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Minimum Acceptable Diet Practice and Associated Factors Among 6-23 Months Children in Households With Irrigated and Non-Irrigated Users of North Mecha District, Northwest Ethiopia, 2021

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**BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES,
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF NUTRITION AND DIETETICS**

**MINIMUM ACCEPTABLE DIET PRACTICE AND ASSOCIATED
FACTORS AMONG 6-23 MONTHS CHILDREN IN HOUSEHOLDS
WITH IRRIGATED AND NON-IRRIGATED USERS OF NORTH
MECHA DISTRICT, NORTHWEST ETHIOPIA, 2021**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF NUTRITION
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Study area	North Mecha district, Northwest Ethiopia

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Abstract

Background: After six months, breast milk is no longer adequate to meet the nutritional needs of infants and children. Thus, additional complementary food should be started. Minimum acceptable diet (MAD) has tremendous health and nutrition benefits but only 12% of Ethiopian children's feeding practices meet its standards. The Ethiopian government has recently increased efforts to expand irrigation, which, if implemented well, could complement plans to eradicate malnutrition.

Objective: The aim of this study was to compare the magnitude of minimum acceptable diet practice and associated factors among children aged 6-23 months in households with irrigated land users and non-users of North Mecha district, Northwest Ethiopia, 2021.

Methods: A community-based comparative cross-sectional study was employed among 824 mother-child pairs aged 6-23 months, from September 15, 2021, to October 14, 2021. The sample size was determined using double population formula with the assumptions of 80% power and 95% confidence level. A stratified sampling technique was used to select irrigated and non-irrigated kebeles and the study population. A semi-structured and pretested questionnaire was used to collect data. Data were collected by face-to-face interview method. Bivariate and multivariable logistic regression analyses were used to see the association between minimum acceptable diet and independent variable at P-value <0.05 with 95% CI. Adjusted odds ratio along with a 95% confidence interval was used to assess the strength of the association.

Result: There was a significant difference in magnitudes of MAD practice among irrigation land users and non-users ($X^2 = 13.91$, $P < .001$). The magnitude of recommended MAD practice was 28.0 % (95% CI: 23.7, 32.4) among users and 16.8% (95% CI: 13.2, 20.7) among non-users. Involvement in a decision (OR=4.37), initiation of BF (OR=5.29), and history of illness (OR=4.10) were independent predictors of MAD practice among users whereas involvement in a decision (OR=4.71), place of delivery (OR=2.51), PNC follow up (OR=3.01), and GMP service utilization (OR= 4.64) were the independent predictors among the non-users.

Conclusion: The overall prevalence of the MAD practice in the study area was low compared with national and WHO recommendations. But the practice was much higher in irrigated users than in non-irrigated users. Involvement in a decision, place of delivery, PNC, and GMP are independent predictors of MAD in children from non-irrigated households. Therefore, the government should expand access to irrigation to households to improve their child's minimum acceptable diet practices.

List of Acronyms and Abbreviations

ANC	-----	Ante-Natal Care
BDU	-----	Bahir Dar University
CF	-----	Complementary Feeding
CI	-----	Confidence Interval
EDHS	-----	Ethiopian Demography and Health Survey
GMP	-----	Growth Monitoring and Promotion
HFIAS	-----	Household Food Insecurity Access Scale
IYCF	-----	Infant and Young Child Feeding
LMIC	-----	Low and Middle Income Countries
MAD	-----	Minimum Acceptable Diet
MDD	-----	Minimum Dietary Diversity
MMF	-----	Minimum Meal Frequency
PCA	-----	Principal Component Analysis
PNC	-----	Post Natal Care
NNP	-----	National Nutrition Program
SPSS	-----	Statistical Package for Social Science
UNICEF	-----	United Nations Children's Fund
WHO	-----	World Health Organization

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1. Introduction

1.1 Background

The WHO and the UNICEF recommend that all mothers should breastfeed their children exclusively for the first 6 months and thereafter they should continue to breastfeed for 2 years or longer (1). Breastfeeding confers both short-term and long-term benefits to the child. It reduces infections and mortality among infants, improves mental and motor development, and protects against obesity and metabolic diseases later in the life course (2). After six months, breast milk is no longer adequate to meet the nutritional needs and increasing demand nutritional requirements of infants and children (3).

From the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk, and additional complimentary food should be started and fed according to the minimum acceptable diet (MAD) feeding recommendation standards (4). Complementary feeding is defined as the practice of beginning liquid, solid, as well as semi-solid foods alongside breast milk, as breast milk alone is not adequate in satisfying the demand of the baby at the age of six months and onwards. Complementary feeding can significantly reduce stunting during the first two years of life (5).

Since infants and young children are in a fast growth and development stage, the World Health Organization (WHO) suggests the recommended tracking infants and young children feeding (IYCF) indicators on the introduction of soft, solid, or semi-solid foods, minimum dietary diversity (MDD), minimum meal frequency (MMF), and MAD during two years of age. The national nutrition program II (NNP II) of Ethiopia also included the MAD among the indicators to assess progress in IYCF practices(6, 7).

Minimum acceptable diet is defined as the percentage of breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day, and non-breastfed children 6-23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day (8).

Consumption of acceptable dietary standards has numerous benefits; including enhanced linear growth, better cognitive development, high school achievement, reduced risk of non-communicable disease, increased body immunity system, and productivity during adult life. Meeting a minimum acceptable diet

is also essential to reduce macronutrient and micronutrient deficiencies that lead to improving linear growth status (6, 9).

The introduction of appropriate nutrition at age 6 months together with sustaining breastfeeding until two years of age warrants optimal growth, development, and maintaining healthy life throughout the life cycle (10). An analysis of 14 countries found that children aged 6–8 months who ate solid or semi-solid foods had a lower risk of being stunted or underweight. Nearly one-third of child deaths could be prevented by optimal complementary feeding practices (11).

The Ethiopian government has recently developed a multi-sectoral plan of nutrition intervention (Sekota Declaration), which aims to address the immediate, underlying, and basic causes of malnutrition to end children under nutrition in Ethiopia by 2030(12). In particular, nutrition-sensitive interventions in the food and agricultural sector are believed to play a pivotal role alongside nutrition-specific interventions (13-15). Nutrition-sensitive agricultural interventions, like bio-fortification, crop diversification, and value-added processing, have the potential to improve nutritional outcomes (16).

Irrigated agriculture can be an important entry point for malnutrition reduction because water is frequently a limiting factor for crop and livestock production. Irrigated agriculture is frequently used to grow nutritious vegetables and fruits throughout the year, with important nutritional and health benefits for the households consuming them. Irrigation can also reduce vulnerability to droughts and climate change, which are both important drivers of hunger and under-nutrition (17, 18).

The adoption of irrigation technology enables farmers to adapt and strengthen their resilience in climate-vulnerable regions, diversify their diet, and increase the nutritional content of foods through bio and post-harvest fortification. Improving agricultural efficiency through adopting irrigation technology is a foundation for improving rural households' food security in Ethiopia (13, 19).

1.2 Statement of the problem

Poor breastfeeding and complementary feeding practices, together with high rates of morbidity from infectious diseases are the prime proximate causes of malnutrition in the first two years of life. Any damage caused by nutritional deficiencies during this period could lead to impaired cognitive development, growth retardation, smaller adult stature, and consequence of compromised educational achievement, and low economic productivity which become impossible to reverse later in life (20-22).

Even with optimum breastfeeding, children will become stunted if they do not receive sufficient dietary diversity and frequency over 6 months of age (23). In developing countries including Ethiopia, feeding infants and children with diversified diets is practiced inappropriately. Globally minimum acceptable diet was 18% among these 12% was in South Asia and 13% was in Sub-Saharan Africa (24).

Inappropriate complementary feeding is commonly practiced in many low- and middle-income countries (LMIC). The study conducted in 80 LMIC revealed that only 10.1% of the countries showed prevalence levels >50% for a MAD practice. Western & Central Africa showed the lowest prevalence (9.4%), whereas the highest (43.7%) was Latin America & Caribbean (25).

The study conducted in 32 African Countries revealed that the proportion of children aged 6–23 months who received a minimum acceptable diet was 8.6%, among the lowest in Guinea (3.7%), and highest in Kenya (21.8%) (26). In Ethiopia, children to have met the minimum acceptable diet were 12%, and among these only 6.3% were in the Amhara region (7).

The unmet of recommended minimum acceptable diet practice standard has devastating, long-term, and irreversible health outcomes such as stunted growth. Moreover, stunted children become small adults with different adverse health effects in their life course(10)

Inappropriate feeding practices are the most risk of malnutrition, illness, and mortality in both infants and young children less than 24 months of age, and more than two-thirds of children deaths related to malnutrition are associated with inappropriate feeding practices during the first 24 months of life (27).

The potential negative impact of malnutrition during this critical period is not limited to childhood life (28) rather it diminishes the individual level of productivity during adulthood (29), negatively affecting the future social and economic development of countries (30) and leading the vicious cycle of

intergenerational malnutrition (31).

Parental education status, household wealth index, household family size, child sex, number of under-five children in household, household decision making, ANC, place of delivery, PNC, birth order, vaccination status, GMP, maternal knowledge on IYCF practice were associated with MAD (32-36).

Despite the above efforts, the progress was not satisfactory; for example, the national and the Amhara region prevalence of the minimum acceptable diet has increased only from 7% to 12% and from 3.1% to 6.3% respectively (2016 -2020) and the magnitude in Amhara region was still a lower than the national and other regions (7).

To the best of my knowledge, there was no specific such comparative study on minimum acceptable diet and associated factors among children from households with irrigated and non-irrigated users including in the study area.

Therefore, this study was devised to compare minimum acceptable diet practice and associated factors among children aged 06-23 months in households with irrigated and non-irrigated users in North Mecha district, Northwest Ethiopia.

1.3 Significance of the study

The lack of research on irrigation-nutrition pathways is unfortunate given the Ethiopian governments' investments in irrigation. So, the need to conduct this study was to compare the minimum acceptable diet practice among households with irrigated and non-irrigated users and to show factors related to minimum acceptable diet practice by comparing the two groups of populations that have been classified as households with irrigated and non-irrigated users, in addition, it used to analyses the proportion between the study area.

This study also aims to build the evidence base to provide insight on nutrition-sensitive irrigation development, using data on children's minimum acceptable diets. The results highlight the potential implications of seasonality and irrigation for children's minimum acceptable diets; it will be helpful for planning and implementation of interventional activities to improve the minimum acceptable diet practice of 6-23 months children including in the study area.

Therefore the findings from this study will be useful for informing policymakers and agricultural and health organizations and strengthening nutrition-sensitive intervention programming and resolving the feeding practices problem to close this gap and further reduce the prevalence of malnutrition in Ethiopia.

2. Literature review

2.1 Magnitude of minimum acceptable diet practice

The prevalence of children who received a minimum acceptable diet is different from place to place. Findings from complementary feeding practices in 80 Low and Middle-Income Countries revealed that only 10.1% of the countries showed prevalence levels >50% for a minimum acceptable diet. Western & Central Africa showed the lowest prevalence (9.4%), whereas the highest (43.7%) was Latin America & Caribbean (25)

The cross-sectional study conducted in China among infants and young children aged 6-23 months in poor rural areas revealed that the proportion of children who received the minimum acceptable diet was 49.0% (37). A community-based study conducted in India among young children in an urban slum in 2020 revealed that children who achieved the recommended minimum acceptable diet were 32.1% (38). A cross-sectional study conducted in Indonesia among children 6-23 months old showed that the proportion of children who received a minimum acceptable diet was 40% (39).

A community-based cross-sectional study conducted in Nepal among children aged 6-23 months revealed that the proportion of children who received the minimum acceptable diet was 44.3%, (40). A community-based cross-sectional study conducted in the Philippines among children aged 6-23 months revealed that the proportion of children who received the minimum acceptable diet was 6.7% (41).

The study conducted in 32 African Countries revealed that the proportion of children aged 6–23 months who received a minimum acceptable diet was 8.6%, among the lowest in Guinea (3.7%), and highest in Kenya (21.8%) (26). A cross-sectional study conducted in Burkina Faso, showed that only 13% benefited from the minimum acceptable diet (42). A cross-sectional study conducted in Southwestern Nigeria revealed that 9.2% received a minimum acceptable diet (43). The other study conducted in Rwanda revealed that the proportion of children who received the minimum acceptable diet was 15.2% (44).

A community-based cross-sectional study conducted in the Democratic Republic of Congo, among children aged 6–23 months revealed that 33% of infants had a minimum acceptable diet (35). The study conducted a cross-sectional analysis using the Malawi Demographic Health Survey (2015-2016) revealed that 12% met the minimum acceptable diet (45). A study in Kenya showed that children who

received minimum acceptable were 34.1%(46). In Ghana, one study revealed that 17% of the children received a minimum acceptable diet (47).

Different studies conducted in Ethiopia showed a low prevalence of minimum acceptable diet among children. According to the EDHS 2016 results, the feeding practices of only 7% of children in Ethiopia aged 6-23 months meet the minimum acceptable diet (48). An Institution-based cross-sectional study conducted in the city of Addis Ababa Ethiopia among children revealed that 74.6% of the children aged 6-23 months met the recommended MAD (49). The other institution-based cross-sectional study carried out in North Shoa, Oromia Region revealed that the proportion of children who received composite indicator minimum acceptable diet was 13.3% (50).

A community-based cross-sectional study conducted in Haramaya showed that 12% of them received the minimum acceptable diet (51). Similarly, a community-based cross-sectional study in Mareka District, Southern Ethiopia, among children aged 6-23 months revealed that the proportion of children who received the minimum acceptable diet was 35.5% (52). A study conducted in Arsi Negele, Southern Ethiopia has been reported a minimum acceptable diet was 12.3 % (53).

In the Amhara region, different studies also showed a low prevalence of minimum acceptable diet. A community-based cross-sectional study employed in communities of Goncha district, Northwest Ethiopia, showed that only 12.6% of children aged 6–23 months received the recommended minimum acceptable diet (54). A similar study conducted in rural areas of Dembecha, Northwest Ethiopia, during the fasting season, showed that about 8.6% of infants and young children aged between 6 and 23 months received a minimum acceptable diet(34). The other community-based cross-sectional study conducted in Debre Berhan town revealed that the prevalence of MAD was 31.6% (55).

2.2 Factors associated with minimum acceptable diet

2.2.1 Socio-demographic and economic characteristics

Mothers who had formal education were more likely to provide minimum acceptable diets for their children compared to mothers who had no formal education (34, 44, 52, 55). Likewise, children whose fathers had primary education were more likely to receive higher MAD practice than children whose fathers had no formal education(34, 55).

The mother's occupational status was also a significant predictor of feeding a minimum acceptable diet to the child. Children who have employed mothers were more likely to feed a minimum acceptable diet (25, 40). Children born to mothers involved in household decision-making were more likely to receive a minimum acceptable diet when compared with children of mothers who were not involved in decision-making (34).

Children born from mothers with a high wealth index were more likely to receive the recommended minimum acceptable diet than children born from mothers with a low wealth index (44, 54). Among 6-23 months old children, having more than five household members had lesser odds of meeting the MAD compared to those with five or fewer household members (41).

Children born in the first to fourth order were less likely to receive a minimum acceptable diet when compared with children born in the above fourth-order (34). And those having mothers with more than three children were more likely to meet the MAD than children having mothers with three or fewer children (41). Children in the age range of 12-23 months were more likely to meet the MAD than children aged 6-11 months (37, 41, 52).

2.2.2 Impact of irrigation on complementary feeding

Nutrition-sensitive agricultural interventions, like bio-fortification, crop diversification, and value-added processing, have the potential to improve nutritional outcomes (16). The agricultural intervention leads to a shift in food production, production variability, dietary diversity, labor productivity, and a change in the role of women. Irrigation generally has an encouraging effect on cash crop production, which has the potential to boost dietary diversity via the income pathway. Women's involvement in income-generating irrigation activities and their control of income from irrigation has a greater impact on increasing the child's nutritional status in the households (56-58).

The production of fruits and vegetables, a nutritionally important food group, is particularly influenced by irrigation availability. It increased and diversified crop production, and in particular, the production and consumption of fruits and vegetables (59). Livestock production is another nutritionally-important food group in which irrigation can play a key role (60).

Irrigation systems are mostly used to grow vegetables in the dry season; consequently, vegetable consumption among irrigation users and their communities usually increases. Vegetables are rich in micronutrients and provide important benefits, especially for children. Irrigation systems are also likely to improve the intake of animal-source foods as a result of higher incomes and improved livestock productivity. In Ethiopia, farmers using irrigation systems produced crops twice, and sometimes even three times, per year (61, 62).

Irrigation can potentially affect nutrition through various transmission channels, from production to market. Access to farmland enhances crop diversity and increased crop diversity leads to improved children's dietary diversity (63, 64).

The study conducted in India revealed that child feeding practices were positively associated with high yield rates of spices and cereals and the production of pulses. Also, it has been found that agricultural intervention is a best practice to improve complementary feeding among children and, therefore, their nutritional status (65, 66).

2.2.3 Maternal and child health service-related characteristics

Mothers who attained four and above ANC visits were more likely to provide MAD to their children (35, 38, 55). Similarly, children born in a health facility were more likely to receive a minimum acceptable diet than those who were born at home (34, 52, 54).

Mothers/caregivers, who had postnatal care visits, were more likely to provide MAD to their children than had not visited (35, 40, 50). Mothers who had good knowledge about child feeding practice were more likely to practice a minimum acceptable diet compared to mothers with poor knowledge (34, 50).

Those children who utilized the GMP service were more likely to meet MAD than children who didn't get GMP service (52, 54). Children who were illness-free within 2 weeks before the survey had greater odds of MAD (40, 55)

3. Conceptual Framework

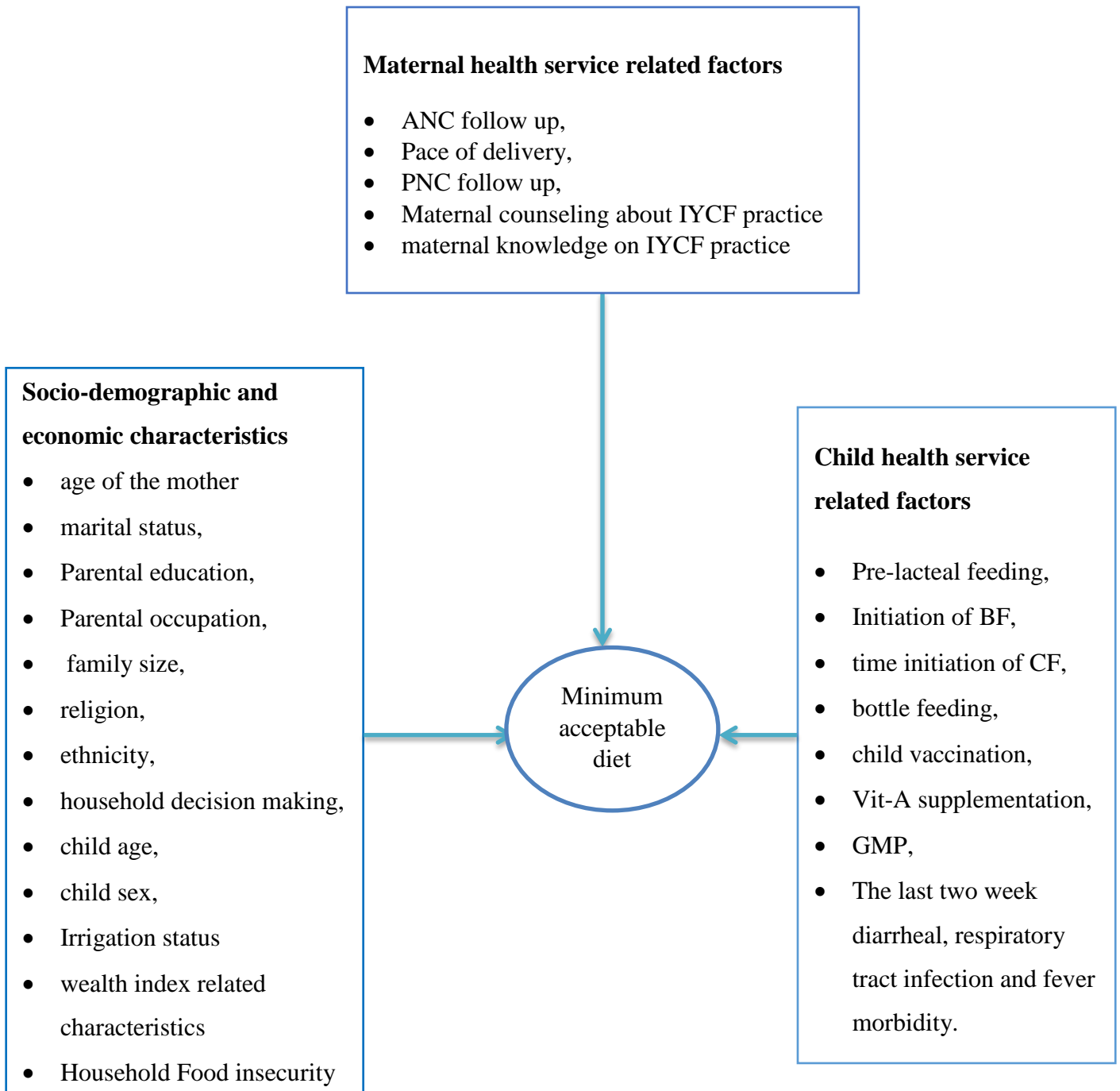


Figure 1 Conceptual framework of minimum acceptable diet practice and associated factors in households with irrigated and non-irrigated users of North Mecha district.

4. Objectives of the study

4.1 General Objective

To compare the magnitude of minimum acceptable diet practice and associated factors among children aged 6-23 months in households with irrigated land users and non-users of North Mecha district, Northwest Ethiopia, 2021.

4.2 Specific Objectives

- To compare the magnitude of minimum acceptable diet practice among children aged 6-23 months in households with irrigated land users and non-irrigated users of North Mecha district, Northwest Ethiopia, 2021
- To identify factors associated with minimum acceptable diet practice among children aged 6-23 months in households with irrigated land users of North Mecha district, Northwest Ethiopia.
- To identify factors associated with minimum acceptable diet practice among children aged 6-23 months in households with non-irrigated users of North Mecha district, Northwest Ethiopia, 2021

5. Methods and materials

5.1. Study design and period

A comparative community-based cross-sectional study design was employed from September 15, 2021, to October 14, 2021.

5.2. Study area

The study was conducted in the North Mecha district which is located 530 km Northwest direction of Addis Ababa, the capital city of Ethiopia, and 34 km in the Southwest direction of Bahir Dar, the central city of Amhara National Region State. It is one of the sixteen districts found in the West Gojjam Administrative Zone. Based on the 2007 national census, the estimated population of the district in 2021 was about 317,885, of which 157,353 were males and 160,532 were females. In the district, there were 10,713 pregnant mothers and 43042 under-five children, among these 11,094 were 6-23 months old age groups. The district has 10 health centers, 40 health posts, 1 government hospital, 20 private clinics, and 18 pharmacies. There were 216 health workers and 107 health extension workers in the district (67).

The district comprises three climatic zones; high land “Dega”, mid-altitude “Wena Dega”, and lowlands “Kola”. The mean annual rainfall ranges from 1,000mm to 2,000mm. The district has 156,027 hectares of area, of which 72,178 hectares were used for cultivation and about 1,386 hectares covered by water bodies. There are 37 rural Kebeles among these 10 Kebeles irrigated users and the remaining are non-irrigated users. Maize, and teff are mainly planted during the main rainy season, while wheat, maize, and vegetables are grown under irrigated conditions (68, 69).

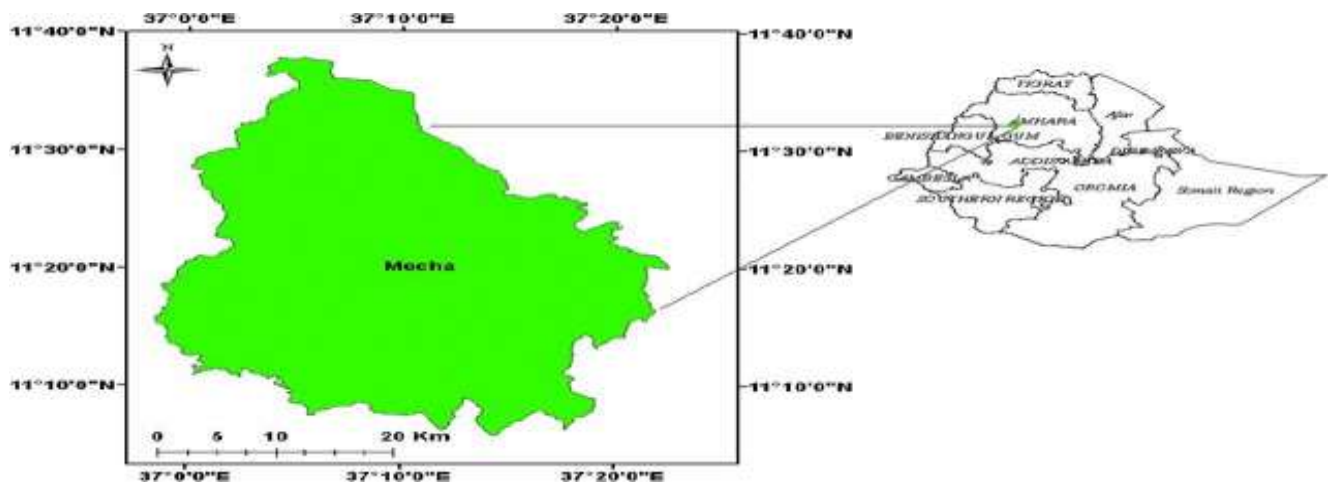


Figure 2 Map of North Mecha district to study MAD practice and associated factors in HHs with irrigated and non-irrigated users

5.3 Populations

5.3.1 Source population

The Source population for irrigation users: All mothers/care-takers with children aged 6-23 months in irrigation land user Kebeles

The source population for the non-irrigation user: All mothers/care-takers with children aged 6-23 months in non-irrigation land user Kebeles

5.3.2 Study population

The study population for irrigation users: Mothers/caretakers with children aged 6-23 months in randomly selected Kebeles among irrigation land users Kebeles.

The study population for non-irrigation users: Mothers/caretakers with children aged 6-23 months in randomly selected Kebeles among non-irrigation land users Kebeles.

5.4 Eligibility criteria

5.4.1 Inclusion criteria

Inclusion criteria for irrigated land users: Mothers/caretakers with children aged 6-23 months who had been residents in the selected irrigation land user kebeles at least for 6 months were included in the study

Inclusion criteria among non-irrigated land users: Mothers/caretakers with children aged 6-23 months in the selected non-irrigation land user kebeles at least for 6 months were included in the study

5.5 Variables

5.5.1 Dependent variable

Minimum acceptable diet (Adequate/ Inadequate)

5.5.2 Independent variable

- **Socio-demographic and economic characteristics:** age of the mother, marital status, religion, ethnicity, parental education, Parental occupation, family size, household decision making, child age, child sex, wealth index related characteristics.
- **Maternal related factors:** ANC follow up, place of delivery, PNC follows up, maternal counseling about child feeding practice, and maternal knowledge on IYCF practice.

- **Child health-related characteristics:** pre-lacteal feeding, initiation of BF, timely initiation of CF child vaccination, bottle feeding, Vit-A, GMP, the last two weeks diarrheal, respiratory tract infection, and fever morbidity

5.6 Operational definition of terms

Food insecurity: is defined as a situation where people, individuals at times, lack physical and economic access to sufficient, safe, and nutritious food needed to maintain a healthy and active life(70).

Household wealth index: A proxy measure of living standards derived from information on ownership available assets and household characteristics and households classified into five categories (48).

Irrigation: is defined as the application of artificial water to the living plants for food production and overcoming the shortage of rainfall and helping to stabilize agricultural production and productivity (71).

Minimum acceptable diet: The percentage of breastfed children 6-23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day, and non-breastfed children 6-23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day (6, 9).

Minimum dietary diversity: Percentage of children 6–23 months of age who consumed foods and beverages from at least five out of eight defined food groups during the previous day (8).

Minimum meal frequency: is child receives solid, semi-solid, or soft foods (but also includes milk for non-breastfed children) the minimum number of times or more over the previous day. The minimum number of times is 2 times for breastfed infants 6-8 months, 3 times for breastfed children 9-23 months, and 4 times for non-breastfed children 6-23 months in the last 24 hours (8, 9).

Irrigation users are households who did use irrigation land whereas those households who did not use irrigation land were called “**non-users**”.

5.7 Sample size determination and sampling procedure

5.7.1 Sample size determination

As it was a comparative cross-sectional study, the minimum sample size was determined by using the double population proportion formula [n (in each group) = $f(\alpha, \beta) (p_1q_1 + p_2q_2) / (p_1 - p_2)^2$], with the following assumptions that two groups were considered based on their irrigation status. Group one was without irrigation as not exposed (non-user HHs) and groups two was with irrigation as exposed (user HH). To estimate the minimum sample size of the study 35.5% (Households with non-irrigated users attain minimum acceptable diet practice among mothers having children 6-23 months of age in Mereka district, Southern Ethiopia (52), and households practice from irrigation users not known, so 50% ($p=0.5$) were taken. Then, the sample size estimation was calculated using Epi Info software, and with a 95% confidence level and an 80% power yielded 392 and multiplied by a design effect of 2 and then adding a 5% non-response rate, the final required sample size was 824. The second objective also calculates the sample size for using Epi Info and put the assumptions.

Table 1: Sample size calculation for the second objective of the study conducted compared the magnitude of minimum acceptable diet practice and associated factors among 6-23 months children in households with irrigated and non-irrigated users of North Mecha district, Northwest Ethiopia, 2021.

S.N	Variable	CI	Power	Ratio	AOR	% outcome in n unexposed	n	n with non-response rate
1	Maternal education (2ndary& above)	95%	80%	1:1	2.06	18.0%	732	769
2	Delivery place(Health facility)	95%	80%	1:1	2.52	28.7 %	252	265
3	Age of the index child(12-23months)	95%	80%	1:1	2.55	63.4%	420	441
4	GMP utilization(yes)	95%	80%	1:1	4.09	19.9%	176	185

The sample size calculated for the first objective ($n=824$) was higher than that used as the final sample size of the study.

5.7.2 Sampling procedure

A multi-stage stratified sampling technique was used to select the study population. In the 1st stage, rural kebeles were stratified by irrigation land use as irrigated and non-irrigated users. In the next stage, a total of twelve kebeles (three from irrigated and nine from non-irrigated kebeles) were selected randomly using the lottery method as depicted in the figure below (Figure 3). After allocating sample size to each kebele of the HHs with irrigated and non-irrigated users, the required sample size was selected using a systematic sampling technique. A single child was selected by lottery method from the

households in whom two or more 6-23 months children were found. The sampling fraction (K) for each group was every 18th and 42nd for households with irrigated and non-irrigated users respectively.

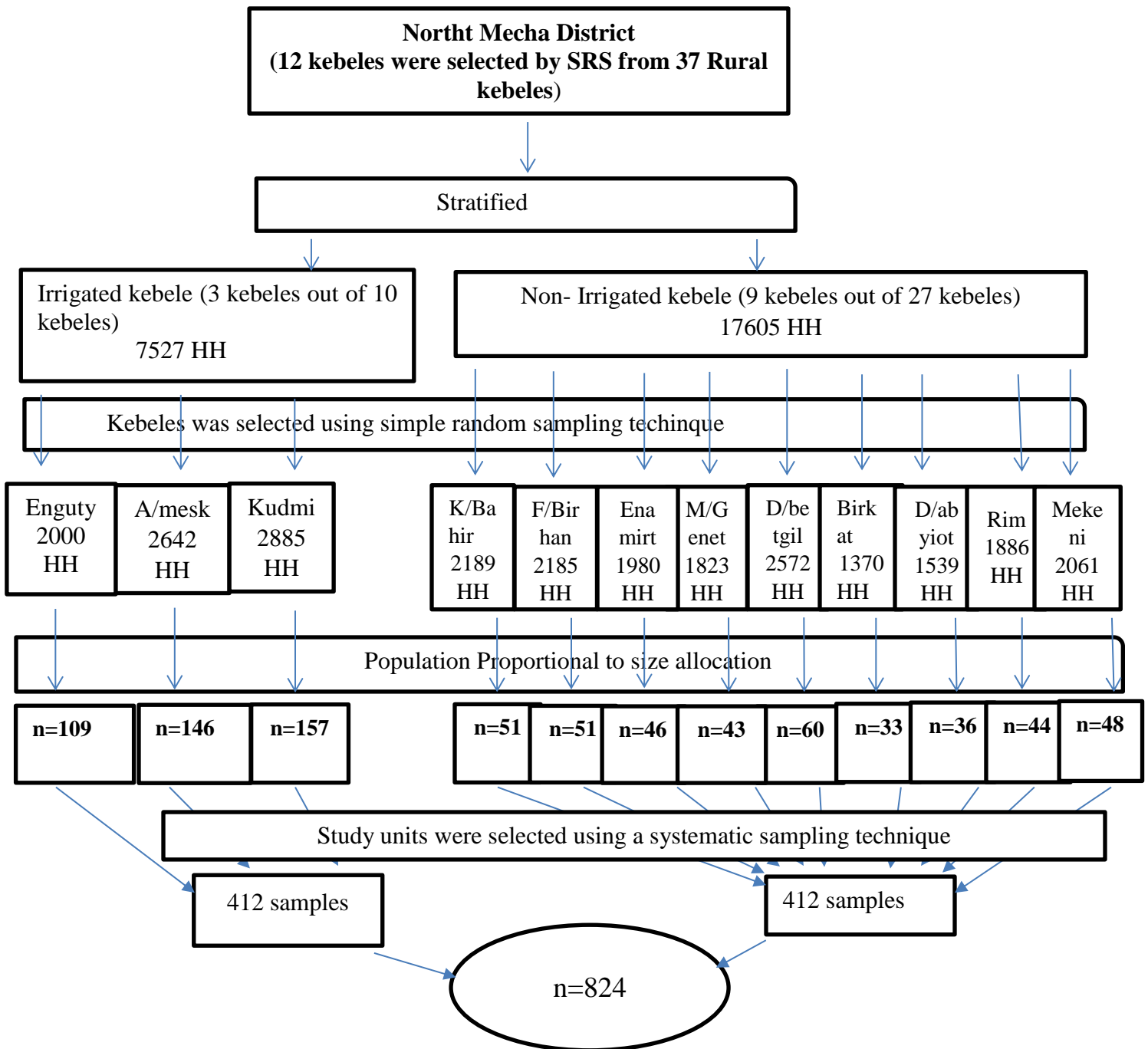


Figure 3 sampling procedure to study minimum acceptable diet and associated factors among infant and young children aged 6-23 months in irrigated and non-irrigated areas of north Mecha district, northwest Ethiopia, 2021.

5.8 Data collection tool and procedure

Data was collected using a semi-structured questionnaire via face-to-face interviews with mothers of children aged 6-23 months. The questionnaire was prepared in English and translated into the local language (Amharic). The data collection tool has six parts; Socio-demographic characteristics, wealth index related characteristics, maternal and child health characteristics, maternal knowledge of IYCF practice, and twenty-four-hour recall child feeding practice and household food insecurity access scale.

The child's dietary diversity and meal frequency were assessed using the 24- hours dietary recall method (8). Wealth status was assessed by using questions adapted from 2016 Ethiopian Demographic and Health Survey (EDHS) and other literature. The tool comprises the number and kinds of livestock, availability of agricultural land, the number of cereal products, and materials in the house (48).

Household food insecurity was assessed by using Household Food Insecurity Access Scale (HFIAS). Household food insecurity access scale generic questions that have been used to distinguish food secure from food-insecure households. The HFIAS consists of two types of related questions. The first question type is called an occurrence question. Nine occurrence questions ask whether a specific condition associated with the experience of food insecurity ever occurred during the previous four weeks (30 days). Each severity question is followed by a frequency-of-occurrence question, which asks how often a reported condition occurred during the previous four weeks (72).

5.9 Data quality assurance

Quality of data was assured by giving training for both data collectors (six diploma nurses) and supervisor (two health officers) on the purpose of the study, data collection technique, and the proper filling of questioner by the principal investigator for two days. The other data quality assurance method also pretest was conducted on 5% of the samples in similar areas (Amarit kebeles) to check the quality of the questionnaire and the instrument before the actual data collection with similar socio-demographic characteristics. Every day after data collection, questionnaires were reviewed by the supervisors for ensuring the completeness of the questions. Incomplete questionnaires were discarded from the analysis. The principal investigator and the supervisor closely monitored the data collection process. In addition to the above, data was rechecked during data entry into the computer software before analysis, to prevent missing important data.

4.10 Data management and analysis

Data were entered by using Epi Data entry client version 4.6.0.6 and exported to SPSS 23.0 statistical package for analysis. Data cleaning was performed to check for consistencies and values. A dietary diversity score was computed out of eight food groups, and household economic status was measured by constructing a wealth index. After labeling the variables between 0 and 1, the Principal Component Analysis (PCA) was applied. Then, the wealth status is ranked and labeled as richest, rich, middle, poorer, and poorest from the highest to the lowest rank. The HFIAS indicator categorizes households into four levels of household food insecurity (access): food-secure, mild, moderately and severely food insecure (≤ 1 , 2-10, 11-17, and > 17) respectively.

To investigate the association of independent variables with dependent variables bivariate logistic regression analysis was performed on the independent variables and their proportion and crude odds ratio were computed against the outcome variable to identify the factors that were associated with the dependent variables. Those variables that showed an association with the outcome variables at the bivariate analysis with a p-value < 0.2 were entered into the final logistic regression to control for potential confounders. Hosmer-Lemeshow goodness-of-fit was used to test the model's fitness. Adjusted odds ratio (AOR) along with a 95% confidence interval was estimated to assess the strength of the association and a P value less than 0.05 was taken as significant.

Note: In the result and discussion section I was using the word “**users**” for households who did use irrigation land and those households who did not use irrigation were called “**non-users**”.

5.11 Ethical considerations

A letter of ethical approval was obtained from the Institutional Review Board of Bahir Dar University, College of Medicine and Health Sciences. Before starting the interview, the data collector was explaining the purpose of the study to all the participants by confirming the confidentiality of their information that it was never be used for purposes other than scientific research. Participation in the study was voluntary based and the autonomy of participants was respected. Participants were informed that participation was voluntary and if they felt discomfort during the interview they could stop at any time.

6. RESULTS

6.1 Socio-Economic and Demographic Characteristics

Among 824 visited households, 775 respondents (94.4% in users and 93.7% in non-users) gave complete responses. The mean ages of mothers were 30.3(\pm 6.8) years for users and 30.3 (\pm 6.7) years, for non-users. All parents (100%) of users and non-users were Orthodox Tewahdo Christian followers and Amhara by ethnicity. One hundred eighty-nine (48.6%) mothers among the users and 189(49%) among non-users were involved in household decision-making (Table 2).

Table 2 Socio-economic and demographic characteristics of the respondents from users and non-users of North Mecha District, Northwest, Ethiopia, 2021 (n1= 389, n2 = 386).

Characteristics	Irrigation				
	Non-users (n2=386)		users (n1=389)		
	Frequency	%	Frequency	%	
Age (years)					
	<=24	84	21.8	84	21.6
	25-34	180	46.6	179	46.0
	>=35	122	31.6	126	32.4
Marital status					
	Married	370	95.9	374	96.1
	Other (*)	16	4.1	15	3.8
Education Status					
	Can't read and write	229	59.3	247	63.5
	Only Read and Write	83	21.5	87	22.4
	Primary school(1-8)	41	10.6	29	7.5
	Secondary school (9-12)	23	6.0	12	3.1
	College/ university	10	2.6	14	3.6
Husband ed. Status					
	Can't read and write	141	38.0	147	39.1
	Only Read and Write	138	37.2	160	42.6
	Primary school(1-8)	44	11.9	28	7.4
	Secondary school (9-12)	39	10.5	31	8.2
	College/ university	9	2.4	10	2.7
Husband occupation					
	Farmer	339	91.4	330	87.8
	Others(**)	32	8.6	46	12.2
Involved on decision					
	Yes	189	49	189	48.6
	No	197	51	200	51.4

Table 2 cont'd---

Sex of children					
	Male	204	52.8	189	48.6
	Female	182	47.2	200	51.4
Birth order					
	First to third	214	55.4	205	52.7
	Fourth & above	172	46.6	184	47.3
Age of children in a month					
	6-8	52	13.5	56	14.4
	9-23	334	86.5	333	85.6
Family size					
	<=5	215	55.7	209	53.7
	>5	171	44.3	180	46.3
# of U-5 children in the HH					
	1	274	71.0	293	75.3
	2 or more	112	29.0	96	24.7
Household Wealth status					
	Richest	66	17.1	69	17.7
	Rich	77	19.9	102	26.2
	Middle	74	19.2	82	21.1
	Poorer	84	21.8	69	17.7
	Poorest	85	22.0	67	17.2
HH's food insecurity status					
	Food secure	279	72.3	289	74.3
	Mildly food insecure	94	24.4	69	17.7
	Moderately food insecure	13	3.4	31	8.0

*Single, Divorced, and widowed

** merchant and daily worker

Abbreviation: HH, Household

6.2 Maternal and Child Health Service Characteristics

Three hundred ten (79.7%) and 267 (69.2%) of the mothers from users and non-users gave birth at health facilities for their previous pregnancy respectively. Less than half of mothers 184(47.3%) and 192(49.7%) from users and non-users had PNC follow-up for the study child, respectively. Only one hundred (28. %) and 83(21.5%) children's weight had been measured every month at GMP sessions by users and non-users respectively (table 3).

Table 3 Maternal and child care characteristics of the respondents from users and non-users of North Mecha District, Northwest, Ethiopia, 2022 (n1= 389, n2 = 386).

Characteristics	Irrigation				
	Non-users (n2=386)		users (n1=389)		
	Frequency	%	Frequency	%	
ANC follow up					
	Fourth and above	61	15.8	153	39.3
	One to three	315	81.6	179	46.0
	Not visit	10	2.6	57	20.3
Place of delivery					
	Home	119	30.8	79	20.3
	Health facility	267	69.2	310	79.7
PNC follow up					
	Yes	192	49.7	184	47.3
	No	194	50.3	205	52.7
When started PNC?					
	Within 1-2 day	98	51.0	84	45.7
	Within 3-6 days	45	23.4	49	26.6
	After 7 days	49	25.5	51	27.7
Pre-lacteal feeding					
	Yes	27	7.0	27	6.9
	No	359	93.0	362	93.1
Initiation of BF					
	Within 1hr	67	17.4	102	26.2
	After 1hr	319	82.6	287	73.8
Complementary feeding initiated					
	Before 6 month	39	10.1	33	8.5
	At 6 month	233	60.4	232	59.6
	After 6 month	101	26.2	112	28.8
	Not started	13	3.4	12	3.1
Ever receive vaccines?					
	Yes	344	89.1	386	99.2
	No	42	10.9	3	0.8
Vaccination status					
	Up to date	57	16.6	64	16.6
	Fully	287	83.4	319	82.6
	Defaulter			3	0.8

Table 3 cont'd---

Vi-A Supplementation					
	Yes	245	63.5	247	63.5
	No	141	36.5	142	36.5
Got GMP service?					
	Yes	83	21.5	109	28.0
	No	303	78.5	280	72.0
Illness in the last 2 weeks					
	Yes	72	18.7	80	20.6
	No	314	81.3	309	79.4
Type of the illness					
	Fever	18	25.0	18	22.5
	Diarrhea	33	45.8	43	53.8
	Cough	19	26.4	19	23.7
	Others	2	2.8		
Maternal knowledge of IYCF					
Practice	Good	288	74.6	292	75.1
	Poor	98	25.4	97	24.9

6.3 Minimum Dietary Diversity and Minimum Meal Frequency

The magnitude of children who received the recommended minimum dietary diversity was 39.6% among users and 27.2% among non-users. The proportion of children who received the recommended meal frequency was 63.5% and 58.0% among users and non-users respectively (Figure 4).

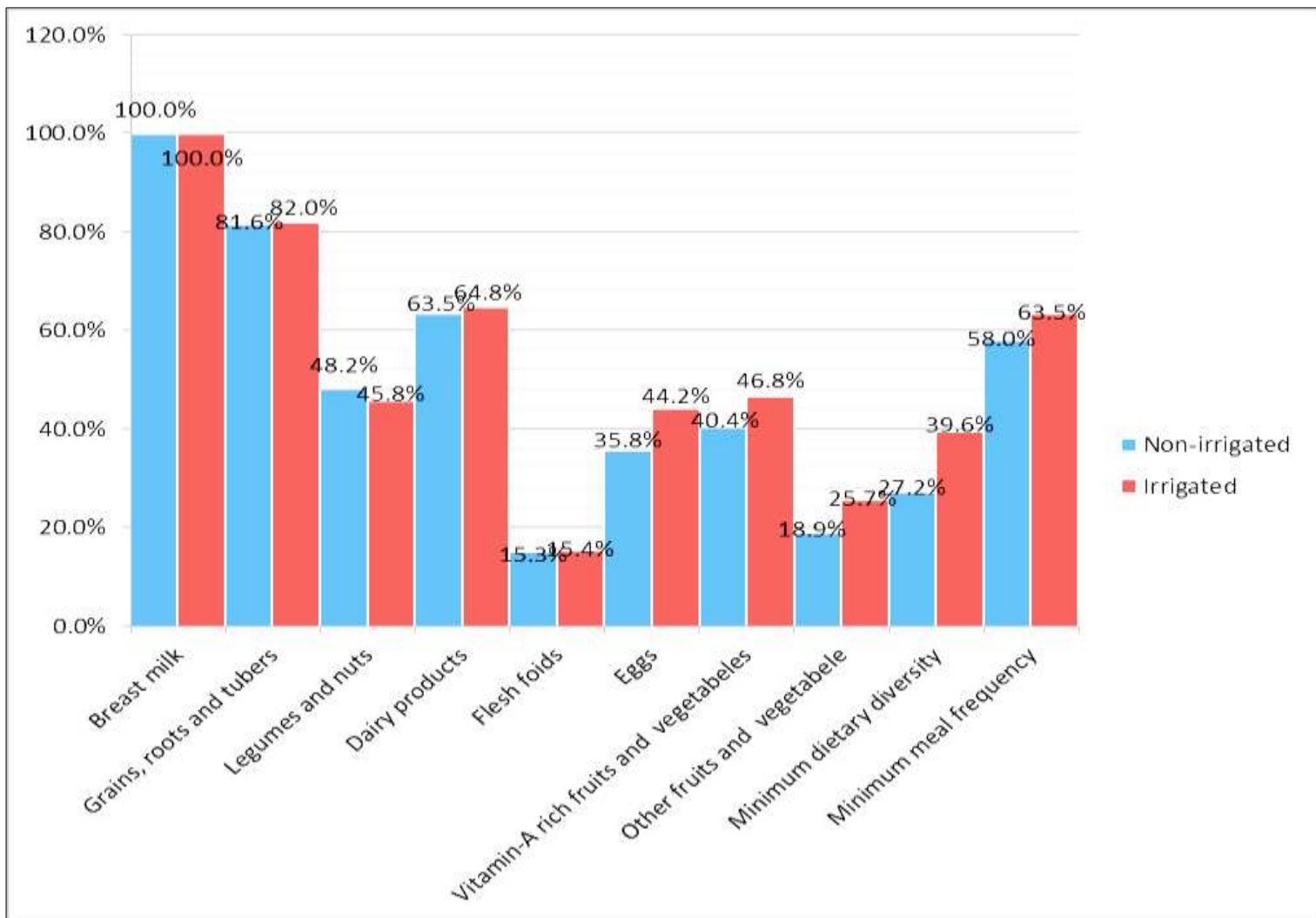


Figure 4 Percentage of MDD, MMF, and each food group consumption by children aged 6-23 months 24-hours before the survey from users(n1) and non-users (2) of North Mecha District, Northwest, Ethiopia, 2022 (n1= 389, n2 = 386).

6.4 Comparison of minimum acceptable diet among users and non-users

There was a significant difference in magnitudes of MAD among users and non-users ($X^2 = 13.912$, $P < .001$). The overall magnitude of recommended minimum acceptable diet practice was 22.5% and the MAD practice among users was 28.0 % (95%CI: 23.7, 32.4) and for non-user was 16.8% (95%CI: 13.2, 20.7) (Figure 5).

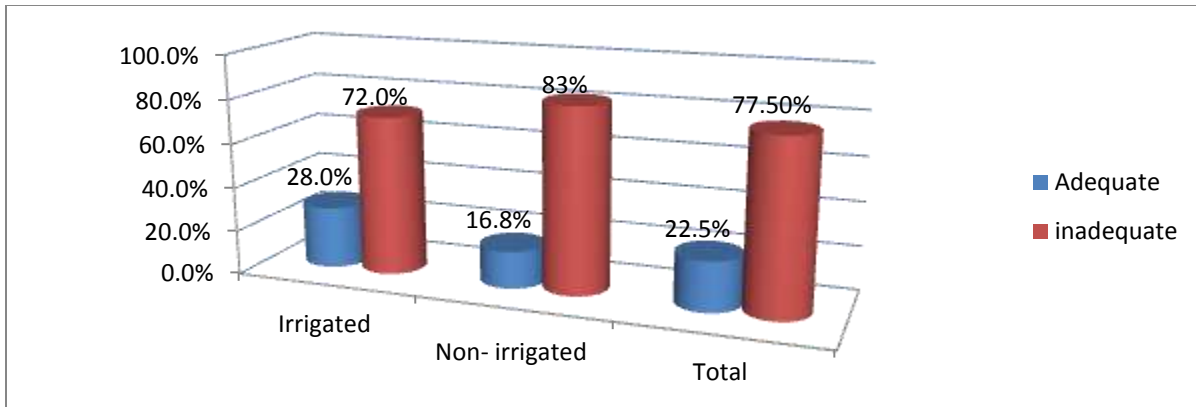


Figure5. The magnitude of minimum acceptable diet among 6–23 months children, from users and non-users of North Mecha District, Northwest, Ethiopia, 2022 (n1= 389, n2 = 386).

6.5 Factors Associated with Minimum Acceptable Diet Practice

6.5.1 Factors Associated with MAD Practice among users

Bivariate and multivariable logistic regression analysis was done to establish an association between the independent variables and outcome variables. During bivariate logistic regression analysis occupation of husband, involvement in the decision, family size, ANC, Place of birth, pre-lacteal feeding, timely initiation of BF feeding, bottle feeding, child illness in the last two weeks, and households food insecure were candidates variable for multivariable logistic regression analysis at $P < 0.2$. Whereas, the multivariable logistic regression analysis revealed that, three variables namely involvement in decision, timely initiation of breastfeeding, and child illness in the last two weeks were found to be significantly associated with MAD in children among users.

Children born from mothers who were not involved in the decisions were 4.37 times more likely to have an inadequate minimum acceptable diet practice than children born from mothers involved in household decisions [AOR=4.37, 95% CI:(2.05,9.33)].

Children who started breastfeeding after one hour of delivery were 5.29 times more likely to practice an inadequate minimum acceptable diet than those children who start breastfeeding within one hour after delivery[AOR=5.29, 95%CI :(2.393,11.672)].

Children who had the illness in the last 2 weeks were 4.10 times more likely to have an inadequate minimum acceptable diet practice than those children who hadn't a history of illness in the last two weeks [AOR=4.10, 95%CI :(1.48,11.38)] (Table 4).

Table 4 Associated factors of MAD 6 to 23 months children from users of North Mecha District, Northwest Ethiopia, 2022 (n= 389).

Characteristics	Minimum acceptable diet(MAD) among users (n= 389)			
	Inadequate n (%)	Adequate n (%)	COR(95% CI)	AOR(95% CI)
Husband's occupation				
Farmer	242(73.3)	88(26.7)	1	1
Others(**)	28(60.9)	18(39.1)	.57(.30, 1.07)	1.39(.38, 5.08)
Involved on decision				
No	171(85.5)	29(14.5)	4.33(2.66, 7.05)	4.37(2.05, 9.32) *
Yes	109(57.7)	80(42.3)	1	1
Family size				
<=5	138(66.0)	71(34.0)	1	1
>5	142(78.9)	38(21.1)	1.92(1.22, 3.04)	1.55(.64, 3.76)
ANC follow up				
No	51(89.5)	6(10.5)	1	1
1-3	132(73.7)	47(26.3)	.33(.13, .82)	.56(.10, 2.98)
>=4	97(63.4)	56(36.6)	.20(.08, .51)	.46(.09, 2.37)
Place of delivery				
Home	69(87.3)	10(12.7)	1	1
Health facility	211(68.1)	99(31.9)	.31(.15, .63)	.47(.12, 1.86)
Pre-lacteal feeding				
No	266(73.5)	96(26.5)	1	1
Yes	14(51.9)	13(48.1)	.39(.18, .86)	.63(.15, 2.59)
Initiation of BF				
Within 1hr	52(51.0)	50(49.0)	1	1
After 1hr	228(79.4)	59(20.6)	3.71(2.29, 6.01)	5.29(2.39, 11.67) *
Bottle-feeding				
No	252(75.2)	83(24.8)	1	1
Yes	28(51.9)	26(48.1)	.36(.20, .64)	.45(.14, 1.49)
Illness in the last 2wk				
Yes	69(95.1)	11(13.8)	2.91(1.48, 5.75)	4.10(1.48, 11.38) *
No	211(68.3)	98(31.7)	1	1
HH Food Insecure				
Food secure	199(68.9)	90(31.1)	1	1
Food Insecure	81(81)	19(19)	1.93(1.10, 3.37)	1.63(.56,4.73)

Note: *Indicates significant at P<.001

**** Merchant and daily worker**

Abbreviation: COR, Crude odd ratio, and AOR, adjusted odds ratio. HH, Household

6.6.2 Factors Associated with MAD Practice among households with non-users

During bivariate logistic regression analysis involved in the decisions, Place of delivery, PNC follow-up, pre-lacteal feeding, initiation of BF feeding, vitamin A supplementation, GMP service utilization, and child illness in the last two weeks were found as candidates variables for multivariable logistic regression analysis at $P < 0.2$. However, on multivariable logistic regression analysis, four variables namely involvement in the decision, place of delivery, PNC follow-up, and GMP service utilization was found to be significantly associated with MAD in children from the non-users.

Children born from mothers who were not involved in the decisions were 4.71 times more likely to practice an inadequate minimum acceptable diet than children born from mothers involved in household decisions [AOR=4.71, 95% CI:(2.28, 9.75)]. Children delivered at home were 2.51 times more likely to have an inadequate minimum acceptable diet practice when compared to children delivered at a health institution [AOR=2.51, 95%CI :(1.14, 5.55)].

Children born from mothers who reported not attending PNC follow-up were 3.01 times more likely to practice inadequate MAD than children born from those who report attending PNC follow-up [AOR=3.01, 95%CI:(1.57, 5.77)]. Similarly, those mothers who reported did not attend GMP service to their children were 4.64 times more likely to practice inadequate MAD than their counterparts [AOR= 4.64, 95%CI: (2.40, 8.95)] (table 5).

Table 5 Associated factors of MAD 6 to 23 months children among non-users of North Mecha District, Northwest Ethiopia, 2022 (n= 386).

Characteristics	Minimum acceptable diet(MAD) among non-users (n= 386)			
	Inadequate n (%)	Adequate n (%)	COR(95% CI)	AOR(95% CI)
Involved on decision				
Yes	136(42.4)	53(81.5)	1	1
No	185(57.6)	12(18.5)	6.01(3.09, 11.68)	4.71(2.28, 9.75)**
Place of delivery				
Home	109(34.0)	10(15.4)	2.83(1.39, 5.77)	2.51(1.14, 5.55) *
Health facility	212(66.0)	55(84.6)	1	1
Had PNC follow up				
Yes	152(47.4)	40(61.5)	1	1
No	169(52.6)	25(38.5)	1.78(1.03, 3.07)	3.01(1.57, 5.77) **
Pre-lacteal feeding				
Yes	20(6.2)	7(10.8)	1	1
No	301(93.8)	58(89.2)	.55(.22,1.36)	.780(.27, 2.26)
Initiation of BF				
Within 1hr	51(15.9)	16(24.6)	1	1
After 1hr	270(84.1)	49(75.4)	1.73(.91,3.27)	1.90(.87, 4.18)
Vi-A Supplementation				
Yes	213(66.4)	32(49.2)	2.03(1.19, 3.49)	1.57(.83, 2.98)
No	108(33.6)	33(50.8)	1	1
Got GMP service				
Yes	48(15.0)	35(53.8)	1	1
No	273(85.0)	30(46.2)	6.64(3.73, 11.81)	4.64(2.40, 8.95)**
Illness in the last 2wks				
Yes	65(20.2)	7(10.8)	2.10(.92, 4.83)	1.76(.70, 4.41)
No	256(79.8)	58(89.2)	1	1

Note: *Indicates significant at * P<.05 **Indicates significant at P<.001

Abbreviation: COR, Crude odd ratio, and AOR, adjusted odds ratio.

7. Discussion

The findings of this study indicated that the prevalence of adequate MAD practice for children aged 6-23 months among households in irrigation land users and non-users was 28% (95%CI: 23.7, 32.4) and 16.8% (95%CI: 13.2, 20.7) respectively. This indicates that the magnitude of minimum acceptable diet practice had statistically significant variation among users and non-users. ($X^2 = 13.912$, $P < .001$)

The possible explanation for this significant variation might be a due difference in household wealth index status in the irrigated and non-irrigated areas. It may be happening due to the irrigation scheme since irrigation increases productivity in addition to the non-rainfall season. The mothers in the irrigated area can easily access a variety of food items as they have the opportunity to grow vegetables and fruits in the dry season by irrigation than in non-irrigated areas. This is an advantage to enhance increases minimum dietary diversity, minimum meal frequency, and improving minimum acceptable diet practice. A study has also found that agricultural intervention is a best practice to improve complementary feeding among children (65). Another study has also indicated that access to farmland enhances crop diversity which in turn leads to improved children's dietary diversity (63, 64).

This study showed that the magnitude of adequate minimum acceptable diet among users was 28% which was higher compared with studies conducted in Goncha district, Northwest Ethiopia, 12.6% (54), North Shoa, Oromia Region 13.3% (50), and from the national report of 7% (48). It was also higher than the study conducted in Kenya which was 21.8% (26), Burkina Faso, 13% (42), and Ghana, 17% (47). But the finding is lower than studies conducted in Addis Ababa 74.6% (49), Nepal 44.3% (40), and China 49.0% (37). The possible Justification for this variation could be due to the study design, period, and study area. This difference may be due to the time of the study, socio-economic differences, geographical variation, and seasonal differences in data collection. Also, low affordability of foods that are not available at home and those foods that are costly are sold from the house instead of feeding their child.

This study revealed that an adequate minimum acceptable diet among non-users was 16.8%, higher than studies conducted in Dembech district, Northwest Ethiopia 8.6% (34). The variation might be due to the difference in study periods. The above study was conducted in populations where only orthodox religion followers were during the fasting season in which feeding habits might be reduced either in food diversity, especially animal source foods or meal frequency which estimate the finding when compared

to other periods. The finding was also higher than the EDHS report of 2016, only 7% of children aged 6–23 months received a minimum acceptable diet (48). The difference might be due to EDHS being conducted on countrywide and culturally different populations, which may underrate child feeding practices while this study was conducted on an almost culturally homogenous population with similar feeding practices. While less than studies conducted in Debre Berhan 31.6% (55), Mareka District, Southern Ethiopia, 35.5% (52). The variation might be because of different study settings and study periods; this study was conducted in rural communities where as the above study was conducted in urban communities, as communities in rural areas are less likely to feed a minimum acceptable diet than people residing in the urban area(48). Also, the difference might be due to higher non-educated mothers were participated in this study; on the contrary, higher numbers of educated participants were included in the above study. This finding is also higher than the study conducted in Nigeria 9.2% (43), and Malawi 12% (45), and less than the study conducted in Kenya (21.8%) (26), and Ghana 17% (47). The variation might be due to differences in socio-demographic characteristics and study period.

A significant association was observed between children born from mothers who were involved in the decision and minimum acceptable diet practice in both users and non-users. The magnitude of inadequate MAD practice was significantly higher among those who didn't involve in the decision as compared to those who had been involved decision. The possible explanation might be mothers who had involved in the decision can get free time to feed their children and can purchase easily foods that are not available in the household. In addition to this, mothers who had involved in income-generating irrigation activities and their control of income from irrigation have a greater impact on increasing the child MAD practice of the households. This finding was supported by the previous studies conducted in Denbecha district in Northwest Ethiopia (34).

In this study among users children who had an illness in the last 2 weeks had a significant association with an inadequate minimum acceptable diet practice. In this study children among users who had an illness in the last 2 weeks were more likely to have an inadequate minimum acceptable diet than those children who hadn't a history of illness in the last two weeks. This result got supported by the study conducted in Nepal and Debre Berhan town, (40, 55). This is because illness reduces child appetite, dietary intake, and nutrient absorption leading to inadequate MAD.

This study showed that among non-users, place of delivery had significantly associated with child MAD practice. Children delivered at home were more likely to have an inadequate minimum acceptable diet practice when compared to children at health institution delivery. The possible description might be due to during institution delivery health professional counseling on appropriate child feeding after delivery on health facility increases mothers awareness on practice of minimum acceptable diet; Hence mother's awareness on appropriate child feeding practice who got from health professionals have had a better child feeding practices than their counterparts. Furthermore, it might be enhanced information about PNC follow-up and child health services, increases maternal knowledge, and practice on MAD. This finding is supported by studies in the Denbecha district in Northwest Ethiopia, Mareka District, Southern Ethiopia, and Nepal (34, 40, 52)

In this study, PNC follow-up was associated with MAD practice among non-users of 6-23months of age children. Children born from mothers who reported not attending PNC follow-up were more likely to practice inadequate MAD than children born from those who report attending PNC follow-up. This could be since nutritional advice and counseling by health workers might not only educate mothers but also avoids traditional beliefs that might inhibit child feeding practices. Furthermore, it might be the strength of health extension worker implementation to maternal health service packages including postnatal services. This finding is supported by the finding from in Democratic Republic of Congo, Nepal, and North Shoa, Oromia Region, Ethiopia (35, 40, 50).

Another most important variable found to be associated with child MAD among non-users was GMP service utilization. Those mothers who reported did not attend GMP service to their children were more likely to practice inadequate MAD than their counters. This might be as the HEWs monitor the weight of children using the standard GMP charts, and they will provide nutrition counseling to mothers or caregivers of children; as a result, there might be an improvement in child feeding practices(73). These activities also provide an opportunity for early recognition of signs of under-nutrition, and any illness and manage them accordingly. This flinging is also supported by studies conducted in northern and southern parts of Ethiopia, which indicated that there is more likely for meeting MAD in those children attending regular GMP services utilization at each health post level (52, 54).

8. Limitations of the study

The information on dietary habits was collected through 24 hours' recall data; hence there is a possibility of reporting/recall bias, and being a self-reported study might not give the exact figure of the minimum acceptable diet practice (social desirability bias).

9. Conclusion and recommendation

The overall prevalence of minimum acceptable diet practice was low compared with national and WHO recommendations. But the practice was much higher in irrigated users than in non-irrigated users. Involvement in a decision, place of delivery, PNC, and GMP are independent predictors of MAD in children from non-irrigated households. The finding reveals that a significant association was observed between irrigation status and MAD practice in the study area. Based on the findings of the study the following recommendations are forwarded to improve minimum acceptable diet practice in the study area.

The district administrative and agricultural office;

- Give great attention to extending irrigation schemes for non-irrigated areas.
- Expand access to irrigation to households to improve their child's minimum acceptable diet practice.

The district health offices;

- Promoting and strengthening institutional delivery, PNC follow up and GMP service utilization should be given emphasis.
- PNC and child growth monitoring follow-up should be strengthened through extensive use of the Health Extension Workers.

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Annexes

Annexes: I English version subject information sheet

Study Title: Minimum acceptable diet and associated factors among children aged 06-23 months in households with irrigated and non-irrigated North Mecha district, Northwest Ethiopia, 2021.

Principal investigator: Welelaw Mengistu (BSC)

Advisors: 1. Dr Dereje Birhanu (PhD)

2. Mr. Omer Seid (Nutrition, Associate Professor)

Name of the organization: Bahir Dar University, College of Medicine and Health sciences.

Sponsors: Self sponsor

Purpose: This study is intended to compare the minimum acceptable diet among children aged 06-23 months in irrigated and non-irrigated users of North Mecha district, Northwest Ethiopia, 2021. And also to investigate whether children receive a minimum acceptable diet appropriately or not is according to WHO indicator. The study tries to identify associated factors influencing children receiving a minimum acceptable diet in the district and look for a solution to the problem.

Procedure and duration: First of all, you were selected by the lottery method. I will administer a questionnaire to fill in pertinent data about the prevalence and associated factors for a minimum acceptable diet. I have taken around 20-30 minutes, so I kindly request you to spare me this time for filling out this questionnaire.

Risks: There are no side effects and known risks related to this research so far. The only discomfort could be from sharing a few minutes (around 30 minutes) for an interview.

Benefit: There would not be any direct benefit for an individual participating in this study. But findings from this research may benefit all mothers and children and reveal the importance of knowing your child's minimum acceptable diet practice.

Confidentiality: The information collected for this research will be kept confidential. Information about you that is collected during the research will be put away and no one but the researcher will be able to see it. Any information about you will have a number on it instead of your name. Only the researchers

will know what your number is and Keep that information very secret that no one else can access, see or know it. It will not be shared with anyone.

Rights: Your participation in this research is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, all the services you receive as any member of this community will continue and nothing will change. If you choose not to participate in this research, you will be offered all the services that are routinely offered. You may change your idea later and stop participating even if you agreed earlier.

Contact: This research was reviewed and approved by the ethical review committee of Bahir Dar University. If you wish to find out more or if you wish to ask questions now or later you can use the contact addresses below

1. Welelaw Mengistu TEL: 0918314342
E-MAIL: welelawm@gmail.com
2. Dr Dereje Birhanu (MPH, PhD) TEL: 0918146608
E-MAIL: derejefrae2014@gmail.com
3. Mr. Omer Seid (Nutrition, Associate Professor) TEL: 0966969093
E-MAIL: oumer0918@gmail.com

Introduction

Dear, how are you? My name is I am a member of the data collector on behalf of Mr. Welelaw Mengistu (BSc), who is studying for his master's degree at Bair Dar University, College of Medicine and Health Sciences, department of nutrition and dietetics to collect data on the study conducted for comparing Minimum acceptable diet and associated factors among children aged 06-23 months in irrigated and non-irrigated users of North Mecha district. Next to this, I want to ask some questions regarding dietary diversity and meal frequency practice in your children and other related questions. Your correct answer to all questions is important to get a good result. You can ask any questions if there is no clear question and confidentiality is kept. I want to confirm that your name is not registered and mentioned at any time and any place. You participate in the study if and only if I get your

permission. You have the right not to participate in the study or you can drop the questions if you are not comfortable with the questions. The interview will not take more than 30 minutes.

Are you voluntary for an interview? Yes, I am voluntary. No, I am not voluntary

Annex II: English version of an informed consent form

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedure, risks and benefits, issues of confidentiality, rights of participating, and contact address for any queries. I have been allowed to ask questions about things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study verbally.

Signature of Participant _____ date ____/____/2014 E.C

Name of data collector and signature _____ date ____/____/2014 E.C

Supervisor name and signature _____ date ____/____/2014 E.C

Thank you for your participation

Annex III: English version Interview questionnaires

Households with irrigated users-----1

Households with none irrigated users-----0

Questionnaire code number _____ Kebele _____ Date _____

Part One : Socio-demographic characteristics related questionnaires.				
Q#	Question	Response	Code	Skip
101	How old are you?	-----in years		
102	What is your religion?	Orthodox Muslim Protestant Other specify-----	1 2 3 4	
103	What is your ethnicity?	Amhara Agew Oromo Other-----	1 2 3 4	
104	What is your marital status?	Single Married Divorced Died Separated	1 2 3 4 5	
105	What is your educational status?	cannot read and write Can Read and Write Primary school(1-8) Secondary school (9-12) college/ university	1 2 3 4 5	
106	What is your husband's educational status?	cannot read and write Can Read and Write Primary school(1-8) Secondary school (9-12) college/ university	1 2 3 4 5	
107	What is your occupation status?	Farmer Other specify.....	1 2	
108	What is your husband's occupation status?	Farmer Merchant government employee daily worker Other specify.....	1 2 3 4 5	
109	Who has the main decision role in the household?	Mother Father Both mother and father other specify-----	1 2 3 4	

110	How many family members are in the house including the childin number		
111	How many under-five children do you have in the household? in number		
112	What is the sex of your index child?	Male Female	1 2	
113	What is the age of your index child?month		
114	What is the birth order of the index child?	-----		

Part Two: Wealth index related characteristics				
Q#	Question	Response	Code	Skip
201	Ownership of the house	Private Rented from individual Others (specify)_____	1 2 3	
202	How many rooms are there in your home?	-----in number		
203	The main material of the floor of the house	earth/sand wood planks cement ceramic tiles Others (specify)-----_____	1 2 3 4 5	
204	The main material of a roof	Thatched Corrugated iron/metal sheet Others (specify)___	1 2 3	
205	What type of fuel is mainly used for household cooking?	Wood Animal dung Charcoal Electricity Others (specify)___	1 2 3 4 5	
206	Do you have separate rooms for animals?	Yes No	1 0	
207	Do you have irrigation?	Yes No	1 0	If no skips Q # 209
208	How many Qada of irrigation land do you have?	_____ Qada		
209	How many kada of agricultural land do you have?	_____ kada		
210	Do you have the following cash crops? A. Eucalyptus B. Gesho	Yes 1----- Qada 1----- root	No 0--Skip 0--Skip	

211	Do you produce the following staple foods and other crops in the previous production season? A. Dagusa B. Maize C. Barley D. Wheat E. Teff F. Bean	Yes	No		
		1----- quintal	0--Skip		
		1----- quintal	0--skip		
		1----- quintal	0--skip		
		1----- quintal	0--skip		
		1----- quintal	0--skip		
212	Do you produce/ grow vegetables and/or fruits?	Yes No		1 0	If no skips Q # 214
213	If yes, how do you use the product?	Sell all of it Sell part of it Use all for HH consumption Use for child consumption		1 2 3 4	
214	Does your household have				
	A. radio/tape	Yes No		1 0	
	B. bed/Cotton/sponge/spring mattress	Yes No		1 2	
	C. mobile phone	Yes No		1 0	
	D. solar energy	Yes No		1 0	
215	Does the following animal available at your home? A. Cows? B. Bulls? C. Oxen? D. Heifer? E. Donkeys F. Mules? G. Goats? H. Sheep? I. Chickens? J. Beehives?	Yes	No		
		__in number	skips to B		
		__in number	skips to C		
		__in number	use similar		
		__in number	manner-----		
		__in number			
		__in number			
		__in number			
		__in number			
		__in number			
		__in number			
Household Water Consumption, Sanitation, and Hygiene					
216	What is the main source of water for your household?	Springs		1	
		Protected well		2	
		Unprotected well		3	
		River water		4	
		Rainwater (dam)		5	
		Pipe (Tap)		6	
		other specify ____		7	

217	Does the household have a latrine?	Yes No	1 0	
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Part Three: maternal and child health characteristics				
Q#	Question	Response	Code	Skip
301	Did you have antenatal care follow-up during the pregnancy of the current child?	Yes No	1 0	If no skip to 303
302	If the above question is yes how many times have you got the service?	1-3 4+ Don't know	1 2 3	
303	Where did you give birth to the child?	Health facility Home Other specify....	1 2 3	
304	Have your history of PNC service after delivery of the current child?	Yes No	1 0	If no skip to 306
305	when do you get the service after delivery?	Within 1-2 day Within 3-6 days After 7 days	1 2 3	
306	Have you given pre-lacteal feeding to a child?	Yes No	1 0	
307	When do you start first breastfeeding a child?	Within 1 hour After 1 hour Not breastfed	1 2 3	
308	When did you start adding food for a child?	Before 6 months after Delivery At 6 months After 6 months Not started	1 2 3 4	
309	Do you use the bottle for feeding the child?	Yes No	1 0	
310	Did the child ever receive vaccines?	Yes No	1 0	If no skip to 312
311	What is the vaccination status of the child? Check the card	Up to date Fully vaccinated Defaulter	1 2 3	
312	Does the child get Vit A since age 6 months?	Yes No	1 0	
313	Has the child measured his/her weight every month at the GMP session?	Yes No	1 0	If no skips to Q315
314	When you were in the GMP session did you receive any counseling on complementary feeding of infants and young children? (Especially diet	Yes No	1 0	

	diversity and meal frequency.)			
315	Was the child has been sick in the last two weeks?	Yes No	1 2	
316	If yes, what is his/her illness?	Fever Diarrhea Cough Other specify-----	1 2 3 4	

Part Four: Tool for assessing maternal knowledge on IYCF practice			
Q#	Questions	Response	Code
401	Are infants should be exclusively breastfed for the first 6 months of life?	Yes No	1 0
402	Is complementary feeding should start at 6 months of child age?	Yes No	1 0
403	Is breastfeeding should be continued up to 2 years and beyond?	Yes No	1 0
404	A 6–23-month child should eat five or more food groups?	Yes No	1 0
405	Giving meat is advisable for a 6–23-month child?	Yes No	1 0
406	One cause of childhood malnutrition is not having diversified foods?	Yes No	1 0
407	Didn't feeling hungry doesn't mean that the nutritional need of a child is fulfilled?	No Yes	1 0
408	One cause of childhood malnutrition is not starting complementary feeding at 6 months of child age?	Yes No	1 0
409	Do you know what kind of foods to feed your child?	Yes No	1 0
410	Do you believe that a baby can survive on breast milk alone without even water before 6 months?	Yes No	1 0
411	Is it important to enrich or make your child's food more energy and nutrient-dense?	Yes No	1 0
412	Our mothers/caregivers should wash their hands before preparing children's food?	Yes No	1 0

Part five: Assessing Infant and Young Child Feeding Practice			
Q#	Questions	Response	Code
501	Did you have information about infant feeding?	Yes No	1 0
502	If Q# 501 yes, where did you get information about infant feeding options	from media promotion (television or radio) from health	1

		professionals	2
		from friends	3
		from relatives	4
		from family	5
Dietary diversity and meal frequency (Next, I will ask you Yesterday/within 24 hrs. /, during the day or at night, did the child receive any of the following foods?)			
503	breast milk;	Yes No	1 0
504	Grains, roots, and tubers/staples source food Gruels/bread/rice/other carbs	Yes No	1 0
505	Legumes and nuts source food Peas/beans (dried, pureed, flour)	Yes No	1 0
506	Dairy products	Yes No	1 0
507	Flesh foods such as meat, fish chicken(organ food liver, kidney, etc.	Yes No	1 0
508	Eggs	Yes No	1 0
509	Vitamin-A rich fruits and vegetables Non-dark/yellowish/ sources like orange, banana, etc.	Yes No	1 0
510	Other fruits and vegetables like kale, cabbage, salad, etc.	Yes No	1 0
Now I would like to ask you the Number of you feeds for your child in the last 24 hours.			
511	How many times did your child eat solid, semi-solid, or soft foods other than liquids yesterday during the day or at night?times	

Part six. Household Food Insecurity Access Scale (HFIAS) Measurement Too				
Q#	Question	Response	Code	Skip to
1	In the past four weeks, did you worry that your household would not have enough food? Probe: By —household we mean those of you that sleep under the same roof and take meals together at least four days a week	Yes No	1 0	If NO skip to Q#2
1. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? Probe: By —the kinds of foods you preferred we mean foods that food secure people eat that food insecure people cannot afford to eat. E.g. Eggs, meat, fish, Doro wot, etc.	Yes No	1 0	If NO skip to Q#3

	By —lack of resources‖ we mean not having money or the ability to grow or trade for food.			
2. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources? Probe: When we say —a limited variety of foods, we want to mean an undesired monotonous diet for an extended period of days.	Yes No	1 0	If No skip to Q#4
3. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
4	In the past four weeks, did you or any household member have to eat some foods that you did not want to eat because of a lack of resources to obtain other types of food? Probe: Foods that you did not want to eat is Food that is considered to be undesirable or socially unacceptable	Yes No	1 0	If NO skip to Q#5
4. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there Was not enough food? Probe: By —a meal we mean the major eating occasions (not including snacks).	Yes No	1 0	If NO skip to Q#6
5. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food? Probe: —fewer meals in a day than the social norm, eat fewer than three meals in a day	Yes No	1 0	If NO skip to Q#7
6. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
7	In the past four weeks, was there ever no food to eat of any kind in your household Because of a lack of resources to get food	Yes No	1 0	If NO skip to Q#8
7. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	Yes No	1 0	If NO skip to Q#9
8. a	How often this did happen?	Rarely Sometimes Often	1 2 3	
9	In the past four weeks, did you or any household member go			

	a whole day and night without eating anything because there was not enough food?			
9. a	How often this did happen?	Rarely Sometimes Often	1 2 3	

1. **Rarely**= once or twice in the past four weeks
2. **Sometimes**=three to ten times in the past four weeks
3. **Often**= more than ten times in the past four weeks

Thank you for your participation

አባሪ IV: የሚጃ ቅጽ

የጥናቱ ርዕስ : - ከጥናቱ በፊት በምስ/ጎጃም ዞን በሰ/ማኔወረዳ የመከላከያ ተጠቃሚዎች ሆኑና ያልሆኑ ቀበሌዎች የሚገኙ አድማጭ ተወካዮች ለሰ/ማኔወረዳ የሆናቸው ህፃናት ላይ ተቀባይነት ያለው የአመጋገብ ብዙ ደዳይና ተያያዥነት ያላቸው ሁኔታዎች :

የዋና አጥኝው (የተሚማሪው) ስም : - ወለላው መንግሥት

የጥናቱ አጣሪዎች ስም : -

1. ዶ/ር ደረጃ ብርሃኑ
2. አቶ አሙር ሰይድ

የሚከተሉት ወጪዎች ስም : - ባህርዳር ዩኒቨርሲቲ የህክምናና ጠፍ ሳይንስ ኮሌጅ

የጥናቱን ወጪዎች ለመክፈት ወጪዎች ስም : - በአጥኝው የሚገኙት

የጥናቱ ዓላማ

ይህ ጥናት በሰ/ማኔ ማኔወረዳ በመከላከያ ተጠቃሚዎችና ባልሆኑ ቀበሌዎች ወስነው የሚገኙ ሰ/ማኔወረዳ-23 የሆናቸው ህፃናት ላይ ተቀባይነት ያለው የአመጋገብ ሁኔታን ለመገንጠል የታወቀ ነው። እንዲሁም ልጆች የአለም ጠፍ ድርጅት ካሰቀመጠው መላኪያ/አመላካች አንጻር ተገቢውን እና ተቀባይነት ያለውን የአመጋገብ ስልጣን መመዘኛውን ወይም አለመመዘኛውን ለመገባባወጥ እና ተያያዥነት ያላቸው ሁኔታዎች ምን ይመስላል እንደነበር ለመለየት እና ለማሻሻል መፍትሄ የሆነ አሰራር ለመቅረፅ ያገለግላቸዋል።

የጥናቱ አተገባበርና የሚጠይቀው ሰዓት : - እርስዎ በሎተሪ ዘዴ የተሚጠሩ ሆኑ፤ ሚጃዎችን ለመመላለስ ከ20-30 ደቂቃዎች አካባቢ ሊወስድ ይችላል። ስለዚህ ይህንን መጠይቅ ለመመላለስ ፈቃድዎትን እንዲሰጡ በአክብሮት እጠይቃለሁ።

ከጥናቱ ጋር የተያያዘ ጉዳት : - በዚህ ጥናት ላይ ተሳታፊ በመሆን አንዳንድ አለመመዘኛ ይኖራል ብለው ሊያስቡ ይችላሉ በተለይ ደግሞ ጊዜያዊ በመሆኑ (በ20-30 ደቂቃ) ነገር ግን እርስዎ እንደሚሰጡት በጣም ብዙ ጊዜ አንሻመዎትም ምክንያቱም እርስዎ የሚጠሩት ጠቃሚዎች ስለሆኑና መልካም ያልሆኑ አመለካከቶች እና ተያያዥ ምክንያቶችን ለመወቅና ለመሻሻል ስለሚገባ ለግል ነው። በዚህ ጥናት ተሳታፊ በመሆንዎት ምንም ዓይነት ጉዳት አይደርስብዎትም።

ጥቅም : በዚህ ጥናት በመሳተፍ ምክንያት ለእርስዎ በግልጽ የሚረጋገጥ ወይም የሚጠቀም ጥቅም ሊኖርዎት ይችላል። የጥናቱ ወጠታ በተግባር ላይ ሲወልግ ሁሉንም እህፃናት ሊጠቅም የሚችል ስራ ሊሰራ ይችላል። በሌላ በኩል በጥናትዎ መሳተፍዎና ለምጣኔ ቁጥጥሮች ተገቢውን ሚጃ መስጠት ለሁሉንም እናቶች እና ልጆች ሊጠቅሙ እና ለልጅዎ አግባብነት ያለው የአመጋገብ ዘዴን ለማወቅ እና ተያያዥ ጉዳዮችን ለመግለጽ ከፍተኛ እገዛ ይኖረዎታል።

ሚጠይቀው ጠባቂነት

ለዚህ ጥናት ተብሎ ከእርስዎ የተገኘ ማንኛውም ሚጃ ሚጠቅሙት በተጠበቀ ሁኔታ የሚገዛ ይሆናል። በመሆኑም ከዋና አጠሪው በስተቀር ማንኛውም ግለሰብ ሚጃውን እንዲያገኝ እንዲመለከት አይፈቀድለትም።

ለዚህም ሲባል የሚጠይቁ ሚጃዎች ላይ ስምዎ እንዳይኖር ይደረጋል በምትኩ መላያ ቁጥር (ኮድ) ብቻ እንዲኖረው በማድረግ ይህንን ቁጥርን የሚያወቀውና አጥኝው ብቻ ይሆናል።

የቃለ መጠይቅ ገደብ _____

አድራሻ/ቀበሌ _____

አመሰግናለሁ!!!

ክፍል አንድ : - የ ማህበራዊና ዲሞክራሲያዊ ሁኔታዎች			
ተ.ቁ	ጥያቄዎች	መልሶች (አማራጮች)	ኮድ
101	ዕድሜዎ ስንት ነው?	-----ዓመት	
102	ሃይማኖትዎ ምን ድን ነው?	አርቶዶክስ መስሊም ፕሮቴስታንት ሌላ (ይጠቀስ)-----	1 2 3 4
103	ብሄርዎ ምን ድን ነው?	አማራ አገው አሮሞ ሌላ (ይጠቀስ)-----	1 2 3 4
104	እናት ጋብቻ ሁኔታ ምን ይመስላል?	ያገባች ያላገባች የተፋታች የሞተባት ተለይታ የምትኖር	1 2 3 4 5
105	የእናት ትምህርት ሁኔታ ምን ይመስላል?	ማንበብ እና መጻፍ የማትችል ማንበብ እና መጻፍ የምትችል የመጀመሪያ ደረጃ ትምህርት ያላት (ከ1-8) የ2ኛ ደረጃ ት/ት ያላት (9-12) ከፍተኛ ት/ት ደረጃ ያላት(ከሌጅ፣ ዩኒቨርሲቲ)	1 2 3 4 5
106	የአባት ትምህርት ሁኔታ ምን ይመስላል?	ማንበብ እና መጻፍ የማትችል ማንበብ እና መጻፍ የምትችል የመጀመሪያ ደረጃ ትምህርት ያላት (ከ1-8) የ2ኛ ደረጃ ት/ት ያላት (9-12) ከፍተኛ ት/ት ደረጃ ያላት(ከሌጅ፣ ዩኒቨርሲቲ)	1 2 3 4 5
107	የእናት ሥራ ሁኔታ ምን ይመስላል?	አርሶ አደር ሌላ (ይጠቀስ)-----	1 2
108	የአባት ሥራ ሁኔታ ምን ይመስላል?	አርሶ አደር ነጋዴ የመንግስት ሰራተኛ የጉልበት ሰራተኛ ሌላ (ይጠቀስ)-----	1 2 3 4 5
109	የቤተሰቡን ሃብት (ወርሃዊ ወጪ) የሚወስነው ምን ነው?	እናት አባት ሁለቱም ሌላ (ይጠቀስ)-----	1 2 3 4
110	የቤተሰቡ አባላት ስንት ናችሁ?	----- በቁጥር	

111	በቤትዎ ወስጥ አድማጭቸው ከአምስት አመት በታች የሆኑ ህጻናት ስንት ናቸው?	----- በቁጥር	
112	የህፃኑ/ኗ ያታ ምንድን ነው?	ወንድ ሴት	1 2
113	የህፃኑ/ኗ እድሜስንት ነው?	-----ዓመት-----ወር	
114	ህፃኑ/ኗ ስንተኛ ልጅዎ ነው/ናት?	-----	

ክፍል ሁለት: - የቤተሰብን የሀብት ደረጃ የተመለከቱ ጥያቄዎች				
ተ.ቁ	ጥያቄዎች	መልሶች (አሜሪካ)	ኮድ	ይለፍ
201	የመኖርያ ቤት ይዞታ	የግል ከራይ ሌላ (ይጥቀሱ) _____	1 2 3	
202	ቤትዎ ስንት ክፍሎች አሉት?	በቁጥር _____		
203	የቤቱ ወለል በአብዛኛው የተሰራበት ቁስ ከምንድን ነው? (ይመልከቱ)	ሜት/ አሽዋ እንጨት ሲሚንት ሸክላ/ሴራሚክ ሌላ (ይጥቀሱ) _____	1 2 3 4 5	
204	የቤቱ ጣራ የተሰራበት ቁስ ምንድን ነው? (ይመልከቱ)	ከሳር ከቆርቆሮ ሌላ (ይጥቀሱ) _____	1 2 3	
205	በመኖርያ ቤትዎ አብዛኛው ምግብ ማበሰያ ምን አይነት የማከም ዶ/ሀይል አሜሪካዊ ጠቀሜታ?	እንጨት የእንስሳት ፍግ ክሰል ኤሌክትሮኒክ ሌላ (ይጥቀሱ) _____	1 2 3 4 5	
206	ለቤት እንስሳት ለብቻ ክፍል አላችሁ?	አዎ የለም	1 0	
207	የመከፈት እርሻ አለዎት?	አዎ የለም	1 0	የለም ካሉ ወደ 209
208	ስንት ቃዳ የመከፈት እርሻ መሬት አለዎት?	_____		
209	ስንት ቃዳ የእርሻ መሬት አለዎት?	_____		
210	የሚከተሉት በሚከተሉት አለዎት ሀ. ባህርዛፍ ለ. ጌሾ	አዎ	የለም	
		----- ቃዳ	ይለፉ	
		----- ቃዳ	ይለፉ	
211	የሚከተሉት የሰብል ምርቶች ባለፈው ዓመት ተመርተዋል ሀ. ዳጉሳ ለ. በቆሎ	አዎ	የለም	
		-----በኩንታል	ወደ ለ ይለፉ	
		-----በኩንታል	ወደ ሐ ይለፉ	

	ሐ. ገብስ መ. ስንዴ ሠ. ጠፍ ረ. ባቄለ ሰ. አተር	-----በኩንታል -----በኩንታል -----በኩንታል -----በኩንታል -----በኩንታል	ወደ መይለፍ ወደ ሠይለፍ ወደ ረይለፍ ይለፍ		
212	አትክልትና ፍራፍሬ ታመር ታላቸሁ	አዎ የለም		1 0	የለም ካሉ ወደ 214
213	አትክልትና ፍራፍሬ እንዴት ነው የምትጠቀሙት?	ሁሉንም ለሸያጭ በከፊል ለሸያጭ ሁሉንም ለቤተሰብ ምግብነት ለህጻናት ምግብነት		1 2 3 4	
214	የሚከተሉት ቁሳቁሶች በቤታችሁ ወስጥ ይገኛሉ?				
	ሀ. ራዲዮ/ቴፕ	አዎ የለም		1 0	
	ለ. አልጋ ከጥጥ /ከስፖንጅ/ ከስፕሪንግ ምንጣፍ ጋር	አዎ የለም		1 0	
	ሐ. ተንቀሳቃሽ ስልክ	አዎ የለም		1 0	
	መ. የፀሃይ ሀይል	አዎ የለም		1 0	
215	በቤት ወስት ምን ያህል እንስሳት አለዎት?	አዎ	የለም		
	ሀ. ላም	___ በቁር	ወደ ለይለፍ		
	ለ. ወይፈን	___ በቁር	ወደ ሐይለፍ		
	ሐ. በሬ	___ በቁር	ወደ መይለፍ		
	መ. ጊደር	___ በቁር	ወደ ሠይለፍ		
	ሠ. በቅሎ	___ በቁር	ወደ ረይለፍ		
	ረ. አሀያ	___ በቁር	ወደ ሰይለፍ		
	ሰ. ፍየል	___ በቁር	ወደ ሸይለፍ		
	ሸ. በግ	___ በቁር	ወደ በይለፍ		
	በ. ዶሮ	___ በቁር	ወደ ተይለፍ		
ተ. የንብቀፎ	___ በቁር				
216	የባንክ ወይም የአብቁተ ቁጠባ ደብተር አለዎት?	አለ የለም		1 0	የለም ካሉ ወደ 218
217	በባንክ ወይም አብቁተ ተቋም ወስጥ ምን ያህል ገንዘብ አለዎት?	_____ በኢትዮጵያ ብር			
218	የቤተሰቡ ዋነኛ የወሃ ምንጭ ምን ድንገት ነው?	ምንጭ የተገነባ የወሃ ጉድጓድ ያልተገነባ የወሃ ጉድጓድ የወንዝ ወሃ የዝናብ ወሃ (ኩሬ) የቧንቧ ወሃ		1 2 3 4 5 6 7	

		ሌላ (ይጠቀስ)-----		
219	መጻዳጃ ቤት አለዎት	1. አዎ 2. የለም		

ክፍል ሶስት: - ከእናቶች እና ከህጻኑ ጠፍ አገልግሎት ጋር የተያያዙ ሁኔታዎች መረጃ				
ተ.ቁ	ጥያቄዎች	መልሶች (አሜሪካ)	ኮድ	ይለፉ
301	በእርግዝናዎ ወቅት ቅድመ ወሊድ ክትትል ነበርዎት?	አዎ የለም	1 0	የለም ከሆነ ወደ 303
302	ለምን ያህል ጊዜ የቅድመ ወሊድ ክትትል አድርገው ነበር?	ከ1-3 ጊዜ ከ4 ጊዜ በላይ አላስታወስም	1 2 3	
303	የአሁኑ/ኗን ህፃን የወለዱት የትነው?	ከቤት ከጠፍ ተቋም ሌላ (ጥቀስ)-----	1 2 3	
304	የመጨረሻ ልጅዎን ከወለዱ በኋላ የድህረ ወሊድ ክትትል አድርገዋል?	አዎ የለም	1 0	የለም ከሆነ ወደ 306
305	መቼ ነበር ድህረ-ወሊድ ክትትል ያደረጉት?	ከ1-2 ባሉት ቀናት ከ3-6 ባሉት ቀናት ከ7 ቀን በኋላ	1 2 3	
306	ጠቅ ከማጥባትዎ በፊት ለህፃኑ የሰጠች ነገር ነበር?	አዎ የለም	1 0	
307	ጠቅ ማጥባት መቼ ጀመሩ?	ወዲያው እንደተወለደ (በ1 ሰአት ወስጥ) ከተወለደ ከ1 ሰአት በኋላ ጠቅ አልጠጠም	1 2 3	
308	ህጻኑ/ኗ በየትኛው እድሜ ነው ተጨምሮ ምግብ የጀመሩለት?	ከ6 ወር በፊት 6 ወር ላይ ከ6 ወር በኋላ አልጀመረም	1 2 3 4	
309	ጠብ ይጠቀማሉ?	አዎ አይጠቀምም	1 0	
310	ልጁ ክትባት ወስዶ ያወቃል?	አዎ አልወስደም	1 0	አልወስደም ከሆነ ወደ 312
311	የህጻኑ የክትባት ሁኔታ ምን ይመስላል? ማክታዎሻ: ካርዱን በማቅት ያረጋግጡ	ለእድሜው ተመጣጠኝ ማሉ ክትባት የጨሰ ያቋረጠ	1 2 3	
312	ህጻኑ/ኗ በየ6 ወሩ የቫይታሚን ኤ ጠቢታ ይሰጠዋል ወይ	አዎ የለም	1 0	
313	በእድገት ክትትልና ማለልበት ወቅት	አዎ	1 0	የለም ካሉ ወደ

	ህፃኑን/ዋን በየ ወሩ ክብደት ያስለካሉ?	የለም		315
314	በእድገት ክትትልና ማስጠንቀቂያ ወቅት ህፃኑን/ዋን በየ ወሩ ሲያስለኩ ስለተጨማሪ ምግብ በተለይም ስለምግብ ስብጥርና የምግቡ ድግግሞሽ ምክር ያገኛሉ?	አዎ የለም	1 0	
315	ባለፉት ሁለት ሳምንታት ህፃኑ/ኗ ታሞ/ማ ነበር?	አዎ አልታመም/ችም	1 2	
316	መልስዎ አዎ ከሆነ ህመም ስር ነበር	ትኩሳት ተቅማጥ ሳል ሌላ (ጥቅስ)-----	1 2 3 4	

ክፍል አራት: - በህጻናት አመገብ ዙሪያ የእናቶች እውቀት ዳሰሳ			
ተ.ቁ	ጥያቄ	መልስ	ኮድ
401	ህጻናት በመጀመሪያዎቹ 6 ወራት የእናት ጠቅብ ብቻ መጥባት አለባቸው?	አዎ የለባቸውም	1 0
402	ህጻናት 6 ወር ተጨማሪ ምግብ መጀመር አለባቸው?	አዎ የለባቸውም	1 0
403	ህጻናት እስከ 2 አመት እና ከዚ በላይ የእናት ጠቅብ መጥባት አለባቸው?	አዎ የለባቸውም	1 0
404	ከ 6 - 23 ወር ልጅ አምስት እና ከዚያ በላይ የምግብ አይነቶችን መመገብ አለባቸው?	አዎ የለባቸውም	1 0
405	ከ 6 - 23 ወር ልጅ ስጋ መስጠቱ ተገቢ ነው?	አዎ አይደለም	1 0
406	ለህጻናት የተመጣጠነ የምግብ እጥረት አንዱ ምክንያት የተለያዩ ምግቦችን አለመመገባቸው ነው?	አዎ አይደለም	1 0
407	ረሃብ አልተሰማም ማለት የልጁ የአመገብ ፍላጎት ተሟላቷል ማለት ነው?	አይደለም አዎ	1 0
408	ለህጻናት የተመጣጠነ ምግብ እጥረት አንዱ ምክንያት በ 6 ወር ዕድሜው ላይ ተጨማሪ ምግብን አለመጀመር አይደለም?	አዎ አይደለም	1 0
409	ልጅዎ ምን ምን አይነት ምግቦች መመገብ እንዳልብዎት ያቃሉ?	አዎ አላቅም	1 0
410	ከስድስት ወር በታች ያሉ ህጻናት በእናት ጠቅብ ብቻ ያለ ወሃም መኖር ይችላሉ ወይ?	አዎ አይችሉም	1 0
411	ለህጻኑ/ኗ በሃይል ሰጭ በንጥረ ነገር የበለጸገ ምግብ መስጠት ጠቃሚ ነው?	አዎ	1

		አይደለም	0
412	እናቶች/ ተንከባካቢ የህጻናትን ምግብ ከማዘጋጀትም በፊት እጃቸውን መታጠብ አለባቸው?	አዎ የለባቸውም	1 0

ክፍል አምስት:- የህጻናት አመገብ መረጃ			
ተ.ቁ	ጥያቄዎች	መልሶች (አማራጮች)	ኮድ
501	ስለ ህጻናት አመገብ በተመለከተ መረጃ ያገኛሉ?	አዎ የለም	1 0
502	ጥያቄ ቁጥር 501 መልስዎ አዎ ከሆነ ስለህጻናት አመገብ በተመለከተ መረጃ የት የት ያገኛሉ?	ከማስታወቂያ (ራዲዮ፣ ቴሌቪዥን) ከጠፍ ባለሙያ ከጓደኛ ከዘመድ ከቤተሰብ ሌላ ጥቅስ-----	1 2 3 4 5 6
የምግብ ስብጥርና ድግግሞሽ ዳሰሳ (ባለፉት 24 ሰዓት ውስጥ ህጻኑ/ኗ ከሚሰጡት የምግብ ዓይነቶች የተመጡትን ለማወቅ የተዘጋጀ መጠይቅ፤ ከተዘረዘሩት አንዱን ከተመጡ “1”ን ያክብቡ)			
503	የእናት ጠቅ	አዎ የለም	1 0
504	ከእህል እና ስራስ ርዘሮች የተዘጋጁ እንደ ገብስ፣ ስንዴ፣ አጃ፣ ፓስታ፣ መከረኒ፣ ሩዝ፣ ዳቦ፣ አጥሚታ ወዘተ....	አዎ የለም	1 0
505	ጥራጥሬ እና የለወዘ እህሎች ዘር የተዘጋጁ እንደ አተር፣ ባቄላ፣ አኩሪ አተር፣ ሸምብራ፣ ምስር፣ (የተቆላ/በዳቄት መልክ የተዘጋጀ ወዘተ)	አዎ የለም	1 0
506	ወተትና የወተት ተዋጽኦ እንደ ወተት፣ እርጎ፣ አይብ፣ ወዘተ...	አዎ የለም	1 0
507	የእንሰሳት አካል ቀይ ስጋ፣ ደሮ፣ ዓሣ፣ ከላሊት፣ ጉበት፣ ወዘተ...	አዎ የለም	1 0
508	እንቁላል	አዎ የለም	1 0
509	በቫይታሚን ኤ የበለጸጉ አትክልትና ፍራፍሬ እንደ ማንጎ፣ ፓፓያ፣ ለሚመዘ፣ ጥቅል ጎመን፣ ድንች ወዘተ...	አዎ የለም	1 0
510	ሌሎች ፍራፍሬዎችና ደማቅ አረንጓዴ ቅጠል ያላቸው አትክልቶች እንደ ሐበሻ ጎመን፣ ቆስጣ፣ ሠላጣ፣ እና ሌሎችም...	አዎ የለም	1 0
511	ባለፉት 24 ሰዓት ውስጥ ልጅዎ ስንት ጊዜ ጠጣር፣ ከፊል ጠጣር ወይም ለስላሳ የሆኑ ምግቦችን ተመግቧል?	-----ጊዜ	

ክፍል ስድስት፡ - የምግብ ዋስትና ሁኔታ በተመለከተ የሚጠየቁ ጥያቄዎች				
ተ.ቁ	ጥያቄ	ሚልስ	ኮድ	ይለፉ
1	ባለፉት አራት ሳምንታት ጊዜ ውስጥ ቤተሰቡ በቂ ምግብ የለወም የሚል ስጋት ገብቷችሁ ነበር? ቤተሰብ ማለት በያንስ በሳምንት ለአራት ቀን ያህል በአንድ ጣሬያ ስር አብራችሁ የምታድሩና የምትመገቡ ለማለት ነው።	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 2
1.ሀ	ለምን ያህል ጊዜ ትሰጉ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
2	ባለፉት አራት ሳምንታት ጊዜ ውስጥ አንተ/ቺ ወይም ሌላ የቤተሰቡ አባል የፈለገውን ወይም የሚጠየቀውን የምግብ አይነት ለመጠየቅ የአቅም ማከስ ችግር ገጥሟቸዎታል ነበር? <u>የሚጠየቀው የምግብ አይነት ማለት</u> ማንኛውም በምግብ እራሱን የቻለ ቤተሰብ የሚመገበው አይነት ማለት ነው። ለምሳሌ፡ -እንቁላል፣ ሥጋ፣ አሣ፣ ደሮ ወጥና የመሳሰሉት ማለት ነው። <u>የአቅም ማከስ ችግር</u> ማለት ለመጠየቅ የሚሆን ገንዘብ ማጣት ወይም ማሞረት አለመቻል ማለት ነው።	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 3
2.ሀ	ለምን ያህል ጊዜ ተቸግራችሁ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
3	ባለፉት አራት ሳምንታት ጊዜ ውስጥ አንተ/ቺ ወይም ሌላ የቤተሰቡ አባል የሚጠየቁትን ወይም አቅም ከማጣት የተነሳ ውስን የሆኑ የምግብ አይነቶችን ለመመገብ ተገዳችሁ ነበር? ውስን የሆኑ ሲባል ተመጋቢው መመገብ የሚጠየቀው አንድ አይነት ምግብ ለብዙ ጊዜያት ለማለት ነው።	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 4
3.ሀ	ለምን ያህል ጊዜ ተገዳችሁ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
4	ባለፉት አራት ሳምንታት ጊዜ ውስጥ አንተ/ቺ ወይም ሌላ የቤተሰቡ አባል አቅም ስለማይፈቅድና ሌላ ምግብ መመገብ ስላልቻላችሁ ፈጽሞ ልትመገቡ የማትችሉትን ምግብ ለመመገብ ተገዳችሁ ነበር? ፈጽሞ ልትመገቡ የማትችሉት ምግብ ማለት በህብረተሰቡ ዘንድ የሚወደድና ተቀባይነት የሌለው ማለት ነው።	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 5
4.ሀ	ለምን ያህል ጊዜ ተገዳችሁ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
5	ባለፉት አራት ሳምንታት ጊዜ ውስጥ አንቺ ወይም ሌላ የቤተሰቡ አባል በቂ ምግብ ስለሌላችሁ በቀን ከምትፈልጉት በመጠን ያነሰ የመጠን ምግብ ለመመገብ ተገዳችሁ ነበር?	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 6

5.ሀ	ለምን ያህል ጊዜ ተገዳችሁ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
6	ባለፉት አራት ሳምንታት ጊዜ ወስጥ አንቺ ወይም ሌላ የቤተሰቡ አባል በቂ ምግብ ስለሌላችሁ በቀን መመገብ ከነበረባችሁ 3 ዋና ዋና ምግቦች በታች ለመመገብ ተገዳችሁ ነበር? ምሳሌ: ከሶስቱ አንድ ወይም ከዛ በላይ መተማመን ጥቅም ይዟል:	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 7
6.ሀ	ለምን ያህል ጊዜ ተገዳችሁ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
7	ባለፉት አራት ሳምንታት ጊዜ ወስጥ ምግብ ለማግኘት የሚያስፈልጋችሁ አቅም ስላልነበራችሁ ምንም አይነት ምግብና ለምግብ የሚሆን ነገር ከቤታችሁ ጠፍቶ ነበር?	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 8
7.ሀ	ለምን ያህል ጊዜ ጠፍቶ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
8	ባለፉት አራት ሳምንታት ጊዜ ወስጥ በቂ ምግብ ስላልነበረ አንተ/ቺ ወይም ሌላ የቤተሰቡ አባል ሳይመገብ ወደ መኝታ የሄደበት ጊዜ ነበር?	የለም አዎ	1 0	የለም ካሉ ወደ ቁጥር 9
8.ሀ	ለምን ያህል ጊዜ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	
9	ባለፉት አራት ሳምንታት ጊዜ ወስጥ በቂ ምግብ ስላልነበረ አንተ/ቺ ወይም ሌላ የቤተሰቡ አባል ምንም አይነት ምግብ ሳይመገብ ቀኑን ሙሉ ወሎሌሊትም ያደረ አለ?	የለም አዎ	1 0	
9.ሀ	ለምን ያህል ጊዜ ነበር?	በጣም አልፎ አልፎ አንድ አንድ ጊዜ ብዙ ጊዜ	1 2 3	

1. በጣም አልፎ አልፎ = ባለፈው አራት ሳምንታት አንድ ወይም ሁለት ጊዜ (1 ወይም 2)
 2. አንድ አንድ ጊዜ = ባለፈው አራት ሳምንታት ከ 3 እስከ 10 ጊዜ (3-10)
 3. ብዙ ጊዜ = ባለፈው አራት ሳምንታት ከ 10 ጊዜ በላይ (>10)
- ለትብብርዎ በጣም አመሰግናለሁ!!!**

Annex v Approval sheet

The undersigned examining committee certifies that the thesis presented by Welelaw Mengistu entitled: Minimum acceptable diet practice and associated factors among 06-23 months children in households with irrigated and non-irrigated users of North Mecha district, Northwest Ethiopia, 2021, submitted to Bahir Dar University, College of Medicine and Health Sciences, School of Public Health, Department of Nutrition and Dietetics, in partial fulfillment of the requirements for master degree in Nutrition and Dietetics with the regulation of the University and meets the accepted standards with respects to originality and quality.

Place of submission: Nutrition and Dietetics Department, College of Medicine and Health Sciences, Bahir Dar University.

Date of Submission: _____

Principal investigator: Welelaw Mengistu (BSc)

Signature



Date 17 June 2022

Advisors:

Name

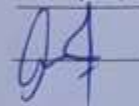
1. Dr. Dereje Birhanu (Ph.D., Mph, Associate Professor)

2. Mr. Omer Seid (MSc, Associate Professor)

Signature



Date



17 June 2022



