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Minimum Dietary Diversity and Associated Factors Among 6-59 Months Children in the Chakhesang Naga Tribe (Phek, Nagaland) of Northeast India

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Abstract

Introduction: Adequate nutrition is essential for physical growth and development in early childhood. After six months, infants require complementary foods, as breast milk alone no longer meets their nutritional demands. Little is known about the diets of indigenous communities. Hence, this study explores dietary diversity among children in the Chakhesang community, Nagaland.

Data and methods: A cross-sectional study assessed dietary diversity among 274 Chakhesang children (6-59 months) in Phek district, Nagaland (2023). Using 24-hour recall and WHO guidelines, a Dietary Diversity Score (DDS; 0-8 groups) was calculated. Minimum Dietary Diversity (MDD) is defined as the consumption of ≥5 groups. Bivariate and logistic regression analyses were employed to identify the association between MDD and background characteristics.

Result: The study reveals that the average DDS score is 4 out of 8 food groups, and 37% of children achieved the MDD standard. The most commonly consumed food groups are grains, roots, and tubers (96%), while legumes and nuts are the least consumed (23%), followed by flesh foods (35%) and eggs (38%). Findings indicate that the age of child (36-59 months), male child, first birth order, higher maternal education, and wealth status are significantly ($p<0.05$) associated with MDD.

Conclusion: Nearly two-thirds of children in the study did not meet the MDD requirements (63%), highlighting a significant gap in nutritional adequacy. Given the importance of diverse diets for child growth and development, long-term investment that strengthens the role of women through education and socio-economic empowerment is crucial.

Keywords

Dietary diversity, Indigenous, Nutrition, Nagaland, Under-5 children

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Introduction

Childhood malnutrition remains a pressing global challenge, contributing to nearly 45% of all deaths among children under five (WHO, 2023). While progress has been made, developing regions, particularly Southern Asia, continue to face a burden of malnutrition (FAO, 2004). This crisis is reflected in India, where, despite advancements in nutrition and healthcare, child undernutrition and micronutrient deficiencies remain alarmingly high (Balarajan et al., 2011; IIPS & ICF, 2021). In 2021, 36%, 19%, and 32% of children under five were stunted, wasted, and underweight, respectively (IIPS & ICF, 2016; IIPS & ICF, 2021). Although improvements have been observed in the past decade or so, these rates surpass the threshold for public health significance established by De Onis et al (2018).

Childhood undernutrition is influenced by a complex set of factors. An inadequate diet is directly associated with high rates of stunting and child mortality (WHO, 2021). Inadequate feeding practices during infancy and early childhood contribute to malnutrition, which not only affects physical growth but also impairs cognitive and social development, resulting in poor academic performance (Tiwari et al., 2016). Several studies illustrate that having inadequate dietary diversity significantly increases the risk of being stunted, wasted, and underweight (Khamis et al., 2019; Saha et al., 2023; Ahmad et al., 2018; Gol et al., 2022). Recognizing its importance, the Poshan Abhiyan highlights dietary diversification as one of its 15 key strategies for improving nutrition outcomes (MWCD, 2018).

The minimum dietary diversity (MDD) is defined as the percentage of children 6-23 months who consumed five out of eight food groups (including breastfeeding) based on a 24-hour recall. WHO recommends that children aged 6–23 months be fed a variety of foods to meet their nutrient needs (UNICEF/WHO, 2021). In 2021, only 11% of children aged 6–23 months in India received an adequate diet (IIPS & ICF, 2021). A similar pattern was observed in tribal children, only one in ten children in India received an adequate diet (Pradhan et al., 2024; Ghosh & Varerkar, 2019). Despite the increasing interest in researching Indigenous peoples' food consumption, the indigenous diet remains largely unexplored. In northeast India, Nagaland stands out for its rich biodiversity. Over 70% of the state population resides in rural areas and depends on agriculture and natural resources for their livelihoods (Census, 2011). However, despite rich biodiversity, 80–90% of children primarily consume rice or maize porridge, with limited access to animal-source foods. There is scarce data on broader dietary patterns, though existing studies highlight a heavy reliance on staples like rice and low intake of animal protein among children (Longvah et al., 2017).

Recent survey data indicate worsening child malnutrition trends in Nagaland, with stunting (33%), wasting (19%), and underweight (27%) prevalence increased from 2016 (IIPS & ICF, 2016; 2021). In 2021, only 15% of children aged 6–23 months in Nagaland received an adequate diet, a decline from 19% in 2016. In reflection of these, Nagaland performed poorly in key Sustainable Development Goals (SDGs) such as 'Good Health and Well-Being' as per NITI Aayog Index (NITI Aayog, 2021). In India, previous studies have focused on Anthropometric failure rather than diet diversity in children.

Although the WHO guidelines specifically address children aged 6 to 23 months, dietary diversity remains vital for growth and development up to 5 years. Studies also recommend that MDD be extended to five years (Diop et al., 2021). Programs such as ICDS and Poshan Abhiyaan target children under 5 years but lack age-disaggregated MDD data beyond 2 years. Therefore, this study aims to fill this gap, and the objective is to explore the dietary diversity of 6 to 59 months children in the vulnerable Chakhesang tribe of Phek district, Nagaland.

Data and Methods

Source of data, Study setting and population

Data for this study was collected from September to December 2023 among the Chakhesang tribe of Phek district, Nagaland. The Chakhesang tribe consists of three linguistic subgroups: Chokri, Khezha, and Sapuh/Poula (Poumai Chakhesang) (Yekha-ü & Marak, 2021). According to the 2011 census, the district has a population of 1.6 lakhs, with tribal communities accounting for 96.2 %. This tribe is located in the southeastern part of Nagaland, a hilly district characterized by thick vegetation and rich flora and fauna. The Chakhesang tribe belongs to the Tibeto-Burmese ethnic group and was formerly known as Eastern Angamis; however, they were recognized as the Chakhesang tribe in 1946. The staple foods of this tribe include cereals (rice, maize), tubers (potatoes), legumes (beans), leafy greens, animal proteins, and traditionally fermented products (Longvah et al., 2017). The study population consists of mothers or caregivers with children aged 0 to 59 months.

Sampling technique

A multistage sampling technique was employed to select the respondents. First, three sub-districts were chosen based on a higher composition of the three subtribes: Chokri, Khezha, and Poumai, to capture ethnic diversity. Secondly, three villages from each sub-division were randomly selected. Thirdly, the sample was selected using proportional allocation based on the population distribution of children aged 0-6 years across the villages. The list of mother-child pairs was obtained from the Anganwadi Workers (AWW). Finally, the children were listed and sorted by age, and the desired sample was selected using systematic sampling. If a household had more than one eligible child, the younger one was considered in the study.

Sample Size Determination

The sample size was calculated based on the prevalence of underweight (28%) in Phek district, Nagaland. The following formulae were used to determine the sample size: $n = (z^2pq)/(d^2r)$. The level of confidence (α) is 95%, the z-value is 1.96, and the margin of error d is 5% (0.05). The total sample size is 345 mother-child pairs. However, this study was limited to children aged 6–59 months (when complementary feeding initiated), resulting in a final sample size of 274.

Data Collection Procedures

Face-to-face interviews were conducted, after explaining the study objectives. Before conducting interviews, verbal consent was obtained from participants. Data collection was carried out using a structured questionnaire with the Kobo Toolbox software. Women were asked about the breastfeeding practices and dietary diversity of infants and young children. Additional information was collected on the socio-demographic characteristics of the respondents, such as age, education, occupation, and household wealth.

Dietary Diversity Calculation

We assessed dietary diversity using WHO IYCF guidelines, based on a 24-hour recall. The food items were categorized into seven major food groups: (1) grains, roots, and tubers; (2) legumes and nuts; (3) flesh foods (meat, fish, poultry, and liver/organ meats); (4) eggs; (5) vitamin A-rich fruits and vegetables; (6) dairy products (milk, yogurt, cheese); and (7) other fruits and vegetables.

Dietary Diversity Score (DDS): The dietary diversity score is defined as the sum of food groups consumed by the children in the last 24 hours before the survey. The DDS scores range from 0 to 8; a child receiving a score of 8 consumed all eight food groups, whereas a child receiving a score of 0 did not consume any of the defined food groups (WHO, 2021).

Minimum Dietary Diversity (MDD): MDD is defined as the proportion of children aged 6 to 23 months who consumed foods and beverages from at least five of eight identified food groups on the day preceding the survey. For children 6–24 months, MDD was defined as the intake of at least 5 of the 8 food groups (including breastfeeding) as defined by the WHO. For children aged 3–5 years, only seven food groups are available. The other fruits and vegetables food group was given a weight of '2' to compensate for the missing food group (Kathuria et. al., 2023). MDD is coded as "1" if the child consumed five or more food groups and "0" if the child consumed less than five food groups (WHO, 2021).

Predictor Variables

The covariates were chosen based on the literature review and the study objectives, viz., child, mother, and household characteristics as reported by the mothers. The variables included are: age of the child in completed months: 6-11, 12-23, 24-35, and 36-59 months; sex of the child: male and female; birth order: 1st order, 2nd order, 3rd order, and 4th order and above; mothers age: 15-24, 25-34, 35+ years; mother's education: no formal schooling, primary, high school, secondary and above; parents occupation: cultivator, both working, others; received counselling on IYCF: yes/no; and wealth index: poor, middle, rich.

Statistical Analyses

Descriptive statistics were used to summarize the data, presenting results as frequencies and percentages. Bivariate analysis was employed to show the association between MDD and background characteristics. Further, the Adjusted Odds Ratio (AOR) was calculated using a logistic regression model, with 95% confidence intervals (CIs). If Xi is a set of independent variables, and βi's are its coefficients, then logistic regression is given as:

$$\text{logit(P)} = \log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots + \beta_n X_n$$

Where P is the probability of having MDD, β_0 is the intercept (the log-odds when all X's are zero). $\beta_1, \beta_2, \ldots, \beta_n$ are the coefficients for each independent variable $X_1, X_2, \ldots, X_n$. (Sperandei, 2014). STATA software, version 16.0, used for our statistical analysis.

Results

Social demographic characteristics of the mothers and children

The study included 274 mother-child dyads, with children between 6 and 59 months of age. Table 1 presents the key socio-demographic characteristics of the mother-child pair. Age distribution of participants aligns with expected demographic patterns, with the largest group being preschool-aged children (36-59 months; 39.8%, n=109), followed by the (12-23 months) children (25.9%, n=71), while (20.8%, n=57) of children are in age group (24-35 months),

and infants 6-11 months constituted (13.5%) of the sample. Our data shows that male children outnumbered females (52% vs. 48%). The distribution of children by birth order indicates that a majority (33.9%) belong to the 'above 4th order' category, suggesting a significant proportion of high-parity births. This is followed by 2nd-order (25.5%) and 3rd-order births (25.2%); the 1st-order births constitute the smallest group, accounting for 15.3% of the sample. Maternal age distribution revealed a predominance of 25-34 years old (55.5%), followed by mothers aged ≥35 years (39.4%), with adolescents (15-24 years) constituting the smallest group (5.1%). Maternal education levels varied substantially: 14% had no formal schooling, 54.4%) attained primary education, 15.3%) completed high school, and 16.1% achieved secondary education or higher. The occupational distribution of parents revealed that the majority (64.6%) were dual-cultivator households, reflecting the community's strong agricultural base.

Table 1 Socio-demographic characteristics of the mother-child pair in the study area, Phek district, Nagaland

Variables	Frequency (n)	Percentage (%)
Age of child in months		
6 - 11	37	13.50
12 - 23	71	25.92
24 - 35	57	20.80
36 - 59	109	39.78
Sex		
Male	142	51.82
Female	132	48.18
Birth order		
1st order	42	15.33
2nd order	70	25.55
3rd order	69	25.18
above 4	93	33.94
Age of Mothers		
15- 24	24	5.11
25- 34	152	55.47
35+	108	39.42
Mothers Education		
No formal schooling	39	14.23
Primary	149	54.38
High school	42	15.33
Secondary and above	44	16.06
Parents Occupation		
Both Cultivator	117	64.60
Cultivator & working	46	16.79
Both Working	29	10.58
Others	22	8.03
Received counselling on IYCF*		
No	201	73.36
Yes	73	26.64
Wealth Index		
Poor	110	40.15
Middle	60	21.90
Rich	104	37.96
Total	274	100

**IYCF: Infant and Young Child Feeding*

A significant proportion (16.8%) showed mixed livelihoods, while 10.6% of households had transitioned completely to non-agricultural work. The remaining 8.03% represented other occupations. The study revealed low coverage of IYCF (Infant and Young Child Feeding) counseling, with only 26.6% of mothers reporting having received it, while the majority (73.4%) had not received any counseling. Wealth distribution followed a U-shaped pattern: 40.2% of households fell in the poor category, 21.9% in the middle category, and 37.9% were classified as rich.

Breastfeeding status among children 6 to 23 months

The breastfeeding status of children (6-23 months) in the Chakhesang tribe is presented in Figure 1. The findings show that only 1 in 4 infants under 6 months are exclusively breastfed (24%), falling far below WHO recommendations. Among children 6 to 23 months, 88.9% are currently breastfeeding, reflecting strong adherence to this practice. Nearly 2/3 of newborns are breastfed within 1 hour of birth (64.8%). Over 1/3 receive other liquids/foods before breastfeeding begins (37%). About 4 in 10 newborns missed colostrum feeding, indicating gaps in knowledge about the importance of immediate postpartum feeding (within one hour).

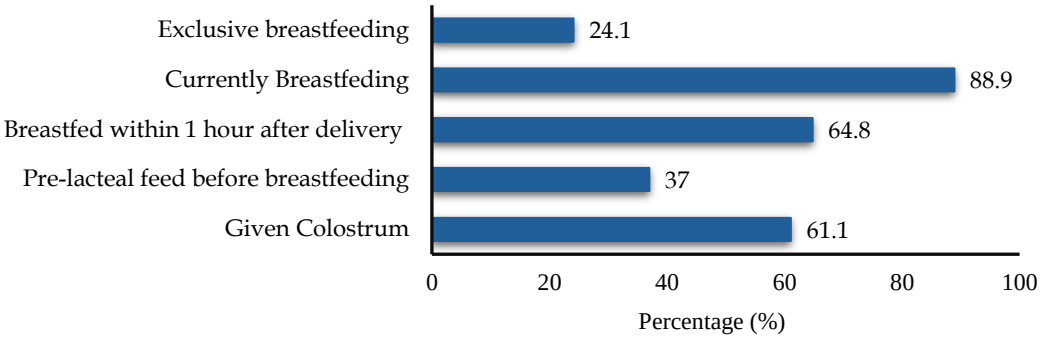

Figure 1 Breastfeeding status among children aged 6-23 months

Specific food group consumption among children in the last 24 hours preceding the survey

The distribution of the Dietary Diversity Score (DDS), based on an 8-food group classification, is presented in Figure 2. The study found that grains, roots, and tubers are nearly universal (95.6%), serving as staple foods for the tribal children. About two-thirds of children consumed vitamin A-rich fruits and vegetables (65.7%). While other fruits and vegetables (42.3%) are consumed moderately, less than half of the children consumed dairy products (43.4%). There is a low consumption of animal-source foods like eggs (38.3%) and flesh foods (34.7%), highlighting potential gaps in dietary diversity and protein intake. Notably, legumes and nuts (23.0%) are the least consumed, suggesting these protein-rich foods are less commonly included in their diets.

Dietary diversity score of children

The distribution of Dietary Diversity Score (DDS) illustrates the number of different food groups consumed in the last 24 hours preceding the survey based on an 8-food group as presented (Figure 3). Only 36.5% of

children from the Chakhesang tribe have achieved Minimum Dietary Diversity (MDD), meaning that 63.5% of the children have not acquired MDD as recommended by the WHO. The mean Dietary Diversity Score (DDS) for the children is 4. The findings show that 36.8% of children consumed only 1–3 food groups, indicating low dietary diversity and potential nutrient deficiencies. About 43.4% of children had slightly better and moderate dietary diversity (4–5 Food Groups). Whereas, only 19.8% of children met higher diversity standards, highlighting a critical gap in balanced nutrition.

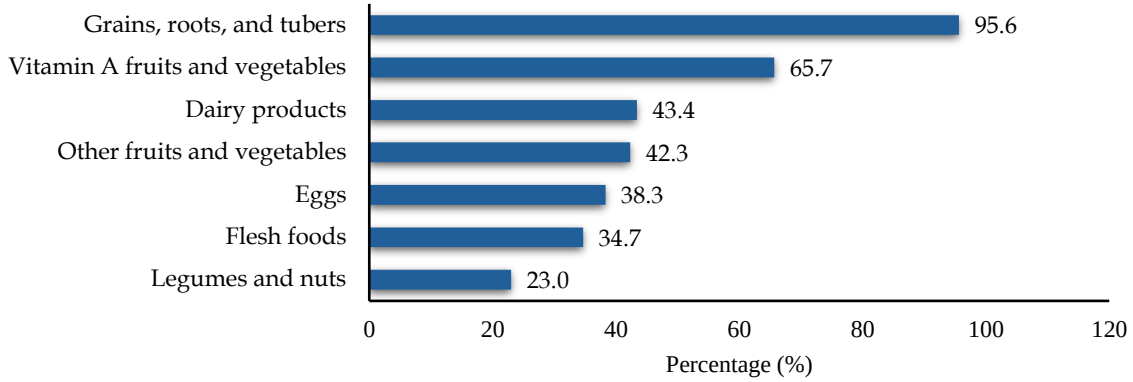

Figure 2 Percentage of children consuming specific food groups based on a 24-hour recall

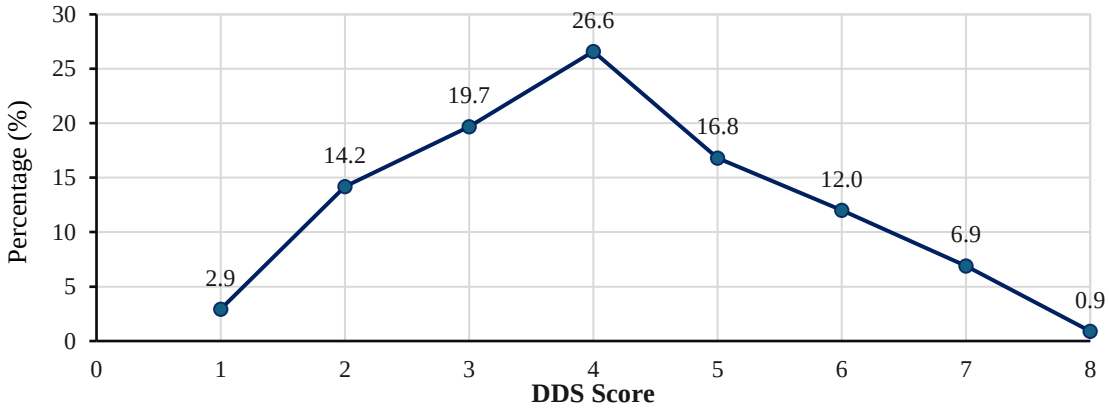

Figure 3 Dietary Diversity Score (DDS) for Children Aged 6-59 months based on 8 Food Groups

Differences in Minimum Dietary Diversity (MDD) of Children by Socio-Demographic Characteristics

The distribution of Minimum Dietary Diversity, a key indicator of child nutrition, across various demographic variables, is presented in Table 2. Only 36.5% of children reached the MDD standard, indicating poor dietary diversity in the studied population. Among the youngest children (6-11 months), only 27%, meaning just about one in every four children, acquired MDD. The proportion of children meeting MDD increases slightly in the 12-23 months (35.2%) and 24–35 months (33.3%) age groups. Notably, the highest MDD rate is observed among children aged 36–59 months (42.2%). Males have an MDD of 10 percentage points higher than that of females (30.4% vs 40.9%). MDD varies across birth orders; 1st and 2nd-order births exhibit

higher MDD rates (42.8% and 40%, respectively). While 3rd-order births show a notable decline (27%), followed by a partial recovery in birth order above 4 (37%). Children of younger mothers (aged 15-24 years) exhibit the lowest MDD rate (28.6%), which may reflect limited caregiving experience or lower awareness of optimal child nutrition guidelines. A modest improvement is observed among children of mothers aged 25-34 years (30.3%). Interestingly, children born to mothers aged 35 years and older show the highest MDD prevalence (46.3%), indicating significantly stronger adherence to diverse feeding practices. Children of mothers with no formal schooling show the lowest MDD (23.1%), primary education corresponds with a notable increase (32.8%), whereas children of mothers with high school completion and secondary education had higher MDD (47.6% and 45.5%) respectively, which underscores education's role in improving feeding practices.

Households where both parents are working demonstrate the highest MDD (62.1%), likely due to higher income stability and diversified food access. In contrast, households where both parents are cultivators (33.9%) or have mixed occupations (cultivator and working) show markedly lower MDD (32.6%). Children whose mothers received counselling have a higher MDD (39.7%) compared to those who did not receive counselling (34.3%), suggesting that nutrition education effectively improves feeding practices. The MDD increases progressively across wealth quintiles: 30% among the poor, 35% in the middle category, and 44.2% among the rich. This pattern reflects the well-established relationship between household economic status and nutritional access.

Table 2 Bivariate Distribution of Background Characteristics with Minimum Dietary Diversity (MDD) in Children Aged 6 to 59 Months, Phek District, Nagaland

Variables	MDD (%)	Variables	MDD (%)
Age of child in months		Mothers Education	
6 to 11	27.03	No formal schooling	23.08
12 to 23	35.21	Primary	32.89
24 to 35	33.33	High school	47.62
36 to 59	42.20	Secondary and above	45.45
Sex		Parents occupation	
Female	30.39	Both Cultivator	33.90
Male	40.91	Cultivator & working	32.61
Birth order		Both Working	62.07
1st order	42.86	Others	31.82
2nd order	40.00	Received counselling on IYCF	
3rd order	27.54	No	34.33
above 4	37.63	Yes	39.73
Age of Mothers		Wealth Index	
15- 24	28.57	Poor	30.00
25- 34	30.26	Middle	35.00
35+	46.30	Rich	44.23
		Total	36.5

Note: Minimum Dietary Diversity (MDD)- Children who consumed 5 out of 8 food groups for 6 to 23 months, and 5 out of 7 food groups for 24 to 59 months.

Determinants of Minimum Dietary Diversity

We examine the association of Minimum Dietary Diversity with various socio-demographic characteristics of mothers, children, and household characteristics using logistic regression with a 95% Confidence Interval (CI) as presented in Table 3.

Table 3 Result of Logistic Regression Showing Association (odds ratios with CI) Between Minimum Dietary Diversity and Selected Background Characteristics of mothers and children, Phek district, Nagaland

Variables	AOR	95% CI
Age of child in months		
6 to 11 ®		
12 to 23	1.71	[0.62-4.65]
24 to 35	0.85	[0.29-2.47]
36 to 59	2.96*	[1.12-7.74]
Sex		
Female ®		
Male	1.81*	[1.01-3.25]
Birth order		
1st order ®		
2nd order	0.7	[0.27-1.78]
3rd order	0.35*	[0.12-0.96]
above 4	0.35*	[0.12-0.97]
Age of Mothers		
15- 24 ®		
25- 34	1.08	[0.28-4.14]
35+	2.83	[0.66-6.01]
Mothers Education		
No formal schooling ®		
Middle	2.11	[0.77-5.76]
High school	4.24*	[1.14-6.77]
Secondary and above	2.07	[0.52-4.13]
Parents occupation		
Both Cultivator ®		
Cultivator & working	0.78	[0.29-2.11]
Both working	2.19	[0.62-7.77]
Others	0.38	[0.11-1.36]
Received counselling on IYCF		
No ®		
Yes	0.59	[0.16-0.28]
Wealth Index		
Poor ®		
Middle	0.77	[0.30-1.94]
Rich	3.31**	[1.45-7.75]

Note: IYCF: Infant and Young Child Feeding, AOR: Adjusted Odds Ratio, CI: Confidence Interval
*® = reference group; * p<0.05; ** p<0.01; *** p<0.001.*

The logistic regression analysis reveals that children aged 36-59 months are three times more likely to acquire MDD compared to younger age groups ($p<0.05$), reflecting developmental progression in food intake capacity and exposure to family diets. There are gender disparities with male children exhibiting 81% higher adjusted odds of meeting MDD than females (AOR: 1.81; 95% CI: 0.99–3.38, $p<0.05$). The adjusted odds ratios (AORs) demonstrate a significant decline in MDD attainment with increasing birth order, suggesting that preferential feeding for firstborn children. Third-order birth and birth order above four are less likely to acquire MDD compared to first birth ($p<0.05$). The study also found that children of mothers with higher education are four times more likely to acquire MDD compared to children of mothers with no formal schooling ($p<0.05$). The logistic regression results show significant socioeconomic disparities in children's dietary diversity. Rich households exhibited 3.3 times higher odds (AOR: 3.31; 95% CI: 1.45-7.75, $p<0.01$). This suggests that households in the higher wealth group overcome structural barriers to diverse diets, highlighting economic status as a key determinant of child nutrition. Interestingly, we found that the age of mothers and parents' occupation has no association with MDD. Similarly, children of mothers who received counselling on IYCF practices have no significant association with MDD.

Discussion

The study intends to capture the dietary diversity of children and to identify the dietary determinants of children among the Chakhesang Tribes in rural areas. It is observed that the daily food habits of this tribe consist of a heavy breakfast in the morning, a light lunch, followed by afternoon snacks, and a hearty dinner in the evening. The study reveals that one in every three children has achieved a Minimum Dietary Diversity (37%) among the children in the Chakhesang tribe, which is lower than a recent study conducted in rural Puducherry (55%) (Rangassamy et al., 2024) but higher than studies in Ethiopia (Jalata & Asefa, 2022). The majority of children did not meet the MDD requirements (63%), highlighting a significant gap in nutritional adequacy. Breastfeeding practices in 6 to 23 months (88.9%) align with the recommended practices by the WHO of breastfeeding up to two years. The most consumed food group is grains, roots, and tubers (95.6%), and these findings are in line with other studies (Beckerman et al., 2020). The consumption of legumes and nuts (23%) and animal-source foods (eggs: 38%; flesh foods: 35%) remains notably low. There is also limited intake of dairy products (43.4%), as found among the Meitei community in Manipur (Loukrakpam et al., 2020). These results underscore the need for targeted interventions to improve access to affordable protein sources while preserving existing breastfeeding and staple food practices.

The alarmingly low MDD among infants (6-11 months: 27%) suggests inadequate complementary feeding practices during this nutritionally vulnerable window. While MDD improves with age (42% for 36-59 months), the progression remains suboptimal. The above association was also confirmed through logistic regression. The three times greater likelihood of MDD attainment among older children (36-59 months) compared to younger age groups ($p<0.05$) likely reflects developmental progression in food intake capacity and greater exposure to family diets. This finding aligns with literature on the association between child age and dietary variety (Rangassamy et al., 2024; Woldegebriel et al.,

2020). An interesting observation is the 83% higher odds of MDD indicated among male children, suggesting potential gender-based feeding disparity even among the tribals, which is unexpected. Another vital factor significantly associated with MDD is birth order. The firstborns show better MDD than higher-order birth children, which reflects the resource dilution effect and a greater attention given to firstborn children; a similar finding reported by a demographic health survey in Ethiopia (Woldegebriel et al., 2020).

The findings also highlight two critical maternal determinants of child dietary diversity. MDD is found higher among mothers aged ≥35 years (46%), suggesting caregiving expertise, greater economic stability, and established social support networks, similar to findings in rural Puducherry (Rangassamy et al., 2024). Maternal education emerges as a key predictor of dietary diversity. The linear trend from the lowest MDD among children of mothers with no schooling (23%) to the highest in those with higher education (47%) aligns with global evidence linking maternal education to improved child nutrition (Jalata & Asefa, 2022; Kundu et al., 2022; Ali et al., 2019). The study also demonstrates the stark contrast between children in dual-income households (62% MDD) and agricultural households (34%), underscoring the nutritional advantage conferred by formal employment, enabling to acquire diverse food items. The study reveals a positive association between household wealth and minimum dietary diversity (MDD), in which rich households exhibit a higher prevalence of MDD (44%) compared to poorer households (30%). This difference is statistically significant ($p < 0.01$). The rich households showed 3.3 times greater odds of achieving adequate dietary diversity than their poorer counterparts. These findings highlight the role of economic resources in enabling access to diverse and nutrient-rich foods, as also evident from prior studies (Jalata & Asefa, 2022; Kundu et al., 2022).

Conclusion

Most children in the study population did not meet the MDD requirements (63%), highlighting a significant gap in nutritional adequacy. Age of child (36-59 months), gender (male), Age of mother, and household wealth are the significant determinants of MDD ($P<0.05$). Given the importance of diverse diets for children's growth and development, community-level awareness programs are needed to educate caregivers about MDD. As the economic condition of households emerges as a key determinant of MDD ($p<0.01$), future programs should combine nutrition education with economic support to enhance affordability. A long-term investment that strengthens the role of women through education and socio-economic empowerment is crucial. Enhancing the awareness of healthy local diets, including diet diversity among children, is vital for a healthier future in this community. Educational interventions are necessary to raise awareness about the negative impact of socio-cultural beliefs on child feeding practices, which are still prevalent in the tribal communities.

Strengths and limitations of the study

The study's strength includes its ability to capture demographic and socio-economic factors that influence dietary diversity. It also offers foundational insights into current dietary patterns, serving as a valuable guide for future research and targeted interventions. As our study employed a single-day 24-hour recall, which may not accurately capture the normal dietary intake over a long period. Besides, the study is

limited to three sub-tribes residing in rural areas in the midst of unique diverse ethnic mosaic.

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Competing interests

The authors declare no competing interests.

Ethical Standard

Ethical clearance was obtained from the Institutional Ethical Review Board of the International Institute for Population Sciences (IIPS) with order no. IIPS/ACAD/SREC/VC/IO-G05/2023.

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