

# Effectiveness of an Information Booklet on Maternal Knowledge Regarding Prevention of Undernourishment in Pre-School Children: A Pre-Experimental Study in Rural Kanpur, India

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## Abstract

**Introduction:** Undernourishment among children under five remains a critical public health challenge in rural India, where maternal knowledge strongly influences child nutrition. This study assessed the effectiveness of an information booklet in improving the knowledge of mothers of preschool children regarding the prevention of undernourishment.

**Materials and Methods:** Using a pre-experimental one-group pre-test post-test design, 60 mothers from rural Kanpur were selected through purposive sampling. Knowledge was evaluated using a structured questionnaire before and after providing a pictorial information booklet.

**Results:** The results revealed a significant increase in mean knowledge scores from 13.5 (SD  $\pm 3.4$ ) to 21.8 (SD  $\pm 4.1$ ) after the intervention ( $t = 13.62$ ,  $p < 0.001$ ), and educational status was significantly associated with knowledge improvement ( $p < 0.05$ ).

**Conclusion:** The study concludes that culturally appropriate, low-literacy-friendly educational materials such as pictorial booklets can effectively enhance maternal knowledge and serve as a practical tool to prevent undernourishment among children in rural communities.

**Keywords:** Undernourishment, Maternal Knowledge, Nutrition Education, Rural Health, Preschool Children, Information Booklet

## Introduction

Undernourishment among children under five years remains a significant public health issue in India and other low- and middle-income countries. According to the World Health Organization (2021), undernutrition accounts for nearly 45% of global child deaths, primarily resulting from stunting, wasting, and micronutrient deficiencies. In India, the National Family Health Survey-5 (2019–21) reported that 35.5% of children under five were stunted, 32.1%

underweight, and 19.3% wasted, reflecting both chronic and acute nutritional deficits (MoHFW, 2021). The burden is particularly high in rural regions such as Kanpur, Uttar Pradesh, where low maternal literacy, food insecurity, inadequate healthcare access, and poor hygiene exacerbate the problem (Singh et al., 2025). Early childhood undernourishment leads to long-term consequences, including impaired cognitive development, poor academic performance, and heightened susceptibility to infections (Bhutta et al.,

2025), which in turn contribute to lower economic productivity and perpetuate intergenerational cycles of poverty and malnutrition (UNICEF, 2023). Maternal knowledge is a key determinant of child nutritional outcomes, as mothers influence infant and young child feeding (IYCF) practices, hygiene, and healthcare-seeking behaviors. Research has shown that improved maternal knowledge enhances feeding practices, dietary diversity, and reduces malnutrition rates (Mehzabin & Nahar, 2025; Debnath & Khan, 2025), while limited awareness and cultural misconceptions often result in harmful behaviors such as pre-lacteal feeding, delayed complementary feeding, and dependence on nutrient-poor diets (Ghosh, 2024). Despite existing government programs like the Integrated Child Development Services (ICDS) and Poshan Abhiyaan, low awareness among beneficiaries and the lack of culturally appropriate, literacy-friendly educational materials limit their effectiveness (Nair et al., 2025). Evidence suggests that pictorial information booklets using simple language can effectively enhance maternal understanding; for instance, Raj et al. (2025) found that localized, visual materials improved rural mothers' knowledge of breastfeeding and complementary feeding by over 40% within weeks. In this context, the present study seeks to evaluate the effectiveness of an information booklet in improving knowledge among mothers of preschool children regarding the prevention of undernourishment in a selected rural area of Kanpur, employing a pre-test/post-test design to determine whether a structured, pictorial educational approach can bridge the maternal knowledge gap and promote better child nutrition outcomes.

## Materials and Methods

**Study Design:** Pre-experimental one-group pre-test post-test design

**Setting:** Selected rural area of Kanpur, Uttar Pradesh, India

**Sample Size:** 60 mothers of children aged 1–5 years

**Sampling Technique:** Purposive sampling

### Inclusion Criteria:

- Mothers aged  $\geq 18$  years with children aged 1–5 years
- Residents of the study area
- Literate or able to comprehend Hindi explanation

### Exclusion Criteria:

- Mothers with formal nutrition training

- Children with chronic illness or disability

### Tool:

#### A structured knowledge questionnaire with 30 MCQs covering:

- Basics of nutrition
- Breastfeeding and complementary feeding
- Hygiene practices
- Micronutrients
- Government schemes (e.g., ICDS, Poshan Abhiyaan)

### Scoring:

- Excellent: 25–30
- Good: 20–24
- Average: 15–19
- Poor:  $<15$

### Procedure:

1. Pre-test conducted with questionnaire
2. Information booklet distributed and explained
3. Post-test conducted after 7 days

**Ethical Approval:** Granted by Institutional Ethics Committee, Rama University. Informed consent obtained.

### Statistical Analysis:

- Descriptive statistics: Mean, SD, percentages
- Inferential: Paired t-test for pre-post comparison; Chi-square test for associations

## Results

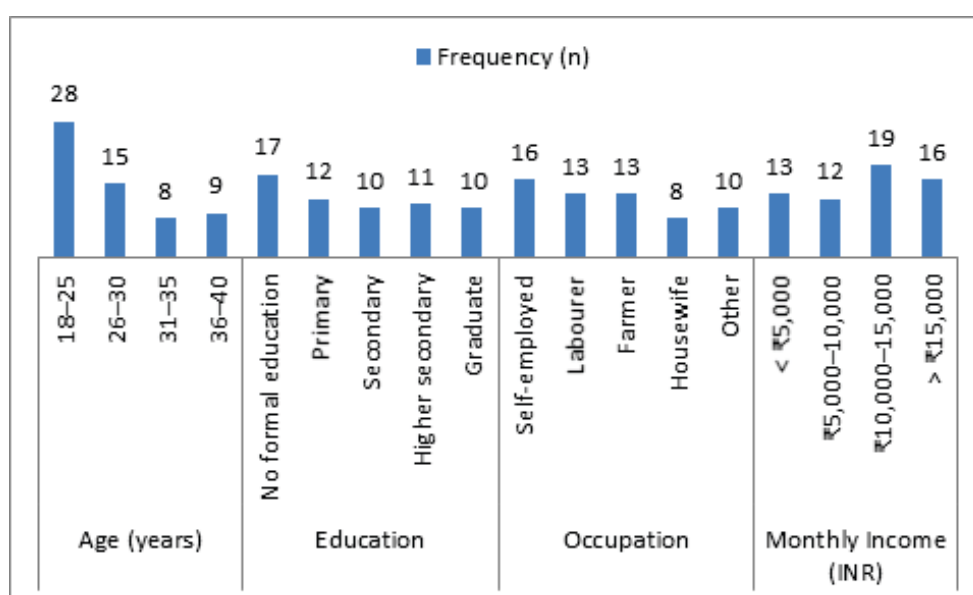
A total of 60 mothers of preschool children participated in the study. The results are presented under three sections: socio-demographic profile, knowledge score analysis (pre- and post-intervention), and association between demographic variables and knowledge scores.

### Socio-Demographic Profile of Participants

The majority of respondents were young mothers between 18–25 years (46.7%), followed by 26–30 years (25%). Regarding education, 28.3% had no formal education, while 20% had primary education and only 16.7% were graduates. Occupationally, 26.7% were self-employed, and 21.7% each were laborers and farmers. More than 50% had a monthly family income below ₹15,000.

**Table 1. Socio-Demographic Characteristics of Mothers (N = 60)**

| Variable                    | Category            | Frequency (n) | Percentage (%) |
|-----------------------------|---------------------|---------------|----------------|
| <b>Age (years)</b>          | 18–25               | 28            | 46.7           |
|                             | 26–30               | 15            | 25.0           |
|                             | 31–35               | 8             | 13.3           |
|                             | 36–40               | 9             | 15.0           |
| <b>Education</b>            | No formal education | 17            | 28.3           |
|                             | Primary             | 12            | 20.0           |
|                             | Secondary           | 10            | 16.7           |
|                             | Higher secondary    | 11            | 18.3           |
|                             | Graduate            | 10            | 16.7           |
| <b>Occupation</b>           | Self-employed       | 16            | 26.7           |
|                             | Labourer            | 13            | 21.7           |
|                             | Farmer              | 13            | 21.7           |
|                             | Housewife           | 8             | 13.3           |
|                             | Other               | 10            | 16.7           |
| <b>Monthly Income (INR)</b> | < ₹5,000            | 13            | 21.7           |
|                             | ₹5,000–10,000       | 12            | 20.0           |
|                             | ₹10,000–15,000      | 19            | 31.7           |
|                             | > ₹15,000           | 16            | 26.7           |



**Figure 01: Socio-Demographic Characteristics of Mothers**

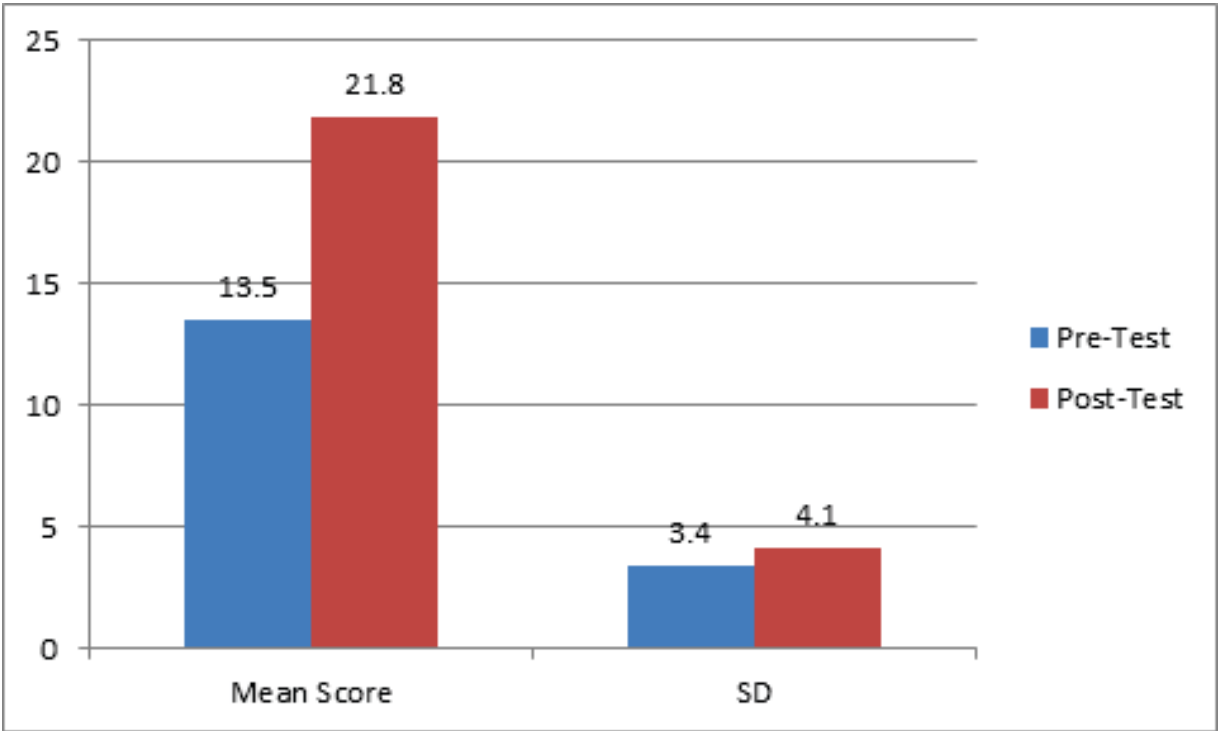
**Interpretation:** The findings indicate that a considerable number of mothers had low educational and income levels—factors that can influence health literacy and access to nutrition services.

**Comparison of Pre-Test and Post-Test Knowledge Scores**

The intervention significantly improved knowledge scores. The mean pre-test score was 13.5 (SD±3.4), while the mean post-test score rose to 21.8 (SD±4.1). The increase was statistically significant with t= 13.62, p<0.001.

**Table 2. Comparison of Pre-Test and Post-Test Knowledge Scores (N = 60)**

| Test      | Mean Score | SD  | Mean Difference | t-value | p-value  |
|-----------|------------|-----|-----------------|---------|----------|
| Pre-Test  | 13.5       | 3.4 |                 |         |          |
| Post-Test | 21.8       | 4.1 | 8.3             | 13.62   | <0.001** |



**Figure 02: Comparison of Pre-Test and Post-Test Knowledge Scores**

**Interpretation:** There was a statistically significant improvement in maternal knowledge following the distribution of the information booklet. The magnitude of change indicates the intervention's high effectiveness.

**Association Between Demographic Variables and Knowledge Scores**

A chi-square test was applied to determine associations between selected socio-demographic variables and post-test knowledge levels.

**Table 3. Association Between Demographic Variables and Post-Test Knowledge Scores**

| Variable        | $\chi^2$ Value | df | p-value | Interpretation     |
|-----------------|----------------|----|---------|--------------------|
| Age             | 2.53           | 3  | 0.47    | Not significant    |
| Education       | 10.72          | 4  | 0.03*   | <b>Significant</b> |
| Occupation      | 5.64           | 4  | 0.23    | Not significant    |
| Income          | 3.01           | 3  | 0.39    | Not significant    |
| No. of Children | 1.84           | 2  | 0.60    | Not significant    |

**Interpretation:** Among all variables, only educational status had a significant association with post-test knowledge levels ( $p = 0.03$ ). This suggests that mothers with higher education levels benefitted more from the intervention.

## Discussion

The present study aimed to assess the effectiveness of a pictorial information booklet in improving maternal knowledge regarding the prevention of undernourishment among mothers of pre-school children in a rural area of Kanpur. The results demonstrated a statistically significant improvement in knowledge following the educational intervention. The mean knowledge score increased from 13.5 (SD  $\pm 3.4$ ) in the pre-test to 21.8 (SD  $\pm 4.1$ ) in the post-test, with a highly significant paired t-test value ( $t = 13.62$ ,  $p < 0.001$ ). This improvement confirms that structured, contextually appropriate, and easy-to-understand educational materials can play a critical role in addressing maternal knowledge gaps, particularly in resource-constrained rural settings.

These findings are in line with previous studies that highlight the effectiveness of information, education, and communication (IEC) tools in improving health-related knowledge among mothers. For instance, Raj et al. (2025) reported a 40% increase in nutrition-related knowledge among rural mothers after exposure to a locally designed booklet covering exclusive breastfeeding and complementary feeding practices. Similarly, Nair et al. (2025) emphasized that maternal education interventions are particularly impactful when delivered in a culturally sensitive and visually engaging manner, as mothers in rural areas often face literacy barriers and may rely more on visual cues than textual information.

The significant improvement in knowledge also supports the broader understanding that maternal knowledge is a strong determinant of child nutrition outcomes. Mehzabin and Nahar (2025) found that children of mothers with higher nutritional literacy had significantly lower levels of stunting and wasting, independent of household income. This reinforces the idea that empowering mothers with the right information can mitigate the impact of poverty and limited food resources on child health. In the current study, despite the low socioeconomic status of many participants (53.4% had a family income below ₹15,000 per month), knowledge scores improved

substantially after the intervention, underscoring the value of non-financial health investments such as education and awareness-building.

Interestingly, among all demographic variables examined, only maternal education level showed a statistically significant association with post-test knowledge scores ( $p = 0.03$ ). This aligns with the findings of Bhatia et al. (2025), who noted that maternal education not only facilitates knowledge absorption but also improves the likelihood of behavioral change. Educated mothers are better positioned to understand, retain, and implement nutrition-related information, leading to improved child feeding practices. Conversely, mothers with no formal education may require repeated, reinforced learning through group counseling or audiovisual methods in addition to printed materials.

The absence of significant associations between knowledge gain and variables such as age, occupation, income, and number of children suggests that educational interventions can benefit a wide range of mothers regardless of background. This universal applicability makes booklet-based interventions both scalable and cost-effective. In areas with limited access to digital media or health workers, printed IEC materials become even more valuable. Ghosh (2024) emphasized that while government nutrition schemes such as ICDS are widespread, their impact is often diluted due to poor maternal understanding of how to utilize provided food rations effectively. Booklets serve as a tangible resource that mothers can revisit, discuss with peers, or share within families, thereby extending their influence beyond the immediate recipients.

The findings also underscore the role of nurses and community health workers in bridging the knowledge gap. As frontline healthcare providers in rural India, nurses are well-positioned to distribute educational materials during home visits or health camps. A study by Singh et al. (2025) found that when health workers integrated IEC materials like booklets into their counseling sessions, retention of information among mothers was significantly higher. The present study supports such integrative models, where the combination of printed education and interpersonal explanation leads to optimal learning outcomes.

Furthermore, this research aligns with the UNICEF (2023) framework, which categorizes undernutrition



as a result of both immediate causes (inadequate dietary intake, disease) and underlying causes (lack of knowledge, poor caregiving practices, and inadequate health services). The intervention addressed these underlying causes by targeting maternal knowledge, which is a modifiable factor that can produce long-term health benefits.

Despite its promising results, the study has limitations. The absence of a control group makes it difficult to entirely rule out external influences on post-test scores. Also, the follow-up period was limited to seven days; hence, the long-term retention of knowledge and actual behavior change was not assessed. However, similar studies have shown that short-term educational interventions can trigger long-lasting shifts, especially when reinforced by ongoing community engagement (Debnath & Khan, 2025). Future studies could incorporate follow-ups after several months and include behavioral and nutritional outcomes in children as key endpoints.

### Conclusion

This study demonstrated that a simple, pictorial information booklet significantly improved maternal knowledge regarding the prevention of undernourishment among mothers of pre-school children in a rural area of Kanpur. The results underscore the importance of accessible, culturally appropriate educational tools in bridging knowledge gaps, particularly in low-literacy settings. Among all demographic variables, education was the only factor significantly associated with knowledge improvement, highlighting the need for targeted support for less-educated mothers. Overall, booklet-based interventions present a cost-effective and scalable strategy for strengthening community-level nutrition awareness and supporting national efforts to reduce child undernutrition.

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**Conflicts of interests:** There is no conflict of interest

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