

Maternal and Child-Related Factors Associated With Severe Acute Malnutrition in Hospitalized Children: A Prospective Observational Study

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Abstract

Background: Severe acute malnutrition is influenced by a combination of child feeding, immunization, socioeconomic, and maternal factors. **Objective:** To describe maternal and child-related factors among hospitalized children diagnosed with severe acute malnutrition (SAM) and identify patterns with implications for prevention and counseling. **Methods:** This prospective observational study enrolled 204 children aged 6-30 months who were admitted with SAM to the department of paediatrics, SSG Hospital and Medical College, Vadodara, during 2023-2024. The child's age, gender, residence, breastfeeding status, immunization, and complementary feeding were recorded. The mother's age, parity, and literacy level were also noted. **Results:** Of 204 children, 57.84% were male and 54.9% were aged 12-24 months. Furthermore, 67.64% were from rural areas. In the source table, 56.86% were listed under breastfeeding for 6 months, 40.19% under no breastfeeding, and 2.94% under breastfeeding for 2 years. Incomplete immunization was reported in 68.62%, whereas 73.03% had improper complementary feeding. The mean age of the mothers was 24.8 years, and 57.35% had parity greater than two. Moreover, 45.58% of the mothers were illiterate, while only 8.82% had higher-secondary education or graduation. **Conclusion:** Children admitted with SAM in this cohort were mostly from rural areas and commonly had incomplete immunization and improper complementary feeding. Low maternal literacy and parity greater than two were also common. Because the study enrolled only children with SAM, these patterns should not be interpreted as independent risk factors without a non-SAM comparison group.

Keywords: severe acute malnutrition; maternal literacy; parity; breastfeeding; complementary feeding; immunization; rural residence; child nutrition.

1. Introduction

Childhood severe acute malnutrition develops through interacting immediate, underlying, and structural factors. Inadequate dietary intake and infection are immediate contributors, while household food security, maternal and child care, health-service access, education, and socioeconomic conditions influence the child's exposure to these risks [1,2]. Maternal health and education are particularly important because they affect pregnancy nutrition, breastfeeding, complementary feeding, health-seeking behavior, and use of preventive services.

Studies from India and other low- and middle-income settings have reported relationships between SAM and rural residence, low socioeconomic status, low maternal education, high parity or larger family size, low birth weight, suboptimal breastfeeding, delayed or inappropriate complementary feeding, and incomplete preventive care [3-9]. However, the distribution of these factors varies across local populations and health-care settings.

This manuscript focuses on the maternal and child-related characteristics recorded in a prospective hospital cohort of children with SAM in Rajkot. Because the study enrolled only SAM cases, it does not provide a non-SAM comparison group. Accordingly, the term "associated" in the title is used in a descriptive clinical sense; the data can identify patterns among children with SAM but cannot establish independent causation or calculate case-control risk estimates.

2. Objectives

- To describe demographic, feeding, immunization, and residence characteristics of hospitalized children with SAM.
- To describe maternal age, parity, and literacy among mothers of children with SAM.
- To identify potentially modifiable maternal and child-care patterns that may inform prevention and counseling.

3. Materials and Methods

Study design and population: This prospective observational study included 204 children aged 6-30 months who were admitted with SAM to the department of paediatrics, SSG Hospital and Medical College, Vadodara, during 2023-2024 and met the thesis inclusion criteria. Parent or guardian consent was obtained. Children with organic causes of malnutrition such as congenital heart disease, cerebral palsy, malabsorption syndromes, or genetic syndromes were excluded from the original study.

Child-related variables: The recorded variables included age, sex, rural or urban residence, exclusive breastfeeding history, immunization status, timing/appropriateness of complementary feeding, and major comorbidities. The thesis classified complementary feeding as proper or improper and immunization as complete or incomplete.

Maternal variables: Maternal age, parity, and literacy were recorded. Maternal literacy categories were illiterate, primary education, secondary education, higher secondary education, and graduate education. Parity was summarized as ≤ 2 or >2 children within four maternal age groups.

Analysis: The source thesis reports frequency distributions and percentages for these variables. Because all enrolled participants had SAM, the present manuscript does not calculate odds ratios or infer independent risk factors. Descriptive patterns are discussed in relation to literature cited in the thesis.

4. Results

The cohort included 204 children with SAM. There were 118 boys (57.84%) and 86 girls (42.15%). More than half of the surveyed children were aged between 12 and 24 months (54.9%), while 17.15% were 6-12 months old and 27.94% were over 24 months. Rural residence was reported for 67.64% of children.

Child-related characteristic	Category	n	%
Sex	Male	118	57.84
Sex	Female	86	42.15
Age	6-12 months	35	17.15
Age	12-24 months	112	54.90
Age	>24 months	57	27.94
Residence	Rural	138	67.64
Residence	Urban	66	32.35
Exclusive breastfeeding	No breastfeeding	82	40.19
Exclusive breastfeeding	6 months	116	56.86
Exclusive breastfeeding	2 years	6	2.94
Immunization	Complete	64	31.37
Immunization	Incomplete	140	68.62
Complementary feeding	Proper	55	26.96
Complementary feeding	Improper	149	73.03

The feeding and preventive-care practices were described in the source table. In that table, 56.86% of children were listed under breastfeeding for six months, 40.19% under no breastfeeding, and 2.94% under breastfeeding for two years. Immunization was incomplete for 140 children (68.62%). Complementary feeding was classified as improper for 149 children (73.03%).

The mean age of mothers was 24.8 years, with the largest group aged 22-25 years. Overall, 117 mothers (57.35%) had parity greater than two, while 87 (42.64%) had parity less than or equal to two. In the reported table, parity greater than two was more frequent in the older maternal age groups.

Maternal age	Parity ≤ 2 , n (%)	Parity >2 , n (%)	Total, n (%)
≤ 21 years	31 (15.19)	18 (8.82)	49 (24.01)
22-25 years	49 (24.01)	47 (23.03)	96 (47.05)
26-29 years	5 (2.45)	31 (15.19)	36 (17.64)

>29 years	2 (0.98)	21 (10.29)	23 (11.27)
Total	87 (42.64)	117 (57.35)	204 (100)

Maternal literacy was low. Ninety-three mothers (45.58%) were illiterate, 56 (27.45%) had primary education, and 37 (18.13%) had secondary education. Only 16 (7.84%) had higher-secondary education and two (0.98%) were graduates.

Maternal literacy	n	%
Illiterate	93	45.58
Primary education	56	27.45
Secondary education	37	18.13
Higher secondary	16	7.84
Graduate	2	0.98

5. Discussion

The descriptive profile of this cohort of children admitted to the hospital revealed a number of features of potential relevance to prevention and counseling related to severe acute malnutrition (SAM). Over half the children were in their second year of life, a period which includes cessation of breastfeeding, introduction to the family diet, increased risk of recurrent infections, and higher nutrient requirements. Previous reports have associated this age range with growth faltering and acute malnutrition [1,3].

The majority of the cohort were living in rural areas, which may have implications for poverty, food insecurity, transport, health-service access, maternal education, and timely treatment of infection. Earlier manuscripts cited in the thesis have reported urban-rural differences in nutritional status, although the direction and magnitude varied according to the setting [3,10]. It was not possible to determine from these data whether rural residence independently increased the risk of SAM since no comparison group was enrolled.

The high prevalence of incomplete immunization in addition to improper complementary feeding is of clinical importance. Infection and malnutrition are mutually reinforcing, and incomplete immunization may increase exposure to vaccine-preventable illness that could worsen nutritional status. Inappropriate complementary feeding can cause inadequate energy and micronutrient intakes after six months of age. Indian and international studies have associated inappropriate feeding with undernutrition and have emphasized timely initiation of appropriate complementary feeding while continuing breastfeeding [6-8].

Maternal literacy was also an important observation. Almost half of the mothers were illiterate while less than 10% of mothers had more than secondary education. Maternal education may affect feeding practices, health-care seeking behavior, hygiene and sanitation, recognition of danger signs and appropriate use of preventive services by their children. Indian studies have shown an inverse association between maternal education and childhood malnutrition [4,9].

More than half of the mothers had a parity above two. Large family size may overwhelm a household and dilute resources available to support each child's feeding, supervision, and health care. The studies cited by the thesis show an association between large families and greater levels of malnutrition, but family size is intricately tied to socioeconomic conditions, birth spacing, maternal health, and household food security [5,11,12].

The variable related to breastfeeding in the source thesis requires caution. The source table includes the categories "no breastfeeding," "6 months," and "2 years," while the variable is labeled "exclusive breastfeeding." Because these categories do not all have the same meaning under that label, the original definition from the case records should be checked before publication and before drawing conclusions from this variable.

6. Limitations

The study only included hospitalized children who had already developed SAM. Without a control group of children who did not have SAM, the study cannot determine whether an exposure increased the odds of developing SAM, and no adjusted risk estimates can be made. Important potential factors such as household income, birth weight, birth spacing, sanitation, maternal BMI, maternal anemia severity, and detailed dietary intake were not reported or analyzed in the presented findings. The breastfeeding categories also need to be confirmed from the original case records.

7. Conclusion

Children admitted with the diagnosis of SAM in this cohort were mostly from rural areas and commonly had incomplete

immunization and improper complementary feeding. Low maternal literacy and parity greater than two were also common. These findings suggest practical directions for family counseling and community prevention, including maternal education, appropriate complementary feeding for different ages, immunization completion, and support for child care in large families. Further analytical studies with an appropriate comparison group are needed to assess independent maternal and child-related risk factors for developing SAM.

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