Original Article

Factors Associated With Minimum Acceptable Diet among Children Aged 6 to 23 Months in Rwanda

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Abstract

Background
Globally, one in two children aged 6 to 23 months fails to meet recommended dietary practices, with 70% fail to meet dietary diversity or meal frequency. This study assessed factors associated with the minimum acceptable diet (MAD) among children aged 6 to 23 months in Rwanda.

Methods
This cross–sectional study utilized secondary data from the 2019–2020 Rwanda Demographic and Health Survey (RDHS), analyzing 1,203 children. Weighted data were analyzed using STATA version 17, employing bivariate and multivariable logistic regression at a 5% significance level.

Results
The prevalence of MAD was 23.9%. Among breastfed children aged 6–8 months, 27.09% achieved the minimum meal frequency (MMF), while only 11.9% of children aged 9–23 months met the MMF. Significant factors associated with MAD included residence in the Eastern Province (AOR: 1.66; 95% CI: 1.02–2.27), access to nutrition–related information (AOR: 1.72; 95% CI: 1.03–2.41), and household wealth, with the richest households showing the highest odds (AOR: 5.93; 95% CI: 3.08–11.42). Delivery in health facilities also increased odds (AOR: 3.42; 95% CI: 1.20–9.77).

Conclusion
The low prevalence of MAD highlights the need for promoting dietary diversity and meal frequency, support low–income households to improve child feeding practices.

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Keywords: Minimum acceptable diet, Child Nutrition, Minimum meal frequency, Rwanda

Introduction

Minimum meal frequency (MMF) refers to the number of meals a child receives per day to meet their age–appropriate energy needs, while minimum dietary diversity (MDD) pertains to the consumption of foods from at least five of the eight recommended food groups, ensuring a balanced intake of essential nutrients. Together, these indicators define the minimum acceptable diet (MAD), which is a composite measure reflecting both adequate meal frequency and dietary diversity. Achieving MAD is crucial for optimal growth, development, and prevention of malnutrition among children aged 6 to 23 months, particularly in low–resource settings.[1]

The World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) suggest that the indicators for appropriate complementary feeding should include initiating feeding practices to constitute the minimum acceptable diet (MAD).[1,2,3] Global statistics report that 50% aged 6 to 23 months do not receive the recommended daily meal frequency. More than two in three (69%) do not receive the foods from recommended food groups which include eggs, fish or meat every day. Therefore only 31% of children receive the minimum dietary diversity, ultimately one in three children aged under five years live in severe food poverty.[1]

The proportion of achieving MAD in Sub–Saharan Africa is low at 14.2% with the lowest level in Liberia (3.2%) to 22% in Rwanda,[4] while the prevalence of MAD child feeding practice in the eastern African region is 11.56%.[5] Inadequate newborn feeding practices lead to malnutrition, inadequate nutrition and chronic stunting that will persist into future generations, by using proper complementary feeding practices, over one–third of child fatalities could be avoided.[6]

The six–to–twenty–three–month window is crucial because as a child develops and becomes more active, breast milk is not enough to supply all of the nutrition. To close this nutrient and energy gap and keep the child from growing stunted, complementary feeding must be started. Children aged more than 6 months should be fed small amounts of suitable and secure solid and semi–solid meals throughout the day as they adjust to eating with the family.[3]

In many countries in Africa, incorrect supplemental feeding is frequently performed despite these recommendations and the health advantages of optimal complementary feeding. A multifaceted range of tasks, encompass the timing of introducing foods, selecting a variety of foods to ensure dietary diversity, employing appropriate preparation methods, determining the right food portions, adhering to feeding schedules, being attentive to newborn signals, and ensuring safe food handling, storage, and preparation.[4]

About 45% of deaths in children under the age of five are caused by nutrition–related issues. These generally take place in nations with low and moderate incomes. Globally, around 51 million, or 7.5% of under–five children, were wasted in 2017, and 38 million, or 5.6%, were overweight. While Rwanda has made remarkable strides in lowering the percentage of children aged five who are malnourished, the scope of the issue remains quite concerning. According to RDHS,[7] 9% of children under the age of five had severely stunted growth, while 33% of children under the age of five were stunted.[7] Studies conducted have emphasized on the MAD feeding practice and determinants of forms of malnutrition such us stunting.[8] However, a little is known on the MAD and associated factors among children aged 6–23 old in Rwanda and the MMF practices for ensuring enough energy required for child's growth is provided.

Despite progress in improving child nutrition in Rwanda, the prevalence of MAD remains low, and factors influencing MAD and its components, such as Minimum Meal Frequency (MMF) and Minimum Dietary

Diversity (MDD), are poorly understood, particularly among children aged 6 to 23 months. Limited research has explored the sociodemographic, economic, and health service–related determinants of MAD in this population. Addressing this gap is critical for informing targeted interventions and policies to enhance complementary feeding practices and reduce malnutrition in Rwanda.

Methods and Materials

Study design
This study was a cross–sectional study based on the 2019–2020 RDHS. A cross–sectional study is an observational study design in which a researcher simultaneously evaluates exposure and outcome.[9] The recent RDHS Survey conducted in 2019–2020, was the sixth survey following those in 1992, 2000, 2005, 2010, and 2014–15.

Study setting
The study was conducted in Rwanda, a landlocked country situated in East–central Africa with more than 13 million (13246394) of population.[10]

Study population
The study population consisted of all 1203 children aged 6 to 23 months, whose data were extracted from the 2019–2020 Rwanda demographic and health survey (RDHS).

Sampling method
The sampling method used in this study was based on a multistage stratified cluster sampling design derived from the 2019–202 RDHS. The country's five administrative Provinces (Kigali, South, North, East and West) were classified into urban and rural strata, households within each stratum were randomly selected using a two–stage process. At the first stage, enumeration areas (EAs) were selected using probability proportional to the size of the population. At the second stage, within each EA, a fixed number of households were randomly selected; all children aged 6 to 23 months within these households were included in the analysis.

Data collection instrument and procedures
The extraction form was used to gather data from the DHS Program's 2019–2020 Demographic and Health Survey dataset. The data extracted included the sociodemographic details and health status of the eligible children, as well as information about their diet and the maternal characteristics of their parents, all of which was evaluated in order to explore the factors that contribute to a MAD.

Data analysis
STATA version 17 was used to clean and analyze the RDHS dataset. The characteristics of the respondents and the prevalence of the MAD were explained using descriptive analysis. The dependent variable under consideration was the practice of providing a MAD, which is binary in nature. A child was deemed to have received a MAD if they met the criteria for both MMF and MDD, regardless of whether they were breastfed or not. To ensure that the analysis accurately reflected the national population, weighting, by using svyset and svy commands, was applied to adjust for the complex survey design. The study investigated the relationship between independent variables (respondents' sociodemographic characteristics and maternal information) and the outcome variable, indicating whether a child received a minimum acceptable diet (MAD) in the 24 hours before the interview. This analysis utilized chi–square tests of independence for bivariate examination. The health state of a child was compared with a MAD using the bivariate analysis. The confounding variables were adjusted and controlled using multiple logistic regression. To present the findings, tables, graphs, and charts were used and 95% of confidence interval was considered to test for hypothesis and association.

Ethical consideration
The study relied exclusively on secondary data obtained from 2019–202 RDHS, which was conducted by National Institute of

Statistics of Rwanda (NISR) in collaboration with DHS Program. NISR followed all necessary ethical protocols including obtaining approval from Rwanda's National Health research ethics committee and ensuring that participants provided informed consent prior to data collection. This study used publicly available, anonymized secondary data; the data obtained from DHS Program database after obtaining permission. Mount Kenya University Ethical review committed provided the ethical permission to conduct the study (MKU04/PGS&R/0910/2023).

Results

Socio–demographic characteristics of Respondents

The study included 1203 children that were aged between 6–23 months as reported in the RDHS dataset. Their mothers were mostly the respondents as the children were too young to respond to the questions. The data in Table 1 indicate that the majority of children surveyed were in the 6–12 months category (39.73%), with 52.7% being male. Insurance coverage was reported for a considerable majority (79.97%) of children. Household heads were mostly aged 30–39 years (43.81%), and mothers were predominantly married (82.88%) and aged 20–34 years (67.5%). Geographically, the Southern Province had the highest respondent concentration (25.35%). Rural areas were more prevalent (79.8%), and primary education was the most common (63.51%). Most respondents identified as Protestant (49.88%) or Catholic (35.16%). Access to information was reported by 42.14% of respondents. Wealth distribution showed a significant portion in the "poorest" (22.86%) and "poorer" (21.78%) categories. The majority of mothers were engaged in formal employment (55.86%), and 98.75% reported the presence of under–five children in their households. Male household heads were predominant (76.31%). (Table 1)
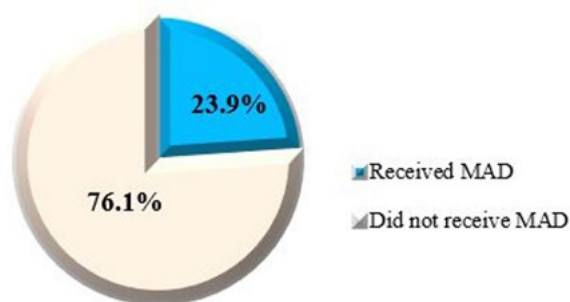
Table 1. Socio–demographic and maternal characteristics of children aged 6–23 months and mothers (N=1203)

Variables	Frequency (n)	Percentage (%)
Age of child in months		
6–12	478	39.73
13–18	396	32.92
19–23	329	27.35
Total	1203	100.0
Sex of child		
Male	634	52.7
Female	569	47.3
Total	1203	100
Covered by insurance		
Yes	962	79.97
No	241	20.03
Total	1203	100
Age of household head		
20–29	262	21.78
30–39	527	43.81
40–49	244	20.28
50+	170	14.13
Total	1203	100
Mother's marital status		
Single	128	10.64
Married	997	82.88
Widow	15	1.25
Separated	63	5.24
Total	1203	100
Mother's age in years		
<20	31	2.58
20–34	812	67.5
35–49	360	29.93
Total	1203	100
Region of residence		
Kigali	139	11.55
South	305	25.35
West	292	24.27
North	186	15.46
East	281	23.36
Total	1203	100
Type of place of residence		
Urban	243	20.2
Rural	960	79.8
Total	1203	100
Mother's education status		
No education	117	9.73
Primary	764	63.51
Secondary	258	21.45
Tertiary	64	5.32
Total	1203	100
Respondent's religion		
Catholic	423	35.16
Protestant	600	49.88
Adventist	126	10.47
Muslim	29	2.41
Traditional	1	0.08
Jehovah witness	5	0.42
Others	5	0.42
No religion	14	1.16
Total	1203	100
Information source		
Yes	507	42.14
No	696	57.86
Total	1203	100
Wealth status		
Poorest	275	22.86
Poorer	262	21.78
Middle	233	19.37
Richer	227	18.87
Richest	206	17.12
Total	1203	100
Mother's occupation		
Not employed	242	20.12
Formal employment	672	55.86
Informal employment	289	24.02
Total	1203	100
Presence of under-five children		
Yes	1188	1.25
No	15	98.75
Total	1203	100.0
Sex of household head		
Male	918	76.31
Female	285	23.69
Total	1203	100.0

Source: Researcher's analysis of RDHS 2019–2020

The Prevalence rate of MAD among 6–23 months old children in Rwanda

On average, 31.17% of children aged 6 to 23 months received at least recommended MDD which is five complementary foods a day from eight listed by WHO with the majority (93.2%) being breastfed followed by vegetables and nuts (72.9%). The results revealed that among those breastfeeding children between 6–8 months, 27.09% had received MMF of at least twice a day. Among the breastfeeding children aged 9–23 months, 11.9% were provided with the MMF at least three times a day, and 10.71% of the non–breastfeeding children were provided with the MMF at least 4 times a day. The MAD was therefore the average of proportions of MMF and MDD, (Figure 1).

The Minimum acceptable diet calculation

The MAD calculation results shown in Table 2 indicate that on average, 31.17% of children with 6 to 23 months received recommended MDD which is at least five complementary foods (breast milk, grains, roots, and tubers; legumes and nuts; vitamin A–rich fruits and vegetables; and other fruits and vegetables) from eight listed by WHO, with the majority being breastfed (93.2%). This prevalence is followed by regimes and nuts (72.9%). The results revealed that among those breastfeeding children between 6–8 months, 27.09% had received MMF at least twice a day. Among the breastfeeding children aged 9–23 months, 11.9% were provided with the MMF of at least three times a day and the non–breastfeeding children that were provided with the MMF of at least 4 times a day were only 10.71%. The MAD was therefore the average of proportions of MMF and MDD (Table 2).

Figure 1. The Prevalence rate of MAD among 6–23 months old children in Rwanda

Table 2. The Minimum Acceptable Diet Calculation (N = 1203)

Minimum Acceptable Diet	Frequency (n)	Percent (%)
Breast milk	1119	93.02
Grains, roots and tubers	458	38.07
Legumes and nuts	877	72.90
Dairy products (e.g. Milk, yogurt and cheese)	24	2.00
Flesh foods (e.g. Meat, fish, poultry, liver or other organs)	186	15.46
Eggs	79	6.57
Vitamin A–rich fruits and vegetables	525	43.64
Other fruits and vegetables.	263	21.86
Total (Receiving at least five food categories)	**375**	**31.17**
Breastfed 6–8 months and eat two times a day	56	27.09
Breastfed 9–23 months and eat three times a day	118	11.90
No breastfed 6–23 months and eat Four times a day	129	10.71

Source: Analysis of RDHS (2019–2020)

The factors of minimum acceptable diet among children aged 6 to 23 months in Rwanda

Table 3. The factors associated with minimum acceptable diet

Variable	COR (CI at 95%)	AOR (CI at 95%)	P Value
Region of residence			
Kigali	1*	1*	
South	1.017 (0.85–1.22)	1.22 (0.72–2.07)	0.466
West	1.022 (1.02–1.13)	0.92 (0.54–1.55)	0.742
North	0.914 (0.83–1.01)	0.64 (0.35–1.19)	0.163
East	1.107 (1.05–1.18)	1.66 (1.05–2.27)	0.041
Type of place of residence			
Urban	1*	1*	
Rural	0.9 (0.86–0.99)	0.72 (0.48–1.09)	0.122
Mother's Education status			
No education	1*	1*	
Primary	0.911 (0.90–0.98)	0.82 (0.48–1.42)	0.476
Secondary	0.95 (0.95–0.95)	0.95 (0.52–1.76)	0.876
Tertiary	1.138 (1.14–1.18)	1.82 (0.80–4.16)	0.156
Information source			
No	1*	1*	
Yes	1.228 (1.22–1.30)	1.72 (1.03–2.41)	0.007
Wealth status			
Poorest	1*	1*	
Poorer	1.091 (1.04–1.18)	1.71 (1.04–2.81)	0.034
Middle	1.16 (1.16–1.16)	1.20 (0.69–2.08)	0.523
Richer	1.078 (1.07–1.08)	2.32 (1.35–3.98)	0.002
Richest	0.983 (0.98–0.99)	5.93 (3.08–11.42)	<0.001
Mother's occupation			
Not employed	1*	1*	
Formal employment	0.95 (0.95–1.05)	1.18 (0.81–1.72)	0.38
Informal employment	1.04 (0.94–1.04)	0.95 (0.59–1.52)	0.819
Delivery site			
At home	1*	1*	
Health facility	1.142 (1.14–1.19)	3.12 (1.09–8.94)	0.035
Others	1.062 (0.95–1.09)	1.37 (0.14–13.66)	0.79
Covered by insurance			
No	1*	1*	
Yes	0.886 (0.87–1.01)	1.38 (0.89–2.13)	0.145
Breastfeeding status			
No	1*	1*	
Yes	0.906 (0.90–1.30)	0.62 (0.37–1.05)	0.076

1*: Reference category; COR: Crude Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval

Source: Analysis of RDHS 2019–2020

To identify the factors associated with MAD, both crude and adjusted odds ratios were calculated to assess the factors that had a significant relationship with the dependent variable (MAD).

The study found that children in the Eastern Province were 1.66 times more likely to receive a minimum acceptable diet (MAD) [AOR=1.66, 95%CI: 1.05–2.27], having a radio, television, or telephone 1.7 times [AOR=1.72, 95%CI: 1.03–2.41]. Children in the richest households had over 5 times higher odds of achieving MAD compared with those in very poor households [AOR=5.93, 95%CI: 3.08–11.42]. Additionally, delivering in health facilities increased the odds of MAD by over three times [AOR=3.12, 95%CI: 1.09–8.94]. Key factors influencing MAD include place of residence, delivery place, information source, and household wealth status (Table 3).

Discussion

The main objective of this study was to explore the prevalence and assess the factors associated with minimum acceptable diets among children aged 6 to 23 months in Rwanda. The study found that the prevalence of MAD in Rwanda is 23.9%. These results are slightly greater than that of the study conducted in India which indicated a prevalence of 21.4%.[4] The prevalence found in this study is over twice as much as 8.4% reported by a different study in Odisha, India,[11] for the East African countries (11.56%), and 14.9% that was identified in Iseyin in Nigeria.[12] with 22% in Uganda.[13] This is due to strategies by the government of Rwanda for improving the maternal and child health. However, the MAD prevalence was much lower than that of Ethiopia (80.2%).[14] This increased prevalence of MAD in Rwanda may be due to the sensitizations given to the people of Rwanda in regards feeding exercise of their infants below two years of age. However, the study's prevalence is less than that of a study done in South Kivu that had the 33% prevalence of MAD for the children and the 74.6% MAD prevalence in Ethiopia.[6]

This could be attributed to different socio–economic conditions, cultural practices and dietary habits in South Kivu and Ethiopia that influence feeding practices.

The study identified some of the factors for MAD and these factors were positively related to achieving the MAD of the infants. This implies that an increase in a factor was likely to increase the attainment of MAD for the infants. The identified factors include the place of residence particularly in the Eastern province, the wealth status of the household (the poor, rich and very rich), having a source of information and delivery place of the mother, and a health facility in particular. These features were similar to several studies that identified some of them as the factors associated with MAD.[11,15–17] However, some of the factors that were identified by these studies for example the mother's education status and education level, antenatal care and post-natal care visits, the breastfeeding status among others were not significant for this study in the case of Rwanda. This may be attributed to the variation in the demographic characteristics of different countries and regions,[4] identified that the higher household wealth index was related to the provision of complementary foods to children in North and East India. This was similar to the findings of the current study as the wealth of the household vital when it comes to buying some of the complementary foods. However, their study did not agree with the current study with respect to the number of ANC visits (more than four visits) as it was not significant in our study. This difference could be linked to the sample size difference (69,464 vs 1203) in the two studies. Furthermore, the gender of a child was found to be significantly associated with MAD in Lalibela, Northwest Ethiopia, which was not the case for Rwanda.[18] This study highlights a substantial prevalence of children under two years of age not meeting the MAD in Rwanda, a rate that exceeds regional and global averages. Government initiatives aimed at improving maternal and child health have played a role in addressing this challenge,

despite that a few gaps remain that require further attention. Factors linked to MAD include residence in the Eastern Province, household wealth, access to information, and delivering at a health facility. Notably, education status, ANC and PNC visits, and gender exhibit variations compared to findings in other regions. The study emphasizes the necessity for targeted interventions considering local demographics to address infant malnutrition effectively and enhance public health outcomes.

Study limitation

This study has strengths and limitations. The strength is that the sample was extracted from the national dataset of the RDHS 2019/2020 and therefore the results can be generalized over the whole country. The first limitation of the study is that it only considered the 24–hour diet recall approach when examining the factors linked with MAD in Rwanda, which may not fully reflect individuals past feeding and dietary habits. This second limitation is that the used quantitative design may not explain the deep challenges and knowledge regarding the minimum acceptable diet practice among participants. Nevertheless, the findings from this study can be widely used in interventional strategies, research and training.

Conclusion

The study revealed that 27.09% of breastfeeding children aged 6–8 months achieved the minimum meal frequency (MMF) of at least 2 times a day, while 11.9% of those aged 9–23 months met the MMF of at least 3 times. Factors contributing to achieving the minimum acceptable diet (MAD) included the region of residence, particularly the eastern province, having a source of information, wealth status (poorer, richer, and very rich), and delivery place from health facilities. Proper early observation of children's feeding practices is crucial for their later development, and addressing the identified factors associated with increased MAD

provision is essential for child nutrition in Rwanda and globally. An in–depth qualitative study should be conducted to gain further insight into the factors contributing to MAD.

Authors' contribution

HI conceptualized the study and conducted the study, CN and MM supervised the study, provided comments and added inputs to the study protocol. TK contributed to data analysis and Manuscript writing.

Conflict of interest declaration

All authors declare no conflicts of interest.

References

1. UNICEF. Too many children are not eating the nutrient–rich foods they need to grow and develop. *Unicef website.* https://data.unicef.org/topic/nutrition/diets/. Accessed 09, April 2024

2. Jones AD, Ickes SB, Smith LE, Mbuya MNN, Chasekwa B, Heidkamp RA, et al. World Health Organization infant and young child feeding indicators and their associations with child anthropometry: A synthesis of recent findings. *Maternal and Child Nutrition.* 2014;10(1):1–17. https://doi.org/10.1111/mcn.12070.

3. WHO. GLOBAL NUTRITION MONITORING FRAMEWORK targets for 2025 A E M IA. *Who website.* 2017. https://www.who.int/publications/i/item/9789241513609. Accessed 17 March 2024

4. Dhami MV, Ogbo FA, Osuagwu UL, Agho KE. Prevalence and factors associated with complementary feeding practices among children aged 6–23 months in India: a regional analysis. *BMC Public Health.* 2019;19(1):1034. https://doi.org/10.1186/s12889-019-7360-6

5. Worku MG, Alamneh TS, Tesema GA, Alem AZ, Tessema ZT, Liyew AM, et al. Minimum acceptable diet feeding practice and associated factors among children aged 6–23 months in east Africa: a multilevel binary logistic regression analysis of 2008–2018 demographic health survey data. *Arch Public Health.* 2022;80(1):127. https://doi.org/10.1186/s13690-022-00882-7

6. Abebe H, Gashu M, Kebede A, Abata H, Yeshaneh A, Workye H, et al. Minimum acceptable diet and associated factors among children aged 6–23 months in Ethiopia. *Ital J Pediatr.* 2021;47(1):215. https://doi.org/10.1186/s13052-021-01169-3

7. RDHS. 6th Rwanda Demographic and Health Survey, 2019–2020 (RDHS –VI). *NISR website* .2020. https://statistics.gov.rw/publication/1724. Accessed 29, January 2024

8. Umwali N, Kunyanga CN, Kaindi DWM. Determinants of stunting in children aged between 6–23 months in Musanze region, Rwanda. *Front Nutr.* 2022;9:1044350. https://doi.org/10.3389/fnut.2022.1044350.

9. Setia M. Methodology series module 3: Cross–sectional studies. *Indian J Dermatol.* 2016;61(3):261. https://doi.org/10.4103/0019-5154.182410

10. Worku MG, Alamneh TS, Tesema GA, Alem AZ, Tessema ZT, Liyew AM, et al. Minimum acceptable diet feeding practice and associated factors among children aged 6–23 months in east Africa: a multilevel binary logistic regression analysis of 2008–2018 demographic health survey data. *Archives of Public Health.* 2022;80(1). https://doi.org/10.1186/s13690–022–00882–7.

11. Acharya A, Pradhan MR, Das AK. Determinants of minimum acceptable diet feeding among children aged 6–23 months in Odisha, India. *Public Health Nutrition.* 2021;24(12):3834–3844. https://doi.org/10.1017/s1368980021002172

12. Ariyo O, Aderibigbe OR, Ojo TJ, Sturm B, Hensel O. Determinants of appropriate complementary feeding practices among women with children aged 6–23 months in Iseyin, Nigeria. *Scientific African.* 2021;13:e00848. https://doi.org/10.1016/j.sciaf.2021.e00848

13. Scarpa G, Berrang–Ford L, Galazoula M, Kakwangire P, Namanya DB, Tushemerirwe F, et al. Identifying Predictors for Minimum Dietary Diversity and Minimum Meal Frequency in Children Aged 6–23 Months in Uganda. *Nutrients.* 2022;14(24):1–18. https://doi.org/10.3390/nu14245208

14. Abebe H, Gashu M, Kebede A, Abata H, Yeshaneh A, Workye H, et al. Minimum acceptable diet and associated factors among children aged 6–23 months in Ethiopia. *Italian Journal of Pediatrics.* 2021;47(1). https://doi.org/10.1186/s13052–021–01169–3.

15. Ba D, Ssentongo P, Lekoubou A, Holland N, Maiga M, Gao X. Prevalence and Determinants of Minimum Acceptable Diet Among Children Aged 6–23 Months in Sub–Saharan Africa: The Demographic and Health Surveys, 2019–2020. *Nutritional Epidemiology* .2022. https://doi.org/10.1093/cdn/nzac067.004

16. Birie B, Kassa A, Kebede E, Terefe B. Minimum acceptable diet practice and its associated factors among children aged 6–23 months in rural communities of Goncha district, north West Ethiopia. *BMC Nutrition.* 2021;7(1). https://doi.org/10.1186/s40795–021–00444–0.

17. Gatica–Domínguez G, Neves PAR, Barros AJD, Victora CG. Complementary Feeding Practices in 80 Low–and Middle–Income Countries: Prevalence of and Socioeconomic Inequalities in Dietary Diversity, Meal Frequency, and Dietary Adequacy. *Journal of Nutrition.* 2021;151(7):1956–1964. https://doi.org/10.1093/jn/nxab088

18. Dhami MV, Ogbo FA, Osuagwu UL, Agho KE. Prevalence and factors associated with complementary feeding practices among children aged 6–23 months in India: A regional analysis. *BMC Public Health.* 2019;19(1):1–16. https://doi.org/10.1186/s12889–019–7360–6

19. Dejene Y, Mezgebu GS, Tadesse SE. Minimum acceptable diet and its associated factors among children aged 6–23 months in Lalibela, northeast Ethiopia: a community–based cross–sectional study. *Journal of Nutritional Science.* 2023;12. https://doi.org/10.1017/jns.2023.24.