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Minimum Dietary Diversity and Associated Factors among Children Aged 6–23 Months in Mozambique: Evidence from the 2022–2023 Demographic and Health Survey

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Abstract

Background

Minimum dietary diversity (MDD) is an important indicator of dietary quality and micronutrient adequacy among young children, and inadequate complementary feeding practices remain common in Mozambique. This study assessed the prevalence of MDD and its associated factors among children aged 6 to 23 months, using nationally representative data from the 2022–2023 Mozambique Demographic and Health Survey (MDHS).

Methods

An analytical cross-sectional design was used, accounting for the complex MDHS sampling design (weights, clustering, stratification). Bivariate associations with MDD were assessed using weighted logistic regression (svyglm, quasibinomial family), yielding crude odds ratios (CORs) with 95% CIs; variables with $p < 0.20$ were retained for the multivariable model, and statistical significance was set at $p < 0.05$.

Results

A total of 2.727 children aged 6–23 months were included. The overall prevalence of MDD was 14.1% (95% CI: 12.34–16.21), ranging from 1.1% in Gaza to 21.1% in Maputo Province. Grains, roots and tubers (85.9%) and breastmilk (76.4%) were the most consumed foods, whereas eggs (5.7%), dairy products (9.8%), and legumes and nuts (27.4%) were the least consumed. Older children (12–17 months: AOR = 2.05, 95% CI: 1.34–3.12; 18–23 months: AOR = 2.19, 95% CI: 1.50–3.20), children of employed mothers (AOR = 1.59, 95% CI: 1.13–2.25), and those in the Central (AOR = 1.58, 95% CI: 1.03–2.43) and Northern regions (AOR = 2.17, 95% CI: 1.29–3.66) were more likely to achieve MDD, while paternal primary education was associated with lower odds (AOR = 0.61, 95% CI: 0.38–0.98).

Conclusion

MDD among children aged 6–23 months in Mozambique remains low, with marked provincial disparities. Child age, maternal employment, paternal education, and region of residence are key determinants. Nutrition-education interventions for mothers and fathers should be geographically targeted, prioritizing the Southern region and households with low paternal education.

1. Introduction

Dietary diversity is considered a determinant of children's nutritional status [1, 2] and a major component of a high-quality diet. It is widely used as an indicator of dietary quality, micronutrient adequacy, and food access, thereby influencing the health outcomes of children under five years of age [3, 4].

A diversified diet is essential for meeting the requirements for essential nutrients. Improved feeding practices through the provision of adequately diverse foods can enhance energy and nutrient intake, leading to better nutritional status. In contrast, inappropriate feeding practices contribute to undernutrition in many developing countries, where diets are predominantly based on starchy staples and seasonal fruits and vegetables, with limited consumption of animal-source foods [5]. According to WHO, children aged 6 to 23 months achieve minimum dietary diversity when they consume foods from at least 5 of the 8 food groups (breast milk; grains, roots, and tubers; pulses, nuts and seeds; dairy products; flesh foods; eggs; and vitamin A-rich fruits and vegetables) in the past 24 hours [6, 7].

In Mozambique, the nutritional status of children continues to pose a significant challenge to public health. The country faces high levels of poverty, food insecurity, and vulnerability to climate, economic, and health shocks, factors that directly affect families' access to nutritious food and health services. In recent years, events such as the COVID-19 pandemic, recurring cyclones, and armed conflicts in some regions have exacerbated social inequalities and further compromised the food security of vulnerable populations [8, 9].

The consequences of malnutrition are particularly critical for children under the age of five, as nutritional deficiencies can have a significant impact on their subsequent growth and development [10]. In Mozambique, according to the 2022–2023 Demographic and Health Survey, national chronic malnutrition (stunting) affected 36% of children under five years of age [11], placing the country among those with the highest burdens of chronic undernutrition in the region. Because inadequate complementary feeding between 6 and 23 months of age is one of the main drivers of this cumulative form of undernutrition, understanding dietary diversity specifically within this age group, as examined in the present study, is essential to addressing Mozambique's broader chronic malnutrition problem [11].

A study conducted in Cabo Delgado, Mozambique, showed that among 6 to 23-month-old children, 17% consumed foods and beverages from at least five out of eight defined food groups, 31% received a minimum frequency of meals, and 23% had a minimum acceptable diet. Furthermore, studies conducted in various countries in sub-Saharan Africa show that children's dietary diversity is influenced by multiple factors, including the child's age, the mother's level of education, the household's socioeconomic status, access to health services, exposure to the media, and women's empowerment [12, 13].

The age range of 6 to 23 months represents a critical window of opportunity for preventing childhood malnutrition and growth faltering, as children at this stage require more energy- and nutrient-dense complementary foods to support their growth and development. Children are particularly susceptible to common childhood illnesses, including diarrheal diseases and infections, which may further increase nutritional requirements and affect growth outcomes [5]. Different food groups provide essential macro and micronutrients necessary for optimal growth, cognitive development, and overall health. Therefore,

achieving adequate dietary diversity is fundamental to ensuring optimal nutrition during early childhood; however, meeting the minimum recommended standards of dietary diversity remains a major public health challenge in many low- and middle-income countries, including Mozambique [14].

Furthermore, to date, many small-scale studies on child dietary diversity have used a cut-off of four out of seven food groups. The indicator was revised in 2017 to add breast milk as a separate food group, thereby increasing the total number of food groups to eight and the cut-off to five groups; the previous version had included infant formula but not breast milk [15]. Moreover, despite the public health relevance of this indicator, nationally representative studies on minimum dietary diversity focused exclusively on Mozambique remain scarce: most of the available evidence comes either from sub-national, district-level analyses or from multi-country comparisons in which Mozambique is only one of several countries considered, rather than the primary focus. Therefore, this study aims to assess the prevalence of minimum dietary diversity and its associated determinants among children aged 6 to 23 months in Mozambique using the revised indicator and nationally representative data from the 2022–2023 MDHS.

2. Materials and Methods

2.1. Study Design

This study adopted an analytical cross-sectional design, using data from the 2022–2023 Mozambique Demographic and Health Survey (MDHS). The MDHS used a two-stage stratified cluster design: in the first stage, enumeration areas were selected within each province, separately for urban and rural strata, with probability proportional to the number of households; in the second stage, a fixed number of households was systematically drawn within each cluster. All eligible children and their mothers in the selected households were included in the child nutrition module, and the DHS collected standardized data through questionnaires developed in collaboration with stakeholders and translated into national languages to address specific health and population needs.

The datasets for this study were extracted from the Children's Recode (KR) file, which contains information on women and children; key variables related to adequate dietary diversity were extracted from these data. The study population comprised children aged 6–23 months and their biological mothers (aged 15–49 years) who were usual residents of or had stayed overnight in; the households sampled by the 2022–2023 MDHS. After excluding children with missing information on dietary intake or on any covariate retained in the final model, a weighted analytic sample of 2.727 children was available for analysis.

2.2. Study Setting

This study was conducted in Mozambique, a country located in south-eastern Africa, bordered by Tanzania, Malawi, Zambia, Zimbabwe, South Africa, and Eswatini. The country is administratively divided into 11 provinces, grouped into three geographic regions: Northern (Niassa, Cabo Delgado, and Nampula), Central (Zambézia, Tete, Manica, and Sofala), and Southern (Inhambane, Gaza, Maputo Province, and Maputo City). According to the 2017 Population and Housing Census, the country had 27.864.265 inhabitants, 66.7% of whom resided in rural areas [16, 17].

2.3. Study Tool and Measurement

2.3.1. Dependent Variable

The outcome was Minimum Dietary Diversity (MDD), defined per the 2021 WHO/UNICEF Infant and Young Child Feeding indicator guidelines as consumption, in the 24 hours preceding the interview, of foods from at least five of eight food groups: (1) breast milk; (2) grains, roots, and tubers; (3) pulses, nuts, and seeds; (4) dairy products; (5) flesh foods; (6) eggs; (7) vitamin A-rich fruits and vegetables; (8) other fruits and vegetables [27]. MDD was coded 1 if a child consumed foods from ≥ 5 groups, and 0 otherwise, applied uniformly to all children aged 6–23 months.

2.3.2. Independent Variables

Candidate covariates were selected a priori based on the WHO/UNICEF IYCF framework and prior literature, grouped as: (i) child and maternal characteristics — child's age (6–11, 12–17, 18–23 months) and sex; maternal age, marital status, education, occupation, antenatal care visits, place of delivery, and birth order; (ii) paternal characteristics father's education and occupation; and (iii) household and community characteristics wealth index, household size, number of children under five, perceived difficulty accessing a health facility, media exposure, area of residence, and region. Province was examined descriptively only (Table 1; Fig. 2) and excluded from the multivariable model due to collinearity with region. Missing/ "unknown" values for a covariate were retained as a separate category in both descriptive and regression analyses to avoid excluding a non-trivial share of the sample.

Table 1
Sociodemographic characteristics of children aged 6–23 months and their parents.

Variable / Category	N	%
Child's age		
6–11 months	934	34.3
12–17 months	880	32.3
18–23 months	913	33.5
Child's sex		
Female	1.406	51.6
Male	1.321	48.4
Area of residence		
Rural	1.983	72.7
Urban	744	27.3
Region		
Southern	382	14.0
Central	1.210	44.4
Northern	1.135	41.6
Wealth index		
Poorest	720	26.4
Poorer	611	22.4
Middle	497	18.2
Richer	562	20.6
Richest	339	12.4
Mother's age		
15–24	1.277	46.8
25–34	982	36.0
≥ 35	468	17.2
Mother's marital status		
Not in union	444	16.3
Married/Cohabitation	2.283	83.7
Mother's occupation		
Unemployed	2.023	74.2
Employed	704	25.8
Mother's education		
Illiterate	834	30.6
Primary	1.295	47.5
Secondary/above	598	21.9
Father's education		
Illiterate	516	18.9
Primary	823	30.2
Secondary/above	614	22.5
Unknown	774	28.4
Father's occupation		
Mozambique, DHS 2022-23 (n = 2.727).		

Variable / Category	N	%
Unemployed	737	27.0
Employed	1.434	52.6
Unknown	556	20.4
Antenatal visits		
No visits	340	12.5
1–3	872	32.0
≥ 4	1.311	48.1
Unknown	204	7.5
Place of delivery		
At home/Other	902	33.1
Institutional	1.825	66.9
Birth order		
1st	616	22.6
2nd–3rd	1.085	39.8
≥ 4th	1.026	37.6
Distance to health facility		
Big problem	1.289	47.3
Not a big problem	1.438	52.7
No problem	0	0.0
Media exposure		
Yes	1.075	39.4
No	1.652	60.6
Number of children < 5 in household		
0	22	0.8
1–2	2.204	80.8
≥ 3	501	18.4
Household size		
≤ 5	1.339	49.1
≥ 6	1.388	50.9
Province		
Niassa	243	8.9
Cabo Delgado	187	6.9
Nampula	705	25.9
Zambézia	499	18.3
Tete	302	11.1
Manica	212	7.8
Sofala	197	7.2
Inhambane	94	3.5
Gaza	105	3.8
Maputo Province	124	4.6
Maputo City	59	2.2
Mozambique, DHS 2022-23 (n = 2.727).		

2.4. Data Management and Analysis

Analyses were performed in R version 4.6.1 using the survey package to account for MDHS sampling weights, clustering, and stratification. Weighted frequencies described sample characteristics and MDD prevalence, overall and by province/region. Bivariate associations were estimated via weighted logistic regression (svyglm, quasibinomial family). Covariates with $p < 0.20$ in bivariate analysis were retained for the multivariable model. Multicollinearity was assessed with the variance inflation factor (VIF); province (VIF = 5.91) was excluded due to collinearity with region (VIF = 2.03), and marital status was excluded despite meeting the $p < 0.20$ threshold because one category had no observations in the complete-case subset. The final model included all remaining candidates simultaneously, yielding adjusted odds ratios (AORs) with 95% CIs; $p < 0.05$ was considered significant. Model calibration and discrimination were assessed using the Hosmer–Lemeshow test and the C-statistic.

2.5. Ethical Considerations

This study was based on publicly available data from the MEASURE DHS program. Permission to access and use the dataset was obtained from http://www.dhsprogram.com. The datasets do not contain personally identifiable information or residential addresses; issues of informed consent, confidentiality, anonymity, and privacy of study participants were addressed by the MDHS authority during the original data collection, and the data were not manipulated or used for any other purpose. There was no direct contact with study participants in the present secondary analysis.

3. Results

3.1. Sociodemographic Characteristics of Children and Their Mothers

A total of 2.727 children aged 6 to 23 months were included in this study (Table 1). Among them, 34.3% were aged 6–11 months and 51.6% were female. Most children resided in rural areas (72.7%), with 44.4% living in the Central region and 41.6% in the Northern region, while only 14.0% were from the Southern region. Regarding household wealth, 26.4% of children belonged to the poorest wealth quintile and 22.4% to the poorer quintile.

Concerning maternal characteristics, most mothers were aged 15–24 years (46.8%), married or cohabiting (83.7%), unemployed (74.2%), and had completed primary education (47.5%). Just under half of the mothers (48.1%) attended at least four antenatal care visits, and 66.9% of children were born in a health facility. Media exposure was reported by 39.4% of mothers, whereas 60.6% had no media exposure.

Provincially, the largest proportions of participants were from Nampula (25.9%), Zambézia (18.3%), and Tete (11.1%). In contrast, Inhambane, Gaza, Maputo Province, and Maputo City each contributed less than 5.0% of the study population.

3.2. Prevalence of Minimum Dietary Diversity

The overall prevalence of Minimum Dietary Diversity (MDD) was 14.1% (95% CI: 12.34–16.21) (Fig. 1). The highest prevalence was observed in Maputo Province (21.1%), followed by Cabo Delgado (18.5%), while the lowest prevalence was recorded in Gaza (1.1%). The remaining provinces showed values between 11.2% and 16.7% (Fig. 2).

Regarding food group consumption, grains, roots, and tubers (85.9%) and breastmilk (76.4%) were the most consumed items. In contrast, consumption of nutrient-dense foods was very low: eggs (5.7%), dairy products (9.8%), and legumes and nuts (27.4%) (Fig. 3).

3.3. Factors Associated with Minimum Dietary Diversity

As shown in Table 2, the final multivariable model identified four factors independently associated with achieving Minimum Dietary Diversity (MDD). Among child-related factors, age was a significant predictor of MDD: compared with children aged 6–11 months, children aged 12–17 months were twice as likely to achieve MDD (AOR = 2.05; 95% CI: 1.34–3.12; $p < 0.001$), and those aged 18–23 months were 2.19 times more likely (AOR = 2.19; 95% CI: 1.50–3.20; $p < 0.001$).

Table 2
Factors associated with minimum dietary diversity among children aged 6–23 months.

Variable / Category	Yes, n (%)	No, n (%)	COR (95% CI)	AOR (95% CI)
Child's age				
6–11 months (ref)	83 (8.8)	852 (91.2)	1.00	1.00
12–17 months	150 (17.1)	730 (82.9)	2.12 (1.51–2.99)	**2.05 (1.34–3.12)** ***
18–23 months	153 (16.8)	760 (83.2)	2.08 (1.44–2.99)	**2.19 (1.50–3.20)** ***
Child's sex				
Female (ref)	198 (14.1)	.,209 (85.9)	1.00	–
Male	189 (14.3)	1.132 (85.7)	1.02 (0.79–1.32)	–
Mother's age				
15–24 (ref)	184 (14.4)	1.093 (85.6)	1.00	–
25–34	144 (14.6)	838 (85.4)	1.01 (0.75–1.37)	–
≥ 35	58 (12.4)	410 (87.6)	0.84 (0.57–1.24)	–
Mother's education				
Illiterate (ref)	93 (11.2)	741 (88.8)	1.00	1.00
Primary	181 (14.0)	1.115 (86.0)	1.29 (0.89–1.86)	1.16 (0.73–1.87)
Secondary/above	112 (18.8)	486 (81.2)	1.84 (1.23–2.75)	1.21 (0.66–2.22)
Mother's marital status				
Not in union (ref)	47 (10.6)	397 (89.4)	1.00	–
Married/Cohabitation	339 (14.9)	1.944 (85.1)	1.47 (1.01–2.16)	–
Mother's occupation				
Unemployed (ref)	270 (13.3)	1,754 (86.7)	1.00	1.00
Employed	117 (16.6)	587 (83.4)	1.29 (0.97–1.72)	**1.59 (1.13–2.25)** **
Father's education				
Illiterate (ref)	82 (15.9)	434 (84.1)	1.00	1.00
Primary	95 (11.6)	727 (88.4)	0.69 (0.45–1.07)	**0.61 (0.38–0.98)** *
Secondary/above	114 (18.5)	501 (81.5)	1.20 (0.81–1.79)	**0.69 (0.40–1.17)**
Father's occupation				
Unemployed (ref)	116 (15.8)	621 (84.2)	1.00	–
Employed	211 (14.7)	1.223 (85.3)	0.92 (0.66–1.29)	–
Area of residence				
Rural (ref)	249 (12.6)	1.734 (87.4)	1.00	1.00
Urban	137 (18.4)	607 (81.6)	1.57 (1.15–2.15)	1.39 (0.87–2.22)
Region				
Southern (ref)	47 (12.3)	335 (87.7)	1.00	1.00
Central	175 (14.5)	1.035 (85.5)	1.21 (0.83–1.75)	**1.58 (1.03–2.43)** *
Northern	164 (14.4)	971 (85.6)	1.20 (0.84–1.72)	**2.17 (1.29–3.66)** **
Wealth index				
Poorest (ref)	81 (11.3)	638 (88.7)	1.00	1.00
Poorer	73 (11.9)	538 (88.1)	1.06 (0.64–1.78)	1.22 (0.75–1.97)
Middle	59 (11.9)	438 (88.1)	1.06 (0.64–1.74)	1.20 (0.70–2.06)
Richer	103 (18.3)	459 (81.7)	1.76 (1.10–2.79)	1.63 (0.89–2.97)

** p-value < 0.05; P < 0.01**; P < 0.001*** Mozambique, DHS 2022-23*

Variable / Category	Yes, n (%)	No, n (%)	COR (95% CI)	AOR (95% CI)
Richest	71 (20.9)	268 (79.1)	2.07 (1.32–3.25)	1.77 (0.87–3.58)
Antenatal visits				
No visits (ref)	44 (12.9)	296 (87.1)	1.00	–
1–3	111 (12.7)	761 (87.3)	0.98 (0.56–1.73)	–
≥ 4	211 (16.1)	1.101 (83.9)	1.29 (0.74–2.25)	–
Place of delivery				
At home/Other (ref)	105 (11.6)	798 (88.4)	1.00	1.00
Institutional	282 (15.4)	1.543 (84.6)	1.39 (0.98–1.97)	0.70 (0.47–1.04)
Birth order				
1st	84 (13.6)	533 (86.4)	1.16 (0.78–1.71)	1.17 (0.77–1.76)
2nd–3rd	180 (16.6)	905 (83.4)	1.47 (1.07–2.01)	1.41 (0.98–2.02)
≥ 4th (ref)	123 (12.0)	903 (88.0)	1.00	1.00
Distance to health facility				
Big problem (ref)	146 (11.3)	1.144 (88.7)	1.00	1.00
Not a big problem	241 (16.7)	1.197 (83.3)	1.58 (1.14–2.18)	1.33 (0.95–1.87)
Media exposure				
No (ref)	181 (10.9)	1.472 (89.1)	1.00	1.00
Yes	206 (19.1)	869 (80.9)	1.93 (1.44–2.58)	1.41 (0.97–2.07)
Number of children < 5 in household				
0	3 (14.8)	18 (85.2)	1.06 (0.22–5.06)	–
1–2	313 (14.2)	1.892 (85.8)	1.01 (0.70–1.46)	–
≥ 3 (ref)	71 (14.1)	431 (85.9)	1.00	–
Household size				
≥ 6 (ref)	181 (13.1)	1.207 (86.9)	1.00	–
≤ 5	205 (15.3)	1.134 (84.7)	1.20 (0.89–1.62)	–
** p-value < 0.05; P < 0.01**; P < 0.001*** Mozambique, DHS 2022-23*				

Regarding parental characteristics, children of employed mothers were 59% more likely to achieve MDD than those of unemployed mothers (AOR = 1.59; 95% CI: 1.13–2.25; p = 0.008). Paternal education was inversely associated with MDD: children whose fathers had primary education had lower odds of MDD than those with illiterate fathers (AOR = 0.61; 95% CI: 0.38–0.98; p = 0.041).

Geographic differences also remained significant after adjustment. Children living in the Central region were 1.58 times more likely to meet MDD (AOR = 1.58; 95% CI: 1.03–2.43; p = 0.037), and children in the Northern region were 2.17 times more likely to meet MDD (AOR = 2.17; 95% CI: 1.29–3.66; p = 0.004) than those in the Southern region.

Other variables, including maternal education, media exposure, place of delivery, birth order, and wealth index, were not significantly associated with MDD in the adjusted model.

The final model showed adequate calibration, with no evidence of lack of fit on the Hosmer–Lemeshow test ($\chi^2 = 7.58$, df = 8, p = 0.476), and modest discrimination, with a C-statistic (area under the receiver operating characteristic curve) of 0.693 (95% CI: 0.662–0.725).

4. Discussion

The prevalence of minimum dietary diversity (MDD) in this study was 14.1% among children aged 6–23 months, indicating that only a small proportion consumed at least five of the eight food groups on the previous day. This is concerning because this age period is a critical window for growth, when energy and micronutrient requirements increase, and complementary feeding becomes particularly important. According to WHO, MDD is defined as consumption of at least five of the eight food groups on the previous day, although the indicator does not establish a minimum quantity of food required within each group [6].

Compared with the 27.4% reported in 2011, [18] the prevalence observed in 2022–23 suggests a substantial decline in dietary diversity over just over a decade. Although this comparison should be interpreted cautiously because the surveys were conducted in different temporal and contextual settings, the

decline may reflect worsening conditions affecting access to diverse foods. Several economic, social, and environmental shocks may have contributed to this pattern. During the COVID-19 pandemic, household consumption in Mozambique fell by 7.1–14.4%, while poverty increased by 4.3–9.9 percentage points, potentially reducing households' ability to obtain more diverse and costly foods such as eggs, meat, fish, and dairy products [8, 19]. Mozambique also experienced major climate shocks, including Cyclones Idai and Kenneth in 2019, which damaged agricultural production and contributed to food insecurity, with approximately 160.000 children under five affected by food shortages and a nutrition crisis in the following months [20].

It is against this backdrop that we take the opportunity to discuss the region variable, which was significant and showed an apparently unexpected pattern: children in the Central and Northern regions were more likely to achieve MDD than those in the Southern region. One possible explanation is the greater importance of agriculture and household food production in these regions. Evidence from Mozambique suggests that, among poor women, greater involvement in agriculture was associated with higher dietary diversity among children, indicating that agriculture may provide both food and income for resource-poor households [21].

However, this explanation should be interpreted only as a hypothesis. The DHS captures the food groups consumed during the 24 hours preceding the interview and does not indicate whether foods were produced by the household, purchased, received, or obtained through other sources, nor does it capture seasonal food availability. Therefore, the higher MDD observed in the Central and Northern regions cannot be interpreted as evidence of better habitual feeding or nutritional conditions in these regions.

Furthermore, MDD does not assess the quantity of food consumed. A child may consume foods from five different groups on a given day while still receiving insufficient quantities, having inadequate meal frequency, or failing to meet energy and nutrient requirements. WHO distinguishes MDD from minimum meal frequency and minimum acceptable diet, which combines dietary diversity with feeding frequency [6]. Thus, the regional differences identified in this study should be interpreted as differences in dietary diversity observed in the 24 hours preceding the survey rather than as evidence of sustained differences in diet quality. Further studies incorporating food security, agricultural production, seasonality, meal frequency, quantity consumed, food sources, and socioeconomic conditions are needed to better understand this association.

This finding is lower than those reported in most other African countries with recent, nationally representative estimates: the Gambia 20% in 2019-20, Rwanda (44%) in 2024–2025, Zambia (22%) in 2024, Malawi (24%) in 2024, Angola (20%) in 2023–2024, Ghana (41%) in 2022 and Kenya (37%) in 2022 [22–27]. Conversely, Mozambique's prevalence is higher than that reported in Liberia (9%) in 2019–2020 and in Nigeria (12%) in 2023–2024 [28, 29]. Taken together, these comparisons indicate that, while Mozambique trails most of its regional peers on this indicator, it is not at the very bottom of the regional distribution.

Such variation, even across countries surveyed within the same short period, is unlikely to be explained by national income alone. It more plausibly reflects a combination of factors: differences in socioeconomic conditions and household food-system characteristics that shape food availability and access; variation in child feeding habits and cultural food practices, including reliance on plant-based versus animal-source diets; differences in study settings, such as the balance of urban and rural strata sampled; and differences in the age structure and size of the analytic samples, which can shift the estimated prevalence independently of true underlying differences [13, 22].

Regarding food groups, consumption of grains, roots, and tubers (85.9%) and breastmilk (76.4%) was highest among children. Similar findings were reported in a study conducted in Malawi, where approximately 70% of children consumed grains, roots, and tubers [30]; another study from Madagascar also found that this food group was the main source of nutrition for children aged 6 to 23 months [31], indicating that staple foods remain the primary component of young children's diet. These results are also consistent with those from a study conducted in Gambia, Liberia, and Rwanda, which likewise identified higher consumption of grains, roots, and tubers and breastmilk [22].

In contrast, the lowest consumption among the food groups assessed was recorded for eggs (5.7%) and dairy products (9.8%), a pattern also reported in Malawi (dairy: 8.0%) and in a pooled analysis of Gambia, Liberia, and Rwanda (dairy: 26.0%) [22, 30], indicating that animal-source foods remain the most difficult food group for young children to access across the region. Beyond affordability and limited household livestock ownership, qualitative evidence from neighboring Tanzania suggests that low egg consumption may also be reinforced by locally held food taboos: caregivers there reported avoiding giving eggs to young children in the belief that eggs could cause hair loss [32]. Whether similar beliefs operate in Mozambique was not assessed by the present survey and warrants dedicated qualitative investigation, given how directly such beliefs could undermine efforts to promote egg consumption as an affordable source of high-quality protein and micronutrients.

Among other variables examined, child age, mother occupation, and father education were significantly associated with minimum dietary diversity after adjustment. Older children were substantially more likely to achieve minimum dietary diversity than their younger counterparts, with the odds rising steadily across the older age bands. This is corroborated by studies conducted in the Gedeo Zone of Ethiopia [12], in Malawi [30], and across nine countries in the wider Eastern and Southern Africa region [18], all of which similarly identified younger child age as one of the most consistent barriers to minimum dietary diversity.

A different finding from a study in southern Ethiopia showed that children aged 6 to 8 months more often met the minimum dietary diversity requirements than older children [33]; this discrepancy may be related, among other factors, to methodological differences in how age groups were defined and compared across studies. The plausible explanation for the pattern observed here is that, as children grow older, they are progressively introduced to a wider variety of solid, semi-solid, and family foods, broadening their dietary diversity; older children also tend to have better developed motor and feeding skills, making it easier for caregivers to offer a range of foods, and caregivers themselves often become more intentional about diet variety as children develop [34]. Another possible explanation is that mothers believe that certain foods, such as bananas, eggs, pumpkin, carrots, green vegetables and meat, are difficult for young

children to digest [35]. In Mozambique, this reinforces the need to deliver age-targeted complementary feeding counselling proactively to caregivers of children under 12 months through routine growth-monitoring and vaccination contacts rather than only once early signs of growth faltering appear.

Children whose mothers were employed were considerably more likely to achieve minimum dietary diversity than those whose mothers were not employed. This is corroborated by studies conducted in Ethiopia [36], across 31 sub-Saharan African countries [13], and across nine countries in the wider Eastern and Southern Africa region [18], all of which identified maternal employment, or its absence, as one of the factors most consistently associated with children's dietary diversity. Employed and more experienced mothers tend to be better equipped to make health and feeding decisions independently, suggesting that maternal participation in the labor market may contribute positively to the quality of children's diets, possibly by providing greater financial stability, more control over household food purchases, and better access to a diverse range of foods, this is in line with broader evidence that employment increases maternal autonomy, which in turn encourages care-seeking behavior and adherence to recommended child feeding practices [37].

In Mozambique, where many mothers work in informal or subsistence agriculture rather than formal employment, policies that expand women's access to formal employment and paid maternity protections, paired with workplace- or community-based nutrition education, could help translate gains in maternal autonomy into more diversified diets for children.

Paternal education also emerged as an independent predictor, although in a direction that runs counter to what might intuitively be expected: children whose fathers had only primary education were less likely to achieve minimum dietary diversity than those whose fathers were illiterate. This can be explained by a study conducted in 56 low- and middle-income countries, which demonstrated that primary education is merely a prerequisite for secondary education and does not guarantee quality learning or provide tools thar are nutritionally relevant. These results also suggest that behavioral practices and health knowledge require more than just basic literacy and numeracy skills. This same study suggests that parents' primary concern lies in keeping the family alive and not necessarily in actively participating in the mundane day-to-day care of their children, including feeding them an adequately diverse diet [38].

The broader literature generally reports a positive association between paternal schooling or involvement and children's diet quality, as corroborated by studies conducted in Ghana [39], in Ethiopia [36], and across 31 sub-Saharan African countries [13], notably, the Ethiopian study also found that low dietary diversity could still be partly attributed to fathers' education level once other socioeconomic circumstances were taken into account, suggesting that the relationship is not always linear. This counterintuitive finding in the present study may reflect residual confounding by household wealth, paternal occupation, or region that is not fully captured by educational attainment alone, or the relatively small number of children in the illiterate-father reference category [40]. In Mozambique, where paternal involvement in child feeding is not routinely assessed in national surveys, further research using more detailed household-level socioeconomic and paternal-involvement data is needed to clarify this association before it is used to guide programming.

4.1 Strengths and Limitations

This study has several limitations. As an observational, cross-sectional analysis, it is vulnerable to residual confounding and cannot establish causality; the associations identified here should therefore be interpreted as descriptive and hypothesis-generating rather than causal. Recall bias and social desirability bias may have affected mothers' reporting of their children's feeding practices over the preceding 24 hours, and some degree of measurement error may have occurred despite the standardized MDHS training and quality-control procedures.

Selection bias is a further consideration: as in most DHS-based analyses, the children's dataset included only children whose mothers were present and eligible for interview at the time of the survey.

Children whose mothers were absent for example, due to work, illness, hospitalization, or death could not be captured, and these children may have differed systematically in their nutritional status; excluding them could have influenced both the prevalence estimates and the associations reported here. Finally, because household food security, dietary intake seasonality, and specific cultural feeding beliefs were not directly measured in the MDHS questionnaire, their contribution to the observed associations could not be assessed.

5. Conclusions

This study, based on nationally representative data from the 2022–2023 Mozambique Demographic and Health Survey, shows was low. Child age, maternal employment, paternal education, and region of residence were the main factors independently associated with MDD, while consumption of nutrient-dense foods such as eggs, dairy products, and legumes and nuts remained very low. These findings highlight the urgent need for nutrition-education interventions targeting mothers and fathers, particularly in the Southern region and among households with low paternal education, alongside strategies to improve access to and consumption of animal-source and other nutrient-dense foods.

5.1. Recommendations

- Province-specific programs (not only region-level), prioritizing Gaza and other low-prevalence provinces, paired with support for smallholder agricultural production.
- Proactive complementary feeding counselling for caregivers of children under 12 months, delivered through vaccination/growth-monitoring visits.
- Policies supporting maternal formal employment (maternity protections, workplace-based nutrition education).
- Engage fathers, not only mothers, in nutrition counselling, with further research on the paternal education finding before it guides policy.
- Incorporate these findings into the Ministry of Health's national nutrition strategies, in collaboration with community/religious leaders.
- Future longitudinal/qualitative studies, including minimum meal frequency (MMF) and minimum acceptable diet (MAD) alongside MDD.

Abbreviations

The following abbreviations are used in this manuscript:

AOR	Adjusted Odds Ratio
ANC	Antenatal Care
CI	Confidence Interval
COR	Crude Odds Ratio
DHS	Demographic and Health Survey
IYCF	Infant and Young Child Feeding
KR	Kids/Children's Recode (DHS dataset)
MDD	Minimum Dietary Diversity
MDHS	Mozambique Demographic and Health Survey
UNICEF	United Nations Children's Fund
VIF	Variance Inflation Factor
WHO	World Health Organization

Declarations

Supplementary Materials

Not applicable.

Informed Consent

Statement: Not applicable. This study used secondary, de-identified, publicly available MDHS data; informed consent was obtained by the original DHS survey team at the time of data collection.

Conflicts of Interest:

The authors declare no conflict of interest.

Funding:

Not applicable.

Author Contribution

Conceptualization, E.J.R. and E.H.C.; methodology, E.H.C.; formal analysis, E.H.C.; supervision, E.H.C., T.A. and K.M.; writing—original draft preparation, E.J.R., E.H.C., T.A. and K.M.; writing—review and editing, E.J.R., E.H.C., T.A. and K.M. All authors have read and agreed to the published version of the manuscript.

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Data Availability

This study was based on publicly available data from the MEASURE DHS program; ethical approval and participant consent were not required for this secondary analysis. Permission to access and use the dataset was obtained from http://www.dhsprogram.com. The datasets used do not contain personally identifiable information or residential addresses. Issues of informed consent, confidentiality, anonymity, and privacy of the study participants were addressed by the MDHS authority during the original data collection; the data were not manipulated or used for any other purpose. There was no direct contact with study participants in this secondary analysis.

6. Patents

Not applicable.

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Figures

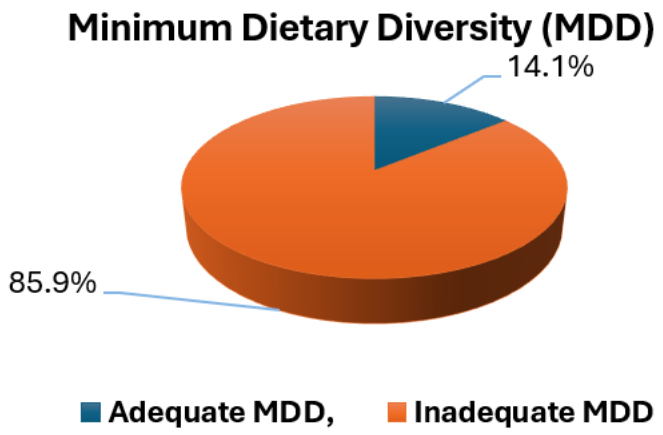


Figure 1

Prevalence of Minimum Dietary Diversity among children aged 6–23 months in Mozambique (MDHS, 2022-23)

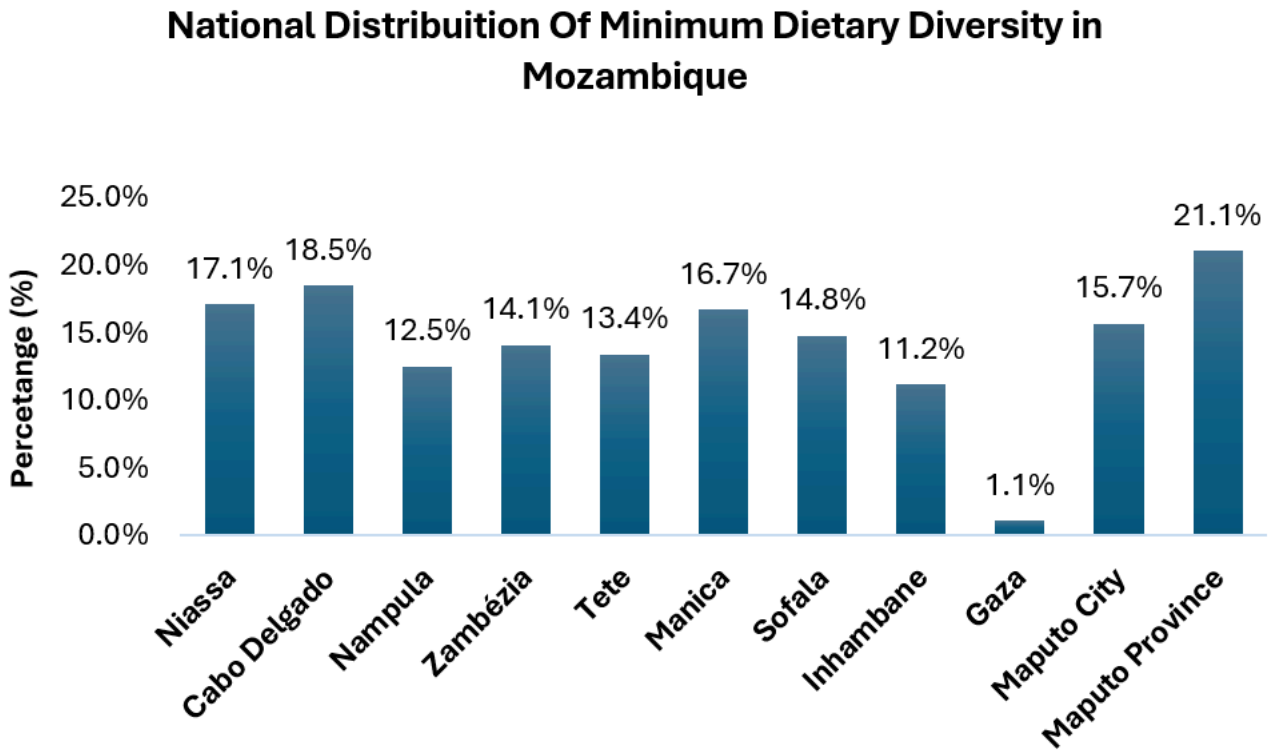


Figure 2

Prevalence of Minimum Dietary Diversity among children aged 6–23 months by province, Mozambique (MDHS, 2022-23)

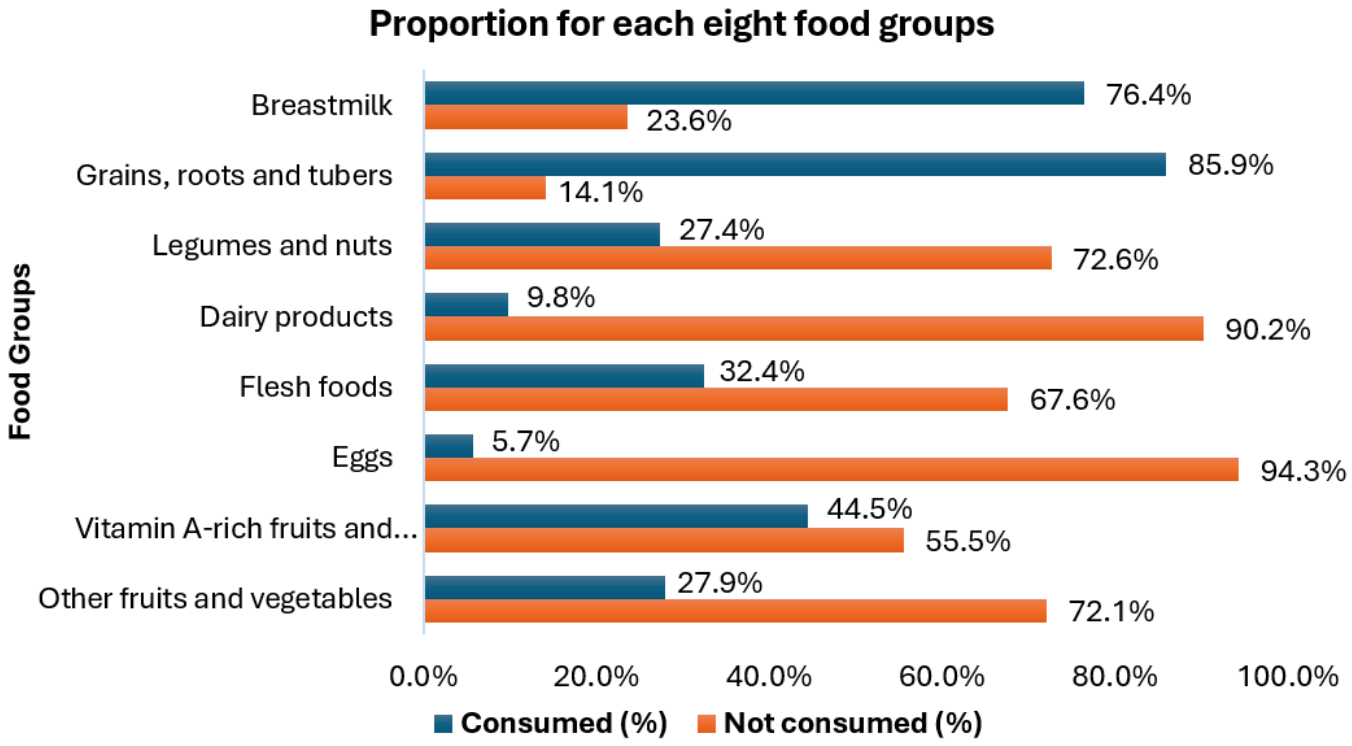


Figure 3

Proportion of food groups consumed by children aged 6–23 months (MDHS, 2022-23)