HARAMAYA UNIVERSITY
POST GRADUATE PROGRAM DIRECTORATE

UNDER NUTRITION AND ASSOCIATED FACTORS AMONG 6-59 MONTHS OLD CHILDREN FROM MOTHER-TO-MOTHER SUPPORT GROUP PARTICIPANTS COMPARED TO NON- PARTICIPANT MOTHERS IN GUMBI BORDODE DISTRICT, OROMIA REGION, EASTERN ETHIOPIA

MPH THESIS

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Under nutrition and Associated Factors among 6–59-Month-Old Children from Mother-To- Mother Support Group Participants Compared To Non-Participant Mothers in Gumbi Bordode District, Oromia Region, Eastern Ethiopia

A Thesis Submitted to the School of Graduate Studies, College of Health & Medical Sciences, Haramaya University

In Partial Fulfillment of the Requirements for the Degree of MASTERS OF PUBLIC HEALTH IN HUMAN NUTRITION

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APPROVAL SHEET

HARAMAYA UNIVERSITY SCHOOL OF GRADUATESTUDIES

I hereby certify that I have read and evaluated this thesis entitled “Under nutrition and associated factors among 6-59 months old children from mother-to-mother support group participants compared to non- participant mothers in Gumbi Bordode district, Oromia region, eastern Ethiopia” , prepared under my guidance by Milion Amare. I recommend that it can be submitted as fulfilling the thesis requirement.

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ABBREVIATIONS AND ACRONYMS

CI	Confidence Interval
DDS	Dietary Diversification Score
EMDHS	Ethiopian mini-demographic health survey
EPHI	Ethiopian Public Health Institute
ESS	Ethiopian Socioeconomic Survey
IHRERC	Institutional Health Research Ethics Review Committee
IYCF	Infant and young child feeding
MAM	Moderate Acute Malnutrition
MtMSGs	Mother to mother support groups
NNP	National Nutritional Program
SAM	Severe Acute Malnutrition

ABSTRACT

Background: Malnutrition is a major global health problem and remains a critical concern in low-income countries. Community-based nutrition interventions, such as Mother-to-Mother Support Groups (MtMSGs), are recognized as effective strategies to improve child nutrition. However, evidence comparing under nutrition among children of MtMSGs participants versus non-participants remains limited, particularly in Ethiopia.

Objective: This study aimed to assess under nutrition and associated factors among 6-59 months old children from MtMSGs participants compared to non-participant in Gumbi Bordode district, Oromia region, eastern Ethiopia, from September1 to 15/2024.

Methods: A community-based comparative cross-sectional study was conducted among 396 randomly selected mothers/caregivers (198 MtMSGS participants and 198 non-participants). Data were collected through interviewer-administered questionnaires and anthropometric measurements. Data were entered into Epi-Data 4.6 and analyzed using SPSS 26. Nutritional status (Z-scores) was computed using WHO Anthro Analyzer. Binary logistic regression was applied to identify factors associated with undernutrition. Associations were declared statistically significant at $p < 0.05$.

Results: The overall prevalence of undernutrition among children aged 6–59 months was 50.0% (95% CI: 45.6–54.4). Undernutrition was lower among MtMSGs participant households 46.7% (95% CI: 40.46–52.98) compared to non-participants 53.3% (95% CI: 47.02–59.54). The prevalence of stunting, underweight, and wasting was 41.9%, 37.4%, and 20.7%, respectively. Children from non-participant mothers had higher odds of stunting (AOR = 2.82; 95% CI: 1.38–5.78) and wasting (AOR = 2.84; 95% CI: 1.52–5.30) compared to children of MtMSGs participants.

Conclusion: Undernutrition in the study area is alarmingly high, with stunting, underweight, and wasting levels meeting WHO classifications of very high and critical. Children of non-participant mothers were more vulnerable, highlighting the importance of expanding MtMSGS programs.

Keywords: Malnutrition, under-five children, mother to mother support groups, under nutrition, Ethiopia.

1. INTRODUCTION

1.1. Background

Under nutrition occurs when an individual's intake of calories and essential nutrients falls short of what is required to maintain health and development (Maleta, 2020). In children under five years of age, this nutritional deficit most commonly presents as stunting (low height-for-age), wasting (low weight-for-height), and underweight (low weight-for-age). Stunting reflects chronic or repeated nutritional shortages, wasting indicates recent and severe weight loss and underweight may result from one or both of these conditions (Maleta, 2020). The period spanning pregnancy through a child's first two years is critical for both physical growth and cognitive development. Nutritional inadequacies during this "first 1,000 days" can produce long-lasting impairments and even extend their effects into the next generation when undernourished mothers give birth to low–birth-weight infants (Prendergast, 2015). This intergenerational cycle is intensified among adolescent mothers whose own growth is incomplete and by short birth intervals or high parity, which further deplete maternal nutrient stores and perpetuate deficiencies in their children (Das & Roy, 2021). In Ethiopia, undernutrition remains a leading underlying cause of child mortality and ranks among the country's most severe public health challenges (Doherty et al., 2016). Mother-to-Mother Support Groups (MtMSGs) are community-based programs that empower mothers with knowledge and practical skills on infant and young child feeding (IYCF), child care, and nutrition. Facilitated by trained health workers or experienced peers, these groups provide guidance on exclusive breastfeeding, timely complementary feeding, hygiene, and illness prevention, while also offering social and emotional support. Evidence from Ethiopia shows that MtMSGs participation can improve maternal knowledge and feeding practices, which are key determinants of child growth and nutritional status. However, limited research exists on the direct effect of MtMSGs participation on the nutritional status of children aged 6–59 months, particularly in pastoralist communities like Gumbi Bordode district. Comparing children from participant and non-participant households can therefore help evaluate the effectiveness of MtMSGs and inform interventions to reduce under nutrition.

1.2. Statement of the problem

Malnutrition remains a major contributor to child mortality, accounting for approximately one-third of deaths among children under five years of age. Global evidence indicates that under nutrition contributes to 50–70% of the burden from diseases such as diarrhea, measles, malaria, and lower respiratory infections (Abate et al., 2023). Children suffering from severe acute malnutrition are up to nine times more likely to die than their well-nourished counterparts (Gemechu et al., 2021).

It is estimated that under-nutrition is responsible for 45% of global under-five mortality (Kassie and Workie, 2020). In Africa, 40% of children under five are stunted and 27% are wasted, while in Asia, the rates are even higher 54% for stunting and 69% for wasting (UNICEF, 2020b).

The Eastern Mediterranean region also faces a notable burden, with underweight, wasting, and stunting rates of 12.8%, 7.5%, and 24.2% respectively (Al-Shameri et al., 2022). In Ethiopia, the 2019 Mini Demographic and Health Survey reported that 37% of children under five were stunted, 21% were underweight, and 7% were wasted (EPHI, 2021). Despite national and international efforts to reduce child under-nutrition, significant gaps persist in various contexts, including Ethiopia (Chakona & Shackleton, 2017; Lachat et al., 2018; Bitew et al., 2021).

Focusing on children aged 6–59 months is critical for improving nutritional practices, particularly through approaches like mother-to-mother support groups that promote dietary diversity and the intake of macro- and micronutrient-rich foods (Sibhatu et al., 2015; Usman & Haile, 2022; Singh et al., 2020).

However, limited evidence exists regarding the nutritional outcomes of children whose mothers participate in such support groups, especially in pastoralist communities of Ethiopia.

1.3. Significance of study

This study is significant because it provides essential evidence on the burden and determinants of under nutrition among children aged 6–59 months in the pastoral communities of Gumbi Bordode District by comparing MtMSGs participants with non-participants. Under nutrition remains a major public health challenge in Ethiopia, particularly in hard-to-reach pastoral areas where data are limited. The findings of this study demonstrate important differences in child feeding practices, maternal knowledge, and nutritional outcomes between the two groups, showing that MtMSGS participation is associated with improved nutritional status and better adherence to recommended infant and young child feeding (IYCF) practices. By identifying key factors associated with stunting, wasting, and underweight, such as maternal education, ANC, household food security, and early initiation of breastfeeding .The study provides valuable insights for designing targeted nutrition interventions. The results contribute to evidence needed by policymakers, health planners, and program implementers to strengthen community-based nutrition programs, expand MtMSGs initiatives, and prioritize resource allocation based on local needs.

Furthermore, this research fills an important knowledge gap in the region and serves as a baseline for future studies aimed at improving child nutrition outcomes in similar pastoral settings.

1.4. Objectives of the Study

1.4.1. General objective:

To assess under nutrition and its associated factors among 6-59 months old children from mother-to- mother support group participants and non-participant mothers in Gumbi Bordode district, Oromia region, eastern Ethiopia from September1 to 15/2024.

1.4.2. Specific objectives

- ✓ To compare under nutrition among 6-59 months old children from mother-to-mother support group participants with non-participant mothers.
- ✓ To identify factors associated with under nutrition among 6-59 months old children from mother-to-mother support group participants and non-participants mothers.

2. LITERATURE REVIEW

Undernutrition significantly increases the severity and impact of many illnesses, such as measles and pneumonia. Globally, the majority of malnourished children over 70% reside in Asia, while Africa hosts 26%, and Latin America and the Caribbean account for approximately 4%. The issue often originates before birth, primarily due to poor maternal nutrition. In developing regions, maternal undernutrition contributes to about one in every six newborns being underweight at birth, which not only heightens the risk of neonatal mortality but also leads to long-term complications including developmental delays, impaired mental function, chronic health problems, visual impairments, and early death (Klaus von Grebmer, 2014). Furthermore, the 2015 Millennium Development Goals report indicates that Sub-Saharan Africa was responsible for one third of the world's undernourished children, with prevalence rates showing 39% stunting, 10% wasting, and 25% underweight among children under five (Akombi et al., 2017). Malnutrition among children under the age of five remains a significant public health issue in various regions. In Nepal's Gandaki province, close to 11 million children under five were reported to be malnourished, with stunting affecting 36%, wasting 10%, underweight 27%, and 1% classified as overweight (Paudel et al., 2021). Similarly, in Bangladesh, 36.1% of under-five children were found to be stunted, 32.6% underweight, and 14.3% wasted, according to national data (ICF, 2016). In Ethiopia, the 2016 Demographic and Health Survey revealed that 9.7% of under-five children were wasted, 28.7% were underweight, and 44.4% were stunted, though significant differences were noted across regions (Gebre et al., 2019). Specifically, the Afar Regional State recorded the highest prevalence rates nationally, with 19.5% of children wasted, 50.2% stunted, and 40.2% underweight (Gebre et al., 2019).

In the Oromia region, child undernutrition remains a critical concern. Approximately 26% of children were reported as underweight, including 7.8% who were classified as severely underweight. Furthermore, 9.7% of children were wasted, with 2.8% experiencing severe wasting. Stunting was observed in 41.4% of the children, and among them, 18% were severely stunted (Redi et al., 2017).

2.1.The magnitude of under-nutrition

2.1.1. The magnitude of stunting

Globally, undernutrition affects approximately 165 million children under the age of five, with an estimated 26% suffering from stunting (UNICEF). A cross-sectional study carried out in July 2019 in the Musi sub-district of Indonesia's East Nusa Tenggara province reported a significantly higher stunting prevalence when measured using the WHO growth standards compared to the Indonesian national reference (53.9% versus 10.7%) (Flynn et al., 2020). A joint report by WHO and UNICEF indicated that the global rate of stunting was 23.1% in 2015, while the prevalence in Africa during the same year stood at 30.9% (Takele et al., 2022). Data from 35 low- and middle-income countries showed an overall stunting rate of 38.5% among children under five (Li et al., 2020). In Ethiopia, the 2019 Mini Demographic and Health Survey (EMDHS) revealed that 37% of children under five were stunted, with 12% experiencing severe stunting (Mengesha et al., 2021). Regionally within Ethiopia, variations in stunting prevalence have been documented. For instance, a study in West Gojam reported a rate of 14.3% (Beruk Berhanu Desalegn, 2016), 31.1% was observed in the southeast Amhara region (Tariku et al., 2014), and 51.1% in Lalibela (Endris et al., 2017). In the Oromia region's West Guji Zone, a community-based cross-sectional study reported a stunting prevalence of 31.8% among children under the age of five (Afework et al., 2021).

2.1.2. The magnitude of underweight

A cross-sectional study carried out in July 2019 in the Musi sub-district of East Nusa Tenggara, Indonesia, revealed a higher prevalence of underweight among children when assessed using the WHO growth standards compared to the Indonesian national reference, with rates of 29.17% and 17.7% respectively, a difference that was statistically significant (Flynn et al., 2020). According to the 2016 Ethiopian Demographic and Health Survey (EDHS), 24% of children under five were underweight. The report also indicated that children from wealthier households and those with mothers who had attained higher education levels were less likely to be underweight (EDHS, 2016a). In Ethiopia, a study conducted in the Gida Ayana and Arsi Oromia areas found that the prevalence of underweight

among children aged 6–59 months was 19.2% in Gida Ayana and significantly higher at 49.2% in Arsi Oromia (Tibebu et al., 2020).

2.1.3. The magnitude of wasting

Child undernutrition continues to pose a serious global public health challenge. As of 2020, approximately one in every nine individuals worldwide experienced hunger or undernourishment, with an estimated 49.5 million children under the age of five suffering from wasting. The majority of these cases were reported in Asia and Africa, accounting for 69% and 27.2% respectively (Yeshaneh et al., 2022). In Ethiopia, the prevalence of wasting has shown little change over time, with a consistent rate of 10% reported in both the 2011 and 2016 Ethiopian Demographic and Health Surveys (EDHS, 2016b). However, the data indicate notable regional differences. The highest levels of wasting were observed in Somali (21%), followed by Afar (14%), Gambella (13%), with significantly lower rates in Addis Ababa (2%) and Harari (4%) (EPHI, 2021). Further research conducted in different parts of the country supports these findings, with reported prevalence rates including 13.4% in Bulehora district (Asfaw et al., 2015), 10% in Northwest Ethiopia (Girma et al., 2019), 11% in the Adi-Harush and Hitsats refugee camps in the Tigray Region (Brhane, 2018), 11.1% in Dilla town (Wete et al., 2019), and 28.2% in Hawassa Zuria district (W and B, 2016).

2.2. Factors associated with under-nutrition among under-five children

2.2.1. Factors associated with child stunting

Socio demographic and economic characteristics

Several studies have consistently shown a higher prevalence of stunting among male children compared to females. Analysis from Demographic and Health Surveys (DHS) across 31 Sub-Saharan African countries reported stunting prevalence of 27% among boys and 25% among girls (Adedokun & Yaya, 2021). Similarly, the 2019 Ethiopia Mini DHS (EMDHS) revealed a higher stunting rate among male children (40%) than females (33%) (EPHI, 2021). In the pastoral communities of Afar, Ethiopia, a community-based cross-sectional study indicated that 27.9% of male children were stunted, compared to 15.2% of females. Additionally, male children had nearly double the risk of stunting compared to females (Gebre, 2019; Gebre et al., 2019b). Age also appears to be a significant factor. Children aged 12–23 months were the most affected by stunting across 31 Sub-Saharan countries, with a prevalence of 32% (Adedokun & Yaya, 2021). The 2016 Ethiopia DHS showed that children aged 25–47 months and 48–59 months were 2.645 and 1.763 times more likely to be stunted, respectively, compared to those aged 0–24 months (Tekile et al., 2019). In Afar, stunting risk increased steadily with age. Children aged 12–23, 25–34, and 35–59 months were 3.4, 3.6, and 4.4 times more likely to be stunted than those aged 6–11 months (Gebre et al., 2019b). Nationally, stunting prevalence rose from 22% among children aged 6–8 months to 44% at 48–59 months, peaking at 45% among those aged 24–35 months (EPHI, 2021). Maternal education is another critical determinant. Across 31 Sub-Saharan countries, about 31% of children whose mothers had no education were stunted (Adedokun & Yaya, 2021). The 2016 Ethiopia DHS found that children of mothers with primary education had a 13% lower likelihood of stunting, while those whose mothers had secondary and higher education had 39.4% and 54.7% lower risk, respectively, compared to those with uneducated mothers (Tekile et al., 2019). The 2019 EMDHS reported stunting in 42% of children born to uneducated mothers, compared to only 17% among children whose mothers had education beyond the secondary level (EPHI, 2021). A study from Meta District, Eastern Ethiopia found that children of mothers with no formal education were over three times more likely to be stunted (AOR = 3.39; 95% CI: 1.12–5.11) (Tesfaye & Egata, 2022a). Economic status is also closely linked with

stunting. According to the 2016 DHS, children from households with medium and high wealth indices had 20% and 31% lower odds of stunting, respectively, compared to those from poor households (Tekile et al., 2019). The 2019 EMDHS similarly reported the highest stunting prevalence (37.3%) among children from the poorest households, with children from the richest households significantly less likely to be stunted (OR = 0.485) (EPHI, 2021). Birth interval plays a vital role in child nutrition. A previous birth interval of at least 36 months has been associated with a 10–50% reduction in stunting risk (Chungkham et al., 2020). Shorter intervals, especially those less than 24 months, are linked to increased risk (Talukder, 2017). Empowerment of mothers also influences child nutritional outcomes. In Meta District, children of mothers not involved in household decision-making were 3.5 times more likely to be stunted (Tesfaye & Egata, 2022a). Similarly, an analysis from Maharashtra indicated that children born to women without decision-making power were nearly five times more likely to be stunted (Aguayo et al., 2016). Globally, stunting remains a major public health concern, with around 149 million children under five affected in 2020, contributing significantly to childhood mortality and disease burden in low- and middle-income countries (UNICEF, 2021a; Rahman et al., 2021).

Maternal and child health caring practices

Maternal and child healthcare practices play a significant role in influencing childhood stunting. A community-based cross-sectional study from the Somali region in eastern Ethiopia revealed that children who experienced illness within two weeks prior to data collection were almost nine times more likely to be stunted than their healthy peers (Fekadu et al., 2015). Similarly, in the pastoral communities of Afar, children who were not fully immunized had over three times higher odds of being stunted compared to those who received full immunization (AOR = 3.34, 95% CI: 1.31–4.81) (Gebre, 2019). The Bangladesh Demographic and Health Survey (BDHS) of 2007 found that lack of antenatal care (ANC) was significantly associated with increased stunting, with children of mothers who had no ANC visits being 1.24 times more likely to be stunted compared to those whose mothers attended ANC (Talukder, 2017). In Meta district, eastern Ethiopia, children born to mothers who did not complete the recommended four ANC visits had a more than fourfold increased risk of stunting (AOR = 4.2; 95% CI: 2.5–6.8)

(Tesfaye & Egata, 2022a). The 2019 EMDHS also highlighted that children born at home showed a higher prevalence of stunting (53.1%) compared to those born in health facilities, with an increased risk of stunting among home-delivered children (OR = 1.187) (Tesfaw & Dessie, 2022). In Dabat, northwest Ethiopia, it was reported that the absence of postnatal vitamin A supplementation for mothers was linked to a 54% higher likelihood of child stunting (AOR = 1.54; 95% CI: 1.02–2.33) (Derso et al., 2017). Evidence from Bangladesh supports the effectiveness of integrated maternal counseling on essential health care and nutrition, which significantly improved mothers' knowledge and child feeding practices, contributing to stunting reduction (Mistry et al., 2019). Environmental factors also contribute to stunting. Data from DHS surveys in 31 Sub-Saharan African countries showed that 30% of children from households relying on non-improved water sources were stunted (Adedokun & Yaya, 2021). A study in the Saesie Tsaeda Emba district of Tigray, northern Ethiopia, indicated that children from food-insecure households using unprotected water sources had a significantly higher risk of wasting 2.95 times for those using protected wells and 3.54 times for those using unprotected sources compared to those using piped or hand-pumped water (Kahsay, 2015). Moreover, proper hygiene practices were shown to reduce the risk of stunting. In Meta district, children from households that practiced hand washing at critical times such as before food preparation and feeding, after using the latrine, and after disposing of child feces had a 54% lower likelihood of being stunted (AOR = 0.46; 95% CI: 0.28–0.76) compared to those from households that did not observe these practices (Tesfaye & Egata, 2022a).

Child feeding practices

Several studies conducted in different parts of Ethiopia have shown strong associations between child feeding practices and the prevalence of stunting. In the Somali Regional State, findings from a cross-sectional study indicated that children who were not exclusively breastfed during the first six months of life were nearly six times more likely to suffer from stunting compared to those who were exclusively breastfed (Eny Setyowat, 2022). Likewise, in Meta District of East Hararghe Zone, a comparative cross-sectional study reported that children who did not receive exclusive breastfeeding had approximately four times greater risk of being stunted (AOR = 3.6; 95% CI: 2.3–4.8) (Tesfaye & Egata, 2022a). In

a study carried out in pastoralist communities of Bale Zone in Southeast Ethiopia, children aged 6 to 59 months who were provided with complementary foods were found to be 70% less likely to be stunted than those who were not (AOR = 0.3; 95% CI: 0.13–0.59) (Tefera et al., 2021). Furthermore, in the same Meta District study, children with low dietary diversity were nearly five times more likely to experience stunting compared to those with adequately diversified diets (AOR = 4.7; 95% CI: 3.0–7.4) (Tesfaye & Egata, 2022a).

2.2.2. Factors associated with child underweight

Socio demographic and economic characteristics

Gender disparities in nutritional status have been documented across Sub-Saharan Africa. Analysis of Demographic and Health Survey (DHS) data from 31 countries in the region indicated that underweight prevalence was slightly higher among boys (21%) than girls (20%) (Adedokun & Yaya, 2021). Similarly, the 2016 Ethiopia DHS reported that female children had a lower likelihood of being underweight compared to their male counterparts, with an odds ratio of 0.856 (Tekile et al., 2019). Supporting this finding, a community-based study conducted in pastoral areas of the Afar Region in northeast Ethiopia found that male children were nearly twice as likely to be underweight as females (AOR = 1.83; 95% CI: 1.29–2.94) (Gebre, 2019). Age also plays a critical role in undernutrition. According to the same DHS data from 31 Sub-Saharan African countries, children aged 12–23 months had the highest rates of underweight, with 28% falling into this category (Adedokun & Yaya, 2021). Maternal education has been shown to influence child nutritional outcomes. Data from the 2016 Ethiopia DHS demonstrated that children whose mothers had completed primary, secondary, or higher education had a significantly lower risk of being underweight by 22.9%, 35.5%, and 44.9%, respectively compared to children of mothers with no formal education (Tekile et al., 2019). Consistent with this, another study in the Afar Region reported that children of illiterate mothers were over four times more likely to be underweight than those whose mothers were literate (AOR = 4.06; 95% CI: 2.01–8.19) (Gebre, 2019). Birth spacing has also emerged as a determinant of child undernutrition. In a community-based study from peri-urban Madhya Pradesh, India, the prevalence of underweight was highest among children born less than 24 months after their older sibling (57.21%) and lowest

among those with a birth interval greater than 48 months (29.62%) (Shahjada et al., 2014). Likewise, the 2014 Ethiopian Mini DHS indicated that children born within a two-year interval from their preceding sibling were 1.43 times more likely to be malnourished than those with a longer birth interval (AOR = 1.43; 95% CI: 1.02–2.04) (Endris et al., 2017).

Maternal and child health care practices

Several studies highlight the significant influence of maternal and child health care practices on child undernutrition. In the pastoral communities of the Afar Region in northeast Ethiopia, a community-based cross-sectional study found that children who had not received full immunization were approximately three times more likely to be underweight compared to those who were fully immunized (AOR = 3.17; 95% CI: 2.14–4.99) (Gebre, 2019). Supporting this finding, a study conducted in Wonsho District, Southern Ethiopia, reported that lack of immunization increased the odds of being underweight by more than twofold (AOR = 2.45; 95% CI: 1.41–4.24) (Gamecha et al., 2017). Similarly, in East Bada Wacho District of Southern Ethiopia, children who experienced diarrhea within two weeks before the survey had a significantly higher risk about 2.5 times of being underweight compared to those who had not suffered from diarrhea (Betebo, 2017). Maternal antenatal care (ANC) utilization also appears to play a vital role. A study in Haramaya District, Eastern Ethiopia, revealed that children born to mothers who did not attend ANC visits were substantially more likely to be underweight (AOR = 3.47; 95% CI: 1.49–7.8) (Yisak et al., 2015). This is consistent with findings from East Bada Wacho District, where children of mothers who did not receive ANC services had nearly three times higher risk of underweight status (Betebo, 2017). Environmental factors such as access to clean water are also linked with child nutritional status. Analysis of DHS data from 31 Sub-Saharan African countries showed that 24% of children living in households using unimproved water sources were underweight (Adedokun & Yaya, 2021). Similarly, a study conducted in Haramaya District found that children whose families relied on unprotected water sources were more likely to be underweight (COR = 2.5; 95% CI: 1.6–3.8) (Tesfaye & Egata, 2022a).

Child feeding practices

Child feeding practices have been shown to significantly influence nutritional outcomes in children. Analysis of the 2007 Bangladesh Demographic and Health Survey indicated that breastfeeding was linked to lower rates of wasting and underweight, with a statistically significant association observed for wasting in particular (Talukder, 2017). In Eastern Ethiopia, a community-based cross-sectional study conducted in Haramaya District found that delayed initiation of complementary feeding starting after six months was significantly associated with increased risk of underweight in children (COR = 0.3; 95% CI: 0.12–0.8) (Yisak et al., 2015). Likewise, research carried out in the pastoral communities of Afar Region in Northeast Ethiopia revealed that children who were given pre-lacteal feeds at birth were nearly three times more likely to be underweight than those who were not (AOR = 2.81; 95% CI: 1.64–3.72) (Gebre, 2019).

2.2.3. Factors associated with child wasting

Socio demographic and economic characteristics

Findings from the Demographic and Health Surveys (DHS) across 31 Sub-Saharan African countries indicate that wasting is more common among male children (7%) than females (6%) (Adedoku & Yaya, 2021). Similarly, analysis of the 2011 Ethiopian DHS data showed that girls were significantly less likely to suffer from acute malnutrition compared to boys (van Cooten et al., 2019). This trend is reinforced by data from the 2016 EDHS, which reported that female children had a 22% lower likelihood of being wasted than male children (AOR = 0.778, 95% CI: 0.681–0.889) (Tekile et al., 2019). In the Haramaya district of eastern Ethiopia, a community-based study found that boys had more than twice the odds of being wasted than girls (AOR = 2.37, 95% CI: 1.19–4.7) (Yisak et al., 2015). Nutritional vulnerability is also closely linked to age. According to the DHS in SSA, children aged 12–23 months are the most affected, with 11% experiencing wasting (Adedokun & Yaya, 2021). In rural Ethiopia, children under 12 months had higher odds of acute malnutrition compared to older children (van Cooten et al., 2018). In northwest Ethiopia, a study from the South Gondar zone found that children aged

24–59 months were significantly less likely to be wasted than those aged 12–23 months (AOR = 0.51, 95% CI: 0.33–0.77) (Engidaw & Gebremariam, 2020). Household size also influences child nutritional outcomes. The 2016 EDHS found that children from households with 6–10 members had higher odds of being wasted compared to those from smaller households (AOR = 1.223, 95% CI: 1.066–1.403) (Tekile et al., 2019). Similarly, research from South Gondar indicated that children in smaller families were 87% less likely to be wasted (AOR = 0.13, 95% CI: 0.09–0.21) (Engidaw & Gebremariam, 2020). In Afar Region, children in households with five or more members had nearly three times higher odds of being wasted (AOR = 2.72, 95% CI: 1.62–4.55) (Gebre, 2019). Moreover, in Haramaya district, households with over 12 members had markedly higher odds of child wasting (COR = 14.8, 95% CI: 3.1–69) (Yisak et al., 2015). Birth spacing has also been shown to influence wasting. A study in periurban Madhya Pradesh, India, highlighted that children with birth intervals under 24 months had the highest wasting rates (42.78%), compared to those with intervals over 48 months (22.22%) (Shahjada et al., 2014). Findings from Bangladesh DHS 2007 revealed that firstborn children and those with birth intervals under two years were more likely to be wasted compared to children with longer birth intervals (Talukder, 2017). Similarly, the 2014 Ethiopian Mini DHS reported that children born less than two years after a previous sibling had a 1.43 times higher risk of malnutrition (AOR = 1.43, 95% CI: 1.02–2.04) (Endris et al., 2017). Globally, nearly half of children under five reside in lower-middle-income countries, yet these countries account for over 70% of all wasted children (UNICEF, 2021a). Wealth status also plays a role in child nutrition. Data from the 2011 EDHS linked higher household wealth to better child nutrition (van Cooten et al., 2018), while the 2016 EDHS noted that children from wealthier households had lower odds of being wasted (Tekile et al., 2019).

The 2019 EMDHS reinforced this, showing that underweight and wasting were most prevalent among children from the poorest households, with children from the richest households having significantly lower odds of both outcomes (AOR for wasting = 0.383) (Tesfaw & Dessie, 2022). Parental education also affects child nutrition. The DHS in SSA reported a wasting prevalence of 9% among children whose mothers lacked formal education (Adedokun & Yaya, 2021). In South Gondar, children with fathers who had education beyond primary school were 75% less likely to be wasted (AOR = 0.25, 95% CI: 0.09–0.66) (Engidaw & Gebremariam, 2020).

Furthermore, a study in North Wollo indicated that maternal decision-making power over household finances was associated with increased odds of child wasting (AOR = 3.04, 95% CI: 1.08–7.83) (Chekol et al., 2022).

Data from the 2014 Ethiopian Mini Demographic and Health Survey (EMDHS) revealed that children born with a preceding birth interval of less than two years had a 1.43 times greater risk of being malnourished compared to those with a birth interval exceeding 24 months (AOR = 1.43, 95% CI: 1.02–2.04) (Endris et al., 2017).

Maternal and child health care practices

Analysis of the 2011 Ethiopian Demographic and Health Survey (EDHS) data indicated that children aged 6–59 months living in rural areas who experienced diarrhea in the two weeks prior to the survey were twice as likely to suffer from acute malnutrition or wasting (Van Cooten et al., 2018). Similarly, a community-based study in East Badawacho district, South Ethiopia, found that children who had diarrhea within the two weeks preceding the survey faced a 2.28-fold increased risk of being wasted compared to their counterparts without recent diarrheal illness (Betebo, 2017). In line with this, research conducted in pastoral communities of the Afar region showed that children with recent diarrhea were 4.6 times more likely to be wasted than those without such a history (AOR = 4.57, 95% CI: 2.56–8.16) (Gebre, 2019). Regarding maternal health services, findings from East Badawacho indicated that children whose mothers had not attended antenatal care (ANC) visits were nearly twice as likely to be wasted compared to those whose mothers received ANC (AOR = 1.95) (Betebo, 2017). Likewise, a study from Haramaya district reported that children of mothers with no ANC

follow-up during pregnancy were four times more likely to be wasted than those whose mothers did attend ANC (AOR = 3.93, 95% CI: 1.35–9.6) (Yisak et al., 2015). Additionally, data from the DHS of 31 Sub-Saharan African countries highlighted that 7% of children from households using unimproved water sources suffered from wasting (Adedokun & Yaya, 2021). Furthermore, analysis of the 2011 EDHS data showed that access to improved sanitation facilities was associated with a 37% reduction in the likelihood of wasting among children compared to those without such facilities (Van Cooten et al., 2018).

Child feeding practices

A cross-sectional study conducted in the rural areas of South Gondar Zone, Northwest Ethiopia, found that children with poor dietary diversity were nearly three times more likely to suffer from wasting compared to those with adequate dietary variety (AOR = 2.99, 95% CI: 1.67–5.35) (Engidaw & Gebremariam, 2020). Similarly, a case-control study from the Meket district in North Wollo Zone, Northeast Ethiopia, indicated that children who did not consume at least four food groups per day had 2.64 times higher odds of being wasted than those who did (AOR = 2.64, 95% CI: 1.64–5.23). The same study also revealed that children who did not receive both breastfeeding and complementary feeding at the appropriate time were at significantly increased risk of wasting specifically, they were 3.52 times more likely to be wasted than those who began complementary feeding at six months of age (AOR = 3.52, 95% CI: 1.097–6.97). Furthermore, children fed only two times or less per day had 6.68 times greater odds of wasting compared to those fed more frequently (AOR = 6.68, 95% CI: 3.6–11.25) (Chekol et al., 2022). In addition, a study conducted in pastoral communities of the Afar region in Northeast Ethiopia showed that children who were given pre-lacteal feeds immediately after birth had a significantly higher likelihood of wasting 3.8 times more than those who were not given such feeds (AOR = 3.81, 95% CI: 1.79–5.42) (Gebre et al., 2019a). Supporting this, findings from a study in the Haramaya district, Eastern Ethiopia, also linked pre-lacteal feeding to increased risk of wasting (COR = 2.2, 95% CI: 1.2–4.1) (Yisak et al., 2015).

2.3. **Conceptual framework**

The conceptual framework for this study has been modified from UNICEF's child under nutrition framework, considering available local evidence from UNICEF 1991 (updated in 2021) and resources.

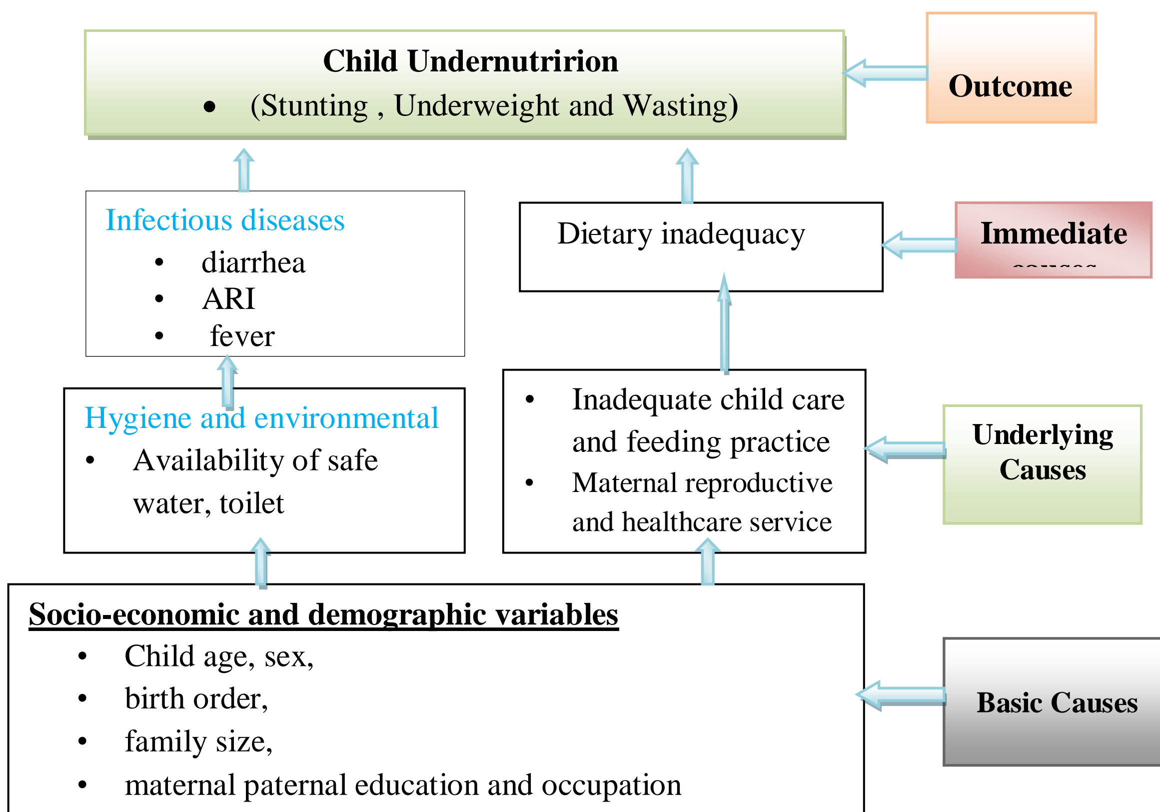

Figure 1 : The conceptual framework of under nutrition and associated factors among children 6- 59 months old from mother-to-mother support groups participants and non-participants households in Gumbi Bordode district, Oromia region, eastern Ethiopia.

3. METHODS AND MATERIALS

3.1 . Study area and period

The study was conducted in Gumbi Bordode district, west Hararghe eastern Ethiopia, from September 1 to 15, 2024. Gumbi Bordode district was one of 17 districts in the west Hararghe zone. The district was established on July 08, 2016, as the 17th district of West Hararge zone. Bordode was the capital of the district, which is 255 km away from Addis Ababa, the capital city of Ethiopia and 75km from Chiro town, the zonal capital. The district was bordered: -by north Afar regional state (Amibara district), the east Mi'eso and Chiro rural district, the south Guba Koricha and Ancar district and the west-east Shewa zone (Fentalle district) (Gumbi Bordode district Report, 2021).

The district was located at 9.052'15"-9.028'43" N and 40.03'33"-40.34'13" E latitude and longitude, respectively. It had 29 rural kebeles (the smallest administrative unit in Ethiopia). The district has a total land area of about 104,472.6 km2. The rural kebeles of the district were divided into two agro ecological zones midlands 3(10%) and low-lands Kebeles 26(90%). The livelihood of the rural population is pastoralist, agrarian or a combination of both. In the district, there were 3 health centers, 28 rural health posts, and 6 different private health facilities rendering health services (Gumbi Bordode District Report, 2021). According to the 2007 population and housing census conducted by the Central Statistical Agency of Ethiopia, the projected population of the Gumbi Bordode district for 2021-2022 was estimated at 100,334; of this, 4,292 were urban and 96,042 were rural residents. Of the total population, 49,156 were women and 51,178 were men with under-five children accounted for 16.43% (16,485) , with 8,409 males and 8076 females (Ethiopia Office of Population and Housing Census of Commission, 2008). The MtMSGs were implemented in 14 rural kebeles of Gumbi Bordode district.

3.2. Study design

A community-based comparative cross-sectional study design was used.

3.3. Source population

The source population was all children 6-59 months of age and their mothers or/caretaker-child dyads from MtMSGs participants and non-participants mothers in the Gumbi Bordode district who lived in the study area.

3.4 . Study population

The study population was all children aged 6–59 months and their mothers/caregivers from the selected kebeles of Gumbi Bordode district who were available during the data collection period.

The population is categorized into two groups based on maternal participation in Mother-to-Mother Support Groups (MtMSGs):

MtMSGs Participants: Mothers who have actively attended and participated in MtMSGs meetings and activities one or more for the last 6 months, and their children aged 6–59 months. These mothers have received guidance on exclusive breastfeeding, complementary feeding, hygiene, and child care practices.

Non-Participants: Mothers who have never attended or participated in any MtMSGs meetings or activities, and their children aged 6–59 months. These mothers have not received structured peer or health worker support through MtMSGs.

3.5. Inclusion and exclusion criteria

3.5.1. Inclusion criteria for both MtMSGs participants and non- participants

Children aged 6 -59 months and their /parent/caretaker-child dyads who lived in the kebeles of the district were included in the study. Participants were selected from both MtMSGS participants and non-participants. In cases where a household had more than one eligible child, one child was randomly selected using a lottery method.

3.5.2. Exclusion criteria for both MtMSGs participants and non-participants

Mothers (guardians of the child's) who were sick and unable to sustain an interview, as well as children with physical deformities of the limbs and spines that hindered height measurements at the time of data collection were excluded from the study.

3.6. Sample Size determination and sampling procedure

3.6.1. Sample size determination

As the study used a comparative cross-sectional study design, the required sample size was estimated using Epi Info version 7 (freely available statistical software from the Center for Disease Control and Prevention (CDC) in Atlanta, Georgia, USA). The software estimates sample sizes for both exposed and unexposed groups based on the Fliess formula for double population proportion with continuity correction (Fleiss, 1981).

$$n = \frac{[Z_{\frac{\alpha}{2}}\sqrt{(\gamma + 1)\rho(1-\rho)} + Z\beta\sqrt{(r\rho_0(1-\rho_0) + \rho_1(1-\rho_1)}\,]^2}{(\rho 0 - 1)2}$$

Where;ρ

- $Z_{\frac{\alpha}{2}}$ at two-sided significance level of 95%= 1.96
- $Z\beta$ at power of 80% = 0.842
- Ratio of sample size, unexposed to exposed (γ) = 1
- Proportion of under nutrition among children from non-support groups (ρ_0) is 42.9% and those From mother support groups (ρ_1) is 25% from previous study done in Kenya (Undlien et al., 2016).
- $n = \frac{\rho_0+\gamma\rho_1}{\gamma+1}$
- The software produced a total sample size of 240 (120 for the exposed and 120 for the unexposed groups). Then, we multiplied the total sample size by a design effect of 1.5 which resulted in 360. Adding 10% for non-response, the final calculation provided a sample size of 396.

3.6.2. Sampling procedure and techniques

A simple random sampling method was used to select study participants. Data obtained from Health Posts showed 14 MtMSGs participants households and14MtMSGs non-participants households. Five (5) kebeles from each group were randomly selected using the lottery methods, making a total of ten (10) kebeles. A list of under five children from both participant and non-participant households was obtained from the district health posts.

The total sample size of (396) was divided equally, with; 198 from MtMSGs participant households and 198 form non-participant households. The sample was then proportionally allocated to each of the ten kebeles based on the number of under five children in each kebele.

According to this, the number of under five children from MtMSGs participants households was 1,753 with a proportionately allocated sample size 198: (Fugnan Ajo kebele 200 total under- five children and proportionately allocated sample size 23, Dire Kalu Kebele 391 total under-five children and proportionately allocated sample size 44, Goda Cale kebele 392 total under five both exposed and unexposed groups based on the Fliess formula for double population proportion with continuity correction (Fleiss, 1981). children and proportionately allocated sample size 44, Kurkuraya kebele 593total under-five children and proportionately allocated sample size 67, Obensa kebele 177 total under-five children and proportionately allocated sample size 20). Similarly ,the number of under-five children from non-participants households was 2266 , with a proportionately allocated sample size of 198 : (Adele kebele had 462 total under-five children and a proportionately allocated sample size of 40 , Hargiti kebele had 621 total under-five children and a proportionately allocated sample size of 54, Buri Arba kebele had 158 total under-five children and a proportionately allocated sample size of 14, Dhadecha Guracha kebele had 520 total under-five children and a proportionately

allocated sample size 46, Balo Kebele had 505 total under-five children and a proportionately allocated sample size 44).

After the sample size was allocated to each kebeles of both MtMSGs participant and non-participant households, the required sample size of under-five children was selected using a systematic sampling technique based on the sampling frames and sampling intervals of each kebeles. In cases where a household had more than one eligible child, a lottery method was used to randomly select one. If a selected household was closed or the eligible child was absent, two attempts were made to find the respondents.

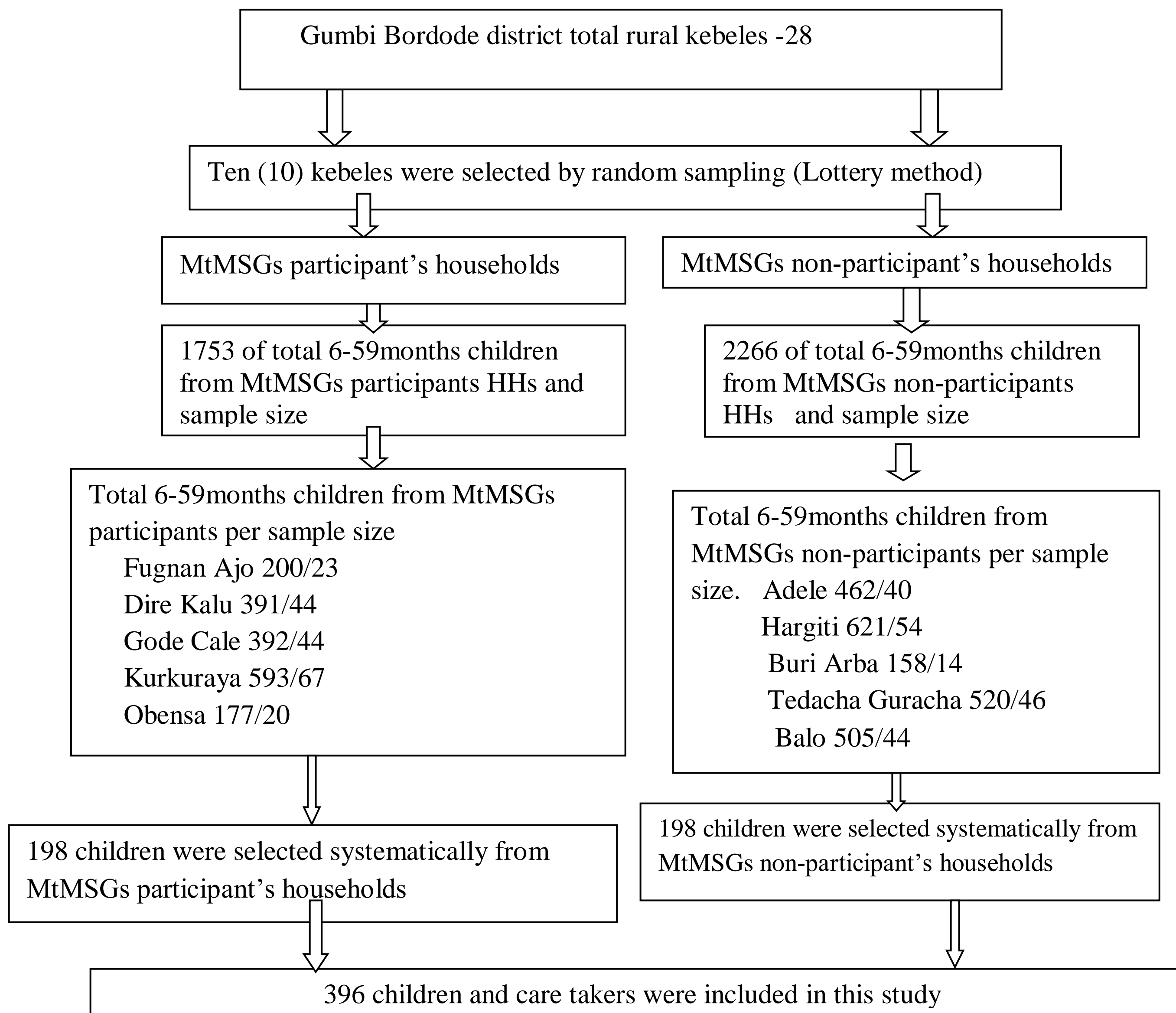

Figure 2: Schematic presentation of sampling procedure for undernutrition and associated factors among children 6-59 months old children from MtMSGs participants and MtMSGs non- participants households in Gumbi Bordode district, Oromia region, eastern Ethiopia**.**

3.7. Data collection methods

3.7.1. Data collection tools and procedure

The primary data collection instrument was consisted of anthropometric measurements and a structured-interviewer-administered questionnaire. The questionnaire included information on the socio-demographic and economic characteristics of mothers or caretakers and their child, as well as child feeding practices. Initially, the questionnaire was prepared in English by reviewing relevant literature related to the study objectives. It was then translated into the local language, "Afaan Oromo" for better understanding and later translated back into English to ensure consistency.

3.7.2. Data Collector Training and Pre-testing

Data were collected through house-to-house visits from randomly selected study participants by ten (10) trained data collectors , including BSc nurses, midwifes and health officers who had received basic CMAM and AMIYCIN or IYCF training at their work place. All data collectors had previous experience and were fluent in the local language. Five supervisors (BSc nurse or health officer who has taken basic CMAM, IMAM, AMIYCN or /IYCF training) who are experienced public health experts from which each supervisor were assigned to oversee data collection , with each supervisor responsible for two kebeles. Before the actual data collection, the questionnaire was pretested on a similar population that was not included in the main study. Based on the pretest findings, necessary amendments were made to improve clarity and reliability.

3.7.3. Anthropometric measurement

Length and / height were measured following the standard procedures to the nearest 0.1 cm using a wooden measuring board produced under the guidance of the United Nations Children's Fund (UNICEF, 2019a). Recumbent length was measured for children younger than 24 months, while height was measured for those children 24 months and older in a standing position, for all who could stand well by maintaining five contact points (SHEILAH, 2021). However, some adjustments was

made for children whose mothers were not able to gauge the exact age of their children to decide between recumbent and standing measurements. In some cases, the local calendar was used to estimate the age of the child when possible, or the estimation of age was made from the length of the child in centimeters as per WHO recommendation.

The child was considered to be younger than 24 months if his or her length is less than 87 cm, and 24 months and above if his or her length was greater or equal to 87 cm using a tape measure (UNICEF, 2019a).

Weight was measured with minimum clothing and taking off shoes, using a calibrated portable scale (UNICEF electronic scale) to the nearest 0.1 kilogram (kg).

Children aged less than two years (who could not stand by themselves) was measured by taking the mother's and children's weight together, then the weight of the mothers alone was measured, and then the difference between the two measurements were taken.

Children aged two and older (who can stand by themselves) was measured on their own. Two separate measurements were taken both for the length or /height and weight, and the average of the two measurements was used for analysis.

3.7.4 . Child's dietary diversity score assessment

The determination of the dietary diversity score of a child was started by asking the mother to list all foods consumed by the child in the previous 24 hours, whether at home or outside the home preceding the survey. Start with the first food or drink of the morning. Write down all foods and drinks mentioned by the mother of the child. In the case of the mixed dish, mothers were asked to list the ingredients of the food items. After the respondent recalls all the foods and drink consumed by their child, underline the corresponding foods in the list under the appropriate food group and write 1 in the column next to the food group if at least one food in this group has been underlining and if not write 0.

Dietary diversity among the study population was measured following WHO's infant and young child feeding (IYCF) recommendation, which states that a percentage of children 6-23 months of age who consumed foods and beverages from at least five out of eight defined food groups according to the former definition during the previous day and night will be used (WHO, 2021). The eight defined food groups were: breast milk; grains, roots and tubers; legumes, nuts and seeds (beans, peas, lentils, nuts and seeds); dairy products (milk, infant formula, yogurt, cheese); flesh foods (meat, fish, poultry, organ meats); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables. Considering five food groups as the minimum acceptable dietary diversity, a child with a dietary diversity score of less than five were classified as having poor nutritional diversity; otherwise, they will have good dietary diversity (WHO, 2021).

1.1.1. Timely initiation of breast feeding

Determination of the timely initiation of breast feeding of a child were put to the breast by asking the mother to how long after birth was your child first put to the breast. If not immediately, circle "000" If less than one hour, record "00" hours. If less than 24 hours pass, record hours otherwise, and record days. The WHO Global Strategy for Infant and Young Child Feeding recommends that infants be breastfed within one hour of birth (WHO, 2003). Percentage of children born in the last 24 months who were put to the breast within one hour of birth. Early initiation of breastfeeding does not require that the infant suckle at the breast or that milk be transferred from the breast to the infant. It represents the practice of putting the baby on the breast within the first hour of delivery.

1.1.2. Exclusive breastfeeding

Exclusive breastfeeding was defined as breastfeeding with no other food or drink, not even water. Breastfeeding by a wet nurse, feeding of expressed breast milk, and feeding of donor human milk all count as being fed breast milk. Prescribed medicines, oral rehydration solutions, vitamins and minerals were not counted as fluids or foods. However, herbal fluids and similar traditional medicines were counted

as fluids, and infants who consume these are not exclusively breastfed. WHO Global Strategy for Infant and Young Child Feeding recommends that infants be exclusively breastfed from birth until they turn six months of age (WHO, 2003). Exclusive breastfeeding in the first two days after birth means the infant receives only breast milk either directly from breast or expressed within the first 48 hours of life, and no other foods or liquids, not even water except oral rehydration solution, drops or syrups of vitamins ,minerals or medicine (WHO,2021).

Determination of exclusive breast feeding by asking the mothers in the first two days after delivery was your child given anything other than breast milk to eat or drink anything at all like water, infant formula, or [insert common drinks and foods, including ritual feeds that may be given to newborn infants].

1.1.3. Time of complementary feeding initiation

The WHO Global Strategy for Infant and Young Child Feeding recommends that solid, semi-solid, and soft foods be introduced at six months of age (WHO, 2003). Guiding principles for complementary feeding of the breastfed child similarly state: “introduce complementary foods at six months of age (180 days) while continuing to breastfeed” (UNICEF, 2020a). After the first six months of life, infants’ nutrient demands start to exceed what breast milk alone could provide and this leaves them vulnerable to malnutrition unless solids were introduced (UNICEF, 2021b).

1.1.4. Meal frequency

WHO guiding principles for feeding the breastfed child recommend that breastfed infants aged 6– 8 months be provided complementary foods 2–3 times per day and breastfed children aged 9–23 months be provided complementary foods 3–4 times per day with additional nutritious snacks offered 1–2 times per day (UNICEF, 2020a). Guiding principles on feeding the non-breastfed child increase that recommendation to 4–5 meals per day for non-breastfed children (WHO, 2005).

Children 6–23 months of age who consumed solid, semi-solid or soft foods at least the minimum number of times during the previous day. The minimum number of times is defined as: two feedings of solid, semi-solid or soft foods for breastfed infants aged 6–8 months; three feedings of solid, semi-solid or soft foods for breastfed children aged 9–23 months; and four feedings of solid, semi-solid or soft foods or milk feeds for non-breastfed children aged 6–23 months whereby at least one of the four feeds must be a solid, semi-solid or soft feed.

3.8 . Study variables

3.8.1. Dependent variables

Under nutrition (Stunting or/and underweight or/and wasting status in children 6-59 months).

3.8.2. Independent variables:

Categories of factors were assessed as independent variables;

Socio-economic and demographic variables; Age of child and mothers, child sex and birth order, family size, income, maternal/paternal education and occupation, marital status of the mother, decision making.

Maternal and child health care service characteristics: child illness, healthcare seeking, vaccination, growth monitoring and promotion, vitamin A supplementation, deworming, ANC visits and nutrition counseling.

Environmental health conditions: water supply, sanitation, and housing conditions.

Maternal and child feeding practices: time of breastfeeding initiation, exclusive breastfeeding, duration of breastfeeding, time of complementary feeding initiation, child dietary diversity and meal frequency, maternal consumption of additional meal during lactation.

3.9 . Operational and term definition

Under-nutrition: -was defined as a deficit (Z-score below -2SD) from the WHO reference of the median of the standard curve in any one of WAZ, HAZ, and WHZ reflects under-nutrition (WHO, 2006).

Underweight: - was defined as weight-for-age (WAZ) is found to be (Z-score below -2SD), moderate underweight (Z-score between -2SD to -3SD) and severe underweight (Z-score below -3SD) (WHO, 2006).

Stunting: - was defined as the height/length for age (HAZ) index was found to be (Z-score below -2SD), moderate stunting (Z-score between -2SD to -3SD) and severe stunting (Z-score below -3SD) (WHO, 2006).

Wasting: - was defined as weight-for-height/length (WHZ) was found to be (Z-score below -2SD), moderate wasting (Z-score between -2SD to -3SD) and severe wasting (Z-score below -3SD) (WHO, (WHO, 2006).

Minimum acceptable child dietary diversity score: - was measured as the proportion of children aged 6-23 months who received ≥ 5 food groups of the eight food groups (WHO 2017).

Mother to mother support groups participants: - were defined as mothers who had attended one or more sessions within the last six months (PATH, 2011).

3.10 . Data Quality Control

Training was provided to data collectors and supervisors for two days on the objectives of the study, interview technique, and anthropometric measurements by the principal investigator. The standardization procedure was followed to ensure reliability and validity of anthropometric measurements by computing relative technical error of measurement (TEM) was computed using the Emergency Nutrition Assessment Standardized Monitoring and Assessment of Relief and Transitions (ENA SMART) software. To compare measurements was

conducted by each data collector with selected criterion anthropometrist before deploying the data collectors to the field to minimize both random and systematic errors attributed to inaccurate anthropometric measurement. Accordingly, the relative TEM for inter-observer (validity) and intra-observer (reliability) for weight and length/height measurement was 1.5% and 2.0%, respectively (UNICEF, 2019).

To see for the accuracy of responses and to estimate time needed prior to the actual data collection; the questionnaires were pre-tested in Gumbi Bordode woreda but in kebele's not included in the main study, on similar population using 5% of the sample size. The principal Investigator and a local expert fluent "Oromic" conducted the in-depth interview.

3.11 . Data processing and analysis

Data were manually checked for completeness, edited, double entered onto Epi-data version 4.6, cleaned, and exported to Statistical Package for the Social Sciences (SPSS) version 26 computer software for further analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviation were used to describe the characteristics of study participants. Moreover, anthropometric indices were generated using WHO Anthro software version 3.2.2 and coded based on WHO cut-off points to serve as outcome variable. Bivariable and multivariable logistic regression analysis were used to identify the factors associated with child under- nutrition. Both crude and adjusted odds ratios together with their corresponding 95% confidence intervals were computed to show the presence, strength and direction of association between the outcome and independent variables.

All independent variables that was associated with the outcome variables (wasting, stunting, and underweight) in bivariable analysis (with p value<0.25) were included in the final multivariable logistic analysis. Before running the multivariable analysis, multicollinearity was assessed among the candidate independent variables using variance inflation factor (VIF); variables with VIF>2.5 were dropped from the model. Additionally, influential cases was checked by Cook's distance and outliers by studentized residuals; cases with Cook's distance > 1 and studentized residuals <-3 or >3 will be excluded from the model. After performing the final multivariable logistic regression, model goodness-of-fit was checked with the Hosmer-Leme show test; result of this test with p>0.05 was considered for well fitted model. A p value of<0.05 was considered to declare the result as statistically significant. The results were presented in text, tables, and graphs based on the types of data.

3.12. Ethical considerations

Ethical clearance was obtained from Haramaya University, College of Health and Medical Sciences Institutional Health Research Ethics Review Committee (IHRERC). Permission letter obtained from the school of graduate studies was submitted to Gumbi Bordode district health and agriculture office and Kebeles administration to get permission for the study from each hierarchy. In each study the participant were informed about the purpose and method and anticipate the benefit of the study by their data collectors; informed voluntary written and signed consent was obtained from the study participants. They had the right to refuse or withdraw from participating in the research without any explanation. They had the right to ask any questions during the data collection period. Additionally, the names of the study the participant were not included in the questionnaire, which addressed the study participant's concern. Only authorized persons got access to the raw data collected from them if the need arises.

4. RESULT

4.1. Socio-demographic characteristic of the study participant

The response rate of this study was 100%. Among the 198 MtMSGs respondents, 185 (93.4%) were participated from agro-pastoralist, 3(1.5%) were pastoralist, 9(4.6) were merchants and 1(0.5) belonged to others occupations. Similarly, Among the 198 non-MtMSGs respondents, 187 (94.4%) were agro-pastoralist, 7(3.5%) were pastoralist and 4(2.0%) were from merchant. The mean age (±SD) of mothers/caretakers in the MtMSGs and non-MtMSGs was (28.93±5.485), and (28.67±5.423) years, respectively. Among participants 72(36.4%) belong to households with seven and more, whereas in the non-participants groups, this proportion is higher at 108(54.5%). Among the MtMSGs participants 126(63.6%) mothers had no formal education (could not read and write), whereas the proportion was much higher among non-participants reaching 192(97.0%). Similarly, the education status of the fathers followed a comparable trend. Among participants 115(58.1%) fathers had no formal education, whereas this figure was markedly higher among non-participants at 188(94.9%). Nearly all mothers in both groups were married. Among participants, all 198(100%) were married, while among non-participants 197(99.5%) were married. Regarding ethnicity, the majority of the respondents were Oromo, with 192(97%) in the MtMSGs and 194 (98%) in the non-MtMSGs. In terms of religion, almost all participants were Muslim followers (see table 1).

Table 1: Socio-economic and demographic characteristics of the respondents from MtMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, west Hararghe zone, Oromia, Eastern Ethiopia, (n1= 198, n2 = 198), 2025.

Variables	Category	MtMSGs Status	
		Participants(n=198)	Non-participants(n=198)
		Frequency n (%)	Frequency n (%)
Sex of the child	Male	107(54.0)	105(53.0)
	Female	91(46)	93(47.0)
Age of children	6-11 months	26(13.1)	62(31.3)
	12-23 months	73(36.9)	54(27.3)
	24-35 months	65(32.8)	33(16.7)
	36-47 months	24(12.)	25(12.6)
	48-59 months	10(5.1)	24(12.1)
Ethnicity of mothers/caretaker	Oromo	192(97.0)	194(94)
	Argoba	6(3.0)	3(1.5)
Religion of mothers/caretaker	Muslim	196(99.0)	198(100)
	Orthodox	2(1.0)	0(0)
Family size	1-3Members	17(8.6)	29(14.6)
	4-6Members	109(55.1)	61(30.8)
	>_7Members	72(36.4)	108(54.5)
Maternal education	Level 4 and above	1(0.5)	0(0)
	Read and write	71(35.9)	6(3.0)
	Not read and write	126(63.6)	192(97.0)
Educational status of father	Level 4 and above	0(0)	1(0.5)
	Read and write	83(41.9)	9(4.5)
	Not read and write	115(58.1)	188(94.9)
Marital status of the mother	Married	198(100)	197(99.5)
	Divorced	0(0)	1(.5)

4.2. Child caring practices

The timing of introducing complementary foods differed significantly between participants and non-participants of mother-to-mother support groups (MtMSGs) ($p<0.001$). The majority of participants 193(97.5%) introduced complementary foods at 6months, compared to170 (85.9%) of non-participants. There was no statistically significant difference in childhood illness prevalence between the two groups ($p=0.400$). The majority of the children in both groups were reported illness free, with 184(92.9%) participants and 188(94.9%) non-participants being healthy. Vaccination coverage was significantly higher among children of MtMSGs participants compared to non-participants ($p<0.001$).The proportion of fully vaccinated children was 157(79.3%) among participants, compared to only 102(51.5%) in non-participants. A significant higher proportion of children in the participant group received vitamin A supplementation compared to non-participants ($p<0.001$). Almost all participants' children 197(99.5%) received vitamin A, whereas only 149 (75.3%) of non-participants children did. Child bottle feeding was significantly lower among participants than non-participants ($p<0.001$). Only 17(8.6 %) of participant children were bottle-fed, compared to 106(53.5%) of non-participant children (see table 2).

Table 2: Child caring practices of the respondents from MtMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, west Hararghe zone, Oromia, Eastern Ethiopia, (n1= 198, n2 = 198), 2025.

Variables	Category	MtMSGs status		P-value
		participants(n=198)	Non-participants (n=198)	
		Frequency n (%)	Frequency n (%)	
Age of introducing complementary food to child	< 6 months	0(0)	20(10.1)	0.001
	At 6 months	193(97.5)	170(85.9)	
	≥ 7 months	5(2.5)	8(4.0)	
Childhood illness	Yes	14(7.1)	10(5.1)	0.400
	No	184(92.9)	188(94.9)	
Vaccination status of children	Fully Vaccinated	157(79.3)	102(51.5)	0.001
	Partially Vaccinated	41(20.7)	94(47.5)	
	Unvaccinated	0(0)	2(1.0)	
Vit.A supplementation	Yes	197(99.5)	149(75.3)	0.001
	No	1(0.5)	49(24.7)	
Child bottle feeding	Yes	17(8.6)	106(53.5)	0.001
	No	181(91.4)	92(46.5)	

4.3. Maternal caring characteristics

Antenatal care (ANC) visits were significantly higher among MtMSGs participants 195(89.5%) compared to non-participants 112(56.6%, p<0.001). Among the participants 184(92.9%) and 148(74.7%) non-participants were delivered at a health facility. Extra food consumption during pregnancy was reported by

participants 196(99.0%), whereas only 45(22.7%) non-participants practiced this (p<0.001. Similarly, extra food intake during lactation was significantly higher among participants 196(99.0%) than non-participants 64(32.3%), p<0.001).The use of modern contraceptive methods was significantly higher among MtMSGs participants188 (94.9%) compared to non-participants 41(20.7%, p<0.001). Joint decision making was predominant among MtMSGs participants 191(96.5%), while it was completely absent among non-participants (p<0.001) (See table 3).

Table 3 : Maternal characteristics of the respondents from MtMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, west Hararghe zone, Oromia, Eastern Ethiopia, (n_1= 198, n_2 = 198), 2025.

Variables	Category	MtMSGs status		P-value
		participants(n=198)	Non-participants(n=198)	
		Frequency n(%)	Frequency n(%)	
ANC visit	Yes	195(98.5)	112(56.6)	0.001
	No	3(1.5)	86(43.4)	
Place of delivery	Home	14(7.1)	50(25.3)	0.001
	Health Facility	184(92.9)	148(74.7)	
Consumption of extra food during pregnancy	Yes	196(99.0)	45(22.7)	0.001
	No	2(1.0)	153(77.3)	
Consumption of extra food during lactation	Yes	196(99.0)	64(32.3)	0.001
	No	2(1.0)	134(67.7)	
Use of modern types of family planning	Yes	188(94.9)	41(20.7)	0.001
	No	10(5.1)	157(79.3)	
Household decision making	Only husband	0(0)	91(46.0)	0.001
	Mainly husband	7(3.5)	107(54.0)	
	Both Jointly	191(96.5)	0(0)	

4.4 . Water source, sanitation and hygienic characteristics

Piped water supply was significant more common among MtMSGs participants households 144(72.7%) than non-participants 14(7.1%, $p<0.001$). Types of Latrine was used significantly higher among MtMSGs participants ($p<0.001$). Open pit latrine without a slab were the most common type used among participants households 169(85.4%) and 53(26.8%) non-participants.

Burning waste was the primary disposal method among MtMSGs participants households 184(92.9%), while none of non-participants used this method ($p<0.001$) (see table 4).

Table 4: Water source, sanitation and hygienic characteristics of the respondents from MTMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, west Hararghe zone, Oromia, Eastern Ethiopia, (n_1= 198, n_2 = 198), 2025.

Variables	Category	MTMSGs Status		P-Value
		Participants(n =198)	Nonparticipants(n=198)	
		Frequencyn(%)	Frequency n(%)	
The main source of drinking water for household	Public or stand pipe	46(23.2)	32(16.2)	0.001
	Protected spring	3(1.5)	98(49.5)	
	Unprotected spring	5(2.5)	15(7.6)	
	Pipe water	144(72.7)	14(7.1)	
	surface water (River, pond)	0(0)	38(19.2)	
	well or bore well	0(0)	1(.5)	
Types of latrines used by Households	No latrine	2(1.0)	145(73.2)	0.001
	Open pit latrine	169(85.4)	53(26.8)	
	ventilated improved pit latrine	27(13.6)	0(0)	
Households waste disposal system	In a private pit	6(3.0)	64(32.3)	0.001
	Burning	184(92.9)	0(0)	
	Common pit, Composting	2(1.0)	0(0)	
	Open field	6(3.0)	134(67.7)	

4.5. Dietary diversity score

The mean dietary diversity (DD) score among participants was 1.9 ±0.3, while among non-participants, it was 1.2±0.4. Most consumed food groups: grains, roots and tubers 189(99.0%) among participants and 189(48.1%) among non-participants .Least consumed food groups: dairy products14 (65.0%) among participants and 14(35.0%) among non-participants. Overall, 190(48.0%) of children 6-59 months consumed less than five food groups and 23(11.6%) of children from MTMSGs participants and 167(84.3%) from the non-participants households were ate less than five food groups (see table 5).

Table 5 : Dietary diversity score of the respondents from MTMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, west Hararghe zone, Oromia, Eastern Ethiopia, (n1= 198, n2 = 198),2025.

Variables	Category		MTMSGs Status		P-Value
			Participants(n=198)	Nonparticipants(n=198)	
			Frequency n(%)	Frequency n(%)	
Food groups consumed	Grains, roots and tubers	Consumed	189(99.0)	189(48.1)	0.001
		Not consumed	9(11.1)	9(88.9)	
	Legumes and nuts	Consumed	92(95.1)	92(4.9)	
		Not consumed	106(10.8)	106(89.2)	
	Dairy products	Consumed	14(65.0)	14(35.0)	
		Not consumed	58(13.8)	58(86.2)	
	Flesh foods	Consumed	85(94.1)	85(5.9)	
		Not consumed	114(17.2)	114(82.8)	
	Eggs	Consumed	80(86.3)	80(13.8)	
		Not consumed	118(25.4)	118(74.6)	
	Vitamin A rich fruits and vegetables	Consumed	101(84.1)	101(15.9)	
		Not consumed	98(14.9)	98(85.1)	
	Other fruits and vegatables	Consumed	80(84.3)	80(15.7)	
		Not consumed	119(27.0)	119(73.0)	
	Breast milk	Consumed	118(49.4)	118(50.6)	
		Not consumed	81(50.9)	81(49.1)	
Overall Dietary diversity score	< 5 food groups		23(11.6)	167(84.3)	0.001
	≥5 food groups		175(88.4)	31(15.7)	

4.6. Magnitude of under nutrition

The overall magnitude of undernutrition among children in the study area was 50.0% (45.6%-54.4%):95%C.I).Among children whose mothers were participants in MtMSGs 46.7 %(40.46%-52.98%:95% C.I) were undernourished. In contrast, 53.3% (47.02%-59.54%:95% C.I) of children whose mothers were non-participants were undernourished.

The magnitude of stunting, underweight and wasting in the study area was, 41.9 %(37.2 % - 46.8%: 95% C.I.) , 37.4 %(32.8% - 42.2%: 95% C.I.) and 20.7 %(17.0% - 25.0%: 95% C.I.), respectively.

4.6.1. Magnitude of stunting

Participants had a mean height-for-age z- score of -1.75 (SD=1.10), while children of non-participants had a mean height-for-age z- score of -2.05 (SD=1.20). The mean difference between the two groups was 0.051, suggesting a small but noticeable difference in the nutritional status of children between the two groups. An independent t-test was conducted to compare the means of the two groups, resulting (t=1.02, p=0.037). The p-value indicates that the difference in height-for-age z- score between participants and non-participants was statistically significant, with participation in the support group showing a positive effect on the children's growth outcomes. The magnitude of stunting was significantly higher among children from non-participants households of MtMSGs compared to those from participants households. Specifically, stunting was observed in 52.5 %(45.6% - 59.4%: 95% C.I) of children from non-participants households, whereas it was only 31.3 %(25.3% - 38.1%: 95% C.I.) among children from participants households. When disaggregated by sex, male children were more affected, 57.1% of male children stunted in non-participants households compared to 37.4% in participants households. Similarly, female children found to have higher odds of stunting , with a magnitude of 47.3% compared to 24.2% .

4.6.2. Magnitude of underweight

The mean weight-for-age z-score among children of participants was -1.14 (SD=1.01), while the mean for non-participants was significantly lower at -2.93 (SD=1.25). An independent samples t-test showed a statistically significant

difference in mean weight-for-age z- scores between the two groups (t=1.20, p=0.04), indicating that participation in MtMSGs was associated with better nutritional outcomes. Among children aged 6-59months, male children had higher magnitude of underweight 43.9% compared to females 29.9%. Specifically, 50.5 % of males from non-participants households and 37.4% from participants households were underweight. Similarly, 39.8% of females from non-participants households and 19.8% from participants households were underweight. Children from non-participants households had a higher magnitude of underweight 45.5% (38.7% - 52.4%: 95% C.I.) compared to those from participants households 29.3% (23.4% - 36.0%: 95% C.I.).

4.6.3. Magnitude of wasting

The mean weight-for-height z-score for participants was 0.14 (SD=0.34), while non-participants had a higher mean score of 0.28 (SD=0.45). An independent samples t-test yielded (t=3.5, p= 0.001), demonstrating a statistically significant difference between the two groups. These findings suggest that children of non-participants were more affected by wasting, as reflected in the wider spread and potentially less stable weight-for-height outcomes. This underlines the positive impact of participation in MtMSGs on reducing the risk of acute malnutrition.

Child wasting was also higher in the children from MtMSGs non-participants households at 28.3% (22.5% - 34.9%: 95% C.I.) compared to the children wasting from participants households, 13.1% (9.1% - 18.5%: 95% C.I.). This study also showed that male children more wasted than female children. The overall magnitude of wasting was 24.1% in male children and 16.8% in female children. The magnitude of wasting among male children was 31.4% for MtMSGs non-participants households and 16.8% for participants while 24.7% of female children from MtMSGs non-participants households and 8.8% of participants' females were wasted.

4.7.Factors Associated with under nutrition

Bivariable and multivariable analysis was done to established association among the independent variables and nutritional outcome variables. Independent variables with a p-value < 0.25 in the bivariable analysis were included in the final multivariable analysis and significance was decided at a p-value < 0.05 and AOR 95% C.I.).

4.7.1. Overall associated factors

Factors associated with Stunting

The multivariable analysis identified several factors significantly associated with stunting. The adjusted odds ratio indicates that children from non-participants households had 2.82 times higher odds of being stunted compared to those from participants households (AOR=2.82 ,95% CI: 1.38 ,5.78) .Male children were 1.68 times more likely to be stunted than female children (AOR=1.68, 95% CI: 1.09, 2.59). Child age was a key determinant, with children aged 24-35 months (AOR = 1.9, 95% CI: 0.78, 4.56) and 36-47 months (AOR = 2.5, 95% CI: 0.953, 6.38) having higher odds of stunting compared to those aged 6-11 months. Maternal nutrition during lactation was another important factor, as children whose mothers did not consume additional food were 1.75 times more likely to be stunted (AOR=1.75 ,95%CI: 0.83, 3.69). Household size also played a role, with children from larger families (seven or more members) being 2.32 times more likely to experience stunting (AOR = 2.32, 95% CI: 1.00, 5.04). Moreover, maternal decision-making power was associated with stunting risk, with children from households where only the father made decisions having slightly higher odds of stunting (AOR = 1.06, 95% CI: 0.57, 2.00)(See table 6).

Table 6 : Bivariable and multivariable analysis of factors associated with stunting among children aged 6-59 months from MtMSGs participants and non- participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 396), 2025.

Variables (n = 396)	Stunting		COR (95% CI)	AOR (95% CI)	P-value
	Yes (n (%)	No (n (%)			
Households MtMSGs Status					
Participants	64(32.3)	134(67.7)	1	1	
Non-participants	105(53.0)	93(47.0)	2.32(1.54, 3.48)*	2.82(1.38, 5.78) **	0.004
Sex of the child					
Male	100(37.2)	112(52.8)	1.52(1.02, 2.28)	1.68(1.09, 2.59) **	0.020
Female	69(37.5)	115(62.5)	1	1	

Variables (n = 396)	Stunting		COR (95% CI)	AOR (95% CI)	P-value
	Yes (n (%)	No (n (%)			
Child age in months					
6-11 months		60(68.2)	0.53(0.23, 1.18)	0.14(0.36, 2.07) **	0.03
12-23 months	28(31.8)	83(65.4)	0.60(0.28, 1.28)*	1.90(0.78, 4.56) **	0.05
24-35 months	44(34.6)	47(48.0)	1.17(0.54, 2.56)*	2.46(0.95, 6.38) **	0.004
36-47 months	38(58.5%)	11(45.8%)	1.78(0.734,4.31)*	1	
48-59 months	7(70.0%)	3(30.0%)	1	1	
Household decision making power					
Only husband		54(47.4)	1.15(0.51, 2.60)*	1.00(0.39, 2.57) **	0.149
Consuming extra additional meals during lactation					
No	71(52.2)	65(47.8)	1.84(1.221, 2.79)*	1.75(0.83, 3.69)**	0.004
Yes	98(37.7)	162(62.3)	1	1	
Household family size					
Small(1-3members)	87(48.3)	34(73.9)	1	1	
Medium(4-6 members)	12(26.1)	100(58.8)	1.98(0.96, 4.10)*	2.32(1.0, 5.04) **	0.01
Large(≥7 members)	70(41.2)	93(51.7)	2.59(1.26, 5.33)*	2.32(1.0, 5.04) **	0.01

* P-value < 0.25 in the Bivariable analysis ** P-value < 0.05 in the multivariable analysis

Factors associated with Underweight

Several factors were significantly associated with underweight status. The adjusted odds ration indicates that children from non-participants households had 1.16 times higher odds of being underweight compared to those from participants households (AOR=1.16 ,95% CI: 0.47 ,2.84) . Child age was a key determinant, with children aged 24-35 months (AOR=2.38, 0.93, 6.12) and 36-47 months (AOR =1.49, 0.57, 3.93) having higher odds of underweight compared to those aged 6-11 months.

The adjusted odds ratio for underweight among children whose fathers could not read and write was 1.16 compared to those read and write (AOR=1.16, 95% CI: 0.71, 1.91). Maternal decision-making also had a significant effect, with children from households where mothers had limited decision-making power being nearly twice as likely to be underweight (AOR = 1.9, 95% CI: 1.18, 3.15). Feeding practices were another key factor, as bottle-fed children had increased odds of underweight (AOR = 1.34, 95% CI: 0.81, 2.23) compared to children not feeding from bottle .child delivered at home had a higher risk of underweight (AOR = 1.51, 95% CI: 0.85, 2.68) compared to child delivered at health facility (See table 7).

Table 7 : Bivariable and multivariable analysis of factors associated with underweight among children aged 6-59 months from MtMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia(n=396), 2025.

Variables (n = 396)	Underweight		COR (95% CI)	AOR (95% CI)	p-value
	Yes (n (%)	No (n (%)			
Household MTMSGs participants status					
MTMSGs participants	60(30.3)	138(69.7)	1	1	
Non-participants	1(46)	107(54)	1.84(1.22,2.78)*	1.16(0.47,2.84)*	0.007
Child age in months					
6-11 months	29(33.0)	59(67.0)	0.67(0.29, 1.51)*	0.69(0.24, 1.96) **	0.007
12-23 months	37(29.2)	90(70.9)	0.85(0.47, 1.53)*	0.90(0.33, 2.49) **	0.48
24-35 months	49(50.0)	49(50.0)	2.06(1.13, 3.74)*	2.38(0.93, 6.12)**	0.02
36-47 months	22(34.9)	27(55.1)	1.75(0.85, 3.59)*	1.49(0.57, 3.93) **	0.013
48-59months	14(9.5)	20(8.10)	1	1	

Variables (n = 396)	Underweight		COR(95%CI)	AOR(95%CI)	p-value
	Yes(n(%)	N0 (n(%)			
Father education status					
Read and write	32(8.08)	116(78.4)	1	1	
Not read and write	61(24.6)	187(75.4)	1.45(0.74, 2.24)	1.16(0.71, 1.91)	0.02
Household decision making power					
Only husband	55(48.3)	59(51.8)	1.86(1.18,2.92)*	1.92(1.18, 3.15) **	0.007
Mainly husband	12(41.3)	17(58.6)	1.30(0.60,2.81)*	1.32(0.59, 2.94) **	0.050
Both Jointly	84(33.2)	169(66.8)	1	1	
Place of index child birth					
Home	30(47.6)	33(52.4)	1.66(0.96,2.85)*	1.51(0.85, 2.68) **	0.016
Health Facility	121(36.3)	212(63.7)	1	1	
Child bottle feeding					
No	102(37.3)	171(62.6)	1	1	
Yes	49(399)	74(60.2)	1.11(0.71,1.72)*	1.34(0, 81, 2.23) **	0.25

* P-value < 0.25 in the Bivariable analysis ** P-value < 0.05 in the multivariable analysis

Factors associated with Wasting

Wasting was significantly associated with multiple socio-demographic and environmental factors. After adjusting for potential confounders , the adjusted odds ratio showed that non-participants children had 2.84 times higher odds of wasting compared to participants groups (AOR=2.84 ,95%CI: 1.52 ,5.30). Male children were 1.70 times more likely to be wasting than female children (AOR=1.70, 95% CI: 0.87, 3.32). Mothers had ANC visit less than four visit were 1.23 times higher wasting compared to mothers had four and greater than four ANC visit (AOR=1.23 ,95% CI: 0.48,3.15). Child feed less than five food groups had 1.71 times higher wasting compared to child feed five and greater than

five food groups (AOR=1.71 ,95% CI:0.67 ,4.38). Feeding practices also influenced wasting risk, with bottle-fed children having increased odds (AOR = 1.34, 95% CI: 0.80, 2.426). Environmental factors were particularly significant, as children from households using surface water sources for drinking had 2.6 times higher odds of wasting (AOR = 2.6, 95% CI: 1.05, 6.51), while those without latrines were at an even greater risk (AOR = 6.6, 95% CI: 1.40, 30.52). These findings emphasize the critical role of water, sanitation, and hygiene in preventing acute malnutrition (See table 8).

Table 8 : Bivariable and multivariable analysis of factors associated with wasting among children aged 6-59 months from MtMSGs participants and non-participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 396), 2025

Variables (n = 396)	Wasting		COR (95% CI)	AOR (95% CI)	P-value
	Yes (n,(%)	No (n,(%)			
Household MTMSGs participants status					
Participants	88(59.5)	60(40.5)	1	1	
Non-participants	110(44.4)	138(55.6)	2.44(1.46, 4.06)*	2.84(1.52 ,5.30)*	0.001
Sex of the child					
Male	90(60.8)	122(49.2)	1.6(0.95,2.57)*	1.70(0.87,3.32)**	0.012
Female	58(39.2)	126(50.8)	1	1	
Numbers of ANC Visit					
< 4times	53(35.8)	64(25.8)	0.89(0.48, 1.67)*	1.23(0.48, 3.15)	0.034
≥ 4times	56(37.8)	134(54.0)	1	1	
Dietary diversity score					
<5 food groups	81(54.7)	109(44.0)	1.94(1.18, 3.19)*	1.71(0.67, 4.38) **	0.009
≥ 5food groups	67(45.3)	139(56.0)	1	1	
Child bottle feeding					
No	50(18.3)	223(81.7)	1.47(0.88, 2.44)*	1	0.014
Yes	30(24.4)	93(75.6)	1	1	0.001

Variables (n = 396)	Wasting		COR (95% CI)	AOR (95% CI)	P-value
	Yes (n(%)	No (n (%)			
The main source of drinking water for households					
Pipe water	22(13.9)	136(86.1)	1.28(0.62, 2.66)*	0.38(0.15, 0.96)**	0.04
Public or stand pipe (Protected)	14(17.9)	64(82.1)	2.5(1.34, 4.59)	1.25(0.60, 2.61)**	0.050
Protected spring	29(28.7)	72(71.3)	1.47(0.45, 4.78)*	2.73(1.40, 5.32)**	0.004
Unprotected spring	4(20.0)	16(80.0)	2.39(1.04, 5.48)	1.52(0.44, 5.19)**	0.53
Surface water(River, pond	11(28.9)	27(71.1)	1	2.61(1.05, 6.51)**	0.04
Well or bore well	0	1(100.0)		1	
Types of latrines used by households					
No latrine	47(31.9)	100(68.0)	1.3(0.37, 4.57)*	6.58(1.40, 30.87)**	0.03
Open pit latrine/without slap	30(13.6)	192(86.5)	1.12(0.62, 2.49)*	1.36(0.38, 4.84)**	0.68
Ventilated pit latrines	33(11.1)	24(88.9)	1	1	

* P-value < 0.25 in the Bivariable analysis ** P-value < 0.05 in the multivariable analysis

4.7.2 . Factors associated with under nutrition MtMSGs participants

Factors Associated with Stunting

The multivariable logistic regression analysis identified several factors significantly associated with stunting among children whose mothers participated in Mother-to-Mother Support Groups (MtMSGs). Child age family size, parental education and source of drinking water were a key determinant. Children aged 24-35months had a higher likelihood of being stunted compared to younger children (AOR-=2.45, 95%CI: 1.32-4.57). Additionally, children from households with greater or equal to 7 members were at an increased risk of stunting compared to those from smaller families (AOR=3.12, 95%CI: 1.89-5.13). With children from households using piped water having a significantly lower risk of stunting (AOR = 0.32, 95% CI: 0.18–0.56). In contrast, children relying on surface water (river or pond) had a markedly higher risk of stunting (AOR = 3.45, 95% CI: 1.65–7.24), suggesting that poor water quality contributes to nutritional deficiencies. Similarly, the absence of a latrine in the household was a strong predictor of stunting, with children from such households being 6.45 times more likely to be stunted (AOR = 6.45, 95% CI: 2.72–15.42,) (see table 9).

Table 9 : Multivariable analysis of factors associated with stunting among children aged 6-59 months from MtMSGs participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 198), 2025.

Variables(n=198)	Stunting		AOR (95% CI)	P-Value
	Yes (n, (%)	No-(n, (%)		
Child age in months				
6-11months	12(10.9)	14(15.9)	2.00(0.42 ,9.50)	0.04
12-23months	38(34.5)	35(39.8)	2.56(0.61 ,10.72)	0.02
24-35months	43(39.1)	22(25.0)	4.65(1.09 , 19.87)	0.012
36-47months	14(12.7)	10(11.4)	3.34(0.68 ,16.34)	0.001
48-59months	3(2.7)	7(8.0)	1	

Variables(n=198)	Stunting		AOR (95% CI)	P-Value
	Yes (n, (%)	No-(n, (%)		
Households Family Size				
Small(1-3 members)	8(7.3)	9(10.2)	1	
Medium(4-6members)	68(61.8)	41(46.6)	0.89(0.30, 2.62)	0.032
Large(≥7members)	34(30.9)	38(43.2)	1.73(0.61 ,4.88)	0.012
Source of drinking water				
Pipe water	74(67.3)	70(79.5)	1	
Public or stand pipe	31(28.2)	15(17.0)	1.98(0.98 ,3.980	0.01
Protected spring	1(0.9)	2(2.3)	0.49(0.04 ,5.55)	0.035
Unprotected spring	4(3.6)	1(1.1)	1.96(0.17 ,22.19)	0.047
Types of latrines used by households				
No latrine	2(1.8)	0(0)	1.3(0.49,3.38)	0.014
Open pit latrine without slap	92(83.6)	77(87.5)	0.95(0.42 ,2.17)	0.021
Ventilated pit latrine	16(14.5)	11(12.5)	1	

Factors Associated with Underweight

The analysis also revealed significant associations between underweight and key child health and feeding practices. Male had 3.34 times higher odds of being underweight compared to females (AOR=3.34, 95% CI: 1.46, 7.65). Vaccination status played a crucial protective role, as partially vaccinated children had 1.19 times higher odds of being underweight (AOR = 1.19, 95% CI: 0.35, 4.02). Additionally, the absence of a latrine in the household was strongly associated with underweight (AOR = 1.23, 95% CI: 0.72–2.42) (see table10).

Table 10 : Multivariable analysis of factors associated with underweight among children aged 6-59 months from MtMSGs participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 198), 2025

Variable(n=198)	Underweight		AOR (95% CI)	P-Value
	Yes (n, (%)	N0-(n, (%)		
Sex of the child				
Male	40(66.7)	67(48.6)	3.34(1.46 ,7.65)	0.004
Female	20(33.3)	71(51.4)	1	
Vaccination status				
Fully vaccinated	49(81.7)	108(78.3)	1	
Partially vaccinated	11(18.3)	30(21.7)	1.19(0.35 ,4.02)	0.02
Types of latrines used by households				
No latrine	2(3.3)	0(0.0)	1.23(0.72 ,2.42)	0.012
Open pit latrine/without slap	50(83.3)	119(86.2)	1.01(0.52 ,3.80)	0.03
Ventilated latrine	8(13.3)	19(13.8)	1	

Factors Associated with Wasting

Wasting, an indicator of acute malnutrition was significantly associated with poor infant feeding practices and inadequate sanitation. Bottle feeding emerged as a strong risk factor, with bottle-fed children being 3.7 times more likely to suffer from wasting (AOR = 3.7, 95% CI: 2.0–6.8). This association highlights the potential risks of unhygienic bottle-feeding practices and the importance of exclusive breastfeeding during the early months of life. The lack of a latrine in the household was also significantly linked to wasting, with children from such households having 6.45 times higher odds of being wasted (AOR = 6.45, 95% CI: 2.72–15.42), reinforcing the role of sanitation in child nutrition. Similarly, waste disposal methods influenced wasting, as open field disposal was associated with a markedly higher risk (AOR = 4.55, 95% CI: 2.28–9.07) (see table 11).

Table 11 : Multivariable analysis of factors associated with wasting among children aged 6-59 months from MtMSGs participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 198), 2025.

Variable(n=198)	Wasting		AOR (95% CI)	P-Value
	Yes (n,(%)	No-(n, (%)		
Child Bottle feeding				
Yes	2(7.4)	15(8.8)	3.7(2.0 ,6.8)	0.042
No	25(92.6)	156(91.2)	1	
Types of latrines used by households				
No latrine	1(3.7)	1(0.06)	6.45(2.72 ,15.42)	0.013
Open pit latrine/without slap	23(85.2)	146(85.4)	2.12(0.76 ,4.28)	0.03
Ventilated pit latrine	3(11.1)	24(14.0)	1	
Households waste disposal practices				
In a private pit	2(7.4)	2(7.4)	1	
Burning	23(85.2)	161(94.2)	0.45(0.25 ,1.70)	0.001
Common pit, Composting	0(0.0)	2(1.2)	1.2(0.60,2.41)	0.04
Open field	2(7.4)	4(2.3)	4.55(2.28 ,9.07)	0.001

4.7.3. Factors associated with under nutrition MtMSGs non-participants

Factors Associated with Stunting

The multivariable logistic regression analysis identified several factors significantly associated with stunting among children of non-participants in Mother-to-Mother Support Groups (MTMSGs). Male children had 2.1 times higher odds of being stunted compared to female children (AOR = 2.1, 95% CI: 0.84, 5.40). The likelihood of stunting increased with age, with children aged 24–35 months having 1.45 times higher odds (AOR = 1.45, 95% CI: 0.45 ,4.65), and those aged 36–47 months having 3.9 times higher odds (AOR = 3.9, 95% CI: 0.91 ,17.63) compared to younger children. Children of mothers who could not read and write had 1.9 times higher odds of being stunted compared to those whose mothers had some level of education (AOR = 1.9, 95% CI: 0.95 ,36.98). Immunization status was a strong predictor, as children who were not fully vaccinated had significantly

higher odds of being stunted (AOR = 2.85, 95% CI: 1.6, 4.92) compared to fully vaccinated children. Additionally, the absence of Vitamin A supplementation further increased the risk of stunting (AOR = 3.12, 95% CI: 1.75, 5.56). Children of mothers who did not consume additional meals during lactation had 1.8 times higher odds of being stunted compared to those whose mothers consumed additional meals (AOR = 1.8, 95% CI: 0.61, 5.20). Furthermore, early introduction of complementary foods before six months of age was significantly associated with stunting, with affected children having 2.42 times higher odds of being stunted compared to those who started complementary feeding at six months or later (AOR = 2.42, 95% CI: 1.18 ,4.94)(see table 12).

Table 12 : Multivariable analysis of factors associated with stunting among children aged 6-59 months from MtMSGs non- participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 198), 2025.

Variables(n=198)	Stunting		AOR (95% CI)	P-Value
	Yes (n, (%)	No-(n, (%)		
Sex of the child				
Male	68(56.7)	37(47.4)	2.1(0.84 ,5.40)	0.0024
Female	120(100)	78(100)	1	
Age of the child in months				
6-11months	29(24.2)	33(42.3)	0.40(0.38 ,2.10)	0.020
12-23months	28(23.3)	26(33.3)	1.12(0.78 ,2.24)	0.008
24-35months	24(20.0)	9(11.5)	1.45(0.45 ,4.65)	0.017
36-47months	22(18.3)	3(3.8)	3.9(0.91, 17.63)	0.023
48-59months	17(14.2)	7(9.0)	1	
Maternal educational status				
Read and write	4(3.3)	2(2.6)	1	
Not read and write	116(96.7)	76(97.4)	1.9(0.95 ,36.89)	0.011
Vaccination status				
Fully vaccinated	71(59.2)	31(39.7)	1	
Partially vaccinated	48(40.0)	46(59.0)	2.85(1.65 ,4.92)	0.03
Unvaccinated	1(0.8)	1(1.3)	1.02(0.35 ,2.31)	0.046

Variables(n=198)	Stunting		AOR (95% CI)	P-Value
	Yes (n, (%)	No-(n, (%)		
Vitamin A supplementation				
Yes	89(74.2)	60(76.9)	1	
No	31(25.8)	18(23.1)	3.12(1.75 ,5.56)	0.001
Consuming additional meals during lactation				
Yes	42(35.0)	22(28.2)	1	
No	78(65.0)	56(71.8)	1.8(0.61 ,5.20)	0.012
Age introducing of complementary feeding				
<6months	12(10.0)	7(9.0)	2.42(1.18 ,4.94)	0.016
At 6months	105(87.5)	67(85.9)	1	
≥7months	3(2.5)	4(5.1)	1.45(0.47 ,2.45)	0.034

Factors Associated with Underweight

The multivariable logistic regression analysis identified several factors associated with underweight among children. Male children had 1.2 times higher odds of being underweight compared to female children (AOR = 1.24, 95% CI: 0.69, 2.22). Family size also played a role, as households with five or more children under the age of five had 1.09 times higher odds of underweight prevalence compared to families with three to four under-five children (AOR = 1.09, 95% CI: 0.26 ,4.60). Maternal food preparation practices were significantly associated with underweight status. Children whose mothers did not prepare separate food for them had 1.46 times higher odds of being underweight compared to those whose mothers prepared food separately (AOR = 1.46, 95% CI: 0.66 ,3.27). Micronutrient supplementation was also a key factor, as children who were not supplemented with Vitamin A had significantly higher odds of being underweight (AOR = 2.75, 95% CI: 1.49, 5.08). Similarly, bottle-fed children had increased odds of being underweight compared to those who were not bottle-fed (AOR = 2.65, 95% CI: 1.54, 4.55). Maternal decision-making power influenced child nutritional status, with children from households where mothers had limited decision-making power being nearly twice as likely to be underweight (AOR = 1.9, 95% CI: 0.70, 5.45). The early introduction of complementary foods before six months was also significantly associated with underweight, as children introduced to complementary foods too early had 2.18 times

higher odds of being underweight compared to those introduced at the appropriate time (AOR = 2.18, 95% CI: 1.10 ,4.32). Furthermore, maternal nutrition during lactation was crucial, as children of mothers who did not consume additional meals during lactation had 1.4 times higher odds of being underweight compared to those whose mothers consumed additional meals (AOR = 1.4, 95% CI: 0.33 ,5.68)(see table 13).

Table 13 : Multivariable analysis of factors associated with underweight among children aged 6-59 months from MtMSGs non- participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 198), 2025.

Variables(n=198)	Underweight		AOR (95% CI)	P-Value
	Yes (n, (%)	No-(n, (%)		
Sex of the child				
Male	50(56.8)	55(50.0)	1.2(0.69 ,2.22)	0.028
Female	38(43.2)	55(50.0)	1	
Households Family Size				
Small(1-3members)	9(10.2)	20(18.20	1	
Medium(4-6members)	25(28.4)	36(32.7)	1.12(0.47 ,2.10)	0.01
Large(≥7members)	54(61.4)	54(49.1)	1.09(0.26 ,4.60)	0.044
Maternal preparing foods separately for child				
Yes	23(26.1)	41(37.3)	1	
No	65(73.9)	69(62.7)	1.46(0.66 ,3.27)	0.021

Variables(n=198)	Underweight		AOR(95%CI)	P-Value
	Yes (n(%)	No (n(%)		
Vitamin A supplementation				
Yes	63(71.6)	86(78.2)	1	
No	25(28.4)	24(21.8)	2.75(1.49 ,5.08)	0.001
Child Bottle feeding				
Yes	45(51.1)	61(55.5)	1	
No	43(48.9)	49(44.5)	2.65(1.54 ,4.55)	0.001
Maternal decision making				
Only husband	54(61.4)	53(48.2)	1.9(0.70 ,5.45)	0.02
Mainly husband	11(12.5)	18(16.4)	1.10(0.84 ,2.19)	0.016
Both Jointly	23(26.1)	39(35.5)	1	
Age introducing of complementary feeding				
<6months	10(11.4)	10(9.1)	2.18(1.10 , 4.32)	0.025
≥7 months	2(2.3)	5(4.5)	1.12(0.86 ,2.60)	0.01
Consuming additional meals during lactation				
Yes	25(28.4)	39(35.5)	1	
No	63(71.6)	71(64.5)	1.4(0.33 ,5.68)	0.015

Factors Associated with Wasting

The multivariable logistic regression analysis identified several factors significantly associated with wasting among children. Maternal nutrition during pregnancy was a key determinant, with children of mothers who did not consume additional meals during pregnancy having 5.81 times higher odds of wasting compared to those whose mothers consumed additional meals (AOR = 5.81, 95% CI: 0.61 ,21.41). Similarly, maternal education played a role, as children of mothers who could not read and write had 2.49 times higher odds of being wasted compared to those whose mothers were read and write (AOR = 2.49, 95% CI: 0.14 ,45.30). Dietary diversity was another important factor, as children who consumed fewer than five food groups had 1.88 times higher odds of being wasted compared to those who consumed five or more food groups (AOR = 1.88, 95% CI: 0.051 ,69.07). Feeding practices also played a crucial role, with bottle-fed children having significantly higher odds of wasting compared to those who were not bottle-fed (AOR =

2.98, 95% CI: 1.73, 5.13). Immunization status was another strong predictor, as partially vaccinated children had 2.21 times higher odds of being wasted compared to fully vaccinated children (AOR = 2.21, 95% CI: 1.24 ,3.94). These findings indicate that inadequate feeding practices, particularly bottle feeding and poor dietary diversity, as well as a lack of maternal nutrition and immunization, contribute significantly to the risk of wasting in children (see table 14).

Table 14 : Multivariable analysis of factors associated with wasting among children aged 6-59 months from MtMSGs non- participants households in pastoral communities of Gumbi Bordode district, Eastern Ethiopia (n = 198), 2025.

Variables (n=198)	Wasting		AOR (95% CI)	P-Value
	Yes (n, (%)	No-(n, (%)		
Consuming additional meals during pregnancy				
Yes	10(18.2)	34(23.8)	1	
No	45(81.8)	109(76.20	5.8(0.61 ,21.41)	0.039
Maternal educational status				
Read and write	1(1.8)	5(3.5)	1	
Not read and write	54(98.2)	138(96.5)	2.49(0.14 ,45.30)	0.04
Dietary diversity score				
<5 food groups	42(76.4)	125(87.4)	1.88(0.05 ,69.07)	0.002
≥5food groups	55(100)	143(100)	1	
Vaccination status				
Fully vaccinated	34(61.8)	68(47.6)	1	
Partially vaccinated	21(38.2)	73(51.0)	2.21(1.24 ,3.94)	0.007
Unvaccinated	0(0.0)	2(1.4)	1.0(0.49 ,1.98)	0.048

5. DISCUSSION

This study aimed to assess the magnitude of undernutrition including stunting, underweight, and wasting and identify associated factors among children aged 6–59 months from households participating and not participating in Mother-to-Mother Support Groups (MtMSGs) in the pastoral communities of Gumbi Bordode district, West Hararghe zone, Eastern Ethiopia. It also sought to examine whether participation in MtMSGs has a measurable impact on the nutritional status of children in these communities.

The study found that 50.0 %(95% CI: 45.6%–54.4%). of the children aged 6–59 months were undernourished. Children from non-participant households experienced a higher prevalence of undernutrition 53.3 %(95% CI: 47.02%–59.54%) compared to those from participant households 46.7 %(95% CI: 40.46%–52.98%). The magnitude of stunting, underweight, and wasting was 41.9% (95% CI: 37.2%–46.8%), 37.4% (95% CI: 32.8%–42.2%), and 20.7% (95% CI: 17.0%–25.0%), respectively.

After adjusting for potential confounders, children from non-participant households had higher odds of being stunted (AOR = 2.82; 95% CI: 1.38+–5.78), underweight (AOR = 1.16; 95% CI: 0.47–2.84), and wasted (AOR = 2.84; 95% CI: 1.52–5.30), compared to those from participant households. A significant association was observed between child stunting and non-participation in MtMSGs. Children from non-participant households were nearly three times more likely to be stunted compared to those from participant households (AOR = 2.82; 95% CI: 1.38–5.78). Since MtMSGs often target economically disadvantaged families, it is possible that these households experience more severe food insecurity. In terms of child sex, male children were found to be at higher risk of stunting compared to females. The odds of stunting were 1.68 times higher in male children (AOR = 1.68; 95% CI: 1.09–2.59).

The results suggest that non-participation in MtMSGs is a significant risk factor for child stunting and wasting. Children from non-participant households were nearly three times more likely to be stunted (AOR = 2.82) and wasted (AOR = 2.84) than

those from households engaged in MtMSGs. This indicates the positive role MtMSGs may play in improving child nutrition by promoting maternal knowledge and better feeding practices. The higher risk among male children for both stunting (AOR = 1.68) and wasting (AOR = 1.7) could be explained by gendered activity patterns in pastoral communities, where boys often engage in more physically demanding activities like herding. Stunting also increased with age, Children aged 24–35 months had nearly twice the odds (AOR = 1.9), and those aged 36–47 months had 2.5 times the odds (AOR = 2.5) of being stunted compared to those aged 6–11 months. This could be attributed to inadequate complementary feeding, reduced breastfeeding beyond infancy, and declining care giving practices as children age.

Furthermore, low maternal autonomy in household decision-making was linked with higher undernutrition rates. For instance, underweight prevalence was higher when the husband was the sole decision-maker (AOR = 1.9), highlighting how gender roles can impact child nutrition.

These findings underscore the critical importance of MtMSG participation, not just for individual knowledge-sharing, but as a community-based strategy to address chronic undernutrition in vulnerable areas. Interventions that empower mothers through education, antenatal care, and participation in decision-making can have a direct and positive effect on children's health. The high rates of underweight and wasting, particularly in non-participant households, point to the need for emergency nutritional interventions, especially considering the acute food insecurity and poor WASH (Water, Sanitation, and Hygiene) conditions in the study area. Improving access to clean water, sanitation, and diverse food sources must be prioritized to reduce wasting. Community engagement programs like MtMSGs should be scaled up and integrated with broader WASH and nutrition efforts to address the root causes of malnutrition.

The higher prevalence of stunting among male children 57.1% in non-participants, 37.4% in participants is consistent with a study in Afar, where male children were nearly twice as likely to be stunted (Gebre et al., 2019b). Children aged 24–35 months and 36–47 months were 1.9 (AOR = 1.9; 95% CI: 0.78–4.56) and 2.5 times (AOR = 2.5; 95% CI: 0.95–6.38) more likely to be stunted, respectively, compared

to children aged 6–11 months. These findings align with the 2016 Ethiopian Demographic and Health Survey, which showed that stunting risk increases significantly in children aged 25–47 months and 48–59 months (Tekile et al., 2019). Regarding maternal decision-making, our findings are supported by research from Meta District (AOR = 3.5) and Maharashtra (AOR = 5.0), which also showed that lack of maternal autonomy increases stunting risk (AOR = 1.06; 95% CI: 0.57–2.00) compared to those whose mothers were involved in household decisions (Tesfaye and Egata, 2022a; Aguayo et al., 2016). While the association between MtMSG participation and underweight has not been widely studied, our findings provide novel insights and point to the need for further investigation. Children of fathers without formal education were more likely to be underweight (AOR = 1.16), aligning with findings from Afar where maternal illiteracy increased underweight risk (AOR = 4.06) (Gebre, 2019). Male children's risk of wasting (AOR = 1.7) supports a study from Haramaya, which found even higher odds (AOR = 2.37) (Yisak et al., 2015). Similarly, fewer than four ANC visits increased the odds of wasting (AOR = 1.23), consistent with East Badawacho findings (AOR = 1.95) and Haramaya (AOR = 3.93).

Low dietary diversity was linked with wasting (AOR = 1.71), as supported by a study in South Gondar (AOR = 2.99) (Engidaw and Gebremariam, 2020). Children from households using surface water had higher odds of wasting (AOR = 2.6), in line with DHS reports from 31 Sub-Saharan African countries, which reported that 7% of children in households using non-improved water sources experienced wasting (Adedokun & Yaya, 2021). Finally, lack of latrine access dramatically increased wasting risk (AOR = 6.6), consistent with 2011 EDHS findings showing a 37% reduction in wasting among children with improved sanitation (van Cooten et al., 2019).

Strength and limitations of the study

The study uniquely focused on assessing under nutrition among children aged 6-59-months by stratifying the study population into MtMSGS participants and non-participants in households of Gumbi Bordode district, Oromia region, Eastern Ethiopia, 2024. This approach allowed for a direct comparison of nutritional outcomes between the two groups, providing valuable insights into the potential impact of MtMSGs on child nutrition. Additionally, the data were collected by

trained health professionals, including Health officers, BSC Nurse and Midwifes, under close supervision. Standardized procedures for weight and height/length measurements were employed to minimize errors, enhancing the quality and reliability of the findings.

As this study was cross-sectional, causal relationships between the dependent and independent variables could not be established. Standard procedures for weight and height/length measurements were used; however, measurement errors, particularly among evaluators, were unavoidable. Additionally, recall bias may have occurred as participants from rural villages were required to report the age of their children.

To minimize biases and errors in weight and height/length measurements, we employed calibrated and standardized measuments, performed repeat measurement, and calculated average to reduced random errors. We confirmed the age of children using the immunization cards whenever they were available, as participants from rural villages were often required to report their children's ages, which may have introduced recall bias.

There might also be the possibility of recall and reporting bias in some infant and young child feeding (IYCF) indicators such as bottle-feeding, dietary diversity, and child's history of illness events happening in the past. We adopted structured interviews, visual aids and short recall periods. For bias in reporting history of illness events, we used health record and open-ended questions to help mothers recall illness episodes accurately.

6. CONCLUSION AND RECOMMENDATION

6.1. Conclusion

This study has uncovered an alarmingly high prevalence of under nutrition across all three indicators within the study population. Children from households not participating in Mother-to-Mother Support Groups were at greater risk. Key factors associated with under nutrition included male sex, older age, low maternal decision-making power, low parental education, inadequate ANC visits, poor dietary diversity, and unsafe water sources. These findings highlight the urgent need to strengthen maternal support programs, promote gender equality, improve antenatal care, enhance dietary diversity, and ensure access to clean water to reduce under nutrition.

6.2. Recommendation

Based on the study findings, the following recommendations were as forwarded:

1. Woreda Health Office: – Expand Mother-to-Mother Support Groups (MtMSGs) in high-under nutrition areas and establish additional groups for mothers without access to these programs. Including women in their household's issues and encourage them as they can decide in their household level.
2. Health Centers and Health Posts: – Strengthen the role of Health Extension Workers (HEWs) in providing home-based counseling on child feeding and hygiene practices.
3. NGOs: – Support the expansion of MtMSGs through financial and technical assistance.
4. Researchers: – Conduct longitudinal studies to evaluate the long-term impact of MtMSGs on child nutrition outcomes.

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8. ANNEXES

8.1. Participant information sheet and informed voluntary consent form for mothers or the child's guardian.

Hello! how are you? My name is M/r/s____________________. I am working as a data collector for the study being conducted in this community by Milion Amare Miesa, studying for his master's degree at Haramaya University, the College of Health and medical sciences. I kindly request you to lend me your attention to explain the study and be selected as the study participant.

The study /project title: Nutritional status of children 6-59months of mother-to-mother support groups participants and mother to mother support groups non-participants of households in Gumbi Bordode district.

Purpose/Aim of the study: -The findings of this study are aimed to inform program decision- makers and health policy makers in order to design programs that are aimed at improving nutritional status of children in future. The study aims to write a thesis for the partial requirement for the fulfillment of a master's program in public health nutrition to the principal investigator.

Procedure and duration I will be interviewing you using questionnaire to provide me a pertinent. Additionally, physical examination of your child will be done. The completion time of data collection is about 30-35 minutes, so I kindly request you to spend me this time for the interview. **Risks and benefits:** The risk of participating in this study is very minimal, but only takes a few minutes of your time. There will not get any direct payment for participating in this study. However, the findings from this research may reveal important information for the local health planners.

Confidentiality: All the information that you will provide us will be kept confidential and placed in a secure place. I will not need to write your name or personal. The questionnaire will be coded to exclude any identification, and the study findings will be general for the community. No reference will be made in oral or written reports that link participants to research.

Rights: participation in this study is entirely voluntary. You have a right to participate or refuse in this study and not answer any questions if you feel uncomfortable within the data collection process. This will not label you for any loss of benefits to which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

Contact address: If there are any questions or concerns at any time about the study, you can contact the concerned bodies with the following address given below: Milion Amare Miesa, phone no.: +251934080616, email: milionamare19@gmail.com, and Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O. Box 235, Harar). You will receive a copy of this information and consent form for your own records.

Declaration by participant:

By signing below, I …………………………………….………. agree to take part in a research study entitled: I declare that I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable. I have had a chance to ask questions and all my questions have been adequately answered. I understand that taking part in this study is voluntary and I have not been pressurized to take part.

I may choose to leave the study at any time and will not be penalized or prejudiced in any way.

Signature ....…....………. Date …………….

Declaration by investigator

I (name) …………………………………… declare that I explained the information in this document to …………………………………. I encouraged him/her to ask questions and took adequate time to answer them. I am satisfied that he/she adequately understands all aspects of the research, as discussed above. I did/did not use an interpreter. (If an interpreter is used then the interpreter must sign the declaration below.

Signature ....….......……………. Date ……....……….

Declaration by interpreter

I (name)   declare that I assisted the investigator (name of participant) ………………………………………. to explain the information in this document using the local language of the study area. I encouraged him/her to ask questions and took adequate time to answer them. I conveyed a factually correct version of what was related to me. I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Signature ....….......……………. Date……...……………….

8.2.English version of questionnaire the interviewer should circle the interviewee's answer or write a short description if necessary.

Identification Information Part I, II, III, IV, V and VI shall be responded to by the head of the household or about the heads of the household by other family members who are adult enough to give full information.

01. Questionnaires ID NO. _______

02. Kebele code________

03. Mother to mother support groups program status

1. Participants 2. Non-participants

04. Code of data collector_________

05. Date of interview___/___/___E.C

06. Result codes: Completed =1, Partially completed =2, Refused =3, Others =4

Part I. Households socio economic and demographic characteristics

S.N	**Variables/questions**	**Response/ coding**	**Skip to/Remark**
101	What is your (respondent's) relation with the child?	1. Mother 2. Guardian/caregiver 3. Father	
102	How old are you in a completed year?		
103	What was your age when you gave birth to your index child?	_______________in years	
104	How old is the child's age in months?	___________in months	
105	Sex of the child	1. Male 2. Female	

107	What is your Ethnicity?	1.Oromo 2. Amhara 3. Argoba 4. Others (specify)____	
108	Current marital status of the respondent	1. Married 2. Divorced 3. Single 4. Widowed 5. Separated	
109	What is the child's mother occupation?	1.Farmer 2.Pastoralist 3.Housewife 4.Merchant 5.Laborer 6.Student 7.Other specify	
110	What is the child's father occupation?	1. Farmer 2. Pastoralist 3. Merchant 4. Laborer 5. Student 5. Other-----------	
111	Have you ever attended formal education? Ask for mother/care taker	Yes 2. No	If no skip to Q 113
112	If yes What is the highest you completed	1. Level 4 and above 2. Read and write	
113	Have you ever attended formal education? Ask child's father	1. Yes 2. No	If no Skip to Q 115
114	If yes What is the highest you completed	1. Level 4 and above 2. Read and Write	
115	Family size of this household (including yourself)?	---------------------	
116	What is the number of under-five children in this house?	------------------	
117	Birth interval (if this is not first child)	----------------	
118	Birth order of this child	-------------------	

119	Who can decide on money you spend in your household	1. Mainly husband 2. Only husband 3. Both jointly	
120	Where do your families get their food mainly?	1. From our own farm 2. Purchase at market 3. Others - - - - - - - - - -	

Part II: Anthropometric measurement

Code	Measurements	First observer	Second observer	Remark
201	Weight of child in kg	_______First ______Second ___Average	_______, First _______,Second ________Average	
202	Height of child in (cm) for children 24 months or above	______, First ____, Second _____Average	_________.First _________Second _______, Average	
203	Length of child in (cm) for children less than 24 months	_______, First ______, Second _____, Average	_______,First _________,Second _______, Average	

Part III: Maternal and child health care practicing

301	Did you have had ANC follow-up during pregnancy of this child?	1. Yes 2. No	If no, skip to Q. 303
302	How many times did you visit a health facility for ANC during you were pregnant this child?	1.<4 times 2.>4times	
303	Where did you deliver this child?	1. Home 2. Health facility	
304	Do you eat additional meals during your pregnancy of this child?	1 Yes 2. No	
305	Do you eat additional meals during your lactation of this child?	1 Yes 2. No	
306	Do you use ever any types of family planning?	. Yes 2. No	
307	Has your child had diarrhea, fever, or sick in past 2 weeks?	1. Yes 2. No	
308	Did your child is fully Immunized?	1.Fully vaccinated 2.Partially vaccinated 3. Unvaccinated	
309	Did your Child get Vitamin A in the last 6 months	1. Yes 2. No	
310	Did your child get de-worming in the last 6 months	1. Yes 2. No	

Part IV: Wealth index of households

401	What is the main source of drinking water for members of your household?	1. Pipe Water 2. Public tap or standpipe 3. Well or bore well 4. Protected spring 5. Unprotected spring 6. Surface water (River, pond) 7. Other Sources (specify) ________	
402	What kind of toilet facility do members of your household usually use?	1. No latrine/on bush/field 2. Open pit latrine/without slab 3. Ventilated improved pit latrine	
403	When do you wash your hands with soap? (Choose all that may apply)	1. After toilet 2. After touching the child's lower body 3. Before cooking food 4. Before feeding child	
404	How do you dispose of waste?	1. Open field 2. In a privet pit 3. Burning 4. Other (common pit, composting)	
405	What is the type of roof of the house?	1. Corrugated iron 2. Thatch roof 3. Other(specify)________	
406	Does the main house have a window?	1. Yes 2. No	If "no" skip to 408

407	How many windows does the main house have?	____________Windows	
408	Does the house have rooms used only for sleeping?	1. Yes 2. No	If "no" skip
409	How many sleeping rooms does the house have?	_____________Rooms	
410	Do you have a separate kitchen room?	1. Yes 2. No	
411	Do you have separate rooms for cattle?	1. Yes 2. No	
412	What is the wall of your residence house made up of	1. Wood with mud 2. Buckets	

Part V: Child feeding practices

501	Was your child ever breastfed?	1. Yes 2. No	If "no", END Questions about retrospective Feeding
502	How long after birth was your child first put to the breast? If immediately, circle "000" If less than one hour, record "00" hours If less than 24 hours, record hours Otherwise, record days	1. Immediately 0 2. Hours 1 3. Days 2	
503	In the first two days after delivery, was your child given anything other than breast milk to eat or drink anything at all like water, infant formula, or [insert common	1. Yes 2. No 3. Don't know	

	drinks and foods, including ritual feeds that may be given to newborn infants]?		
504	If yes, what types of food did you give?	1.Plain water 2. Sugar water or glucose water 3. Powdered or fresh animal milk 4. Infant formula (add locally available brand names) 5. Other (specify)____	
505	Was your child breastfed yesterday during the day or at night? (Only for 6-24 months children)	1. 2. No	If no skip to Q. No. 507
506	If yes, how often in 1 day?	_________Times	
507	If not, when did you stop to breastfeeding you child?	________Months	
508	Did your child drink anything from a bottle with a nipple yesterday during the day or at night?	1. Yes 2.No 3.Don't know	
509	At what age did you start adding food to your children? (For all 6-59 months children)	________Months	
510	Do you separately prepare food for your children? (For all 6-59 months children)	1. Yes 2. No	
511	When does a child eat their food? (For all 6-59 months children)	1) upon child demand 2) when convenient for the mothers 3) upon child crying	

Part VI: Dietary diversity score questions

Please ask the child's mother to describe the foods (meals and snacks) that ate or drank their child yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning. Write down all foods and drinks mentioned. When composite dishes are mentioned, ask for the list of ingredients. When the respondent has finished, probe for meals and snacks not mentioned. Record these items in the spaces provided at the top of the questionnaire. After the respondent recalls all the foods and drank consumed by their child, underline the corresponding foods in the list under the appropriate food group and write "1" in the column next to the food group if at least one food in this group has been underline and if not write "0". The assessment includes all age of 6-59 months children.

<table>
<tr><td colspan="2">Breakfast</td><td>Snack</td><td>Launch</td><td>Snack</td><td>Dinner</td><td>Snack</td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Question
No-</td><td>Food group</td><td colspan="4">Types of foods</td><td>Yes=1
No=0</td></tr>
<tr><td>1</td><td>Breast milk</td><td colspan="4">(Asked separately, not as part of open recall or list-based recall)
(Only for 6-24 months of children</td><td></td></tr>
<tr><td>2</td><td>Grains, roots and tubers</td><td colspan="4">Porridge, bread, rice, noodles, pasta or other commonly consumed grains, including foods made from grains like rice dishes, noodle dishes, etc. Plantains, white potatoes, white yams, manioc, cassava, or other commonly consumed starchy tubers or starchy tuberous
roots that are white or pale inside</td><td></td></tr>
<tr><td>3</td><td>Legumes, nuts and seeds</td><td colspan="4">Beans, peas, lentils, nuts or other commonly consumed foods made
from beans, peas, lentils, nuts, or seeds</td><td></td></tr>
<tr><td>4</td><td>Dairy products (milk, infant formula, yogurt, cheese)</td><td colspan="4">Infant formula such as local names of common formula Milk from animals such as fresh, tinned or powdered milk Yogurt drinks such as local names of common types of yogurt drinks Yogurt, other than yogurt drinks Hard or soft cheese such as commonly
consumed types of cheese _______________</td><td></td></tr>
</table>

5	Flesh foods (e.g., meat, fish, poultry, organ meats)	Liver, kidney, heart or other commonly consumed organ meats ____________ Sausages, hot dogs, ham, bacon, salami, canned meat or other commonly consumed processed meats _________________Any other meat such as beef, pork, lamb, goat, chicken, duck or other commonly consumed meat _____________ Fresh or dried fish or shellfish	
6	Eggs	Eggs	
7	Vitamin A rich fruits and vegetables	Pumpkin, carrots, sweet red peppers, squash or sweet potatoes that are yellow or orange inside? (any additions to this list should meet “Criteria for defining foods and liquids as ‘sources of vitamin A” Dark green leafy vegetables such as commonly consumed vitamin A-rich dark green leafy vegetables Ripe mangoes, ripe papayas or other commonly consumed vitamin A-rich fruits	
8	Other fruits and Vegetables	Any other fruits such as (commonly consumed fruits) Any other vegetables such as (commonly consumed vegetables)	

I finished my question Thank you!

Time of the question is completed _________________________________

8.3. Afan Oromo participant information sheet and informed voluntary consent form for mothers or the child's guardian.

Akkam bultan/akkam ooltan? Ani maqaan koo ___________________________ jedhama. Yeroo ammaa kan qorannoo obbo Miliiyoon Amaara Miessa Yuunivarsitii Haramayaa Kolleejjii saayinnsi fayyaa fi meedikaalaa irraa dhufanii hawaasa kana keessatti gaggeessan irratti akka ragaa sassaabatti dalagaa jira. Kanaafuu kaayyoo qorannoo kanaafi akkaataa isin itti filatamtan akkan isiniif ibsuuf xiyyeeffannaa akka naaf kennitan kabajaan isin gaafadha.

Mata duree qorannoo: - Haala soorataa daa'imman umuriin isaanii ji'a 6-59 ta'e gareewwan deeggarsa haadha irraa hirmaattootaa fi hirmaattoota hin taane Gumbi Bordoddee, Godina harargee lixaa, naannoo Oromiyaa keessa jiranii sakatta'uu dha.

Kaayyoo qorannoo: - Bu'aan qorannoo kanaa rakkoowwan gama soorataa da'immaniin haadha warraa gareewwan deeggarsa haadha irraa hirmaattootaa fi hirmaattoota hin taane walqabatee jidu jiru addaan baasuudhaan waajjirri fayyaa aanaa tarkaanfii barbaachisaa akka fudhatuuf kaka'uumsa uumuudha. Irra caalatti kaayyoon qorannoo kanaa barreeffama gahuumsa eebba digrii lammaffaa qopheessuudha.

Adeemsaa fi yeroo turtii: - Gaaffiwwan qorannoo kana milkeessuuf gargaaran gaafannoo kana fayyadameen isin gaafadha. Qorannaa keenya adeemsisuudhaaf gaaffiwwan daqiiqaa 30-35 tti fudhachuu danda'u. Kanaaf hanga gaaffii xumurutti yeroo akka naaf kennitan kabajaan isingaafadha.

Miidhaa fi Bu'aa qorannoo: -Qorannoo kana keessatti qooda fudhachuu keetif miidhaan sirra gahu baay'ee xiqqaa dha, kunis yeroo kee haarsaa gootu qofa. Hirmaannaa keetiif kaffaltaan siifkennamu hin jiru, garuu bu'aan qorannoo kanaa qaama karoora qopheessuf odeeffannoo kennuu ni danda'a.

Iccitii: -Ragaan isin nuuf kennitan hundi icciitiidhaan qabama, iddoo iccitis olkaayama. Maqaa keetis ta'ee manaa fi maatii kee wanti adda baasuu gaafannoo kana irratti hin barraa'u. Bu'aan qorannoo kanaa hawaasa malee namadhuunfaa bakka hin bu'u.

Mirga: - Hirmaannaan kee fedhii irratti kan hundaa'eedha. mirga hirmaachuu fi dhiisuu akkasumas gaaffii sitti hin mijoofne yoo jiraate deebisuu dhiisuu mirga qabda.

Teessoo qaama qorannaa: - Qoranoo kana ilaalchisee gaaffii fi yaada yoo qabaatte, qaama dhimmi ilaalu teessoo armaan gadiitiin qunnamuu ni dandeessan.

Maqaa Qorataa: – Milion Amare Miesa

Teessoo- Aanaa Gumbi Bordoddee,

Bilbila -+251934080616

Email-milionamare19@gmail.com

Teessoo IHRERC- Yuunivarsitii Haramayaa lakkosfsa bilbilaa: 02546602011 Lakkoofsa poostaa-235, Harar Yunivarsitii Haramayaa Kolleejjii saayinnsi fayyaa fi meedikaalaa.

Unkaa fedhii qorannoo keessattii qooda fudhachuu Hirmaattootaa

Ani kaayyoo, adeemsa qorannoo, miidhaa fi bu'aa hirmaachuun qabu, dhimma iccitii, mirga hirmaannaa fi teessoo qorataa fi dhaabbata qorannoo kana hooggannu hubadheen jira. akkasumas yeroon barbaadetti qorannoo keessaa bahuu akkan danda'uu fi gaaffii deebisuufnaaf hin mijoofne dhiisuuf mirga akkan qabu hubadhee jira. Kanaafuu fedhii qorannoo keessatti hirmaachuu qabaachuu kiyya labsaa akkaataa gadiitti mallattoo kiyyaan mirkaneessa.

Maqaa fi mallattoo ragaa funaanaa___________________________

8.4. Afan Oromo Version of Questionnaire

01. Lakk. koodii gaafannoo_______________________

02. Lakk. koodii aaraddaa ________________________

03. Sadaarka haadha warraa MtMSGs ilaalchisee

1. Hirmaattootaa 2. Hirmaattootaa kan hin taane

04. Koodii ragaa sassaabaa ________________

05. Guyyaa ragaan funaaname___/___/___A.L.H.

06. Koodii bu'aa (Result codes): Completed =1, partially completed =2, Refuse

Kutaa I: Ragaa qorannoo haala hawaasummaa fi dinagdee Hirmaattootaa

Lakk	Gaafannoo	Deebii	Darbii
101	Daa'ima kanaaf maal taataniif?	1.Haadha 2.Guddiftuu 3.Abbaaa	
102	Umriin keessan waggaadhaan meeqa?	_______________W aggaa	
103	Yeroo daa'ima kana deessan umriin keessan meeqa ture?	__________waggaan	
104	Umriin daa'imaa keessanii meeqa?	__________Ji'aan	
105	Saala daa'imaa?	1. Dhiira 2. Dubarti	
106	Amantaan keessan?	1.Musilima 2.Ortodoksii 3.Protestantii 4.Kaatoolikii 5.Kan biro (ibsii)____	
107	Haalli fuudhaa heerumma keessan yeroo ammaa akkami?	1. Hertumte/fuudhe 2. Kan hiikkate/tte 3.Kophaa/hin heerumne/hin fuune 4.Kan du'ee 5. Adda bahaniiru	
108	Hojiin haadha daa'imaa maali?	1. Qotee bulaa 2. Horsiisee bulaa 3. Hadha mana 4. Daldala 5. Hojji humna 6. Barataa	

		7.Kan biroo (ibsii)____________	
109	Hojiin abbaa daa'imaa maali?	1. Qotee bulaa 2. Horsiisee bulaa 3. Daldala 4. Hojjii humna 5. Barataa 6. Kan b	
110	Haati daa’ima baratanii jiruu?	1. Eeyyee 2. Lakkii	Lakkii yoo Gaaffii 113tti darbi
111	Yoo baratanii jiru ta’e	1. Level-IV fi Sanii oli 2.Barreessuu fi dubbisuu	
112	Abbaan daa’imaa baratanii jirtuu?	1. Eeyyee 2. Lakkii	Lakkii yoo Gaaffii 115tti darbi
113	Yoo baratanii jiru ta’e Yoo baratanii jiru ta’e	1.Level-IV fi Sanii oli 2.Barreessuu fi dubbisuu	
114	Abbaa Warraa kana keessatti baay’ina maatii jiraatan isin dabalatee meeqa?	__________________	
115	Baay’ina daa'immaan waggaa 5 gadii Maatii kana keessa jiraatan meeqa?	_______________	
116	Daa’imni kun daa’ima isa duraa irraa yeroo hangam tokkootti dhalate? (Daa’ima duraa tahuu yoo baate)	________________	
117	Daa’imni kun maatii keessaniif meeqaffaadha?	___________________	

118	Baasii qabeenya/maallaqa mana keessan keessatti murteessuuf eenyuutu Aangoo qaba?	1. Caalatti haadha manaa 2 Caalatti Abbaa warraa 3 .Abbaa warraa qofa 4.Lamaanuu waliin Murteessu	
119	Maddii midhaan nyaata maatii keessani maali?	1. Omishaa qonnaa ofii irraa argamu 2. Bittaadhaan 3 Kan biroo --------------	

Kutaa.II: Safartuulee sadarkaa guddina daa'immanii

Koodii	Safaramaa		Safaraa,1ffaa (Ogeessa1ffaa)	Safaraa ,2ffaa (Ogeessa 2ffaa)		Yaada
201	Ulfaatina (kg)	da'imaa	Kan duraa __________ Kan 2ffaa __________ Avireejii __________	Kan Kan ________ Avireejii ________	duraa 2ffaa	
202	Dheerina dhaabbataan daa'imaa (cm) daa'immaan ji'a 24 oli ta'aniif		Kan duraa __________ Kan 2ffaa __________ Avireeji __________	Kan ________ Avireejii ________ __________ __________	duraa 2ffaa	
203	Dheerina daa'imaa dalgeen (cm) daa'immaan uriin isaanii ji'a 24 gadi ta'aniif		Kan duraa ________ Kan 2ffaa __________ Avireejii ____________	Kan Kan ________ Avireejii __________	duraa 2ffaa	

Kutaa III: Gaafannoo haala fayyaa fi Sirna nyaatatin walqabatuu

Koodii	Gaaffii	Deebisaa	
301	Did you have had ANC follow-up during pregnancy of this child?	1. Yes 2. No	If no, skip to Q. 303
302	Tajaajila dahumsa duraa yeroo daa'ima kana ulfaa qabdutti yeroo meeqaaf dheqxee?	1.Yeroo 4 gadi 2.Yeroo 4 oli	

303	Daa'ima keessan eessatti deessan?	1 Manatti 2 Dhaabbata fayyaatti	
304	Yeroo daa'ima kana ulfa turtanitti nyaata dabalataa ni nyaatta turtanii?	1. Eeyyee 2. Lakkii	
305	Yeroo daa'ima kana hoosiftanitti nyaata dabalaataa ni nyaattu turee?	1. Eeyyee 2. Lakkii	
306	Yeroo ammaa tajaajila karoora maatii ammayyaa kamiyyuu ni fayyadamuu?	1. Eeyyee 2. Lakkii	
307	Torbee lamaan darban keessaa daa'imaa keessaan dhukkubbiin gosa kamuu mudatee jiraa/jirtii?	1. Eyye 2. Lakki	
308	Daa'imni kee talaalamtee?	1. Talaallii Guutuu argatte 2. Gar-tokkee talaalamte 3. Tasumaa hin talaalamne	
309	Daa'imni keessan ji'oota 6'n darban kana keessa qoricha habeenoo (Vit.A) argattee jirtii/jira?	1. Eeyye 2. Lakki	
310	Daa'imni keessan ji'oota 6'n darban kana keessa qoricha raammoo maxxantuu argattee jirtii/jira?	1. Eeyye 2. Lakki	

Kutaa IV: Qulqullina Naannoo/nyaataa/dhugaatii fi tilmaaama qabeenya

401	Maddii bishaan dhugaattii Maatii keessanii maali?	1.Bishaan bonbaa 2.Boonoo umataa 3.Bishaan bollaa 4.Madda qulquluu 5.Madda qulquluu hin tahin 6. Bishaan lagaa 7. Kan biroo (ibsi)_____	

402	Gosa mana fincaani akkamiiti kan maatiin keessan fayadamu?	1. Hinqaban/Dirree/Caakkaatti hagu 2.Mana Fincaanii Aadaa/Sadarkaa hin eeggatin 3.Mana fincaani sadarkaa Eegatae	
403	Harka keessan saamunaan yeroo akkamii dhiqattu? deebisaa tokkoo ol deebisuun ni danda'ama	1. Erga mana fincaanii seenne booda 2. Erga qaama daa'immannii tutuqinee fi udaansifne booda 3. Nyaata qopheessuun dura 4. Daa'ima nyaachisuun dura	
404	Maatiin keessan balfa adda addaa haala kamiin maqisitan?	1. Dirree irratti 2. Iddoo dhuunfaan qopheeffanetti awwaalu 3. Ni gubna 4. Kan biro (Iddoo gataa waliinitti, Kompostii)	
405	Cuqqaallaan/Gubbaan mana keessanii maaliin uwwifame?	1. Qorqoroo, 2 Citaa/Sanbaleexii, 3 Kan biro (ibsi)__________	
406	Manni guddaan/kan maatiin keessan keessa jiraatu fooddaa qaba?	1. Eeyyee 2. Lakkii	Lakkii yoo ta'e Gaaffii
407	Manni guddaan fooddaa meeqa qaba?	___________Baay'ina fooddaa	
408	Manni jireenyaa keessan mana hirriibaa qophaatti ni qabuu?	1. Eeyyee 2. Lakkii	Lakkii yoo ta'e Gaaffii

409	Mana hirriibaa meeqa qabu?	____________Kutaa	
410	Kushiina/Iddoo nyaata maatiif itti qophaa'u qophaatti ni qabduu?	1. Eeyyee 2. Lakkii	
411	Manni jireenya namaa fi beeyladaa qophaatti adda bahee qabduu?	1. Eeyyee 2. Lakkii	
412	Dhaabni mana isin keessa jiraattan maal irraa ijaarame?	1. Mukaa fi Horofa 2. Bulukeetin 3. Kan biro ibsi ________	
413	Lafti/Keessoon mana keessanii maaliin hojjatame?	1. Lafa/Biyyooo/Waan tokkollee 2. Simintoo fi ashawwaa/liishoo 3. Kan biro ibsi _____	
414	Maatin keessan lafaa qonnaa ni qabuu?	1. Eyye 2. Lakki	Lakkii yoo ta'e gaaffii Dabri
415	Lafa qonnaa hektara meeqa qabdu?	____________hektaara	

Paartii V: Haala Nyaata daa'imaa sakatta'uu

501	Daa'imni keessan harma hodhaa/luugaa jiruu?	1.Eeyyen 2. Lakkii	Yoo Lakkii ta'e gaaffii yaadachuu nyaata daa'imaa dhiisii bira darbi
502	Daa'ima keessan dhalattee yeroo hangam takkaatti harma eegalsiiftan	Battalumatti sa'aa "0" Sa'aatii "1" keessatti 3. Guyyaa 2 keessatti	
503	Daa'imni keessan dhalattee hanga guyyaa lamaa keessatti harma keessaniin alatti wanta akka	1. Eeyyen 2. Lakkii, 3. Hin Yaadadhu/hin beeku	

	sukkaaraa, bishaan, Aannan loonii, dhadhaa fi.k.kf soorachiiftanii beektuu?		
504	Eeyyen yoo ta'e maal kennitaniif	Bishaan qofa Bishaanii fi Sukkaara Aannan loonii Aannan formulaa Kan biroo ibsi----	
505	Daa'imni keessan sa'aa 24 kana keessatti ykn Kaleessa irraa eegaltee harma hodhaa jirtii?	1. Eeyyen 2. Lakkii, 3. Hin Yaadadhu	
506	Eeyyen yoo ta'e guyyaa 1 tti si'a meeqa hoosifta?	__________	
507	Yoo Lakkii ta'e Umrii daa'imaa meeqatti dhaabe?	Ji'aan _______	
508	Daa'ima keessan xuuxxoo ni lugsiftuu?	1. Eeyyen 2. Lakkii, 3.Hin yaadadhu	
509	Umriin daa'ima keessanii ji'a meeqatti nyaata dabalataa eegalchiiftan? Daa'imman hundaaf gaafadhu	Ji'a ___	
510	Daa'ima keessaniif nyaata kophaatti ni kopheessituu?	1.Eeyyen 2. Lakkii	
511	Daa'ima keessan yeroo akkamii soorata/nyaata nyaachiftu?	1.Yeroo daa'imni Barbaadetti 2. Yeroo Haadhaaf mijaawetti 3. Yeroo daa'imni booche	

Paartii VI: Gaaffiiwwan qabxii garaagarummaa nyaataa

Mee haati daa'imaa nyaata (nyaataa fi nyaata salphaa) kaleessa halkanii fi guyyaa daa'ima isaanii nyaatan ykn dhugan, mana keessattis ta'e manaan alatti akka ibsitu gaafadhaa. nyaata ykn dhugaatii jalqabaa ganama irraa jalqabi nyaataa fi dhugaatii caqafaman hunda barreessi. nyaatni walmakaa yeroo kaafamu tarree wantoota itti qophaa'an gaafadhu. Deebii kennaan yeroo xumuru nyaataa fi nyaata salphaa hin eeramne qoradhu. Wantoota kana bakka gaaffilee gubbaatti kenname keessatti galmeessi. Deebii kennaan nyaata fi dhugaatii daa'imni ishee/isaa dhuge hunda erga yaadatee booda, nyaata walgitu tarree garee nyaataa sirrii ta'e jalatti jala sararuun garee nyaataa cinaatti tarree irratti "1" barreessaa yoo xiqqaate nyaata garee kana keessaa tokko jala sararame yoo hin taane immoo "0" bareessi.

Ciree	**Nyaata Salphaa (Maksas ii)**	**Laaqana**	**Nyaata Salphaa (Maksasii)**	**Hiraata/Irbaata**	**Nyaata Salphaa (M aksasii)**
Lakkoofsa Gaaffii	Garee nyaataa	Gosa nyaataa			Eeyyee=1 Lakkii=0
1	Daa'imni kee harma ni hodhuu	Haadha kophaati akka siif ibsitu gaafadhu (Daa'imman umriin ji'a 6-24 tahe qofaaf)			

2	Midhaan Nyaataa, Hundee fi Hidda	Boqqolloo, ruuzii, qamadii, Mishingaa, ykn midhaan dheedhii biroo kamiyyuu nyaata kanneen irraa hojjetaman (fkn. daabboo, Buddeenii, ykn oomisha midhaanii biroo) + nyaata naannoo keessa jiru galchuu fkn. daabboo ykn paastaa ykn midhaan biroo naannootti argaman. Dinnichaa adii, Godarree adii, kaasaavaa adii, ykn nyaata biroo hundee irraa hojjetaman, Kaarotaa, Mixaaxisii/Bakulee keessaa burtukaana qabu, Dubbaa ykn Dabaaqulaa	
3	Mindhaan Ittioo, Loozii fi Sanyii	Baaqelaa, Daangullee, Maraara/hulbata, Loozii, ykn Nyaata kanneen irraa omishaman	
4	Aannanii fi Oomishaalee Aannanii	Aannan, itittuu ykn oomishaalee Aannani kan biro yoo fayyadame Aannan Paawudarii	
5	Foon loonii, Lukkuu fi Qurxummiilee	Foon kalee, tiruu, onnee fi K.k. fi kan biroo, Foon loonii, Foon allaattii (Lukkuu, Sololiya, Gogori), hoolaa, re’ee, bineensa bosona, Foon qurxummii haaraa ykn goggogaa ykn qurxummii	
6	Killee	Killee/hanqaaquu lukkuu fi kan biroo kamiyyuu yoo ta’e	
7	Kuduraalee fi muduraalee Vitamin A dhaan badhaadhan	Kuduraalee magariisa dukkanaa’oo/baala qaban, kanneen bosona keessa jiran dabalatee + baala naannootti argamu kan vitaamin-A badhaadhe kan akka amaranth, baala kaasaavaa, Faaruu habashaa, Qaaraa diimaa mi’aawaa fi kkf. Maangoo bilchaate, paappaaya bilchaate, Kuukii fi fuduraalee biroo naannootti argaman vitaamin A-dhaan badhaadhe	

8	Kuduraalee fi Muduraalee Biroo	Kuduraalee biroo (fkn timaatima, shunkurtii diimaa), kuduraalee bosona dabalatee, firii bosona dabalatee firiiwwan biroo yoo nyaate	
			Yes=1 No=0

Gaaffii kootiif deebii kennuu
keessaniif galatoomaa!
Sa'atii gaafannoo itti
xumuramee ___________________________________

9. CURRICULUM VITAE (CV)

1. Personal profile

Full name: -Milion Amare Miesa

Sex: -Male

Place of birth: -Arsi Asela

Date of birth: -07/12/1991E.c

Marital status: -Single

Nationality: -Ethiopia

Current address-West Hararghe (G/Bordode woreda)

Phone: -0934080616

Email address: milionamare19@gmail.com

Educational background/Field of study

No-	Grade	Year/G.c	Place /city	Academic school
1	Degree	2013-2017	Asela/City	Adama University
2	11-12	2009-2010	Asela	Asela prep. School
3	9-10	2006-2007	Asela	Asela Adenet highschooler
4	1-8	2004-2005	Shirka	Shirka Elementary

2. Carrer objectives:

To gate Master of Public Health (MPH) in nutrition from Haramaya University College of Medicine and Health Science school of public health

3. Qualification:

Bsc degree in Public Health Officers from Adama University School of Health.

4. **Language proficiency**

Language	Listening skill	Speaking skill	Reading skill	Writing skill
English	Excellent	Excellent	Excellent	Excellent
Ahmaric	Excellent	Excellent	Excellent	Excellent
Oromic	Excellent	Excellent	Excellent	Excellent

5. **Experience:**

I had 5yrs and 2months experience in the area of AOPD, PHEM, NTD, PHCUD, Nutrition and HEW Coordinators

6. **Certified**

S.N	Title	Training provided	Start	End date	Award
1	TT Tracker user course	Fred Hollows Foundation (FHF) collaboration with West Hararghe Zonal Health Offices	March 6,2020	March 7,2020	Certificate
2	TOT on trainers on facilitators skill competence-based training on integrated refresher training (IRT)	West Hararghe Zonal Health Office	October 4,2021	October 9,2021	Certificate
3	Integrated eye care worker training (IECW)	Oromia Regional Health Bureau in collaboration with the Fred Hollows Foundation Ethiopia	March 26,2018	April 26,2018	Certificate
4	Mental and psychosocial support (MHPSS)	International medical corps in collaboration with the West Hararghe Zonal Health Office	February 15,2023	February 20,2023	Certificate

7. Soft Skills Training:

- Cholera/AWD, COVID19,
- Public health emergency management (PHEM) and emergency preparedness plan (EPP).
- Nutrition on SAM, CMAM, IMAM, IYCF and MIYCN.
- HMIS and others

8. Computer Skills:

- Ms Office Soft ware's (Word Excel, Power point).

9. Personal Skills:

- Self-confidence.
- Quick learner
- Ability to work hard and handle crisis situation and face challenges.
- Good time management and commitment.
- Generating new ideas and solving problems.

10. Hobby and Interest:

- Teaching voluntarily.
- Visit historical place.
- Follow up breaking news, psychological support of disable person.
- Willingness to learn

11. References:

1. Mr. EjigayewTesfaye, Gumbi Bordode Nutrition Focal person. +2510910164258
2. Zakir Mama, Gumbi Bordode Health Offices MCH Head. +2510911392849
3. Mr. ZemarkunTarfa, West Hararghe Zonal PHEM Coordinator. +2510953544050