Disparities in Infant and Child Health Status: a Comparative Study of two Rural Regions of Ethiopia

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ABSTRACT

It is estimated that about 10.8 million children die each year. Six countries (China, the Democratic Republic of the Congo, Ethiopia, India, Nigeria and Pakistan) account for 50% of worldwide deaths in children under age of 5 years (Black RE, et al 2003; 226-34).

According to Ethiopian Central Statistics Agency, Ethiopian has one of the highest mortality rates in the world among infants in their first year of life (97/1000 live births) and children less than 5 years old (166/1000 live births) (CSA, 2000).

The problem that guided this study is that infant and child mortality and morbidity disparities continue to be observed in the areas of improved expansion of the provision of health care services as well as in areas of where poor provision of health care services exist. Therefore, the main aims of the study are: to review the major determinants of infant and child mortality and morbidity that are discussed in academic literature, with a focus on academic finding from African region and to identify the most influential factors that explain the observed infant and child mortality disparities in the two regions of Ethiopia (Affar and Somali regions). The observed Infant and child mortality rates are 61 and 123 per 1000 live births in Affar region and 57 and 93 per 1000 live births in Somali region (CSA, 2005).

The study is descriptive research type and has used secondary data sources. The key findings of this study points (five out of seven) factors (poverty, health care system, diseases, maternal care and family care) as the most influential factors that have been responsible observed infant and child under age five years mortality rates disparities between the two regions of Ethiopia in 2005/2006. Two out of seven factors (i.e, education and access to information) seem to be less significant in explaining the observed infant and child mortality rates disparities between the two regions. This does not correspond to the theory reviewed.

In order to reduce infant and child mortality rates disparities between the regions, investment on health care resources (particularly health professionals), on education, social protection should be increased and maternal care and child vaccination converge should be improved in Affar Region.

Key words: infant and child morbidity & mortality rates, Affar, Somali, Ethiopia & health status
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Abiot Mindaye Tessma

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CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

Ethiopia is located in the Horn of Africa. The total area of the country is 1.1 million square kilometers (CSA, 2005) it borders with Djibouti, Sudan, Kenya, Eritrea, and Somalia. The total population is estimated to be 78.3 million (CIA, 2008). Ethiopia is one the poorest countries in the world with an estimated GDP per capita of US$ 800 in purchasing power parity in 2007 (CIA, 2008).

According to the new Ethiopian constitution, introduced in 1994 there are nine regional States: Tigray, Afar, Amhara, Oromia, Somali, Benishangul Gumuz, Southern Nations Nationalities and Peoples Region (SNNPR), Gambella and Harrari and two city Administrations (Addis Ababa and Dire Dawa).

The health status of the country is poor even compared to other low-income countries, even within Sub Saharan Africa. Ethiopian has one of the highest mortality rates in the world among infants in their first year of life (97/1000 live births) and children less than 5 years old (166/1000 live births) (CSA, 2000). There is great variation in infant and child under age five years mortality rates among regions, even in the areas of improved expansion of the provision of health care services as well as in areas of where poor provision of health care services exist. For example, the observed Infant and child mortality rates are 61 and 123 per 1000 live births in Afar region and 57 and 93 per 1000 live births in Somali region (CSA, 2005).

This study will to review the major determinants of infant and child mortality and morbidity that are discussed in academic literature, with a focus on academic finding from African region, identify and analyze which of the reviewed health determinants could be the most influential factors in explaining observed infant and child mortality and morbidity disparities between the two regions (namely Afar and Somali) and forward discussion for further analysis and possible solutions.
1.2 STATEMENT OF THE PROBLEM

Demographers have for a long time been interested in the study of mortality which is one of the components of population change. Infant and child mortality are among the best indicators of socioeconomic development because a society’s life expectancy at birth is determined by the survival chances of infants and children.

A recent analysis of global child survival pointed out that more than 10 million children die each year, most from preventable causes almost all in developing countries (Black RE, et al. 2003; 226-34). Ethiopian has one of the highest mortality rates in the world among infants in their first year of life (97/1000 live births) and children less than 5 years old (166/1000 live births) (CSA, 2000).

The problem that guided this study is that infant and child (defined for this study purpose as children less than 5 years) mortality and morbidity disparities continue to be observed in the areas of improved expansion of the provision of health care services as well as in areas of where poor provision of health care services exist. Therefore, observed infant and child mortality and morbidity disparities (See table below) between the two rural regions of Ethiopia namely, Afar and Somali are the major reasons guided this thesis.

Table 1.1 mortality rates in 2005/2006

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Afar</th>
<th>Somali</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant Mortality rate per 1000</td>
<td>61</td>
<td>57</td>
</tr>
<tr>
<td>Under Age 5 Mortality rate per 1000</td>
<td>123</td>
<td>93</td>
</tr>
</tbody>
</table>

Source: Health and Health related Indicators, (Ethiopian Ministry of Health, 2005/06)
1.3 OBJECTIVES

Various factors, such as Nutritional Status, Environmental Health Factors, Socioeconomic Factors and Health Care System may account for infant and child mortality and morbidity disparities between these two regions (Rutstein, 2000; Canada-population health policy, 2008). Hence, observed disparities in children health could be due to uneven distribution of access to healthcare facilities or other factors or the combination and interaction of two or more health determinants.

The objective of this study is set to review widely acknowledged (Nutritional Status, Environmental Health Factors, Socioeconomic Factors and Health Care System) health determinants which could be potentially influential in explaining observed infant and child mortality and morbidity disparities between the two regions of Ethiopia. Specifically, this study aims:

- to review the major determinants of infant and child mortality and morbidity that are discussed in academic literature, with a focus on academic finding from African region;
- to identify and analyze which of the reviewed health determinants could be the most influential factors in explaining observed infant and child mortality and morbidity disparities between the two regions;
- to forward discussion for further analysis and possible solutions.

1.4 RESEARCH QUESTION

What are the factors that have contributed to the observed infant and child mortality disparities between the two regions (Afar and Somali)? will be the major research question of this study. In addition to this question, the study has to find answer for the following sub-questions:

- What are the major determinants of infant and child mortality and morbidity discussed in academic literatures?
- Which of the factors tend to be the most influential in explaining the observed differences?
1.5 SIGNIFICANCE OF THE STUDY

The study will help policy makers and other stakeholders:

- to better understand the infant and child health epidemiology to contribute to more effective approaches to save children’s lives (given Ethiopian circumstances);
- to suggest further steps, necessary for design of appropriate strategies to improve infant and child death and to diminish regional disparities in child health in Ethiopia – this could be suggestion on needed data, specific research on certain questions, management issues, etc.
- to provide some suggestions on how increase the effectiveness of infant and child health intervention and services.

1.6 METHOD

The study will be descriptive which will be analyzed using secondary data sources

1.7 OUTLINE OF THE RESEARCH

In addition to chapter one, the introduction, and chapter two, the methodology, this research work encompasses two major parts. Part I- is a literature review that gives an insight on the topic. It consists of:

Chapter 3 – review of major health determinants of infant and child mortality and morbidity

Part II - is the major part of the research work and focus on answering the research questions. It consists of:

Chapter 4- analysis and releases the findings of the survey made on infant and child mortality and morbidity

Chapter 5- gives conclusions and provides recommendations
CHAPTER 2: METHODOLOGY, DATA COLLECTION & SAMPLING

Research type

According to Yin (1994) and Wiedersheim-Paul and Eriksson (1998), research can be classified into one of the following three different types: descriptive, exploratory and explanatory.

Descriptive research is suitable when the purpose is to correctly describe a phenomenon and when the problem is well structured. The researcher needs to have a clear picture of the phenomenon before the collection of data starts (Saunder, Lewis & Thornhill, 2000). Moreover, a descriptive research purpose is used when the researcher wants to find out which aspects of a problem that are relevant, and describe these aspects more thoroughly without searching between causes and symptoms (Wiedersheim-Paul and Eriksson, 1998). Further more descriptive research is often an extension of, or a forerunner to, an exploratory research (Saunder et al 2000).

Exploratory research aims to formulate and define a problem. According to Patel and Tebelius (1987), is to collect as much information as possible about a specific problem. Furthermore, Reynolds (1971) claims that in the exploratory study researcher gain a better understanding of the research area.

The primarily purpose of this thesis will be descriptive. It has also an exploratory part to gain as much information as possible to understand the research area better.

Sampling

Several sampling method can be used to select a sample from a population; one of the most common is simple random sampling. According to Anderson et al, 2003, a simple random sample of size n from a finite population of size N is a sample selected such that each possible sample of size n has the same probability of being selected. The other type of sampling, non-probability sampling techniques, which is relatively easy way of selecting a sample is judgment sampling. In this technique, the researcher most knowledgeable on the subject of the study selects elements of the population that he or she feels are most representative of the population (Anderson et al, 2003)
In this study, non-probability sampling method is used in selecting the two regions namely, Afar and Somali. The researcher has set the following criteria (from his experience) in selecting the regions:

Socio-economic and demographic settings;

- rural regions
- Similar in life style – nomadic
- Economy is mainly dependent on livestock
- Similar religion
- Unstable in political situation – Claim their independence
- Didn’t get government attention and government fear that NGOs will involve in disruptive political activities. Therefore, they are not encouraged to work in the regions (Valerie Browning, 2005).

Afar and Somali regions of Ethiopia are selected to be studied because:

- the further review of regions should closely follow the structure of criteria
- the observed infant and child morbidity and mortality rate disparity between these two regions is high.
- there has not been done that much research on these two regions, due to lack of data, lack of infrastructure etc.
Features of the regions

The Afar region people live primarily in Ethiopia and the areas of Eritrea, Djibouti, and Somalia in the Horn of Africa. The region is mainly rocky and desert terrain. There are approximately 1.4 million people live in the region, 90.9% of the population are estimated to be rural inhabitants and the region has an estimated density of 14.36 people per square kilometer (CSA, 2005). And the Somali region lies in south eastern Ethiopia, bordering on Somalia and Kenya. The region is hot and approximately 4.3 million people live in the region, 80.3% of the population are estimated to be rural inhabitants and the region has an estimated density of 15.5 people per square kilometer (CSA, 2006).

Fig 1.1 Map of Ethiopia


The two regions have similar socio-economic and political settings. Most of the peoples of the regions are nomadic herders. Their daily life consists of tending to live stock including goats, camels, and cattle. Their economy is highly dependent on the livestock. Most (95%) of the peoples of the regions are Muslim (CSA, 2006).
The regions are known for political instability. Since its establishment in 1993, the Afar Revolutionary Democratic Unity Front (ARDUF), fought against the Ethiopian government. The ARDUF seeks the creation of an independent Afar homeland.

Similar political settings exist in Somali region. Some Ogaden (Ogaden is the local name for the Somali region) residents and Somalis in the other hand want the region to be part of a "Greater Somalia" - an idea strongly resisted by Ethiopia's government. The Ogaden National Liberation Front (ONLF) was founded in 1984, is fighting for independence from Ethiopia.

The health care system in the regions is poor and most of the peoples do not have access to health care. For example, the proportion of births protected against tetanus coverage is highest among mothers in Addis Ababa (68 percent) and lowest among mothers in the Somali and Affar regions (9 percent and 11 percent, respectively) (CSA/DHS, 2005). And the percentage of children fully immunized ranges from a low of less than 1 percent in the Affar Region to 70 percent in Addis Ababa (CSA/DHS, 2005).

**Data collection**

The research will explore information from secondary data sources. Printed and electronic literatures like text books, journals, World Bank, WHO, UNESCO and Ethiopian Central Statistics Agency’s publications and data base will be a major sources of data. This data covers topics that are relevant for this paper.

**Data analysis**

Data can be analyzed with the help of different econometrics softwares like SPSS and STATA depending on the type of research. This study will use spreadsheet software and tabular, graphical and numerical statistics to summarized and analyze the findings.
CHAPTER 3 LITERATURE REVIEW

3.1 INFANT AND CHILD MORTALITY INDICATORS

Generally, indicators are important to evaluate whether the targeted objective(s) or goal(s) are achieved or not. Policy interventions could be successful if policy makers use appropriate indicator(s) during their decision to start, continue, change or stop a program. Comparison between countries or between certain population groups is easier if there is a common indicator to measure the outcome of the policy intervention. It is with this intention that UN has developed a total forty eight millennium development goals (MDGs) indicators; eighteen are directly related to health (WHO, 2003).

The health indicators which are listed and defined in table below are recommended by different organizations, particularly by WHO, to be used as indicators of infant and child mortality reduction (MDG4). The reasons to use mortality as health indicator are, currently infant and child mortality is a major public health concern or priority.

A one more reason of a widespread use of these indicators is that, estimates of the infant and child mortality rates are available for most countries as well as for regions of the country. Furthermore, some countries collect these data based on a number of distributional features, such as lower and higher socioeconomic classes.

Table 3.1 Health indicators and their definition

<table>
<thead>
<tr>
<th>Health Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant mortality rate (per 1000)</td>
<td>The number of children who die before one year of age in a given year per 1,000 live births.</td>
</tr>
<tr>
<td>Child mortality under 5 (per 1000)</td>
<td>The number of children who die before the age of 5 years (5q0) in a given year per 1,000 live births.</td>
</tr>
</tbody>
</table>

Source, WHO, 2003
3.2 MAIN DETERMINANTS OF INFANT AND CHILD HEALTH

According to United Nations 2001 report most countries have pledged to reduce infant and child mortality by two third by 2015 (UN, 2001). To achieve this objective it is important to access and understand the major determinants of child health. This paper focuses on determinants of child health, as measured by the health outcome indicator of child mortality.

Some of these determinants include fertility behavior, nutritional status, maternal health care, environmental health factors and socioeconomic factors, health care system, etcetera (Rutstein, 2000). It is the combination and interaction of these determinants that result differences in health status among individuals and various regions of the population (WHO, 2000). The figure below shows the conceptual framework of determinants of infant and child health.
Fig 3.1 Conceptual framework: the determinants of infant and child health

Infant & Child Health

- Nutritional Status -> Breast feeding and infant feeding
- Environmental health factors
  - Nutritional Status
  - Water & sanitation
  - Education/literacy
  - Employment/income
  - Health care facilities
  - Human resource
  - Finance
  - Maternal care
- Socioeconomic Factors
  - Education/literacy
  - Employment/income
- Diseases
  - Malaria
  - Acute respiratory infections
  - Diarrhea
- Health care system

This paper will focus on major child health determinants that have been responsible for children deaths in developing countries in general and Africa in particular. These determinants include; nutrition status, environmental health factors, socio-economic factors, diseases like malaria and health care system.

### 3.2.1 NUTRITIONAL STATUS

One of the main determinants of infant and child health is the availability of good quality and adequate quantity of food. Both the quality and quantity of food affects not only the mortality rates of infant and children but also affects how well infant and children grow and develop. The availability of poor quality and inadequate food causes malnutrition. Many evidences show that there is a strong link between malnutrition and infections or deaths (Gopalan S., 2000 ; F Dabis, 2008)

According to Gopalan S, from the whole population group, it is children and young women who often receive the least food to eat (Gopalan S., 2000). This implies that children and women are the most vulnerable to be infected and die because of malnutrition. Empirical evidences show that, 60% of 10.9 million children under age of 5 years deaths annually, malnutrition is directly or indirectly have been responsible (WHO, 2001 & 2003). Further empirical evidence show that, globally less than thirty five per cent of infants get breastfed at their convenient (any) time during their initial four months after birth and more than 1.5 million deaths occur yearly due to inappropriate feeding (WHO, 2002). World Health Organization estimated that 30% of the world’s children in 1990 have underweight for their age and 43% of children in developing countries have low height for their age because of malnutrition (WHO, 1995)

As a result of malnutrition between 5% and 20% of African women have low body mass index (BMI) (F. Dabis et al, 2008). The level of anemia, and vitamin A and Zn deficit level ranges from 21% and 80% across the continent (F. Dabis et al, 2008). This, poor maternal nutrition status, has also results high infant and child morbidity and mortality in the continent. The risk of dying from measles, anemia, pneumonia and diarrhea also increase by between 13% and 25% if a child has a deficiency of vitamin A and zinc (Robert E Black et al, 2003)
According to Anna Lartey, inappropriate feeding practice and unavailability of good quality and inadequate quantity of food have largely contributed to high rate of infant and child mortality in Sub Saharan African countries (WHO, 2005).

There are evidences (UNICEF, 2002) that show, malnutrition is one the most important causes (directly or indirectly) of women and children deaths in Ethiopia. According to UNICEF, Ethiopia is the leading country in malnutrition rate in Africa (UNICEF, 2002). It has also estimated that, around half a million children under the age of 5 years suffer from acute malnutrition in Ethiopia in 2005 (UNICEF, 2005).

Ethiopian Demographic and Health Survey that children and mothers are the most vulnerable population group that are affected by lack food intake in general and vitamin A and protein energy in particularly (CSA/DHS, 2005/06). The table below shows the percentage of children under the age of 5 years and were affected by under-nutrition in 2000.

Table 3.2 Percentages of children under the age of 5 years and were affected by under-nutrition in Ethiopia in 2000

<table>
<thead>
<tr>
<th>Underweight</th>
<th>Stunted (weight for age)</th>
<th>Wasted (weight for height)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Severe Underweight</td>
<td>Stunted</td>
</tr>
<tr>
<td>47</td>
<td>16</td>
<td>52</td>
</tr>
</tbody>
</table>

Source: EDHS (2005/06)

There is a huge nutrition status variation by regions, with the largest rate is found in three regions of Ethiopia (i.e, Tigray, Amhara and SNNP) and the lowest rate in other two regions (i.e, Addis ababa and Diredewa (CSA/DHS, 2000). Children who are living in rural region are more stunted and wasted that children living in urban region (CSA/DHS, 2000). The table below shows the percentage of children classified as malnourished by region.
Table 3.3 Percentages of children under the age of 5 years and were affected by under-nutrition in 2000 by region

<table>
<thead>
<tr>
<th>Region</th>
<th>Height for age</th>
<th>Weight for height</th>
<th>Weight for age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- 3 SD</td>
<td>- 2 SD</td>
<td>- 3 SD</td>
</tr>
<tr>
<td>Urban</td>
<td>19</td>
<td>42</td>
<td>&lt;1</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>8</td>
<td>34</td>
</tr>
<tr>
<td>Rural</td>
<td>27</td>
<td>53</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>17</td>
<td>47</td>
</tr>
</tbody>
</table>

Source: EDHS, 2000

3.2.2 ENVIRONMENTAL HEALTH FACTORS

Environmental factors such as unsafe water, poor sanitation and poor housing conditions are major contributors of infant and child morbidity and mortality around the world. They increase the development infections and diseases (for example, diarrhea). Globally, diarrhea disease is responsible for about three million deaths a year among children. Some researchers have confirmed that investing in safe water and sanitation reduces childhood diarrhea in general and child morbidity and mortality in particular. (WHO, 1995)

Most of world population (about 50 percent) and around 90 percent of rural population in developing countries uses unprocessed biomass fuel like wood, dung, and crop residues (Nacul LC, et al, 1997). These are creating indoor air pollution (Hussey GD, 1990). This indoor pollution will increase the risk of respiratory infection in children, which is one of the major causes of infant and child morbidity and mortality in developing countries.

WHO-AFRO report on national profile of children’s environmental health in Ethiopia stated that, children in Ethiopia are exposed to “preventable environmental hazards such as contaminated water and thus water-related, water born, water washed diseases, air pollutions, poisoning & injuries, vector born infection, endocrine-disrupting chemicals and pesticides” (WHO, 2003). It is estimated that very small portion (25%) of the total Ethiopian children and below 13% of Ethiopian children in the rural region had access to portable water (WHO, 2003).
Lack of access to safe water and other factors are the major factors that exposed children to diarrhea and parasites. According to Ethiopian Demographic and Health Survey (EDHS), 20% of total children under the age of 5 years had experienced diarrhea in 2000 (CSA/DHS, 2000).

WHO-AFRO report further stated that “serious air pollution from burning of animal dug, woods and coal” caused the morbidity and mortality rates of the Ethiopian people in general and children in particular to increase significantly (WHO, 2003).

3.2.4 SOCIOECONOMIC FACTORS

Poor socio-economic conditions affect people’s health. I will discuss in the next paragraphs the most important socio-economic factors for child health in general and in developing countries in particular. These factors include education, poverty, income and social excisions.

**Education**

The link between education and health has long been the concern of health researchers and health care professionals around the world (Health Canada, 1996; World Bank, 2000). Evidences show that education and literacy on the people in developing countries has improved the health of the population in general and the health mothers and children in particular (Nussbaum, 2000).

Expanding investment in schooling, particularly for girls and promoting the rights and status of women through political and economic empowerment and legal protection against abuse have long been associated with good health. (World bank, 1993, p.6)

Educated women’s primary concern is to improve the health status of her family. If a mother is educated, then she is well aware of the type of nutrition that is needed for her family. Furthermore, she is knows very well how to handle when health related problems occur, family planning methods and so on. This implies that a family of educated mother is healthier than a family of uneducated mother.
Back 1985, the World Bank report commented generally on ‘the extremely powerful role of literacy in determining a population’s level of mortality’ and suggested that women’s education carries far more weight than many others, including income growth (World Bank, 1985, p.120). In 1983 a World Bank publication on child mortality in urban Brazil concluded: ‘increased maternal education accounted for a large share (34%) of the mortality decline between 1970 and 1976’ (World Bank, 1983, abstract). The World Bank repeated the same message ten years later:

“Education greatly strengthens women’s ability to perform their vital role in creating healthy households. It increases their ability to benefit from health information and to make good use of health services; it increases their access to income and enables them to live healthier lives. It is not surprising, therefore, that a child’s health is affected more by the mother’s schooling than by the father’s schooling”. (World Bank, 1993, p.42).

According to save the children 2000 report, except few farina countries such as South Africa and Zimbabwe (literacy - i.e who can write and read) rates 80%); most of the poorest countries in the continent for example Niger and Burkina Faso (literacy rate 10%) have the lowest literacy rate in the world (save the children, 2000).

According to Ethiopian Ministry of Education, the literacy rate is 46% for males and females, and girls primary schools enrollment rate is about 59.1% (EMoE, 2004). This is by far lower than the enrollment rate in Sub Saharan Africa which is on average 86% (Ethiopia at a Glace, 2004). It is therefore clear that, the illiteracy of the majority of Ethiopian population in general and women in particular makes the people (especially children) more at risk of disease that could be preventable.

Some developing countries which have reached women literacy rate between seventy and eighty three per cent have significantly reduced an infant mortality rate (save the children, 2000).

**Poverty**

Several studies Watterson (1988), Hobcraft et al (1984), Benteo et al (1992) have found that poverty and ill health are interrelated (Watterson, 1988, 2002; Hobcraft et al, 1984). Poverty and low income are one of the most important factors that cause ill health. Poor people will have relatively the worse health outcome than the rich people.
The major reason according to Watterson is that, poor people have less money and therefore, it limits them from the amount and quality of health care, food (nutrition), cloth and shelter (Watterson, 2002). Most importantly, the poor tends to be uneducated (which is the main factor of health outcome)(Watterson, 2002).

Other studies and evidences show that poverty and mortality are strongly correlated (Hill & King, 1992). The number of children under the age of 5 years deaths in the world’s poorest countries (120 per 1000 lives) is 20 times higher than children under 5 years deaths in rich countries (6 per 1000 lives) (Watterson, 2002)

Watterson (1988), Hobcraft et al (1984), Benteo et al (1992) have found that there is a very strong correlation between household income and infant & child mortality. A study in two African countries indicates that, as household income increases by one percent, infant mortality decreases by 0.4 percent in Coted’ Ivoire and between 0.3 and 0.8 percent in Ghana (Benteo et al, 1992) According to Watterson, if there were a one percent increase in income in developing countries, up to thirty three thousands infant and fifty three thousands child deaths would be avoided annually (Watterson, 2002).

It is also acknowledged that poverty remains the most important challenge to enhance infant and child survival in Ethiopia (CIDA, 2004).

Social exclusion which can be a result of poverty, racism, discrimination, stigmatism and hostility prevents people from participating in different activities such as education and gaining access to services. As a result of this the risk of premature deaths in all age group in general and children in particular increases (WHO, 2003)
3.2.5 DISEASES

From the leading diseases (infections) causes of infant and child morbidity and mortality, diarrhea and respiratory tract infections are already discussed above under environmental health factors. Now the other major causes of infant and child morbidity and mortality will be discussed below.

*Malaria*

Malaria is one of the most important and complex causes of death in Africa. It was the single most important cause of children under age of 5 years deaths in Africa in 2000. According to World Health Organization 2006 report, it has estimated that 74 per cent of the people in the continent of Africa live in places that are highly prevalent for malaria, only a small percentage of the people (around 7%) lives in areas where malaria risk is free or the risk is very low (WHO, 2006).

Malaria causes huge number deaths among all groups of people across the continent of Africa. However, the most malaria affected group of people according to WHO 2006 report and WHO 2000 global disease project, are children under age of 5 years. See fig below. The major reason of this is that children do not have high level of immunity compare to adult men and women.

Graph 3.1 Deaths caused by malaria by age group

![Graph 3.1](image_url)

It is also estimated that about 350-500 million clinical malaria disease occurs annually around the globe but Sub Saharan Africa is the most affected region (UNICEF, 2007). Nearly 60 per cent of the causes and above 90 per cent of deaths occur in Sub Saharan Africa. The higher percentage of these deaths (about 75 per cent of the deaths) is among children whose age is below 5 years. About 750,000 – 200,000 infant deaths each year in Africa occur because of anemia and low birth weight which are caused by malaria.

WHO 2005 report show that malaria is also the primary cause of deaths in Ethiopia. The organization has estimated that more than sixty eight per cent of Ethiopian population lives in places where there is a risk of malaria.

In the year between 2002 and 2003, was the leading cause of morbidity and mortality in the country. Evidences show that, in these years the percentage of outpatient visit was 16%, hospital admission, 20% and 27% of hospital deaths was occurred because of malaria disease (WHO, 2005).

Only in four regions in 2003 the diseases caused above 4 million cases and 111,000 deaths (WHO, 2007). All age group people are affected by the disease; however, children under age of 5 years are the most vulnerable and suffered from the disease.

Recently WHO has discovered that, the risk of the diseases has been rapidly increasing over the past years. For example, between 1995 and 2001 malaria cases in the country have increased by 400,000 (from 1.1 million to 1.5 million) (WHO, 2007).

At this time (i.e Africa is in need of significant economic growth), malaria becomes one of the most important burden for economic and social development. According to WHO- Africa Malaria 2006 report, in the most endemic countries in the continent, the burden of malaria is responsible for on average 1.3 per cent annual economic growth reduction and massive social disruptions.
3.2.6 LACK OF ACCESS TO HEALTH CARE SYSTEM

According to OECD health system comprises “the sum of activities performed either by institutions or individuals pursuing, through the application of medical, paramedical and nursing knowledge and technology, the goal of:

- Promoting health and preventing disease;
- Curing illness and reducing premature mortality;
- Caring for persons affected by chronic illness who require nursing care;
- Caring for persons with health related impairment, disability, and handicaps who require nursing care;
- Assisting patients to die with dignity;
- Providing and administering public health;
- Providing health programmes, health insurance and other funding arrangements.”

It is clear that effective and efficient health care system is an important means to improve the health and quality of life of a population.

Lack of access to basic health care is one of the major reasons for the deaths of millions live in Africa. In industrialized countries, where there is a well functioning health care system, these diseases do not cause deaths or permanent disability. This implies that, if there were effective and efficient health care system in Africa, then most the causes of death in the continent could be avoided. Effective and timely provision of health care (treatment) could decrease a significant number of maternal and children deaths in the continent.

Since few years ago, investment on health care facilities and human resource in Ethiopia is increasing (expanding), but access to health care in general and maternal and child health care in particular is still a problem in the country. For example in 2001/2002 the percent of children who received vaccination against were DPT3 (Diphtheria, Pertussis and Tetanus) (51.5), measles (41.5) and fully immunized (29.8). Many (70%) children under age of one year had not immunized against preventable childhood diseases during 2001/2002 (Alemu et al, 2003).
Timely and appropriate treatment (health care) that mother get during pregnancy, during delivery and post delivery is also very important for both the mother and child to be alive. Different studies show that the health of infant and children is primarily shaped by the health of their mothers. (Gokhale MK et al 2002). According to WHO 2005 report Africa has the highest maternal mortality rate in the world. The estimated maternal mortality rate of the region is on average about one thousand deaths per one hundred thousand live births. (WHO/AFRO, 2001) Direct causes like hemorrhage (accounted for 25%), sepsis (15%), abortion (13%), and hypertension disorder (12%) and other indirect causes such as malaria, anemia and HIV/AIDS (accounted for 20%) and other (15%) have been responsible for maternal deaths (WHO/AFRO, 2001)

Some research evidence (WHO, 2008) shows that children who have lost their mothers have higher probability to die before celebrating their second birthday than those whose mothers are alive (WHO, 2008). If a mother is alive, then she is well aware of the type of nutrition that is needed for her child. Furthermore, she is knows very well how to handle when health related problems occur. This implies that child that live with his/her mother has higher probability of survival than the one who has lost his/her mother. It is unfortunate that, the percentage of Ethiopian children who do not have father or mother alive is eight percent and six percent respectively (EDHS 2005)

According to Lee Jong-wook, more than 70 million mothers and countless children under the age of 5 years around the globe are not getting health care for which they are entitled (WHO, 2005). The number of women in the world who suffer from short-term or long-term illness brought about by pregnancy or childbirth has reached over three hundred million (World Health Report, 2005).

According to Ethiopian Demographic and Health Survey (EDHS), during the years between 2000 and 2005, 94% of births in Ethiopia delivered at home, 5% in public hospital and only 1% in private facilities (EDHS, 2006).
The proportion of mothers who received treatment (health care) during pregnancy, delivery and post delivery in the country during those years is very low. 80% of mothers had a live birth in Ethiopian between 2000 and 2005 received no postnatal care and only 5% received ‘within the critical first two days after delivery’ (EDHS, 2006). It is also estimated that more than 70% of mothers received no antenatal care during those years (EDHS, 2006). Lack of health care access by mothers during pregnancy, during delivery and post delivery will significantly increase maternal, infant and child mortality rates.

It is true that most of maternal deaths in Africa are preventable and significant number of maternal and child deaths can be reduced if women (mothers) receive timely and appropriate health care by skilled health worker.
CHAPTER 4- RESULT AND ANALYSIS OF THE FINDINGS

This section releases the findings that are collected from secondary data sources in a synthesized form. It presents the observed infant and child mortality rates, and analyses of the actual status of the major child health determinants in the two regions of Ethiopia (namely, Affar and Somali) in 2005/2006. And finally it will answer the research questions that are listed in the first chapter.

4. 1 OBSERVED INFANT AND CHILD MORTALITY RATES

This paper will use infant and child under age of five years mortality rates are as health indicators for infant and child death reduction (MDG4). Child health determinants such as family care, household education, poverty, maternal care, diseases and health care system which might explain the observed infant and child under age five years mortality rates disparity in the two regions of Ethiopia will be discussed in this chapter.

The graph below (4.1) shows there is a variation (disparity) in actual infant and child mortality rates between the two rural regions of Ethiopia in 2005/2006. Infant mortality and child mortality rates under age five in Affar region were 61 and 123 per 1000 live births respectively. These rates were 57 and 93 per 1000 live births respectively in Somali region. Infant mortality rate in both regions were lower compared to the national average (77 per 1000 live births). However, Child mortality rate in Affar region was higher compared to the national average (120 per 1000 live births). Both rates were lower in Somali region than the rates in Affar region during the same year. The disparity in the mortality rate of children under age five was significant.
**Graph 4.1 Mortality rates, 2005/2006**

Source: Ethiopian Central Statistics Agency (ECSA), 2007

### 4.2 HOUSEHOLD EDUCATION AND ACCESS TO INFORMATION

As one of the major socioeconomic factors, education, greatly improve the ability of people in general and women in particular to perform their vital role in creating healthy households (World Bank, 1993; save the children, 2000).
Graph 4.2 Percent distribution of women who have never attended school and no access to all types of mass media once per week by region (2005/06)

Source: ECSA, 2007 & EDHS, 2005/06

Generally, education attainment in Ethiopia is very low. There is also a huge disparity between urban and rural households, gender, and regions of Ethiopia. As the scatter plot in graph (4.2) above shows, Somali region had the highest (with 88.8%) and Affar region (87%) the second highest proportion of female households who have never attended school. These percentages were higher than the country’s average (66.8%). The lowest proportion (24.6%) of female households who have never attended school is in the capital city of Ethiopia (i.e, Addis Ababa).
Afar region had the lowest proportion of women who have completed secondary education (0.4%) and surprisingly no women (0%) have attended more than secondary school in 2005/2006. Relatively, Somali region had better proportion of women who have completed secondary education (0.9%) and after secondary education (0.3%) compared to Affar region. See graph 4.3 below.

Graph 4.3 percent of women who have secondary school and more than secondary, 2005/06

Access to information

Having access to mass media will help people to get new ideas and knowledge. Such exposure will improve peoples’ awareness towards improving their family’s health.

A majority (79.9%) of Ethiopian people did not have access to any type of mass media at least once per week. There was regional disparity in the opportunity to access mass media. For example, the proportion of women in Somali region who have read a news paper, watched television and all media type (news paper, radio, and television together) at least once per week was 0.6%, 6.5% and 0.3% respectively. These proportions were 0.5%, 4.4% and 0% respectively for Affar women.
According to these results both regions had similar rates of uneducated women and no access to mass media, and the rates were very large compared to the national average.

### 4.3 POVERTY

Graph 4.4 Poverty headcount by region

![Graph showing poverty headcount by region](image)

Source: FDRE, 2002

Ethiopia is one of the poorest countries in the world. The national poverty headcount (it is absolute poverty measured using household income and poverty line $1 a day) was 45% in rural region, 27% in urban region and 44% in total.
Poverty headcount significantly vary between urban and rural, and between regions. As the above graph (4.4) shows, the highest poverty headcount (68%) was in the Affar rural region of Ethiopia. Somali region had the lowest total poverty headcount (38%) in the country (Addis Ababa and Dere Dewa are excluded).

Somali region had lower rural poor, urban poor and total poor poverty headcount compared to Affar region and national average. The difference in household income between the two regions was due to, Somali people have higher involvement in livestock marketing and cross border trade than Affar people (Stephe Devereux, 2006).

This household income advantage might also explain the previously observed infant and child mortality rates by creating to have better circumstances for Somali people to have better access to education, health care services and food consumption.

### 4.4 MATERNAL CARE

As it is thoroughly discussed in the literature review, antenatal care by health professional during pregnancy, at the time of delivery and post delivery is an important factor to reduce the risk deaths or serious illness of the mothers and the babies or both.

Graph 4.5 below shows, there was a regional variation in the proportion births that took place at home and health institutions. Relatively, the lowest proportion (21%) of home delivery was took place in the capital city of Ethiopia (i.e, Addis Ababa).

Affar was the second largest (95.8%) region where babies are delivered at home without the assistance of trained health professionals. This proportion was relatively lower (93.9%) in Somali region compared to Affar region.

Five percent of delivery in Somali region took place in public and private health facilities in 2005/2006. And only 5.2% have received assistance during delivery by trained health professionals, and 71.6% by traditional birth attendant.

Only 3.7% of delivery in Affar region was took place in public health facilities, and 4.5% have received assistance during delivery by trained health professionals and 42.5% traditional birth attendant.
Only six hundred forty three (643 - 1.2%) mothers have received postnatal service during 2005/2006 in Affar region. Relatively higher number (2.1%) of mothers in Somali region have received postnatal service (at regular medical facility) during the same year.

Since antenatal care (during pregnancy, at the time of delivery and after delivery) is one of a major factors for mothers and children’s health, a region with relatively lower percentage that delivered at home, such as Somali region, have higher chance to be safe than regions with higher percentage that delivered at home such as Affar.

Graph 4.5 percent of delivery at home by region, 2005/06

Source: ECSA, 2007 & EDHS, 2005/06
In 2005/2006, the proportion of children living with both parents in rural residence (74.6%) was higher than the proportion of children who were living with both parents in urban residence (52.6%). The percentage of children who were living in a family with one or both parents dead was higher in urban residence (18.4%) that rural residence (10.6%).

These percentages were also vary between regions. For example, the proportion of children who were living with both parents in Affar region in 2005/06 was about 75.2%, which was lower than Somali region (79.4%). And the proportion of children who were living with one or more parents dead in Affar region in 2005/06 (12%) was higher than Somali region (9.7%).

The percentage of women and men age 15-49 who were primary care givers of children, and the percentage who have made arrangements for someone else to care for the children in the event of their own inability to do so because of illness or death were lower in Afar region (60.6% & 45.7% respectively) than in Somali region (68.8% & 59.4% respectively). See annex 3

When parents are primary care giver to children or arrangements for someone else to care for the children in the event of their own inability to do so because of illness or death might help to reduce the risk children illness and death. And therefore, they have a significant contribution to child health and growth.
### 4.6 DISEASES

Table 4.1 percent of children with different type of diseases and treatment, 2005/06

<table>
<thead>
<tr>
<th>Region</th>
<th>Fever Percentage</th>
<th>Diarrhea Percentage</th>
<th>Malaria (in no.) Percentage</th>
<th>Treatment Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>from whom</td>
<td>who took</td>
<td>who took</td>
<td>of children with</td>
</tr>
<tr>
<td></td>
<td>treatment for</td>
<td>fever antibiotics</td>
<td>fever antibiotics</td>
<td>diarrhea taken to</td>
</tr>
<tr>
<td></td>
<td>fever was seeked</td>
<td>drugs</td>
<td></td>
<td>health facility or</td>
</tr>
<tr>
<td></td>
<td>from health facility or provider</td>
<td></td>
<td></td>
<td>provider</td>
</tr>
<tr>
<td>Affar</td>
<td>17</td>
<td>13.7</td>
<td>3</td>
<td>12.1</td>
</tr>
<tr>
<td>Somali</td>
<td>14</td>
<td>12.2</td>
<td>2.5</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Source: ECSA, 2007 & EDHS, 2005/06

Some of the leading causes of infant and child morbidity and mortality in developing countries particularly in Ethiopia are diarrhea, fever and malaria.

There is regional variation in the prevalence of fever, diarrhea and malaria cases, and there treatments. As table 4.3 shows, a higher percentage of children under age of five years in Affar region have had fever (17%) and diarrhea with 16.7% (13.7% all diarrhea and 3% diarrhea with blood) compared to percentage of children under age of five years in Somali region (have had fever 14% - which is the second lowest prevalence of fever in the country) and diarrhea with 14.7% (12.2% all diarrhea and 2.5% diarrhea with blood).
Treatment

The annual outpatient malaria cases for children under age 5 years was higher in Affar region (18,110) than cases in Somali region (only 5,726) during 2005/2006.

There were higher percentages (7.6%) of children under age 5 years who have had fever in Affar region received treatment for fever (fever antibiotics drugs) from health facilities than children under age 5 years who have had fever in Somali region (only 1.9%) during the same period.

From children under age 5 years who have had diarrhea in Affar region were taken to health facility more than fifty percent (51.6%) did not get any type of treatment. Relatively lower percentage (49.8%) of children under age 5 years who have had diarrhea in Somali region were taken to health facility did not get any type of treatment.

These differences i.e, the proportion of people who have had fever, diarrhea and malaria, and treatments, might contributed to the observed infant and child mortality rates disparities between the two regions in 2005/2006.

Children vaccination coverage

Table 4.2  the percent of children who received different type of vaccination

<table>
<thead>
<tr>
<th>Region</th>
<th>DPT</th>
<th>Measles</th>
<th>All (BCG, Measles and three doses each DPT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Affar</td>
<td>13.5</td>
<td>8.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Somali</td>
<td>14.9</td>
<td>11.1</td>
<td>5.6</td>
</tr>
</tbody>
</table>

Source: ECSA, 2007 & EDHS, 2005/06

To protect their infant and children from illness and death, parents take several measures. One of these measures is to vaccinate their infant and children against infectious diseases that cause illness and death. Some of these diseases include measles, diphtheria, pertussis (whooping cough), tetanus and polio.
The vaccination coverage in Ethiopia is very low. Table 4.2 shows that, the percents of children who received DPT 1 (vaccination against three diseases namely, Diphtheria, Pertussis (whooping cough) and Tetanus), DPT-2 and DPT-3 in Affar region were 13.5%, 8.7% and 2.8% respectively and 14.9%, 11.1% and 5.6% respectively in Somali region. The coverage of DPT 1 to DPT 3 were very low in Affar region compared to Somali region during 2000 to 2005. However, higher proportion (8.1%) of children in Affar region have received vaccination against measles than children in Somali region (6.4%) during 2000 to 2005.

The coverage of all (BCG, measles and each DPT) type of vaccination was very low (0.6%) in Affar region than Somali region (2.8%). These lower vaccination coverage rates might exposed Affar region’s children for illnesses and deaths than children in Somali region during those years.

### 4.7 HEALTH CARE SYSTEM

Effective and efficient health care systems are a means to improve the health of a population. The availability of resources such as hospitals, equipments, skilled human resources, fund and excreta are crucial to achieve the objective of improving people’s health.

The coverage of health care in terms of health facilities including skilled health workers in Ethiopia is very poor. For example, in 2005/2006 population to physician ratio was 35,493 (one physician for 35,493 people). Compare to World Health Organization minimum standard of one physician for 10,000 people, the country’s population to physician ration is very large.

There are huge regional disparities in the availability of health care facilities. The graph (4.6) below shows that, the ratio of population to physician in Somali region is 84,882 during 2005-2006. This ratio is higher in Affar region by more than fifty percent (63.64%). These ratios are significantly higher (more than eight times and more than thirteen times for Somali region and Affar region respectively) than the World Health organization minimum standard.

Somali region has better population to bed ratio (9,928) and population to physician ratio (84,882) than Affar region which has 11,385 and 138,900 respectively. This created a better opportunity to Somali region’s people in general and children in particular to have access to health care during 2005-2006.
**Health care financing**

Ethiopian public health care services were financed by four main sources. A majority proportion (33%) of the total public health care expenditure was financed by the government of Ethiopia (both federal and regional). The remaining proportion was financed by households' contribution (36%), private contributions (15%) and bilateral and multilateral donors (16%) (FMOH, 2003).

As we can see the scatter plot (graph 4.7) below there was a regional disparity in public health expenditure per capita. Both Afar (19) and Somali (14.2) regions had higher per capita expenditure compared to the national average (13.4). Afar region was in a better position in terms of per capita expenditure than Somali Region.
Graph 4.7 Public Health Expenditure per capita by region, 2005/06

Source: ECSA, 2007
4.8 OVERALL REVIEW OF THE FINDINGS.

The following table summarizes the key findings.

Table 4.3 summaries of key findings

<table>
<thead>
<tr>
<th>Factors</th>
<th>Somali</th>
<th>Affar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed mortality rates</td>
<td>In 2005/06, infant mortality and child mortality rates under age five were 61 and 123 per 1000 live births respectively.</td>
<td>In 2005/06, infant mortality and child mortality rates under age five were 57 and 93 per 1000 live births respectively.</td>
</tr>
<tr>
<td>Household Education</td>
<td>88.8% of female households who have never attended school.</td>
<td>87% of female households who have never attended school.</td>
</tr>
<tr>
<td></td>
<td>The proportion of women who have completed secondary education was 0.4% and surprisingly no women (0%) have attended more than secondary school.</td>
<td>The proportion of women who have completed secondary education was 0.9% and 0.3% have attended more than secondary school</td>
</tr>
<tr>
<td>Access to information</td>
<td>Proportion of women who have read a newspaper, watched television and all media type (newspaper, radio, and television together) at least once per week was 0.5%, 4.4% and 0% respectively.</td>
<td>Proportion of women who have read a newspaper, watched television and all media type (newspaper, radio, and television together) at least once per week was 0.6%, 6.5% and 0.3% respectively.</td>
</tr>
<tr>
<td>Poverty</td>
<td>Poverty headcount was 68% in rural region, 27% in urban region and 56% in total.</td>
<td>Poverty headcount was 40% in rural region, 26% in urban region and 40% in total.</td>
</tr>
<tr>
<td>Maternal care</td>
<td>3.7 percent of delivery took place in public and private health facilities in 2005/2006. And only 4.5% have received assistance during delivery by trained health professionals, and 42.5% by traditional birth attendant. Six hundred forty three (643 - 1.2%) mothers have received postnatal service (at regular medical facility).</td>
<td>5 percent of delivery region took place in public and private health facilities in 2005/2006. And only 5.2% have received assistance during delivery by trained health professionals, and 71.6% by traditional birth attendant. 3,387 (2.1%) mothers have received postnatal service (at regular medical facility) during the same year.</td>
</tr>
<tr>
<td>Family Care</td>
<td>The proportion of children who were living with both parents was about 75.2%. The proportion of children who were living with one or more parents dead was 12%. The percentage of women and men age 15-49 who were primary care givers of children, and the percentage who have made arrangements for someone else to care for the children in the event of their own inability to do so because of illness or death were 60.6% &amp; 45.7% respectively.</td>
<td>The proportion of children who were living with both parents was about 79.5%. The proportion of children who were living with one or more parents dead was 9.7%. The percentage of women and men age 15-49 who were primary care givers of children, and the percentage who have made arrangements for someone else to care for the children in the event of their own inability to do so because of illness or death were 68.8% &amp; 59.4% respectively.</td>
</tr>
<tr>
<td>Diseases</td>
<td>Fever (%)</td>
<td>No treatment for diarrhea (%)</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Fever</td>
<td>17%</td>
<td>14%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>16.7%</td>
<td>14.7%</td>
</tr>
<tr>
<td>Malaria</td>
<td>18,110</td>
<td>5,726</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Fever (%)</th>
<th>No treatment for diarrhea (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>12.1%</td>
<td>4.4%</td>
</tr>
<tr>
<td>No treatment for diarrhea</td>
<td>51.6%</td>
<td>49.8%</td>
</tr>
<tr>
<td>DPT 1</td>
<td>13.5%</td>
<td>14.9%</td>
</tr>
<tr>
<td>DPT 2</td>
<td>8.7%</td>
<td>11.1%</td>
</tr>
<tr>
<td>DPT 3</td>
<td>2.8%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Measles</td>
<td>8.1%</td>
<td>6.4%</td>
</tr>
<tr>
<td>All types</td>
<td>0.6%</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health care system</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population to hospital ratio</td>
<td>683,000</td>
<td>712,500</td>
</tr>
<tr>
<td>Population to bed ratio</td>
<td>11,385</td>
<td>84,882</td>
</tr>
<tr>
<td>Population to Physician ratio</td>
<td>138,900</td>
<td>9,929</td>
</tr>
<tr>
<td>Public health expenditure per capita</td>
<td>19</td>
<td>14.2</td>
</tr>
</tbody>
</table>
CHAPTER 5 – CONCLUSIONS AND RECOMMENDATIONS

In this chapter key research findings will be summarized, and conclusions and recommendations will be forwarded.

5.1 CONCLUSION

Infant and child mortality and morbidity disparities continue to be observed in the areas of improved expansion of the provision of health care services as well as in areas of where poor provision of health care services exist. This study has selected two rural regions of Ethiopia where there has not been done that much research on the regions, due to lack of data, lack of infrastructure etc.

The main aims of the study are: to review the major determinants of infant and child mortality and morbidity that are discussed in academic literature, with a focus on academic finding from African region and to identify the most influential factors that explain the observed infant and child mortality disparities in the two regions.

The study will help to better understand the infant and child health epidemiology to contribute to more effective approaches to save children’s lives (given Ethiopian circumstances), provide some suggestions on how increase the effectiveness of infant and child health intervention and services and to suggest further steps, necessary for design of appropriate strategies to improve infant and child death and to diminish regional disparities in child health in Ethiopia.

In the 21st century, over 10 million children die each year, although most of these deaths can be avoided. The death rates vary between countries and within a country. For example, child deaths are increasingly concentrated in the African Region (43% of the global total in 2003, up from 30% in 1990). More than 50% of all child deaths are concentrated in just six countries: China, the Democratic Republic of the Congo, Ethiopia, India, Nigeria and Pakistan.
Generally, all the factors (environmental, socioeconomic, nutrition, diseases and health care system) that are discussed in this paper have contributed for million infant and child deaths in Africa in general and in Ethiopia in particular. And also they (education, poverty, maternal care, family care, diseases and health care system) have been responsible for the observed infant and child under age five years mortality rates disparities between the two regions of Ethiopia in 2005/2006. The observed Infant and child mortality rates are 61 and 123 per 1000 live births in Affar region and 57 and 93 per 1000 live births in Somali region (CSA, 2005).

Particularly, the key findings of this study points to the following (five out of seven) factors as the most influential factors that have been responsible observed infant and child under age five years mortality rates disparities between the two regions of Ethiopia in 2005/2006—These are;

Poverty – the income situation was worse in Affar, and thus there are more poor households in this region compared to Somali. Affar region’s poverty headcount was higher by 28% and 16% in rural and in total respectively, than Somali region in 2005/2006.

This household income advantage is one of the reasons to explain the observed infant and child mortality rates by creating to have better circumstances for Somali people to have better access to education, health care services and food consumption.

Health care system - Effective and efficient health care system is one the major factors to have a better health status in a country. Weak health care system is one of the major reasons that prevented major health gains and economic development in Ethiopia.

The physical infrastructure (medical facilities), financing health care service and most importantly professional human resources are important to give quality health care service to the society of a country. This paper has used population to hospital ratio and population to bed ratio as a proxy indicators of health facilities and population to physician ratio as a proxy indicator of the availability professional health workers in the two region of Ethiopia.
Accordingly, the key findings show that, Affar region had better health facilities (population to hospital ratio and population to bed ratio) than Somali region in 2005/2006. To provide quality health care service to the people these facilities need to have sufficient number of health professionals. Otherwise, they are less useful. This is the case in Affar region. Its population to physician ratio was fourteen times lower than the ratio in Somali region in 2005/2006.

Higher population to physician ratio and their ability to finance (there was lesser number of poor households) had created better circumstances for Somali region’s children and mothers to have better access to health care services than children and mothers in Affar region.

Diseases and treatments – a significant number of infants and children in Ethiopia have been affected by diseases and this is one of the major reasons for millions deaths in the country. This paper has found that the proportion of children under age five years who have been affected by fever, diarrhea and malaria in Affar region was higher than the proportion of children who have been affected by the same diseases in Somalia region in 2005/2006.

The proportion of infant and children who have received treatment, for example vaccination for DPT 1, 2 and, and all types of vaccinations (i.e, all DPTs, measles and BCG) in Affar region was lower than the proportion of children who have received these treatments in Somalia region in 2005/2006.

Therefore, the difference in the proportion of children who have been affected by diseases and who have received treatments between the two regions could be one of the major factors that explain the observed morality rates disparities between the two regions in 2005/2006.

Maternal care – the proportion of women who gave birth by traditional birth attendant (substituting for shortage in conventional medicine) was higher by 30% in Somali region than in Affar region. Since the difference in these rates is significantly large, it seems that traditional birth attendance might be crucial in explaining disparities in deaths –This would specifically explain death at birth rates or death within the first year (due to complications).

Very few numbers of women have received postnatal services at regular medical facility in Affar region compared to Somali region. This might also contributed for the observed infant and child mortality rates disparities between the two regions.
Family Care – children in Somali region have received better family care compared to Affar region. This is reflected by higher percentage of children who were living with their parents and women and men age 15-49 who were primary care givers of children, and who have made arrangements for someone else to care for the children in the event of their own inability to do so because of illness or death.

The significant differences in the proportion of children who have received family care between the two regions could be one of the major factors that explain the observed mortality rates disparities between the two regions in 2005/2006.

Two out of seven factors (i.e, education and access to information) seem to be less significant in explaining the observed infant and child mortality rates disparities between the two regions. This does not correspond to the theory reviewed.

5.2 RECOMMENDATIONS

In order to reduce infant and child mortality rates disparities between the regions and improve national health target or the fourth Millennium Development Goal (MDGs) the following recommendations are forwarded to the government and other stakeholders.

- Increase investment on education in the two regions particularly in Affar region, and empower the households in general and women in particular;
- Design and implement social protection scheme (like child benefit) which targeted the poor and marginalized Affar households;
- Encourage and finance researchers to conduct and come up with possible strategies regularly to reduce the regional disparities in terms of infant and child mortalities;
- Strengthen collaboration with donors, non government organizations and private sectors to support the poor and marginalized Affar households to finance their families’ health care and other (like food, education etc) expenses;
- Improve the quality and coverage of maternal health care in Affar region by improving the capacity and number of professional and non professional health workers in the region;
• Improve the provision and coverage of DPT 1,2&3, measles, tetanus and other immunizations in Affar region and create awareness in the community of Affar to vaccinate their children on time;
• Give insecticide-treated nets for poor and marginalized Affar households to prevent malaria;
• Increase the number of health professionals (particularly physicians) in Affar region by recruiting new staffs and retaining the existing staffs by giving incentives (for example, salary top up);
• Stabilize (politically) the two regions and create accountable leadership to improve teamwork and use of resources effectively and efficiently to improve the health status in the two regions.


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