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MATERNAL FACTORS, CHILD DIETARY PRACTICES AND CHILD MALNUTRITION IN SELECTED DISTRICTS IN KARNATAKA

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ABSTRACT This comparative cross-sectional research investigated the associations of maternal factors, dietary habits, delivery practices, and breastfeeding on child malnutrition in 800 children aged 0–6 years from high-burden districts (Vijayapura and Yadgir; n = 400) and low-burden districts (Udupi and Dakshina Kannada; n = 400). Percentages, Pearson's chi-square analyzes, and Cramér's V were employed. The nutritional status exhibited significant variation among the groups, $\chi^2(2, N = 800) = 138.691$, $p < .001$, $V = .416$. In high-burden districts, severe malnutrition was recorded at 35.5%, compared to 9.5% in low-burden districts, but normal nutritional status was observed at 27.0% and 66.5%, respectively. Maternal age at marriage had the most significant correlation in the high-burden cohort (V = .515), while exclusive breastfeeding demonstrated a robust association in both cohorts (V = .437 and .424). Nutritional elements exhibited moderate correlations, but delivery elements were weak or insignificant. The results advocate for localized interventions to avert early marriage, enhance nursing assistance, elevate nutrition standards, and amplify growth surveillance. Given that the study is cross-sectional and bivariate, the findings suggest correlation rather than causality.

KEYWORDS : Maternal Age At Marriage; Exclusive Breastfeeding; Dietary Practices

1. INTRODUCTION

Child malnutrition signifies the interplay of nutritional, health, caring, and social factors, rather than merely a lack of food. Maternal conditions affect the provision of care and accessibility to services, whereas breastfeeding and nutrition define the immediate dietary context for children. The ensuing growth deficiencies may adversely affect health, cognitive function, and future human development (Black et al., 2013; United Nations Children's Fund [UNICEF], 2020).

The advancement of Karnataka varies significantly among its districts. The NFHS-5 indicates that child nutrition metrics in Vijayapura and Yadgir are less favorable compared to those in Udupi and Dakshina Kannada (International Institute for Population Sciences [IIPS] & ICF, 2021a, 2021b). The significance of maternal age at marriage, exclusive breastfeeding, dietary quality, and delivery-related circumstances may vary across these contexts. Premature matrimony may hinder maternal education and independence, whereas suitable nursing and nutrient-rich diets facilitate healthy development (World Health Organization [WHO], 2023).

This research utilizes primary data from 800 children to analyze nutritional status between two district groups and investigates seven maternal, delivery, dietary, and feeding variables. It evaluates the strength of associations through Cramér's V to discern shared and location-specific priorities. The cross-sectional examination is clearly correlational and fails to determine causation.

2. Review of Literature and Research Gap

The UNICEF framework situates child nutrition between direct factors like diet and illness, foundational conditions such as feeding practices and services, and broader societal structures (UNICEF, 2020). Maternal age at the time of marriage correlates with these levels. Premature matrimony can disrupt educational pursuits, diminish independence, and heighten the risk of early pregnancy and maternal malnutrition; research in India links child marriage to adverse child welfare and nutritional results (Chari et al., 2017; Paul et al., 2019).

Nutritional variety and baby nourishment hold similar significance. Indian research links enhanced dietary diversity to better growth, although children in same diversity categories may have varying food choices (Beckerman-Hsu et al., 2020; Borkotoky et al., 2018; Khura et al., 2024; Saha et al., 2023). The World Health Organization (2023) advocates for exclusive breastfeeding for a duration of six months, succeeded by appropriate supplemental feeding. These activities serve as pertinent indicators for the program, although survey correlations may additionally signify maternal health, employment status, morbidity, food accessibility, and counseling.

National and state research highlights general correlations, although there is scant primary evidence assessing their comparative strength across Karnataka districts with markedly varying malnutrition levels. This research fills that void by utilizing identical outcome categories and statistical analyzes across seven maternal, delivery, nutritional, and feeding variables in both district cohorts.

3. Objectives and Hypotheses

The study had three objectives:

1. To quantify differences in normal, moderate, and severe nutritional status between selected high- and low-burden district groups.
2. To examine whether maternal and dietary practices are associated with child nutritional status within each group.

3. Hypotheses

H_0: Maternal and Dietary factors are not associated with child nutritional status within the district group.

H_1: Maternal and Dietary factors are associated with child nutritional status within the district groups

4. METHODOLOGY

The research employed a comparative cross-sectional methodology and utilized primary home survey data. The analytical cohort consisted of 800 children between the ages of 0 and 6 years. Vijayapura and Yadgir were the high-burden district cluster, whilst Udupi and Dakshina Kannada comprised the low-burden group. Every district provided 200 children, ensuring balanced representation from both rural and urban areas; hence, each analysis group comprised 400 observations. Primary caregivers or mothers replied to a systematic, validated questionnaire, with the child serving as the unit of analysis. The dependent variable was the survey's triadic assessment of children's nutritional status: normal, moderate malnutrition, or severe malnutrition. The explanatory variables recorded in the primary-data tables included maternal age at marriage (<18, 18–20, 21–30, or >30 years); location of delivery (home, government hospital, or private hospital); method of delivery (vaginal/normal or caesarean); frequency of fruit and vegetable intake (rarely, frequently, or always); frequency of protein-rich food intake (rarely/never, frequently, or always); frequency of junk food consumption (rarely, frequently, or always); and exclusive breastfeeding for six months (yes or no). No outcomes are documented for factors excluded from the accompanying tables.

The distribution of nutritional status within each predictor category was characterized by counts and row percentages. Pearson's chi-square test evaluated bivariate relationships at $\alpha = .05$. Cramér's V was computed using the formula $V = \sqrt{[\chi^2/\{N \times \min(r - 1, c - 1)\}]}$ and categorized as negligible (<.10), weak (.10–.19), moderate (.20–.39), strong (.40–.59), or extremely strong (≥.60). The assessments were recalculated based on the documented cell counts, individually for the two district categories. A complementary chi-square analysis assessed

the aggregate three-category result among the groups. Due to the differing burden-based district selection and the cross-sectional design, these statistics illustrate sample correlations; they do not confirm temporality, independent effects, or causation.

5. RESULTS

5.1 Regional Distribution of Nutritional Status

The nutritional status exhibited significant variation among the district groups, $\chi^2(2, N = 800) = 138.691$, $p < .001$, $V = .416$ (Table 1). In the high-burden group, severe malnutrition was recorded at 35.5%, while in the low-burden group, it was 9.5%; the prevalence of normal status was 27.0% and 66.5%, respectively. The regional null hypothesis (H_0R) was dismissed.

Table- 1: Nutritional Status by Selected District Group

District group	Normal	Moderate	Severe	Total	Group comparison
High burden	108 (27.0)	150 (37.5)	142 (35.5)	400 (100.0)	$\chi^2(2, N = 800) = 138.691$; $p < .001$; $V = .416$
Low burden	266 (66.5)	96 (24.0)	38 (9.5)	400 (100.0)	
Total	374 (46.8)	246 (30.8)	180 (22.5)	800 (100.0)	

Note: Values are n (row %), Percentages may not total 100 because of rounding.
Source: Primary survey.

5.2 High-Burden Districts

Table 2 analyzes the seven elements of Vijayapura and Yadgir. Maternal age upon marriage emerged as the most significant relation, succeeded by exclusive breastfeeding; dietary influences were moderate, while delivery factors were weak or insignificant.

Table 2: Maternal, Delivery, Dietary, and Feeding Factors in the High-Burden Districts (N = 400)

	Characteristic / Category	Normal	Mode-rate	Severe	Total	Pearson's χ^2 test
Maternal age at marriage	<18 years	5 (5.1)	15 (15.3)	78 (79.6)	98 (100.0)	$\chi^2(6) = 212.385$; $p < .001$
	18–20 years	20 (13.0)	90 (58.4)	44 (28.6)	154 (100.0)	
	21–30 years	75 (67.0)	30 (26.8)	7 (6.2)	112 (100.0)	
	>30 years	8 (22.2)	15 (41.7)	13 (36.1)	36 (100.0)	
Place of delivery	Home	8 (19.5)	15 (36.6)	18 (43.9)	41 (100.0)	$\chi^2(4) = 6.577$; $p = .160$
	Government hospital	63 (32.0)	66 (33.5)	68 (34.5)	197 (100.0)	
	Private hospital	37 (22.8)	69 (42.6)	56 (34.6)	162 (100.0)	
Mode of delivery	Vaginal/ normal	85 (31.3)	97 (35.7)	90 (33.1)	272 (100.0)	$\chi^2(2) = 7.845$; $p = .020$
	Caesarean	23 (18.0)	53 (41.4)	52 (40.6)	128 (100.0)	
Fruit and vegetable consumption	Rarely	23 (13.3)	85 (49.1)	65 (37.6)	173 (100.0)	$\chi^2(4) = 60.771$; $p < .001$
	Frequently	47 (29.7)	41 (25.9)	70 (44.3)	158 (100.0)	
	Always	38 (55.1)	24 (34.8)	7 (10.1)	69 (100.0)	
Protein-rich food consumption	Rarely/never	10 (15.4)	17 (26.2)	38 (58.5)	65 (100.0)	$\chi^2(4) = 42.830$; $p < .001$
	Frequently	34 (18.8)	75 (41.4)	72 (39.8)	181 (100.0)	
	Always	64 (41.6)	58 (37.7)	32 (20.8)	154 (100.0)	
Junk-food consumption	Rarely	14 (35.9)	10 (25.6)	15 (38.5)	39 (100.0)	$\chi^2(4) = 47.052$; $p < .001$
	Frequently	35 (22.3)	90 (57.3)	32 (20.4)	157 (100.0)	
	Always	59 (28.9)	50 (24.5)	95 (46.6)	204 (100.0)	
Exclusive breastfeeding for six months	Yes	85 (35.6)	110 (46.0)	44 (18.4)	239 (100.0)	$\chi^2(2) = 76.493$; $p < .001$
	No	23 (14.3)	40 (24.8)	98 (60.9)	161 (100.0)	
	Overall total	108 (27.0)	150 (37.5)	142 (35.5)	400 (100.0)	

Note: Values are n (row %). Tests are Pearson's chi-square tests within the district group.
Source: Primary survey.

Maternal age at marriage exhibited a significant correlation, $\chi^2(6, N = 400) = 212.385$, $p < .001$, $V = .515$: severe malnutrition occurred in 79.6% of cases when mothers wed before 18 and in 6.2% when they married between 21 and 30 years. Exclusive breastfeeding exhibited a robust correlation ($V = .437$); the incidence of severe malnutrition was 60.9% in the absence of exclusive breastfeeding and 18.4% in its presence. Consumption of fruits and vegetables, protein-dense foods, and junk food had a modest correlation with nutritional status ($V = .231–.276$), despite certain frequency patterns being non-linear. The method of delivery was notable however feeble ($V = .140$), whereas the location of delivery was not significant ($p = .160$). Consequently, the null hypothesis unique to each factor was dismissed for all variables except the location of delivery.

5.3 Low-Burden Districts

Table 3 displays the relevant findings for Udupi and Dakshina Kannada. Exclusive breastfeeding was prioritized, the three food interventions were deemed modest, and both delivery factors were considered insignificant.

Table- 3: Maternal, Delivery, Dietary, and Feeding Factors in the Low-Burden Districts (N = 400)

	Characteristic/ category	Normal	Mode-rate	Severe	Total	Pearson's χ^2 test
Maternal age at marriage	<18 years	15 (39.5)	13 (34.2)	10 (26.3)	38 (100.0)	$\chi^2(6) = 29.644$; $p < .001$
	18–20 years	75 (58.6)	38 (29.7)	15 (11.7)	128 (100.0)	
	21–30 years	135 (75.8)	33 (18.5)	10 (5.6)	178 (100.0)	
	>30 years	41 (73.2)	12 (21.4)	3 (5.4)	56 (100.0)	
Place of delivery	Home	6 (66.7)	1 (11.1)	2 (22.2)	9 (100.0)	$\chi^2(4) = 2.743$; $p = .602$
	Government hospital	142 (65.7)	52 (24.1)	22 (10.2)	216 (100.0)	
	Private hospital	118 (67.4)	43 (24.6)	14 (8.0)	175 (100.0)	
Mode of delivery	Vaginal/ normal	132 (65.7)	54 (26.9)	15 (7.5)	201 (100.0)	$\chi^2(2) = 3.189$; $p = .203$
	Caesarean	134 (67.3)	42 (21.1)	23 (11.6)	199 (100.0)	
Fruit and vegetable consumption	Rarely	10 (25.6)	10 (25.6)	19 (48.7)	39 (100.0)	$\chi^2(4) = 92.673$; $p < .001$
	Frequently	85 (60.3)	45 (31.9)	11 (7.8)	141 (100.0)	
	Always	171 (77.7)	41 (18.6)	8 (3.6)	220 (100.0)	
Protein-rich food consumption	Rarely/never	10 (25.6)	13 (33.3)	16 (41.0)	39 (100.0)	$\chi^2(4) = 67.668$; $p < .001$
	Frequently	78 (60.9)	36 (28.1)	14 (10.9)	128 (100.0)	
	Always	178 (76.4)	47 (20.2)	8 (3.4)	233 (100.0)	
Junk-food consumption	Rarely	88 (80.7)	14 (12.8)	7 (6.4)	109 (100.0)	$\chi^2(4) = 74.838$; $p < .001$
	Frequently	124 (81.0)	17 (11.1)	12 (7.8)	153 (100.0)	
	Always	54 (39.1)	65 (47.1)	19 (13.8)	138 (100.0)	
Exclusive breastfeeding for six months	Yes	160 (88.4)	13 (7.2)	8 (4.4)	181 (100.0)	$\chi^2(2) = 71.779$; $p < .001$
	No	106 (48.4)	83 (37.9)	30 (13.7)	219 (100.0)	
	Overall total	266 (66.5)	96 (24.0)	38 (9.5)	400 (100.0)	

Note: Values are n (row %). Tests are Pearson's chi-square tests within the district group. Source: Primary survey.

Exclusive breastfeeding had a significant correlation, $\chi^2(2, N = 400) =$

71.779, p < .001, V = .424; 88.4% of children who were exclusively breastfed were classified as normal, in contrast to 48.4% of those who were not. Consumption of fruits and vegetables, protein-rich foods, and junk foods had modest correlations (V = .291–.340), with the most adverse effects shown in children who had restricted access to nutrient-dense meals or frequently consumed junk food. The age of mothers at the time of marriage was notable however feeble (V = .192). The location and method of delivery were not statistically significant (p = .602 and .203). The factor-specific null hypothesis was thereby dismissed for mother age at marriage, the three dietary variables, and exclusive breastfeeding, while it was upheld for both delivery factors.

5.4 Comparative Magnitude of Associations

Table 4 illustrates a prevalent feeding pattern alongside a distinct mother pattern. Exclusive breastfeeding was prevalent in both cohorts, although mother age at marriage was significantly pronounced solely in the high-burden districts. Dietary elements were positioned in the median, while delivery elements were placed at the bottom.

Table 4 Ranking of Associations With Child Nutritional Status by District Group

Panel A. High-burden Districts (N = 400)

Rank	Factor	χ^2 (df)	p	V	Magnitude
1	Maternal age at marriage	212.385 (6)	< .001	.515	Strong
2	Exclusive breastfeeding	76.493 (2)	< .001	.437	Strong
3	Fruit and vegetable consumption	60.771 (4)	< .001	.276	Moderate
4	Junk-food consumption	47.052 (4)	< .001	.243	Moderate
5	Protein-rich food consumption	42.830 (4)	< .001	.231	Moderate
6	Mode of delivery	7.845 (2)	.020	.140	Weak
7	Place of delivery	6.577 (4)	.160	.091	Negligible

Panel B. Low-burden Districts (N = 400)

Rank	Factor	χ^2 (df)	p	V	Magnitude
1	Exclusive breastfeeding	71.779 (2)	< .001	.424	Strong
2	Fruit and vegetable consumption	92.673 (4)	< .001	.340	Moderate
3	Junk-food consumption	74.838 (4)	< .001	.306	Moderate
4	Protein-rich food consumption	67.668 (4)	< .001	.291	Moderate
5	Maternal age at marriage	29.644 (6)	< .001	.192	Weak
6	Mode of delivery	3.189 (2)	.203	.089	Negligible
7	Place of delivery	2.743 (4)	.602	.059	Negligible

Note. Rankings are based on Cramér's V within each group. Magnitude describes association, not causal importance. Source: Primary survey; statistics recomputed from reported cell counts.

6. DISCUSSION

The results validate a significant nutritional disparity between the chosen northern and coastal regions, while also indicating that the correlational hierarchy varies by context. Due to the selection of districts based on differing challenges, this comparison illustrates the sampling environments and should not be seen as a statewide causal inference.

The age of mothers at the time of marriage was the primary high-burden factor. Premature matrimony can disrupt education, limit independence, and elevate the risk of early pregnancy and maternal malnutrition, potentially impacting future childcare and nutrition practices (Chari et al., 2017; Paul et al., 2019). The diminished correlation in the low-burden group indicates that regional factors might influence this connection. The irregular trend observed in moms who wed after the age of 30 suggests potential subgroup and confounding influences.

Exclusive breastfeeding emerged as the sole significant correlation in both environments, reinforcing the need for ongoing, practical feeding support in alignment with WHO recommendations (WHO, 2023). Dietary correlations were moderate and typically more structured in the low-burden regions, aligning with Indian findings on dietary diversity (Borkotoky et al., 2018; Khura et al., 2024; Saha et al., 2023). Anomalous trends in certain high-burden classifications can indicate seasonality, portion sizes, age variations, or dietary modifications following sickness; hence, frequency categories should not be regarded as exact intake indicators (Beckerman-Hsu et al., 2020).

The factors related to delivery provided minimal explanatory significance. The location of delivery was not significant in either group, whereas the method of delivery showed a weak significance solely in the high-burden group. Obstetric hazards, premature birth, neonatal weight, and postnatal assistance could obscure this outcome. The data endorses a unified nutrition-service framework that emphasizes enhanced maternal life-course interventions in high-burden areas, alongside intensive breastfeeding and dietary assistance in both environments.

7. CONCLUSION

Child malnutrition rates were significantly elevated in Vijayapura and Yadgir compared to Udupi and Dakshina Kannada. Maternal age at marriage emerged as the primary high-burden correlation, exclusive breastfeeding had significant strength in both contexts, while dietary factors were of moderate influence; delivery factors were weak or inconsequential. The results endorse a collective nutrition framework with priorities tailored to each district, however the cross-sectional methodology constrains interpretation to mere association.

8. Policy Implications

- **Address Early Marriage as an Upstream Nutrition Risk.** The strong high-burden association supports combining enforcement of the legal marriage age with girls' school retention, adolescent nutrition, reproductive-health support, and livelihood opportunities in Vijayapura and Yadgir.
- **Strengthen Breastfeeding Support Across all Districts.** Because exclusive breastfeeding was strongly associated in both groups, Anganwadi workers, ASHAs, and facility staff should provide practical assistance from pregnancy through six months and monitor feeding outcomes, not only counselling contacts.
- **Improve Diet Quality and the Local Food Environment.** ICDS, the Public Distribution System, and Mission Saksham Anganwadi and Poshan 2.0 should improve access to fruits, vegetables, pulses, milk, eggs, or acceptable alternatives while discouraging displacement by low-cost processed foods (Ministry of Women and Child Development, 2022).
- **Use District-sensitive Monitoring within a Common Service Continuum.** High-burden districts should prioritise children exposed to early maternal marriage and poor feeding, while low-burden districts should identify diet-related vulnerability hidden by favourable averages. Antenatal care, breastfeeding assistance, complementary-feeding counselling, growth monitoring, and referral should operate as one continuous pathway.

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