SOCIO-ECONOMIC, ENVIRONMENTAL, AND BEHAVIOURAL FACTORS ASSOCIATED WITH THE OCCURRENCE OF DIARRHOEAL DISEASE AMONG UNDER-FIVE CHILDREN, MESKANENA MAREKO WOREDA, SOUTHERN ETHIOPIA.

BY

TEKLU MULUGETA (B.Sc.)

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DEDICATION

This work is dedicated to my beloved wife Tigist Bogale whose encouragement and help gave me strength to successfully finish this MPH course. I would like also to dedicate this thesis to our son Mussie Teklu who is only two, and also to all under-five children in the study area.

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ABSTRACT

Diarrhoeal diseases are still the major cause of morbidity and mortality among children in many developing countries, including Ethiopia. There is a general agreement that the cause of child mortality and morbidity in developing countries is multi-factorial. Interaction of socio-economic, biological, behavioural and environmental factors influences the survival of children. This comparative cross-sectional study was carried out to examine the effects of socio-economic, environmental and behavioural factors that were associated with childhood diarrhoea in Meskanena Mareko Woreda, between December 2002 and January 2003.

A total of 987 households that had at least one under-five child were randomly selected from the nine peasant associations and one urban kebele that are found in the Butajira Rural Health Program catchments. Information on the households' socio-economic, environmental and behavioural characteristics was collected using structured, pre-tested questionnaire. Diarrhoeal morbidity occurred in the under-five children at the time of the interview, and the subsequent 15-days was registered to determine prevalence and incidence.

The findings of this study showed that the overall two-week period prevalence of diarrhoea in under-fives was 51.4%, and that of incidence 12.9 percent. The point prevalence was found to be 38.5 percent. Significant variation was observed in prevalence of diarrhoea between urban and rural areas. Children in the age group 12 – 23 were highly affected. A logistic regression analysis showed that rural children had more than five times higher odds of having diarrhoea than their urban counterparts. The odds of having diarrhoea in children who lived in households where there were two or more children were two times higher than the odds in children who lived in households where there was only one child. Also, households that

disposed refuse indiscriminately had children who had about two times higher odds of getting diarrhoea than households that burned or disposed the refuse in a pit. Maternal diarrhoeal morbidity and current breast-feeding were also found to be significant predictors of diarrhoeal morbidity in children.

From the study it is concluded that the prevalence of diarrhoea in under-five children is very high in Meskanena Mareko Woreda, especially in children who reside in rural areas, and who are younger than two years of age. Poverty, crowding and poor environmental conditions are associated with the occurrence of diarrhoea in children. Even though these problems may be alleviated by sustainable socio-economic development through integrated effort of different sectors in the long run, recommendations are forwarded considering short-term solutions.

I. INTRODUCTION

Diarrhoeal disease remains a leading cause of mortality and morbidity in children of the developing world. In developing countries, the average annual incidence rate of diarrhoea in under-fives is estimated to be 2.6 episodes. It is also estimated that there are 1000 million episodes and 3.3 million deaths occurring each year among children of under-five years of age (1). In Africa, a child experiences five episodes of diarrhoea per year, and 800,000 children die each year from diarrhoea and dehydration (2). Diarrhoea is also responsible for 25 to 75% of all childhood diseases and account for about 14% of outpatient visits, 16% hospital admissions (3). In addition to the excess mortality and morbidity, diarrhoea predisposes children to malnutrition, which makes children highly susceptible to other infections (4).

In Ethiopia, morbidity reports and community-based studies have shown that diarrhoeal disease is a major public health problem that causes excess morbidity and mortality in children (4,5,6,7). Morbidity-Mortality-and Treatment (MMT) surveys conducted in Ethiopia at different times revealed five diarrhoeal episodes per child/year; and the two-week incidence rate to be 16%. The diarrhoea associated mortality rate is about 10/1000 under-five population (4,7). Studies conducted in central rural Ethiopia revealed that diarrhoea is one of the common causes of under-five mortality, accounting for about 8.4 to 27% of all deaths (8,9). Recent estimates indicate that the two-week period prevalence of diarrhoea in under-five children in Ethiopia is about 24 percent. (6).

Children's health is affected by environmental conditions as well as by their family's socioeconomic status (10). Socioeconomic factors do not directly affect the risk of diarrhoea;

rather influence family behavior, which alter the child's exposure to pathogens and susceptibility to infection (11). Maternal practices related to hygiene, breastfeeding, sanitary food preparation and appropriate weaning practices are also potentially important determinants in the occurrence of diarrhoea in children. On the other hand, the relationship between childhood diarrhoea and parental socioeconomic, behavioral and household environmental factors was not consistent (2,10,11,12,13,14).

There is a general agreement that the cause of child mortality and morbidity in developing countries is multi-factorial. The child's survival depends on the interaction of socioeconomic, biological, behavioral and environmental factors (15,16). Hence, it is very important to see the relation and interaction of these factors to understand child survival. However, information on these factors is either scarce or inadequate (5). Very limited information on the effects of socioeconomic, behavioral and environmental factors are incorporated in the few studies conducted on childhood diarrhoea.

This study is, therefore, an attempt to assess the effects of important socioeconomic, environmental and behavioral factors in relation to childhood diarrhoea. Studies that consider multiple contributing factors simultaneously may help to identify major factors that influence childhood morbidity independently by considering most possible variables (12,15,16). Within the identified independent influencing factors, it is also possible to look for factors that are amenable for change by considering local resources.

II. LITERATURE REVIEW

2.1. Magnitude and Risk Factors of Diarrhoeal Morbidity

In developing countries, morbidity and mortality associated with childhood diarrhoea still continues to be a challenge. A ten-year review of the global problem of diarrhoeal disease has shown that there are 1000 million episodes and 3 million deaths occurring each year among under-five children. It is also estimated that each child in developing countries has 2.6 episodes of diarrhoea per year (1).

A comprehensive analysis of 73 studies from 23 Sub-Saharan African countries showed that children under five years of age experience about five episodes of diarrhoea each year. The analysis also showed that prevalence of childhood diarrhoea ranged from 10.5 to 19 percent (3). In their study on the determinants of childhood diarrhoea in The Republic of Congo, Mock et al found a two-week period prevalence of 18.6 percent in children under-three years of age (12). In rural Zaire, a longitudinal study done on children aged 3-35 months showed annual incidence of 6.3 episodes per child (13).

In addition to being the cause of excess mortality and morbidity, diarrhoea affects children by exposing them to malnutrition. Evidence from numerous studies on under-five children in developing countries suggests that diarrhoea episodes predispose to or exacerbate malnutrition, and conversely chronic malnutrition may be a risk factor for diarrhoea (3,12,17,18). A study showed that children having second or third degree malnutrition were three times as likely to have experienced a recent episode of diarrhoeal disease (12)

In Ethiopia, as in other developing countries, diarrhoeal diseases are important child health problems. Surveys conducted in the Country have revealed diarrhoea episode of five per child per year, and a two-week period incidence of 16 percent. The age and cause-specific mortality rate was found to be 9.7 per thousand under-five population (4). The recent demographic and health survey reported that a two-week period prevalence of diarrhoea in under-five children was 24 percent (6).

Other studies done in different parts of Ethiopia have also shown that diarrhoea incidence and prevalence is very high among under-five children. According to a follow-up study in Butajira, the incidence of diarrhoea was about two-episodes/person-year (19). A community-based study conducted in Keffa-Sheka Zone, southern Ethiopia, found a two-week childhood diarrhoea prevalence of 15 percent (20). Another study from Jimma town, southwest Ethiopia, showed a prevalence of 36.5 percent (21). A community-based cross-sectional study done to determine the ORS use rate showed a two-week prevalence of 22.7 percent in under-five children (22).

In their study on patterns of childhood morbidity in Tigray Region, Ali et al (23) found 3.05 diarrhoeal episodes per child per year. A study that attempted to determine household illness prevalence in Gondar showed that diarrhoea was one of the three most frequently occurring symptoms, accounting for 11.4% of the overall illness prevalence (24). Kaba and Ayele, in their ethnographic study of diarrhoeal disease among under-five children found a two-week prevalence of 33.7 percent (25).

The factors that potentially determine the occurrence of diarrhoea in children include malnutrition, poor personal hygiene, environmental problems, water availability and quality, unhygienic feeding practices, improper use of latrines, early discontinuation of breastfeeding, child's age, maternal education and household income (11,26). The parents' beliefs about diarrhoea in their children, and their attitude and practices influence these risk factors (26). Even though each of these potential risk factors is associated with diarrhoea, the mechanisms through which they affect a child's risk of diarrhoea are quite different.

For example, educational level and water quality are both associated with diarrhoeal disease. However, water quality has a direct effect on the child's exposure to pathogens, while education level has an indirect effect through its influence on the mother's childcare practices (10,11,12). Many aspects of environmental sanitation and infant feeding are also influenced by the same set of underlying socioeconomic factors. For example, a study revealed that household income was inversely related to the duration of breastfeeding, and directly related to having in-house water connection or a private excreta disposal facility (11).

2.2. Diarrhoeal Morbidity and Socioeconomic Factors

In developing countries, child health is determined by a large number of factors. However, there is a consensus that childhood mortality and morbidity from different causes are significantly related to socioeconomic status of the child’s parent, which forms the immediate environment to the child (27). According to social scientists, socioeconomic status has two broad interlinked components: class and position (28). Socioeconomic class refers to social groups that arise from interdependent economic, social and legal relationships among a group

of people. Socioeconomic position is a resource-based concept that refers to holdings of assets, the income these assets yield, and the consumption that such income permits (28).

Some authors agree that socioeconomic factors may have a greater effect on diarrhoeal mortality than on morbidity. Well-educated mothers may be unable to reduce risk of exposure due to factors beyond their control, such as a contaminated community environment, or lack of water. However, their knowledge and wealth may allow them to use healthcare services more effectively than uneducated women (29).

Socioeconomic factors may affect, directly and indirectly, environmental, behavioral, nutritional, demographic risk factors with the exception of age and sex (30). Therefore, differences in rates of diarrhoea by socioeconomic status are mainly due to differences in childcare practices, such as preparation of weaning foods, boiling of drinking water, or personal hygiene practices (10,12,31,32).

Different studies have assessed the relationship of parental education and family income/wealth with the occurrence of childhood diarrhoea, more than any other socioeconomic status variables. And, many studies have shown a negative and significant relationship between the levels of parental education as well as family income and diarrhoeal morbidity in children (2,12,13,16,21). Several studies on determinants of child health revealed that child survival in developing countries is highly associated with maternal education, more than with any other socioeconomic variables (27,31,33,34). This is so because the practices of

educated women are quite different from those of uneducated women with regard to pregnancy, childbirth, healthcare services utilization and childcare (31,34).

There is a universal tendency for better-educated women to marry similarly advantaged men and to enjoy relatively high standards of living (13,27,34). The association between parental education and diarrhoeal morbidity is, therefore, likely to be attributable to many other factors acting together to improve the environment and childcare (13). In a cross-sectional survey conducted in The Republic of Congo, highly educated mothers reported less diarrhoea (12). A follow-up study from Zaire also indicated that both mother's and father's education were significantly associated with diarrhoea incidence (13).

The association between family income/wealth and childhood diarrhoea is observed in many studies (2,13,21). Family income/wealth is an important determinant of diarrhoea through which factors like parental education and occupation exert their major effect. A study on determinants of diarrhoea among under-five children revealed that the probability of having diarrhoea was 33-38% lower for children from the medium- and high-socioeconomic groups than the children from the low-socioeconomic group (2). A study done in an urban area of southwest Ethiopia also revealed that family income was significantly associated with childhood diarrhoeal morbidity (21). Research findings on the significance of socioeconomic determinants (parental education and income/wealth) on childhood diarrhoeal morbidity were not consistence. There were studies that did not show significant association between education and income/wealth and diarrhoeal morbidity (12,13,29).

There are also other factors that influence diarrhoeal morbidity in under-five children. These factors include family size or number of children in a family, maternal age and place of residence. Family size has been suggested as an important risk factor for childhood diarrhoea. When many people live together, the chance of contact with pathogens increases, and hygiene may deteriorate (2,13,16). A large number of children in a household may be more likely of having diarrhoea because of crowding and competition for mother's time and attention and other resources (2). A study revealed that mothers having five or more living children reported more frequently that their child had had diarrhoea (12). Another study also showed that the probability of having diarrhoea was about 60% higher in households with six or more children than in households with less than three children (2).

Even though there is no consistent finding in the literature, maternal age is considered as a proxy for a host of factors including family size, educational level, modernity, knowledge and practice related to childcare and energy/capacity to care for a child (12,35). The place of residence is one of the predictors of child health in general, diarrhoeal disease in particular. In developing countries, socioeconomic status, access to health services and environmental conditions all affect the health of children of the rural areas (10). Children in urban areas where proper sanitation and water are available, and where modern treatment is more frequent will have a lower prevalence of diarrhoea. Studies indicated that children living in urban areas were less likely to have diarrhoea compared to those in rural areas (2,19).

2.3. Diarrhoeal Morbidity and Environmental Factors

The relationship between environmental factors and the occurrence of diarrhoea in children has been addressed in a number of studies. Environmental factors include water quality and quantity, access to improved water sources, availability of toilet facilities, compound hygiene, housing condition, and refuse disposal. Most environmental factors are usually associated with socioeconomic status, and place of residence (2,10,32). The effect of the environment on health is complex, and conditioned by a wide range of characteristics and behaviors. For example, the effect of improved water and toilet facilities on child health may vary depending on parental education, child feeding practices or income (10).

It is well documented that poor environmental situation is a major risk factor for diarrhoeal disease, as young children are often exposed to the ground, the dirt, and the contamination in the environment. In their comparative study on differentials of child health in urban areas of Brazil, Egypt, Ghana and Thailand, Timaeus and Lush found out that environmental factors are strongly related to childhood diarrhoea prevalence in Brazil; to child mortality in Egypt and Brazil; and to stunting in Ghana and Egypt (10).

The quality and the quantity of water as well as the possibility of contamination by the time the water is ingested have impact on diarrhoea morbidity. A study that assessed environmental determinants of childhood diarrhoea, and another study from The Republic of Congo revealed that children coming from households that obtain water from protected sources were less likely to have diarrhoea as compared to those who get their water supply from unprotected sources (12,20). A study that was done to determine the prevalence of

childhood diarrhoea in North Gondar Zone, northwest Ethiopia, indicated that use of unprotected water sources was significantly associated with diarrhoeal morbidity (36). A study from Zimbabwe indicated that children living in households that used river water as a source for drinking had 33% more episodes of diarrhoea than children living in households using borehole water (29). The results of a study from southwest Ethiopia showed that the mean per-capita water consumption was lower in households where child had diarrhoea (20).

Van Derslice et al (11) pointed out that poor environmental conditions were strongly associated with the risk of diarrhoeal disease. The study indicated that lack of excreta disposal facility and the presence of excreta in the yard exhibited strong association with diarrhoea. Studies from Jimma, southwest Ethiopia, (21) and from The Republic of Congo (12) showed that children of families with latrines had a lower prevalence of diarrhoeal disease than those children whose families did not. It was also reported that defecation in the open by young children in the living area was associated with high incidence of childhood diarrhoea (37).

A cross-sectional study that assessed environmental and socioeconomic determinants of childhood diarrhoea in Eritrea indicated that the availability of toilet facility in the household was associated with a 27 percent reduction in risk of diarrhoea (2). A study indicated that in households without a latrine, and where feces are left deposited in the yard, or house, infant mortality was 2.76 times higher than in households where latrine was used (37). A study from Zimbabwe revealed that the absence of refuse disposal pit was associated with higher diarrhoea morbidity (29).

Overcrowding is said to be a risk factor for diarrhoea morbidity. Teklemariam et al (20) observed an inverse relationship between number of rooms and diarrhoea morbidity. Another study from Jimma town also revealed that children living in houses with three or more rooms had less diarrhoea (21). The presence of animals in a house also can be used as a measure of exposure to diarrhoea-causing organisms (11). However, these conditions may be confounded by socioeconomic and other environmental factors (20,21).

2.4. Diarrhoeal Morbidity and Behavioral Factors

Human behaviors and beliefs are significant components of the epidemiologic model of host-agent-environment. This is true also for diarrhoeal diseases (38). Behavioral factors play a primary role in the epidemiology of diarrhoeal diseases. Risk of exposure to diarrhoea-causing organisms may be affected by behavior patterns common to the population, such as, defecation habits and personal hygiene; and by patterns of food preparation, storage and consumption (38,39). Infant feeding, for example, encompasses a complex set of behaviors, and apparently small differences in behavior can have a large impact on an infant's exposure to pathogenic organism and susceptibility to infection (11).

Studies on risk factors for diarrhoeal disease have described the relationship between parental behavior and the occurrence of childhood diarrhoea. Studies suggested that maternal practices related to hygiene, breastfeeding, food preparation, appropriate weaning practices, and health care are important determinants of diarrhoeal disease incidence (12,40). The introduction of supplementation with other liquids or foods marks the beginning of a child's exposure to possibly contaminated foods and liquids (2,11,16,38). It has been reported that partially

breastfed or non-breastfed infants have about two to five times higher episodes of diarrhoea experienced by exclusively breastfed infants (11,16).

In their study on breastfeeding and the occurrence of acute childhood diarrhoea, Ketsela et al (4) found out that the risk of developing diarrhoeal disease in partially breastfed infants was five-times higher than that of infants exclusively on breast milk. The study showed that exclusive breastfeeding was an important predictor of the occurrence of diarrhoeal disease in infants less than six months of age. A study done on the effect of water quality, sanitation and breastfeeding on infant health pointed out a clear relationship between feeding practice and diarrhoeal disease (11).

In unhygienic environment that prevails in most developing countries, contamination of infant foods with disease-causing organisms is common (3,11,16). Study done in Gambia demonstrated heavy contamination of gruels used as complementary foods (3). A bacteriological study done on infant feeding bottle contents in Addis Ababa, Ethiopia, recovered a total of 2270 bacterial isolates, and concluded that infants and young children in the studied population ingest contaminated feeds (41).

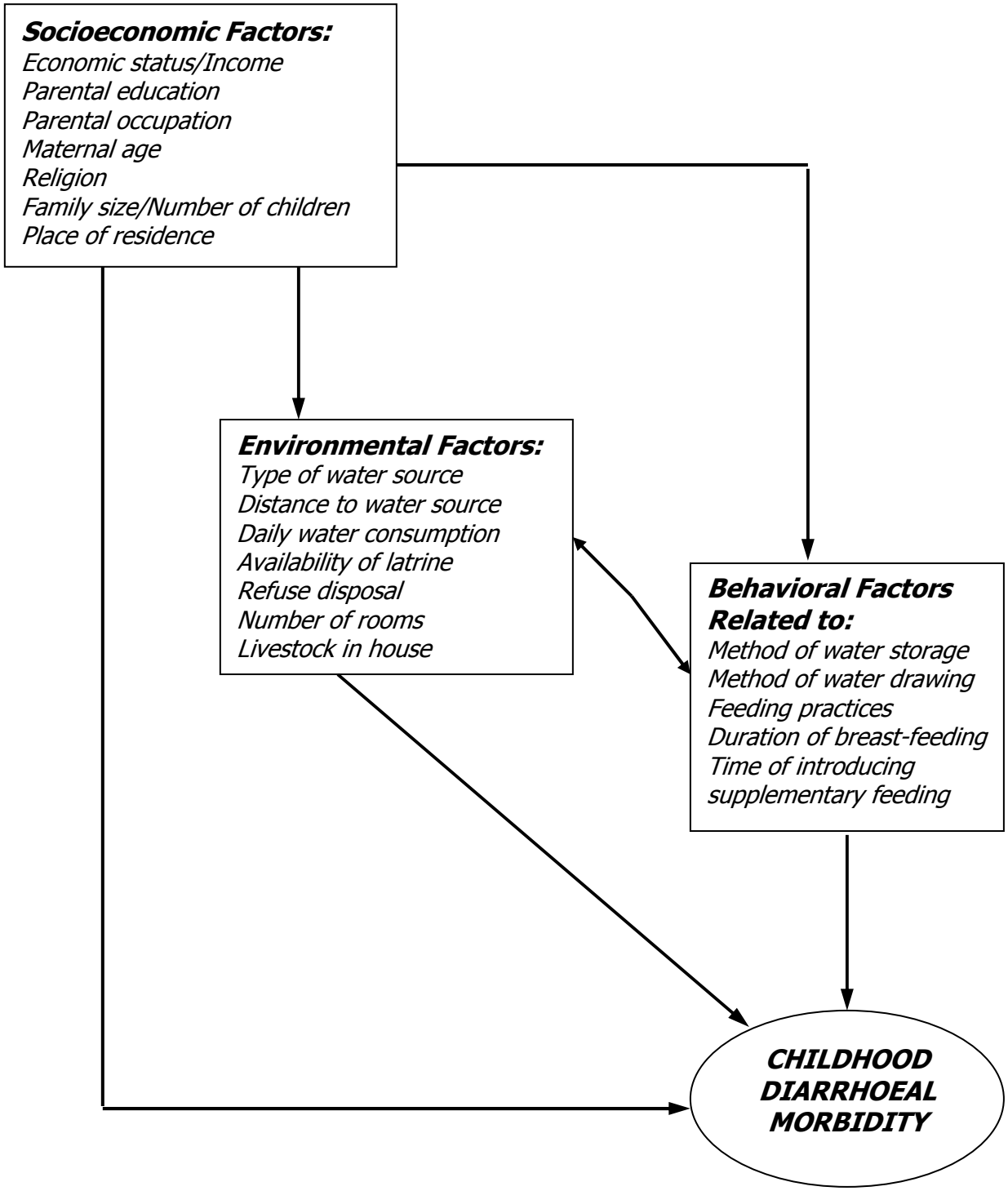
A study from Kinshasa demonstrated that the use of improper means of fecal and solid waste disposal and maternal ignorance of proper hygiene practice were significantly associated with diarrhoeal disease (3). The findings of a case-control study on hygiene behavior and severe childhood diarrhoea suggested that unhygienic practices were important risk factors for severe diarrhoea in under-five children (40). The study also indicated an increasing excess risk of

diarrhoea with declining standards of maternal hygiene practice and kitchen hygiene. A review of different studies on improving hygiene practices showed a positive impact on diarrhoea morbidity in young children, with a median reduction of 33 percent (40).

Availability of improved water sources or latrine alone will not reduce diarrhoea morbidity, without a change in behavior that affects hygiene practice (12,14,37). Even though the source is protected, water may be contaminated at or following collection, i.e. during transport and/or storage. Water stored in an uncovered container may be contaminated easily by pets, dirt, or other debris (14). Dirty utensils used to draw water from a storage container may also contaminate the water obtained from protected sources. A study revealed that the prevalence of diarrhoea was significantly higher in children from households where water is obtained from storage container by dipping than in those where water is obtained by pouring (20).

Investigating risk factors for unhygienic behavior, poor feeding practice for infants and young children, and inappropriate food-handling practices are potentially useful for the development of effective intervention programs. However, in developing intervention programs to prevent diarrhoeal diseases, it may be useful to distinguish between risk factors that are related primarily to cultural practices and those behaviors that are influenced or constrained by environmental conditions (38).

Figure 1. **Conceptual framework of potential determinants of childhood diarrhoeal morbidity.**



III. OBJECTIVES

General

To assess the effect of parental and environmental factors that are associated with the occurrence of diarrhoea in under-five children.

Specific

1. To identify socioeconomic, environmental and behavioral factors of urban and rural households, which are associated with childhood diarrhoea.

2. To determine the point and two-week period prevalence of diarrhoea in under-five children of urban and rural areas.

3. To determine the two-week period incidence of diarrhoea in under-five children of urban and rural areas.

4. To compare the under-five diarrhoea prevalence and incidence between rural and urban communities.

IV. METHODS AND MATERIALS

4.1. Study Design

This was a comparative cross-sectional study that examined households' socioeconomic, environmental and behavioral factors as exposure variables and diarrhoeal morbidity in under-five children as an outcome variable. The study attempted to compare these variables between rural and urban areas of Meskanena Mareko Woreda, and was conducted from December 2002 to January 2003.

4.2. Study Area

The study is conducted in Meskanena Mareko Woreda, specifically in areas that are covered by the Butajira Rural Health Program. Meskanena Mareko is one of the 11 Woredas of Gurage Zone of the Southern Nations, Nationalities and Peoples Region. The total population of the Woreda was estimated to be 257,000 in 1999 (42). The Woreda consists of four urban kebeles (Butajira town) and 39 peasant associations (PAs). Butajira, the capital town of the woreda, is located at about 130 Km. south of Addis Ababa. The total population of the town reached to 25,000 in 1999 (42).

The major ethnic group of the Woreda are Gurage, which is further divided into minor ethnic groups, such as Mareko, Meskan, Sodo, Dobi and Siltie. The population is predominantly Moslem by religion. Agriculture is the main livelihood of the population. *Enset* (false banana), *Teff,* maize, millet, barley and legumes are the main crops cultivated in the Woreda. Cash crops, such as pepper, coffee and *khat* are also grown. *Enset* is the main staple food in the area. The Woreda consists of both highland and lowland areas, with an altitude ranging

from 1,750 to 3,400 meters above sea level. Annual rainfall ranges from 900 to 1,400 millimeter (42).

There is a Rural Health Program in Butajira that was established in 1987. The objectives of the Butajira Rural Health Program (BRHP) were to generate health-related information; to establish and maintain an epidemiological research laboratory; to build and strengthen research capability and to develop local capacity in the prevention and control of disease (42). The Program covers one urban kebele and nine rural villages, with a population of about 37,000 (as of 1997), constituting about 14% of the woreda population (Annex 1).

There are similarities in such characteristics as religion, ethnicity, economy and other social services, like education and health care services, between the areas covered by Butajira Rural Health Program and the rest of the Woreda. The total population of the Program area was 37,323 at the beginning of 1997. The population structure is typical of developing countries. Children of under-15 constitute 48% and that of under-fives 15%, and only 3 percent of the population are 65 years and above. At the beginning of 1997, the annual growth rate was 2.7%. Under-five mortality accounts for 50% of all deaths. Acute respiratory infection is the most common cause of death, followed by diarrhoea (42).

Agriculture is the main livelihood of the rural population in the Program area. In the town, most people are engaged in commercial activities. In rural areas, two out of three households have no literate adults in the households, indicating high level of illiteracy. In the town, 80% of the households have at least one literate household member. Rivers and hand-dug wells are

the main source of water for rural areas. The majority of the town population obtains piped water from deep wells (42).

4.3. Source and Study Population

The source population for the study was all households of the Butajira Rural health Program (BRHP) area. The study subjects, those were mothers/caretakers in the household that had under-five child, were selected from urban and rural areas of the BRHP catchments. If there were more than one child in the household, the youngest child (index child) was selected to collect information on the child's demographic and health characteristics.

4.4. Sample Size Determination

The prevalence of diarrhoea for the areas covered by the Butajira Rural Health Program is not known from previous studies. Other studies done in different parts of the Country also did not report the prevalence of diarrhoea in urban and rural areas separately. Hence, the national prevalence is taken from the report of the Demographic and Health Survey (DHS) to calculate the sample size. According to the DHS, the two-week period prevalence of diarrhoea in children aged less than five years is 25% for rural and 17% for urban (6). Accordingly, the sample size was calculated by assuming that:

- ✓ The prevalence of under-five diarrhoea for rural population (P_1) = 0.25
- ✓ The prevalence of under-five diarrhoea for urban population (P_2) = 0.17
- ✓ Power to detect a significant difference between P_1 and P_2 if it exists (1 - β) = 80%

- ✓ Significance level to conclude that the difference between P_1 and P_2 would not occur by chance (α) = 0.05
- ✓ Urban to rural ratio = 1: 2
- ✓ The weighted average of P_1 and P_2 = $P = \frac{P_1 + r(P_2)}{1 + r}$
- ✓ ($P_1 - P_2$) = the level of difference to be detected at p-value of 0.05 and power of 80%
- ✓ Sample size for urban = n_1
- ✓ Sample size for rural = $n_2 = 2(n_1)$

The formula used to calculate the sample size is:

$$n_1 = \frac{\left[Z_{\alpha/2}\sqrt{(1 + 1/r)\,P\,(1 - P)} + Z_{(1-\beta)}\sqrt{P_1(1 - P_1) + \frac{P_2(1 - P_2)}{r}}\right]^2}{(P_1 - P_2)^2}$$

The calculated total sample size for this study was ***987*** households that had at least one under-five child. The ratio of urban to rural was taken to be 1 to 2 by considering the level of precision that is maintained in employing this ratio; and the available time and other resources. Accordingly, the sample size for urban was ***329***, and that of rural ***658*** households with at least one under-five child**.**

4.5. Sampling Procedure

Since the study was comparative, the study subjects were selected from both urban and rural areas of Butajira Rural Health Program (BRHP) site. There are one urban kebele and 9 peasant associations (PAs) in the areas covered by BRHP. These areas (the 9 PAs and the urban kebele) were previously selected from the total of 82 peasant associations and the four urban kebeles of the capital town of the Woreda by using probability proportionate to size technique (42,43).

In reference to previous works done in the area (19,42,43,44), the PAs were stratified according to their altitude, i.e. highland and lowland. Accordingly, Misrak-Meskan, Bido, Dirama, Yeteker and Wrib are located in highland areas, and Mekakelegna-Jarda, Bati, Dobena and Hobe in the lowlands. The total sample size (658) for the rural areas was distributed to the nine PAs proportionally to their population size (Annex 2). The urban kebele in Butajira town was taken as it is. The households that have under-five children were selected randomly using a sampling frame from the BRHP. The mothers' identity number and the households' number that are used by the BRHP were used to identify the selected households.

4.6. Data Collection

A structured questionnaire was developed to collect information on the households' socioeconomic, environmental conditions and behavioral aspects. The study instrument contained a combination of open-ended and closed-ended questions. A card with the mother's identity number and the household's number on it was prepared and was given to the mothers/caretakers. In the first visit, the interview was conducted, and the child's mothers/caretakers was requested to mark any sign on the card if the child gets diarrhoea in the subsequent two weeks period. During the second visit, the enumerators collected the card and recorded diarrhoea cases, if there were any, by referring the card (Figure 2).

If the card was lost, or if the mother/caretaker did not make any sign on the card, the enumerators asked the mother/caretaker whether her child experienced diarrhoea in the past two-week period and made the registration accordingly. If the mother/caretaker was not

available at the time of the second visit, the enumerators made another visit to that household the next day. And, if the same condition occurred in the third visit, the household was considered as a non-response.

The information on diarrhoeal morbidity obtained in the first visit was used to calculate the point prevalence. The two-week period incidence was calculated from the information obtained in the second visit. And, the sum of the two rates would give the two-week period prevalence of diarrhoea in under-five children (Figure 2).

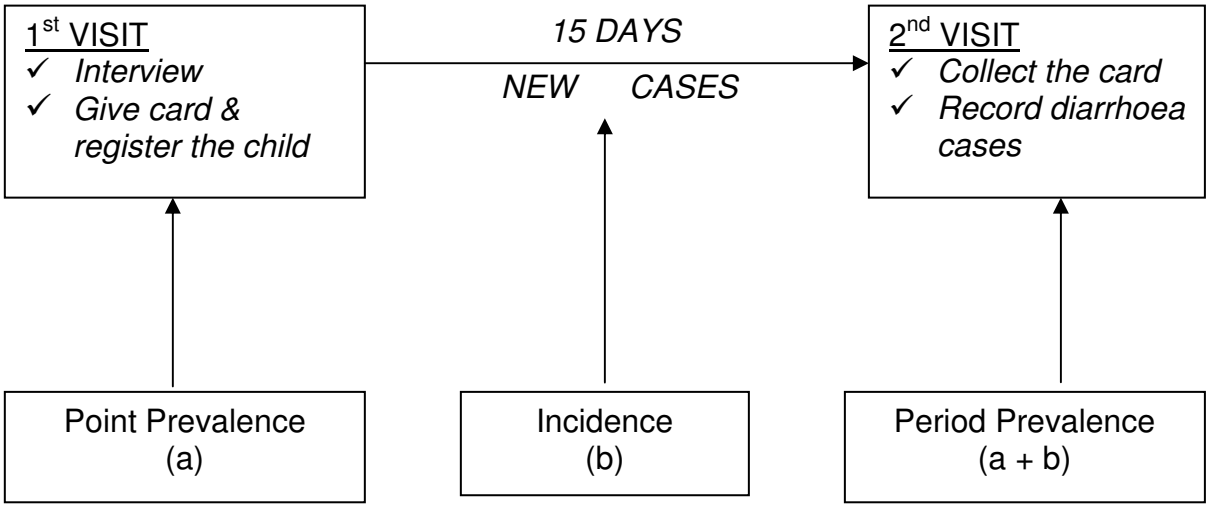


Figure 2. ***Schematic representation of data collection process***

Ten data collectors who are staff members of Butajira Rural Health Program (BRHP) were involved in the data collection process. The BRHP enumerators live in the study area and have a long experience in collecting data for similar kinds of surveys. Considering the above points, a three-day training was given to the data collectors prior to the start of the data collection process. The principal investigator gave the training. Training manual was prepared to aid the training process. The training mainly focused on interviewing techniques, and

emphasis was also given for questions that need careful attention and observation. Classroom lecture, mock interview and field practice were included in the training.

The six supervisors who are working for the BRHP were involved in the survey. The supervisors were trained together with the data collectors. However, orientation was given to the supervisors separately on how to supervise the data collectors and how to check for completed questionnaire, such as to check for inconsistencies of responses. The supervisors were responsible for supervising the data collectors; check for the completed questionnaire; and correct any mistake or problem encountered. The over all data collection process was coordinated by the principal investigator.

4.6.1. Variables

- Outcome (Dependent) variable
    - the occurrence of any episode of diarrhoea in a child at the time of the survey.
- Explanatory (Independent) variable
    - *Socioeconomic status*

      includes family economic status, place of residence, household size, maternal age, education, ethnicity, number of children, occupation, marital status, religion, etc.

- *Environmental sanitation*

  includes type of water source, distance to the water source, amount of daily water consumption, availability of latrine, number of rooms, livestock in house, refuse disposal, etc.

- *Behavioral factors*

  includes method of water drawing and storage, feeding practices, action for diarrhoea, duration of breast-feeding, time of introducing supplementary feeding, etc.

4.7. Data Quality

The questionnaire was developed after reviewing relevant literatures to the subject to include all the possible variables that address the objective of the study. The questionnaire was first prepared in English and then translated to Amharic and back translated to English to maintain the consistency of the contents of the instrument.

Pretest was conducted in two rural villages and one urban kebele outside of the Butajira Rural Health Program site. Since the areas where the pretest was conducted are in the Woreda and also near the BRHP sites, it was assumed that the villages and the urban kebele have similar characteristics to the areas where the actual study is carried out. A total of 20 households were interviewed during the pretest. Vague terms, phrases and questions identified during the pretest were modified and changed. Missing responses like "No response" and "Others" were added, and skipping patterns were also corrected.

During the pretest, the type of water containers used by the majority of the households were identified, and the capacity of these containers were measured to facilitate the determination of the mean per capita water consumption. Accordingly, clay pots with a capacity of 8, 10 and 15 liters; plastic Jerry cans with a capacity of 5, 10 and 25 liters and plastic and metal buckets with a capacity of 20 liters were identified. The enumerators were acquainted with the different kinds of water containers before they went to the actual data collection.

The completed questionnaires were checked everyday during data collection for completeness, clarity and consistency by the supervisors and the principal investigator. Any mistake detected was corrected the next day. Five percent of the households were re-interviewed by the supervisors and the principal investigator to check for the consistency of data collection; and correction was made at the spot.

Different studies were conducted in the Butajira Rural Health Program (BRHP) catchments (42). The determinants of acute respiratory infection in children; the problem of indoor air pollution; the patterns and determinants of morbidity and mortality in children; nutritional status of under-five children; and magnitude of bottle-feeding were some of the researches carried out at different times by different authors in the BRHP catchments. These studies might ask more or less the same questions as the present study intended to ask. It was, therefore, tried to minimize the bias that may be occurred by over-studying of the area by modifying the questions that were asked in other studies; by including on-site observation; and by distributing the sample to all the 9 peasant association and the urban kebele.

4.8. Data Management and Analyses

The completed questionnaires were categorized into urban and rural. The data entry and cleaning were performed using EPI Info version 6.04 statistical package. The data entered was checked for its consistency. Frequencies and cross tabulations were used to check for missed values and variables. Errors identified were corrected after revising the original questionnaire.

Frequencies, proportions and measures of central tendency and measures of variation are used to describe the study subjects. The strength of association between variables was determined using odds ratio, with 95% confidence interval employing EPI Info version 6.04 statistical package. Further analysis was also performed using stepwise logistic regression analysis employing SPSS version 10 software package to assess the relative effect of selected explanatory variables on the outcome variable. P-values of 0.05 or lower are taken to declare that the association is statistically significant.

4.9. Operational Definitions

1. *Diarrhoea* is defined as having three or more loose or watery stools in a twenty-four hours period, as reported by the mother/caretaker of the child.

2. *Number of rooms* is defined as any partition of a house that is intended to separate the rooms for different purposes

3. *Refuse:* includes such solid wastes as ash, cow dung, home-sweepings; but not human excreta.

4. *Per capita water consumption* is calculated by considering frequency of water collection in a day, capacity of container and family size. Accordingly,

$$\textit{Per capita water Consumption} = \frac{\text{Freq. of collection X Capacity of container}}{\text{Family size}}$$

5. A child who was receiving no food, solid or liquid, other than breast milk at the time of the survey was considered as *exclusively breast-fed*.

6. *Partial breast-feeding:* a child who was receiving food, solid or liquid, in addition to breast milk at the time of the survey.

7. *No breast-feeding:* a child who was not receiving breast milk at the time of the survey. The child may eat food/liquid that was prepared for adults or prepared separately for him/herself.

8. *Index child:* refers to a child that was included in the study from a household to have information on the demographic and health characteristics, and also to calculate the prevalence and incidence of diarrhoea.

9. *Point prevalence rate:* the number of diarrhoea cases at the time of the interview divided by the total number of households included in the study

10. Incidence rate: the number of new cases of diarrhoea in the preceding two weeks period after the interview divided by the number of total households that returned the case registry cards.

4.10. Ethical Consideration

Permission was obtained from the ethical clearance committee of Addis Ababa University, Medical Faculty. Informed verbal consent was obtained from the mothers/caretakers of the children. Privacy and confidentiality was maintained during interview. Children who were found to be sick during the visits were told to consult the nearby health institution or health post for better management.

V. RESULTS

5.1. Households' Socio-economic, Environmental and Behavioral Descriptions

5.1.1. Socio-economic Characteristic

A total of 987 households were included in this study. Out of these households, 329 (33.3%) were from urban area, i.e. Butajira town, while 658 (66.7%) from rural areas [279 (28.3%) from lowland and 379 (38.4%) from highland rural villages].

The mean age of mothers from both areas was 29.6 (±6.1) years. Mothers in the urban area were a little younger [28.35 (±5.8) years] than those in rural areas [30.2 (±6.1) years] ($p<0.05$). More than 75% of the mothers were below the age of 35 years (Table 1). The majority of mothers were married (97.1%), Muslim by religion (77.5%) and Meskan by ethnic group (51.9%). Seven hundred and forty-five (75.5%) mothers were housewives, and 713 (72.2%) were illiterate. Hundred and thirty-nine (42%) urban and 574 (87.4%) rural mothers were illiterate. Of the 220 mothers who had formal education, the majority (64.1%) attended some primary education. Only 3 (0.5%) rural mothers have attended some secondary education.

Sixty-six (20.8%) urban and 275 (42.4%) rural fathers were illiterate. And, 43.2% of the urban fathers had attended some secondary education and above. This proportion was very low for rural fathers, i.e. 7.9%. The majority (95.2%) of the spouses in rural areas were engaged in farming, while most (36%) of the spouses in urban areas were merchants. The mean age of the spouses was 38.6 (±9.1) years. There is a significant difference ($p<0.05$)

between the mean age of urban and rural spouses. Most (56.2%) of the spouses were below the age of 30 years.

The mean household size of the study population was 5.8 (±1.9) persons. The mean household size in urban and rural areas was almost the same, 5.9 (±2.1) and 5.8 (±1.9) persons, respectively. About 66% of the households had less than 6 persons in their families (Table 1). There was only one under-five child in 537 (54.4%) households, and only 24 (2.4%) households [13 (4%) in urban and 11 (1.8%) in rural] had three under-five children.

Hundred and eighty-three (26.8%) households in rural areas and 239 (72.6%) in urban areas owned radio. Nearly 76% of the households in rural areas had at least one cow, ox, sheep, goat or other animal, and 249 (75.7%) households in urban areas did not have any. Seventeen (5.2%) households in urban areas and 418 (64.2%) in rural areas claimed that they produced either pepper or *khat* or both, which are considered as cash crop in the area.

***Table 1**. Socioeconomic characteristics of the study households by place of residence, Meskanena Mareko Woreda, Jan. 2003.*

Characteristic	*Urban (n=329) No (%)*	*Rural (n=658)*		*Total (n=987) No (%)*
		Lowland (n=279) No (%)	*Highland (n=379) No (%)*	
Maternal age				
15 – 24	71 (21.6)	47 (16.9)	58 (15.3)	176 (17.8)
25 - 34	199 (60.5)	146 (52.3)	220 (58.1)	565 (57.3)
> 34	59 (17.9)	86 (30.8)	101 (26.6)	246 (24.9)
Marital status				
Married	317 (96.4)	271 (97.1)	370 (97.6)	958 (97.1)
Divorced	4 (1.2)	3 (1.1)	2 (0.5)	9 (0.9)
Never married	1 (0.3)	1 (0.4)	----	2 (0.2)
Widowed	7 (2.1)	4 (1.4)	7 (1.8)	18 (1.8)
Religion				
Muslim	246 (74.8)	213 (76.3)	306 (80.7)	765 (77.5)
Christian	83 (25.2)	66 (23.7)	73 (19.3)	222 (22.5)
Ethnicity				
Meskan	208 (63.2)	81 (29.0)	223 (58.8)	512 (51.9)
Sodo	27 (8.2)	13 (4.7)	54 (14.2)	94 (9.5)
Dobi	23 (7.0)	4 (1.4)	24 (6.3)	51 (5.2)
Selti	20 (6.1)	101 (36.2)	63 (16.6)	184 (18.6)
Mareko	1 (0.3)	62 (22.2)	2 (0.5)	65 (6.6)
Other	50 (15.2)	18 (6.5)	13 (3.4)	81 (8.2)
Maternal Education				
Illiterate	139 (42.2)	246 (88.2)	328 (86.5)	713 (72.2)
Read & write	15 (4.6)	15 (5.4)	24 (6.3)	54 (5.5)
Primary	99 (30.1)	17 (6.1)	25 (6.6)	141 (14.3)
Sec. & above	76 (23.1)	1 (0.3)	2 (0.6)	79 (8.0)
Occupation of mother				
Housewife	146 (44.4)	264 (94.6)	335 (88.4)	745 (75.5)
Gov't employee	17 (5.2)	----	----	17 (1.7)
Private work	155 (47.1)	13 (4.7)	43 (11.3)	211 (21.4)
Other	11 (3.3)	2 (0.7)	1 (0.3)	14 (1.4)

Table 1. (Continued)....

Characteristic	*Urban*	*Rural*		*Total*
		Lowland	*Highland*	
Occup. Of father (n=959)				
Gov't employee	51 (16.1)	2 (0.7)	4 (1.1)	57 (5.9)
Merchant	114 (36.0)	4 (1.5)	11 (3.0)	129 (13.5)
Farmer	64 (20.2)	262 (96.3)	348 (94.1)	674 (70.3)
No job	7 (2.2)	----	----	7 (0.7)
Other	81 (25.6)	4 (1.5)	7 (1.9)	92 (9.6)
Fathers' education (n=959)				
Illiterate	66 (20.8)	107 (39.3)	168 (45.4)	341 (35.5)
Read & write	36 (11.4)	81 (29.8)	84 (22.7)	201 (21.0)
Primary	78 (24.6)	61 (22.4)	91 (24.6)	230 (24.0)
Sec. & above	137 (43.2)	23 (8.5)	27 (7.3)	187 (19.5)
*No. persons in h.h**				
<4	36 (10.9)	34 (12.2)	41 (10.8)	111 (11.2)
4 – 6	178 (54.1)	156 (55.9)	205 (54.1)	539 (54.6)
7 – 9	93 (28.3)	81 (29.0)	120 (31.7)	294 (29.8)
>9	22 (6.7)	8 (2.9)	13 (3.4)	43 (4.4)
*No. under 5s in h.h**				
One	190 (57.8)	146 (52.3)	201 (53.0)	537 (54.4)
Two	126 (38.3)	126 (45.2)	174 (45.9)	426 (43.2)
Three	13 (4.0)	7 (2.5)	4 (1.1)	24 (2.4)
Radio ownership				
Own radio	239 (72.6)	56 (20.1)	127 (33.5)	422 (42.8)
No radio	90 (27.4)	223 (79.9)	252 (66.5)	565 (57.2)
Ownership of cattle				
Own cattle	80 (24.3)	188 (67.4)	317 (83.6)	585 (59.3)
No cattle	249 (75.7)	91 (32.6)	62 (16.4)	402 (40.7)
Produce cash crop				
Yes	17 (5.2)	191 (68.5)	227 (59.9)	435 (44.1)
No	312 (94.8)	88 (31.5)	152 (40.1)	442 (55.9)

*Note: *hh=household*

5.1.2. Environmental Characteristics

From the total of 987 households, 633 (64.1%) had thatched roof houses. However, the proportion of houses with thatched roof in rural areas was higher (94.6%) than that in urban areas (3.6%). Only 14.4% of the total houses had more than three rooms. Most households in rural areas (51.7%) had one room, and in urban areas (48.9%) had two rooms. All households in rural and the majority (78.7%) in urban areas had houses with mud floor. In rural areas, majority of the households (83%) kept cattle in their houses; while in urban areas this proportion was only 6.7% (Table 2). About 88% of the households in urban areas had either privately owned or shared latrine. This proportion was very low for rural areas, i.e. 3.8%. About half (50.2%) of the households in urban, and 97.3% households in rural areas disposed their refuse open in the field. Only about 3% of the households in rural areas burnt or buried the refuse in a pit (Table 2).

Three hundred and fifteen (95.7%) households in urban areas used tap as the main source of water. In rural areas, almost equal proportion of households used protected and unprotected well as the main source of water, 37.4%, 36.8%, respectively. A good proportion of households (24%) in rural areas also used river water (Table 2). Regardless of the type of water source, 212 (64.4%) households in urban areas and 324 (51.7%) in rural areas got water in a 15 minutes walking distance from their home. Only 0.3% of the urban households and 2% of the rural households spent more than one hour to fetch water. The mean per capita per day water consumption in urban areas was 6.4 (±3.5) liters. In rural areas, there is only 5.2 liters of water for a person in a day. There was a significant difference between urban and rural areas in per capita water consumption ($p<0.05$).

Table 2. Environmental conditions of the study households by place of residence, Meskanena Mareko Woreda, Jan. 2003.

Characteristic	*Urban (n=329) No (%)*	*Rural (n=658)*		*Total (n=987) No (%)*
		Lowland (n=279) No (%)	*Highland (n=379) No (%)*	
Housing characteristic				
Roof				
Thatched	12 (3.6)	269 (96.4)	352 (92.9)	633 (64.1)
Corrugated iron	317 (96.4)	10 (3.6)	27 (7.1)	354 (35.9)
Floor				
Mud	259 (78.7)	279 (100)	379 (100)	917 (93.0)
Cement	70 (21.3)	---	---	70 (7.0)
No. of rooms				
1	56 (17.0)	173 (62.0)	157 (41.4)	386 (39.1)
2	161 (48.9)	99 (35.5)	199 (52.5)	459 (46.5)
≥ 3	112 (34.0)	7 (2.5)	23 (6.1)	142 (14.4)
Animals live with people				
Yes	22 (6.7)	232 (83.2)	314 (82.8)	568 (57.5)
No	307 (93.3)	47 (16.8)	65 (17.2)	419 (42.5)
Waste disposal				
Latrine				
Available	288 (87.5)	12 (4.3)	13 (3.4)	313 (31.7)
Not available	41 (12.5)	267 (95.7)	366 (96.6)	674 (68.3)
Refuse disposal				
Pit	64 (19.5)	----	2 (0.5)	66 (6.7)
Burning	91 (27.7)	12 (4.3)	2 (0.5)	105 (10.6)
Open field	165 (50.2)	267 (95.7)	375 (98.9)	807 (81.8)
Use garbage can	9 (2.7)	----	----	9 (0.9)
Water supply				
Type of water source				
Pipe	315 (95.7)	----	----	315 (31.9)
Protected well	----	120 (43.0)	120 (31.7)	240 (24.3)
Unprotected well	14 (4.3)	152 (54.5)	72 (19.0)	238 (24.1)
River	----	7 (2.5)	187 (49.3)	194 (19.7)
Distance to water source				
≤ 15 minutes	212 (64.4)	188 (67.4)	136 (35.9)	536 (54.3)
16 - 30 "	102 (31.0)	74 (26.5)	148 (39.1)	324 (32.8)
31 - 60 "	14 (4.3)	13 (4.7)	86 (22.7)	113 (11.4)
≥ 61 "	1 (0.3)	4 (1.4)	9 (2.4)	14 (1.4)
Mean water consumption (Liters/person/day)	6.4 (±3.5)	5.2 (±2.9)	5.2 (±2.4)	5.6 (±3.0)

5.1.3. Behavioral and Child Demographic and Health Characteristic

Of the total 987 mothers/caretakers, 129 (13.1%) mothers breastfed their children exclusively. This proportion is a little higher for rural mothers (14.1%) than that for urban mothers (10%) (Table 3). Almost equal proportion of mothers/caretakers in urban (60%) and rural (62.1%) areas fed their child other types of food in addition to the breast milk. Thirty-three (10.1%) urban mothers stopped to breastfed their child before the age of four months. This proportion is small for rural mothers, i.e. 6.5%. Equal proportion (43.7%) of mothers in urban and rural areas breastfed their child for two years.

Out of the total 858 mothers/caretakers who started supplementary feeding for their children 618 (72%) started before the child reached 6 months, and 240 (28%) after the age of 6 months (Table 3). Thirty-two percent of the rural and 18.2% of urban mothers started supplementary feeding after the age of 6 months. Only 15 (4.8%) mothers in rural areas and 41 (13.9%) in urban areas bottle-fed their children. More rural mothers (33%) fed their children using their hands than urban mothers (14.9%).

Out of the 380 mothers/caretakers (74 in urban and 306 in rural) whose children got diarrhoea at the time of the survey, only 17.2% of the rural and 28.4% of the urban mothers claimed that they took their child to the nearby health post or other health institution to seek medical help (Table 3). A high proportion of mothers from both rural (47%) and urban (43.2%) did nothing to manage the diarrhoea, until the time of the survey. Of the total interviewed mothers/caretakers, 263 (79.9%) from urban areas and 299 (47%) from rural areas were found

to cover their water storage container at the time of the survey. And, 182 (55.3%) urban and 421 (61.1%) rural mothers claimed that they drew water from a storage container by pouring.

Almost all mothers/caretakers returned the case registry cards in the two-week time. Twenty-seven (2.7%) mothers/caretakers lost the card and 13 (1.3%) forgot to make any sign on the card to indicate the occurrence of diarrhoea in their children in the two-week period. In these households the information on diarrhoeal morbidity was obtained by asking the mother/caretaker whether there was diarrheic child in the two-week period. Accordingly, the point prevalence and the two-week period incidence of diarrhoea in the study children was found to be 38.5% and 12.9%, respectively (Table 4). The overall two-week period prevalence of diarrhoea in under-five children was found to be 51.4 percent.

Children in the age group 12 – 23 months were highly affected, with a proportion of 45.5% (Figure 3). Children in this same age group were highly affected in both urban (51.4%), and rural (44.1%) areas. Children aged 0 - 6 months in rural, and 36 - 59 in urban areas were affected least, with a proportion of 8.5% and 5.4% respectively (Figure 3).

Of the total 987 children, about 67% were below the age of 24 months. The mean age of the index children included in this study was 20.1(±13.3) months. The mean age for urban and rural children was almost the same, 20.9(±13.4) and 19.7(±13.3) months, respectively (Table 4). One hundred and eighty (54.7%) children in urban and 420 (64.2%) in rural areas were born either fourth or beyond, and only 41 (12.5%) urban and 50 (7.6%) rural children were first born (Table 4). Only 11 (2.9%) of the rural and 80 (24.3%) urban children were delivered

in health institutions. Of the total 791 (263 urban and 528 rural) children whose age was 9 months and above at the time of the survey, 183 (69.6%) of the urban and 251 (46.4%) of the rural children were immunized for measles. Majority of children in urban (79.7%) and rural (84.2%) areas had diarrhoea lasting less than 15 days.

Table 3. Maternal childcare and health practices by place of residence, Meskanena Mareko Woreda, Jan. 2003.

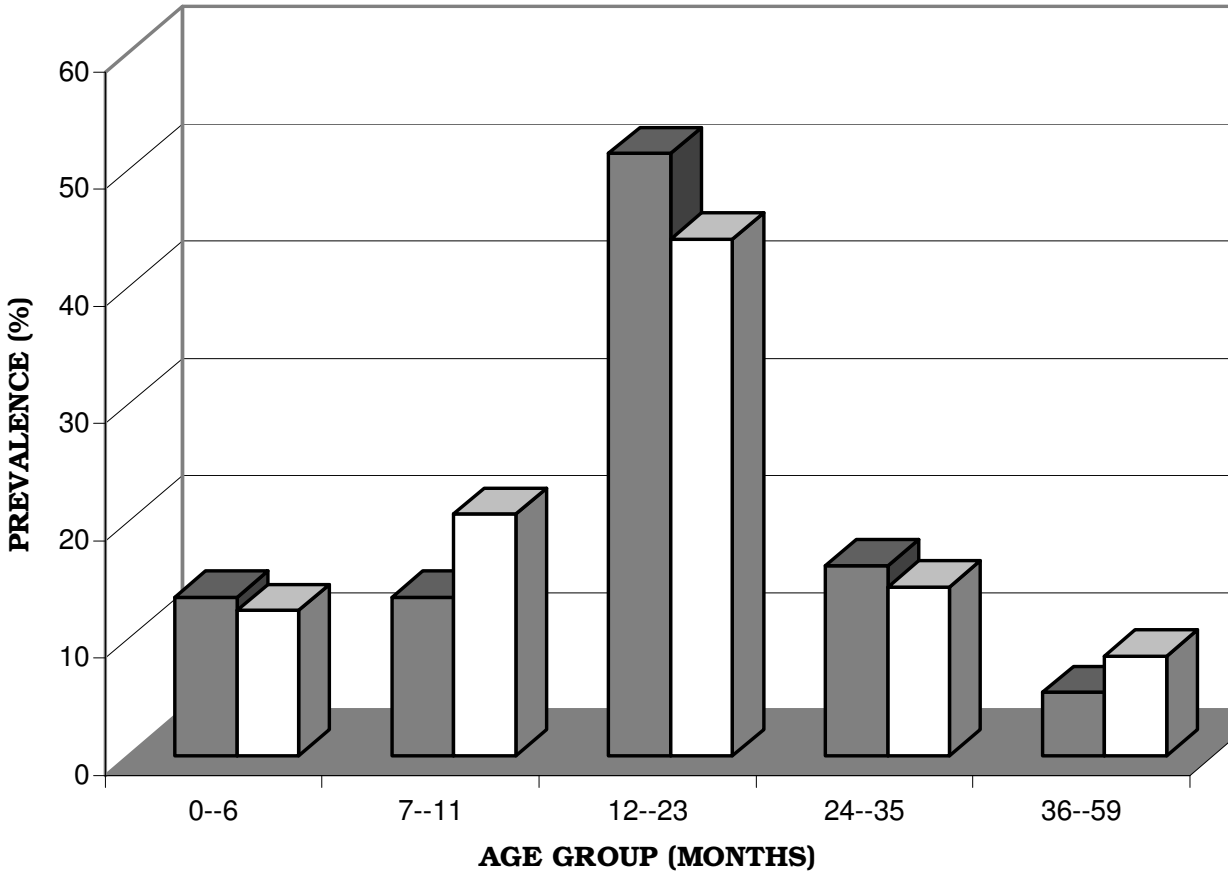
Characteristic	Urban (n=329) No (%)	Rural (n=658) Lowland (n=279) No (%)	Rural (n=658) Highland (n=379) No (%)	Total (n=987) No (%)
Breast feeding (BF) status				
Exclusive BF	33 (10.1)	30 (10.8)	66 (17.4)	129 (13.1)
Partial BF	197 (59.9)	181 (64.9)	225 (59.4)	603 (61.1)
No BF	99 (30.1)	68 (24.4)	88 (23.2)	255 (25.8)
Duration of BF (months) [#]				
≤ 4	33 (10.1)	12 (4.3)	26 (6.9)	71 (7.2)
5 - 11	56 (17.1)	65 (23.3)	92 (24.3)	213 (21.6)
12 - 23	143 (43.7)	129 (46.2)	156 (41.2)	428 (43.5)
≥ 24	95 (29.1)	73 (26.2)	105 (27.7)	273 (27.7)
Time of introduction of supplementary feeding (months)[##]				
≤ 1	7 (2.4)	4 (1.6)	11 (3.5)	22 (2.6)
2 - 4	85 (28.7)	118 (47.4)	76 (24.3)	279 (32.5)
5 - 6	150 (50.7)	75 (30.1)	92 (29.4)	317 (36.9)
≥ 7	54 (18.2)	52 (20.9)	134 (42.8)	240 (28.0)
Methods used in supplementary feeding[##]				
Hand	44 (14.9)	74 (29.7)	114 (36.4)	232 (27.0)
Cup and spoon	8 (2.7)	8 (3.2)	----	16 (1.9)
Cup	97 (32.8)	46 (18.5)	21 (6.7)	164 (19.1)
Bottle	41 (13.9)	----	15 (4.8)	56 (6.5)
Other**	106 (35.8)	121 (48.6)	163 (52.1)	390 (45.5)
Action during diarrhea [###]				
Take to health institute	21 (28.4)	32 (24.8)	17 (9.6)	70 (18.4)
Take to traditional healer	5 (6.8)	3 (2.3)	24 (13.6)	32 (8.4)
Home made treatment	16 (21.6)	23 (17.8)	67 (37.9)	106 (27.9)
Do nothing	32 (43.2)	71 (55.0)	69 (39.0)	172 (45.3)
Maternal diarrhoeal morbidity				
Yes	14 (4.3)	22 (7.9)	22 (5.8)	58 (5.9)
No	315 (95.7)	257 (92.1)	357 (94.2)	929 (94.1)
Cover water storage container				
Yes	263 (79.9)	160 (57.3)	139 (36.7)	562 (56.9)
No	66 (20.1)	119 (42.7)	240 (63.3)	425 (43.1)
Method of drawing water from the container				
By pouring	182 (55.3)	118 (42.3)	303 (79.9)	603 (61.1)
By dipping	147 (44.7)	161 (57.7)	76 (20.1)	384 (38.9)

[#] n=985 (urban=327; Lowland=279; Highland=379)
[##] n=858 (urban=296; Lowland=249; Highland=313)
[###] n=380 (urban=74; Lowland=129; Highland=177)
*** Mainly includes children who ate by themselves, i.e. without the help of mothers/caretakers.*

***Tables 4*. Demographic and health characteristics of the index children, by place of residence, Meskanena Mareko Woreda, Jan. 2003.**

Characteristic	*Urban (n=329) No (%)*	*Rural (n=658)*		*Total (n=987) No (%)*
		Lowland (n=279) No (%)	*Highland (n=379) No (%)*	
Age				
0 – 6	47 (14.3)	33 (11.8)	49 (12.9)	129 (13.1)
7 – 11	37 (11.2)	41 (14.7)	68 (17.9)	146 (14.8)
12 – 23	127 (38.6)	119 (42.7)	137 (36.1)	383 (38.8)
24 – 35	71 (21.6)	47 (16.8)	72 (19.0)	190 (19.3)
36 – 59	47 (14.3)	39 (14.0)	53 (14.0)	139 (14.1)
Sex				
Male	147 (44.7)	142 (50.9)	189 (49.9)	478 (48.4)
Female	182 (55.3)	137 (49.1)	190 (50.1)	509 (51.6)
Birth order				
First	41 (12.5)	21 (7.5)	29 (7.7)	91 (9.2)
Second	60 (18.2)	39 (14.0)	46 (12.1)	145 (14.7)
Third	48 (14.6)	34 (12.2)	69 (18.2)	151 (15.3)
Fourth & above	180 (54.7)	185 (66.3)	235 (62.0)	600 (60.8)
Place of birth				
Health institution	80 (24.3)	----	11 (2.9)	91 (9.2)
Home	249 (75.7)	279 (100)	368 (97.1)	896 (90.8)
Measles vaccinated (n=791)				
Yes	183 (69.6)	87 (38.3)	164 (54.5)	434 (54.9)
No	80 (30.4)	140 (61.7)	137 (45.5)	357 (45.1)
Diarr. at the time of the survey				
Present	74 (22.5)	129 (46.2)	177 (46.7)	380 (38.5)
Absent	255 (77.5)	150 (53.8)	202 (53.3)	607 (61.5)
Diarrhoea in the two wks period (Incidence)				
Present	39 (11.9)	37 (13.3)	51 (13.5)	127 (12.9)
Absent	290 (88.1)	242 (86.7)	328 (86.5)	860 (87.1)
Two wks period prevalence (Point Prev. + Incidence)				
Present	113 (34.3)	166 (59.5)	228 (60.2)	507 (51.4)
Absent	216 (65.7)	113 (40.5)	151 (39.8)	480 (48.6)

FIGURE3. DISTRIBUTION OF PREVALENCE OF CHILDHOOD DIARRHOEA
MORBIDITY BY AGE GROUP, MESKANENA MAREKO WOREDA, JAN. 2003



5.2. Socio-economic, Environmental and Behavioral Determinants

5.2.1. Socio-economic Determinants

Table 5 presents selected socio-economic characteristics of the households in relation to under-five diarrhoeal morbidity. From the socioeconomic variables included, maternal age, religion, household size, livestock ownership and production of cash crop did not show significant association with under-five diarrhoeal morbidity.

Childhood diarrhoeal morbidity was significantly associated with both fathers' and mothers' education. Children who are born to illiterate mothers are about two times more likely to have diarrhoea than children of mothers who are literate [OR: 1.72, 95% CI: (1.26, 2.35)]. The odds of having diarrhoea in children whose fathers were illiterate was one and half times greater than the odds in children whose fathers were literate [OR: 1.50, 95% CI: (1.14, 1.99)].

Mothers' and fathers' occupation were also significantly associated with diarrhoeal morbidity. Children of mothers who are housewives are more likely to had diarrhoea compared to children of mothers who are government employees, and engaged in other private work, a statistically significant association [OR: 1.51, 95% CI: (1.09, 2.07)] (Table 5). Being a child of a farmer [OR: 2.31, 95% CI: (1.54, 3.48)] and living in households where there is more than one child [OR: 1.96, 95% CI: (1.50, 2.56)] were significantly associated with diarrhoeal morbidity. Households that do not own radio have children who have more than one and half times higher odds of experiencing diarrhoea than those households that own radio [OR: 1.66, 95% CI: (1.26, 2.18)].

***Table 5**. Households' selected socio-economic factors in relation to childhood diarrhoeal morbidity by place of residence, Meskanena Mareko Woreda, Jan. 2003.*

Characteristic	*Urban (n=329)*		*Rural (n=658)*		*Both (n=987)*
	Diarrhoea (%) [@]		*Diarrhoea (%)* [@]		*Crude OR*
	Yes	No	Yes	No	*(95% CI)*
Maternal age					
15 – 24	14(19.7)	57(80.3)	54(51.4)	51(48.6)	1.05 (0.69,1.60)
25 – 34	44(22.1)	155(77.9)	176(49.1)	190(51.9)	1.07 (0.77,1.47)
>34	16(27.1)	43(72.9)	76(40.6)	111(59.4)	1.00
Religion					
Muslim	48(19.5)	198(80.5)	245(47.2)	274(52.8)	0.96 (0.70,1.32)
Christian	26(31.3)	57(68.7)	61(43.9)	78(56.1)	1.00
Maternal education					
Illiterate	38(27.3)	101(72.7)	261(45.5)	313(54.5)	***1.72 (1.26,2.35)*** [c]
Literate	36(18.9)	154(81.1)	45(53.6)	39(46.4)	1.00
Mothers occupation					
Housewife	31(21.2)	115(78.8)	273(45.6)	326(54.4)	***1.51 (1.09,2.07)*** [c]
Other	43(23.5)	140(76.5)	33(55.9)	26(44.1)	1.00
*Fathers education**					
Illiterate	19(28.1)	47(71.2)	134(48.7)	141(51.3)	***1.50 (1.14,1.99)*** [c]
Literate	53(21.1)	198(78.9)	164(44.7)	203(55.3)	1.00
*Fathers occupation**					
Farmer	18(28.1)	46(71.9)	281(46.1)	329(53.9)	***2.31(1.54,3.48)*** [b]
Merchant	25(21.9)	89(78.1)	6(40.0)	9(60.0)	0.92(0.52,1.63)
Other	29(20.9)	110(79.1)	11(64.7)	6(35.3)	1.00
*No. persons in hh***					
<4	7(19.4)	29(80.6)	33(44.0)	42(56.0)	1.00
4 – 6	41(23.0)	137(77.0)	166(46.0)	195(54)	1.11(0.71,1.73)
>6	26(22.6)	89(73.4)	107(48.2)	115(51.8)	1.16(0.72,1.85)
*No. under 5s in hh***					
1	33(17.4)	157(82.6)	135(38.9)	212(61.1)	1.00
2 – 3	41(29.5)	98(70.5)	171(55.0)	140(45.0)	***1.96(1.50,2.56)*** [b]
Livestock ownership					
No	51(20.5)	198(79.5)	91(59.5)	62(40.5)	0.88(0.60,1.13)
≤ 4	17(26.2)	48(73.8)	158(44.5)	197(55.5)	1.16(0.79,1.70)
> 4	6(40.0)	9(60.0)	57(38.0)	93(62.0)	1.00
Radio ownership					
Own radio	57(23.8)	182(76.2)	77(42.1)	106(57.9)	1.00
Do not own radio	17(18.9)	73(81.1)	229(48.2)	246(51.8)	***1.66(1.26,2.18)*** [b]
Produce cash crop					
Yes	4(23.5)	13(76.5)	175(41.9)	243(58.1)	1.00
No	70(22.4)	242(77.6)	131(54.6)	109(45.4)	0.82 (0.63,1.07)

***Note**: [@]Row percentages * n=959 (urban=317 and Rural=642)*

*** hh=household* $p<0.05$ [a]; $p<0.001$ [b]; $p<0.01$ [c]

5.2.2. Environmental Determinants

The households' selected environmental variables and their relation to childhood diarrhoea is presented in Table 6. As shown in the Table, in the crude analysis, all variables showed significant association with diarrhoeal morbidity.

Children who live in houses with thatched roof have more than two times odds of having diarrhoea than those who live in corrugated iron roofed houses [OR: 2.76, 95% CI: (2.05, 3.73)]. Again, living in houses with one room [OR: 1.78, 95% CI: (1.13, 2.81)] and two rooms [OR: 2.42, 95% CI: (1.56, 3.79)] had significant association with childhood diarrhoeal morbidity. Type of floor material also showed significant association with diarrhoea prevalence. Children who live in houses where cattle do not stay indoor with people are less likely to have diarrhoea [OR: 0.51, 95% CI: (0.39, 0.68)](Table 6).

Presence of latrine in a household [OR: 2.45, 95% CI: (1.80, 3.33)] and disposing refuse in open [OR: 2.85, 95% CI: (1.88, 4.32)] were significantly associated with under-five diarrhoeal morbidity. Again, drinking water source [OR: 1.44, 95% CI: (1.10,1.88)], distance to this source [OR: 1.50, 95% CI: (1.15,1.95)] and mean per capita water consumption [OR: 1.37, 95% CI: (1.03,1.82)] were significantly associated with diarrhoeal morbidity (Table 6).

***Table 6**. Households' environmental conditions in relation to childhood diarrhoeal morbidity by place of residence, Meskanena Mareko Woreda, Jan. 2003.*

Characteristic	*Urban (n=329)*		*Rural (n=658)*		*Both (n=987)*
	Diarrhoea (%) [@]		*Diarrhoea (%)* [@]		*Crude OR*
	Yes	No	Yes	No	*(95% CI)*
Housing					
Roof					
Thatched	4(33.3)	8(66.7)	291(46.9)	330(53.1)	***2.76(2.05,3.73)*** [b]
Corrugated iron	70(22.1)	247(77.9)	15(40.5)	22(59.5)	1.00
Floor					
Mud	65(25.1)	194(74.9)	306 (100)	352 (100)	***4.16(2.16,1.14)*** [b]
Cement	9(12.9)	61(87.1)	--	--	1.00
No. of rooms					
1	13(23.2)	43(76.8)	129(39.1)	201(60.9)	***1.78(1.13,2.81)*** [c]
2	35(21.7)	126(78.3)	168(56.4)	130(43.6)	***2.42(1.56,3.79)*** [b]
≥ 3	26(23.2)	86(76.8)	9(30.0)	21(70.0)	1.00
Animals live indoor					
Yes	9(40.9)	13(59.1)	247(45.2)	299(54.8)	1.00
No	65(21.2)	242(78.8)	59(52.7)	53(47.3)	***0.51(0.39,0.68)*** [b]
Waste disposal					
Latrine					
Available	66(22.9)	222(77.1)	12(48.0)	13(52.0)	1.00
Not available	8(19.5)	33(80.5)	294(46.4)	339(53.6)	***2.45(1.80,3.33)*** [b]
Refuse disposal					
Pit/burning	27(17.4)	128(82.6)	8(50.0)	8(50.0)	1.00
Open field	47(27.0)	127(73.0)	298(46.4)	344(53.6)	***2.85(1.88,4.32)*** [b]
Water supply					
Water source					
Protected	74(23.5)	241(76.5)	119(49.6)	121(50.4)	1.00
Unprotected	0(0.0)	14(100)	187(44.7)	231(55.3)	***1.44(1.10,1.88)*** [b]
Dist. to water source					
≤ 15 minute	41(19.3)	171(80.7)	142(43.8)	182(56.2)	1.00
> 15 "	33(28.2)	84(71.8)	164(49.1)	170(50.9)	***1.50(1.15,1.95)*** [b]
Mean water consu.					
≤ 6L/per/day	42(23.2)	139(76.8)	227(47.7)	249(52.3)	***1.37(1.03,1.82)*** [a]
> 6L/per/day	32(21.6)	116(78.4)	79(43.4)	103(56.6)	1.00

Note: [@]*Row percentages* *p<0.05* [a]*; p<0.001* [b]*; p<0.01* [c]

5.2.3. Behavioral and Child Demographic Determinants

Tables 7 and 8 present maternal childcare and health practices, and the demographic and health characteristics of index children in relation to diarrhoeal morbidity. Children who were not on breast milk [OR: 0.41, 95% CI: (0.25,0.65)] and those who were partially on breast milk [OR: 0.88, 95% CI: (0.59,1.13)] at the time of the survey were less likely to have diarrhoea than children who were exclusively on breast milk (Table 7). However, only the former showed significant association. Duration of breastfeeding was also significantly associated with childhood diarrhoeal morbidity.

Method of feeding is significantly associated with diarrhoeal morbidity. The odds of having diarrhoea in bottle-fed children was about two times higher than the odds in children who were fed using cup [OR: 1.99, 95% CI: (1.02, 3.85)]. Method of drawing water from a storage container, and covering water storage container had significant association [OR: 0.74, 95% CI: (0.56, 0.97); and OR: 1.40, 95% CI: (1.07, 1.83), respectively]. In this study, maternal diarrhoeal morbidity was significantly associated with childhood diarrhoeal morbidity [OR: 4.20, 95% CI: (2.27, 7.82)] (Table 7).

The prevalence of diarrhoea reached a peak by the second half of the first year, and the second year of the child's life. The mean age of children with diarrhoea was 17.5 months as compared to 21.7 months for those with no diarrhoea ($p<0.05$). Children aged 0–6 months had twice, 7–11 months more than three times and 12–23 months about three times higher odds of experiencing diarrhoea than children aged 36 – 59 months [OR: 2.15, 95% CI: (1.21, 3.83); OR: 3.63, 95% CI: (2.10, 6.32); and OR: 2.99, 95% CI: (1.86, 4.83), respectively] (Table 8).

The odds of having diarrhoea in children who were born third was about two times higher than the odds in children who were born first [OR: 1.85, 95% CI: (1.04, 3.31)]. Sex of the index child, place of birth and measles vaccination were not associated with diarrhoeal morbidity (Table 8).

Table 7. Maternal childcare and health practices in relation to childhood diarrhoeal morbidity by place of residence, Meskanena Mareko Woreda, Jan. 2003.

Characteristic	*Urban (n=329)*		*Rural (n=658)*		*Both (n=987)*
	Diarrhoea (%) [@]		*Diarrhoea (%)* [@]		*Crude OR*
	Yes	No	Yes	No	*(95% CI)*
*Current BF**					
Exclusive	7(21.2)	26(78.8)	52(54.2)	44(45.8)	1.00
Partial	53(26.9)	144(73.1)	203(50.0)	203(50.0)	0.88(0.59,1.13)
No	14(14.1)	85(85.9)	51(32.7)	105(67.3)	***0.41(0.25,0.65)*** [b]
Duration of BF[#] *(months)*					
< 5	6(18.2)	27(81.8)	18(47.4)	20(52.6)	1.51(0.83,2.75)
5 – 11	16(28.6)	40(71.4)	84(53.5)	73(46.5)	***2.62(1.75,3.91)*** [b]
12 – 23	39(27.3)	104(72.7)	148(51.9)	137(48.1)	***2.29(1.62,3.25)*** [b]
≥ 24	13(13.7)	82(86.3)	56(31.5)	122(68.5)	1.00
Time of introduc. suppl. feeding (month) [##]					
≤ 4	17(18.3)	76(81.7)	78(37.3)	131(62.7)	***0.62(0.43,0.89)*** [c]
5 – 6	39(26.0)	111(74)	85(50.9)	82(49.1)	0.86(0.60,1.23)
>6	11(20.8)	42(79.2)	91(48.9)	95(51.1)	1.00
Method of feeding[##]					
Cup	23(21.9)	82(78.1)	29(38.7)	46(61.3)	1.00
Hand	30(20.0)	120(80.0)	213(45.1)	259(54.9)	***1.58(1.08,2.30)*** [a]
Bottle	14(34.1)	27(65.9)	11(73.3)	4(26.7)	***1.99(1.02,3.85)*** [a]
Cover water cont.					
Yes	67(24.5)	196(74.5)	130(43.5)	169(56.5)	1.00
No	7(10.6)	59(89.4)	176(49.0)	183(51.0)	***1.40(1.07,1.83)*** [c]
Method of drawing					
Pouring	47(25.8)	135(74.2)	202(48.0)	219(52.0)	1.00
Dipping	27(18.4)	120(81.6)	104(43.9)	133(56.1)	***0.74(0.56,0.97)*** [a]
Maternal diarrhoea morbidity					
Yes	10(71.4)	4(28.6)	31(70.5)	13(29.5)	***4.20(2.27,7.82)*** [b]
No	64(20.3)	251(79.7)	275(44.8)	339(55.2)	1.00

Note: [@]*Row percentages* ** Current breast-feeding status* [#]*n=985 (Urban=327 and Rural=658)*
[##] *n=858 (Urban=296 and Rural=562)* *p<0.05* [a]*; p<0.001* [b]*; p<0.01*[c]

Table 8. Child demographic and health factors in relation to childhood diarrhoea morbidity by place of residence, Meskanena Mareko Woreda, Jan. 2003.

Characteristic	*Urban (n=329)*		*Rural (n=658)*		*Both (n=987)*
	Diarrhoea (%) [@]		*Diarrhoea (%)* [@]		*Crude OR*
	Yes	No	Yes	No	*(95% CI)*
Sex					
Male	36(24.5)	111(75.5)	160(48.3)	171(51.7)	1.23 (0.94,1.61)
Female	38(20.9)	144(79.1)	146(44.6)	181(55.4)	1.00
Age (months)					
0 – 6	10(21.3)	37(78.7)	38(46.3)	44(53.7)	***2.15(1.21,3.83)*** [c]
7 – 11	10(27.0)	27(73.0)	63(57.8)	46(42.2)	***3.63(2.10,6.32)*** [b]
12 – 23	38(30.0)	89(70.0)	135(52.7)	121(47.3)	***2.99(1.86,4.83)*** [b]
24 – 35	12(16.9)	59(83.1)	44(37.0)	75(63.0)	1.52 (0.88,2.61)
36 – 59	4(8.5)	43(91.5)	26(28.3)	66(71.7)	1.00
Birth order					
First	6(14.6)	35(85.4)	23(46.0)	27(54)	1.00
Second	12(20.0)	48(80.0)	35(41.2)	50(58.8)	1.03(0.56,1.87)
Third	9(18.8)	39(81.3)	61(59.2)	42(40.8)	***1.85(1.04,3.31)*** [a]
Fourth +	47(26.1)	133(73.9)	187(44.5)	233(55.5)	1.37(0.83,2.25)
Place of birth					
Health institute	21(26.3)	59(73.7)	5(45.5)	6(54.5)	1.00
Home	53(21.3)	196(78.7)	301(46.5)	346(53.5)	1.63 (0.99,2.70)
*Measles vaccine.**					
Yes	41(22.4)	142(77.6)	114(45.4)	137(54.6)	1.00
No	18(22.5)	62(77.5)	130(46.9)	147(53.1)	1.27 (0.95,1.72)

Note: [@]*Row percentages* * *n=791 (Urban=263 and Rural=528)*

p<0.05 [a]*; p<0.001* [b]*; p<0.01* [c]

5.3. MULTIVARIATE ANALYSIS

The multivariate analysis is performed by taking the conceptual framework (Fig. 1) into consideration. Stepwise logistic regression technique was used to assess the relative effect of the explanatory factors on the outcome factor. To avoid an excessive number of variables and unstable estimates in the subsequent model, only variables reached a p-value less than 0.3 were kept in the subsequent analyses (30).

The overall effect of the selected socioeconomic variables (Table 5) on childhood diarrhoeal morbidity was assessed in the first step. In the second step of the analysis, the environmental variables (Table 6) were added, and their effect was assessed in the presence of the socioeconomic variables. Behavioral factors (Tables 7 & 8) were entered in the third step. In this step, the effect of the selected behavioral factors was assessed in the presence of both socioeconomic and environmental factors. Table 9 presents the socioeconomic, environmental and behavioral variables which remained in each step of the analysis.

From the socioeconomic variables entered in the first step of the analysis, place of residence, number of under-five children in a household, ownership of livestock and production of cash crop remained significant in the final step (Table 9). According to this study, rural children had more than five times higher odds of having diarrhoea than their urban counterparts [OR: 5.06, 95% CI: (2.10, 12.21)]. The odds of having diarrhoea in children who lived in households where there were two or more children were about two times higher than the odds in children who lived in households where there was only one child [OR: 2.07, 95% CI: (1.48, 2.89)]. Ownership of livestock and production of cash crop were also significantly associated

with childhood diarrhoeal morbidity [OR: 1.52, 95% CI: (1.03, 2.24) and OR: 1.66, 95% CI: (1.12, 2.47), respectively]. Mothers' occupation and fathers' educational status showed significant association with diarrhoea morbidity in the first [OR: 0.66, 95% CI: (.044, 0.99)] and second [OR: 1.37, 95% CI: (1.01, 1.86)] step of the analysis, respectively. However, their significance disappeared in the third level of the analysis.

Method of refuse disposal remained significant in the final model, from all the environmental variables tested in the second step of the analysis. The odds of diarrhoea in households where refuse was disposed indiscriminately was significantly higher than the odds in those households that burned or used pit to dispose the refuse [OR: 1.82, 95% CI: (1.06, 3.11)]. Even though number of rooms in a house showed significant association with diarrhoeal morbidity in the second step of the analysis, the significance disappeared in the final step. Type of drinking water source showed significant association in the bivariate analysis [OR: 1.44, 95% CI: (1.10, 1.88)], however, the association disappeared and the direction of association was changed in the multivariate analysis.

Children who were not breast fed at the time of the survey were less likely to have diarrhoea than those children who were partially breastfed [OR: 0.56, 95% CI: (0.38, 0.82)]. Maternal diarrhoea morbidity was also associated with more than a four-fold increase in the odds of diarrhoeal disease [OR: 4.09, 95% CI: (2.12, 7.86)]. Even though method of water drawing and method of feeding showed significant association in the bivariate analysis, their significance disappeared in the final step of the multivariate analysis [OR: 0.74, 95% CI: (0.53, 1.04) and OR: 1.583, 95% CI: (0.78, 3.22), respectively] (Table 9).

Table 9. Summary of the stepwise logistic regression analysis of the relative effect of socioeconomic, environmental and behavioral factors on the prevalence of childhood diarrhoea, Meskanena Mareko Woreda, Jan. 2003.

Characteristic	Crude OR (95% CI)	Adjusted OR (95% CI)		
		Model 1	Model 2	Final Model
Model 1 (Socioeconomic variables) [#]				
Place of residence	***3.00****	***4.766****	***4.743****	***5.064****
(Rural Vs Urban*)	***(2.19,4.09)***	***(2.619,8.673)***	***(1.930,11.65)***	***(2.099,12.214)***
Mothers' occupation	***1.51****	***0.660****	0.783	0.715
(Housewife Vs Other*)	***(1.09,2.07)***	***(0.440,0.991)***	(0.520,1.180)	(0.454,1.126)
Fathers' education	***1.50****	1.332	***1.372****	—
(Illiterate Vs Literate*)	***(1.14,1.99)***	(0.975,1.821)	***(1.012,1.862)***	
No. of children	***1.96****	***2.206****	***2.072****	***2.066****
(>1 Vs one*)	***(1.50,2.56)***	***(1.643,2.963)***	***(1.558,2.757)***	***(1.480,2.885)***
Own livestock	0.80	***1.538****	***1.615****	***1.520****
(No Vs Yes*)	(0.61,1.04)	***(1.084,2.182)***	***(1.096,2.381)***	***(1.031,2.241)***
Produce cash crop	0.82	***1.517****	***1.513****	***1.662****
(No Vs Yes*)	(0.63,1.07)	***(1.082,2.127)***	***(1.055,2.169)***	***(1.118,2.470)***
Maternal age	1.05	1.308	1.344	—
(15-24 Vs >34*)	(0.69,1.60)	(0.793,2.157)	(0.851,2.122)	
Maternal age	1.07	1.222	1.214	—
(25-34 Vs >34*)	(0.77,1.47)	(0.849,1.757)	(0.862,1.711)	
Model 2 (Socioeconomic + Environmental variables) [#]				
Type of roof	***2.76****		1.441	—
(Thatched Vs Corr. iron*)	***(2.05,3.73)***		(0.733,2.834)	
Source of water	***1.44****		0.776	0.712
(Unproted Vs Protected*)	***(1.10,1.88)***		(0.545,1.106)	(0.478,1.062)
Refuse disposal method	***2.85****		1.535	***1.817****
(Open field Vs Pit/burn*)	***(1.88,4.32)***		(0.927,2.542)	***(1.062,3.109)***
Number of rooms	0.89		***0.620****	0.769
(One Vs >1*)	(0.67,1.17)		***(0.452,0.850)***	(0.543,1.090)
Model 3 (Socioeconomic + Environmental + Behavioral variables) [#]				
Method of drawing	***0.74****			0.739
(Dipping Vs Pouring*)	***(0.56,0.97)***			(0.528,1.036)
Mother had diarrhoea	***4.20****			***4.086****
(Yes Vs No*)	***(2.27,7.82)***			***(2.124,7.861)***
Current breastfeeding	***0.41****			***0.555****
(No BF Vs Breastfed*)	***(0.25,0.65)***			***(0.377,0.817)***
Method of feeding	***1.99****			1.583
(Bottle Vs Cup/Spoon*)	***(1.02,3.85)***			(0.778,3.220)

[#] Only variables reached p-value less than 0.3 were kept in the subsequent analyses, and displayed in the table.

**** Reference group ** Significant at p<0.05***

VI. DISCUSSION

The findings of this study revealed that the two-week period prevalence of diarrhoea in under-fives was 51.4 percent. This figure is quite high compared with the findings in Keffa-Sheka Zone (15%), in Adami-Tulu Woreda (22.7%), North Gondar Zone (17.9%) and the recent Demographic and Health Survey report (24%) (6,20,22,36). The difference in prevalence could be attributed to the difference in the method of data collection. In the present study, information on diarrhoeal morbidity was collected from two visits made in two weeks interval, and the two-week period diarrhoea prevalence was calculated from the information obtained from these visits (see the methods section). The other studies collected the same information from one visit using a two-week recall period. Thus, this point should be taken into account in comparing the findings.

The point prevalence of diarrhoea in under-five children in this study was 38.5 percent. The two- week period incidence, on the other hand, was 12.9 percent. The incidence rate observed in this study is lower than the Mortality-morbidity and Treatment (MMT) surveys, i.e. 16%, conducted in different parts of Ethiopia earlier (4,7). This lower two-week period incidence rate might be explained, to some extent, by the recall bias as some mothers/caretakers forgot to make any sign on the case registry card that were given to them.

In this study, a large discrepancy was observed between the prevalence and incidence rates. This discrepancy is mainly because the point prevalence includes all children who had diarrhoea at the time of the first visit, regardless of the time when the diarrhoea started, and

incidence was based on only 2-week period. Out of the total children who had diarrhoea at the time of the survey, 16.8% of the children had diarrhoea that lasted for more than 15 days.

The result showed also that the odds of having diarrhoea was significantly higher among children younger than two years of age than the odds in older children. Significant increase in diarrhoea prevalence in this age group reflects the combined effect of declining level of maternal acquired immunity; the introduction of food or liquid that may be contaminated with pathogens; and direct contact with human and animal excreta when the child starts to crawl (2,16,20,21).

From all socioeconomic variables tested in, number of children in a household, residence place, ownership of livestock and production of cash crop persisted their significance in the multivariate model. Studies documented that the number of children in a family had impacts on the occurrence of diarrhoea in children. As the number of children in a family becomes larger, there may be crowding which deteriorate the hygiene condition, which in turn increases the chance of contact with pathogens. There may also be competition for mother's time and attention and other resources (2,12,13,16). The odds of having diarrhoea associated with the number of children remained significant even after controlling for all environmental, behavioral and other socioeconomic variables considered in this study.

In this study, rural children exhibited more than five higher odds of getting diarrhoea than their urban counterparts. This variation in prevalence between urban and rural persisted even after adjusting for environmental, behavioral and other socioeconomic variables. This may be

attributed to the difference between urban and rural areas in literacy status, type of water source and latrine availability. Other studies also demonstrated a significant variation in diarrhoea prevalence between urban and rural children (2). Place of residence, urban-rural, affects mothers' exposure to education and the extent to which proper sanitation, clean water and health care facilities are available (2,12).

Studies considered ownership of durable goods, such as radio, television, refrigerator, or livestock, or whether a family produce cash crop as proxy measure for household economic status (2,12,45,46). Others also considered parental education and occupation as proxy measure for household income (27,35). We have considered, in this study, ownership of radio and livestock and production of cash crop as proxy measures for households' economic status. Accordingly, the effect of radio ownership on childhood diarrhoeal morbidity disappeared in the multivariate analysis. On the other hand, the effect of livestock ownership and production of cash crop remained significant even after adjusting for other variables tested in this study.

Although maternal education showed an association with the occurrence of childhood diarrhoea in the bivariate analysis, it exhibited no significant association with diarrhoea morbidity once other variables were controlled for. In similar studies done in The Republic of Congo and Zimbabwe maternal education showed no significant association with childhood diarrhoeal morbidity (12,29). In a cohort study in Zaire, parental education was significantly associated with diarrhoeal incidence in children (13). However, some authors agree that maternal education has a greater effect on diarrhoea mortality than morbidity (29). This is so because educated mothers may be unable to reduce risk of exposure from a contaminated

community environment or lack of safe water, however, their knowledge allows them to early recognize the disease, and use health care facilities effectively.

Poor environmental sanitation and water supply have been reported by many studies to increase the risk of morbidity and mortality from diarrhoea. However, such associations have not been consistently observed in different studies, especially of children (2,12,20,21). Although the significance disappeared in the multivariate analysis, number of rooms in a house; type of water source; distance to water source; availability of latrine; and staying of animals indoor with people were significantly associated with the occurrence of diarrhoea in the bivariate analysis.

The lack of association between type of water source and latrine availability and diarrhoeal morbidity may be explained by no great differences exist in the sample households with respect to the use of protected water source and latrine availability. From the households studied only 31.7% had latrine and 56.2% use protected water sources. In addition to this, type of water source provides little information about water quality or protection against diarrhoeal infection. From all the environmental variables considered in this study, only method of refuse disposal remained significant after controlling for socioeconomic, behavioral and other environmental variables. Method of refuse disposal was found to be the only significant determinant of diarrhoeal morbidity from among water and sanitation variables measured in The Republic of Congo (12).

It is well documented that maternal childcare and hygiene practices have important impacts on the occurrence of diarrhoea in children (12,38). In this study, maternal diarrhoeal morbidity and current breastfeeding status were found to be significant predictors of diarrhoeal morbidity in children. The four-fold increase in the odds of getting diarrhoea in children whose mothers had diarrhoea may be explained by the fact that maternal morbidity may be considered as a sign of disease exposure in a family. This is so because mothers are food handlers of the family, and also they are usual childcare providers (12). Moreover, the care of the child may be compromised if the mother herself is sick. Similar finding was observed in Congo where maternal diarrhoeal morbidity was associated with a two-fold increase in the odds for diarrhoeal disease in children (12).

Breastfeeding is an effective means of protecting children from diarrhoeal disease. This protection is greatest in the first three months of life, and falls thereafter (11,12,21). The finding of this study showed that children who were not breastfed at the time of the survey were less likely to have diarrhoea compared to breastfed children. This association is exhibited in both bivariate [OR: 0.41, 95% CI: (0.25, 0.65)] and multivariate [OR: 0.56, 95% CI: (0.38, 0.82)] analyses. This finding may have resulted from the confounding effect of age. In this study, the majority of children who were not breastfed at the time of the survey were above two years of age. In older children, repeated infections from enteric pathogens stimulate immunity, which helps declining of diarrhoeal disease in children older than two years. However, child's age, though not included in the conceptual framework, was entered in the final model of the multivariate analysis to see its effect. Accordingly, the statistical

significance of current breastfeeding status disappeared, while the direction of association remained the same [OR: 0.81, 95% CI: (0.49, 1.34)].

It has been documented that there is a high chance of contamination, and greater risk of diarrhoea associated with bottle-feeding (11,21,38). Even though it was not statistically significant in the multivariate analysis, the odds of getting diarrhoea in bottle-fed children was about one and a half times greater than the odds among children who were not bottle-fed. Bottle-feeding was significantly associated with diarrhoeal morbidity in the bivariate analysis [OR: 1.99, 95% CI: (1.02, 3.85)]. Similar findings were observed in Jimma, southwest Ethiopia (21).

In different studies, it was observed that water-handling practices were associated with the occurrence of diarrhoea (14,20). In the current study, method of drawing water from the storage containers and use of cover for the storage container were considered from the water-handling practices. In the bivariate analysis, children who live in households where water storage container is not covered have higher odds of having diarrhoea than their counterparts [OR: 1.40, 95% CI: (1.07, 1.83)]. However, this significance disappeared in the multivariate analysis.

Studies revealed that obtaining water from storage containers by dipping was a risk factor for diarrhoea, and suggested that hands and objects introduced in to stored water were sources of contamination (20,47). In contrast to these findings, the present study showed that children who live in households where water is dipped out are less likely to have diarrhoea compared

to those who live in households where water is poured out. This association is observed in both bivariate [OR: 0.74, 95% CI: (0.56, 0.97)] and multivariate [OR: 0.74, 95% CI: (0.53, 1.04)] analyses. Further investigation is necessary to have clear idea on this variable, as it is one of the important variables that determine the transmission of diarrhoeal disease (14,47).

Limitations and Strengths of the Study

Limitations

As being cross-sectional in the design, this study shares the drawbacks of similar cross-sectional studies. In cross-sectional studies, it is difficult to entertain the seasonal differences in the occurrence of diarrhoeal diseases. The information on the prevalence of diarrhoea may not reflect the actual situation that may be observed in the various seasons of the year, as the information on diarrhoea was collected in January, which is a dry season.

The other limitation is related to the definition of the term *"diarrhoea."* There may be difference among mothers in perceiving their child's health. And, the definition of diarrhoea given by mothers shares this difference in perception. This was considered during the design, and it was tried to give the definition of diarrhoea to the mother.

Strengths

The present study assessed the households' socioeconomic, environmental and behavioral characteristics that are considered to have effects on child health, in general, and childhood diarrhoea morbidity, in particular. Considering multiple contributing factors that affect child health may help use the limited resources more effectively, by identifying the most important risk factors. The multiple factors considered in this study were analyzed using a stepwise logistic regression technique. This technique helps control for mediating and confounding factors, and also to identify the most important risk factors for proper intervention. Being a comparative study design is also an advantage.

VII. CONCLUSIONS

This study has shown that the prevalence of diarrhoea in under-five children is quite high. The prevalence is higher among rural children. Moreover, children younger than two years of age are highly affected.

In consistent with other study findings, place of residence, numbers of children in a household and economic status of a household were found to be significant socioeconomic determinants of diarrhoeal morbidity. Living in rural areas; having more than one child in a household; not owning livestock; and not producing cash crop are risk factors for the occurrence of diarrhoea in under-five children. Unlike common beliefs and results of some studies, maternal education did not show an association with diarrhoea morbidity, in the multivariate analysis.

The study has also shown that indiscriminate disposal of refuse is a risk factor for diarrhoeal morbidity. Even though poor environmental conditions are generally believed to increase the risk of diarrhoeal morbidity, the majority of the environmental variables included in this study showed no significant association with diarrhoea morbidity in the multivariate analysis.

Maternal practices related to childcare determine the occurrence of diarrhoea in children. In this study, maternal practices related to breastfeeding and the occurrence of diarrhoea in mothers are found to be significant predictor of diarrhoea in children.

VIII. RECOMMENDATIONS

As seen in this study, poverty, crowding and poor environmental conditions are associated with the occurrence of diarrhoea in children. These problems may be alleviated in the long run, by integrated efforts of different sectors. However, there are activities that can be performed before long-term solutions are obtained. Taking this into consideration, the following recommendations are forwarded based on the findings of the study.

1. Providing simple and "easy to understand" information to the mothers/caretakers on how to care for a child especially during they (mothers) are ill.

2. Strength and incorporate family planning service activities in the prevention of childhood diarrhoea.

3. Improve the environmental condition at the household level by providing continuous information and minimal material support.

4. Further study to identify the possible factors that are responsible for the high prevalence of diarrhoea in rural areas for proper interventions.

IX. REFERENCES

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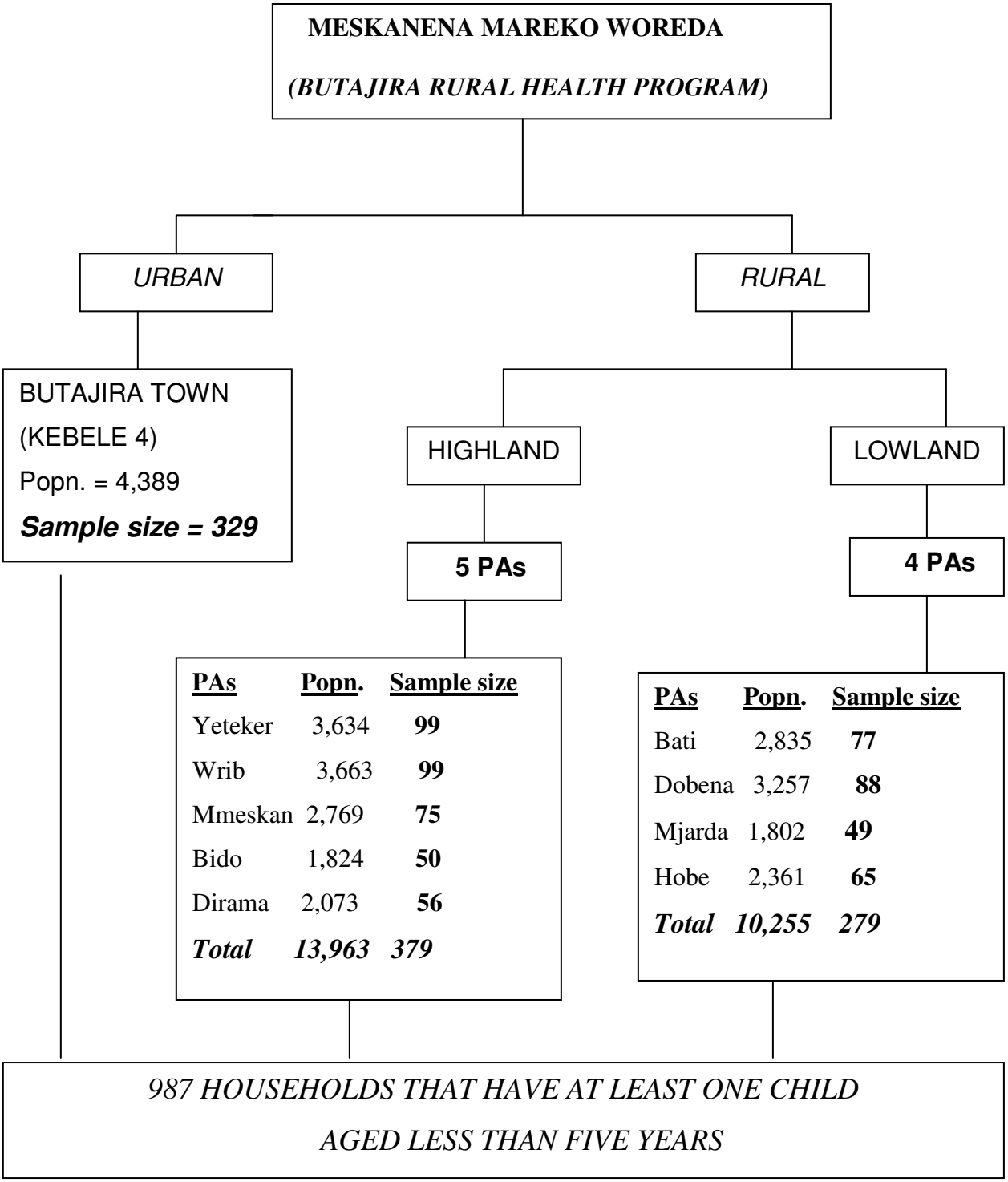
<u>ANNEX 1</u>. MAP OF MESKANENA MAREKO WOREDA, INDICATING THE STUDY SITES.

ANNEX 2. ***SCHEMATIC REPRESENTATION OF THE SAMPLING PROCEDURE***



ANNEX 3. QUESTIONNAIRE- ENGLISH VERSION

ADDIS ABABA UNIVERSITY
MEDICAL FACULTY
DEPARTMENT OF COMMUNITY HEALTH

QUESTIONNAIRE PREPARED TO ASSESS DETERMINANTS OF CHILDHOOD DIARRHOEA MORBIDITY IN MESKANENA MAREKO WOREDA, 2002/03

HOW TO APPROACH and INTERVIEW THE HOUSEHOLD

- You will be given the name of the household head and the house number that is going to be interviewed.
- Once you get the household, you should get permission to enter in to the house. Do not rush in to the house with out the permission of the household members.
- Introduce yourself by name, and explain the purpose of your visit.
- Tell the household member "*WHY"* and "*HOW"* the household is selected for the study.
- Ask whether the mother/caretaker of the child is present.
- If the mother/caretaker is there, briefly explain the purpose of the study by reading what is written on the questionnaire, and ask for her consent.
- If the mother/caretaker is not around, take an appointment for another visit.
- **At the end of the interview**, tell the respondent that it is the end of the interview, and thank the individual for giving her/his time.

CONSENT

My name is _____. I am working for Butajira Rural Health Program. I am going to collect information for a study on childhood diarrhoea. The study is designed by Addis Ababa University to assess the effect of households' socioeconomic, environmental and behavioral factors on the occurrence of childhood diarrhoea. I assure you that the information that you are going to give will be kept in secrete. Therefore, you are free to respond or not to respond the questions. Your support and willingness in responding the questions will be very important for the success of this study.

Do you agree to participate in this study? Yes_____ No_____

If no, go to the next house.

THANK YOU FOR YOUR COOPERATION.

IDENTIFICATION

001. Mother's ID number: _____

002. Address Rural:

Highland/Lowland

PA name: _____ House number: _____

Urban:

Kebele**:** _____ House number: _____

003. Number of persons in the household_____

004. Number of under-five children in the household_____

List all under-five children present in the household

S.No	NAME OF THE CHILD	SEX	AGE (In months)	DIARRHEA AT THE TIME OF THE SURVEY**

**** Mark " √ " if the child has diarrhoea, and mark " X " if he hasn't*

PART I. SOCIOECONOMIC CONDITIONS

NO.	*QUESTIONS AND FILTERS*	*RESPONSES*	
Q101	Relation of the respondent to the child	1. Mother 2. Caretaker	
Q102	Age of the mother/caretaker	_____ Years	
Q103	Marital status of the mother/caretaker	1. Married 2. Divorced 3. Single 4. Widowed	
Q104	Religion of parents/caretaker	1. Christian 2. Muslim 3. Other (specify)	
Q105	Ethnic group of parents/caretakers	1. Sodo 4. Selti 2. Meskan 5. Mareko 3. Dobi 6. Welene 7. Other	
Q106	Educational level of mother/caretaker	1. Formal education (last grade completed) 2. Read and write	

		3. Read only 4. Neither	
Q107	Occupation of the mother/caretaker	1. Housewife 2. Government employee 3. Private gainful work 4. Other (specify)	
Q108	Age of the child's father	_____Years	
Q109	Educational level of the father	1. Formal education (last grade completed) 2. Read and write 3. Read only 4. Neither	
Q110	Occupation of the father	1. Government employee 2. Merchant 3. Farmer 4. No job 5. Other (specify)	
Q111	Perceived economy (compared to the neighbors)	1. Very poor 4. Rich 2. Poor 5. Very rich 3. Average 6. No response	
Q112	Does the family own radio?	1. Yes 2. No	
Q113	Does the family have livestock?	1. Yes 3. No response 2. No	
Q114	If yes, for Q113, number & type of livestock?		
Q115	Does the family produce cash crop (do not include teff, wheat, barley and other cereals)?	1. Yes 2. No 3. No response	
Q116	If yes for, Q115, what type of cash crop do you produce?	1. Pepper 3. Both 2. Khat 4. Other	

PART II. ENVIRONMENTAL HEALTH CONDITIONS

Q201	Type of floor material of the living house *(OBSERVATION)*	1. Mud 3. Cement 2. Wood 4. Other (specify)	
Q202	Type of roof material of the living house *(OBSERVATION)*	1. Thatched 2. Corrugated iron sheet 3. Other (specify)	
Q203	Do animals live in the same house where the members of the family live? *(OBSERVATION)*	1. Yes 2. No	
Q204	Number of rooms in the house	_____	
Q205	Is latrine available?	1. Yes 2. No (If No, skip to Q208)	
Q206	Ownership of the latrine	1. Privately owned 2. Shared with neighbors	
Q207	Is feces seen around the pit-hole (or on the floor)? *(OBSERVATION)*	1. Yes 2. No	
Q208	Is feces seen around the house (or in the compound)? *(OBSERVATION)*	1. Yes 2. No	
Q209	If the family has no latrine, where do you dispose human waste?	1. Open field 2. Other (specify)	
Q210	How do you dispose refuse?	1. Pit 3. Open field 2. Burning 4. Garbage can 5.Other	

Q211	From where do you get water for drinking? *(OBSERVATION)*	1. Pipe 2. Protected well/spring 3. Unprotected well/spring 4. River 5. Other (specify)	
Q212	Distance from the house to the water source	_____ Minutes	
Q213	Type of collection container	1. Pot 4. Jerry can 2. Plastic bucket 5. Other 3. Iron bucket	
Q214	How did you transport the collected drinking water to the house yesterday?	1. In a covered container 2. In an uncovered container 3. Other (specify)	
Q215	Capacity of the container, which you used to collect drinking water yesterday?	_____ Liters	
Q216	How many times did you collect water for drinking yesterday?		

PART III. BEHAVIORAL ASPECTS

Q301	Does the child take other food than breast milk?	1. Yes 2. No (If No skip to Q305)	
Q302	Do you separately prepare food for the child, using a separate material?	1. Yes 2. No	
Q303	What food/fluid is the child mostly receiving (if the child is not on exclusive breastfeeding)?	1. Cow's milk 4. Adults' food 2. Powder milk 5. Other 3. Gruel	
Q304	What do you use to feed the child?	1. Hand 4. Bottle 2. Cup and spoon 5. Other 3. Cup	
Q305	Does the drinking-water storage container have a cover? *Ask the respondent to show you the storage container.*	1. Yes 2. No	
Q306	Is there a separate can for taking drinking water from the storage container? *Ask the respondent to show you the can*	1. Yes 2. No	
Q307	How do you take water from the drinking water storage container?	1. Pouring 2. Dipping	
Q308	Do you know that flies can transmit diseases?	1. Yes 2. No	
Q309	If “Yes”, can you tell me the name of the diseases?	1. Diarrhoea 2. Typhoid fever 3. Cholera 4. Trachoma 5. Do not know the names 6. Other (specify)	
Q310	Do you know that excreta of children can be a cause of diseases?	1. Yes 2. No	
Q311	If “Yes”, what do you do to avoid this problem?		
Q312	In your opinion, what is/are the use of latrine?		

PART IV. INFORMATION OF THE INDEX CHILD

Ask the mother/caretaker about the child with diarrhoea, or if there is no child with diarrhoea, ask about the child who is younger than others.

Q401	Age of the index child	_____ Months	
Q402	Sex of the index child	1. Male 2. Female	
Q403	Where was your child born?	1. Health institution 2. Home	

Q404	Birth order of the child	1. First 3. Third 2. Second 4. Fourth &above	
Q405	Do you (the mother/caretaker) have a history of diarrhoea in the past two weeks?	1. Yes 2. No	
Q406	Have you ever breast-fed your child?	1.Yes 2. No (Skip to Q408)	
Q407	For how long did you breastfed your child?	_____Months	
Q408	What is his/her current breastfeeding status?	1. Exclusive breastfeeding 2. Partial breastfeeding 3. Not breastfeeding	
Q409	At what age the child started supplementary /weaning food?	_____ Months	
Q410	Did the child receive measles vaccination? *Ask for children of age greater than nine months*	*1.* Yes, *(by the response of the respondent)* *2.* Yes, *(by checking the card)* 3. No	
Q411	Do your child have diarrhoea today?	1. Yes 2. No	
Q412	For how long the diarrhoea last?	1. Less than 14 days 2. Greater than 14 days	
Q413	If the child has diarrhea today, how many times a day he/she passes stool?	1. Three times 2. More than three times 3. Don't know	
Q414	The type of diarrhoea that the child had	1. Watery 2. Blood and mucus	
Q415	What actions do you take to treat/stop the diarrhoea?	1. Take him/her to health institution 2. Take him/her to traditional healer 3. Increase feeding 4. Give him/her ORS 5. Give him/her cereal based fluids 6. Stop/decrease feeding 7. Home made treatment 8. Other (specify)	

Date of interview----------

Name of the interviewer---------- Signature----------

ANNEX 4. QUESTIONNAIRE- AMHARIC VERSION

በአዲስ አበባ ዩኒቨርስቲ
ሕክምና ፋከልቲ
የሕብረተሰብ ጤና ትምሕርት ክፍል

ከአምስት አመት ዕድሜ በታች ባሉ ሕፃናት ላይ የሚከሰተውን የተቅማጥ በሽታ ወሳኝ ምክንያቶቹን ለማወቅ የተዘጋጀ መጠይቅ::

ቃለመጠይቁን ከመጀመርሕ በፊት የሚከተሉትን ነጥቦች አስታውስ፤

- **ለጥናቱ የተመረጠው ቤት ቁጥር እና የሕፃኑ እናት መለያ ቁጥር ቃለመጠይቁን ከመጀመርሕ በፊት መያዝሕን አረጋግጥ:: የተመረጠውን ቤት ካገኘሕ በኋላ፤ ወደ ውስጥ ለመግባት መጀመሪያ ቤት ውስጥ ካለ ሰው ፍቃድ ማግኘት ይኖርብሃል፣ ፍቃድ ሳታገኝ በፍፁም ወደ ቤቱ መግባት የለብሕም**
- **በቤቱ ውስጥ ላለው ሰው ስምሕን በመናገር ራስሕን አስተዋውቅ፣ የመጣሕበትንም አላማና ቤቱ ለጥናቱ እንዴትና ለምን እንደተመረጠ በቤቱ ውስጥ ላገኘኸው ሰው ንገር**
- **ያገኘኸው ሰው የሕፃኑ እናት/አሳዳጊ ካልሆነ፣ የሕፃኑን እናት/አሳዳጊ እንዲያገናኝሕ ጠይቅ**
- **የሕፃኑ እናት/አሳዳጊ በቤት ውስጥ ካገኘሕ፣ የጥናቱን አላማ *"የስምምነት መጠየቅያ"* ከሚለው በታች የተፃፈውን በማንበብ ለቃለምልልሱ ፍቃደኛ መሆኗን/መሆኑን ጠይቅ**
- **የሕፃኑ እናት/አሳዳጊ በቤት ውስጥ ካላገኘሕ፣ መቼ እንደሚገኙ ጠይቀሕ ለሌላ ጊዜ ቀጠሮ ይዘሕ ወደሚቀጥለው ቤት እለፍ**
- **ቃለምልልሱን ከጨረስክ በኋላ፤ ቃለምልልሱን እንደጨረስክ ተናግረሕ፣ ግለሰቡን/ግለሰባን አመስግነሕ ወደሚቀጥለው ቤት እለፍ**

<u>የስምምነት መጠየቅያ</u>

ስሜ---------- ይባላል:: የምሰራው በቡታጅራ የገጠር ጤና ፕሮግረም ውስጥ ነው:: ይሕ መጠይቅ በሕፃናት ላይ የሚከሰተውን የተቅማጥ በሽታ የሚያመጡ ዋና ዋና ምክንያቶች ለማወቅ በአዲስ አበባ ዩኒቨርስቲ የተዘጋጀ መጠይቅ ነው:: መጠይቁ የሚሞላው በቃለ-ምልልስ ሲሆን፤ የሚሰጡት ምላሽ ለማንም ግለሰብ ወይም ድርጅት ተላልፎ የማይሰጥና ምስጥራዊነቱም የተጠበቀ ይሆናል:: ጥናቱ ውጤታማ ሊሆን የሚችለው እርስዎ በሚሰጡት ትክክለኛ መልስ ላይ በመሆኑ፤ ጥያቄዎቹን በጥንቃቄ እንዲመልሱልን ፍቃደኝነትዎን በትሕትና እንጠይቃለን::

ቃለ-ምልልሱን ለማድረግ ተስማምተዋል?

አዎ ተስማምቻለሁ----------

አልስማማም----------(ወደሚቀጥለው ቤት እለፍ)

መለያ

001. የእናትየው/የአሰሳደጊው መለያ ቁጥር ----------

002. አድራሻ ገጠር

ቆላ---------- ደጋ----------

የገ/ማ ስም------ የቤት ቁ----------

ከተማ

ቀበሌ 04 የቤት ቁ----------

003. ጠቅላላ የቤተሰብ ብዛት ----------

004. በቤቱ ውስጥ ያሉ ከአምስት አመት ዕድሜ በታች ሕፃናት ብዛት ----------

በቤቱ ውስጥ ያሉ ከአምስት አመት ዕድሜ በታች ሕፃናት ዝርዝር

ተ.ቁ	የሕፃኑ ስም	የሕፃኑ ፆታ	የሕፃኑ ዕድሜ (በወራት)	በአሁኑ ጊዜ ሕፃኑ ተቅማጥ ይዞታል?

ሕፃኑ ተቅማጥ ይዞት ከሆነ ይህንን ምልክት አድርግ "√ "

ሕፃኑ ተቅማጥ አልያዘው ከሆነ ደግሞ ይህንን አድርግ "X "

ክፍል አንድ፣ ማሕበራዊና ኢኮኖሚያዊ ሁኔታዎች

ተ.ቁ	ጥያቄዎችና ማጣሪያዎች	አማራጭ መልሶች	ኮድ ቁ
Q101	*መላሿ/ሹ ከሕፃኑ ጋር ያላቸው ግንኙነት*	*1* እናት *2* ሌላ አሳዳጊ	
Q102	የሕፃኑ እናት/አሳዳጊ ዕድሜ	ዓመት	
Q103	የሕፃኑ እናት/አሳዳጊ የጋብቻ ሁኔታ	*1* ያገባች *2* የተፋታች *3* ያላገባች *4* ባል በሞት የተለያት	
Q104	የሕፃኑ ወላጆች/አሳዳጊዎች ሃይማኖት	*1* ክርስቲያን *2* ሙስሊም *3* ሌላ (ይገለፅ)	
Q105	የሕፃኑ ወላጆች/አሳዳጊዎች ዘር/ነሳ	*1* ሶዶ *5* ማረቆ *2* መስቃን *6* ወለኔ *3* ዶቢ *7* ሌላ (ይገለፅ) *4* ስልጤ	
Q106	የሕፃኑ እናት/አሳዳጊ የትምሕርት ደረጃ	*1* መደበኛ ትምህርት *(የመጨረሻ የትምህርት ደረጃ ይገለፅ)* *2* መፃፍና ማንበብ *3* ማንበብ ብቻ *4* ምንም ያልተማረ	
Q107	የሕፃኑ እናት/አሳዳጊ የስራ ሁኔታ	*1* የቤት እመቤት *2* የመንግስት ሰራተኛ *3* ገቢ የሚያስገኝ የግል ስራ *4* ሌላ (ይገለፅ)	
Q108	የሕፃኑ አባት ዕድሜ	ዓመት	
Q109	የሕፃኑ አባት የትምሕርት ደረጃ	*1* መደበኛ ትምህርት *(የመጨረሻ*	

		ዮትምህርት ደረጃ ይገለፅ) *2* መፃፍና ማንበብ *3* ማንበብ ብቻ *4* ምንም ያልተማረ	
Q110	የሕፃኑ አባት የስራ ሁኔታ	*1* የመንግስት ሰራተኛ *2* ነጋዴ *3* ገበሬ *4* ስራ የለውም *5* ሌላ (ይገለፅ)	
Q111	ከጎረቤትዎ ጋር ሲያነጻጽሩ የርስዎን የኑሮ ደረጃ ከየትኛው ይመድቡታል? *(አማራጮቹን አታንብብላቸው)*	*1*. በጣም ድሃ *4*. ሐብታም *2*. ድሃ *5*. በጣም ሐብታም *3*. መካከለኛ *6*. ለመመለስ ፈቃደኛ አይደሉም	
Q112	ቤተሰቡ ሬድዮ አለው?	*1* አለው *2* የለውም	
Q113	ቤተሰቡ ላም በሬ በግ ፍየል አህያ የመሳሰሉት እንስሳት	*1* አለው *2* የለውም (መልሱ <u>*ይለውም*</u> ከሆነ ወደ Q115 እለፍ) *3* ለመመለስ ፍቃደኛ አይደሉም	
Q114	የ Q113 መልሱ " አለው " ከሆነ ቁጥራቸውና አይነታቸው ይገለፅ		
Q115	ቤተሰቡ በዚህ አመት ለሽያጭ የሚውሉ ተክሎችን ያበቅላል? *(ጫት በርበሬ እና ቡና ብቻ ይጨምራል)*	*1* አዎ *2* አያበቅልም(መልሱ <u>*አያበቅልም*</u> ከሆነ ወደ Q201 እለፍ) *3* ለመመለስ ፍቃደኛ አይደሉም	
Q116	የ Q115 መልሱ " አዎ " ከሆነ የተክሎችን አይነቶች ይገለፅ	*1* በርበሬ *3* ሁለቱንም *2* ጫት *4* ሌላ (ይገለፅ)	

ክፍል ሁለት፣ የአካባቢ ጤና ሁኔታ

Q201	የመኖሪያ ቤቱ ወለል ሁኔታ *(ቤቱን በመቃኘት የሚመለስ)*	*1* አፈር *2* እንጨት (ጣውላ) *3* ሲሚንቶ *4* ሌላ (ይገለፅ)	
Q202	የመኖሪያ ቤቱ ጣሪያ የተሰራበት *(ቤቱን በመቃኘት የሚመለስ)*	*1* የሳር ክዳን *2* የቆርቆሮ ክዳን *3* ሌላ (ይገለፅ)	
Q203	እንስሳት በቤት ውስጥ ከሰዎች ጋር አብረው ይኖራሉ? *(ቤቱን በመቃኘት የሚመለስ)*	*1* አዎ *2* አይኖሩም	
Q204	በቤቱ ውስጥ ያሉት ክፍሎች ብዛት		
Q205	ቤተሰቡ መፀዳጃ ቤት	*1* አለው *2* የለውም (መልሱ የለውም ከሆነ ወደ Q208 እለፍ)	
Q206	የመፀዳጃ ቤቱ የባለቤትነት ሁኔታ	*1* የግል *2* የጋራ	
Q207	በመፀዳጃ ቤቱ አካባቢ የሰው አይነምድር ይታያል? *(አካባቢውን በመቃኘት የሚመለስ)*	*1* አዎ *2* አይታይም	
Q208	በመኖሪያ ቤቱ አካባቢ የሰው አይነምድር ይታያል? *(አካባቢውን በመቃኘት የሚመለስ)*	*1* አዎ *2* አይታይም	
Q209	መፀዳጃ ቤት ከሌለ ቤተሰቡ የት ይጠቀማል?	*1* በየሜዳው *2* ሌላ (ይገለፅ)	
Q210	ደረቅ ቆሻሻን እንዴት ያስወግዳሉ?	*1* በጉድጉዋድ ውስጥ *2* በማቃጠል *3* በየሜዳው *4* በእቃ አጠራቅመው ሌላ ቦታ ይደፋሉ *5* ሌላ (ይገለፅ)	

Q211	የመጠጥ ውሃ ከየት ያገኛሉ?	1 ከባንባ 2 ከተጠበቀ የውሃ ጉድጉዋድ/ምንጭ 3 ካልተጠበቀ የውሃ ጉድጉዋድ/ምንጭ 4 ከወንዝ 5 ሌላ (ይገለፅ)	
Q212	ውሃ በሚቀዳበትና በቤቱ መካከል ያለው የደርሶ መልስ ርቀት	ደቂቃ	
Q213	ብትናትናው ዕለት ለመጠጥ የሚሆነውን ውሃ የቀዱበት ዕቃ ምን አይነት ነበር?	1 እንስራ 2 ባልዲ (ፕላስቲክ) 3 ባልዲ (ብረት) 4 ጄሪ ካን 5 ሌላ (ይገለፅ)	
Q214	ብትናትናው ዕለት ለመጠጥ የሚሆነውን ውሃ ከቀዱ በኋላ ወደ ቤት የወስዱት እንዴት ነበር?	1 ክዳን ባለው ዕቃ 2 ክዳን በሌለው ዕቃ 3 በቅጠል የተከደነ እንስራ 4 ሌላ (ይገለፅ)	
Q215	ብትናትናው ዕለት ውሃ የቀዱበት ዕቃ የሚይዘው የውሃ መጠን	ሊትር	
Q216	ብተያተያወ ዕለት ስንት ጊዜ ውሃ ቀዱ/አመላለሱ?	ጊዜ	

ክፍል ሦስት፣ የሕፃናት አያያዝ ልምድና እውቀት

Q301	ሕፃኑ ከጡት ወተት ሌላ ምግብ ይወስዳል?	1 አዎ 2 የጡት ወተት ብቻ ነው የሚመገበው *(ወደ Q305 እለፍ)*	
Q302	ሕፃኑ ለብቻው ምግብ ያዘጋጁለታል?	1 አዎ 2 አላዘጋጅም	
Q303	ሕፃኑ ከጡት ወተት ሌላ ምግብ ይወስድ ከሆነ ምን አይነት ምግብ ይወስዳል? *(ከአንድ በላይ መልስ ሊኖረው ይችላል)*	1 የላም ወተት 2 የዱቄት ወተት 3 ከተፈጨ ጥራጥሬ የተዘጋጀ ምግብ 4 ለአዋቂ የተዘጋጀ ምግብ 5 ሌላ (ይገለፅ)	
Q304	ሕፃኑን በምን ይመግቡታል?	1 በእጄ 2 በስኒና በማንኪያ 3 በኩባያ 4 በጡጦ 5 ሌላ (ይገለፅ)	
Q305	የመጠጥ ውሃ ማጠራቀሚያው/ማምጫው ዕቃ ክዳን አለው? *(ዕቃውን እንዲያሳይህ ጠይቅ)*	1 አለው 2 የለውም	
Q306	ተለይቶ የተቀመጠ የውሃ መቅጃ ዕቃ አለ? *(ዕቃውን እንዲያሳይህ ጠይቅ)*	1 አለ 2 የለም	
Q307	ለመጠጥ የሚሆን ውሃ ከማጠራቀሚያ ዕቃው እንዴት ነው የሚቀዱት?	1 በማንቆርቆር 2 በመጥለቅ	
Q308	ዝንብ በሽታ ልታስተላልፍ እንደምትችል ያውቃሉ?	1 አውቃለሁ 2 አላውቅም (መልሱ አላውቅም ከሆነ ወደ Q310 እለፍ)	
Q309	የQ308 መልሱ " አውቃለሁ " ከሆነ ልታስተላልፍ የምትችለውን የበሽታ ስም ሊነግሩኝ ይችላሉ? *(አማራጮቹን አታንብብላቸው)*	1 ተቅማጥ 2 ታይፎይድ 3 ኮሌራ 4 አይን ማዝ (ትራኮማ) 5 ስማቸውን አላውቅም 6 ሌላ (ይገለጽ)	
Q310	የሕፃናት አይነምድር በሽታ ሊያስተላልፍ እንደሚችል ያውቃሉ?	1 አውቃለሁ 2 አላውቅም (መልሱ አላውቅም ከሆነ ወደ Q312 እለፍ)	
Q311	የQ310 መልሱ " አውቃለሁ " ከሆነ		

	የሚያመጣውን ችግር ለማቃለል ምን ያደርጋሉ?		
Q312	**በእርስዎ አስተያየት የመፀዳጃ ቤት ጥቅም ምንድነው ይላሉ?**		

ክፍል አራት፣ ስለ ሕፃኑ አጠቃላይ መረጃ

ከዚህ በታች ያለው መጠይቅ የሚሞላው ተቅማጥ ስለያዘው ሕፃን ወይንም በቤቱ ውስጥ ተቅማጥ የያዘው ሕፃን ከሌለ በዕድሜ አነስተኛ ለሆነው ሕፃን ነው::

Q401	**የሕፃኑ ዕድሜ**	**ወር**	
Q402	**የሕፃኑ ፆታ**	**1 ወንድ 2 ሴት**	
Q403	**ሕፃኑ የት ነው የተወለደው?**	**1በጤና ድርጅት 2 በቤት ውስጥ**	
Q404	**ሕፃኑ ለእናትየው ስንተኛ ልጅ ነው ?**	**1 አንደኛ 3 ሦስተኛ 2 ሀለተኛ 4 አራተኛና ከዝያ በላይ**	
Q405	**እናትየዋ/አሳዳጊዋ ባለፈው ሁለት ሳምንት ጊዜ ውስጥ ተቅማጥ ይዛቸው ነበር?**	**1 አዎ 2 አልያዘኝም**	
Q406	**ሕፃኑ ከተወለደ ጀምሮ ጡት ጠብቶ ያውቃል?**	**1 አዎ 2 አያውቅም (መልሱ <u>ሷያውቅም</u> ከሆነ ወደ Q408 እለፍ)**	
Q407	**ሕፃኑ ለስንት ጊዜ ያህል ጡት ጠባ?**	**ወር**	
Q408	**በአሁኑ ጊዜ ያለው የጡት አመጋገብ ሁኔታ**	**1 የጡት ወተት ብቻ ነው የሚመገበው *(ወደ Q410 እለፍ)* 2 በከፊል የጡት ወተት ይመገባል 3 የጡተ ወተት አይመገብም**	
Q409	**ሕፃኑ እድሜው ስንት ወር ሲሆን ነው ተጨማሪ ምግብ የጀመረው?**	**ወር**	
Q410	**ሕፃኑ የኩፍኝ መከላከያ ክትባት ተከትቦዋል? *(ከዘጠኝ ወር በላይ ላሉ ህፃናት ብቻ የሚጠየቅ)* የክትባት ካርድ ካለ ከካርዱ ጋር አመሳክር**	**1 አዎ *(ከመላ/ሹ የተገኘ)* 2 አዎ *(ከካርድ የተገኘ)* 3 አልተከተበም**	
Q411	**በአሁኑ ጊዜ ሕፃኑ ተቅማጥ ይዞታል?**	**1 አዎ 2 አልያዘውም (መልሱ <u>ሷልያዘውም</u> ለሆነ የቀሩትን ጥያቄዎች እለፋቸው)**	
Q412	**ተቅማጡ ለስንት ጊዜ ቆየበት?**	**1 ከ 14 ቀን በታች 2 ከ 14 ቀን በላይ**	
Q413	**በቀን ውስጥ ስንት ጊዜ ያስቀምጠዋል?**	**1 ሶስት ጊዜ 2 ከሶስት ጊዜ በላይ 3 አላውቅም**	
Q414	**ምን አይነት ተቅማጥ ነው?**	**1 እንደ ውሃ የቀጠነ 2 ደምና ምግል የተቀላቀለበት 3 ሌላ (ይገለጽ)**	
Q415	**ተቅማጡን ለማቆም ለሕፃኑ ምን አድርገውለታል? *(አማራጮቹን አታንብብላቸው)* *ከአንድ በላይ መልስ ሊኖረው ይችላል***	**1 ወደ ጤና ድርጅት ወስጀዋለሁ 2 ወደ ባህል ህክምና ወስጀዋለሀ 3 ወትሮ ከሚበላው ምግብ ተጨማሪ እሰጠዋለሁ 4 ኦ.አር.ኤስ እሰጠዋለሁ 5 ከተፈጨ ጥራጥሬ የተዘጋጀ ፈሳሽ እሰጠዋለሁ 6 ወትሮ ከምሰጠው ምግብ ያነሰ እሰጠዋለሁ 7 በግል መድሃኒት ገዝቼ ሰጥቼዋለሁ 8 ሌላ (ይገለፅ)**	

መጠይቁ የተደረገበት ቀን---------- መጠይቁን የሞላው ሰው ስም---------- ፊርማ----------