ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
FACULTIY OF SOCIAL SCIENCE AND HUMANITIES

THE GEOGRAPHICAL STUDY OF THE ROOT CAUSES OF INFANT MORTALITY IN RURAL AREAS: THE CASE OF MISRAQ BADAWACHO WOREDA, HADIYA ZONE, SNNPR, ETHIOPIA

BY: ASNAKE TAYE

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By:

ASNAKE TAYE

Advisor:

YOHANNES G/MICHAEI (PhD)

ADDIS ABABA UNIVERSITY

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DEAPRTEMENT OF GEOGRAPHY AND ENVIORNMENTAL STUDIES

Approved by Board of Examiners	**Signature**
YOHANNES G/ MICHAEL (Phd) Advisor	_____
BEKURE WOLDESEMAIT (Prof) Examiner	_____
DESALEGN WANA (Phd) Department chairman	_____

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Acronyms

AIDS Acquired immunodeficiency syndrome

BOFED Bureau of finance and Economic development

CMR Child mortality rate

CSA Central statistical authority

EDHS Ethiopian demographic health survey

FGD Focus group discussion

GIS Geographic information system

HIV Human immunodeficiency virus

IMR Infant mortality rate

KT Komata -Tembaro

MDG Millennium development goals

MOH Ministry of health

MOE Ministry of education

NGO'S Non government organizations

PSRC Population studies and research center, Addis Ababa University

SNNPRS Southern nations and nationalities people's regional state

TTA Traditional birth attendant

TTBA Trained traditional birth attendant

UN United Nations

UNDP United Nations development programmed

USAID United States agency for international development

WFS World fertility survey

WHO World health organization

ABSTRACT

The reduction of child mortality is one of the millennium development goals of the ministry of heath of Ethiopia. No doubt some efforts have been made to minimize the problem. The problem is more serious in urban areas than rural areas.

Accordingly with the overall aim of understanding the root causes of infant mortality in rural areas a study was conducted Misrak Badawacho district in southern Region. As a methodology four kebeles have been selected using combination of factors including agro-ecology, magnitude of the problem and accessibility. Accordingly a total of 160 productive age women have been selected using stratified sampling. This was complemented with focus group discussions with different stakeholders.

Generally the finding of the study indicate that the magnitude of infant mortality is very high in the rural areas and factors attributing to the high magnitude includes early marriage, low level of education, widespread poverty, socio-economic values of children, lack of access to modern health facilities are some to be mentioned.

Finally it was recommended that the improving the livelihood of the community is fundamental and need to be complimented with expansion of social services mainly education and health.

CHAPTER ONE

1. Introduction

1.1Background of the study

Infant and child survival is one the most sensitive indicators of human welfare, the comparative health of nations and the effectiveness of public policy reduction of infant and child mortality rate is not only a major goal but also in important strategy to achieve health for all.

The level of mortality is at the same time the reflection and determinant of socio economic progress. Moreover, infant and child mortality rates are among the vital indicators widely used to assess the socio–economic wellbeing of a country's population. "A reduction in child mortality significantly increases life expectancy and thus human capital, which is needed for development". With a life expectancy of only 46 years. Ethiopia, unfortunately, has one of the highest children and adult mortality rates (EDHS 2005).

Infant and child mortality commonly on the agenda of public health and international development agencies, has received renewed attention as a part of the United Nations millennium development goals. Approximately 10 million infants and children under five years of age die each year, with large variations in infant and child mortality rates, the trends, across regions and countries.

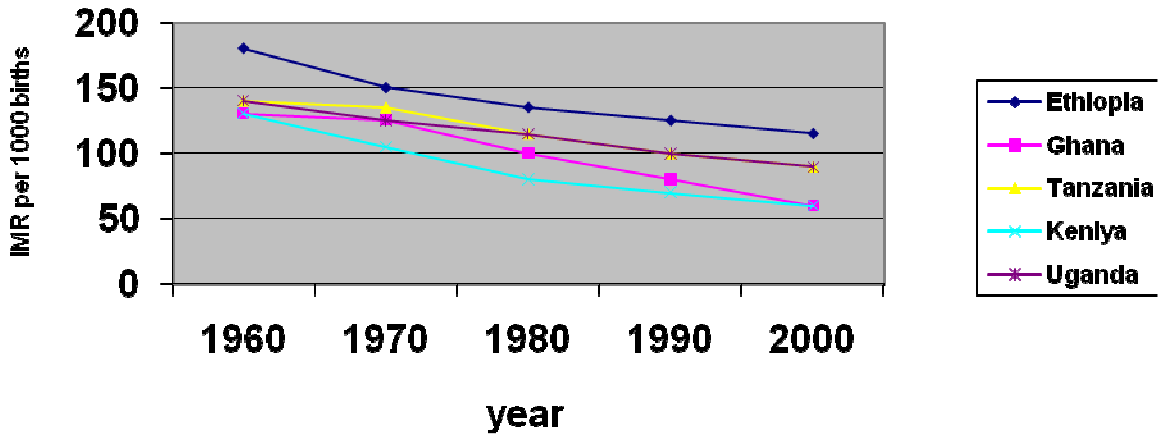
Infant and child mortality rates have declined all over the world in the last fifty five years between the end of the world war II and early 1970's child death rates even in the developing countries were reduced by half (Valin, 1970) a great deal of these gains was achieved through interventions targeted at communicable diseases (diarrhea, reparatory infections, malaria, measles and other immunisable infant and child infections.

However in the 1970's the world wide progress was not maintained and infant mortality rates rose especially in Africa. It was noticed that disease oriented vertical programmes were not effective alone. Maternal, environmental, behavioral and socio economic factors are recognized as additional important determination of infant survival, Despite the broad approach towards child health ,the decline in child mortality in Africa has lowered since 1980 than in the in the 1960s and 1970s .Of the thirty countries with the world's highest child mortality rates, twenty –seven are in sub Saharan Africa (UNICEF, 1999), the regions under five mortality was in 1998, 173 per 1000 live births (UNICEF ,2000) compared to the millennium goal of 70/1000 internationally adapted in the 1990 world summit for children.

It is not known why the infant and child mortality rates are staying higher or even increasing in many sub-Saharan African counties despite action plans and interventions made. Mortality rates among children under the age of five remain strikingly high throughout the majority of sub Saharan Africa, while other areas of the world have experienced declining rates of infant and child mortality over the 30 years. This area, for the most part still maintains relatively high rates, It has been recently noted that 18 of the 20 countries across the world with the highest infant and child mortality were in Africa (UN 1995).

As the world enters in to the 21 century, infant and child mortality remains a big issues for the developing countries especially as researchers attempt to distinguish what factors contribute to the high level. Figure 1 shows the variation in infant mortality rates for some sub-Saharan African countries between 1960 and 2000 using the United Nations estimates (UN, 2006)

Figure1. Trend in Infant Mortality Rate (IMR) for some sub-Saharan Africa countries



Source: UN report, 2006

The infant mortality level estimated for each country considered shows a declining trend. Despite the declining trend, the level of infant mortality in Ethiopia is highest as compared to other countries considered. An investigation of the level of infant and child mortality during the same period in these countries also revealed that the rate is high in Ethiopia. Infant and under-five mortality in Ethiopia has continued to decline over 25 years with more pronounced reduction in the last decade yet, over all infant and under five mortality rates remain very high between 1995-2000 almost one in every ten new borne (97 per 1000) did not survive to celebrate its first birth day, and one in ever six children (166 per 1000) died before its fifth birth day (MOH 2004). According to the EDHS (2005) fifteen years ago 95 out of 1000 infant die before celebrating their first birth day. By 2005 this number dropped to 77; reflecting an

improvement of 18 infants per every 1000 live birth in 15 years, during the same period under five mortality has improved by 25 percent:-as the rate per one thousand live births, declined from 166 in 1990 to 123 in 2005. This indicates that the pace of improving infant and child mortality in Ethiopia is very slow. At current mortality levels one in every thirteen Ethiopian children dies before reaching age one while one in every eight does not survive to the fifth birth day (CSA and ORC macro 2006).

1.2 Statement of the problem

Given the slow pace of improvement infant and child mortality, in order to reach the child survival MDG target by 2015 , Ethiopia would have to reduce under five mortality at the rate of 5.2 per 1000 live birth each year since the beginning of 1990's However between 1990 and 2000 , the rate of decrease of under – five mortality has only been less than 2 per 1000 live birth per year, Ethiopia would therefore, have to reduce child mortality by 7.4 per 1000 live birth per year between 2003 and 2015 in order to achieve the MDG in question (World Bank and MOH,2004). This task would be very challenging given past trends as well as major unmet needs for child survival in Ethiopia.

In depth understanding of the level, trends, differentials and determinants of infant and child mortality is, therefore, crucial in any attempt to attain the goal of reducing infant and child mortality level through any kind of intervention. There is substantial difference in child mortality rate in the country. Under five mortality rate ranges from the lowest 72 per 1000 on Addis Ababa to the highest 157 per 1000 live birth in Bineshangul-Gumez. The next higher mortality rates are registered in the Amhara, Gambella and the SNNPRS regions, decreasing in that order (CSA and ORC MACRO 2006).

Over last decade a number of studies have been conducted to understand the determinants of infants and child mortality in Ethiopia. (e.g Gasha 1996, Assefa and Mekonnen, 1997; Girma, 2001; Gulteneh, 2001 Mokonen et al- 2001; Messay 2006). However, the lack of pertinent and sufficient data at national level limited the study. As a result, some of the studies had to rely on old data source (Girma'2001 .while other have been limited to a smaller geographical unit e.g. rural and urban setting; Assefa and Mekonnen, 1997 or had to consider a limited number of variable (Gulteneh, 2001). In addition, the determinants of infant and child mortality are static and they vary with geographical location and they change over time. This study therefore aims at addressing the root causes of infant mortality in MisraqBadawacho Woreda, Hadiya zone in SNNPRS, by using spatial sample survey.

SNNPR is one of the food insecure regions of Ethiopia. MisraqBadawacho, selected for this study, is one of the food insecure Woredas of SNNPR as Large number of its population has been depending on food aid for the last three decades. Population pressure and recurrent drought resulting from seasonal rain failure or erratic nature of rain, has exposed the Woreda for serious humanitarian crisis for years. This situation in Misraq Badawacho woreda leads the people to poverty. Infant and children under five years in particular were the most exposed group for these unfavorable situations. The result of 2007 CSA data indicated that under five mortality is 157 per thousand (child mortality rate is 50 deaths per 1000 live birth and infant mortality is rate is 107 deaths per 1000 live birth). This persistence of high infant and child mortality rates, call for a need to identify the root cause of infant and child mortality in the Woreda.

In Misraq Badawacho Woreda the 1998 CSA data indicates that infant and child mortality is 221 deaths per 1000 births (infant and child mortality are 149 and 86 death per 1000 live birth respectively). Comparison of the mortality estimated the 2007 according Woreda health office strategic plan; it was 157 deaths per 1000 birth (107 and 50 infant and child mortality respectively), children under five mortality has declined by 42 death per 1000 birth of infant mortality and 36 death per 1000 birth child mortality for the 9 years period, the decline in both infant and child mortality rate is lower.

The other thing that makes me to emphasis on infant mortality for the following reasons,

First, in high fertility population infant and child represent the largest population. For instance the 1994 census data indicate that the 0-4 age group constitutes 20.5 percent of the total population of Ethiopia.

Second, this group is the most vulnerable to adverse health risks with in the immediate family, community and environment. Evidences from mortality studies of various developing countries have shown that death of young children before age 5 accounts a greater part of all deaths. This implies that further decline in general mortality level is possible only if a simultaneous decline infant and child hood mortality rates achieved.

Third, through the study of the determinants of infant and child mortality, it is possible to identify the difference in quality of life between different socio-economic groups. In light of the strong association between infant and child mortality and fertility, it is expected that lowering child mortality in the long run will contribute to lower fertility. The data that will be used in this study comes from a special sample survey conducted by the researcher in the Woreda.

1.3 Objective of the study

1.3.1 General objective

The general objective of the study is to assess the root causes for the infant mortality.

1.3.2 Specific objective

I. To document the major characteristics of the differentiated rural community.

II. Understanding the magnitude of infant mortality rates in the study area.

III. To evaluate the root cause of infant mortality.

1.4 Research questions

In accordance with the above objective of the study, the following fundamental research questions were attempted to be answered in the study.

1. What are the major features of the differentiated rural community?
2. What is the magnitude of the problem of infant mortality?
3. What are the major factors for infant mortality?

1.5 Methodology

1.5.1 Source of data

The relevant data to meet this study were obtained from both primary and secondary sources. The primary data are acquired and collected from individual household (women in age group 15 – 49), health office, and health center and health extension workers. So as to upgrade the reliability of the primary data, secondary sources were also gathered from office documents, references and periodicals etc. Data for the study collected from mentioned sources by questionnaires with closed or open ended, field observation and focus group discussion.

To collect primary data, the questionnaires that consists different sections were administered. The first and the second sections of questionnaires mainly dealt with information on household, mortality and health questions .From third to fifth sections of the questionnaires tried to collect information about factors for infant mortality.

The main data sources for this study are women in age group 15-49 at household level. Therefore, data were collected from sample household by using questionnaires. Questionnaires were filled by trained health extension workers and by researcher himself. Additional information or data for the

study were also obtained by focus group discussion. Stakeholders participated during the discussion.

To supplement primary sources, the relevant data on population size and growth, land area and other geographical issues of the study area were obtained from both published and unpublished documents of secondary sources.

1.5.2. Sample design

According to agriculture and rural development office of MisrakBadawacho Woreda report of 2010, Misrak Badawacho Woreda divided in to agro- ecological zones. These are moist weinadega and dry woina dega. According to the above mentioned report, the woreda divided in to 39 kebeles. The researcher had selected four rural kebeles, Ajeba Elele and Bulgita from moist weinadega and1st Keranso and Edo from dry weinadega by stratification and simple random sampling techniques.

The last stage is systematic selection of sample households. The total households at selected sample kebeles were 653,675 and475, 472 in moist woinadega and dry woinadega zones respectively. Because of shortage of time and tedious nature of household survey, form a total of 2275 households of the sample kebeles, a total sample size of 160 (7%) households i.e. 46, 48 and 33,33(households were taken according to their proportion from selected kebeles of moist woinadega and dry woinadega zones respectively.

As indicated above further stratification of households were made based on administrative village levels of each kebeles and the household heads participating to provide information .the samples were selected by using simple random sampling techniques. Totally 160 women in age group 15-49 years in households from moist woinadega and dry woinadega zones were taken as a sample of study.

Table 1 Sample kebeles of the study area

Agro-ecology	Kebele	Total household	Samples	Percent (%)
Moist weinadega	Ajebaelele	653	46	28.75
Moist weinadega	Bulgita	675	48	30
Dry weinadega	1st keranso	475	33	20.6
Dry weinagega	Edo	472	33	20.6
Total	4	2275	160	100

Source: household survey

1.5.3 Method data analysis

Data that were available through different instruments were analyzed by using quantitative and qualitative techniques. Descriptive statistics such as percentage and frequency value were employed. In addition cross tabulations are used to describe the relationships between the different variables. Qualitative data obtained through focus group discussion and field observation are also added in the analysis.

1.6 Significance of the study

Any attempt to attain the goal of reducing infant mortality level through different kind of intervention requires adequate knowledge of the problem and factors that contribute to the problem. In line with this goal, the present study will attempt to identify the major factors of infant mortality in Misrak Badawacho Woreda, the findings of the study will expect contribute to development projects concerned with maternal and child care in Ethiopia, it also serve as source of information for interested researcher who need to conduct further studies in the area.

1.7 Scope of the study

The study would conduct in Badawacho woreda of Hadya zone in SNNPR. The area coverage of the study was delineated in 4 kebeles of the study woreda which represents total kebeles of the woreda. It is very difficult to conduct a study of more than selected representative kebeles within this short period. The study in investigates about factors for infant mortality. Therefore, factors for infant mortality are the main focus of the study.

1.11 Limitation of the study

Different constraints affect the quality of the study. To carry out this study, only the 4 kebeles were selected from the total of 39 kebeles 160 households were taken as sample of the study which was relatively low in relation to total size of population. All these are limited because of time, finance and distance constraints. These may cause some bias on quality of the results when conducting at woreda level. The second limitation is unavailability some of the relevant local officials and experts at the time of the survey are expected to create gaps on the information. Despite all these constraints, the researcher has used various techniques to minimize the negative impacts from the constraints. One of these techniques is triangulation of information from various sources.

1.9 Organization of the study

This thesis organized into six chapters. The first Chapter presents the introductory part of the study, which consists of background, the statement of the problem, objectives, research questions, significance, methodology, scope, limitation of the study, and organization of the thesis. Chapter

two highlights of the related literature. In chapter three, the physical, demographic and socioeconomic characteristics of the study woreda is highlighted. Chapter four and five presents the main body of the study in which the relationships among factors (Biodemographic, socioeconomic and environmental) and infant mortality would be presented. The last chapter deals with the summery conclusion and recommendation.

CHAPTER TWO

2. Review of Related Literature

2.1 Global experience of infant and child mortality

Introduction

Literature related to the determinants of infant and child mortality are reviewed in this The various socioeconomic, environmental, cultural as well as demographic factors affecting infant and child survival are identified and studied by different researchers.

Definition of some terms

Neonatal mortality: the probability of dying within the first month of life.

Post-neonatal mortality: the probability of dying between the 5th and 52nd week after birth.

Infant mortality: the probability of dying between birth and the first birthday.

Child Mortality: the probability of dying between exact ages one and five.

Under-five mortality: the probability of dying between birth and the fifth birthday

Infant and child mortality is affected by individual , household and community characteristics individual characteristics are the characteristics which are related to parents such as age at present, at marriage ,at first birth ,education ,income , occupation, land ownership and live stock assets . Household characteristics include ownership, type of cooking fuels. The community characteristics are concerning to the availability of health care, education services, prevalence of electricity and sewage connections, and existence of garage disposal services.

Bonte and van Ballen (1969) noted that many sociological, biological, economical, demographic and environmental factors were strongly interrelated, this strong relationship among factors makes it difficult to determine the individual effect of each factor on child mortality , to them breast feeding duration , preceding and succeeding birth intervals, death of previous child, maternal age , birth order , premature deaths of previous child and many other factors are unable to measure the infant and child mortality separately.

Wrigley (1977) classified the determinants of infant and child death as intrinsic and extrinsic, intrinsic and extrinsic factors refer to endogenous or biological or bio-demographic like sex, maternal age, number of previous births , birth interval , birth order , birth weight and breast feeding and exogenous or environmental such as residence , mother ‘s and father’s education ,

occupation ,and existence of garbage disposal services and health facilities available respectively , to him ,endogenous infant mortality is approximately equivalent to neonatal death and it is more likely to implicate prenatal cause linked to maternal health while exogenous infant mortality encompasses extrinsic causes.

Mosely and Chen (1984) pointed out that there is a substitutive and complementary relationship between community and individual household characteristics and labeled the factors environmental contamination measured by intensity of household crowding, drinking water contamination and potential faucal contamination and by presence of latrine or toilet types as the proximate determinants through which social ,economic and demographic factors affect mortality, he proved that although the availability of health , sanitation and other social services were important for reducing child mortality, their interactions with individual and household characteristics determined the actual outcomes ..

Ruzica and Kane (1986) assessed the extent to which social and economic changes contributed to the mortality decline of the last thirty years in selected countries of the Asia pacific region to them, various methods for evaluating the association between health and mortality and social and economic conditions are available, yet it argues that it is difficult or impossible to measure statistically the effect of certain interventions because they are interrelated in their impact on mortality,

2.1.1 Bio - demographic features of Childhood Mortality

Differences in Mortality levels by Biodemographic characteristics of the child and mother have been demonstrated in many studies (e.g., Bicego and Ahmed 1996; Sullivan et al., 1994 Rutestein, 1983)

Demographic factors can basically be divided in to two; maternal and child factors. Maternal factors are those affecting the health of the mother to the extent of exposing her offspring to a higher risk of death. These are the age of the mother at birth, the birth interval, the birth order of the child and survival starts of the preceding child. Child factors refer to the sex of the child, age of the child multiplicity of birth and birth weight.

I. Profile of childbearing mother

Birth orders and maternal age at birth are strongly related. The relationship however varies across socio cultural settings depending on levels and age patterns of fertility (Sullivan et al., 1994). For most countries the relationship between mother’s age at birth and level of infant mortality risk exhibits a U-shaped curve. When women give birth at young age, they are at increased risk of

complications and the child is at an increased risk of low birth weight and prematurely. When women give birth at older age, they are more likely to have pregnancy complications and the baby is more likely to have birth defects which increase the risk of dying in early childhood, In addition the risk to children born to older women is often increased because of higher parity.

Hobcraft (1993) also demonstrated that children born to very young mothers are at a higher risk of mortality, even after controlling the effect of other.

Bouvier (1976) reported that the risk of death is higher for infants born to teen- age mothers and then decline sharply for those born to mothers in the intermediate ages ; and rise to nearly the same high level among mothers aged 40 and over . Martins et al. (1983) in their study of co- variants of child mortality in the Philippines, Indonesia and Pakistan found that the risk of dying of children born to older mothers as well as younger mothers would be greater than babies born to mothers at prime reproductive ages. In each country, babies have born to women less than 20 years of age experience much higher mortality than children born to women of prime reproductive ages 20 to 34.

Alam and Cleland (1984) studied infant and child mortality in Pakistan. To them, the enhanced risk of death at young maternal ages was largely attributable to neonatal mortality. The proportion of babies dying within the first month was nearly twice as high among mothers aged 15-19 than among those aged 25-29 ; post neonatal mortality was only 20 percent higher among the former group.

According to Davanzo (1984) babies born to very young mothers(less than19 years old) are much more likely to die in the first month of life and babies born to mothers older than 40 are also more likely to die in infancy. Some die in the neonatal period and other death are concentrated in the second six months of infancy.

Hobcrft et al. (1985) commented that short birth interval had indirect effects through such factors as mother's depletion, premature birth and limited family resources. However, maternal age and birth order effects had been shown to be weaker than the effect of child spacing.

Hobcraft et al. (1985) searched that considerable evidence indicates the harmful consequences for child survival of child bearing at younger and older maternal ages. That is the children born to teenage mothers' generally considerable excess risks.

Pebley and Stupp (1987) reported U- shaped relationship between infant and child mortality and age of mother. Young mothers have reproductive system that are not completely mature and leads to under weight babies where as older mother have declining maternal resources due to aging

II. Birth spacing

Cantrelle and Leidon (1971) in their study of breast feeding, mortality in child hood and fertility in rural zone of Senegal showed a sharp decrease in mortality as the interval increased in those cases where the first child was still alive at the time of the second child's birth.

Bleck (1976) showed that the premature death of a pervious child would lead to the short preceding birth interval for the index child and the short succeeding birth interval would results in termination of breast feeding that places the child at greater risk and may be the cause of death.

Frenzen and Hogan (1982) investigated those second or later births, with birth intervals of two or more years, had the highest rates of infant survival, whereas all other births had lower rates of survival. Fifth or higher parity births with short birth intervals had especially high rates of neonatal mortality, resulting in an infant mortality rate of 170 in contrast; second, third and fourth births with long birth interval had an infant mortality rate of only 41. infants born after gestations of seven months or less has much higher rates of neonatal death than birth carried to them (126 versus 29) , producing infant mortality rates of 214 and 80 respectively .

Cleland and Sathar (1981) explored that the mortality of children born after an interval of 18 and 23 months is twice as greater as that experienced by children born after an interval of 48 to 53 months.

Alam Cleland (1984) in their study of infant and child mortality in Pakistan found that infant mortality rate for births preceded by an interval of less than two years was 146 compared to 95 for those with preceding intervals of two to three years and 70 for those with intervals of four or more years.

According to population reports in 1985 of world fertility surveys, short intervals between births pose high risk of death. In nearly all world fertility surveys, infants born within two years of an older sibling were likely to die than those born two to three years after. The difference was the largest in countries with infant mortality rates, on Bangladesh, for instance, the mortality rate was higher for infants born within two years than after. the difference was the largest in countries with infant mortality rates .In Bangladesh , for instance , the mortality rate was higher for infants born within two years than after an interval of two three years.

Birth spacing is generally believed to be associated with infant and child mortality. The proper spacing of births allows more time for childcare, is likely to make more maternal resources available for the care of the child and also allows for healthier mother. Several studies have found out that maternal nutrition and maternal depletion are key factors affecting mortality levels for

births following a short birth interval (e.g. Potter, 1998; Miller 1990 Gribble 1993; Sullivan et al 1996).

The world fertility survey (WFS) finding have also indicated that the existence of strong associations between interval of child bearing and chances of childhood survival. (Rutestein,1993, Edward, 1995). Results from comparative studies found out that the most pronounced influence of short birth interval on mortality occurs during neonatal and post neonatal periods, and the weakest effect during the 1-4 years age period (Sullivan et al., 1994).

III. Infant feeding practices

Methorst (1953) pointed out that in the USA in the early 1920's mortality was between three and four times high among artificially fed infants as compared to breast fed infants.

Contrelle and Leridon (1971) in their study of "breast feeding, Mortality in childhood and fertility in rural zone of Senegal" showed a sharp decrease in mortality as the interval increased in those cases where the first child was still alive at the time of the second child's birth.

Bongaarts and Potter (1983) noted that breastfeeding .although not the most effective method of contraception available nonetheless performs that roll for many women in less developed regions. Premature death a previous child might lead to short preceding birth interval for the index child. Short succeeding birth interval results in termination of breastfeeding of the index child and a reduction in other available maternal resources. Alternatively, death of an index child results in a short breast feeding interval and early return to fertility. This might result in a short succeeding birth interval.

IV. Birth order and sex

The birth order or rank of the childs is closely associated with chances of survival (Sullivan et al /. 1994) Assefa and Mekonnen 1997; may 2003). First births and high order births (7+births) carry higher than average mortality risk compared with other birth, the high mortality of first and higher order births may be related to the age of the mother at the birth of the child which is termed as high risk births for very young and older mothers.

The major reason for the existence of high mortality among first births in developing countries is the fact that most of the first birth occurs before a woman is physically mature and ready to play a maternal role. while, births of high order may have mothers who are physically depleted at the time of conception and throughout pregnancy, such births are thus more likely than other children to suffer from conditions associated with high mortality risk such as fetal growth retardation and low

birth weight, children of high birth orders are also more likely to be affected by competition from older siblings in terms of food and other family resources.

In general, Males have higher mortality rates during the first six months of life for genetic reasons primarily because of higher vulnerability to infectious diseases, excess male mortality risk declines after six months. The world fertility survey data show excess male mortality in 27 of the 29 countries. A study using DHS data from 28 countries also showed higher under-five mortality among males than females in all of the 28 countries included in the study (Sullivan, 1994).

However, in situations where girls are considered more of a financial burden to the family than boys, health care patterns tend to favors boys. For instance excess female mortality for infants and children has been found to be particularly high in Pakistan, Bangladesh and India. Although the reasons for excess female mortality are varied several factors have been considered, including female infanticide, differential nutrition and differential health care (Arnold) 1992.

V. Survival status of preceding child

Children in families where an older sibling has died at a young age are likely to have heightened mortality risks themselves. They may face adverse biological conditions that affected the older sibling or a family environment associated with high risks of infant and child mortality. Studies carried out in some developing countries highlight the effect of previous child mortality on the survival of subsequent children. In Bangladesh, for instance previous child mortality experience was clearly shown to be crucial in determining the mortality of subsequent children by shortening the birth interval through cessation of breast feeding and the consequent early return of fecundity in the absence of contraception.

Data from the Nepal fertility survey also showed that the risk of infant and child death is considerably higher among children of mothers whose previous child had died than among those whose previous child survived even when demographic variables are considered and this is mainly due to “family environment effect “ or care or both (Gubhaju, 1985).

2.1.2 Socioeconomic factors of infant and child mortality

Place of residence of a child is one of the most important determinants in survival analysis. In developing countries, infant mortality is often thought to be higher in rural areas than urban areas because of differences in standards of living, health conditions and availability of or access to public health facilities and services.

A study conducted in Malaysia reveled that mortality is higher for children in rural areas than in urban areas and also mortality is higher for children whose mothers previous place of residence was rural, a study conducted in Ethiopia based on the 1994 population and horsing census also found

out a significant difference in the level of childhood mortality which s higher in rural than in urban areas

I. Material education

Material education is one of the strongest correlates of infant and child mortality because education provides women with decision making them more aware of their children's welfare and increasing their knowledge about childhood diseases and their ability to understand illness and provide timely treatment.

Although some studies found out that the effect of mothers education was substantially reduced when controlling for other variables the majority of the studies seem to suggest mothers education to have an independent inverse and strong correlation with infant and child mortality, various studies conducted in Ethiopia also identified significant relationship between maternal education and child mortality (eg Gashaw 1996; Assefa and mekonnen 1997 Mekonnen 2001)Ruzieka and Kanitkar (1973) found that the illiterate women in India had the highest mortality rates, exceeding the overall infant mortality by 27 percent, post- neonatal mortality by 35 percent and as expected with strongest effect in the post- neonatal period. Arriaga (1979) indicated that for a given amount of maternal education, levels of early age mortality drop faster in urban than in rural areas.

Hobcraft (1981) computed that the chance of dying during the neonatal period for the child of a woman with seven or more years of education would be about 40 percent lower than that experienced by one whose mother has received no education, mother's education influences mortality beyond the first year of life in almost all the Asian countries, and this delay may be associated with prolonged breast feeding, coupled with some levels of women's general education. Hoberaft et al. (1982) pointed out that both parental and maternal education level appears to be much more influential than, say, the employment status of the mother. Scholars argue that the relationship between maternal occupation and early age mortality is not clear. Work provides independent income for women and improves their autonomy. On the other hand it impedes mother- child contact and takes time away from the child.

Martin et al, (1983) estimated that infant mortality rates would fail 25 percent even after taking into account of factors such as age of mother, birth order ethnic group, urban or rural residence, and various indicators of the standard of living if all mothers had at least seven years of education if all mothers had at least seven years of education.

Ware (1984) disclosed that raising the average level of the education for women could reduce infant mortality substantially. It could be argued that maternal nutrition is determined by mother's education rather than by income because educated mothers eat more sensibly and have a greater share in the food supplies of the household or because they space their births at greater intervals . it should be recognized that daughters of educated women may have better life chances not simply their mothers places a greater value on daughters but also because such women are less likely to make these vital decisions regarding allocation of resources .

Alam and Cleland showed that the children of the educated women if Pakistan experience low mortality at all ages than those with no education, the infant mortality rate for the former category are 141 as against 311 for the latter.

Caldwell and McDonald (1985) narrated that the contents of education are less important to infant survival than that the exposure to modern culture which breaks down traditional ideas. infant mortality rates were gives as 116 if the mother had no education, 85 if she had one to six years of education, and 64 if she had 7 or more years of education during the study in Cameroon.Jain (1985) highlighted that in India the infant mortality rates in rural areas decreased with an increased in the level of women's education from 145 per thousand births among mothers with no education to 101 per thousand births among mothers with some education and 71 among mothers with at least primary education. The negative effect of women's education on infant and child mortality is usually attributed to better child care including better use of available medical facilities.

Pebley and Stupp(1987) described that mothers who had some education might be able to avoid some of the potential risks associated with short birth intervals , fertility at the oldest and at the youngest ages and at the youngest ages and high birth order . More educated women have the skills and resources to overcome some of the negative effect of very young and old maternal age at birth and close birth spacing.

Drez and Sen (1995) investigated that child mortality rates are much higher in families with non educated parents, which is particularly pronounced for the mother's education. To him education is strongly correlated with the type of work.

Sastry (1996) associated better conditions of water supply and sanitation with lower mortality for children of less well -educated mothers but with significantly lower mortality for the children of better- educated mothers.

Pritchett and summers (1996) argued that education is often mentioned as having a strong effect on reducing infant and child mortality.

Wolpin (1997) recognized that improving women's welfare can be an important measure to reduce child mortality and mentioned the reduction of child mortality as one of the key strategies to achieve population stabilization, he believed that a decline in child mortality rates will also cause fertility rates to drop and presented time- series and cross country evidence that relates child mortality and fertility.

II. Wealth

Household wealth is strongly associated with infant mortality risk. Children born to the wealthiest households have mortality risks lower than those born into the poorest. Similar to education the way in which household income and wealth affect child mortality is complex. Income is often used as proxy for children's consumption of goods and services such as shelter, nutrition and adult supervisions that may affect their health. It should be noted that due to difficulties in monetary conversion household wealth is often used as a proxy for income and it is primarily measured from a set of objects owned by a family such as durable goods.

2.1.3 Local Environmental factors and infant and child survival

Environmental contamination which refers to the transmission of infectious agents to the children is one subset of the sit of intermediate or proximate determinants through which socioeconomic factors influence child mortality. Many of the deaths in the first five years of life especially in developing countries are due to infections spread by environmental factors, diarrheal disease including gastro-enteritis, is one of the main causes of death during these period of life,

Environmental variables considered to be important in influencing child survival include source of drinking water and availability of toilet facility. A study in Bangladesh indicated that living conditions, especially water supply and sanitary conditions directly affect contamination of the household environment while access to these facilities is associated with low mortality risks. Another study conducted in Malaysia revealed that the absence of modern toilet sanitation and piped water is strongly associated with mortality for babies who breastfeed little or not at all however the presence of these facilities makes no significant difference for the mortality of babies who breastfeed without supplementation the reason is that babies who do not breastfeed usually have other foods mixed with water which may be contaminated.

Sastry (1996) related household toiler facilities very weakly to child mortality risks in Brazil. However, in other parts of the developing world, sanitation facilities have been found to be more important than water supply in reducing mortality levels. Improvement of water supply and quality of sanitation are important for decreasing mortality.

Ridder and Tunah (1999) found no significant effect of having access to piped water on child mortality rates in Malaysia.

Jalan and Ravallion (2003) investigated that argued that access to piped water alone is not a sufficient condition for improving the child's health status when unsafe drinking water is considered to be a major cause for diarrhea among children and yearly many children die from diarrhea. Wang found that access to electricity is important in reducing child mortality rates using a across country analysis of DHS data

2.2 Panoramas of Infant and Child Mortality in Ethiopia

The mechanisms of infant and child morbidity and mortality are influenced by geographical, climate, social, cultural and economic characteristics that differ from one country to another and, very often, even among different regions of the same country. Therefore, prudence should be used when extending the result of a study to other populations, especially if there are substantial difference among the population considered .For this reason, since this study focuses on infant and child mortality in Ethiopia, we try to summaries in this section the results of some of the various studies which have been carried out in the past 20 years on infant and child mortality in Ethiopia. This summary does not pretend to be an exhaustive review of the knowledge in this field, but, nevertheless, it can provide useful back ground information.

Unfortunately ,the lack of pertinent and reliable data made it very difficult for the researchers to study and to explain the variations in infant and child mortality for the whole country .However there have been several small – scale studies that have attempted to document the interrelationship between infant mortality and socio –economic and cultural characteristics .Most of these studies focus on specific geographic area: Abate (1988) , Enemanachew and Chaudhury (1994) ,Kassahun (1987) and Teshome and Chaudhury (1994) studied rural Ethiopia ; Assefa (1991) and Tesfayesus (1985) and Yohannes (1990) considered selected towns ; Gebre-egziabher and Hogan (2000) reported on the situation of 1979-93 in the Tigrai region and Shamebo et al (1993)report on a specific project area. Other studies to be mentioned are those conducted by Abdulahi (1988) and Genet (1987), in addition to the reports of the Central Statistical Authority and its predecessors.

We began this review with the studies dedicated to socio-economic determinants. Abate (1988), began using data from the 1969 -71 and 1981 Ethiopian rural demographic surveys, found that the most important correlates of child hood mortality in rural areas were ethnicity, religion, region of residence, place of birth, disability status and literacy status of parents .The data also confirmed that

ethnicity and religion were highly correlated and that they interacted with the region of residence in their effects on child mortality.
As for the role of mother‘s education, the studies by Tesfayesus (1985), Kassahun (1987) ,Yohannes (1990) and Makonnen et al (2000) seems to confirm that the inverse relationship between the mothers educational attainment and infant and child mortality is valid also in Ethiopia.

Education ,as it was said in the previous chapter ,not only influences infant and child survival in a direct way ,but also indirectly through its association with a higher socio-economic status of the household , which then permits better household amenities and facilities contributing to the reduction of infant and child mortality. Mekonnen (1993) cites water supply and the availability of a latrine as example. Taking into account the direct and indirect effects of education on infant and child health and survival the variable emerged as the most significant characteristic, which could be a specific target for policies.
Assefa (1991) and Tesfayesus (1985) could confirm the negative link between work status of women and infant and child mortality for selected Ethiopian towns. In the case of economically active women –in the modern sector – the number of children surviving is highest.

In their studies Tesfayesus (1985) and Abate (1988) showed the important role of economic well – being of the house hold for infant and child mortality, noting that the proportion of surviving children increased with increasing size of land, increasing number of live stock or the number of Oxen available to work the land, since land holding and ownership of live stock is the best measure of wealth in rural Ethiopia.

Assfa (1991), Abate (1988), Kassahun (1987) and Tesfayesus (1985) confirmed the important of religion and ethnicity –categories reflecting traditions and norms – for the patterns of infant and child mortality in the case of Ethiopia .Abate (1988) observed in the case of 3 regions, Out of a total of 12 Ethiopian regions, the loss of mortality advantages of female new –born over males.
As for the biological determinants of infant and child mortality, birth spacing is confirmed as a key variable: the length of the time interval between births is an important factor of the probability of survival for birth the preceding and the subsequent child (Mekonnen, 1993). Mekonnen also found that the survival of the preceding child has an effect on the probability of survival of the child and concluded that maternal and child health services should direct attention to persons or households most vulnerable, who experienced already the death of one child. According to Berhanu and Hogan (1998), the death of the previous child and the consequent interruption of breast feeding have a

strong effect on the resumption of menses, therefore it causes a shortening of the time interval between births and increases the death risk for the following child.

Lindstrom and Betermariam (1999) confirmed that closely spaced births increase the probability of dying in the first months and years of life. They also attribute the negative effect of birth spacing in the Ethiopia context to the mechanism of resource competition between the index child and the later born. Certainly the length of breast feeding has an important role. Makonnen et al (2000) using data on infants born in Jmma town in 1992 ,found that almost all infants were initially breastfed, and about 80% were still breast feed at one year.
Lindstrom and Betermariam , (1999) also found that breastfeeding had beneficial effects up to eight months of age ,but there is also evidence that prolonged breastfeeding beyond the age of two years, is increasing the risk of child mortality.

The commonly found results on the relations between age at maternity ,birth order and infant and child mortality are confirmed for Ethiopia by several studies, which report higher mortality for relatively young (under 20) and old mothers (over 35) (Makonnen, 1993) and for first order and higher order (6 and more) births .

It was said before that the combination of mother‘s education and high economic status, two variables which are usually highly correlated, has a positive effect on infant and child survival .in fact, these “advantaged “house holds are more likely to have access to piped water and to latrine or flush toilet, and in addition pay more attention to hygienic norms, like washing hands (Makonnen et al 2000) .As a consequence, the risk of contracting infectious diseases is substantially reduced.

Unfortunately, the sanitary conditions in Ethiopia are very often very poor. In a survey regarding a rural peasant association in the Jimma region, the authors concluded that, there is a great need for improvement in several basic health areas, including the environmental sanitary conditions…, as well as the fundamental health status of women and children (Surafel et al, 1995, p 91).
According to a study of morbidity patterns in the Butajjra Rural Health Project in Central Ethiopia, sanitation factors were the principal risks for gastroenteritis (Shamebo et al, 1993). The authors also found that the most common diseases were acute respiratory infections and acute diarrhea, and that parental factors such as illiteracy were linked to morbidity .Acute respiratory infections and acute diarrhea, together with malnutrition, were also the most common causes of death in a study of infant and child mortality conducted in 1994-1995 in the north Gonder Administrative Zone (Mesganaw Fantahun et al, 1998). Freij et al (1979) investigated the associations between various individual and house hold characteristics and the prevalence of diarrhea in an urban area in Ethiopia

The main risk factors that emerged from their study were poor nutrition, housing hygiene, sanitation and water supply. An ethnographic study of diarrhea in Southwest Ethiopia (Mirgissa and Fekadu, 2000) showed resently, that the causes of diarrhea are known only by a small percentage of mothers or caregivers: only 20.5 percent of them indicate “poor hygiene “while 23.4 percent indicate “evil eye “as the major cause for diarrhea.

Regarding the causes of infant and child mortality, the country Health Profile prepared for USAID states: `As throughout sub –Saharan Africa, the vast majority of child deaths in Ethiopia are preventable. Reportedly more than three-quarters result from vaccine preventable diseases or dehydration due to diarrhea …` The 1988-89 survey in Butajira District found that ARIs (including measles and pertussis) and diarrheal diseases together accounted for over half of reported deaths among infants and children …`(Center of International Health Information 1999,p.8 with reference to Shamebo et al .1993)

We conclude this review with some results of studies on malnutrition and on the effects of famines. Malnutrition is, unfortunately , a very common problem in Ethiopia according to a study conducted in Southern Ethiopia, for instance, 45 percent of children aged 3-36 months were stunted, 42 percent underweight and 12 percent wasted . Among the socio- economic factors, household economic status and women‘s education were important in explaining the variation in long – term nutritional status of children (Gugsa Yimer, 2000). Given this very high level of malnutrition, it does not surprise that the recurrent famines has very level of malnutrition, it does not surprise that the recurrent famines have very severe consequences.

Gebre – egziabher and Hagos (2000) argue in a recent study, which focus on the Tigrai region, for the important to take into consideration wars, famines, droughts and environmental degradation as an important factor to explain high levels of infants and child mortality. “The combination of these natural and man –made catastrophes not only destroyed food production, but also undermined social services, in particular health services. The already major government resources were taken away from all other sectors to finance military build-ups. Economic activities such as traditional subsistence agriculture practices were disrupted .Other devastating effects of these catastrophes were uprooting people from their villages and breading up families, creating a large urban refugee population” (Gebre- Egziabher and Hogan. 2000, p.172).

2.2.1 Conceptual Frameworks

Various conceptual or analytical frameworks have been developed by different scholars to examine the determinants of childhood mortality. Mosley and Chen (1984) proposed an analytical framework which is based on the premise that 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. They grouped the proximate determinants into five categories. These are maternal factors (age, parity, birth- interval), environmental contamination, nutrient deficiency, injury and personal illness control, socioeconomic determinants such as maternal education, income wealth and health system are also believed to exert a substantial impact on child survival through the proximate determinants.

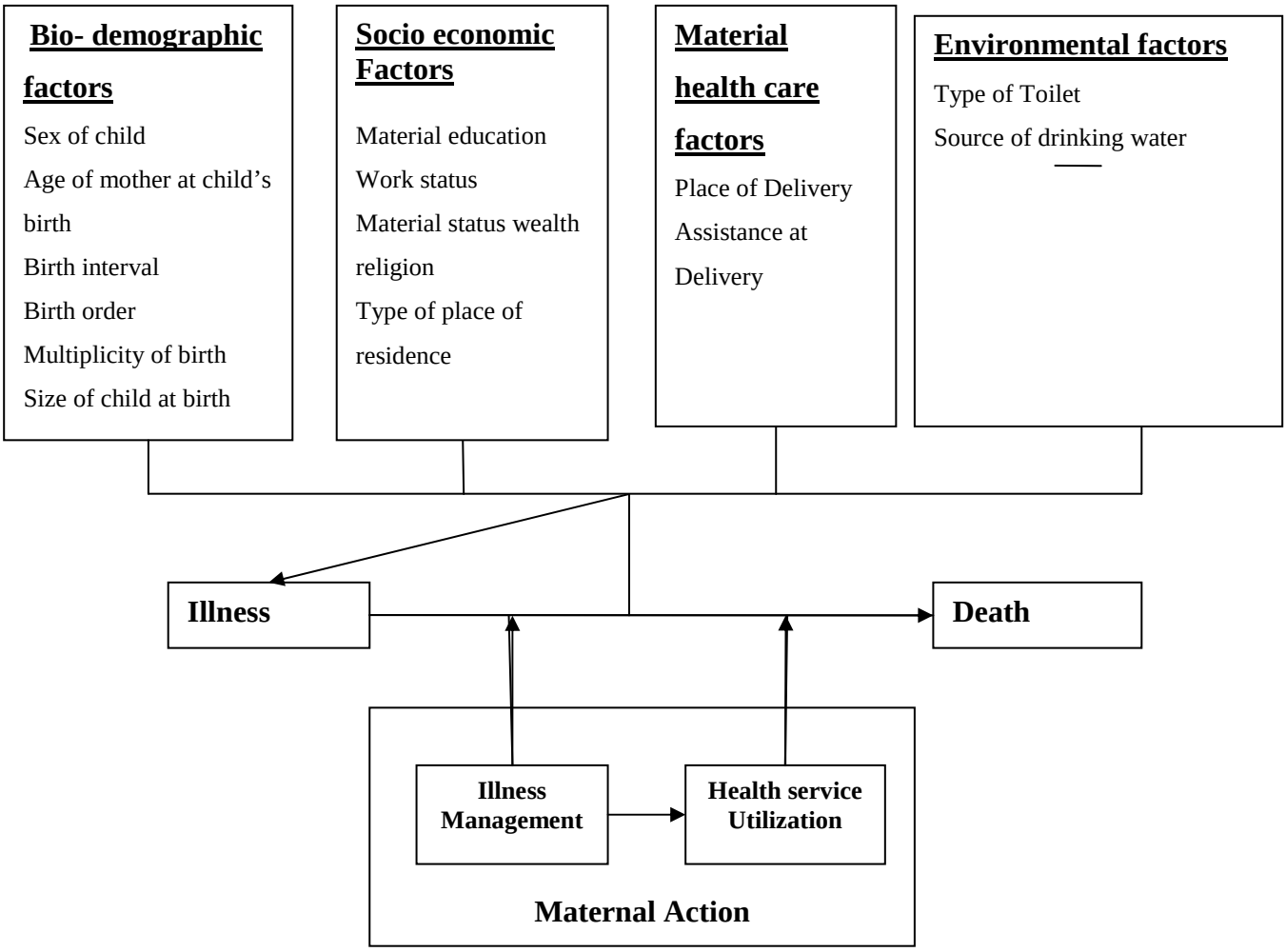
The model developed by Mosley and Chen (1984) became a classical reference for researchers in the area of childhood mortality and the current study adopts this framework with some modification.

The Dependent variable: for the purpose of this study, childhood (infant and child) survivorship is taken as an outcome (dependent) variable. Each category is treated as a dichotomous variable (alive or dead).

Proximate Determinants: Proximate determinants or intermediate variables are those variables which directly in the study, maternal factors (age at child birth, birth order, birth interval, survival status of previous sibling). Child factors (sex of child, size of child at birth, multiplicity of birth), environmental contamination (type of toilet facility and sources of drinking water) and nutrient deficiency (duration of breast feeding) are used as proximate determinants.

Independent Variables: socioeconomic variables and maternal health care factors are treated as independent variables.

Figure 2 Analytical frameworks for the analysis of determinants of infant and Children under five survivals in Misraq Badawacho woreda (adopted from Mosley and Chen (1984) analytical framework.



UNIT THREE

3. The Description of the Study Area.

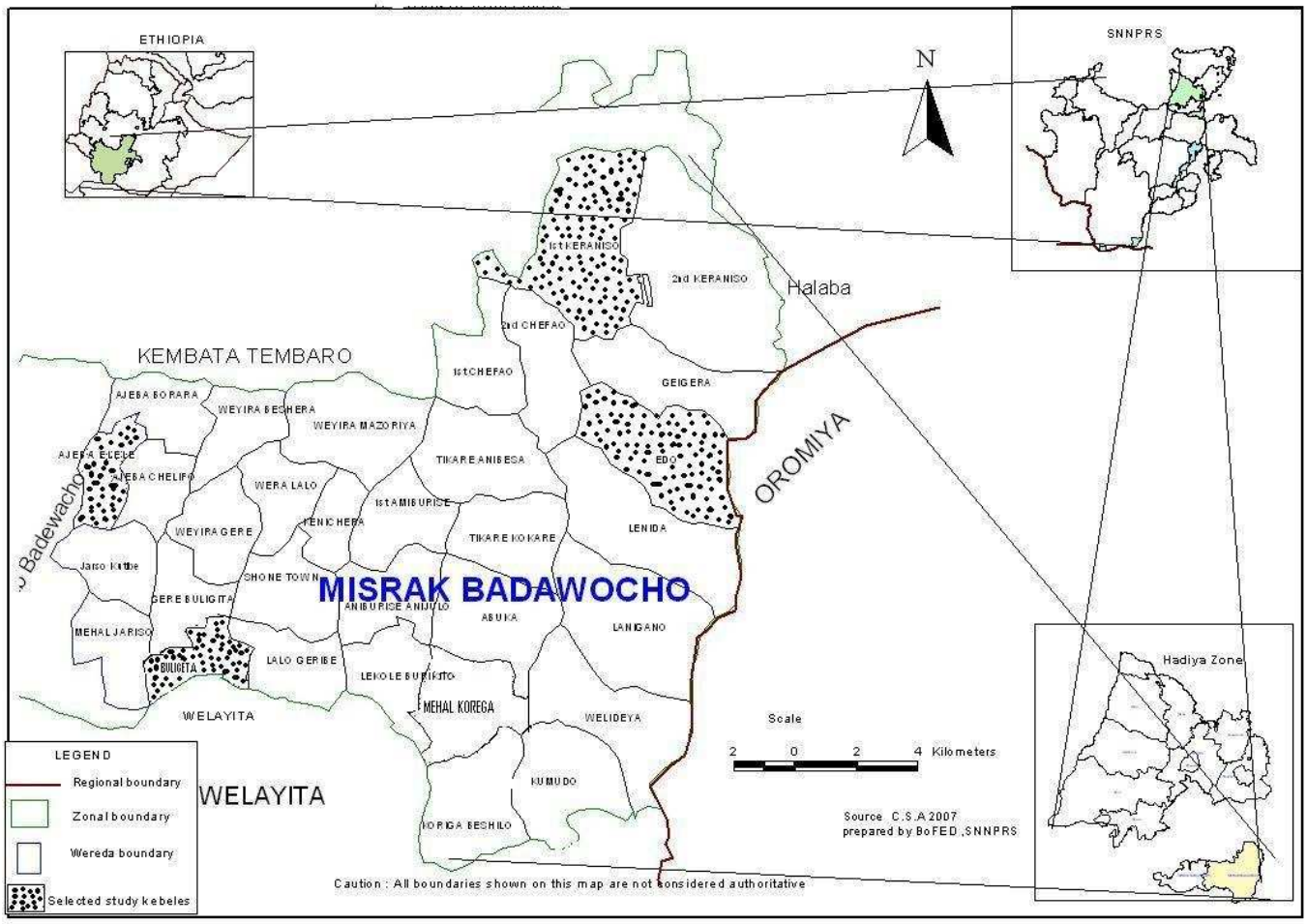
3.1 Bio-Physical Conditions

This unit comprises the description of the study area. The issues raised in the unit provide back ground information that has relationship with the topic. Thus, the unit consists; physical conditions, population conditions, Economic and infrastructural back grounds of the study area that has more or less ties with infant and child mortality.

I. Location

Misirak Badawacho wereda is found in Hadiya Zone of SNNP Geographically located between 7^0 $9^{'}$ $00^{''}$ to 8^0 $15^{'}$ 00'' North latitude and 37^0 $5^{'}$ $00^{''}$ to 40^0 $00^{'}$ $00^{''}$ East longitude. Relatively, the woreda is bounded by Halaba special woreda of SNNP and Siraro woreda of Oromia region to the north, Kadida Gamela woreda of KT Zone and Mirab Badawacha woreda which was former part of Badawacho wereda to the east and Wolayta Zone to the South. Woreda's capital, Shone, is situated at about 345 kms away from Addis Ababa on the asphalt road running from Shashemene to Arbaminch. The special feature in terms of location of Misraq Badawocho is that not have boundary share with other woredas of Hadiya Zone except Merab Badawacho woreda since it is separated by the presence of Kembata and Tembaro zone between Misraq Badawacho and other woredas of Hadya zone.

Figure 3 Map of the study area



MAP OF BADAWACHO WEREDA, HADIYA ZONE IN SNNPRS

II. Climate

According to the 1:50,000 topographic map, elevation of Woreda ranges between 1580 meter above sea level in the northern part of the woreda bounding Bilate River and 1980 meters above sea level along the highest peak found around Tito (southern part of the woreda).

Having this altitudinal range, the whole woreda is divided into two major agro-ecological zones namely dry and moist weinadegas. According to the newly produced sketch map prepared by the Financial and Economic office of the woreda, most part was situated along the dry weinadega part, though the number of kebeles remains less. The total kebeles situated at the woreda are 39 from this 16 are part of dry weina dega having large sizes, while 23 kebeles are belong to the moist weina dega with smaller sizes.

Dry weinadega constitutes 51% of the total area whereas moist weinadega constitutes the remaining 49%. Later Badawacho was divided into east and west. This is because proper implementation of resources and ease processing of socio-economic program of the woreda. Based on this concept the woreda has been divided in to Misraq and Miriab Badawacho derived from the direction east and west. Misrak (East) and Mirab (west).Months between June and October are the major rain month's (Meher) while March to May is the second rainy months (Belg).Though there is little variation in amount of rainfall in both agro-ecological zones the amount of rainfall varies in different seasons.The mean annual temperature ranges from 17.6^0 to 22.6^0 Celsius and the annual rain fall distribution ranges from 800 to 1500 mm (WARDO 2010).

III. Soils

Soils are among the major determinants of agricultural activities, on which the food security situation also largely depends. If soils are reasonably deep, well drained, and fertile, possibility of getting high agricultural yield per unit area is high. Though soils are classified in different ways, consideration of texture based classification may be enough to briefly discuss about soils of Misiraq Badawacho.

Sandy soils – Whereas sandy soils are easy to work but do not retain soil moisture. Thus, watering is essential to use them during drier periods.

Clay soils - they are poorly drained and usually dark in color and difficult in terms of workability.

Silt- Loam Soils – The most preferable soil type which is suitable for agricultural purposes since they are well drained and relatively fertile compared to other types of soils.

Most parts of Misraq Badawacho are covered by poorly drained clay soils whereas some parts are dominated by sandy soils that usually lack moisture retaining quality. According to 2009 WARDO report about 90% of the woreda's soils are infertile mainly due to domination of less preferred soil types, over cultivation and limited soil conservation measures against soil erosion. These soils are found in both agro-ecological zones. Fertile soils are found only in about 10% of the land area of the woreda. This indicates that to obtain optimum crop production, either modern inorganic fertilizers or organic manure or compost need to be used. Application of modern chemical fertilizers is also very costly for the poor farmers, even more costly under erratic rainfall condition as they can simply incur costs with no adequate harvest. On the other hand, the effect of organic fertilizers is not as quick as that of the inorganic once.

IV. Drainage System of Misiraq Badawacho

In assuring food security and poverty reduction process, using drainage basins play a pivot /crucial role. Parts of Hadiya zone and most parts of Misraq Badawacho are drained by Bilate River. Bilate River crosses north south direction which bisects Misraq Badawacho into two parts and reaches Lake Abaya. According to Agriculture and Rural development office of the woreda, about 92% of the woreda is drained by the Bilate River. In addition to Bilate River, Bisanguracha River also covers some parts of the woreda. Though, these rivers are permanently flowing with lesser volume of water during the drier months, there is no attempt to use them Chronic food insecurity particularly in the moist weina dega parts of the woreda. And precious top soils are highly eroded and contributing for the increasing silt deposits in Lake Abaya.

3.6 Socio economic situation

I. Settlement of Misraq Badawacho

Misraq Badawacho was formerly known by the name Badawacho until it was divided into east and west parts. This is because East and West indicates the direction, while, Badawacho reflects the common name that represents most of the tribes living in the woreda. Thus, Misiraq Badawacho has got its name after the division of the current woreda, in to east and west. Recently five kebeles have been added in to the woreda from Siraro woreda of Oromia region-through referendum.

Though written documents were not available to indicate the actual time of the first settlement, current population density and settlement patterns witness that the area was settled since long ago. Some evidences assured the time span of settlement include the resettlement program of 1985 that displaced several thousands of population to the north western part of the country namely to Metekel (Part of Benishengul Gumuz) and (Gambela), was also the result of long resettlement history.

According to 2007 population and housing census result, the population of Misiraq Badawacho was 185,305 excluding the population of 5 kebele's annexed from Oromia. According to the woreda Finance and Economic Development Office report of 2010, the total population of the woreda including the 5 kebeles estimated to be 195,446 with almost equal ratio of male and female of which female population constitute 97, 875 and male population of 97,571.

II. Demographic feature

Crude density may not be the real indicator of the population pressure. This is because newly included Keble's are very big in their size and have very few populations settled. This may affect the crude density that fails to describe the agriculture density. Therefore, calculating the other types

of densities may give better information about population distribution in relation to resource base. These include rural population density which compares the total rural population of a certain geographical area with its total area and Agricultural density that compares the total rural population of a certain geographical area with the total cultivable land within that geographical unit. Though the carrying capacity differs from place to place depending on the land characteristics and quality, generally speaking, high population density indicates heavy population pressure on land resources. Whatever is the case, the woreda is among the densely populated woredas of the country with crude density of about 453 persons per square kilometers and agricultural density of about 512 persons per square kilometers.

Though there is no reliable data disaggregate the calculations, population density is higher in the moist weina dega parts of the woreda than the drier weina dega, which can easily be seen from the residential houses very close to one another. As a result, scarcity of land and over cultivation are among the major causes of chronic food insecurity particularly in the moist weina dega parts of the woreda.

III. Population Age sex Ratio

Population of the woreda is almost proportional in terms of male female ratio with having 50.7 female and 49.3 percent of male. Age is a determinant factor that affects food security activities. The productive age population constitutes about 53.8. Most productive age population in most developing countries /are idle/ have no Job opportunities. Thus, most of the productive age populations are dependent economically. MisraqBadawacho has large proportion of young population that constitutes about 46.2 percents of the total population and even, those productive age population require extra job to survive because no more job opportunities are being created to accommodate these people except competing over limited arable land. As a result, significant numbers of youngsters seasonally migrate to the nearby towns and state farms of the rift valley areas looking for job opportunities. It is also common to see many youngsters from Badawacho area working as share croppers in the neighboring Alaba and Silte areas where the land holding is relatively better. Besides, large numbers of households were recently resettled in areas away from their home such as Basketo and Dawro.

Table 2 population density and different land use.

	Density categories	Year 2009/10
1	Total population	195,446
2	Total rural population	180, 025
3	Total area (km^2)	431.16
4	Total cultivated Area(km2)	351.39
5	Total Arable land (km^2)	380.50
6	Crude density (person)	453.3
7	Agricultural density person / km^2)	512

Source: Agriculture and rural development office calculated by the researcher (2010)

3.3 Livelihood in Misraq Badwacho Wereda

I. Agriculture

Ethiopia's economy is mainly agricultural in nature. A greater proportion of the country's population is dependent on agricultural sector for their livelihood. But on agriculture, productivity is low. As cited by M.L NARSARINA (2007), the main reason for the less productivity in most developing countries is agriculture of these countries are characterized by primitive technologies, poor organization and limited capital. Similar to any other parts of the country, agriculture in Misraq Badawacho is mainly rain fed and traditional. The drier weina dega is mostly dependent on cereal crops such as maize, teff and sorghum.

To some extent, they also grow commercial crops like coffee while the moist agro-ecology is relatively diverse in terms of crops grown as they grow cereals, root crops like sweet potato and taro, tubers like enset, fruit trees like avocado, etc. Coffee is the main source of cash mostly for this agro-ecology. The dry weinedega area is characterized by large land holding compared to the moist one but due to scarcity of moisture and absence of irrigation activities the area is not as such productive. Thus, it is difficult to practice intensive agriculture in this zone. Livestock production is important in both agro-climatic zones as a mixed farming.

The productivity of the major cereal crops and root crops at the two crop growing seasons vary from year to year. Moreover, when the land coverage increased in size the productivity also increased. Based on the above figure in the year 2008 one of the root crops, sweet potato was totally destroyed by the pests and drought. As the WARDO report, little effort has been made to

recover this damage for a very crucial gap filling crop during the hunger months as sweet potato is mainly harvested between April and June in the woreda.

II. Live stock production and productivity

Ethiopia is the leading county in Africa in the size of live stock. The distribution of live stock covered high land areas where mixed farming activities held and low lands where animal husbandry is the dominant source of income obtained. Misraq Badawacho is one of the central high land part of SNNP region accommodates large production of livestock. According to WARDO data, milk yield of the local cow reaches 3 litters per day during the first two to three months of lactation. This is still very low compared to the world standard. (See table3)

Table 3 Live stock population number of Misraq Badawacho

S .N	Nome	No
1	Cattle	193999
2	Sheep	11741
3	Goats	11630
4	Poultry	47460

Source: WARDO (2009/10) report.

As indicated in the table 3, cattle population is relatively high in the woreda but its productivity is very low. According to the key informants, Zebu breeds dominate the cows and the average daily milk yield is between 1 and 1.5 litters for a maximum of 6 months of lactation. Livestock provide food such as meat, milk and non food products such as hide and skin. Indirectly they contribute by supplying essential in puts such as manure for replenishing soil fertility and restoring nutrients also animals used for traction and power for halving, and threshing. It is the main source of income for periods of distress time when crop failure Happened due to erratic nature or seasonal drought occurred in rural areas. However, they are also victims of recurrent drought in the area.

3.4 Social service in Misiraq Badawacho

Infrastructure plays an important role to enhance socio-economic development of any country. Infrastructure can be categorized in to different types according to different individuals. But the major once include social and physical infrastructures. Among the social infrastructures Education and Health are the most and determinant once.

I. Health Infrastructure

Availability of health institutes are among the major social infrastructures on which the level of communities 'vulnerability to hazards such as sickness, epidemics, and even death partly depends. According to the data obtained from WHO, no hospital is available in Misraq Badawacho. The ratio is vary high considering population number and health facility (see table 4) As a result of this

in habitants have to travel to Wolita Sodo about 45kms far. In the recent past there is only one health station at the woreda capital, Shone. But now about 5 health stations have been established at different parts of the woreda. Though the presence of health institutions is not the only factor, it improves the previous health challenges of the woreda. The major problems of health institutes of Misraq Badawacho include lack of well equipped necessary medical equipments and medicines. Furthermore, almost all institutes lack the appropriate number of health personnel. Although recent progress of health infrastructure in Ethiopia is observable, it lacks quality in different aspects.

Table 4 Health facilities and trained personnel

Health facilities and trained personnel	Number of	Population Ratio with health facilities and personals
Health centers	3	1:65148.6
Clinic	15	1:13029
Health posts	34	1:5748.4
Pharmacies /group	-	-
Vendors private	11	1:17767.8
Physicians	0	No
Nurses/midwives	66	1:2961.3
Health assistants	2	1:97723

Source: Woreda Health office (2010)

II. Educational Infrastructures

The education policy of Ethiopia targeted on the goal that cultivation of citizens with an all round-education capable of playing conscious and active role in the affairs of economic, social and political life of the country (MOE 2008). Though various strategies have been taken place, it is not easy to achieve the desired goal appropriately. The major strategy was distribution of fair and quality education to all regions, particularly to rural areas where 85% of the population live. Universalizing primary education is one of the major policy directions. While attention has not been given to the disadvantaged nationalities and women, rural areas lack basic education programs.

Misiraq Badawacho has about 90% of rural population almost all of them has no pre-primary education programs. Most students attend primary schools without having an opportunity of receiving pre-primary or kindergarten studies. The dropout and detention rates are very high at the primary level. As already known the millennium goal has given due attention to achieve universal primary education for all children who are found at the school age. But drop out and detention rates continue, it is difficult to achieve the desired goal.

III. Road Infrastructure

Road is one of the crucial infrastructure that links farmers and market centers, so that they can easily transport their produce to the markets and transport back agricultural inputs and other essentials from the market to their villages. Besides, roads can reduce communities' vulnerability to disaster during natural and manmade hazards.

Misraq Badawacho has one asphalt road that divides the woreda capital in to two equal parts and it serves people to travel to north or southern part of the country easily. Besides, there are gravel roads with a total length of 7 kms and feeder roads with a total length of 352kms at present (2010)- Other than the absence of vehicles to give local services, the woreda has no major road problem. The following table shows main and seasonal roads of Misiraq Badawacho. (See also table5)

Table 5 Type of main and seasonal roads in M/ Badawacho Woreda

Type of roads	Total coverage
All weather road	168.7 km
Gravel road	7 km
Asphalt rod	21 km –part of the main road from AA to Arbaminch
Road built by PSNP	157.5 KM
Bridge built	24

Source- Infrastructure development sector office (2010)

IV. Potable Water

Access to potable water in Ethiopia is measured by the average distance traveled to get it. If a household is getting potable water within 1.5 kms of radius from the residence, the household is said to be accessible to potable water. While this type of data is not available at the time, potable water coverage has reached 38% according to woreda report with out excluding those water schemes not functional at present. Information obtained from key informants and own personal observation have also indicated that, majority of the inhabitants are not accessible to potable water. The available water types in the woreda are summarized in the table 6.

Table 6 Access to portable drinking water in Misraq Badawacho Woreda.

No	Type	Quantity		
		Functional	Non functional	Total
1	Motorized scheme	15	3	18
2	Shallow well	35	4	39
3	Hand dug well	8	12	20

Source: Woreda water, Mines and Energy office (2010)

Number of water sources is relatively large but considerable proportion is not functional mainly due to low yield and mechanical problems. The main funding NGOs include, Catholic, World – Vision, UNICEF, KHC HAD and Concern. The roles of people are limited to providing some materials and labor during water works. For example, the fund allocated for water distribution is only 84,000 Ethiopia birr in 2010, which is insignificant compared to the need for potable water in the woreda.

CHAPTER FOUR

4. DETERMINANTS OF INFANT MORTALITY

INTRODUCTION

This chapter discusses the study results based on the survey collected data from the field work. These results will provide the basis for the formulation of guidelines and recommendations pertaining to appropriate responsible policies and measures reducing infant mortality and reinforcing and up grading infant mortality rate. Interpretation of the main determinants of infant mortality and its impact on infant survival were revealed in this chapter. The main determinants of infant mortality, bio-demographic (age of mother at birth, birth interval, duration of breastfeeding, birth order, infant weight at birth, sex of infant…etc), socio-economic (maternal education, marital status and wealth), environmental (type of toilet facility and source of drinking water) and other related determinants such as housing condition health related factors were revealed. This will prepare the way for an appropriate course of action to ensure reduction of infant mortality rate.

4.1 Bio –demographic factors for infant mortality

4.1.1 Age at maternity

Birth orders and maternal age at birth are strongly related. The relationship however varies across socio cultural settings depending on levels and age patterns of fertility (Sullivan et al., 1994). According to the table 7 bellow age at first marriage indicate that 96% mothers married at the age less than 20 years and 4% married at age between 20-35.age at birth also indicated that 47% of the respondents were bellow 20 years,40% the respondents were at age between 20-35 and 13 %were at age above 36. For most countries the relationship between mother's age at birth and level of infant mortality risk exhibits a U-shaped curve. When women give birth at young age, they are at increased risk of complications and the child is at an increased risk of low birth weight and prematurely. When women give birth at older age, they are more likely to have pregnancy complications and the baby is more likely to have birth defects which increase the risk of dying in early childhood, In addition the risk to children born to older women is often increased because of higher parity.

A comparative study conducted on infant and child mortality in the developing world based on DHS data exhibits the expected U-shaped relationship between mothers age and childhood mortality in most of the countries. In this study, mother's age appears to have the greatest impact in the first month of life. On average, infants born to mothers under the age 20 are 45 percent more

likely to die during the first month of life than infants born to mothers' age 20 to 29 and infants born to women age 40 to 49 are 30 percent more likely to die in the first month of life.

Table 7 Age at first marriage and age at birth

Age at first marriage	frequency	percent
Less than 20 years	154	96
20-35 years	6	4
36+ years		-
Total	160	100
Age of mother at birth		
Less than 20years	75	47
20-35 years	64	40
36+ years	21	13
Total	160	100

Source: household survey 2010

4.1.2 Preceding birth interval

Birth interval, is defined as the length of time between two successive live births, it indicates the pace of childbearing. The length of birth interval between births has a significant influence on a child's chance of survival. Short birth intervals are associated with high rates of infant and child mortality .The expected higher risk of infant and child mortality for births with short preceding birth interval is clearly observed.

Infants born with in 2 years after the previous birth were 64%. Whereas 24-36 months and 36+ months after the previous birth accounts 23%and 13% respectively. The number of living sibling aged 5 years and under is also indicating the interval. 74% of the respondents had 2 and more children, 26 % of the respondents had only one child. (See the table 8) Births with preceding birth interval of 2-3 years after the previous birth have also a higher risk (more than twice) of mortality compared to the reference category (>4).In general, being born with in a very short birth interval (less than 2 years) is associated with a very high mortality risk.

The 2005 Ethiopian demographic health survey also show that probability of an infant just born dying before he/she is one month old is four time as high (.0068) if he/she is born less than 2 years after the previous child, compared to a baby born at least 4 years after his/her immediate sibling was borne (0.0017). For that same child the probability of dying before the 5th birth day (0.0208) is also almost four times (0.0066) as high as a sibling born after an interval of at least four intervening years.

Table 8 Birth interval and number of other living sibling aged 5 years and under

Preceding birth interval	frequency	percent
Less than 24 months	102	64
24-36 months	37	23
37-48 months	21	13
48+months	-	-
Total	160	100
Number of other living sibling aged5 years and under		
None		
1	42	26
2 or more	118	74
Total	160	100

Source: household survey 2010

4.1.3 Duration of Breast feeding

Infants who were never breastfed and who were breast fed for more than 12 months have a higher mortality risk than infants who were breastfed for more than 12 months.10% of the women breastfeed their children less than 36 months, between 6-12 and >=12monthswere57% and 33% respectively. (See table 9) Many studies show that the beneficial effects of breastfeeding on the nutritional status morbidity and mortality of infants (Hobcraft et al., 1984; Benefo and Parnell, 1991). Breastfeeding also has an indirect effect on the postpartum fecundity of mothers (Kennedy, 1990). In particular, more frequent breastfeeding is associated with longer periods of postpartum amenorrhea, which in turn are related to longer birth intervals and lower fertility levels. The effects of breastfeeding on infant survival seem to be greater during the early months of life.

The greatest advantage of breast mill over substitutes such as bottle – feeding is that breast milk contains antibodies against bacterial and viral agents that cause diarrhea and other infections , in additions , breastfeeding involves no food preparation or storage unlike artificial feeding and it protects against infection , the anti infective properties of breast milk are particularly important for babies.

Table 9 Duration of breastfeeding

Duration of breast feeding	frequency	percent
Lessthan36 months	16	10
6-12 months	91	57
>=12 months	53	33
Total	160	100

Source household survey

4.1.4 Birth order

38% the respondents were in birth order 1, between 2-3 were 23%, Whereas 4-6 and 7+ orders were 19% and 20% respectively. (see the table 10) first and higher order birth have relatively higher mortality risk as compared to other birth order (3-4) .This Might be due to the fact that high-order births are born into families that already have a number of young children who compete for resources and parental care, and most of higher order births have mothers who are physically depleted. Such children are more likely than other to suffer from high mortality risks such as low birth weight. First –born children are likely to be raised by parents with limited skills and experience, possibly increasing the risk of infant and child mortality.

Table10 Birth order mothers who take birth the last 12 months during the survey

Birth order	**frequency**	**percent**
1	31	38
2-3	18	23
4-6	15	19
7+	16	20
Total	80	100

Source: household survey 2010

4.1.5 Infant weight at birth

A child weight at birth is an important indicator of child's vulnerability to the risk of infant and child illnesses and the chances of survival. Children whose birth weight is less than 2.5 kilograms, or children reported to be "very small' or smaller than average" are considered to have a higher than average risk of early child death. Based on the table bellow mothers who deliver at health center were 6 and their 6 infant weights were 55%, 33% and17% with low, average and high respectively.(see the table11 bellow)

In developing countries, low birth weight stems primarily from the mother's poor health and nutrition. Three factors have most impact; the mother's poor nutritional status before conception

short stature (due mostly to under nutrition during her childhood) poor nutrition during pregnancy inadequate weight gain during pregnancy is particularly important since it accounts for a large proportion of fetal growth retardation, moreover , diseases such as diarrhea and malaria , mother becomes infected while pregnant (UNICEF and WHO 2004) born to under privileged mothers who have inadequate access to clean water supply and water disposal facility.

Table 11 weight of infants whose mothers deliver at health center

Child weight	frequency	percent
Low	3	50
average	2	33
high	1	17
total	6	100

Source: household survey 2010

4.1.6 Sex of infant mortality

The proportion of infant deaths is higher for male than for female children. The excess male to female infant death could be attributed to genetic reasons. During early childhood period, however male children seem to have slight advantage over their female counterparts and child mortality among females is higher. In general, Males have higher mortality rates during the first six months of life for genetic reasons primarily because of higher vulnerability to infectious diseases, excess male mortality risk declines after six months. The world fertility survey data show excess male mortality in 27 of the 29 countries. A study using DHS data from 28 countries also showed higher under-five mortality among males than females in all of the 28 countries included in the study (Sullivan, 1994). (See the table 12)

Table 12 Infant death by sex

Infant	Infants Borne	Death of infants	Mortality rate
Male	38	4	105
female	42	3	71
Total	80	7	88/1000

Source: household survey 2010

4.1.7 Multiplicity of birth

Children from multiple births (twins , triplets etc) experience much higher mortality than single births , it is a biological factor that plays a major role in the survival of infants , children of

multiple births are often not fully developed in the womb , resulting in low birth weight. In addition, complications at delivery and competition for resources after birth often result in greater risk of dying for multiple births.

A study based on DHS data show that in Eritrea, children of multiple births are five times more likely to die in the first year of life than children of singleton birth. The same study revealed that in Ethiopia, Chad, Niger Bangladesh and Nepal, more than half of the children born in multiple births died before their fifth birthday, a longitudinal, Community based study conducted in south west Ethiopia also showed that infant mortality among multiple births is 4 times higher compared to singletons and twins were mush more likely to die than singletons, even after taking their birth weight in to account.

4.2 Socioeconomic factors for infant mortality

4.2.1 Maternal education

The percentage of mothers with no education were 61.26%, mothers with elementary education constitute 33.75 and percentage of mothers post primary education (>8 grade and graduates) were 5%. (See the table 13) Mother's education is one of the most important socioeconomic determinants of childhood mortality. Many studies showed that the higher the level maternal education the lower infant child mortality Caldwell (1981) provided three explanations ; more educated mothers become less fatalistic about their children's illnesses, they are more capable of manipulating available health facilities and personnel and greatly change the traditional balance of familial relationships with profound effects on child care . In addition to this, they are more likely to have received antenatal care to have given birth with some medical attendance, to have taken their children at some time to see a physician (Caldwell, 1981 and Dyson, 1981).

Table 13 Maternal education

Mother education	frequency	percent
No education	98	61.26
with some primary education (1-8)	54	33.75
With post primary education (7+)	8	5
Total	160	100

Source: household survey 2010

4.2.2 Marital status

Regarding the marital status, it was found that 95%of the respondents were married, 3.75% was never married and 0.625%was divorced.(See the table 14) The results show that infants whose mothers were union at the time of the interview have higher chances of survival than those whose mothers were not in union during the survey. Infants from mother s who were not in union at the time have higher risk of dying than infants from mothers who were in union. This can be explained by the fact that most women in Ethiopia are economically dependent on their husbands. Hence, the lack of conjoint may aggravate the socio-economic condition of the family. Moreover married women are more likely to use maternal health services than their unmarried counterparts because the stigma associated with out-of wedlock pregnancies could be severe in societies like Ethiopia, and it is reasonable to assume that most such pregnancies are unwanted or unintended .as a result, such women may be less motivated to seek maternal and child health care services. (See the table 14)

Table 14 Marital status and types of marriage

Marital status	**frequency**	**percent**
married	152	95
Never married	6	3.75
Divorced	1	0.625
Total	160	100
Tape of marriage		
Polygamy	60	37%
monogamy	100	63%
Total	160	100

Source: household survey 2010

4.2.3 Wealth (economic status of the family)

It obvious that majority of families were low income group (low expenditures group) 68.75%, where as the medium and high expenditures groups accounts for 28 .75 and 2.5 % respectively. Whereas concerning working status 93.75% of the respondents were not working. Only 6.25 of the respondents had work. (See the table 15) This shows that infants from mothers who are in the lower and middle wealth index face relatively higher mortality risk as compared to the reference category (highest wealth index), similar to education the way in which household income and wealth affect child mortality is complex .The result FGD indicated that poverty not only affects food supply and access to health care but also linked to higher fertility rates.

Table 15 Economic and working status of the household

Economic status of the house hold	frequency	percent
above average	4	2.5
average	46	28.8
below average	110	68.8
Total	160	100
Working status		
Not working	150	93.8
Working	10	6.3
Total	160	100

Source: household survey 2010

4.3. Environmental factors for infant mortality

4.3.1 Type of toilet facility and source of drinking water

Access to potable water in Ethiopia is measured by the average distance traveled to get it. If a household is getting potable water within 1.5 kms of radius from the residence, the household is said to be accessible to potable water. While this type of data is not available at the time, potable water coverage has reached 38% according to woreda report with out excluding those water schemes not functional at present. Information obtained from key informants and own personal observation have also indicated that, majority of the inhabitants are not accessible to potable water.

The percentage of mothers who used protected sources of drinking water was 31.25%and 68.75% used water from unprotected sources .Regarding to the type toilet facility, 93.75% women were used pit and 6.25% had on facilities. (See the tale16)

Access to a flush or pit toilet is potentially a very important determinant of infant and child mortality in developing countries. Children in households that lack such access could have higher exposure that other children to diseases such as tetanus and digestive disorders (e.g., puffer and Serrano, 1978; UN, 1985) Unadjusted infant mortality is higher for infants in households that do not have access to a flush toilet in the region.

The risk of infant mortality associated with households with pit latrine is higher this is due to the fact that pit latrine might not be a good measure of sanitation having pit latrine does not mean that it will be used hygienically or by all members of the houses hold and caretakers may not have the habit of washing their hands using soap after using latrines. A study of child mortality in relation to water supply and nutritional status in Malawi noted that young children often did not use the pit latrines, and consequently there was much fecal contamination around homes. Even though pit

latrines protect against some parasitic diseases .They appear not to protect against diarrhea, which is one of the major contributors to child mortality in most developing countries (Lindskog et al., 1988)

Table 16 Source of drinking water and type of toilet facility

Environmental variable	frequency	percent
Source of drinking water		
protected	50	31.25
Unprotected	110	68.75
Total	160	100
Type of toilet facility		
Flush	-	
Pit	150	93.75
No facility	10	6.25
Total	160	100

Source: household survey

4.3.2 Housing condition

Traditionally, roofs with corrugated iron are considered as an indicator of better economic status. In fact, there are some well-built thatch roofs that are equally considered as an indicator of wealth. About 81.25 of the sample households were found thatch roofed with the 18.75 corrugated iron roofed. Most of these corrugated iron roofed houses were found in dry weinadega part, 65% of the sample households were used wood for source of fuel and 35% were used residual off leaves. Considering kithen18.75% of the sample household had kitchen the remaining 81.25% had no kitchen. Lamp is the only means lighting after dark in rural areas which covered 81.25% of the sample households and the other households were used electricity.(See the table 17)

Table 17 Housing condition

Factors	frequency	percent
Type of house		
Corrugated	30	18.75
Thatched	130	81.25
Other	-	-
Total	160	100
Source of fuel		
Wood	104	65
Animal dung	-	-
Residual off leaves	56	35
Electricity	-	-
Total	160	100
Availability of kitchen		
Yes	30	18.75
no	130	81.25
Total	160	100
Source of lighting for home		
electricity	30	18.75
lamp	130	81.25
Hearth	-	-
lantern	-	-
Total	160	100

Source: Household survey 2010

The variable 'person per room' (room density/ crowding) was calculated by dividing the total number of persons living in the house by the total number of rooms in the house (excluding kitchen and bathroom). This continuous variable was divided into two categories by taking the median of the distribution (less than or equal to three persons per room). Crowding is an approximation for contamination and risk of contact acquire respiratory infection. The variable 'refuse in the courtyard' denotes that refuse was disposed of inside the courtyard in the open. The variable 'animals in the courtyard' means that the household does not has separate cattle shed and the animals are tethered inside in the courtyard. The latter two variables are expected to exert an impact on mortality because these conditions are closely related to the risk of exposure to infectious agents

(Jatrana, 2001). Based on that most the respondent's houses which are, 81.25% had no room and animals are living together with the family in the same room. 18.75% had two and above rooms and Animals were living outside the house. Household size concerned, 20% of the respondents had <4, 53% had 5-8 and 27% had > 8. (See the table18) Crowding, which is a consequence of poverty, increases the risk of infant mortality. In the houses which are already crowded and no separate place for cattle, the contaminated environment increases the risk of death.

Table 18 number of rooms in the house

Number of rooms in the house	frequency	percent
1	130	81.25
2and above	30	18.75
House hold size		
< 4	32	20
5-8	85	53
> 8	43	27
Total	160	100

Source: household survey 2010

4.3.3 Place of delivery and assistance at delivery

Children delivered at a medical facility are likely to Experience lower mortality risk than children delivered at home because such facilities usually provide a sanitary environment, proper birth assistance and vaccination. But in developing countries like Ethiopia most births takes place at home and the risk of mortality is higher.

The same result is also obtained when referring to assistance at delivery. Both infant and child mortality is lower among mothers who receive assistance from health professionals as compared to mothers who receive assistance from traditional birth attendant. The result indicated that 90.6% the respondents were delivered at home and also the same percent assistance by traditional birth attendants. 9.4% the respondents were delivered at health center were assistance by health professional. In the woreda most mothers were delivered at home and assisted by traditional birth attendants and those mothers who seek assistance or go to health facilities might be those who encounter complications during delivery that may lead to death, or go to health facilities as at last resort (unable to give birth at home after long hours labor.) see table19.

Table 19 Maternal health care

Maternal health care	frequency	percent
Place of delivery		
Home	145	90.6
Health facility	15	9.4
Total	160	100
Assistance at delivery		
traditional	145	90.6
Health professional	15	9.4
Total	160	100

Source household survey 2010

4.3.4 Antenatal care

Mothers were asked whether they had received medical care or not during pregnancy of the youngest child. Accordingly, about 24% in dry weinadega and 30% in wet weina dega parts of the woreda went to receive medical care during pregnancy. From FGD Over all, about 35% of the pregnant women in the woreda received antenatal care during pregnancy. However, about 43% in dry weinadega and 66% of pregnant women who received medical care in weinadega part, they visited health institutes at or after 8th month of their pregnancy for the first time. (See table 20)

Table 20 Antenatal care

Antenatal care	frequency	percent
When you were pregnant did you take medical care?		
yes	87	54
No	73	46
Total	160	100

Source: Household survey 2010

4.3.5 Religion and ethnicity

Regarding relation between religion and mortality reveals that children of orthodox, Muslim and other (catholic and traditional) mothers have higher risk of dying during infancy than those of protestant mothers. The difference could be explained by the relatively higher number of mothers with some education among protestant mothers. However, child morality among children of orthodox and protestant mothers is lower as compared to children of Muslim mothers.

Differentials by ethnicity show considerable effect during infancy than child period. Infant mortality of children of mothers belonging to Halaba ethnic group is the highest may be due to

higher number of illiterate mothers and they are Muslim .among these ethnic groups as compared to mothers belonging to other ethnic groups.

Table 21 Religion

Religion	frequency	percent
Orthodoxies	18	11.5
Protestants	92	57.5
Muslims	50	31.25
Other	-	-
Total	160	100

Source: household survey 2010

4.3.6 Infant and child mortality rate.

Rutstein (1984) defined infant mortality rate (IMR) infants dying in the first year of life per 1000 live births, whereas under five mortality rates (1-5) is the probability of dying between the first and fifth birth day expressed per 1000 live births.

Table 22 Infant and child mortality in Badawacho woreda

Mortality	Frequency	Percent (%)
Infant mortality		
Yes	7	8.75
No	73	91.25
Total	80	100
Children mortality (1-5) years		
Yes	15	5
No	285	95
Total	300	100

Source: household survey 2010

Table 22 show infant child mortality in Badawacho wereda about 8.75% of the infant died before one year. This meant infant mortality rate is 88 deaths per 1000 live births ,for the age group (1-5), about 5% of child died while 95% of them alive, yielding child mortality rate for that group as 50 death per 1000 live births. FGD result indicated that the main causes that led child mortality are mal-nutrition, pneumonia, neonatal complication, malaria, diarrhea, measles, AIDS and other. These main causes for death are preventable. Percentage of preventable has shown on the table23 below.

Table 23 Preventable percentage of main causes death on infant and child mortality.

Causes	Percent (%)
Due to pneumonia	65
Due to neonatal complication	55
Due to malaria	92
Due to diarrhea	88
Due to measles	100
Due to AIDS	48

Source: from focus group discussion

On focus group discussion we discuss what challenges hinder in reducing infant and child mortality and said that the Government of Ethiopia has given high priority child survival interventions. This decision has been taken in a context which strongly supports such action. Not only is there powerful international support, but also recent developments in the health and health-related sectors in Ethiopia can provide the practical means for implementing a successful Child Survival Strategy.

Achieving the MDG 4 for child survival in Ethiopia demands focused and coordinated action to improve nutrition, to strengthen health systems, and to reduce inequities in access to effective interventions against the diseases which kill young children.

The Strategy to achieve the MDGs must take advantage of existing opportunities and address the challenges which may hinder implementation. These challenges were the following:-

- The health system is generally weak in relation to the health needs of the country
- The coverage and utilization of essential programmes is very low, with wide regional variation
- There is limited access to health services with a widespread shortage of skilled human resources and supplies.
- Basic and undergraduate training of health staff contains too little practical experience.
- Supervision, monitoring and evaluation are very weak.
- Lack of motivation of health workers at all levels.
- Regional and Woreda health offices are short of staff and management capacity.
- Decentralization is in progress but there are widespread problems of information flow, inadequate management and accountability.
- Health information system is weak,(making planning, monitoring and response)

CHAPTER FIVE

5 DIFFERENTIALS IN INFANT MORTALITY

Mortality differential refers to the unequal survival chances among individuals and population groups. Death is often preceded by illness (morbidity). As a result, the state of health of individuals and societies is the prime determinant of mortality differences. However, variations in the types and severity of illnesses around the world indicate that the state of health is itself dependent on the level of socio-economic development.

5.1 Biodemographic differentials

5.1.1 Infant mortality deferential by mother's age.

Infants born to mothers who are below age 20 had lower chance of surviving as compared to infants born to women in the age group 20-34. However, infant mortality is higher for infants born to mothers above age35. The reason for higher mortality risk of infants born to younger women is that younger mothers are more likely to be premature, have low birth weights and they are not; in general, ready to take on parental responsibilities.(see the table 24)

Table 24 Differential infant mortality by age of mothers

Infant birth and death by age of mother at birth	Number of mother	Infant birth	Infant death	Mortality rate per 1000
<20 years	75	40	4	100
20-34 years	64	30	2	67
35+ years	21	10	1	100
Total	160	80	7	88 /1000

Source: researcher's own survey results

5.1.2 Differential infant mortality by birth order

Usually the relationship between birth order and mortality at early ages takes a U shape. Mortality is high for first born children as well as births of very high orders, and is low for intermediate birth orders. The possible explanation for greater risk to first order and higher order births is that first order births are more likely to have a difficult birth process than later births, thus increasing the risk of neonatal mortality .Moreover, first –born children are likely to be raised by parents with limited skills and experience, possibly increasing the risk of infant and child mortality. Births of very high order may have mothers who are physically depleted at the time of conception and throughout pregnancy and the births may have low birth weight. (See the table 25)

Table 25 Differential infant mortality by birth order

Infant death by birth order of mother at birth	Number of mother	Birth of infant	Death of infant	Mortality rate per 1000
1-2	75	40	4	100
3-6	64	27	2	74
7+	21	13	1	76
Total	160	80	7	88 /1000

Source: researcher's own survey results

5.1.3 Differential of infant mortality by birth interval

The length of birth interval between births has a significant influence on a child's chance of survival .Short birth intervals are associated with high rates of infant and child mortality that we have seen on the table 26 bellow .The risk of dying during infancy for children born less than two years after a previous birth is more than double that of children born four or more after a previous birth.

Table 26 Differential of infant mortality by preceding birth interval

Infant mortality by Preceding birth interval	Number of mother	Birth of infants	Death of infants	Mortality rate per 1000
Less than 24 months	102	52	5	96
24-36 months	37	28	2	71
37-48 months	21	-	-	-
48+months	-		0	-
Total	160	80	7	88 /1000

Source: researcher's own survey results

5.1.4 Differential infant mortality by Sex

The proportion of infant deaths is higher for male children than for female children. The excess male to female infant death could be attributed to genetic reasons. During early child period, however male children seem to have slight advantage over their female counterparts and child hood mortality among females is higher. (See the table 27)

Table 27 Differential of infant mortality by sex

sex	Birth of infant	Death of infant	Mortality rate
Male	38	4	105
female	42	3	71
Total	80	7	88/1000

Source: researcher's own survey results

5.2 Socioeconomic differentials of infant mortality

Differentials in child hood mortality by socioeconomic variables, namely, level of education, religion and ethnicity are presented

5.2.1 Differential of infant mortality by maternal education

Maternal education has been identified as one of the most important socio economic determinants of infant and child mortality. An examination of infant and child mortality rates presented in reveals the expected pattern of inverse relationship between mother's education and child's risk of dying. Mortality rates of children of mothers with no education are higher than those whose mothers have some education both during infancy and childhood periods. (See table 28)

Material education is one of the strongest correlates of infant and Childs mortality because education provides women with decision making them more aware of their children's welfare and increasing their knowledge about child hood diseases and their ability to understand illness and provide timely treatment.

The beneficial effects of a mother's education, and its critical role in the survival of their children from infancy to adulthood, are well known. Infant and child mortality are inversely related to the education of mothers. In Ethiopia "under-five mortality among children born to mothers with no education (139 per 1,000 live births) is more than twice that of children born to mothers with secondary and higher level of education (54 per 1,000 live births) (DHS2005)

Table 28 Differential of infant mortality by mother's education

Infant mortality by mother education	Number of mother	Birth of infants	death of infants	Mortality rate per 1000
No education	98	50	5	100
with some primary education (1-8)	54	30	2	67
With post primary education (7+)	8	2	0	-
Total	160	80	7	88 /1000

Source: researcher's own survey results

5.2.2 Differential by Religion and ethnicity

Regarding relation between religion and mortality reveals that children of orthodox, Muslim and other (catholic and traditional) mothers have higher risk of dying during infancy than those of protestant mothers. The difference could be explained by the relatively higher number of mothers with some education among protestant mothers. However, child morality among children of orthodox and protestant mothers is lower as compared to children of Muslim mothers,

Differentials by ethnicity show considerable effect during infancy than child hood period. Infant mortality of children of mothers belonging to Halaba ethnic group is the highest may be due to higher number of illiterate mothers and religion (they are Muslim) among these ethnic groups as compared to mothers belonging to other ethnic groups. (See table 29)

Table 29 Differential infant mortality by religion and ethnicity

Infant mortality by Religion	Number of mother	Birth of infants	Death of infants	Mortality rate per 1000
Orthodoxies	18	13	1	76
Protestants	92	40	2	50
Muslims	50	30	4	133
Other	-	-		-
Total	160	80	7	88 /1000

Source: researcher's own survey results

5. 3 Environmental differentials

5.3.1 Differential of infant by source of drinking

The positive effect of toilet, sanitation and use of pure water on child survival has been documented in various literatures (eg D vanzo et.al., 1983;UN 1985) .Households with flush or pit latrine have

lower mortality risk during infancy as compared to households with no facility ,bush or field. The result also indicates that there is difference in infant mortality by source of drinking water in the woreda as we have seen in the table 30.

Table 30 Differential **of infant mortality by source of drinking water**.

Source of drinking water	Number of mother	Birth of infants	Death of infants	Mortality rate per 1000
Protected	50	30	2	67
Unprotected	110	50	5	100
Total	160	80	7	88 /1000

Source: researcher's own survey results

5.4 Differential by Maternal health care seeking factors

Children delivered at a medical facility are likely to experience lower mortality risk than children delivered at home because such facilities usually provide a sanitary environment, proper birth assistance and vaccination. But in developing countries like Ethiopia most births takes place at home and the risk of mortality is higher. (See the table 31)

Table 31 Differential infant mortality by place delivery

Place of delivery	Number of mother	Birth of infants	Death of infants	Mortality rate per 1000
Home	145	72	7	97
Health facility	15	8	0	-
Total	160	80	7	88 /1000

Source: researcher's own survey results

The same result is also obtained when referring to assistance at delivery. Both infant and child mortality is lower among mothers who receive assistance from health professionals as compared to mothers who receive assistance from traditional birth attendant. In the woreda those mothers who seek assistance or go to health facilities might be those who encounter complications during delivery that may lead to death, or go to health facilities as at lest resort (unable to give birth at home after long hours of labor.)

CHAPTER SIX

6. SUMMRY, CONCLUTION AND RECOMENDATION

6.1 Summery

This study was conducted in four kebeles of Misraq badawacho wereda which is located in the SNNPR to access the root cause of child mortality in Ethiopia. Based on the household survey, participatory qualitative focus group discussion and observation. The main findings of the study are summarized as follows.

Maternal age at birth less than 20 years and above 35 years greater than the intermediate age between 20-34 .this indicate that children born to younger mother (less than 20years) and older mothers greater than 34 years have higher risk in chance of survival infants. Because of biological (endogenous) factors (prematurity, low birth weight, complication of delivery… etc. This is because the higher mortality risk of younger mother may be partly due to physical immaturity, lack of experiences or knowledge in caring and treating children. Children of old mothers are due to maternal depletion and resource competition.

Short length of preceding birth interval was also observed. Short length of birth interval has negative impact on infant mortality. Which short preceding birth intervals affect infant survival is that of maternal depletion. A mother who has a child after a very short birth interval does not have time to recover from the previous birth so that her subsequent infant is born weak and of low birth weight.

Duration of breast feeding appears to reduce the impact of short birth interval on infant mortality due to its role in regulating human fertility by lengthening the birth interval, especially in societies, like those in the SNNPRS, where the practice of modern contraceptive is low.

The result first and higher birth order children are more likely to have lower chance of survival than intermediated births. The relationship between birth order and survival are important during infancy .The high mortality risk for higher order births may be related to the age of the mother. Higher order children may face competition over resources such as food and medical care.

This study also found out differences in infant survival by sex, Mortality risk higher for male infant than female at infancy. Excess male mortality has been documented by many researcher and has been attributed to the biological weakness of male infant at birth .It has been noted that that boys

are more vulnerable to prematurity, malformation, and birth injury (Benjamin and Poland, 1993). However, during child period, male children seem to have a higher survival chances as compared to female children

In the study, duration of breastfeeding is found to be the most important in creating the variation in both infant and child survivorship of the children. Children who were never breastfed for relatively longer period have high mortality risk. This can be explained by the effect of breastfeeding on child survival by its role in nutrient intake, birth spacing and anti-infective properties.

There is some support in this study for the correlation of mortality risks between siblings since those whose previous sibling had died have higher risks of dying in infancy , because of genetic reasons ,child care practices ,or access to similar quality and quantity of resources such as food and health care .The death of the previous sibling can have also an effect on the survival chances of the index child by reducing the length of the birth interval ,either because of biological factors (a quick return to fecundity due to curtailed breastfeeding) , or by parental choice (replacement of the dead child).

Among the socioeconomic variables, maternal education, martial and economic statuses are found to be important variables in explaining the variation in infant and child mortality. **First,** education may increase the productivity of health inputs. For example, educated mothers may know to boil water in order to kill water-borne pathogens. **Second,** it may reduce costs of information about the optimal use of health inputs. Where information about what is "best" is scarce, educated mothers may be at an advantage in seeking out such information. **Third,** education may increase family income. Fourth, education may increase the mother's time costs. To the extent that mother's time is an input in infant health, such a result would serve to decrease infant health. Fifth, education may change preferences for child health and family size.

Households with access to safe water have significantly lower mortality rates. Access to sanitation facilities is also significantly related to infant mortality. Children born in households with either flush toilets or pit latrines have lower mortality rate than those born in households without any toilet facility but in my observation had not been done properly, it hasn’t roof and wall around the pit and used this facilities unhyginically. Pit latrine is in fact related to higher mortality risk s. this could be explained by the fact that owning a pit toilet facility does not mean that it will be used hygienically or used by all members of the house hold hygienically or used by all members of the house hold.

With regard to the source of cooking fuel, infant born in households using high polluting fuels as their main source of cooking fuel have higher mortality rates as compared to those using low polluting fuels. Higher incidence of respiratory infections which are responsible for infant deaths is expected in households which use ‘dirty’ fuels as opposed to those using clean cooking fuels.

Children born to mother who had received assistance at delivery and those who delivered in a health facility have higher mortality risk as compared to infant born to mothers who were not assisted by a health professional or delivered at home. The result indicated that smaller percent mother’s birth at health facility and assisted by health professional in the woreda. Most the mothers who seek assistances or go to health facilities might be those who encounter pregnancy complication that are associated with higher risk of child death, or go to health facilities as a last resort after long labors at home.

High rates of infant mortality are their low socio-economic status and poor household environment. The results also demonstrate that crowding, which is a consequence of poverty, increases the risk of infant mortality. In the houses which are already crowded and where cattle have no separate place, the contaminated environment increases the risk of death.

Ethnicity shows considerable effect during infancy than during child period. It was found out that infants from Halaba ethnic group are more likely to die than infants from other ethnic groups .This could be explained by relatively higher number of illiterate mother s (78%) among this ethnic group and they are Muslim and in terms of practice polygamy(types of marriage)

6.2 Conclusion

The following major conclusions were made possible from the study

- **Magnitude of infant mortality**: The study result indicated that the magnitude of infant mortality based on my own survey result was 88 deaths per thousand (88 /1000). In terms of 2007 year death rate 107 /1000, it decline by 19/1000 but still high.
- **Community differentiation:** age of mother, birth order, birth interval, sex of child, wealth rank, family size, education, source of drinking water, place of delivery, This means they need to be addressed according their needs and priorities.
- **Root causes of child mortality:** As already identified the root causes of infant mortality are very complex and divers. Hence considering of the combination of factors with integrated approach might be more visible than sectoral approach.
- **Policy implications:** enabling policy environment on health and education, however, more has to be done on accessibility of education and health service facilities in the rural areas. The expansion of health extension agents is a good start by the government.

6.3 Recommendations

Based on the given brief conclusions the following major recommendations have been made:

- **Need of concentrated effort:** As already the infant mortality rate is very high government and different stakeholders (government , NGOs and community) need to have a joint effort in education, availability of health services and improvements of the livelihoods of the community
- **Addressing the needs and priorities:** The rural community is highly differentiated on wealth ranks which have many implications to accessibility of education and health services. Hence the poorest of the poor who are more \vulnerable need to be given priorities.
- **Addressing the root causes:** The problem is very complex and diverse, which implies it needs a holistic and integrated approach to address the problem with the principle of participatory approaches.
- **Policy implications:** No doubt under the millennium development goal and growth and transformation social services is given priorities in the rural areas. Yet still the development intervention needs to expand compare to the existing magnitude of the child mortality rate.

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Annex I

House hold questionnaire

Purpose: The aim of this questionnaire is to gather necessary information to look into the factors for child mortality in misrak badawacho woreda, Hadiya Zone.

You are kindheartedly requested to give your genuine and valuable information with respect to the given questions. The researcher would like to assure you that any information that you provide is to be kept secret and it will be used purely for academic purposes. Thus, your collaboration in providing reality is very obligatory to achieve the objectives of the study.

Instruction: Please circle the choice you supposed to be correct answer from the given alternatives and write your answers for the open ended questions in the given space.

Section A <u>Information on members of the house hold</u>

1. Head of house hold_____ address ---------- 2 kebele ---------- 3. House number_____

No	Name of usual members of the house hold	Relationship to the head of the house hold	Sex M(1) F(2)	Age in completed years	<u>For members above age 15</u>		
					Marital status	For female only	
						Mother hood status	Eligibility
						Has she ever given any birth	Line number of eligibility
	1	2	3	4	5	6	7
01							
02							
03							
04							
05							
06							

Question for woman age 15-49 and Eligible for the study

Annex II Mortality and health questions

No			
1	Age of women in completed year?	----------	
2	How many children have you ever born?	1.Male -------- 2. Female ----	
3	How many of these are living with you?	1.Male -------- 2. Female ----	
4	How many living elsewhere?	1.Male -------- 2. Female ----	
5	How many of them are dead?	1.Male -------- 2. Female ----	
6	Have you given birth in the last 12 months?	1.yes 2. no	
7	Sex of the infant child	1.Male -------- 2. Female ----	
8	Date of birth?	Month ------- Year--------	
9	What was your age at birth of this child?	Years----------	
10	Is the child a live?	1.Yes 2.No	Skip to 16
11	Date of death	Date ---------month ------ year----------	
12	Where did you take the child when he was sick?	1.Health care unit 2. Local injector 3. To traditional healer 4. No action 5. other specify	
13	What do you believe was the cause of death?		
14	Have you been medically told the cause of death?	1.Yes 2.No	Skip to 16
15	It was_____	_____	
16	When you were pregnant with this child did you visit anybody far to check on the pregnancy	1.Yes 2.No	
17	Whom did you consult on your first visit?	1.heatlth personnel 2.traditionalbirth attendant 3.traditional healer 4. Other	
18	How many months pregnant were you at first visit?	Month ------	
19	Where did you deliver this child?	1.Home 2. Health care unit 3. other	
20	Who helped you during delivery?	1.TBA 2. Health care unit	

		3. Neighbors 4.self 5. Other	
21	What is the birth order of this child	----------	
22	Did you face problem during labor?	1.Yes 2.No	Skip to 24
23	It was_____	1. prolonged labor 2. obstructed labor 3. mal presentation 4. excessive bleeding 5. other specify	
24	The child was born ----------	1.before expected month 2.an expected month 3.later than expected month	
25	At birth the size of the baby was ----------	1. smaller than usual 2. as usual 3. larger than usual	
26	In the last12months do have death between 1-5 years?		
	yes		
	no		

Annex 3 Bio-demographic factors

No			
1.	Age of month at birth	1.less than 20 years 2. 20-36 years 3. 35+months	
2	Preceding birth interval	1. less than 24 months 2. 24-36 months 3. 37-48 months 4. 48+months	
3	Survival status of preceding child	1.Alive 2.Dead	
4	Multiplicity of birth	1.Single 2.Multiple	
5	Size of child at birth	1.Large 2. Average 3. Small	
6	Sex of child	1. Male 2. Female	
7	Duration of breast feeding	1.Less than 36 months 2.6-12 months 3.>=12months	
8	House hold size	1. <4 2. 5-8 3. >8	
9	Birth order	1.1-if mother didn't previous live birth 2. 2-3 3.4-6 4.7+	
10	Number of other living siblings aged 5 years and under	1. 1 2. 2 or more	
11	Types of marriage	1. polygamy –if the mother is currently married and her husband has other wife 2. monogamy – if the husbands have only one wife	

Annex 4 Socio-economic factors

NO			
1	Density (population density per square kilometer	1. High if it is above 300 people per sq. kms. 2. Low if it is below 300 people per sq .kms.	
2	Residence	1.urban 2.Rural	
3	Current marital status	1.married 2.Never married 3.Diverced 4.windowed 5.Separated	
4	Mother education	1.No education 2 with some primary education (1-8) 3. With post primary education (7+)	
5	Economic status of the house hold	1. above average 2. average 3. below average	
6	A adequacy of house hold monthly /yearly income	1.Not sufficient 2. Barely sufficient	
7	Religion	1.Orthodoxes 2.Protestants 3. Muslims 4. Other	
8	Husband occupation	1. professional(teacher and other civil servants) 2. sale /service 3. agricultural farmers 4. un employed	
9	Ethnicity	1. Hadiya 2. Kembata 3. Halaba 4. Walayita 5. Other specify	

Annex 5 Environmental factors

No			
1	What is the type of roof	1. corrugated 2. Thatched 3. Other specify_____	
2	Types of floor	1.soil 2 soil with animal dung 3.other specify	
3	Number of rooms excluding kitchen	_____	
4	Does the house have kitchen	1.yes 2. no	
5	During winter where does the family get water?	1.river 2.unprotected stream 3.protected stream 4.unprotecte well 5.protected well 6.other specify	
6	Distance of this source	_____	
7	On average how many times you fetch water a day	_____	
8	Vaccination status if the child received any or all of the following vaccination	1.fully vaccinated 2.partally vaccinated 3.none	
9	What type's fuel does the house hold use?	1.wood 2.animal dung 3.residual off leaves 4electrcity 5.other	
10	What is your means of lighting after dark?	1.none 2.lamp 3.hearth 4.lanter	
11	Toilet	1.flush	
		2.pit	
		3.no toilet	

Annex 6 Definition of terms

Neonatal mortality: the probability of dying within the first month of life.

Post-neonatal mortality: the probability of dying between the 5th and 52nd week after birth

Infant mortality: the probability of dying between birth and the first birthday

Child Mortality: the probability of dying between exact ages one and five.

Under-five mortality: the probability of dying between birth and the fifth birthday