

# Impact of maternal education on the development of severe acute malnourished children



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## ABSTRACT

**Background:** Severe acute malnutrition (SAM) is a grave form of undernutrition that has been recognized as a medical and social disorder. Various factors contribute to the development of SAM, but the impact of maternal education on the nutritional status and development of the child is of paramount importance since focused interventions in this aspect can yield promising results.

**Aims and Objectives:** The aims and objectives of the study are to assess the impact of maternal education on the development of children with SAM. **Materials and Methods:** A total of 125 SAM children in the age group 12–30 months were enrolled in this prospective observational study from among those admitted to the nutritional rehabilitation center of a tertiary care center in central India. The developmental status of SAM children was assessed using the Developmental Assessment Scale of Indian Infants. The association of maternal education with the development of SAM children was analyzed. **Results:** Overall developmental delay was observed in 44.8% of SAM children, whereas motor and mental development delay was noted in 45.6% and 44% of SAM children. The maternal education level was significantly associated with the overall development of the SAM child. ( $P=0.043$  for motor development,  $P=0.017$  for mental development,  $P=0.023$  for motor developmental delay). **Conclusion:** Maternal education plays a key role in improving the developmental status of SAM children, who are more prone to developmental delays across various domains. Efforts toward enhancing maternal education, especially knowledge regarding child nutrition and development, can reduce the incidence and improve the management of SAM in children.

**Key words:** Maternal; Education; Development; Malnutrition; Severe acute malnutrition

## INTRODUCTION

Malnutrition and its effects on the child's development, encompassing various functional domains such as cognitive, motor, and speech are a huge bottleneck for most developing countries.<sup>1</sup> A strong association between the nutritional status of the child and its development has been reported by various studies.<sup>2</sup> Malnutrition is not only responsible for affecting physical growth but also causes significant developmental delays in the motor and cognitive development of the child.<sup>3-5</sup>

Severe acute malnutrition is defined as any of the following-1. Weight-for-height z-score (WHZ)  $<-3$  SD

of the median WHO growth standards. 2. A mid-upper-arm circumference (MUAC)  $<115$  mm. 3. Presence of nutritional edema. 4. Visible severe wasting in infant less than 6 months of age.<sup>6</sup> It is the most severe variant of undernutrition, often leading to neurodevelopmental sequelae in affected children. Delayed development in these children has far-reaching grave consequences, which can be mitigated with timely intervention.<sup>7</sup>

Various preventive and management interventions help improve the developmental status of SAM children, but, among them, maternal education stands out as one essential component whose impact on the development of SAM children cannot be belabored. A strong association between

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maternal education and child health has been established in various studies.<sup>8</sup> The chances of malnutrition in children of educated mothers are less. The knowledge of educated mothers regarding various causes of malnutrition as well as the critical stages of child development and their corresponding nutritional requirements is more effective in preventing child malnutrition than any other intervention strategy.<sup>9</sup>

Three major explanations, including the transference of child, nutrition-related knowledge from educated mothers to future mothers, the ability of educated mothers to recognize symptoms and seek timely medical intervention, and the higher capability of understanding and applying the instructions needed for the treatment of malnourished children justify this association of maternal education and the nutritional status of the child.<sup>8</sup> This study aims to assess the impact of maternal education profile on the development of children with SAM.

### Aims and objectives

To the impact of maternal education in the development of severe acute malnutrition in their children.

## MATERIALS AND METHODS

This prospective observational study was undertaken in the Nutritional Rehabilitation Center (NRC) of a tertiary-care hospital in Central India from March 2021 to September 2022, after approval from the Institutional Ethical Committee. A total of 125 children of consenting parents meeting the inclusion criteria of being aged between 12 and 30 months, admitted to the NRC, as screened by the WHO criteria for identification of SAM, were selected for the study.

The exclusion criteria were – (a) malnourished children due to organic causes such as cerebral palsy, congenital heart disease, malabsorption syndrome, and genetic syndromes. (b) Children who were clinically unstable to participate in the Developmental Assessment Scale for Indian Infants (DASII) test.

Informed consent was taken from the parents/guardians of the SAM children after explaining the method and purpose of the study. DASII was used to assess the development of the SAM children.

A single trained examiner executed it at the time of admission before starting the intervention. DASII is an Indian modification of the Bayley scale of infant development containing motor and mental scales with 67 and 163 items, respectively.

After the assessment of children, motor development quotient (DMoQ) and mental development quotient

(DMeQ) were calculated as per the manual of the DASII scale. Developmental delay was defined as development quotient  $\leq$  DQ ( $\leq$  2 SD) on either the mental or motor scale. The delay was categorized as mild, moderate, and severe.<sup>10</sup> Standard the WHO protocol-based treatment was provided to the SAM children.

### Analytical tools

The data collected included demographic data, anthropometric data of the SAM child, maternal education profile, and developmental assessment of the child using DASII. Statistical analysis was done using SPSS 26.0. The Chi-square test was used to demonstrate the association between maternal education and the development of SAM children. A  $P < 0.05$  was considered significant.

## RESULTS

The mean age of the SAM children was  $18.06 \pm 4.9$  months, with the majority (86.4%) being 12–24 months old, as depicted in Figure 1. Most SAM children were boys (56.8%).

The data corresponding to the maternal educational profile, as shown in Figure 2, revealed that about 18.4% of the mothers were illiterate, while only 12% of mothers completed their education till high school; this shows that the majority of mothers were either illiterate or just have bare minimum primary education.

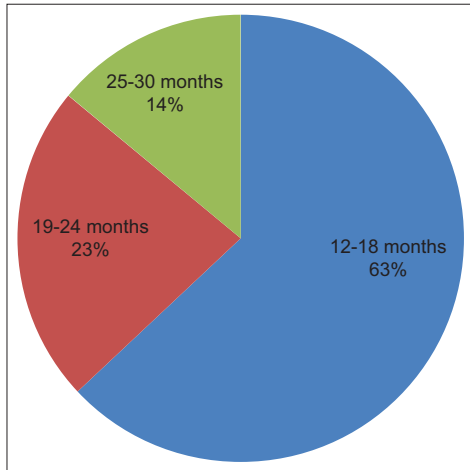
The development of the SAM children was assessed using DASII. It was observed that motor development was delayed in 45.6% of SAM children (DMoQ  $\leq$  70), while mental development was delayed in 44% of SAM children (DMeQ  $\leq$  70) as shown in Figures 3 and 4, respectively. Overall developmental delay was seen in 44.8% of SAM children.

Children whose mothers were educated at least up to high school were significantly less developmentally delayed as compared to the children whose mothers were either illiterate or did not get an education up to high school (Figure 5).

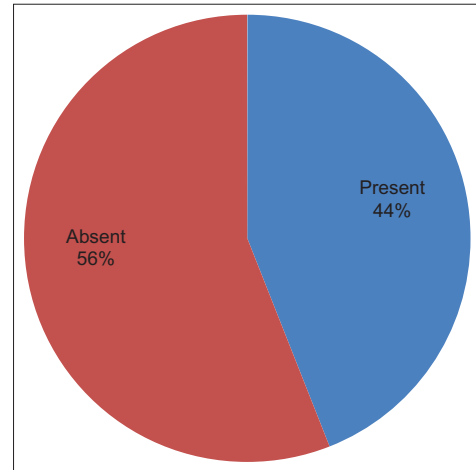
This association was statistically significant. ( $P = 0.023$  for the motor developmental delay) as seen in Table 1.

## DISCUSSION

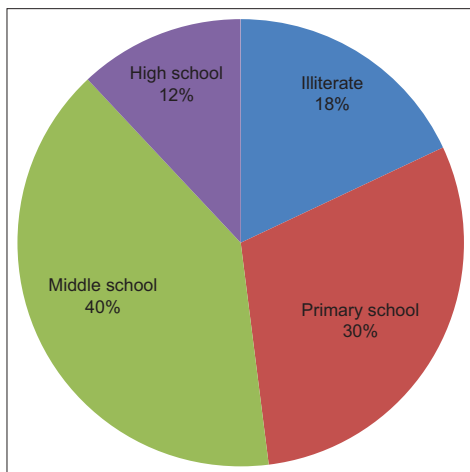
The WHO usually defines SAM for children in the age group of 6–59 months.<sup>11</sup> The most prevalent age group affected by SAM, as noted in this study, was 12–24 months (86.4%). Several other studies from India have reiterated this observation.<sup>12–14</sup> Malnutrition is known to affect



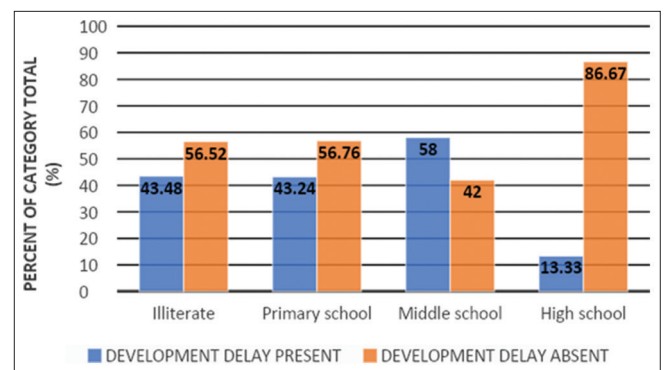
**Figure 1:** Age distribution of severe acute malnutrition children



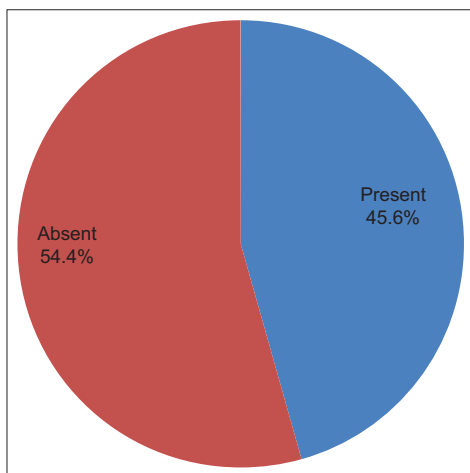
**Figure 4:** Mental developmental delay in severe acute malnutrition children



**Figure 2:** Maternal education profile in severe acute malnutrition children



**Figure 5:** Maternal education profile and motor developmental delay in severe acute malnutrition children



**Figure 3:** Motor developmental delay in severe acute malnutrition children

myelination and cause reductions in the number of neurons and their capability to form new synaptic connections.<sup>15,16</sup> These pathological processes are responsible for causing

developmental delays in SAM children and also for lingering neurodevelopmental sequelae.<sup>17</sup> Significant occurrences of developmental delays across various functional domains such as motor and cognitive are seen more in SAM children as compared to normal healthy children, as observed in this study and corroborated by other similar studies conducted in the Indian subcontinent.<sup>18,19</sup>

Maternal education has a profound impact on the nutritional status of the child. There is an old saying that the mother is the child's first teacher. Mother plays the most important role in every child's life, if the mother does not know how to take care of her child, then there are significant chances of having lifelong consequences of poor child rearing. Educated mothers are better equipped to prevent malnutrition through adequate knowledge about the nutritive requirements of the developing child, as well as in identifying and treating malnutrition if it develops through understanding and executing necessary instructions.<sup>20</sup>

This is the largest study in our knowledge conducted in the Indian subcontinent which identifies an association

**Table 1: Association of maternal education with motor development delay in severe acute malnutrition children**

Maternal education	Developmental delay		Total (%)	P-value
	Present (n=57) (%)	Absent (n=68) (%)		
Illiterate	10 (43.48)	13 (56.52)	23 (100)	0.023
Primary school	16 (43.24)	21 (56.76)	37 (100)	(<0.05)
Middle school	29 (58)	21 (42)	50 (100)	
High school	2 (13.3)	13 (86.67)	15 (100)	
Total	57 (45.6)	68 (54.40)	125 (100)	

between developmental delay in SAM children and low level of education in their mothers. Other studies conducted in the Indian subcontinent were only limited to the association between maternal education and occurrence of SAM in their children.<sup>14,21</sup>

Our study has some limitations like this was a hospital-based study so there may be some differences in findings at the community level.

### Limitations of the study

The limitations of this study are 1. This was a hospital based study so its implementation in community is limited. 2. Small sample size and cross-sectional study design.

## CONCLUSION

The present study outlines the grave impact of SAM on a child's overall development across various functional domains as assessed by DASII. The developmental delays caused due to SAM not only decrease the chances of healthy development of a child but also hamper the growth potential of the nation due to reduced cognitive capabilities of the upcoming generation affected by SAM. Among various interventions meant to counter this condition, effective and focused maternal education regarding various aspects of child malnutrition can go a long way in tipping the balance in favor of reduced incidence and better management of SAM in children.

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**Authors Contribution:**

**VJ**- Definition of intellectual content, literature survey, prepared the first draft of the manuscript, implementation of the study protocol, data collection, data analysis, manuscript preparation, and submission of the article; **AA**- Design of study, statistical analysis and interpretation, review manuscript; **ASP**- Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; **ST**- Statistical analysis and interpretation, review manuscript

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