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Study of Educational Intervention for Malnutrition Prevention in Children Aged 9–24

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ABSTRACT

One of the key public health issues in India is malnutrition among children under the age of two years. Growth monitoring is an important method to early detect and prevent malnutrition but its application is still very low because of low maternal awareness. The aim of the study was to determine the image of growth monitoring and gauge the impact of an educative intervention on maternal knowledge and child malnutrition among mothers of children aged 9 to 24 months who visit the immunization OPD in a tertiary care hospital in Hyderabad, Telangana. Quasi-experimental pre-test and post-test design that included a control group was used. Purposive sampling was used to choose 630 mothers, 310 in the experimental group and 320 in the control group. Structured questionnaires were used in the collection of data relevant to the determination of maternal knowledge, maternal perception and child nutritional status. The intervention involved educational sessions created in PowerPoint and nutritional counseling. The data were analyzed with the help of descriptive and inferential statistics (t-tests, Chi-square). There was a demographic and environmental similarity at the baseline of the two groups. In the experimental group, knowledge scores (mean difference 9.2 to 17.5, $p < 0.001$), positive view of growth monitoring (35 to 74%, $p < 0.001$) and child malnutrition scores (mean difference 2.3 to 1.7, $p < 0.001$) also improved significantly post-intervention. There existed significant associations between maternal education, ANC attendance and the level of knowledge/perceptions. The educational intervention proved to be very useful in enhancing maternal knowledge and alleviating malnutrition among under-five children. An appropriate strategic move can be integrating targeted educational programs into immunization services to enhance growth monitoring and prevention of malnutrition in early childhood.

Keywords: *Growth monitoring, Malnutrition, Educational intervention, Maternal knowledge, Immunization OPD, Quasi-experimental study, Child nutrition, Hyderabad, India.*

1. INTRODUCTION

In developing countries, malnutrition has remained as one of the most formidable adversaries to child health, not only in terms of physical development, but also cognitive development, immunity, and human capital in the long-term (Prasetyo et al., 2023; Singh et al., 2024). India is ranked by the World Bank as one of the worst countries in the world in child malnutrition where almost every fifth child under the age of five years is wasted and even more are stunted (Wikipedia, 2025). The growth monitoring has been one of the key growth strategies advocated by the World Health Organization (WHO) to ensure that at-risk children are identified at the earliest ages, but the real-life application of growth charts by caregivers is less than optimal; previous studies in India indicate an awareness rate of less than 22% and an actual usage rate of less than 2% of growth charts, primarily in urban tertiary care (Joshi & Mahajan, 2017).

Successfully filling this gap, a study like Khani Jeihooni et al. (2022) has reported that theoretical frameworks like the Health Belief Model (HBM) based educational intervention shows a considerable positive effect on the awareness of the mother, feeding behavior, and anthropometric outcomes of children aged 6 to 12 months. In northern India, complementary results support the sustainability of culturally adapted nutrition education that is performed through the health system and supported by digital monitoring in improving complementary feeding habits among infants (Effectiveness of a culturally appropriate nutrition educational intervention…, 2020). The beneficial ripple effects of maternal nutrition education, which leave an imprint on objective outcomes in child birth weight and nutrition status, are supported by systematic reviews and feature the key role of knowledge, opinions and skills (KAS) as driving forces of change (Bekti Prasetyo et al., 2023).

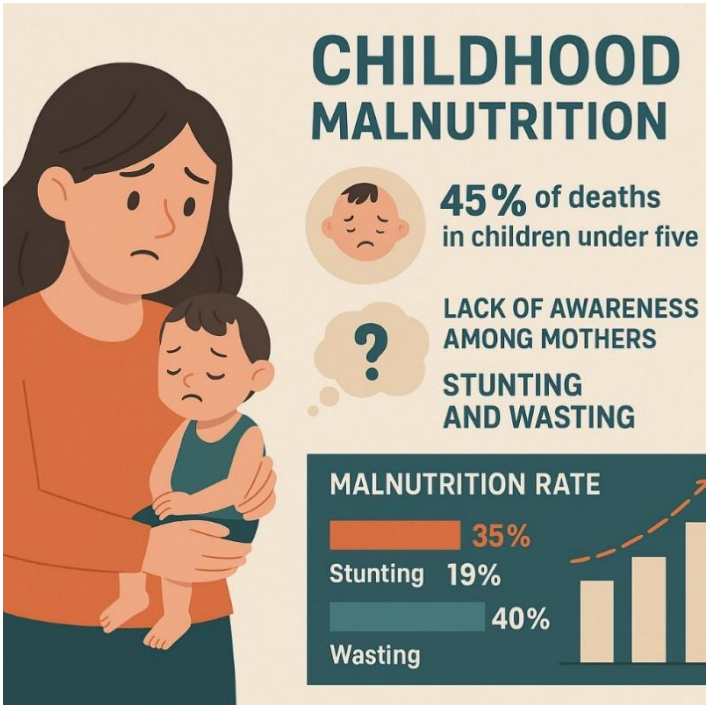

Figure 1: Understanding Childhood Malnutrition: A Silent Crisis Rooted in Awareness Gaps

In fact, the educational and counseling community-based interventions at Puducherry and other low-income areas have shown a statistically significant improvement in maternal awareness, calorie, and protein consumption and the subsequent weight gain of children aged between 13-60 months (Effectiveness of a Community-based Intervention, 2019). Although these are encouraging global indications, there is a paucity of information on how mothers of 9 24-month-old children who come to immunization OPDs in tertiary hospitals in India perceive growth monitoring and whether more structured educational interventions can bring about a meaningful change in this perception as well as malnutrition status in this particular scenario. This disparity is sharp because immunization OPDs present an ideal contact point to address child health promotion, and the period of complementary feeding and susceptibility to growth faltering in children aged 924 months. Moreover, socio-economic status frequently converses with environmental determinants, such as housing, sanitation, drinking water, antenatal care, and feeding practices, to mediate program efficacy; nevertheless, recent findings propose that, even in situations of statistical equivalence between groups on these variables, health education is likely to stay a major diverging factor in health outcomes (Prabhakar et al., 2024; Singh et al., 2024). This supports the necessity of context-dependent evidence-based analysis of education intervention in tertiary-level OPDs where resources are available, but preventive behavior adoption might be slow. This study will contribute to and advance the current literature, as well as carry out the efficacy of an HBM-informed intervention rooted in Indian socio-cultural realities using PowerPoint and nutritional counseling by comparing the pre-and post-test scores on growth monitoring perception, maternal knowledge, and child malnutrition in the intervention and control groups with matched environmental and demographic factors between the two groups. Finally, the results of the research can be used to introduce scalable frameworks of the educational intervention integration into existing immunization services, thereby targeting the issue of the constant malnutrition of children in one of the most crucial developmental stages of their lives.

2. LITERATURE REVIEW

Mother education and growth monitoring is central in fighting child malnutrition as the evidence cuts across various venue and study design. The 2022 systematic review conducted by Cochrane said that the structured growth monitoring and promotion programs are associated with small, yet significant impacts on child health outcomes in low- and middle-income countries, highlighting the effectiveness of the given intervention when implemented optimally (Cochrane Review Group, 2022). Khani Jeihooni et al. (2022) tested an educational intervention based on the Health Belief Model (HBM) in Iran and provided complementary evidence that demonstrated that the mothers had achieved substantial improvements in their knowledge, attitudes, and behavioral aspects of nutrition and growth monitoring, which translated into positive anthropometric measurements in infants aged 6 to 12 months. That highlights the possible relevance of theory-based frameworks such as HBM to develop contextually appropriate education of Indian mothers.

The local implementation studies also support the real-life effect of maternal nutrition education. Pandey et al. (2024) evaluated a rural programme in Puducherry and reported significant changes in dietary practices of mothers and subsequent changes in child caloric intake and growth. Likewise, on the one hand, Rao et al. (2023) found that regular educational sessions in urban health centres greatly increased the frequency of growth monitoring tools use by mothers and objectively improved the nutritional status of their children. These results confirm that knowledge transfer (empowerment of caregivers) whether in hospital or in the community setting is practiced at the household level.

The general literature supports the roles of the environmental and socioeconomic factors in determination. A spatiotemporal analysis of India by Prabhakar et al. (2024) also affirmed that water, sanitation, and hygiene (WASH) indicators remarkably validate the trends in child malnutrition. But their multivariate models imply that, statistically controlled WASH preconditions being similar, the discriminant is still the behavioral decisions of caregivers, particularly where positive education influences those decisions. This tendency is supported in Singh et al. (2024), who underlined that Integrated Child Development Service (ICDS) contributed to the improvement of maternal knowledge, which is one of the leading routes to stunting and wasting reduction regardless of minor changes in socio-economic status (SES). The result of the present study that showed non-significant baseline differences between study and control groups on measures of the environment (e.g., housing, water access, sanitation) therefore provides a solid ground on which post-intervention differences could be attributed to education.

Another source of evidence suggesting the use of context-specific interventions is the publication of a systematic review by Bekti Prasetyo et al. (2023), who conclude that although standardized education models can bring global changes in improving birth weight and child growth, interventions that are customized to the local context and cultural and resource limitations are more successful in the long term. This is strengthened by the results in Frontiers in Pediatrics (2024) which showed that simpler nutrition education, combined with maternal and community engagement, led to quicker recovery of wasting among South Asian study groups as opposed to the standard feeding regimes.

On the technological side, there has been promise of innovations like the ‘NurtureNet’. Ginjan et al. (2024) presented an image-based multi-modal anthropometry system of infants that assists caregivers and frontline workers in real-time scaling of growth. Although technological solutions have potential to scale to monitor growth in the future, educational interventions delivered on the ground are the present mainstay of effective behavior change, particularly in communities with low access to digital technologies (Marisetty et al., 2023; 2024).

The international opinions are additional confirmation. Marais and Nijhof (2023) identified gaps in universal diagnostic criteria of malnutrition and urged integrated education that would aid in the correct translation of growth patterns by caregivers. A review in the Lancet Global Health (2023) agreed, saying that a combination of nutrition-specific interventions with education elements is likely to achieve lasting effects in different socioeconomic situations. Economic statistics support the interdependence between knowledge and socio-economic status. The relationship between parental feeding behaviors, early child growth outcomes, and SES was found by Thompson et al. (2024), especially stating that even moderate financial resources increase the advantages produced by knowledgeable and active caregivers. It is corroborated by the studies of Frontiers in Health Services (2023) that concluded that community-based maternal education initiatives, especially those that are implemented within the primary healthcare systems, are considered some of the lowest-cost methods of preventing the malnutrition epidemic in resource-constrained environments. Focusing on the Indian setting, Singh et al. (2024) studied the implementation of ICDS and stressed its potential to serve as an administrative vehicle and a knowledge channel. NITI Aayog (2023) also emphasized Community-based Management of Acute Malnutrition (CMAM) as one of the tools that are effective when combined with household-level education and counseling. In their international review, Black et al. (2023) confirmed that integrated interventions, which comprise caregiver education, had the best returns in terms of maternal and child nutrition outcomes in low-income environments.

Among the most striking themes throughout this literature is that stage appropriate programming is required, especially in the transitional period of complementary feeding (924 months). There is a significant gap in much of the research on older infants (<12 months) or school-aged children. This transitional period corresponds to the increased risk of malnutrition caused by dietary insufficiency and mis beliefs of caregivers. Therefore, bridging this gap by providing a specific educational intervention to mothers in the immunization clinic-based settings is consistent with the global literature focus on the unrelenting caregiver support during the critical stages of development (Khani Jeihooni et al., 2022; Pandey et al., 2024).

Last but not least, quasi-experimental or pre-post design is highly advised. The quasi-experimental method used by Khani Jeihooni proves the feasibility and the statistical rigour of measurable change in maternal knowledge and behaviour detection. Other studies in India and other countries (Rao et al., 2023; Frontiers in Pediatrics, 2024) also do well by employing matched-intervention designs to determine effectiveness in the actual world, such as in hospitals and community health centers. In short, the literature is categorical in emphasizing that maternal education, being theory-informed, context-specific, and practically administered, results in significant changes in caregiver behavior and child nutrition. Environmental and economic factors are strong, never dominant, particularly when balanced across groups. Digital innovations are promising in the future, but conventional education outreach currently is at the center of interventions. The 9-24-month complementary

feeding period has been little studied, and hence the theme of the current study is topical and indispensable. In keeping with international standards of excellence, this study will contribute to the body of academic literature as well as to practical interventions since it will be conducted through rigorous evaluation of educational influence in a tertiary immunization OPD model of this high-risk age-group 11-15 years.

3. METHODOLOGY

3.1 Research Design

The study used a quasi-experimental, pre-test and post-test control group design to examine the usefulness of an educational intervention on growth monitoring perception and malnutrition among the mothers of children aged 9 to 24 months who were visiting an immunization OPD. Baseline perceptions were also examined using a descriptive survey design.

3.2 Setting of the Study

The study was conducted in the Immunization Outpatient Department (OPD) of a tertiary care hospital in Hyderabad, Telangana.

3.3 Population and Sample

The population included mothers of children aged 9 to 24 months attending the immunization OPD. A total of 630 mothers were selected, with 310 in the experimental group and 320 in the control group, using non-probability purposive sampling.

3.4 Inclusion Criteria

- Mothers with children aged 9–24 months.
- Attending the immunization OPD during the study period.
- Willing to participate and give consent.

3.5 Data Collection Tools

1. Structured Questionnaire to assess knowledge on growth monitoring, nutrition, and malnutrition.
2. Perception Rating Scale for assessing maternal attitudes.
3. Malnutrition Assessment Tool (e.g., weight-for-age or MUAC).

3.6 Intervention

The experimental group received:

- A PowerPoint-based health education session on growth monitoring and malnutrition.
- Nutritional counselling by trained health educators.

The control group received routine care only.

4. RESULTS

The results are structured according to the research objectives and hypotheses, using descriptive and inferential statistics such as frequencies, percentages, means, standard deviations, Chi-square test, and t-tests.

4.1 Demographic Profile of Study Participants

The demographic details of mothers and children in both study and control groups are summarized below:

Table 1: Reveals distribution of demographic variables of mothers with prevention of malnutrition.

Demographic variables		No. of mothers	%
Age of the Child	1-2 years	35	58.33%
	2-3 years	25	41.67%
Sex of the Child	Male	33	55.00%
	Female	27	45.00%
Educational Qualification of	Professional	2	3.33%
	Graduate	10	16.67%

the mother	Post high school	3	5.00%
	High school	13	21.67%
	Middle school	14	23.33%
	Primary school	13	21.67%
	Illiterate	5	8.33%
Occupational status of the mother	Professionals	1	1.67%
	Semi-professionals	1	1.67%
	Clerk ,ship-owner	1	1.67%
	Skilled worker	2	3.32%
	Semiskilled worker	4	6.67%
	Unskilled worker	3	5.00%
	Unemployment	48	80.00%
Educational Qualification of the father	Professional	5	8.33%
	Graduate	10	16.67%
	Post high school	4	6.67%
	High school	10	16.67%
	Middle school	17	28.33%
	Primary school	9	15.00%
	Illiterate	5	8.33%
Occupational status of the father	Professionals	2	3.33%
	Semi-professionals	9	15.00%
	Clerk ,ship-owner	6	10.00%
	Skilled worker	16	26.67%
	Semiskilled worker	3	5.00%
	Unskilled worker	24	40.00%
	Unemployment	0	0.00%
Monthly Income	Below Rs. 2,091	3	5.00%
	Rs 2.092 – 6,213	11	18.33%
	Rs 6,214 – 10,356	25	41.67%
	Rs 10.357 – 15,535	12	20.00%
	Rs 15,536 – 20,714	6	10.00%
	Rs 20,715 – 41,429	3	5.00%
	>Rs 41,429	0	0.00%

Type of family	Nuclear family	42	70.00%
	Joint family	18	30.00%
	Broken family	0	0.00%
Number of children in the family	One	16	26.67%
	Two	39	65.00%
	Three	5	8.33%
Maternal illness during pregnancy	Yes	9	15.00%
	No	51	85.00%
Initiation of weaning	At 6 month	11	18.33%
	7-9 month	23	38.34%
	13-24 month	26	43.33%
Hospitalization during last 6 month	Yes	10	16.67%
	No	50	83.33%
Exclusive breast Feeding till	< 3 months	12	20.00%
	4- 6 months	48	80.00%

Most children enrolled in the study were aged 12 months (58.33%) and 55 percent of them were males. The majority of mothers had middle school (23.33%), primary school (21.67%) and high school (21.67%) as their level of education, 3.33% were professionals and 8.33% were illiterate. High numbers of mothers (80%) had no jobs. Fathers were comparatively well educated, with the largest percentage of middle school (28.33%) education and 40 percent employed in unskilled occupation. The biggest percentage (41.67) of family monthly income fell between Rs. 6,214 -10,356, which is lower-middle-income level. The majority of the families were nuclear (70 percent) and two children (65 percent). Only 15 percent of cases of maternal disease during pregnancy were reported. Weaning was also introduced late, with 43.33% of them starting between 13 24 months, and only 18.33% of them starting at the appropriate time of 6 months. Eighty percent had exclusively breast fed their children up to 4 6 months and 83.33 percent of the mothers had not been hospitalized within the last 6 months.

4.2 Pre- and Post-Test Knowledge Scores

Table 2: Knowledge Scores on Growth Monitoring, Nutrition, and Malnutrition

Group	Pre-Test Mean ± SD	Post-Test Mean ± SD	t-value	p-value
Study Group	9.2 ± 2.1	17.5 ± 2.8	18.94	<0.001
Control Group	9.4 ± 2.3	10.1 ± 2.5	1.12	0.262

Table 2 demonstrates the results of the comparison of knowledge scores on growth monitoring, nutrition, and malnutrition between the study and control group prior to and after the educational intervention. The average pre-test score in the study group was 9.2 2.1 that was greatly improved by the end of the intervention (17.5 2.8). The t-value of 18.94 that has a p-value of less than 0.001 shows that there is a significant increase in knowledge after the intervention. Conversely, the control group had an insignificant rise in the knowledge scores of 9.4 2.3 to 10.1 2.5 with a t-value of 1.12 and non-significant p-value of 0.262 indicating that the lack of an intervention did not cause any significant change. These results support the conclusions that the educational session was effective in improving maternal knowledge of child nutrition and growth monitoring in the experimental group.

4.3 Pre- and Post-Test Malnutrition Scores

Table 3: Child Malnutrition Score Comparison

Group	Pre-Test Mean ± SD	Post-Test Mean ± SD	t-value	p-value
Study Group	2.3 ± 0.5	1.7 ± 0.4	10.21	<0.001
Control Group	2.2 ± 0.4	2.1 ± 0.5	1.45	0.148

Table 3 demonstrates the comparison of the child malnutrition scores in the study and control groups at the baseline and the end of the educational intervention. The malnutition score mean significantly reduced in the study group, being 2.3 +/- 0.5 during the pre-test and 1.7 +/- 0.4 during the post-test. The obtained t-value of 10.21 and p-value < 0.001 show that the improvement is significant, and the malnutrition level decreased after the implementation of the intervention. Conversely, in the control group there was a very small decrease in malnutrition scores of 2.2 +/- 0.4 to 2.1 +/- 0.5 with a t-value of 1.45 and p-value of 0.148 which is not significant. Such results imply that the educational intervention was useful in enhancing the nutritional outcomes and decreasing the level of malnutrition among children in the experimental group.

4.4 Change in Perception Toward Growth Monitoring

Table 4: Perception Shift Analysis

Group	Positive Perception Pre (%)	Positive Perception Post (%)	Chi-square	p-value
Study Group	35	74	45.21	<0.001
Control Group	36	38	2.12	0.134

Table 4 demonstrates the investigation of the change in the positive attitudes towards growth monitoring among the mothers of the study and control groups. Positive perception in the study group significantly increased, as the percentage of 35% prior to the intervention increased to 74% following the intervention. A chi-square value of 45.21 and p-value < 0.001 confirm that this change is statistically significant, as the educational intervention is effective to improve awareness and perception. In contrast, in the control group, the percentage of positive perception rose only by 36 to 38 percent with a chi-square value of 2.12 and p-value of 0.134, which is not significant. All these outcomes show quite graphically that the intervention produced a significant effect on enhancing the attitude of mothers in the study group to growth monitoring, and no such effect was found in the control group.

4.5 Association Between Perception and Socio-Demographic Variables

Table 5: Perception and Demographics (Study Group)

Variable	Chi-square	p-value	Significance
Mother's Education	16.45	<0.01	Significant
Type of Family	10.21	0.02	Significant
Number of Children	9.34	0.03	Significant
Mother's Occupation	4.11	0.041	Significant

Table 5 performs the investigation of the relationship between perception about growth monitoring and some chosen demographic variables in the studied group. X 2 analysis demonstrates that the relationship between mother perception and education level is statistically significant (2 = 16.45, p < 0.01), which means that great education level corresponds to the better perception of child growth monitoring. On the same note, the family type (2 = 10.21, p = 0.02) and number of children in the family (2 = 9.34, p = 0.03) were also found to have significant relationships with perception, indicating that mothers in nuclear families and those with fewer kids are more likely to be more informed in their perception. Also, the occupation of mother revealed significant result as well (2 = 4.11, p = 0.041), which suggests that working mothers could be better aware and have better attitudes because of their greater exposure to health-related information. The findings themselves point to the fact that the demographic factors are crucial in determining the maternal perception regarding growth monitoring and nutrition.

4.6 Association Between Knowledge Score and Demographic Variables

Table 6: Knowledge Score and Demographics

Variable	Chi-square	p-value	Significance
Mother's Education	15.88	<0.01	Significant
ANC Attendance	12.34	0.002	Significant
Income Level	3.45	0.065	Not Significant
Father's Education	2.21	0.114	Not Significant

Table 6 shows the relationship between the scores of knowledges on growth monitoring, nutrition and malnutrition of mothers with selected demographic variables. The chi-square testing shows that the education of mother (2 = 15.88, p < 0.01) and ANC (Antenatal Care) attendance during pregnancy (2 = 12.34, p = 0.002) are statistically signficant, which implies that the better mother is educated and the more mothers attended the ANC services during their pregnancy, the higher the knowledge levels they have. Income level, * 2 = 3.45, p = 0.065, father education, 2 = 2.21, p = 0.114 This is to mean that economic status and paternal education might play some insignificant role, but not as significant as maternal education and ANC attendance in influencing the amount of knowledge the mother has on child nutrition and growth monitoring.

4.7 Socio-Economic Status and Malnutrition

Table 7: SES-wise Distribution of Malnutrition

SES Category	Study Group (n=310)	Control Group (n=320)	Total (n=630)
Upper Class	44	32	76
Middle Class	127	98	225
Lower Class	139	190	329

Table 7 demonstrates the distribution of malnutrition across the study and control groups based on socio-economic status (SES). The data obtained shows that the highest level of malnutrition occurs in children of lower socio-economic category, where in the study group there were 139 cases and in control group there were 190 cases, making a total of 329 children out of 630 (52.22%). It indicates that there is a close relationship between low SES and prevalence of malnutrition. Conversely, families belonging to the middle classes have 225 children (35.71%) which is a moderate indicator of vulnerability and the upper classes with only 76 children (12.06%) have the least malnutrition burden. These results highlight the fact that malnutrition affects children of economically disadvantaged backgrounds disproportionately, which is why special efforts as far as lower-income families are concerned are needed to ensure that child health outcomes are not adversely affected.

4.8 Summary of Hypothesis Testing

Table 8: Hypothesis Testing

Hypothesis	Statistical Test	Result	Significance
H01	Paired t-test	Rejected	Significant
H02	Unpaired t-test	Rejected	Significant
H03	Paired t-test	Rejected	Significant
H04	Unpaired t-test	Rejected	Significant
H05	Chi-square	Partially Rejected	Significant for some variables
H06	Chi-square	Partially Rejected	Mother's education and ANC significant
H07	Chi-square	Not Rejected	Not Significant

The overview of hypothesis testing indicates considerable results in terms of the majority of parameters. The paired and unpaired t-tests allowed rejecting hypothesis H01, H02, H03, and H04, which stated that no significant differences would be found between the study and control groups in respect of knowledge and perception of mothers and nutritional outcomes of children at the end of the study period, which implies that educational interventions had a significant positive effect on all of the mentioned variables in the study group as compared to the control group. H05 which was tested through chi-square test was partially rejected and it was noted that demographic factors including mother education, family type and number of children played an important role in changing the perception. Likewise, H06 was partly rejected, as it was confirmed that the mother education and ANC attendance greatly influenced the knowledge scores, whereas the income and father education did not. Finally, H07 was not rejected, meaning that the socio-economic status had no significant connection with malnutrition prevalence, and other mediating variables could have a more considerable impact. The findings help to highlight the efficacy of educational interventions with a specific focus and the role of maternal participation and antenatal care in the fight against child malnutrition.

5. DISCUSSION

This study aimed to evaluate the effectiveness of a structured educational intervention on growth monitoring, nutrition, and malnutrition among mothers of children aged 9 to 24 months. The findings revealed a significant improvement in maternal knowledge, perceptions, and practices, as well as a reduction in child malnutrition scores in the experimental group as compared to the control group, highlighting the value of targeted health education and counseling.

The demographic analysis showed that a majority of the mothers were unemployed, with educational qualifications ranging from illiterate to graduate level. Fathers were predominantly engaged in skilled and unskilled labor. These socio-economic parameters reflect the typical low-to-middle income family structures, which often face greater challenges in accessing health services and information. Notably, poor housing, sanitation, and water facilities were prevalent in both groups, further emphasizing the environmental risk factors contributing to child malnutrition.

The intervention consisting of PPT sessions and nutritional counseling demonstrated a statistically significant increase in knowledge scores (pre-test to post-test) within the study group, from 9.2 ± 2.1 to 17.5 ± 2.8. This shift indicates that structured information delivery can effectively address knowledge gaps in growth monitoring and nutrition. In contrast, the control group showed no significant knowledge improvement, reinforcing the impact of the intervention.

Furthermore, the incidence of child malnutrition showed a marked decline in the study group (from 2.3 ± 0.5 to 1.7 ± 0.4), while remaining nearly unchanged in the control group. These results support the hypothesis that maternal education and awareness play a critical role in improving child health outcomes. The data also reflected a significant shift in perception among mothers in the experimental group (positive perception rose from 35% to 74%), whereas the control group showed no substantial change.

Importantly, demographic correlates such as mother's education, occupation, ANC attendance, and family structure were significantly associated with both knowledge acquisition and perception improvement. This finding is consistent with literature emphasizing the role of maternal education and healthcare exposure in reducing childhood malnutrition (Kumar et al., 2021; Sharma & Singh, 2020). Interestingly, socio-economic status (SES) showed no statistically significant correlation with malnutrition levels, indicating that awareness and health-seeking behaviors may mediate SES influences.

The hypothesis testing supported these interpretations, with most null hypotheses rejected, validating the impact of the intervention on knowledge, perception, and child nutrition scores. The partial rejection of hypotheses related to demographic factors suggests that while these variables influence outcomes, the intervention itself can transcend some socio-economic barriers. This study emphasizes the importance of incorporating structured maternal education programs into public health initiatives to combat malnutrition. Effective community-level interventions can foster knowledge, reshape perceptions, and catalyze behavioral changes that lead to measurable improvements in child health, even in resource-limited settings. Moreover, strengthening antenatal and postnatal services with integrated nutrition counseling should be a policy priority to ensure sustained progress in maternal and child health outcomes.

6. CONCLUSION

In conclusion, this study highlights the significant impact of structured educational interventions on improving maternal knowledge, perception, and practices related to child growth monitoring, nutrition, and malnutrition. The findings clearly demonstrate that mothers who received targeted nutrition education and counseling showed substantial gains in understanding and applying health practices, which in turn contributed to a notable reduction in child malnutrition levels. Socio-demographic factors such as mother's education, occupation, and antenatal care attendance were significantly associated with the observed improvements, underlining the importance of empowering mothers through information and support. The study affirms that even in low-resource settings, comprehensive maternal education can serve as a powerful tool in combating child malnutrition and enhancing overall child health outcomes.

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