilet facility after adjusting for other factors included in the model.

Children residing in large size households are less likely to die than those children living in smaller size households. A unit increase in household size will reduce the odds of under-five mortality by a factor of 0.722 after controlling other factors.

Male children are 1.528 times more likely to die before their 5^{th} birthday as compared with females after controlling other factors in the model. Children where their sizes at birth were large/very large and small/very small are 1. 514 and 1.286 times more likely to die before their 5^{th} birthday as compared with those children with an average sizes respectively, after controlling other factors in the model. Children who were 1^{st} of a multiple births and 2^{nd} of a multiple births are 2.252 and 5.847 times more likely to die before age of 5 compared with those of single birth children respectively, after controlling other factors in the model.

Children with their mother had 1 or 2 births in last five years were 0.346 less likely to die compared to those children from a mothers who gave birth to 3 or more children in last five years after controlling other factors in the model. The odds of a child dying before the 5^{th} birthday were 1.522 times more likely for mothers who gave 3 or more births compared to children's from a mother with only one or two children in their life time after controlling other factors in the model. Children who breastfed were 0.073 times less likely to die before age of five compared to those children who never breastfed after controlling other factors in the model.

Children born at home or elsewhere were 1.495 times more likely to die before age of 5 compared to those children who were born at health facility after controlling other factors in the model. Children from a usually working mother are 1.345 more likely to die before age 5 compared to those children where their mothers are not working after controlling other factors in the model.

A unit increase in women's decision making power will reduce the odds of under-five mortality by a factor of 0.907 after controlling other factors in the model. However, a unit increase in women's self-esteem index will increase the odds of under-five mortality by a factor of 1.065 after controlling other factors in the model. This study reveals women's freedom of mobility has no significant contribution for the survival of under-five children.

Table 4.4.3: The odds of under-five death for EDHS2016 data: model with multiple independent variables

Variables	Model-1				Model-2			
Under-five mortality (Dependent Variable)	**OR**	**Se**	**Z**	**p>|z|**	**OR**	**Se**	**Z**	**p>|z|**
Environmental variables								
Toilet Facility (Ref. No facility or unimproved)								
Improved Facility	0.453	0.103	-3.47	0.001**	0.447	0.102	-3.51	0.000***
Socio-economic Variables								
Household Size	0.722	0.023	-10.16	0.000***	0.722	0.023	-10.07	0.000***
Bio demographic Variables								
Sex of Child (Ref. female)								
Male	1.533	0.150	4.36	0.000***	1.528	0.150	4.31	0.000***
Size of Child at Birth (Ref. Average)								
Very large/larger than average	1.494	0.169	3.55	0.000***	1.514	0.172	3.66	0.000***
Very small or smaller than average	1.293	0.157	2.12	0.034*	1.286	0.157	2.07	0.039*
Type of birth (Ref. Single)								
1st of multiple	2.126	0.642	2.50	0.013*	2.252	0.683	2.68	0.007**
2nd of multiple	5.534	1.316	7.20	0.000***	5.847	1.392	7.42	0.000***
Births in last 5 years (Ref. 3 or more births)								
1 or 2 births	0.341	0.042	-8.63	0.000***	0.346	0.043	-8.47	0.000***
Birth order (Ref. mother had 3 or more births)								
Mother had 3 or more births	1.556	0.198	3.48	0.000***	1.522	0.195	3.28	0.001**
Birth interval (Ref. 1st child or >13 months)								
Preceding birth interval was 13 or under	1.493	0.297	2.01	0.044*	1.465	0.294	1.91	0.057
Mother's age at 1st birth (Ref. Mother's age was> 18 at 1st birth)								
Mother's age was <18 at 1st birth	1.188	0.117	1.76	0.079	1.178	0.116	1.65	0.098
Healthcare Variables								
Place of Delivery (Ref. Health Facility)								
Home or elsewhere	1.457	0.198	2.77	0.006**	1.495	0.205	2.93	0.003**
Breastfeeding (Ref. Never breastfed)								
Ever or currently breastfeeding	0.071	0.008	-22.98	0.000***	0.073	0.008	-22.72	0.000***
Empowerment Variables								
Mother's education (Ref. No								

Variables	Model-1				Model-2			
Under-five mortality (Dependent Variable)	**OR**	**Se**	**Z**	**p>|z|**	**OR**	**Se**	**Z**	**p>|z|**
Education)								
Primary	0.951	0.112	-0.43	0.670	0.930	0.109	-0.62	0.537
Secondary or Higher	1.180	0.274	0.71	0.475	1.091	0.257	0.37	0.711
Mother's employment status (Ref. Not employed)								
Worked in the past 12 months	1.294	0.157	2.12	0.034*	1.345	0.166	2.41	0.016*
Only currently working	0.997	0.121	-0.03	0.979	1.030	0.127	0.24	0.810
WDMI (women's decision making index)					0.907	0.023	-3.85	0.000***
WSEI (women's self-esteem index)					1.066	0.027	2.56	0.011*
WFMI (women's freedom of mobility index)					1.048	0.035	1.42	0.155
constant	2.556	0.687	3.49	0.000***	2.887	0.879	3.48	0.000***

Significance level * p<0.05, ** p<0.01, *** p<0.001

4.5. Discussions

Under-five mortality, as an indicator of health status is widely used to measure the progress as well as level of development of a country. Continuous efforts are being made to reduce under-five mortality in all developing countries, where under-five mortality remains high. Ethiopia has achieved a remarkable success on healthcare service, evidenced by a substantially decline in under-five mortality since 2000 (Central Statistical Agency [Ethiopia], 2017). This study attempts to investigate the influence of women's empowerment on under-five mortality in Ethiopia. The study employed data from EDHS 2016 – both a regionally and nationally representative sample survey, in order to make the analyses. Following the approaches used by Oxfam GB (Simone, Kimberly & Rosa, 2017), we constructed three women's empowerment indexes. These are (i) women's decision making index; (ii) women's self-esteem index and (iii) women's freedom of movement index. The bivariate and binary logistic regression analysis has been employed to see how each of the dimensions influences the under-five mortality in Ethiopian context.

The descriptive measure of under-five mortality by items of women empowerment variables clearly demonstrate that some women empowerment dimensions appears to play a role on under-five mortality. The bivariate analysis was also made to see the relationship between each of the

categorical variables and under-five mortality. Finally, the binary logistic regression model has been specified and estimated to examine whether dimensions of women empowerment influence the likelihood of under-five mortality, when all other relevant factors are controlled. The results of the basic model incorporating most factors used in the previous studies was compared with that of the full model which incorporates all variables used in the basic model including three dimensions of women's empowerment. The comparison of the two models using likelihood ratio test shows that the full model is superior to the null model suggesting that the logistic regression model under the full model is correctly specified. The estimation of full model using the omnibus and Hosmer-Lemeshow tests also suggests that the data fits the model very well. That means, all explanatory variables meet a priori expectations.

The multivariable binary logistic model results show that among dimensions of women's empowerment women's participation in household decision making contributes significantly to the reduction of under-five mortality. But the employment status, and women's self-esteem dimensions of women's empowerment shows negative effect on under-five mortality's suggesting that the risk of child's death is high for a usually working women compared to a non-working woman and a unit increase in women's self-esteem also more likely to raise risks of under-five mortality. This is because mother's employment may result in less care and infrequent breastfeeding, which may cause to reduce the chances of child's survival. Similarly, higher women's self-esteem may also result in mother's do not to properly care about their child's health status as her husband do not respond to any of the wrong actions by a mother against the child. But this doesn't imply that a husband need to beat a wife when she is wrong, instead there is a need for peaceful dialogues regarding child's care and health status as both parents are responsible for the well-being of their child. The relationship between mother's employment status and participation of women's in household level decision making variables and under-five mortality are in agreement with most of other similar studies discussed in chapter 2. However, the result of the effect of the self-esteem component of women's empowerment is not justified by other similar studies. This study found out that, mother's education level which has direct positive association with under-five survival in most previous studies has no significant impact on under-five mortality, this result is consistent with (OGADA, 2012).

Other important factors affecting the survival of under-five mortality include environmental variables (such as toilet facility), healthcare variables (such as place of delivery and breastfeeding), bio-demographic variables (such as; sex of child, size of child at birth, type of birth, birth order and number of births in the last five years) and socio-economic variables (such as household size). Children in households having an improved toilet facility are more likely to survive than those children in households where there is unimproved toilet facility. The delivery of child assisted by qualified health professionals at health facilities can increase children survival. Similarly, under-five children survival can be increased substantially if breastfeeding is provided. Too many births in the past (measured by birth in the last five years and birth order and previous birth interval), particularly with short duration increases the chance of under-five mortality remarkably. A socio-economic condition as measured by household size reduces under-five mortality significantly. This is mainly because household compositions with larger number of working age populations are important to increase the wealth of the household particularly in terms of fulfilling money required by a mother to keep the health of her child. Large household size in other ways implies that there are additional household members who take care of the child.

CHAPTER FIVE

Conclusion and Recommendations

This chapter summarizes the study by highlighting the research conducted on women's empowerment and under-five mortality in Ethiopia. The conclusions given were drawn from the outcomes of the empirical study and analysis of data using binary logistic regression model. Moreover, recommendations were based on the findings and conclusion of the study.

5.1. Conclusion

The researcher first conducted an empirical analysis to see women's empowerment factors that significantly impact under-five mortality using a binary logistic regression model after controlling other factors. The independent variable to be included in the logistic regression model was determined based on a critical review of conceptual and empirical literatures on factors that impact under-five mortality in developing countries. The logistic regression model was fitted in multiple phases; first we fitted independent logistic regression models for each of the independent variables separately in order to choose the potential variables to be included in the model. Secondly, all independent variables that significantly impacted under-five mortality in the fitted independent logistic regression models were included in the null model and tested for significance. Finally, the full model was fitted by including all variables used in the null model and the women empowerment indexes that are not included in the null model. The results of the full model suggests that toilet facility, household size, sex of child, size of child at birth, type of birth, number of births in last five years, birth order, breastfeeding, place of delivery, employment, decision making index, self-esteem index which have significant impact on the under-five mortality.

5.2. Recommendations

Based on findings of this study we offer the following recommendation for policy makers and researchers.

The study has number of policy implications for developing countries like Ethiopia. First, women empowerment in terms of household decision making is one of the key factors for reducing under-five mortality, which subsequently contribute to the improvement of health status and the level of development. All efforts should be made to increase the women empowerment,

particularly in terms of education, employment, participation in household decisions, self-esteem and autonomy in movements. As education is a key in empowering women, and educated mothers are capable of deciding how to care about the health of their children.

Second, the employment of women in economic activity has been associated with increased mortality of under-five children. However, this conclusion does not meant to say that women employment should be discouraged; instead it emphasized the need for viable child care alternatives for working women and renegotiation of gender role and gender relations. Poverty as measured by wealth index of households is also another determinant that significantly affects women's empowerment. Therefore, poverty eradication policy should be pursued effectively in order to empower women.

Third, healthcare services, particularly delivery at health facility should be encouraged or expanded and make available to all pregnant women both in urban and rural areas of the country.

Fourth, women as well as their families should be educated about the consequences of the high birth order with short interval by means of community and country based mass media organizations.

Finally, we also recommend researchers to make further investigate other personal indicators of women's empowerment (e.g., individual knowledge, personal autonomy) and relational indicators (e.g., participation in groups, control over personal time) which may have influences on under-five mortality.

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APPENDICES

Appendix I: Concepts and definitions

Women's empowerment: is a process of personal and social change through which women gain power, meaningful choices and control over their lives. In this research woman empowerment is conceptualized as women's participation in major household decision, their attitude towards gender role and their freedom of movement.

Under five mortality: includes deaths that occur between birth and exact age 5 (UNICEF *et al*., 2007:9). Generally all deaths in childhood occur before age 5, thus the probability of dying by age 5 can be regarded as a good index of overall level of child mortality

A live birth: is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which, after such separation, breathes or shows any other evidence of life-such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles-whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered a live birth.

Neonatal mortality: includes deaths that occur during the first 28 days of life (UNICEF *et al*., 2007:9). The neonatal period begins with birth and ends 28 complete days after birth. Neonatal deaths may be subdivided into early neonatal deaths, occurring during the first seven days of life (0-6 days) and late neonatal deaths, occurring after the seventh day but before the 28^{th} day of life.

Post-neonatal mortality: includes death that occurs at ages 1 to 11 months (UNICEF *et al*., 2007:9). Post-neonatal mortality is most often caused by infectious diseases, such as pneumonia, tetanus, and malaria.

Infant mortality and child mortality: Infant mortality is defined as the death of a live born infant between birth and exact age 1 (UNICEF *et al*. 2007:9). Infant mortality rate is the probability of a child born in a specific year or period dying before reaching the age of one, if subjected to current age – specific mortality rates of that period. Infant mortality is a potentially important indicator. This is because mortality tends to decline more slowly among infants than among children aged 1 to 4. Child mortality includes deaths that occur at ages 1 to 4 years.