ADDIS ABABA UNIVERSITY
MEDICAL FACULTY
DEPARTMENT OF COMMUNITY HEALTH

"FEEDING PROFILE AND DIARRHEA MORBIDITY AMONG INFANTS OF 7-12 MONTHS" ADUA TOWN, TIGRAY, NORTH ETHIOPIA 2006

BY:
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A THESIS SUBMITTED TO FACULTY OF MEDICINE
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SCHOOL OF GRADUATE STUDIES

"Feeding profile and diarrhea morbidity among infants of 7-12 months" A community based study among mothers with infants of 7-12 months in Adua town, Tigray, North Ethiopia 2006

By Getachew Gezehagne

DEPARTMENT COMMUNITY HEALTH

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I THE UNDERSIGNED, SENIOR MPH STUDENT DECLARE THAT THIS THESIS IS MY ORIGINAL WORK IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH. ALL THE SOURCES OF THE MATERIALS USED FOR THIS THESIS AND ALL PEOPLE AND INSTITUTIONS WHO GAVE SUPPORT FOR THIS WORK ARE FULLY ACKNOWLEDGED.

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DEDICATION

This thesis is dedicated to my beloved mother

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LIST OF ABBREVIATIONS AND ACRONYMS

AAU	Addis Ababa University
CBRHA	Community Based Reproductive Health Agent.
DCH	Department of Community Health
DHS	Demographic and Health Survey
HI	Health Institution
NGO	Non-Governmental Organization
OR	Odds Ratio
RHB	Regional Health Bureau
RHS	Rural Health Survey
SPSS	Statistical Package for Social Sciences
SSA	Sub Saharan Africa.
TTBA	Trained Traditional Birth Attendant
WHO	World Health Organization
WIC	Women Infant Child
$\mathbf{X}^2$	Chi-square

ABSTRACT

A community based cross-sectional study using a structured questionnaire was conducted from November 2005 to January 2006 in Adua town central zone of Tigray regional state to assess infant feeding profile, determinant factors affecting breast-feeding and prevalence of diarrhea morbidity in infants. Six hundred and ninety six mothers having infants in the age group 7-12 months were included in this study and the Mean age of mothers was 25.7 years (SD±5.68). Orthodox Christians accounted for 654 (94%) and the rest were Muslims. Three hundred and seventy nine (54.5%) were Male infants, 648 (93%) were on breast-feeding within the first 1hr and the rest 125 (18%) were not started weaning diet until the time of study. Two hundred and ninety one (41.8%) mothers exclusively breast-fed for six months. Overall, mean age of weaning was 5.59 (SD±1.34) months. Mother's education was directly associated with exclusive breast-feeding practice (OR= 0.52; 95% CI, 0.25-0.94). Similarly husband's occupation was significantly associated with exclusive breast-feeding (OR=0.66; 95% CI, 0.44-0.99) in private employed and (OR= 0.43; 95% CI, 0.21-0.91) in the un-employed husbands compared to the government-employed husbands. Prevalence of diarrhea was 26.35%, and odds of experiencing diarrhea was higher in infants from single mothers than in the married mothers (OR=2.50; 95% C.I, 1.55-4.02). Infants from un-employed fathers were also at higher odds of experiencing diarrhea than the infants from employed fathers (OR= 3.45; 95% CI, 1.56-7.68). A higher proportion of infants who were not exclusively breast-fed developed diarrhea compared to those who were exclusively breast-fed that is 29.9% and 21.6% respectively.

In our study, weaning and exclusive breast-feeding was relatively good, but a considerable proportion of infants were not on weaning diet until the time of study. Over a quarter of infants in the town are suffering from diarrheal morbidity, it is highly pronounced in infants whose mothers are uneducated and unmarried. Infants from unemployed fathers were at higher odds of experiencing diarrhea than infants whose fathers were governmental employed. So as to address the existing diarrheal morbidity the district health office and local NGO's should educate parents and equip parents with up to date information on benefits of breast-feeding, timing of weaning, infant care and feeding, and should work in harmony in the practice of infant feeding and controlling diarrhea in the town.

1. INTRODUCTION

Human experience over the ages has shown that there is a great sorrow on the death of infants and children. The situation is worse in developing countries where among other things, infant and child mortality rates are high. The intensity of the problem in developing countries could be explained in terms of the already established factors, such as the scarcity of services and facilities, poor sanitary conceptions, and improper utilization of the available resources (1). Pneumonia, diarrhea, malaria, measles and malnutrition account for over 70% of the 11.5 million deaths (2). Approximately 1.5 billion episodes of diarrhea occur annually in children under the age of 5yrs, resulting in some 1.8 million deaths (3).

Diarrheal diseases remain one of the most important causes of morbidity and mortality in developing countries, especially in African countries. Diarrhea, which is characterized by an increase in water evacuations or some watery evacuation with blood or mucus relative to the usual pattern of each individual, has been found to be a major contributor to illness and death, particularly among children in sub-Saharan Africa. WHO report indicated that each child in Africa has five episodes of diarrhea per year and that 800,000 die each year from diarrhea and dehydration (4).

It is widely recognized that exposure to diarrhea pathogens in developing countries is conditioned by such factors as age of the child, quality and quantity of water, availability of toilet facilities, housing conditions, level of education, household economic status, place of residence, feeding practices, and the general sanitary conditions (personal or

domestic hygiene) around the house (4). Diarrhea illnesses account for a large proportion of childhood morbidity and mortality in the developing world where the levels of hygiene and nutrition may be poor. Infants have proven to be particularly vulnerable. Factors associated with infant diarrhea illnesses can be divided into exposure and resistance factors. The former includes water quality, availability, and household sanitation, and the latter includes infant feeding methods and nutritional status. These, together with other variables, are collectively referred to as "intermediate or proximate" determinants in the epidemiology of diarrhea diseases (5).

The median annual incidence of diarrhea in Sub-Saharan Africa peaks among infants 6-12 months old and decreases progressively there after. Most incidence studies have restricted their focus to children less than five years old. A review of longitudinal community-based studies with frequent surveillance has found that 6 to 11 month-old children in Africa had a median of 4.5 diarrhea episodes per year (6).

In Ethiopia, the incidence of diarrhea was found to be higher in the second half of the infant life and children living in households with some kind of toilet facility are less likely to be sick than children in households that do not have toilet facilities. In Ghana, the risk of having diarrhea was found to be significantly associated with toilet facility, where children living in houses with toilet facilities are about 50% less likely to contract diarrhea than children living in houses with no such Facilities (4).

There is no study done in the study area, which shows the practice of exclusive breast-feeding and associated determinants that have a role in infant diarrhea morbidity, and this

thesis is intended to evaluate the existing practice of exclusive breast-feeding with the recent WHO recommended period that's (6 months).

This study will also determine the prevalence of diarrhea, and associated factors in Adua, which in turn will have a great input in addressing infant nutrition and controlling infant diarrheal morbidity in the study area and the nation at large.

2. LITERATURE REVIEW

2.1. BREAST FEEDING PATTERN

Extensive researches have shown that human milk is the most beneficial choice for infant feeding. Breast-feeding confers many advantages to both infants and mothers. These include social, economic, nutritional, developmental, immunological, and other health benefits (7). A study done by UNICEF in 195 countries showed the global practice of exclusive breast-feeding within the first six months after birth to be (25%) (8).

In 2001, only (69.5%) of women in the U.S. breast-fed their infants and (46.3%) of women exclusively breast-fed their infants in the early postpartum period, in the same year, only (32%) of mothers were still breast-feeding for a one year time and only (17.2%) were exclusively breast-feeding at six months postpartum (9). In Bolivia, Lapaz, the prevalence of exclusive breast-feeding practice was 25% in the first 6 months (10). In Egypt, only 76% of infants initiate breast-feeding within the first 3 days (11). A study done by UNICEF in 2001 also showed that the prevalence of exclusive breast feeding in sub Saharan countries to be (33%) (12). another study also showed that the prevalence of exclusive breast-feeding in Ethiopia to be within a range between 41-59 percent (8).

In the 2001, Ethiopian DHS report the prevalence of exclusive breast-feeding for the first 6 months of life was found to be (38%) (13). And according to the Ethiopian 2005 DHS preliminary report the prevalence of exclusive breast-feeding for the first 6 months of life declined to (18.1%) (14).

A study done in Addis Ababa on magnitude and determinants of breast-feeding showed that the prevalence of excusive breast-feeding was (32%) whereas the rest (65.4%) and (2.6%) were partially breast-fed and non-breast fed respectively. The same study showed that (29.2%) infants were early weaned where as (17.5%) were late weaned (15). Another study done in Addis Ababa on the pattern of breast feeding in infants also showed that only (29.2%) were started on breast feeding in the first 2 hrs after birth and (70.8%) were started on breast feeding within the first 12 hrs and (2.8%) were never breast fed (16). Study done in Akaki showed that for infants of age range 7-9 months (95.24%) of mothers started breast-feeding after birth and (90.91%) of those of age range 10-12 were started on breast-feeding. The same study showed that the mean age of weaning was 3.29 (SD±1.87) months (17). A study done in Jimma showed that only 25% of mothers offered breast milk alone for the first four to six month (18).

Another study in Jimma showed that only 83% of mothers started breast-feeding within 24 hrs of which 64% initiated immediately and around 62% were predominantly breast fed for greater than four months (19). A study done in north Gondar Dabat district showed that 90% of children were breast fed initially and 26% of mothers started with complementary feeding before age of six months (20). A community based cross sectional study done among 0-2 yrs children in Tigray showed that working mothers had higher chance of early weaning compared to housewives (OR=3.5; 95% CI= 1.61-8.14). Similarly better income mothers had higher chance of early weaning compared to poor mothers (OR=2.2, 95%; CI= 1.17-4.06) similarly, mothers working out side home had

about three times higher chance of bottle feeding compared to house wives (OR=2.87; 95% CI, 1.16-7.10) (21).

2.2. PREVALENCE OF DIARRHEA MORBIDITY

Diarrhea accounts a major part in the mortality and morbidity of children and especially it's more prevalent in infants of the developing world where infants are highly exposed to various contaminants during introduction of additional weaning diet. In Ethiopia like in other developing countries diarrhea is a major contributor of morbidity and mortality in young infants and children (16). In Peru and Lima, the prevalence of diarrheal morbidity in the first six moths was 27.6% (22). Another study done in rural Egypt on early initiation of breast-feeding and risk of infant diarrhea showed that infants who had initiated early breast-feeding with in the first three days was 26% lower rate of diarrhea than those who initiated late showing the marked reduction of rate of diarrhea through out the first 6 months of life (11). In Eritrea, the prevalence of diarrhea among infants of 6-12 months was found to be 30.1% (23).

The 1983 Rural Health Survey of Ethiopia showed the prevalence of diarrhea in infants to be (28.8%) and the highest prevalence of diarrheal morbidity were in Gondar, Illubabor, and, Wellega 59.3%, 41.9%, and 45.7% respectively (24). A study done in Jimma showed that the overall two-week prevalence of acute diarrhea in infants was 39.3% (19). A study done in Jimma (Mana district) showed that the prevalence of diarrhea among under five children to be 33.7% (25). A one year follow up study in Butajirra showed that the prevalence of diarrhea morbidity among infants to be 23% where parental literacy had

a significant association that infants from illiterate parents were at higher odds of developing diarrhea compared to infants from literate parents OR= 1.45 (26).

Another study done in Keffa-sheka zone of southwest Ethiopia showed that the overall prevalence of diarrhea among children to be 15% (27). In Dabat district of northern Gondar the prevalence of diarrhea among children was found to be 11.4% (20). A community-based study conducted in two districts of Eastern Tigray, Northern Ethiopia showed that the overall incidence of perceived illness was found to be 5.26 per child-year of which 3.05 per child-year was due to diarrhea (28).

2.3. DETERMINANTS OF DIARRHEA

2.3.1. AGE

A study done in Brazil on risk of dehydrating diarrhea found that the risk was greater in the first nine months of life and, especially, infants 2-3 months were highly likely to develop dehydrating diarrhea (OR= 2.4 and 7.1) than those 6-8 and 9-11 months of age respectively (29). A study done in Eritrea showed that infants in the age group 6-11 months had the higher likelihood to develop diarrhea than infants of 0-5 months OR=3.27 (23).

A study done in Welayta showed that prevalence of diarrhea was 14.4% in infants where the overall prevalence of diarrhea in under five children was 11.1% (30). Study done in Addis Ababa child referral hospital also showed that peak diarrhea occurrence to be at age 7-12 months (31). A study in south west Ethiopia showed that young age and male gender were significantly associated with the under five mortality at $p<0.05$ (27). A study

done in Dabat district north Gondar showed that infants of age 0-12 months were at higher odds of getting sick compared to those infants above 2 yrs age (OR= 2.26 95% CI, 1.2-4.2) (20).

2.3.2. BREAST FEEDING

Several studies have indicated that the incidence of diarrheal disease increases in the non-breastfed compared to the breast-fed ones. A study done in U.S.A showed that the risk of developing diarrhea increases as the amount of breast milk an infant receives decreases. When compared with exclusively breastfed infants, infants who were exclusively formula-fed had an 80% increase in their risk of developing diarrhea (32). In England the type of milk consumed before start of diarrhea episode was strongly associated with diarrhea that infants who were bottle-fed were six times at higher odds of developing diarrhea compared to those exclusively breast-fed infants and similarly formula-fed infants were also seven times at higher odds of developing diarrhea compared to those who were exclusively breast-fed infants (33). In Peru and Lima diarrhea morbidity was significantly associated with infant feeding mode that infants given non-nutritive liquid artificial milk were at higher risk of developing diarrhea (RR =1.6-2.4) and infants given solid foods in addition to breast milk were also at higher risk of developing diarrhea (RR= 2.6-3.4) compared to infants who were exclusively breast fed. In this study, partial breast-feeding was protective for diarrhea morbidity for infants of 6-11 months compared with infants who receive no breast-milk (22).

A prospective study in Philippines showed, among urban infants under 6 month breast-feeding with addition of non nutritive liquid were three fold at higher risk of developing diarrhea compared to those exclusively breast-fed infants, similarly among those not breast-fed infants the risk of diarrhea was thirteen fold higher compared to those exclusively breast-fed (34).

A study done in Thailand showed that among children less than two years old the occurrence of diarrhea in the previous 24 hours and two weeks was about (3%) higher among children not breast-fed than children who were breast-fed (35). In India exclusive breast fed infants showed least incidence of diarrhea followed by spoon-fed and bottle-fed ones that was significant $p<0.01$ (36).

A retrospective study done in Nigeria in morbidity and mortality of breast fed and bottle fed Nigerian infants showed that the risk of diarrheal illness was significantly lower in exclusively breast-fed than in partially breast-fed or bottle-fed children, that's (35%) exclusively, (76%) partially breast fed and (74%) formula fed infants had diarrhea morbidity (37). A study in western Ethiopia showed that exclusive breast-feeding was associated with reduced diarrhea compared with partial breast feeding in age groups 2-4 and 5-6 months RR =5.42 and5.00 respectively (38).

2.3.3. MATERNAL AND ENVIRONMENTAL FACTORS

A study done in India showed that maternal education had a significant negative association with the two-week risk of diarrhea where infants from illiterate mothers were

at higher odds of developing diarrhea compared to infants from literate mothers p<0.005 (36).

Additionally a study done in Eritrea showed that there is a (27%) decreased risk of diarrhea in infants in household with toilet facility and households with non-dirty house floor were at (43%) less likely to have diarrhea than houses with dirty house floor. In this study, maternal education showed a significant negative association with the two-week risk of diarrhea in infant that infants from educated mothers were at lesser risk of developing diarrhea than those from illiterate mothers (23).

Additionally the 1983 R H S of Ethiopia showed that, children who lived in a house with a latrine facility and who defecated in the latrine had the lowest morbidity rate (p<0.001). In this study (12.7%) of children who lived in a home with piped water were sick in the two weeks prior to the survey compared with 20% for all other sources of water (p=0.001). The water supply with the highest morbidity rate was a river (30%). In addition, children who had a garbage bin in their house experienced fewer illnesses than did those who did not have a bin 17.1% vs. 29.2% respectively p=0.001 (24). A study done in Akaki showed that (75%) of illiterate and (78%) of literate mothers working in the factory were practicing exclusive breast-feeding where as (94%) of the illiterate and (91%) of the literate housewives were practicing exclusive breast-feeding (17).

A study done in Ethio-Swedish referral Hospital in Addis Ababa showed that of children with persistent diarrhea (28%) were with no income and (32%) were from families with income less than 300.00 Eth birr. The same study showed that (27%) of diarrhea occurred

in infants of literate mother while, it was (73%) in infants whose mothers are illiterate (31). A study done in Addis Ababa on maternal education and child survival showed that infants from literate mothers were at (141%) enhanced child survival as compared to illiterate mothers. The same study also showed that child survival increases as income or household wealth increases (39). A study done in Sebeta, showed that mortality rate in infants born to teenage mothers were 1.78 times higher as compared to infants born to mothers aged 20-34 yrs. The same study showed that infants born to mothers aged 35+ yrs were 1.21 times at higher rate of mortality compared to the referent group 20-34 yrs, similarly access to latrine and safe water were found to be important factors affecting infant and child mortality (40).

A study done in Jimma, Keffa, and illubabor zones of southwest Ethiopia showed that infants whose mothers were illiterate had the higher infant mortality rate (IMR) compared to those infants whose mothers were junior and above $P<0.001$. Similar study showed that household's floor was associated with infant mortality rater that households with earth or soil floor had the highest infant mortality rate compared to cement 108 and 79 per thousand respectively $P<0.01$. Similar study showed that latrine availability or possession was significantly associated with infant mortality that there was a higher infant mortality among households with no latrine compared to house holds having latrine facility $P<0.001$(41).

3. OBJECTIVE

3.1. GENERAL OBJECTIVE

- To assess feeding pattern, diarrheal morbidity and associated factors among 7-12 month infants in Adua town.

3.2. SPECIFIC OBJECTIVE

- To determine the prevalence of exclusive breast-feeding among 7-12 month infants in Adua town.
- To identify determinant factors of exclusive breast-feeding in infants of 7-12 months
- To determine the two-week prevalence of diarrhoeal disease among 7-12 month infants in Adua town.
- To identify associated factors or determinants with diarrhoeal disease.

4. SUBJECT AND METHODS

4.1. STUDY DESIGN

A community based cross-sectional study was made among mothers with infants of 7-12 months.

4.2. STUDY AREA

Adua is one of the three big towns in central zone of the Tigray regional state located at around 1020 Kms away from Addis Ababa and 260 Kms from Mekele. It is bounded by, Soloda in the north, Endabagerima on East, Mayteum on the west and Bete-yohannes in the south covering an area of 7.67 Km^2. The town has a population of 54,700 of which 51% are females, 702 are infants of 7-12 months, according the town's municipality population projection based on the data from population census of 1994.

Adua is administratively divided in to two higher and four kebeles or Tabias. As to the health facility and service, the town has one district hospital, one health center and one health station.

4.3. SOURCE AND STUDY POPULATION

The source population for this study area was all children and mothers residing in Adua town, and infants in the age group between 7-12 months were the study population.

4.4. EXCLUSION CRITERIA

Infants in the age group 7-12 months but who had no mother and mothers who were unable to communicate in the interview were excluded from the study.

4.5. SAMPLE SIZE DETERMINATION

Since all infants of 7-12 months age in the town were estimated to be around 702, the sample size calculated, at P=0.5 Z=1.96 and d=0.04 is 596 and a 10% contingency for non responses will be 656.

$$n = \frac{(Z\alpha/2)^2 \, p \, (1-p)}{d^2}$$

$$n = \frac{(1.96)^2 \, 0.5 \times 0.5}{0.04^2} = 596 + 10\,\%(60) = \mathbf{\underline{656}}$$

Therefore, it was advisable to include all 702 infants (7-12 months) who were illegible in the study area to have a better precision, perhaps there is no additional financial and logistical coast implications in this study design.

4.6. DATA COLLECTION

Data collection was made using a house-to-house visit, and household was used as a sampling unit, and kebeles as blocks. The first house was the house to the eastern end of the study block and each house was visited for presence of eligible child and visited houses were marked using a chalk so that there will not be an overlap or double counting. In the presence of two or more eligible infants, in a house all infants were included. In

absence of a respondent visits were repeated for three times to minimize non-response rate as possible.

Questionnaire first produced in English was translated in to Tigrigna (A local language in the area). Tenth and twelfth grade complete interviewers/data collectors/ and supervisors with better experience in data collection were recruited. After preparing a training manual training was given for all interviewers and supervisors on ways of maintaining good data quality, ethical issues etc.

Supervisors were given the duties of checking for completeness and facilitating the fieldwork.

Identified illegible mothers were asked to participate after a consent format, which explains the purpose, and confidentiality of the study was read. Once their willingness was known a questionnaire having questions including breast-feeding patterns weaning, socio demographic variables like age, sex, etc, and immunization status of infant was read to the mother.

4.7. DATA QUALITY

To ensure data quality, questionnaire was pre-tested in a local area with population having similar socio-demographic status. Collected data was edited and cleaned on daily basis. For missing values, irregularities, inconsistencies, unlikely values and suspicious regularities, corrective measure was taken timely; to ensure data quality at each data collector level, data was also checked by recollecting 5% of the study population by the principal investigator.

4.8. OPERATIONAL DEFINITION

4.8.1. EXCLUSIVE BREAST FEEDING

- Applied to an infant who has received only breast milk from his or her mother in the first six months of life and no other liquid, neither solid nor food based fluids except medicaments or therapeutic syrup.

4.8.2. DIARRHEA: -

- Is defined as mother's perception on her infant as having diarrhea or frequent loose stool at least 3 times in 24 hrs in the past 15-days time.

4.8.3. CORRECT WEANING: -

- An infant who started supplementary feeding at the sixth month of age

4.8.4. EARLY WEANED: -

- An infant who started supplementary feeding prior to the sixth month of age

4.8.5. LATE WEANED: -

- An infant who started supplementary feeding after the age of six months

4.8.6. NEVER WEANED

- An infant who had never been given any supplementary feeding other than breast-milk until the time of the study

4.8.7. TEENAGE MOTHER: -

- A mother with an eligible infant (7-12months) in the age range 16-19 years old.

4.9. STUDY VARIABLES

4.9.1 DEPENDENT

- Variables included in this study are caseness of diarrhea and infant exclusive breast-feeding status or practice.

4.9.2. INDEPENDENT

- Socio economic and demographic variables such as age, sex, ethnic group, Religion, monthly income, occupation, educational status, housing condition e.t.c

4.10 DATA PROCEESING AND ANALYSIS

After completing data collection, the data was categorized and coded by the principal investigator and EPI 6 software was used for data entry and cleaning in to computer and analysis was done using SPSS version 11 computer packages, and proportions, frequencies, mean were computed as needed. Chi-square and student's t test and OR with corresponding 95% CI were used to determine relationships between certain variables and multiple logistic regression was also used to control for possible confounders among variables that were associated with the diarrhea morbidity in the last two weeks. Results were described using tables and figures including bar chart and pie chart.

4.11. ETHICAL CONSIDERATION

Ethical clearance was obtained from AAU faculty of Medicine. Letter was written from Wereda /town municipality/ to individual kebele administration offices to enhance cooperation and then Verbal consent was taken from each selected participant to confirm willingness and those not willing were given the rights to do so. To ensure confidentiality interview was held on a private basis and it was ensured through out the process.

The principal investigator was referring sick infants to an appropriate healthcare facility. Parents were encouraged to seek early care, and an appropriate follow-up was made whether infant has received appropriate care or not.

4.12. COMMUNICATION OF RESULTS

Results of this study will be disseminated to A.A.U medical faculty department of community health. Tigray RHB, Adua district health office and local NGOs in Adua working on infant care and support.

5. RESULTS

5.1. SOCIO-DEMOGRAPHIC CHARACTERISTICS

In this study of 702 eligible infants, 696 mothers with infants of 7-12 months were voluntary to be interviewed while three declined to participate and the rest three were not at home after repeated visits and were excluded from the study, making the response rate 99.0%. The age range of mothers in this study was between 16 and 47 years. Seventy-eight (11%) were teenage mothers and 82 (11.8%) were aged 35 yrs and above. The mean age was 25.7 (SD±5.68) years.

As to the infants: the male-to-female ratio was 1.19:1. Male infants were 379(54.5%) of the total study subjects (Table 1).

Six hundred thirty-five (91.2%) of the infants were immunized. Four hundred fifty three (65.1%) of infants were born in a health institution where as the rest were at home. Regarding Ethnicity 682(98%) of the study subjects are Tigreans and the rest 41(2%) were other ethnic groups. In this study 654(94%) were orthodox Christians and 42(6%) were Muslims. As to the educational background, of the 696 mothers 597 (85.8%) have attended formal education of which 166 (24%) were primary school while the rest 431 (61.9%) were higher-level students and graduates. Five hundred eighty five (84.3%) of the respondents were married (Table 1).

Among mothers in this study 507 (72.8%) are unemployed where as the rest were governmental or private employed workers (Table 1).

Five hundred thirty five (91.1%) of husband's were employed of which 225 (38.3%) were governmental employees and 310 (52.8%) were NGO/private/ employed husbands. Five hundred and thirty eight (91.7%) of husbands attended formal education of which 403(68.7) attended above sixth grade (Table 1).

The monthly household income of the respondents ranges between 50 and 1,200 Eth birr. Around 495 (71.2%) of households have a monthly income of less than 500 Eth birr of which (33.8%) were with a monthly income 250 Eth birr and less with an overall mean monthly income of 421 Eth birr (Table 2).

As to the sanitary facility 629 (90.4%) of households have a proper garbage disposal site or services, whereas the rest 67(9.4%) do not have such facility and use an open field disposal. This study has also found that 295 (42.4%) have a private tap and the rest 401(57.6%) have a public tap water source (Table 2).

Table 1: Distribution of selected Socio-demographic characteristics of infants and mothers in Adua town: North Ethiopia, May 2006 (n=696)

Characteristics	Frequency	Percent
Sex of infant		
Male	379	54.5
Female	317	45.5
Infant's age		
7-9 months	429	61.6
10-12 ,,	267	38.4
Delivery place		
Home	243	34.9
Health institution	453	65.1
Infant immunization status		
Yes	635	91.2
No	61	8.8
Mother's age in years		
15-19 years	78	11.2
20-24	243	34.9
25-29	210	30.2
30-34	83	11.9
35 & above	82	11.8
Marital status		
Married	587	84.3
Single	109	15.7
Religion		
Orthodox	654	94.0
Muslim	42	6.0
Mother's education		
No	99	14.2
1-6th grade	166	23.9
6th +	431	61.9
Mother's occupation		
Yes	189	27.2
No	507	72.8
Hand washing habit of the mother		
Using soap	622	89.4
Not using soap	74	10.6

Table 2: Distribution of selected Socio-demographic characteristics of infant's fathers and household conditions: Adua town, North Ethiopia, December 2006 (n=696).

Characteristics	Frequency	Percent
Husband's residence (n= 587)		
Lives together	546	93.0
Lives else where	41	7.0
Husband's occupation		
Government employee	225	38.3
NGO/private employee	310	52.8
Un employed	52	8.9
Husband's education (formal)		
No	49	8.3
1-6th grade	135	23.0
6th +	403	68.7
Monthly income (n=696)		
0-250 Eth Birr	235	33.8
251-500	260	37.4
501-750	107	15.4
751 & above	94	13.4
Source of drinking water		
Private tap	295	42.4
Public tap	401	57.6
Type of latrine you use		
No latrine	157	22.6
With latrine	539	77.4
Garbage disposal		
Open field disposal	67	9.6
Proper disposal	629	90.4
Type of house floor		
Earth or Soil	366	52.6
Cement	330	47.4

5.2. PATTERN AND DETERMINANTS OF BREAST-FEEDING

In our study six hundred forty eight (93%) were first breast fed within the first one hour after birth. Only 48 (7%) were not first fed on breast milk of those 24(3.5%) started feeding by sugar solution and the rest started feeding on cow's milk, salt solution etc. Six hundred seventy seven (97.3%) started on breast-feeding within the first 12 hrs after birth.

At the time of the survey, 571 (82%) of those infants were weaned, and the mean duration of weaning practice was 5.59 (SD±1.34) months. One hundred twenty five (18%) were not yet started supplementary feeding (Figure 2). As to the practice of exclusive breast-feeding, the prevalence of exclusively breast feeding for the first six months after birth was 291 (41.8%) (Figure1). Mean time of weaning of infants was higher among infants whose mothers were un-employed than those whose mothers were workers (t= 2.83 df 570 P<0.001).

There was no significant difference in time of weaning practice among sex of the infants, delivery place, marital status of the mother, mother's age, occupation and household monthly income (Table 3).

Figure 1: Prevalence of exclusive breast-feeding practice in infants of 7-12 months in Adua town, Tigray North Ethiopia 2006 (n =696).

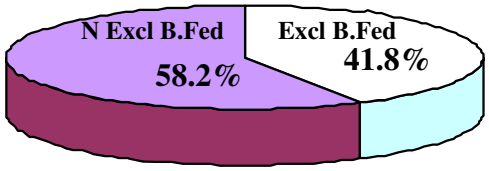

Figure 2: Timing of weaning practice in infants of 7-12 months in Adua town, North Ethiopia 2006 (n=696).

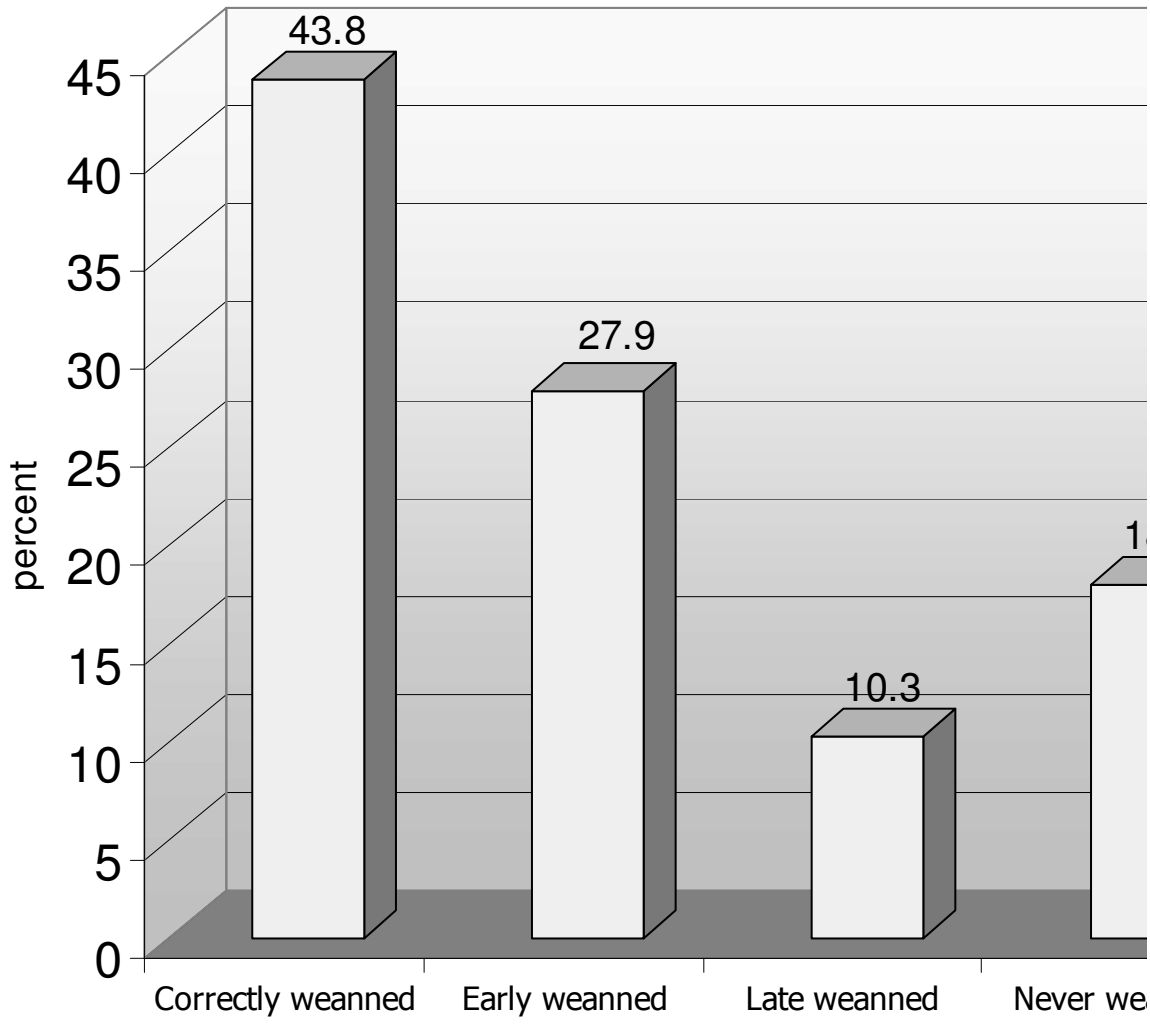

Table3: Time of weaning in infants of 7-12 months age by selected mother's and child variables, Adua northern Ethiopia (2006) .

CHARACTERISTICS	WEANING TIME (n =571)		
	Mean	t-test (df)	P-value
Sex of infant			
Male	5.57		
Female	5.61	0.406 (569)	0.85
Delivery place			
Health institution	5.55		
Home	5.65	0.88 (569)	0.33
Mother's education			
Yes	5.53		
No	5.96	2.61 (570)	0.76
Marital status of mother			
Married	5.56		
Single	5.71	-0.99 (569)	0.83
Mother's occupation			
Worker	5.34		
Un employed	5.69	2.83 (570)	0.001 *
Mother's age			
Less than 19	5.61		
19-34 years	5.64		
35 and above	5.24	2.69 (570)	0.07
H.H monthly income			
0-250 Eth birr	5.63		
251-500	5.54		
501-750	5.62	0.176 (570)	0.91
751 and above	5.59		
Overall weaning (months)	**5.59**	**(SD ±1.34)**	

***** Significant at $p<0.05$

5.3. EXCLUSIVE BREAST-FEEDING

In our study, exclusive breast-feeding was higher to a statistical significant level among infants 10-12 months age than in infants in the age 7-9 months, crudely and after adjusting for some socio-demographic characteristics, (Adjusted OR= 1.56, 95% CI 1.08-2.23). Similarly the practice of exclusive breast-feeding was much lower to a statistical significance level among un-educated mothers compared to the literate mothers after it was adjusted for some socio-demographic variables (Adjusted OR= 0.52, 95% C.I 0.25-0.94). However, there was no significant difference between practice of exclusive breast-feeding and mother's income, marital status, mother's occupation, education and infant's sex (Table 4).

Exclusive breast feeding practice was significantly associated with spouse's occupation, that the practice of exclusive-breast feeding was lower among mothers whose spouses were non governmental employees (Adjusted OR= 0.66; 95% CI, 0.44-0.99), and it was also lower among mothers whose spouses were unemployed (Adjusted OR= 0.43; 95% CI, 0.21-0.91) compared to mothers whose spouses were governmental employed. However, there was no statistically significant difference of exclusive breast-feeding practice among different residence and educational status of husbands (Table 4).

Table 4: History of exclusive breast-feeding among infants of age seven-twelve month
infants by selected socio-demographic variables: Adua, north Ethiopia 2006 (n=696).

Characteristics	Feeding pattern43.3			
	Participants n	Excl.B-Fed n (%)	Crude OR	Adjusted OR
Infant age (n=696)				
7-9 months	429	153 (36.3)	1.00	1.00
10-12 >>	267	138 (51.7)	1.51(1.06-2.14)*	1.56 (1.08-2.23)*
Sex				
Male	379	160 (42.2)	1.00	-
Female	317	131 (41.3)	0.91(0.64-1.27)	
Mother education				
Yes	597	260 (43.5)	1.00	1.00
No	99	31 (31.3)	0.59(0.37-0.95)*	0.52(0.25-0.94)*
Delivery place				
Health institution	453	196 (43.3)	1.00	
Home	243	95 (39.1)	0.84 (0.60-1.17)	-
Marital status				
Married	587	246 (41.9)	1.30 (0.91-1.86)	
Single	109	45 (41.3)	1.00	-
Mother's occupation				
Yes	189	71 (37.6)	1.00	
No	507	220 (43.4)	1.27 (0.89-1.82)	-
Monthly income				
0-250 Eth Birr	235	94 (40.0)	0.64 (0.38-1.06)	
251-500	260	104 (40.0)	0.64 (0.39-1.06)	
501-750	107	45 (42.1)	0.70 (0.38-1.26)	-
751 and above	94	48 (51.1)	1.00	
Husband's residence				
Lives together	546	232 (42.5)	1.00	
Lives else where	41	14 (34.1)	0.69 (0.33-1.45)	-
Husband occupation				
Gov't employee	225	112 (49.8)	1.00	1.00
Private NGO employee	310	119 (38.4)	0.70 (0.47-1.03)	0.66 (0.44-0.99)*
Un employed	52	15 (28.8)	0.45 (0.22-0.93)*	0.43 (0.21-0.91)*
Husband's education				
No	49	17 (34.7)	0.66 (0.34-1.27)	
1-6th grade	135	49 (38.5)	0.71 (0.46-1.08)	-
6th +	403	180 (46.7)	1.00	

* Significant at p<0.05

Each category in the table has different number of study subjects

5.4. PREVALENCE OF DIARRHEA MORBIDITY

In this study the prevalence of diarrhea among infants of 7-12 month infants in the past 15 days (two weeks) was found to be 26.35% (95% C.I 23.0%, 29.6%). Moreover, the two-week prevalence of diarrhea was higher in female infants as compared to male infants (28.7%) and (24.3%) respectively. Similarly the prevalence was also higher among infants of illiterate mothers (37.4%) compared infants of educated mothers (24.5%). Moreover, the two-week prevalence was lower among infants of married mothers than infants of single mothers (23.5%) and 41.3% respectively. Frequency of diarrhea morbidity was much higher among infants whose feeding utensils was washed less frequently (52.4%) compared to infants whose feeding utensils are washed twice and above per day (26.2%). Infants from households' monthly income of 0-250 Eth Birr were at higher prevalence of diarrhea (34%) compared to infants from families with a monthly income of 751 Eth Birr and above (16%) (Table5).

Table 5: Diarrhea morbidity among infants of age seven-twelve month by selected socio-demographic variables: Adua, Northern Ethiopia 2006 (n=696).

CHARACTERISTICS	Participants n	DIARRHEA MORBIDITY n (%)	95% C.I
Infant age			
7-9 months	429	115(26.8)	(21.00-30.61)
10-12 ,,	267	68 (25.5)	(22.24-31.15)
Sex of infant			
Male	379	92 (24.3)	(19.98-28.62)
Female	317	91 (28.7)	(23.72-33.68)
Mother education			
Yes	597	146 (24.5)	(21.05-27.95)
No	99	37 (37.4)	(27.87-46.93)
Marital status of mother			
Married	587	138 (23.5)	(20.07-26.93)
Single	107	45 (41.3)	(31.97-50.63)
Monthly income			
0-250 Eth Birr	235	80 (34.0)	(23.62-44.38)
251-500	260	61 (23.5)	(12.86-34.14)
501-750	107	27 (25.0)	(08.67-41.33)
751 and above	94	15 (16.0)	(-2.55-34.55)
Feed mater. Washing			
Twice & above	550	144 (26.2)	(31.03-73.76)
Less frequent	21	10 (52.4)	(22.52-29.87)
Mother's age	78	24 (30.8)	(20.55-41.04)
Less than 20 yrs	536	133 (24.8)	(21.14-28.45)
20-34 years	82	26 (31.7)	(21.63-41.77)
35 and above			
Mother's occupation	189	47 (24.9)	(18.73-31.06)
Employed	507	136 (26.8)	(22.94-30.65)
Un employed			
Exclusive B-Feeding	291	62 (21.6)	(16.87-26.33)
Yes	405	121 (29.9)	(25.42-34.38)
No			
Over all	**696**	**183 (26.3)**	**(23.02 -29.57)**

5.5. DETERMINANTS OF DIARRHEA

Using crude analysis, the likelihood of experiencing diarrhea was higher among infants who were incorrectly weaned than among infants who were correctly weaned (OR= 1.60; 95% C.I, 1.11-2.33). Moreover, the odds of experiencing diarrhea was higher among infants of Illiterate mothers than among infants of educated mothers, (OR= 1.84 95% CI, 1.17-2.88). (Table 6)

Additionally, in this study marital status was found to be associated with infant diarrhea morbidity where higher proportion of infants from unmarried or single mothers experienced diarrhea in the last two weeks than infants of married mothers, (OR= 2.29 95% C.I, 1.49-3.50) (Table 6). Average frequency of washing feeding materials was also associated with infant diarrhea morbidity, where a higher proportion of infants whose feeding utensils were washed less frequently experienced diarrhea, than infants whose feeding utensils were washed twice or more frequently (OR= 2.56; 95% C.I 1.06-6.16) (Table 7).

Husband's occupation was also associated with infant diarrhea morbidity where the odd of experiencing diarrhea among infants from non-governmental employed father was two fold higher than the odds of experiencing diarrhea among infants of governmental employees (OR=1.99; 95% C.I, 1.26-3.17). Similarly, the odds of experiencing diarrhea among infants of un-employed father was over three times higher than the odds of infants of employed fathers (OR=3.32; 95% C.I, 1.62-6.77) (Table 7). As to the household facility, the likelihood of experiencing diarrhea among infants living on soil type floor

was much higher (OR=1.51; 95% C.I 1.07-2.13) than infants living on cement house floor type (Table 7).

Experience of diarrhea was not associated to a significant level with infant age, sex, delivery place, mother's occupation and age (Table 6). Moreover, husband's education, residence, family size, feeding style, latrine facility and source of water were not significantly associated with two weeks experience of diarrhea (Table 7).

Table 6: Diarrhea morbidity among infants of seven-twelve months by selected mothers and infants determinant characteristics in Adua town, North Ethiopia, December 2006 (n=696).

Characteristics	Participants n	Diarrhea Case ness n (%)	Crude O.R (95% CI)
Infant age			
7-9 months	429	115 (26.8)	1.00
10-12 >>	267	68 (25.5)	1.07 (0.75-1.52)
Sex			
Male	379	92 (24.3)	1.00
Female	317	91 (28.7)	1.25 (0.89-1.76)
Delivery place			
Health institution	453	117 (25.8)	1.00
Home	243	66 (27.2)	0.93 (0.66-1.33)
Weaning time			
Correct	305	69 (22.6)	1.00
Incorrect	266	85 (32.0)	1.60 (1.11-2.33) *
Mother's education			
Yes	597	146 (24.5)	1.00
No	99	37 (37.4)	1.84 (1.17-2.88) *
Marital status			
Married	587	138 (23.5)	1.00
Single	109	45 (41.3)	2.29 (1.49-3.50) *
Mother's occupation			
Worker	507	47 (24.9)	1.00
Un employed	189	136 (26.8)	1.10 (0.75-1.62)
Mother's age			
Less than 20 yrs	78	24 (30.8)	1.00
20-34 years	536	133 (24.8)	0.74 (0.44-1.24)
35 and above	82	26 (31.7)	1.04 (0.53-2.04)

* Significant at $p<0.05$

Table 7: Diarrhea morbidity in infants of seven-twelve months by selected father's socio-demographic variables and other related determinants in Adua town, December 2006

VARIABLE	Participants	Diarrhea Case ness	
	n	n (%)	Crude O.R (95% CI)
Husband's residence (n=587)			
Lives together	546	127 (23.3)	1.00
Lives else where	41	11 (26.8)	1.21 (0.59-2.48)
Husband's occupation			
Gov't employee	225	34 (15.1)	1.00
Private/NGO/ employee	310	84 (27.1)	1.99 (1.26-3.17) *
Un employed	52	20 (38.5)	3.32 (1.62-6.77) *
Husband's education			
Yes	538	123 (22.9)	1.00
No	49	15 (30.6)	0.67 (0.35-1.27)
Freq. Wash feed utensils/ day			
Twice & above	550	144 (26.2)	1.00
Less frequent	21	10 (52.4)	2.56 (1.06-6.16) *
Family size			
1-3	220	50 (22.7)	1.00
3+	476	133 (27.9)	1.31 (0.90-1.91)
Type of floor			
Cement	330	73 (22.1)	1.00
Soil	366	110 (30.1)	1.51 (1.07-2.13)*
Latrine possession			
With latrine	539	133 (24.6)	1.00
Without latrine	157	50 (32.3)	0.68 (0.46-1.01)
Water source			
Private tap	295	80 (27.1)	1.00
Public tap	401	103 (25.6)	0.98 (0.71-1.38)
Feeding style			
Cup and Spoon	366	92 (25.1)	1.00
Bottle and teat	205	62 (30.2)	0.77 (0.52-1.13)

* Significant at $p<0.05$

Each category in the table has different number of study subjects

Adjustment of variables using logistic regression was made for predicting variables that were associated with infant diarrhea morbidity during crude analysis. The odds of experiencing diarrhea among infants of unmarried mothers were almost 2.5 times higher than the odds of experiencing diarrhea among infants of married mothers (Adjusted OR=2.50 95 % C.I, 1.55,4.02). Moreover, the likelihood of getting diarrhea among infants whose fathers are nongovernmental employees was higher compared to infants whose fathers are non-governmental employees (Adjusted OR=2.35, 95% C.I, 1.46, 3.86). Similarly it was also higher among infants whose fathers are unemployed (Adjusted OR=3.45, 95% C.I, 1.56, 7.68).

In our study, variables that were associated with experience of diarrhea during crude analysis like weaning time, maternal education, type of house floor and frequency of washing infants feeding utensils turned to be insignificant after it was adjusted for some of the significant explanatory variables (Table 8).

Table8: Adjusted analysis on diarrhea morbidity in infants of 7-12 months by selected variables, Adua town December 2006 .

Characteristics	Diarrhea prevalence n (%)	Crude OR	Adjusted OR
Weaning time			
Correct	69 (22.6)	1.00	1.00
Incorrect	85 (32.0)	1.60 (1.11-2.33)	1.49 (0.96-2.30)
Mother's education			
Yes	146 (24.5)	1.00	1.00
No	37 (37.7)	1.84 (1.17-2.88)	1.59 (0.84-3.01)
Marital status			
Married	138 (23.5)	1.00	1.00
Single	45 (41.3)	2.29 (1.49-3.50)	2.50 (1.55-4.02) *
Husband Occupation			
Gov't employee	34 (15.1)	1.00	1.00
Private employee	84 (27.1)	1.99 (1.26-3.17)	2.35 (1.46-3.86) *
Un employed	20 (38.5)	3.32 (1.62-6.77)	3.45 (1.56-7.68) *
Type of floor			
Cement	73 (22.1)	1.00	1.00
Soil	110 (30.1)	1.51 (1.07-2.13)	1.18 (0.76-1.83)
Freq. Wash feeding materials			
Twice & above	144 (26.2)	1.00	1.00
Less frequent	10 (52.4)	2.563 (1.06-6.16)	1.47 (0.47-4.61)

* Significant at $p<0.05$

6. DISCUSSION

Of the 702 eligible women with a child, 696 were included in our study making the response rate 99.1%; this high response rate was due to meticulous work done in the fieldwork.

In our study, almost all infants started breast-feeding within the first one hrs after birth. This finding is consistent with finding from study done in Akaki where 95.2% of infants aged 7-9 months and 90.9% of infants aged 10-12 months started breast-feeding immediately after birth

Moreover, it was consistent to a study done in Dabat 90.6% (17, 20).In addition, our finding is slightly higher than the findings of study done in Addis Ababa where only 70.8% started breast-feeding in the first 12 hrs (16). Moreover, is much higher than a study done in Jimma where only (64 %) started breast-feeding immediately and (83%) of mothers started breast-feeding within the first one day (19). It is also higher when compared to a study done in rural Egypt, where 76% of the study subjects started breast-feeding with in the first three days after birth (11). This could be because mothers in the study area are at lower access to the current influences on commercial feeding styles and so the primitive style of breast-feeding is yet relatively maintained.

As to the prevalence of exclusive breast-feeding (41.8%), infants were exclusively breast-fed but yet highly unsatisfactory. Our finding is consistent with the prevalence of Ethiopia (8, 12). But much higher compared with the global and in sub-Saharan countries which had the prevalence of 25% and 33% respectively (6, 12). Our finding is also higher than the practice in Addis (32%) and U.S.A (17.2%) (15, 9). Moreover, it is higher than the practice in Bolivia-Lapaz (25%) and Jimma (25%) (10,15). This could be attributable

to the fact that Adua is much at lesser access to influences on infant feeding and employment level, which probably forces mothers for early introduction of additional feeding, was relatively low where almost all mothers in the town are unemployed. Exclusive breast-feeding practice was much higher among un-employed mothers, and this is consistent with a study done in Akaki where the practice of exclusive breast-feeding was much higher among un-employed mothers (17). It was also consistent with a study done in Tigray where mothers working out side home had three times higher practice of bottle feeding compared to house wives (OR=2.87) and the practice of early weaning was higher among working mothers compared to house wives OR= 3.5 (21). This could be because employed mothers are forced to wean their infants much earlier because they lack time to feed their infants exclusively and early introduction of additional food is common compared to those unemployed mothers who relatively have a longer time to exclusively breast-feed their infants.

In our study, educated mothers have better practice of exclusive breast-feeding, but this is inversely related with study done in Akaki where illiterate mothers had a better practice of exclusive breast-feeding than literate mothers (17). As to our study, this could possibly be because literate mothers have a good understanding and access on practice of proper timing of exclusive breast-feeding than illiterate mothers.

In addition to this spouse's occupation was found to be associated with maternal exclusive breast-feeding practice that mothers whose spouses were governmental employees practiced exclusive breast feeding than those mothers whose spouses were non governmental employees and unemployed. This could be attributable to the fact that

government employed spouses are at better access to up-to-date scientific information and hence will support the mother in caring and supporting her infant. The mean weaning age of infants was much better practiced as compared with the practice in Akaki (17).

In our study, the two-week prevalence of diarrhea among infants to be (26.35%), which is similar to the 1983 Rural Health Survey of Ethiopia 28.8 %(24), and with the diarrhea prevalence in Butajirra 23% (26). But higher than the prevalence in Wolayta 14.1% and keffa-sheka zone (15%) (30, 27). Our finding was lower than the prevalence in Jimma 39.3% (19). Similarly it was also lower than the prevalence in Eritrea 30.1 % (23). This is also lower than the prevalence in Gondar (59.3%), Illubabor (41.9%) and Welega (45.7%) (24).Moreover, the prevalence was much lower than the prevalence in Manna district of Jimma 33.7% (25).

Prevalence of diarrhea morbidity was lower among infants who were exclusively breast-fed for the first six months than infants who were not exclusively breast fed, this is consistent with a study done in U.S.A there was an 80% increase in the risk of acquiring diarrhea in those exclusively formula fed compared to those who were exclusively breast fed (32). Similar study done in Thailand also showed that there was a (3%) higher rate of diarrhea among those infants not breast-fed compared to breast-fed infants (35). It is also consistent with a study done in Peru where the risk of diarrhea in infants was twice higher among infants who were given non-nutritive liquid and it was three times higher in infants who were given solid foods in addition to breast milk (22). Similarly our study was consistent with a study done in Nigeria where the risk of diarrhea morbidity in

infants was twice higher in those partially breast fed (76%) and formula fed (74%) as compared to those exclusively breast fed infants (35%) (37). It was also consistent with a study done in India where exclusively breast-fed infants were at lower risk of developing diarrhea $p<0.01$ (36).

Additionally, there was no significant difference in the likelihood of acquiring diarrhea in infants under different age categories. This could be because infants within the age range 7-12 months have almost similar rate of exposure because this is the age at which infants are weaned and are exposed to different pathogens for it is the time when the infant starts to crawl on the ground and puts every thing at hand to its mouth.

Infant weaning was found to be significantly associated with diarrhea morbidity that infants who were correctly weaned were at lower odds of experiencing diarrhea than those who were weaned incorrectly. This is consistent with a study done in Philippines where infants under six month who were given non-nutritive additives were three times at higher risk of diarrhea morbidity than exclusively breast fed infants and the risk was thirteen times higher among infants who were non breast-fed. Moreover it was consistent with a study done in India where exclusively breast fed infants were at a lower risk of developing diarrhea compared to spoon and bottle fed infants $P<0.01$ (36). In addition, it was consistent with studies done in USA, England, Peru and Thailand: where infants with better breast-milk intake had a lower risk of diarrheal morbidity and mortality compared to infants with lower breast milk intake (32, 33, 22, and 35). Moreover, Diarrhea morbidity was lower by half among those infants who were exclusively breast-fed

compared to those early-weaned infants. This could be because infant's who were weaned too early will lack the antibodies and nutrients supplied by breast milk, which could be exposed to different pathogens. On weaning time and those infants who are lately weaned will suffer of inadequacy of nutrient from breast milk because unless the infant is supported with weaning diet the breast milk will gradually lack it's ingredients to supply the ever increasing nutrient demand of the growing infant.

Diarrhea morbidity was significantly associated with maternal literacy that the odds of experiencing diarrhea was lower among infants of educated mothers. Our study is consistent with a study done in Eritrea where the prevalence of diarrhea was lower by 27% among infants of literate mothers compared to illiterate mothers (23). Moreover, our study was consistent with a study done in Ethio-Swedish Hospital where 73% of cases were from literate mothers while the rest 27% were from illiterate mothers (31). Similarly A study done in Jimma, Keffa, and Illubabor showed a higher infant mortality among illiterate mothers $p<0.001$ (41)

This could be because educated mothers have a better understanding on how to handle, feed, and care an infant than the illiterate mothers. Moreover, the practice of exclusive breast-feeding was much higher than in educated mothers compared to illiterate mothers, which could predispose infants to diarrhea morbidity.

In our study, prevalence of diarrhea morbidity was lower by 8.3% among exclusively breast fed infants this is consistent with a study done in Eritrea where the diarrhea prevalence was 43% lower among those with cement or clean floor compared to soil type

floor (23). It's also consistent with a study done in Jimma, Keffa, and Illubabor where higher infant mortality rate was among infants with earth type floor houses (108.6/1000) compared to cemented floor (79/1000) (41). This could be because infancy is the age when infants start to crawl on the ground and are there fore on immediate contact with the ground so that the cleanliness of the ground will immediately affect infant health.

In our study, diarrhea prevalence was slightly higher among infants with out a latrine facility (32%) compared to households with latrine facility (24%) which is consistent with a study done in Jimma, Keffa, and Illubabor where those with out latrine facility were at higher IMR compared to those with latrine facility P<0.001(41). Similarly it was consistent with the 1983 RHS where children who are in a house with a toilet facility had the lowest morbidity P<0.001(24). This could be because toilet availability and use prevents possible risk of fecal contamination and

Prevents fly breading that in turn will prevent diarrhea morbidity among infants.

7. STRENGTH AND LIMITATIONS OF THE STUDY

7.1. STRENGTH

- The study has included all the illegible subjects in the town and has got a 99% response rate.
- In testing associations for significance, potential confounders were controlled using logistic regression so the associations computed in the study are independent effects of the explanatory variables.

7.2. LIMITATIONS

- Cross sectional nature of the study where it is difficult to take in to account the seasonal difference in the occurrence of diarrhea, and other related events.
- In this study, mothers were asked if the infant had diarrhea in the past two weeks that could have a possible recall bias.
- The practice of exclusive breast-feeding in the past six months is also liable to a possible recall bias.

8. CONCLUSION

This study found that 41.8% of mothers having infants of 7-12 months have exclusively breast-fed their infants. One hundred and twenty five (18.0%) were not on weaning diet till the time of study, this shows that a considerable number of infants are under incorrect feeding practice.

Majority of mothers started breast-feeding immediately within one hour after birth, which is a good practice on initiation of breast-feeding, but as to the maintenance of the breast feeding practice still unsatisfactory because over half of infants are under incorrect feeding style.

Less than half mothers were exclusively breast-feeding their infants while majority of infants are under incorrect feeding style. Both exclusive breast-feeding and weaning were influenced by parental factors like, mother's education, and husband's occupation that educated mothers were practicing exclusive breast-feeding properly than the uneducated mothers. Similarly weaning was better practiced in un-employed mothers than in the employed mothers.

The finding of this study also showed that over a quarter of infants in the town were suffering from diarrhea morbidity. Occupation of the Spouse or husband and marital status of the mother were independently associated with diarrheal morbidity in infants. Household's type of floor and availability of latrine facility were slightly affecting infant diarrheal morbidity.

According to this study, factors such as maternal literacy and frequency of washing infant's feeding utensils were not significantly associated with prevalence of diarrhea morbidity.

9. RECOMMENDATION

Depending on the results of our study, the following recommendations are suggested:-

- The district health office and local NGO's should educate and equip parents with complete, up to date information on the benefits and methods of breast-feeding to ensure that the feeding decision is a fully informed one.
- Female education should be encouraged so as to have a literate mother who could cope with scientific ways of infant care and support.
- Town administration and local officials should work in decreasing unemployment by creating a job opportunities.

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APPENDIX

Sample English questionnaire

Addis Ababa University Faculty of Medicine

Questionnaire for data collection on breast-feeding and diarrhea morbidity, Tigray, 2005

Greeting:

Hello, My Name is_____ I am a student of MPH working my thesis in the research team of AAU. I would like to invite you to have a short discussion concerning this study. Before we go to our discussion, I will request you to listen carefully to what I am going to read to you about the purpose and general condition of the study and tell me whether you agree or disagree to participate in this study.

VERBAL CONSENT FORM BEFORE CONDUCTING THE INTERVIEW

The purpose of this study is to asses and explores the status of breast-feeding and health status of the infant and other related issues. In this locality, you are randomly selected to be one of the participants in the study. The study will be conducted through interviews. We are asking you for a little of your time, about 45 min, to help us in this study. At the end, it is hoped that the information you give us could help to design appropriate service delivery strategy for infant health. The interviewer will carry out the interview. We could like to assure you that this privacy should strictly be maintained through out. A code no will identify every participant and no name will be used your responses to any of the questions will not be given to anyone else & no reports of the study will ever identify you. If a report of results is published, only information about the total group will appear.

The interview is voluntary. Your participation/ non-participation/, or refuse to respond to the questions will have no effect now or in the future, on services that you or any member of your family may receive from any service provider.

Are you willing to participate in this study?

1. Yes: - …….. Continue to the next page
2. No: - …… Skip to the next participant

Interviewer name _____ signature _____

Date of interview _____Time started _____Time-finished _____

Supervisor name _____ Signature_____

QUESTIONNAIRE ON EXCLUSIVE BREAST FEEDING STATUS AND DIARRHEAL MORBIDITY AMONG INFANTS OF 7-12 MONTHS AGE

001. QUESTIONNAIRE NUMBER_____

002. STUDY AREA KEBELE _____

003. HOUSE CODE_____ VISIT NUMBER 1_____2 _____3 _____3+_____

Name of interviewer _____ Date of interview DD_____ MM_____ YY___

PART ONE: SOCIO-DEMOGRAPHIC ASSESSMENT

N	Question	Response	Code
101	Child's birth date	DD____ MM____ YY____	
102	Child sex.	1. Male 2. Female	
103	Had the child ever been immunized?	1. Yes 2. No	Skip to 105
104	If yes see card for immunization	1. BCG 2. DPT 3. Measles 4. No card found	
105	Place of delivery.	1 Home 2. Health institution 3. Other	
106	Birth attendant	1. Health personnel 2. TTBA/CBRHA/ 3. Relatives 4. Other mention	
107	Birth order	____ th child	
108	Gestational age at birth	_____Month	
109	Type of birth	1. Single 2. Multiple/Twin/	
110	Mother's age in years	_____ Years	
111	Total family size	_____	
112	Total number of children ever born to you	_____	
113	Ethnicity	1. Tigray 2. Amhara 3. Others	
114	What is your religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Other (specify)_____	

N	Question	Response	Code
115	What is your educational level	1. Can't read & write 2. Can read & write 3. _____th Grade 4. Above 12th grade	
116	Mother's immunization status	1. Yes 2. No	
117	What's mother's major current occupation	1. Full time housewife 2. Government employee 3. Private Organization employee 4. Self employee 5. Daily laborer 6. Retired 7. Other (specify) ————	
118	Marital status	1. Married 2. Divorced 3. Widowed 4. Separated 5. Other (specify)_____	Skip to 123 ,, ,, ,,
119	Husband's residence /If married /	1. Lives together 2. Lives else where 3. Not applicable	
120	Husband's age in years	————Years	
121	Husband's occupation	1. Government employee 2. Private organ employee 3. Self employee 4. Daily laborer 5. Retired 6. Other specify	
122	Husband's educational status	1. Can't read & write 2. Can read & write 3. ———th grade 4. Over 12th grade	
123	Monthly total household income in Eth Birr	——— Eth Birr	

PART TWO: FEEDING PRACTICE			
No	Question	Response	code
201	Did you breast-feed your infant after birth?	1. Yes 2. No	Skip to 203
202	After how many hours did you breast-fed?	1. Immediately. 2. After _____Hours	
203	What ingredients you gave?	1. Butter 2. Sugar solution 3. Salt solution 4. Cow's milk 5. Other (specify) _____	
204	Is the infant weaned	1. Yes 2. No	Skip to 211
205	If weaned the age of weaning	_____ Months	
206	Method of weaning food is delivered	1. Bottle /Teat/ 2. Cup /Spoon/ 3. Other (specify) _____	
207	Do you wash the feeding materials?	1. Yes 2. No	Skip to 209
208	If yes how frequent you wash it?	1. Twice daily 2. Daily 3. Every other day 4. Less frequent	
209	Did you give your infant additional food or fluid other than breast milk in the past 48 hrs?	1. Yes 2. No	Skip to 211
210	If yes what were the ingredients you gave?	1. Cow's milk 2. Formula milk 3. Cereals 4. Sugar 5. Fruits/Vegetables/ 6. Other (specify) _____	
211	Had the baby had diarrhea in the past 15 days?	1. Yes 2. No	Skip to 301
212	What did you do with the diarrhea on feeding?	1. Stopped feeding. 2. Continued feeding. 3. Other (specify)———	
213	Where did you took your infant when he had diarrhea?	1. Health facility 2. Holly water 3. Local healer 4. Other (Specify)_____	

PART THREE: HOUSING			
N	Question	Response	Code
301	Source of drinking water	1. River /Pond/ 2. Un protected spring. 3. Protected spring 4. Private tap 5. Public tap 6. Other (Specify)_____	
302	Type of latrine you use.	1. No latrine 2. Private pit 3. Shared pit 4. Flush toilet 5. Other (Specify)_____	
303	Hand washing habit of the mother	1. Using soap 2. Not using soap 3. I don't wash mostly	
304	Waste disposal	1. Open field disposal. 2. Pit/burning/ 3. Other (Specify)_____	
305	Type of house floor	1. Earth /Soil/ 2. Cement 3. Other (Specify)_____	
306	Type of Roof	1. Corrugated Iron Sheet 2. Soil 3. Thached roof 3. Other (Specify)_____	

THANK YOU!

ትግርኛ መጠይቅ

አዲስ አበባ ዩኒቨርሲቲ ፋኩልቲ ጥዕና መሕተቲ ኣመጋግባ ሕጻናት ጡብ ኣዶን ዉጻኣትን

ትግራይ 2006

ሰላም: ከመይ ዉዒለን

ኣነ----------ይባሃል። ኣብ ኣዲስ ኣበባ ናይ ካልኣይ ዲግሪ ናይ መመረቂ ጽሑፍ ካብ ዘቅርቡ ናይ መጽናዕቲ ቡድን እየ። እሞ ሕዚ ቅድሚ ናብ ናይ መጽናዕቲ ሰራሕቲ ምጅማረይ ሕዚ ብዛዕባ ናይዚ መጽናዕቲ ጥቅሚን ኣጠቃላሊ ኩነታትን ዝምልከት ክንብበለን እየሞ ጽን ኢልክን ክትሰምዓኒን ኣብ መወዳእታ እውን ኣብዚ መጽናዕቲ ንክትሳተፉ ዘለክን ድሌት ኣለኒ ወይ የብለይን ኢልክን ክትምልሳለይ ኢክን።

ናይ ቃል ስምምዕነት ቅጥዒ ቅድሚ መጽናዕታዊ ሕቶን መልሲን

ናይዚ መጽናዕቲ ቀንዲ ዓላማ ኣብ ኣመጋግባ ህጻዉንቲ ብዛዕባ ጸባ ጡብ ኣዶን ኩነታት ጥዕና ህጻዉንቲን ካለኦት ተዛመድቲ ጉዳያትን ዘሎ ኩነታት ንምፍላጥ ዝግበር እዩ።

ኣብዚ መጽናዕቲ ንክትንፈላ ብዝተጠቀምናዮ መመዘኒ ንስክን ተመሪጽክን ኣለክን።እዚ መጽናዕቲ ዝካየድ ብቃል መጠይቅ ቅጥዒ እዩ፤ሕዚ ንሕና ንሐተክን ናብ ዘለክን ጊዜ ናብ 45 ደቓይቅ ዝኸውን ግዜክን ንእነንይዶ መጽናዕቲ ንክትታሓባበራና እዩ።

ኣብ መወዳእታ ትጽቢት ዝግበረሉ እንረክቦ ጠቃሚ ሓበሬታ ንቀጻሊ ኣብ ዝግበር ናይ ጥዕና ግልጋሎት ንህጻናት ጥዕና ዝምልከት ትልሚ ምቅራጽን ግቡእ ግልጋሎት ክረክቡ ኣብ ምግባር ክሕግዝ እዩ ተባሂሉ ይእመን። እዚ መጠይቅ ዝምላእ ብህሰልጠነ ሓታታይ ክከውን ከሎ ኣብ ኩሉ ክይዲ ምምላእን ሓበሬታታት ምስጢሩ ዝታሓለወ ምኩኑ ክነረጋግጽ ንፈቱ።

ናይ ዉልቀ ሰባት መልሲ ዝታሓዝ ብህዋሃብ ኮድ ቁጽሪ ክከዉን ከሎ ናይ ዉልቀ ሰብ ሽም ይኩን ኣድራሻ ኣይታሃዝን። ዉጽኢት እዉን ዝግለጽብጥቅሉል እምበር ናይ ዉልቀ ሰባት ዝገልጽ ኣይኮነን።

እዚ መጠይቅ ብድሌት ዝግበር ጥራሕ እዩ። ስለዚ ኣብዚ ሕቶን መልሲን ምስታፍክን ኮነ ዘይምስታፍክን ኣብ ቀጻሊ ንባዕልክን ይኩን ኣብ ስድራክን ኣብ ዘድልክን ኣገልግሎት ዝፈጥሮ ምንም ዓይነት ጽዕንቶ ከምዘየለ ነረጋግጽ።

እሞ ንምስታፍ ፍቃደኛ ድየን?

1. እወ..... ናብ ዝቅጽል ገጽ ቀጽል
2. ኣይፋለይን..... ናብ ዝቅጽል ተሳታፋይ ቀጽል

መጠይቅ ኣመጋግባ ፀባ ጡብ ኣደን ኩነታት ውፃእትን ኣብ ህፃወንቲ ክለ. ዕድመ ካብ ሸውዓተ ክሳብ ዓሰርተ ኽልተ ወርሒ

ናይ ሓታታይ ሽም----------ፊርማ--------
መሕተቲ ዕለት----------ዝተጀመረሉ ሳዓት---------ዝተወደአሉ ሳዓት--------
ህም ኮብራሪ/ተቆጻጻሪ/----------ፊርማ----------

001 ቁፅሪ መጠይቅ ----------
002 ናይ መፅናዕቲ ቦታ ----------
003 በዝሒ ዝተገብረ ዑደት ----------
004 ሽም ሓታታይ ----------
005 መጠይቅ ዝተመልኣሉ ዕለት ---------- ወርሒ ----------ዓ.ም ----------

ክፍሊ ሓደ ማሕበራዊን ዲሞግራፍያዊን ኩነታት

ተ.ቁ	ሕቶ	መልሲ	መ.ቁ
101	ህፃን ዝተወለደሉ ዕለት	ዕለት ------ወርሒ.------ዓ.ም------	
102	ናይ ህፃን ፆታ	1. ተባዕታይ 2. ኣንስታይ	
103	እዚ ህፃን ተኸቲቡዶ ይፈልጥ?	1. እወ 2. ኣይፋሉን	ናብ ቁ 105
104	ዝተኸተበሉ ከርዲ መርኣያኒ ዶ?	1. ቢ.ሲ.ጂ 2. ዲ.. ፒ. ቲ 3. ሚዝልስ 4. ከርድ የለን	
105	እዚ ህፃን ዝተወለደሉ ቦታ	1. ኣብ ገዛ 2. ኣብ ጥዕና ትከል 3. ከልኢ ይገለፅ----------	
106	እንክውለድ ክሎ ዘዋለደ ኣከል	1. ጥዕና በዓል ሞያ 2. ፋና ጥዕና 3. ቤተሰብ (ዘመድ ጎረቤት)	
107	እዚ ህፃን መበል ክንደይ እዩ?	መበል ----------	
108	እንክውለድ ክሎ ናይ ክንደይ ወርሒ ጥንሲ ነይሩ?	----------ወርሒ.	
109	ናይ ወሊድ ዓይነት	1. ናፅላ 2. ማንታ	
110	ናይ ኣዶ (ወላዲት) ዕድመኸ ክንደይ እዩ?	---------- ዓመት	
111	በዝሒ ስድራ	----------	
112	ኣጠቃላሊ በዚሒ ኣዶ ዝወለደቶም ቆልዑት	----------	
113	ብሔረሰብክን እንታይ እዩ?	1. ትግራይ 2. ኣምሓራ 3. ከልኢ (ይገለጽ)----------	
114	ሃይማኖትክን (እምነትክን) እንታይ እዩ?	1. ኦርቶዶክስ 2. ሙስሊም 3. ፕሮስታንት 4. ከቶሊክ 5. ከልኢ (ይገለፅ) ----------	

ተ.ቁ	ሕቶ	መልሲ	መ.ቁ
115	ናይ አዶ ትምህርቲ ደረጃ	1. ምንባብ ምዕሓፍን ኣይክእልን 2. ምንባብን ምዕሓፍን ጥራሕ 3. ----------ክፍሊ 4. ልዕለ 12^{+} ክፍሊ	
116	ናይ አዶ ክታበትዶ ተኸቲብክን?	1. ተኸቲበ 2. ኣይተኸተብኩን	
117	ናይ አዶ ቀንዲ ሕዚ መተሓዳደሪአን ስራሕ	1. ሙሉእ እዋን ኣብ ገዛ 2. ናይ መንግስቲ ሰራሕተኛ 3. ኣብ ግሊ መ/ቤት ቁፃር 4. ናይ ባዕለይ ስራሕ አለኒ 5. ዕለታዊ ሰራሕተኛ 6. ጥሮታ ወፂአ 7. ክልአ የገለፅ----------	
118	ኩነታት ሓዳር	1. ባዓልቲ ሓዳር 2. ተፋቲሓን 3. በዓል ገዝኣን ዝሞተን 4. ክልእ ይገለፅ	ናብ ቁ.123 ,, ,,
119	ባዓልቲ ሓዳር እንተኾይነን ናይ ባዓል ገዝአን መንበሪ	1. ብሓደ ንነብር 2. ብሓደ አይኮናን ዘለና 3. ክልእ ይገለፅ ----------	
120	ናይ በዓል ገዛአን ዕድመ ብዓመታት	----------ዓመት	
121	ናይ በዓል ገዛአን ስራሕ	1. ናይ መንግስቲ በራሕተኛ 2. ናይ ግሊ መ/ቤት ቁፃር 3. ናይ ባዕለይ ስራሕ አለነዎም 4. ዕለታዊ ሰራሕተኛ 5. ጥሮታ ወፂአም 6. ክልእ ይገለፅ ----------	
122	ናይ በዓል ገዛአን ደረጃ ትምህርቲ	1. ምንባብን ምዕሓፍን ኣይኸእሉን 2. ምንባብን ምዕሓፍን ጥሪሕ 3. ----------ክፍሊ 4. ልዕለ 12^{+}ክፍሊ	
123	ወርሓዊ ናይ ገዛ እቶት ብ ኢትዮ ቅርሽ	----------ኢትዮ ቅርሽ	

ክፍሊ ክልተ

አመጋግባ ህፃን

ተ.ቁ	ሕቶ	መልሲ	መ.ቁ
201	እዚ ህፃን ምስተወለደ ፀባ ጡብዶ ሂበንኦ?	1. እወ 2. ኣይሩሱን	ናብ ቁ 203
202	ደሕሪ ኽንደይ ሳዓት ምጥዋብ ጀሚሩ?	----------ሳዓት	
203	እንተ ዳኣ ፀባ ጡብ ኣደ ዘይጠበወ እንታይ ሂበንኦ (መጊበነኦ)?	1. ጠስሚ 2. ሽኮር ኣሕቂቀ 3. ጨው ኣሕቂቀ 4. ናይ ላሕሚ ፀባ 5. ከልኣ (ይገለፅ) ----------	
204	ተወላኽ ምግቢ ጀሚሩዶ?	1. እወ 2. ኣይፋሉን	ናብ ቁ 211
205	ተወላኺ ምግቢ ኣብ ኽንደይ ወርሑ ጀሚሩ?	----------ወርሒ	
206	ኣመጋግባ ተወለኽ ምግበ ብኽመይ ይወሃቦ?	1. ብጡጦ 2. ብማንከን ኩባያን 3. ኻልኣ (ይገለፅ) ----------	
207	ህፃን ዝምገበሉ ኣቕሓ ይቆፀብ ዶ?	1. እወ 2. ኣይፋሉን	ናብ ቁ 209
208	እቲ ዝምገበሉ ኣቕሓ በብኽንደይ ጊዜ ይሕፀብ?	1. ኣብ መዓልቲ----------ጊዜ 2. ኣብ ሳልስቲ 3. ከልኣ (ይገለፅ) ----------	
209	ኣብ ዝሓለፈ 48 ሰዓታት (2ተማዓልትታት) ከብ ፀባ ጡብ ወፃኢ ምግቢ ወይ ፈሳሲዶ ሂበናኡ ነይረን?	1 እወ 2 ኣይፋሉን	ናብ ቁ 211
210	ኣብ 48 ሰዓታት እንታይ እዩ ዝወሃቦ ነይሩ (ምግቢ ወይ ፈሳሲ)	1. ናይ ላሕሚ ፀባ 2. ናይ ታነከ ፀባ 3. ስብቆ 4. ሽኮር ኣሕቂቀ 5. ፅሚቅን ኣትክልትን 6. ከልኣ (ይገለፅ) ----------	
211	እዚ ህፃን ኣብ ዝሓለፉ ኽልተ ሰሙናት ውፃኣት ሒዝሞ ዶነይሩዶ?	1. እወ 2. ኣይሓዞን	ናብ ቁ.301
212	ውፃኣት ምስ ሐዞ ኣብ ኣመጋግብኡ እንታይ ገይረናሉ?	1. ጡብ ምሃብ ገዲፈዩ 2. ጡብ ምሃብ ቀኒሉ 3. ኻልኣ (ይገለፅ) ----------	
213	ውፃኣት ምስ ሐዞ ናበይ ወሲደነኦ?	1. ናብ ጥዕና ተክል 2. ናብ ማጨለት 3. ናብ ናይ መንደር ሓኪም 4. ከልኣ (ይገለፅ) ----------	

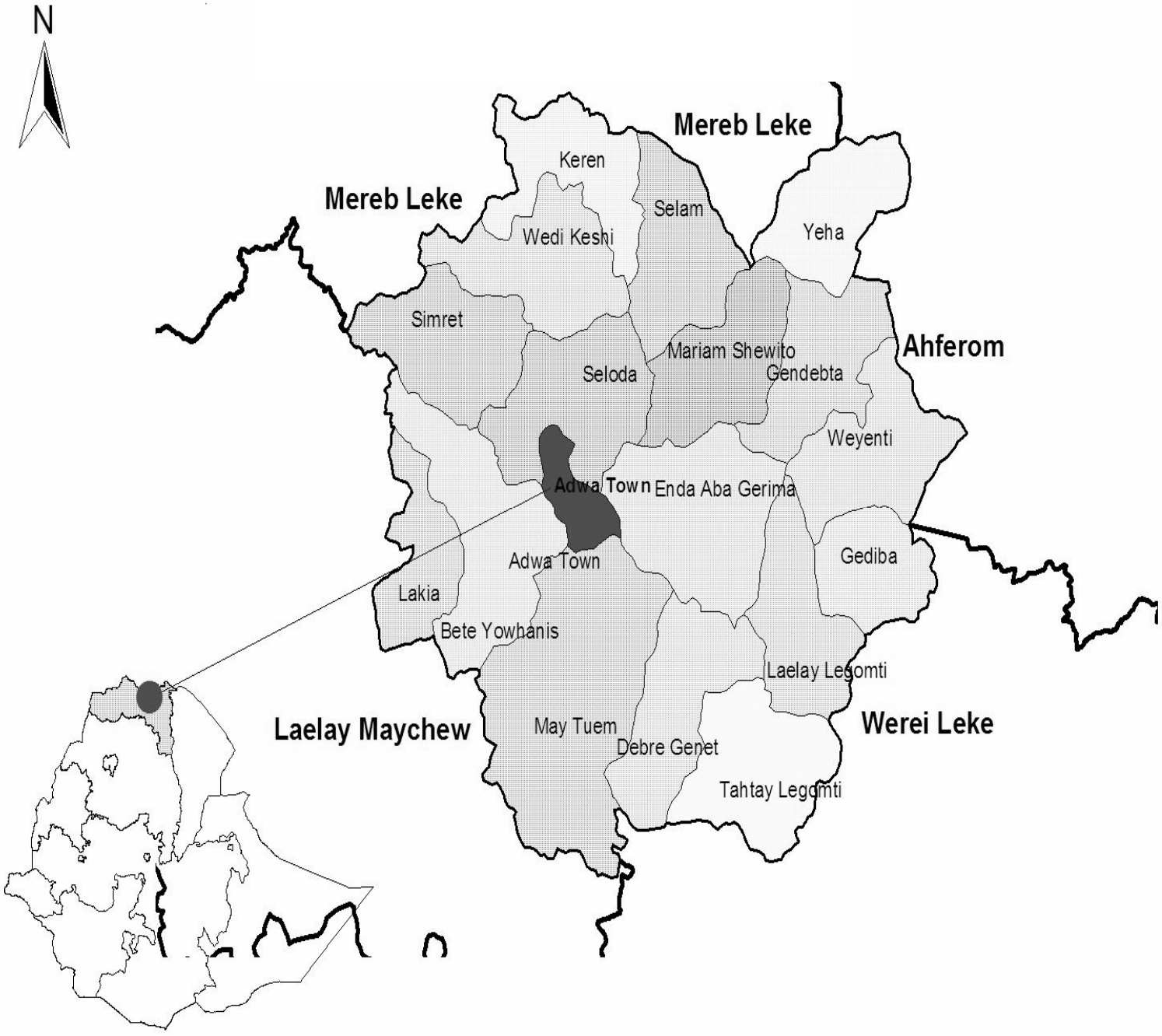
ክፍሊ ሰለስተ

ኩነታት ገዛን ከባቢን

ተ.ቁ	ሕቶ	መልሲ	መ.ቁ
301	ዝስተ ማይ ከበይ ትጥቀሙ?	1. ሩባ (ግድብ) ማይ 2. ዘይተኸለለ ፍልፍል 3. ዝተኸለለ ፍልፍል 4. ናይ ውልቀ ቡንባ 5. ናይ ህዝቢ ቡምባ 6. ከልእ ይገለፅ ----------	
302	ዓይነት ሽንቲ ቤት (ዓይኒ ምድሪ)	1. ሽንት ቤት የብልናን 2. ናይ ውልቀ ሽንት ቤት 3. ናይ ሓባር ሽንት ቤት 4. ብማይ ዝሰርሕ ሽንት ቤት 5. ከልእ (ይገለፅ) ----------	
303	ወላዲት (መፅበይት) ኢድክን ብኽመይ ትሕፅባ?	1. ሳሙና ይጥቀም 2. ሳሙና አይጥቀምን 3. መብዛሕትኡ አይሕፀብን	
304	ንሓፍን ርስሓትን ኣበይ ይድፋእ?	1. አብ ማይዳ /ድህሪ ገዛ/ 2. አብ ጉድጋድ 3. ከልእ (ይገለፅ) ----------	
305	ናይ ገዛ ምድር ቤት ዓይነት	1. ሓመድ 2. ስሚንቶ (ማተካላ) 3. ከልእ (ይገለፅ) ----------	
306	ናይ ገዛ ኽዳን (ጣራ) ዓይነት	1. ቆርቆሮ 2. ሓመድ (ሀድሞ) 3. ሳዕሪ 4. ከልእ (ይገለፅ) ----------	

የቅንየለይ!

MAP OF THE STUDY AREA



CONCEPTUAL FRAMEWORK