

Minimum acceptable diet and its associated factors among 6–23 months old children enrolled in Outpatient therapeutic program in the Tulla District, Sidama region, Ethiopia : A community- based cross-sectional study

Mesfin Markos (✉ mesfinmarkos2020@gmail.com)

Hawassa University

Beniyam Samuel

Dilla University

Research Article

Keywords: knowledge, complementary feeding, minimum adequate diet, outpatient therapeutic program, 6–23 months old children, Ethiopia

Posted Date: December 28th, 2023

DOI: <https://doi.org/10.21203/rs.3.rs-3772772/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background: Improving MAD is essential for ensuring optimal growth and development of children, as well as preventing malnutrition and its consequences. Previous studies in Ethiopia have focused on the magnitude and determinants of a minimum adequate diet. However, much emphasis was not given to minimum acceptable diet and its associated factors among 6–23 months old children enrolled in Outpatient therapeutic program, particularly, in the study area. This study determines minimum acceptable diet and its associated factors among 6–23 months old children enrolled in Outpatient therapeutic program.

Methods: A community-based cross-sectional study was conducted among 346 randomly selected mothers with children aged 6–23 months who were admitted to the OTP. The data were collected using structured questionnaires. Data entry and cleaning were exported to SPSS version 26 for further analysis. Multivariate logistic regression was used to assess the determinants of an adequate diet.

Results: The overall prevalence of minimum Acceptable diet among children aged 6–23 months was 14.5% (95% CI: 12.02%-19%). The odds of adequate diet were 1.9 times higher among children aged 18–23 months compared to children aged 6-11 months (AOR = 1.9, 95% CI (1.2 3.9). The odds of adequate diet 2.9 times higher in children whose caregiver had greater than 70 percent of knowledge on recommended feeding (AOR = 2.9, 95% CI (1.2, 6.35). The odds of adequate diet to the children were 81 percent less likely in a caregiver who did not attend formal education compared to their counter part (AOR = 1.94, 95% CI = 1.24, 4.19).

Conclusion: The practice of minimum acceptable diet is inadequate. Nutrition education should be emphasized to improve the mothers' nutrition knowledge regarding infant and young child feeding recommendations, to support mothers in overcoming barriers to feeding their children with adequate diets, and to foster complementary feeding practices for malnourished children.

Introduction

A child's minimum acceptable diet (MAD) is the percentage of 6-to 23-month-olds who had a minimum diverse diet and minimum frequency of meals the day before(1, 2). For children between the ages of 6 and 23 months, appropriate feeding practices are essential because this is the ideal time for their growth and development(3). Given their increased vulnerability to illness, mortality, and malnourishment, children under the age of two benefit greatly from varied diets and regular meal schedules(4). The minimum acceptable diet (MAD) is useful for inadequate nutrient intake and is one of the most significant indicators for assessing infant and young child feeding (IYCF) practices. It combines standards of dietary diversity and feeding frequency based on feeding status(5, 6).

Inadequate nourishment, especially during the initial two years of life, is linked to elevated rates of illness and death, along with inadequate brain growth, which in turn affects adult cognitive development, intellectual capacity, and economic productivity(7, 8). Based on UNICEF, In the year 2019, 47 million

children under the age of five were wasted at all times, with 75% of them residing in lower- and middle-income nations(9).

There are many possible causes for low minimum acceptable diet (MAD) among children aged 6–23 months, depending on the context and factors that influence child feeding practices. Some examples include low education, lack of knowledge, poor health, and cultural beliefs, which affect the quality and quantity of complementary foods offered to children. Household and environmental factors, such as poor sanitation, hygiene, and water quality, which increase the risk of infections and malabsorption of nutrients in children(10)

Globally, in 2020, the prevalence of MAD was 16.6% (95% CI: 15.8–17.4%) among children aged 6–23 months(11). Based on a meta-analysis conducted in 32 countries in sub-Saharan Africa, few children receive nutritionally adequate and safe complementary foods. In many countries, less than a quarter of infants aged 6–23 months meet the criteria of dietary diversity and feeding frequency that are appropriate for their age, and the prevalence of malnutrition is highest in East and West Africa(12). In Ghana, Nigeria, Uganda, and Kenya, wherein 29.9%, 8.36%, 7.3%, 23.9%, and 48.5% of children, respectively, obtained the recommended(13–16). A study conducted in Ethiopia showed that only a small percentage of children received minimum dietary diversity and maternal knowledge of complementary feeding practices was low(17–20). The magnitude of MAD varies from 7 to 74% in Ethiopia(21–23). Mothers' knowledge and fathers' income, age of the child, wealth status, marital status, and the presence of a family member who fed the child without fasting were important factors for ensuring adequate diet and were significantly associated with MAD(24, 25).

The Ethiopian government has designed different nutrition-related strategies in its development plans, and has highlighted the role of nutrition in sustainable development. The Seqota Declaration is one of the components of the Second National Nutrition Program(NNP II) of Ethiopia, which aims to end child undernutrition by 2030(26). However, there are limited data regarding the minimum acceptable diet and its associated factors among children aged 6–23 months enrolled in outpatient therapeutic programs, particularly in the study area. Determining the prevalence and determinants of MAD helps obtain evidence-based information based on the study's area context and monitor and evaluate the impact of nutrition programs and policies on the dietary quality and diversity of young children. Therefore, the main purpose of this study was to describe an acceptable minimum diet and its associated factors among 6–23 months old children who were enrolled in the OTP in the Tulla district, Sidama region, Ethiopia.

Methods and materials

Study design, study setting, design and participants

A community-based cross-sectional study was conducted from October 5 to November 30, 2023, in the Tulla District, Sidama Region of Ethiopia. The district has a population of approximately 248,710 people, with 23,199 children under five years old. The district has one primary hospital, six health centres, four

private clinics, and 12 drug outlets. The local community relies on farming and growing seeds of maize, chat, and coffee. This study focused on mothers of 6-23-month-old children who were enrolled in the outpatient patient program (OTP). The source population consisted of all mothers and carers enrolled in the OTP in the Tulla District administration, with children between the ages of 6 and 23 months. The study population included mothers and carers of children with mild acute malnutrition, aged 6 to 23 months, who were enrolled in the OTP and lived in randomly selected kebeles. Individual mothers or carers who had children between the ages of six and twenty-three months resided in the randomly chosen Kebeles, enrolled in the OTP, and took part in the actual data collection were the study units. Mothers with mild acute malnutrition, whose 6- to 23-month-old infants were included in the Tulla district's Outpatient Treatment Programme (OTP), were included in the study. Mothers with children with severe acute malnutrition who also had heart illness, vomiting, or grade two or three nutritional edoema were excluded from the study. For sample size calculation, a single population proportion formula was used. Considering the proportion of MAD in Mareka District, southern Ethiopia, 35% of the children aged 6–23 months met the recommended MAD(23), with a 0.05 margin of error and a 95% confidence level. The mean sample size was 352. Ultimately, 370 was calculated after a 5% non-response rate was added. A list of mothers with children aged 6–23 months enrolled in an OTP program was obtained from the health buruea of Tulla District. Children's dates of birth and the number of houses were also recorded. The list was based on the community health campaign conducted by trained health extension workers in all 12 Kebeles of Tulla Woreda in August 2023. Children with MAM (MUAC: 11.5 x 12.5 cm, no medical complications, and bilateral pitting edema) were registered separately. There are 12 Kebeles in the Tulla District administration, out of which six kebeles (with an estimated 1315 study participants) were randomly selected using a lottery method. To provide equal chance in the selection, a proportional allocation technique was employed across each selected kebele. A systematic random sampling technique was used to select 370 participants.

Data collection tools

We used a questionnaire to gather data. The questionnaire items were obtained from the FAO questionnaires for measuring nutrition and feeding knowledge, attitudes, and practices of infants and young children (27). We measured nutritional knowledge of how long to breastfeed, when to start complementary feeding, and why and how to make complementary feeds more nutritious.

Two scales were used to measure the knowledge and attitudes of the participants towards infant and young child feeding recommendations. The knowledge scale consisted of seven questions, some open-ended and some multiple-choice, which tested participants' understanding of the recommendations. Each question was worth one point for a correct answer, and the total score was calculated as a percentage of 100.

The attitude scale consists of seven items that use a 3-point Likert scale to assess the participants' perceived benefits and barriers to the following recommendations. The Likert-scale responses varied depending on the item, with higher scores indicating a more positive attitude. The total score was calculated as a percentage of 100.

To assess the variety of foods consumed by children, we used a list of six food groups and asked mothers to mark the foods consumed by their children in the last 24 h. We followed the Food and Agriculture Organization (FAO) guidelines to count the number of different food groups consumed by each child. For example, if a child ate at least one food item from a specific group, we assigned a score of one for that group. Food groups included grains, roots, tubers, dairy products, vitamin A-rich foods, flesh foods, eggs, fruits and vegetables, legumes, and nuts. We used the mothers' answers to calculate three indicators of complementary feeding: minimum meal frequency, minimum diet diversity score, and minimum adequate diet.

The WHO/UNICEF guidelines define the minimum meal frequency as the number of times a child aged 6–23 months has received complementary foods in the last 24 hours. This depends on the child's age and breastfeeding status: two times for 6–8 months, three times for 9–23 months, and four times for non-breastfed children(5, 28). The minimum dietary variety is the number of food groups (out of seven) that a child consumed in the last 24 h. A child who met both criteria had a minimum acceptable diet(MAD). The minimum acceptable diet was defined as the percentage of children who met both criteria(5).

Data collection and quality assurance

The data collectors interviewed the mothers once in person when they joined the OTP. They were asked about their education, income, wealth, and knowledge of CF. They were also asked how they fed their babies when they were sick or had a minimum acceptable meal(MAM). They obtained the children's details, such as age, sex, and treatment, from the records. They used questionnaires, an OTP chart, and a logbook to collect data. The questionnaire was written in English and included a sidamu afoo. The interviews lasted approximately 20–30 minutes. The questions were tested for accuracy and clarity before the study in a nearby Woreda, Hawella, with a sample size of 5%. Pre-testing also helped estimate the time required for the interviews. The questions were revised based on the feedback and interpretation consistency. The responses were recorded as they were given.

Statistical analysis

The data were entered, cleaned, coded into epidata version 4.6 and transferred to SPSS version 25 for further analysis. Descriptive statistics such as frequencies, percentages, and interquartile ranges were computed. Bivariate and multivariate logistic regression models were used to determine the degree of association between outcome and predictor variables. Independent variables with a P-value of less than 0.25 during bivariable analysis were selected for multivariable logistic regression analysis. Multivariate logistic regression analysis was performed to identify the statistically significant variables. Statistical significance was set at a P-value of less than 0.05, and model fitness was checked using Hosmer and Lemeshow's goodness of fit. Variance inflation factor (VIF) was used to evaluate the potential for multicollinearity among independent variables.

Results

Socio-demographic characteristics of children caregiver's

The study involved 346 caregivers of children on the OTP out of the planned 370 (93.5% response rate). Almost all the mothers of the children were caregivers (99.1%). Most children were 18–23 months old (54.6%). The participants were mostly Protestants (81%), married (98.8%), or unemployed (80%). More than half had no formal education (54.3%)(Table 1).

Table 1
Socio demographic characteristics of caregiver's of Tulla Woreda, 2023. (N = 346)

Variables	Response category	Frequency	%
Age of children in years	6–11 Months	38	11
	12–17 Months	119	34.4
	18–23 Months	189	54.6
Sex of Child	Male	167	48.3
	Female	179	51.7
Children MUAC during OTP entry	≤10cm	220	64
	≤11.5cm	126	36
Weight of children after OTP entry	≤5kg	72	20.8
	≤8kg	274	79.2
Marital status	Married	342	98.8
	Single	4	1.2
Education of mothers/ caregivers	No formal education	188	54.3
	Formal education	158	45.7
Family size	≤ 4	137	39.5
	> 4	209	60.5
Number of < 5children	One	60	17.3
	Two and above	286	82.7
Religion of Caregiver's	Protestant	281	81
	Orthodox	26	7.5
	Muslim	40	11.5
Employment Status of the mother	Employed	277	80
	Unemployed	68	20
Age of caregiver	15–17	2	0.6
	17–19	13	3.8

Variables	Response category	Frequency	%
	19–21	31	8.9
	21–30	206	59.5
	> 30	94	27.2
Children primary caregiver	Mother	343	99.1%
	Father	3	0.9%
Monthly in come	< 500Birr	221	64
	500-1,000 Birr	87	25
	> 1,000 Birr ⁺	38	11
Child's father earns adequate income for family upkeep	Yes	202	58.3
	No n	144	41.7

Caregivers' Knowledge on Complementary Feeding

Caregivers' Knowledge on Complementary Feeding

Most mothers and caregivers (71.7%) knew how long they breastfed their babies. They also knew the right time to start giving complementary foods after 6 months (76%). However, they did not explain why this was important or how to make food more nutritious and diverse. Only 224 (64.7%) and 62.1%) knew these aspects, respectively. Of total study participants, **209** (60.5%) had good knowledge of the recommended feeding practices (Table 2).

Table 2
 complementary feeding knowledge among caregivers of children 6–23 month of age admitted at OTP in
 Tulla Woreda, 2023. (N = 346)

Variables	Category	Frequency	Percent
Correctly answered recommended duration of continued breastfeeding	Yes	248	(71.7%)
	No	98	(28.3%)
Correctly answered age of start of complementary foods	Yes	263	(76%)
	No	83	(24%)
Gave good reasons for giving complementary foods at 6 months	Yes	122	(35.3%)
	No	224	(64.7%)
Correctly knew how to ensure consistency of meal	Yes	211	(61%)
	No	135	(39%)
Gave good reasons why consistency of meal of meal is necessary	Yes	169	(48.8%)
	No	177	(51.2%)
Correctly knew how to ensure dietary diversity and ways of enriching porridge	Yes	131	(37.9%)
	No	215	(62.1%)
Knew responsive feeding	Yes	251	(72.5%)
	No	95	(27.5%)
Classification of knowledge scores	High (> 70%)	209	(60.4%)
	Low	137	(39.6%)

Complementary feeding attitude among caregivers of children 6–23 months of age admitted to the OTP.

Most mothers (88.6%) felt confident about making food for their children, but nearly half (46.8%) had trouble with food variety. Almost all mothers (98%) understood the benefits of breastfeeding for the past 6 months, but some (13.3%) faced challenges in doing so. The majority of mothers (57.5%) had a positive attitude towards the feeding recommendation (Table 3).

Table 3

Complementary feeding attitude among care-givers of children 6–23 months of age admitted at OTP in Tulla Woreda, 2023. (N = 346)

Characteristics	Category	Frequency	Percent
Feels confident in preparing food for child	Yes	306	(88.6%)
	No	40	(11.4%)
Perceives that giving different types of food is beneficial to child	Yes	238	(68.8%)
	No	108	31.2%)
Has difficulty giving different types of food to child	Yes	162	(46.8%)
	No	184	(53.1%)
Perceives that feeding child several times each day is beneficial	Yes	295	(85%)
	No	51	(15%)
Has difficulty feeding child several times a day	Yes	139	(40.2%)
	No	207	(59.8%)
Perceives that its beneficial to continue breastfeeding beyond 6 months	Yes	339	(98%)
	No	7	(2%)
Has difficulty continuing to breastfeeding beyond 6 months	Yes	46	(13.3%)
	No	300	(86.7%)
Attitude classification	Positive(>70%)	199	(57.5%)
	Less Positive	147	(42.5%)

Magnitude of minimum adequate diet

A summary of the food intake of the children in the last day is as follows: Out of 346 children, only 55% ate legumes and nuts, 60% ate grains, roots, and tubers, 55% ate dairy products, 20.3% ate flesh foods, 23. % ate eggs, 28% ate vitamin A-rich foods, and 6.4% ate fruits and vegetables. Most of the mothers (96.9%) were still breastfeeding their children. Only 13% of the children had a diverse diet, 39.5% had a frequent diet, and 14.5% had an adequate diet.

Factors associated with minimum adequate diet

In the binary logistic regression, the monthly income greater than 1,000 Ethiopian Birr, mothers who do not have formal education, children who were aged 12–17 and 18–23 months, a child's father earning adequate income for family upkeep, knowledge level, and positive attitude were factors associated with the minimum adequate diet. However, mothers who do not have formal education, mothers whose

knowledge level is greater than seventy percent, and children who were aged 18–23 months were significantly associated factors in the multivariable logistic regression model. The odds of an adequate diet were 1.9 times higher among children who were aged 18–23 months compared to children who were aged 6–11 months (AOR = 1.9, 95% CI (1.2 to 3.9)). The odds of an adequate diet were 2.9 times higher in children whose caregiver had greater than 70 percent knowledge of recommended feeding (AOR = 2.9, 95% CI (1.2, 6.35)). The odds of an adequate diet for the children were 81 percent less likely in a caregiver who did not attend formal education compared to their counterparts (AOR = 1.94, 95% CI = 1.24, 4.19) (Table 4).

Table 4

Multivariable Logistic regression analysis of factors associated with adequate diet among care-givers of children 6–23 months of age admitted at OTP in Tulla Woreda, 2023. (N = 346)

Variable	Met adequate diet		Odds Ratio (95% CI)	
	Yes (%)	No (%)	Bivariate(COR)	Multivariate(AOR)
Educational level				
No formal education	11(6.3%)	178(93.7%)	0.2(0.290–1.080)	0.19(0.095–0.456)**
Formal education	36(21.8%)	121(78%)	1.00	1.00
Age of children in years				
6–11 Month	8(21%)	30(79%)	1.00	1.00
12–17 Month	19(14%)	99(86%)	1.4(1.02, 3.3)	1.2 (0.70, 3.42)*
18–23 Month	20(15%)	170(85%)	2.2 (1.4, 4.5)	1.9 (1.2 to 3.9) *
Monthly income				
< 500Birr	9(4.3)	214(95.7)	1.00	1.00
500-1,000 Birr	9(7)	77(93)	0.36(0.28, 1.12)	0.46(0.41,1.02)
> 1,000 Birr ⁺	29(81)	8(19)	0.01(0.012, 0.08)	0.021(0.01, 1.01)
knowledge level				
High knowledge level	38(19)	171(81)	3.2(1.7, 5.94)	2.9(1.2, 6.35)*
Low	9(8)	128(92)	1.00	1.00
Attitude				
Posetive attitude(> 70%)	32(14)	166(86)	1.7(1.04, 4.73)	1 .53 (0.90, 3.54)
Less posetive attitude	15(15)	133 (85)	1.00	1.00
Child's father earns adequate income for family upkeep				
Yes	32(19)	169(81)	1.6(1.10,3.49)	1.5(0.82, 4.19)
No	15(10.7)	130(89.3)	1.00	1.00
*Statistical significant at P < 0.05, ** at P < 0.01 and *** at P < 0.001				

Discussion

A minimum acceptable diet (MAD) is a measure of the quality and quantity of complementary feeding for children aged 6–23 months. It is based on the combination of dietary diversity and meal frequency. Conducting a study on MAD can help to assess the nutritional status and feeding practices of young children, identify the factors that influence their diet, and design interventions to improve their health and development. This study aimed to assess the knowledge and attitude of mothers on complementary feeding among children aged 6–23 months and the factors influencing adequate diet in Tulla District, Sidama Region, Ethiopia.

The results of this research showed that only 14.5% (95% CI: 12.02%-19%) of the children aged 6–23 months who were enrolled in the outpatient therapeutic program met the minimum adequate diet criteria. This suggests that the complementary feeding practices in the study area were inadequate and could lead to growth problems. Therefore, it is important to implement effective interventions to improve the nutritional status of these children. The quality and quantity of food that a child receives in the first years of life can have a lasting impact on their health and development. Feeding practices that are unsuitable or inadequate can increase the child's vulnerability to malnutrition, vitamin deficiencies, diarrhea, and respiratory tract infections. On the other hand, feeding the child with appropriate and sufficient food can enhance their mental and motor development, reduce their risk of obesity, protect them from various infectious diseases and their mortality, and improve their overall development(29–31). This finding higher than studies conducted in Tigray (2.30%)(32), North West, Ethiopia (12.6%)(1), EDHS 2016(6.10%)(33), Uganda (5.34%) (34), India(8.4%)(35), Dembecha (8.60%)(22). However, lower than the studies conducted in Addis Abeba(76.6%)(21), Mareka District(35.5%)(23), Bangladeshi (38%)(36), Lalibela, northeast Ethiopia(16.7%)(37), Myanmar (16.00%)(38), Delhi (19.70%)(39), Congo(33%)(40), central Amhara (31.60%)(41), Kaski (42.40%)(42), Abu Dhabi(36.20%) (43), Ghana (24.90%)(43), Rural Madagascar (50%) (44), and Bangladesh (23.00%)(45). The fact that the study contexts, economic backgrounds, and data collection seasons varied could be one reason for discrepancy in the finding. Furthermore, variations in study methodology, sample size, study period, and sociodemographic variation may account for the level discrepancies between the finding.

Our study shows that most mothers((76%) knew the right time to start giving other foods besides breast milk, but majority of mothers (64.7%) did not explain why they should do so at six months. It also shows that less than half of the mothers (37.9%) knew how to make the food more nutritious and varied. These knowledge gaps could be dangerous because they could lead to early or late introduction of complementary foods, which could affect the child's growth and development negatively. Therefore, this suggests that health workers should give more counseling and education on nutrition during the regular sessions of growth monitoring and child care events.

We assessed the mothers' attitudes toward feeding habits for infants and young children in this study, as these practices are critical to the growth and development of children. While most women (85%) believe that feeding their children multiple times a day is good, over 40.2% of them said they found it challenging to feed their children multiple times a day. While the majority of women feel comfortable making meals for their children, nearly half of them said they had trouble doing it. These challenges may have

contributed to the low degree of meal frequency and dietary diversity that we found in our study, which may have had detrimental effects on the children's health and nutritional status. The mothers' low income may be a contributing factor in these issues since it may restrict their access to a variety of wholesome foods. In reality, the majority of the mothers claimed that their inability to provide their kids with a variety of meals at the suggested times was due to their lack of income. The economic barriers that mothers face should also be addressed by interventions aimed at improving infant and young child feeding practices. Healthcare providers should also offer individualized counseling to mothers and other caregivers during child health care sessions to help them identify the unique obstacles they face in adhering to the recommendations for infant and young child feeding. Mothers and other caregivers may receive encouragement to implement the best feeding habits during these sessions, as well as support in overcoming some of the challenges they encounter. This technique will promote children's growth and health as well as the amount and quality of feeding practices for infants and early children.

In this study, several factors were identified that affected minimum adequate diet among 6–23 months old children who admitted to outpatient therapeutic program in the study area. Mothers who did not have formal education, mothers whose knowledge level greater than seventy percent and children who were aged 18–23 months were significantly associated factors with minimum adequate diet.

Mother education was significantly associated with the minimum acceptable diet practice. Based on this study, mothers who had no formal education were 81% less likely to provide minimum acceptable diets for their children compared to mothers who had no formal education. This finding was supported by studies done in Dembecha and Goncha districts, northwest Ethiopia, respectively(1, 22). These studies reported that mothers who had formal education were more likely to provide the minimum acceptable diet for their children compared to mothers who had no formal education. This could indicate that education helps mothers understand the advantages of child feeding practices and contributes to achieving a minimum acceptable diet.

Our study showed that the odds of an adequate diet were 1.9 times higher among children who were aged 18–23 months compared to children who were aged 6–11 months (AOR = 1.9, 95% CI (1.2 to 3.9)). This finding was supported by a previous study that was conducted in Debre Berhan Town, Ethiopia(41). It is likely that mothers' perceptions of their young children's stomachs being incapable of breaking down solid or semisolid food are the cause of the correlation between greater probabilities of MAD and advancing age. As a result, after the infant turns 12 months old, the mother may start introducing a varied solid and semisolid diet instead of just a milk-based one.

A minimum adequate diet is essential for the growth and development of children. It means that the children receive a variety of foods from different food groups and that they meet the minimum requirements for frequency and quantity of feeding. One factor that influences this diet is the mother's knowledge of infant and young child feeding recommendations. These are guidelines that provide information on what, when, and how to feed infants and young children. This study showed that children whose mothers had a good knowledge of these recommendations were 2.9 times more likely to have a

minimum adequate diet than those whose mothers did not. This result is consistent with a previous study in Ghana(25), which also found a positive association between a mother's knowledge and a child's diet. The reason for this may be that mothers who are well-informed about infant and young child feeding recommendations try to ensure and provide a minimum adequate diet for their children.

Strengths and limitations

The current study had a number of limitations and strengths. One strength of our study is that we designed a community-based study. However, the utilization of the cross-sectional study design method has limitations due to its inability to identify causality. Recall bias might also need consideration when interpreting our findings. Notwithstanding this, the study has important strengths. The findings broaden our knowledge of the prevalence of feeding practices for infants and young children as well as the factors that contribute to them by adding to the body of existing research on the subject. The results open up new directions for designing interventions to enhance the eating patterns of infants and young children in the research area and throughout Ethiopia.

Conclusion and recommendation

The practice of a minimum acceptable diet is inadequate, and there are also knowledge and attitude gaps in the comprehensive feeding practice among children 6–23 in the study area. Mothers who did not have formal education, mothers whose knowledge level was greater than seventy percent, and children who were aged 18–23 months were significantly associated with a minimum adequate diet. Providing the nutritional counseling to the women through health extension workers is a better strategies to enhance minium acceptable diet and complementary feeding. Nutritional education through multi-media campaigns, education of mothers and caregivers on nutrition, promotion of breastfeeding, and increasing production of local complementary foods have a vital role to reassure adequate diet and increase the maternal knowledge on the complemetary feeding among children who aged 6–23.

Abbreviations

CF, Complementary feeding CI, Confidence interval, MAD, Miniumum acceptable diet, CHD, Community health day, MAUC, Middle uppper arm curcumfrance, OTP, Out patient program, MAM, Miniumum acceptable meal

Declarations

Acknowledgements

Our heartfelt gratitude also goes to the study participants, Tulla health buruea for facilitating the data collection..

Author's contributions

Contributors: MM, conception, and original draft writing. BS , study design, data analysis, and interpretation. MM, critically review the initial draft and finalize the manuscript. MM and BS : Preparing manuscripts. All authors reviewed and approved the final manuscript.

Funding

This study did not receive any external funding.

Data Sharing Statement

On reasonable request, the corresponding author will provide the complete data set and additional study-related information.

Ethical Approval and Consent to Participate

This study was conducted according to the guidelines listed in the Declaration of Helsinki, and an ethical clearance was obtained from the Institutional Review Board of Hawassa University, College of Agriculture, with reference number IRB/086/14 E.C., scrutinizing all the necessary ethical considerations. A permission letter was obtained from Hawassa University, College of Agriculture, Department of Nutrition, and submitted to the Tullla District Administration and health offices. Informed consent was obtained from the mothers. All methods were performed according to the institutional guidelines. Each study participant was adequately informed about the objective of the study and the anticipated benefits and risks of the study, and told the right not to respond to the questions if they did not want to respond or to terminate the interview at any time.

Consent for publication

Not applicable ..

Competing interests

No competing interests exist

Author's details

¹Department of Nutrition, College of Agriculture, Hawassa University, Hawassa, Ethiopia ²Department of Midwifery, College of Medicine and Health Science, Dilla University, Dilla, Ethiopia

References

1. Birie B, Kassa A, Kebede E, Terefe B. Minimum acceptable diet practice and its associated factors among children aged 6–23 months in rural communities of Goncha district, north West Ethiopia.

- 2021;1–9.
2. Nutrition G, Framework M. Operational guidance for tracking progress in meeting targets for 2025.
 3. Daelmans B, Ferguson E, Lutter CK, Singh N, Pachón H, Creed-Kanashiro H, et al. Designing appropriate complementary feeding recommendations: Tools for programmatic action. *Matern Child Nutr.* 2013;9(S2):116–30.
 4. Beyene M, Worku AG, Wassie MM. Dietary diversity, meal frequency and associated factors among infant and young children in Northwest Ethiopia: A cross-sectional study. *BMC Public Health.* 2015;15(1):1–9.
 5. WHO. Indicators for assessing infant and young child feeding practices.
 6. Masters WA. Technical Working Group on Measuring Food and Nutrition Security Measuring Food and Nutrition Security: An Independent Technical Assessment and User ' s Guide for Existing Indicators. 2016;(June).
 7. Report A. ANNUAL REPORT 2014 Our Story. 2014.
 8. Onis M De, Branca F. Review Article Childhood stunting: a global perspective. 2016;12:12–26.
 9. UNICEF/WHO/WORLD BANK. Levels and trends in child malnutrition UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates Key findings of the 2021 edition. *World Heal Organ [Internet]*. 2021;1–32. Available from: <https://www.who.int/publications/i/item/9789240025257>
 10. Unicef. Nutrition Statistics in Malawi. 2018;2018.
 11. Ambaw G, Id K, Gebrekidan AY, Enaro EY. Minimum acceptable dietary intake among children aged 6–23 months in Ethiopia: A systematic review and meta-analysis. 2023;1–13. Available from: <http://dx.doi.org/10.1371/journal.pone.0287247>
 12. Akombi BJ, Agho KE, Merom D, Renzaho AM, Hall J. Child malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys (2006–2016). 2017;1–11.
 13. Udoh EE, Amodu OK. Complementary feeding practices among mothers and nutritional status of infants in Akpabuyo Area, Cross River State Nigeria. *Springerplus.* 2016;5(1).
 14. Issaka AI, Agho KE, Burns P, Page A, Dibley MJ. Determinants of inadequate complementary feeding practices among children aged 6–23 months in Ghana. 2014;18(4):669–78.
 15. Mokori A, Schonfeldt H, Hendriks SL. Child factors associated with complementary feeding practices in Uganda. 2017;30(1):7–14.
 16. MACHARIA JACQUELINE WAIRIMU. FEEDING PRACTICES AND NUTRITION STATUS AMONG CHILDREN AGED 6–23 MONTHS FOLLOWING DISCHARGE FROM SUPPLEMENTARY FEEDING PROGRAM IN ISIOLO COUNTY, KENYA MACHARIA. 2018;(June).
 17. Forsido SF, Kiyak N, Belachew T, Hensel O. Complementary feeding practices, dietary diversity, and nutrient composition of complementary foods of children 6–24 months old in Jimma Zone, Southwest Ethiopia. 2019;6:1–7.
 18. Mihretie Y. Maternal Knowledge on Complementary Feeding Practice and Nutritional Status of Children 6–23 Month in Jigjiga Town. 2019;(August 2018).

19. Ethiopian Public Health Institute (EPHI), ICF. Ethiopia Mini Demographic and Health Survey 2019: Final Report [Internet]. 2021. 1–207 p. Available from: <https://dhsprogram.com/pubs/pdf/FR363/FR363.pdf>
20. Raru TB, Ayana GM, Merga BT, Negash B, Deressa A, Birhanu A, et al. Magnitude of under-nutrition among under five children in Ethiopia based on 2019 Mini-Ethiopia Demographic and Health Survey: Generalized Linear Mixed Model (GLMM). *BMC Nutr.* 2022;8(1):1–9.
21. Abebe H, Gashu M, Kebede A, Abata H, Yeshaneh A, Workye H, et al. Minimum acceptable diet and associated factors among children aged 6–23 months in Ethiopia. 2021;1–10.
22. Mulat E, Alem G, Woyraw W, Temesgen H. Uptake of minimum acceptable diet among children aged 6–23 months in orthodox religion followers during fasting season in rural area, DEMBECHA, north West Ethiopia. *BMC Nutr.* 2019;5(1):1–10.
23. District M, Based C, Feleke FW, Mulaw GF. Minimum Acceptable Diet and its Predictors among Children Aged 6–23 Months in Mareka District, Southern Ethiopia : Community Based Cross-Sectional Study. 2020;(December).
24. Birhanu H, Gonete KA, Hunegnaw MT, Aragaw FM. Minimum acceptable diet and associated factors among children aged 6–23 months during fasting days of orthodox Christian mothers in Gondar city, North West Ethiopia. *BMC Nutr* [Internet]. 2022;1–11. Available from: <https://doi.org/10.1186/s40795-022-00558-z>
25. Bimpong KA, Cheyuo EKE, Abdul-Mumin A, Ayanore MA, Kubuga CK, Mogre V. Mothers' knowledge and attitudes regarding child feeding recommendations, complementary feeding practices and determinants of adequate diet. *BMC Nutr.* 2020;6(1):4–11.
26. Sector H, Plan T. *Hstp ii.* 2021;25(February).
27. Yvette Fautsch Macías R.D. MSFNC, Division with PGPDFN. Guidelines for assessing nutrition-related K nowledge, A ttitudes and P ractices manual Guidelines for assessing nutrition-related K nowledge, A ttitudes and P ractices manual.
28. WHO G. WHO_TRS_714.pdf.
29. Project EN. Nutrition Project. 2019;(136172).
30. Imdad A, Yakoob MY, Bhutta ZA. Impact of maternal education about complementary feeding and provision of complementary foods on child growth in developing countries. 2011;11(Suppl 3).
31. Romero-velarde E, Villalpando-carrión S, Pérez-lizaur AB, De M, Iracheta-gerez L, Alonso-rivera CG, et al. Consenso para las prácticas de alimentación complementaria en lactantes sanos. *Bol Med Hosp Infant Mex* [Internet]. 2016;73(5):338–56. Available from: <http://dx.doi.org/10.1016/j.bmhimx.2016.06.007>
32. Desalegn BB, Lambert C, Riedel Simon.Riedel@Uni-Hohenheim.De S, Negese T, Biesalski HK. Feeding practices and undernutrition in 6–23-month-old children of orthodox christian mothers in rural tigray, ethiopia: Longitudinal study. *Nutrients.* 2019;11(1):1–15.
33. Abay A, Yemane D, Bekele A, Meressa B. Determinants of minimum acceptable diet among 6–23 months age children in Ethiopia: A multilevel analysis of the Ethiopian demographic health survey.

bioRxiv. 2018;1–14.

34. Id DK, Nakaggwa F, Kasule K, Kiconco I, Nyakwezi S, Sevume S, et al. Level of minimum acceptable diet and its associated factors among children aged 12–23 months in Ugandan districts. 2023;2030:1–14. Available from: <http://dx.doi.org/10.1371/journal.pone.0293041>
35. Acharya A, Pradhan MR, Das AK. Determinants of minimum acceptable diet feeding among children aged 6–23 months in Odisha, India. *Public Health Nutr.* 2021;24(12):3834–44.
36. Shaun MMA, Nizum MWR, Munny S. Determinants of meeting the minimum acceptable diet among children aged 6 to 23 months in Bangladesh: Evidence from a national representative cross-sectional study. *Heliyon.* 2023;9(6):1–14.
37. Of J, Science N. *Journal of nutritional science.* 2023;1–8.
38. Mya KS, Kyaw AT, Tun T. Feeding practices and nutritional status of children age 6–23 months in Myanmar: A secondary analysis of the 2015-16 Demographic and Health Survey. *PLoS One.* 2019;14(1):1–13.
39. Khan AM, Kayina P, Agrawal P, Gupta A, Kannan AT. A study on infant and young child feeding practices among mothers attending an urban health center in East Delhi. *Indian J Public Health.* 2012;56(4):301–4.
40. Kambale RM, Ngaboyeka GA, Kasengi JB, Niyitegeka S, Cinkenye BR, Baruti A, et al. Minimum acceptable diet among children aged 6–23 months in South Kivu, Democratic Republic of Congo : a community-based cross-sectional study. 2021;1–9.
41. Molla A, Egata G, Getacher L, Kebede B, Sayih A, Arega M, et al. Minimum acceptable diet and associated factors among infants and young children aged 6–23 months in Amhara region, Central Ethiopia: Community-based cross-sectional study. *BMJ Open.* 2021;11(5):1–10.
42. Khatri D, Shrestha N. Factors Associated with Feeding Practices of Children in Kaski. *Online J Heal Allied Sci.* 2016;5(1):14–20.
43. De-Jongh González O, Tugault-Lafleur CN, O'Connor TM, Hughes SO, Mâsse LC. Are fathers' and mothers' food parenting practices differentially associated with children's eating behaviors? *Appetite.* 2021;166:1–8.
44. Remonja CR, Rakotonirainy NH, Rasoloarijaona R, Piola P, Raharintsoa C, Randremanana V. Dietary diversity of 6- to 59-month-old children in rural areas of Moramanga and Morondava districts, Madagascar. *PLoS One [Internet].* 2018;13(7):1–14. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6044523/pdf/pone.0200235.pdf>
45. Sheikh N, Akram R, Ali N, Haque SR, Tisha S, Mahumud RA, et al. Infant and young child feeding practice, dietary diversity, associated predictors, and child health outcomes in Bangladesh. *J Child Heal Care.* 2020;24(2):260–73.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Table1Sociodemographiccharacteristicsofcaregiver.docx](#)