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RESEARCH ARTICLE

Developing and Assessing the Effectiveness of a Need-Based Information Booklet on Immunization Knowledge

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Abstract: Background: Immunization is an effective and cost-saving measure to prevent childhood morbidity and mortality. Despite that, low awareness and myths among mothers in urban slum areas remain a constraint to achieving optimum immunization coverage. This study was conducted to design and test the effectiveness of a need-based information booklet for enhancing mothers' knowledge of child immunization. ***Methods***: Pre-experimental one-group pre-test and post-test design was followed among 100 mothers of under-five children living in selected urban slums in Assam. Data were gathered using a structured knowledge questionnaire pre- and post-distribution of the information booklet. The information booklet was formulated based on assumed information needs and validated by subject experts. Descriptive and inferential statistics were used to analyze the data, with p-values less than 0.05 considered statistically significant. ***Results***: The pre-test knowledge mean score was 12.45 (SD ±3.28), which improved significantly to 20.68 (SD ±2.91) in the post-test following exposure to the booklet ($t = 21.45$, $p < 0.001$). There was a significant correlation between post-test knowledge scores and mothers' educational status ($p < 0.05$). Other demographic factors, such as age, occupation, and socioeconomic status, did not show a significant correlation with improvements in knowledge. ***Conclusion***: The research demonstrated that a need-based information booklet is an effective educational intervention to improving mothers' knowledge of immunization. Integrating such culturally relevant, literacy-sensitive education interventions into community health programs can reinforce awareness, promote complete immunization, and help to improve children's health outcomes.

Keywords: Immunization, Mothers, Knowledge, Urban Slums, Information Booklet, Health Education.

INTRODUCTION

Immunization is one of the most powerful and cost-effective public health interventions, with substantial achievements in preventing morbidity and mortality due to vaccine-preventable diseases. Despite relentless national efforts towards achieving universal immunization coverage, genuine gaps persist, particularly in urban slums, where socio-economic constraints, unhygienic living conditions, and inadequate health infrastructure limit access to routine immunization services. Evidence from across different parts of India and South Asia has consistently demonstrated poor caregivers' and parents' knowledge, negative sentiments, and poor practices towards child immunization [1–3].

Urbanization and migration also contribute to widening the urban–rural gap in immunization coverage by creating mobile populations often beyond the reach of regular health services [4,5]. Research on urban slums and construction sites has found that low immunization rates are typically linked with inadequate education, vaccine misconceptions, and poor communication between healthcare providers and the population [6]. In addition, systemic challenges, such as infrastructure limitations and implementation issues in the slum context, result in partial or delayed immunization [7].

These problems are addressed through targeted educational interventions that meet the specific information needs of caregivers from disadvantaged groups. The production of a locally tailored information booklet can be a powerful vehicle for developing knowledge, improving attitudes, and promoting good practice in immunization. By providing relevant, clear, and accurate information, such interventions can reduce knowledge gaps and, in the long term, extend immunization coverage to children in risk groups [8].

METHODS

Study Design

A pre-experimental, one-group pre-test and post-test design was used to evaluate the effectiveness of a need-based information booklet on immunization knowledge among mothers of children aged under five years in Assam. This design was used to assess the change in participants' knowledge prior to and following the education intervention without using a control group.

Study Setting

The research was done in a sampled urban slum of Assam settlements within a municipal health division's jurisdiction. These were sampled based on their low level of immunization coverage, high population density, and poor access to formal health education programs. The research setting represented the everyday urban slum

environments in Assam, marked by overcrowding, poor hygiene, and limited healthcare resources.

Study Population

The study sample was drawn from mothers of children under five living in the chosen slum areas. Mothers were thought to be appropriate participants since they are the primary decision-makers for their child's health and immunization status.

Sample Size and Sampling Technique

A purposive sampling strategy was used to recruit participants who met the inclusion criteria. The sample size was determined based on the number of eligible mothers during the data collection period and the feasibility of pre- and post-assessment. Mothers of children under 5 years old who agreed to participate and could read or speak the local language were included. Mothers who were healthcare workers or absent during follow-up were excluded.

Development of Information Booklet

An information booklet was prepared after a thorough needs assessment was carried out among the target group. Experts in community medicine, nursing, and public health were consulted to organize the content. The booklet contained essential information, including the significance of immunization, vaccine schedules, advantages and disadvantages, myths and misconceptions, and how parents can promote complete vaccination. The vocabulary employed was uncomplicated and culturally sensitive, supplemented with pictures to ensure comprehension by low-literate mothers. The content validity of the booklet was ensured through expert assessment.

Data Collection Instrument

A standardized knowledge questionnaire was developed to assess mothers' immunization knowledge. It included multiple-choice and dichotomous questions from different areas of expertise related to immunization, such as vaccine awareness, immunization timetables, and preventive benefits. Subject experts validated the instrument, and reliability was assessed through a test–retest procedure to ensure replicable responses.

Data Collection Procedure

Data were collected in three phases: pre-test, intervention, and post-test. During the pre-test period, baseline knowledge of immunization was measured using the pre-tested questionnaire. After the pre-test, the need-based information booklet was given to all the participants and its contents were clearly explained through an interactive session. Mothers were motivated to read the booklet and clarify their queries. Seven days later, the post-test was conducted using the same questionnaire to assess any gain in knowledge.

Data Analysis

Data were entered into a statistical computer program and coded for analysis. Descriptive statistics of frequency, percentage, mean, and standard deviation were used to summarize demographic variables and knowledge scores. Inferential statistics, such as paired t-tests, were performed to compare pre-test and post-test knowledge scores to establish the effectiveness of the information booklet. A p-value of less than 0.05 was used to determine statistical significance.

RESULTS

Socio-Demographic Profile of the Participants

100 under-five child mothers took part in the study. 46% of the mothers were in the 26–30-year age group, followed by 18% aged 25 or younger. More than half of the respondents were homemakers, and slightly more than 62% had an education to the secondary level. With respect to the number of children, 55% reported that they had two children, and 30% reported that they had one child. The most common family type (67%) was low socioeconomic status, and 80% lived in nuclear families. Table 1 shows the socio-demographic distribution of study participants.

Table 1. Socio-Demographic Profile of Mothers (N = 100)

Variables	Categories	Frequency (f)	Percentage (%)
Age (in years)	<25	18	18
	26–30	46	46
	>30	36	36
Education	Illiterate	14	14
	Primary	24	24
	Secondary	62	62

Occupation	Homemaker	68	68
	Daily wage worker	22	22
	Employed	10	10
Type of Family	Nuclear	80	80
	Joint	20	20
Socioeconomic Status	Low	67	67
	Middle	28	28
	High	5	5

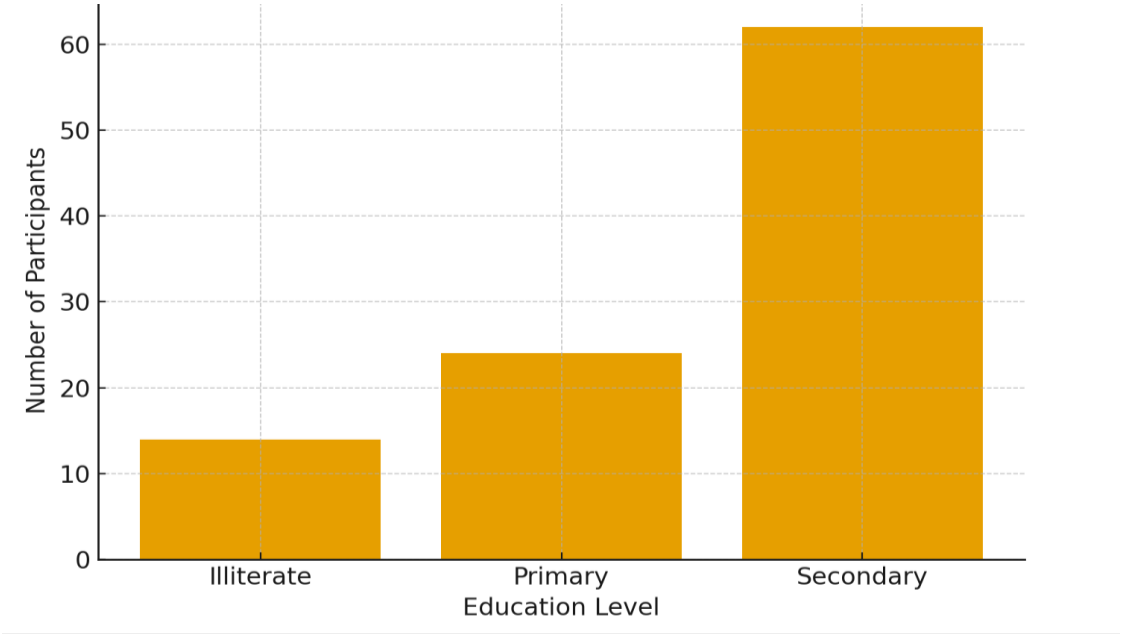

Figure 1: Distribution of Participants According to Education Level

Pre-test and Post-test Scores of Knowledges

The pre-intervention mean knowledge score among mothers was 12.45 (SD ±3.28) out of a maximum possible score of 25. The mean post-test score rose to 20.68 (SD ±2.91) following exposure to the need-based information booklet. This impressive improvement speaks volumes about the major improvement observed in the understanding of immunization ideas, schedule, and necessity among the mothers.

Table 2. Comparison of Pre-test and Post-test Knowledge Scores (N = 100)

Test	**Mean**	**Standard Deviation**	**Mean Difference**	**t-value**	**p-value**
Pre-test	12.45	3.28			
Post-test	20.68	2.91	8.23	21.45	<0.001*

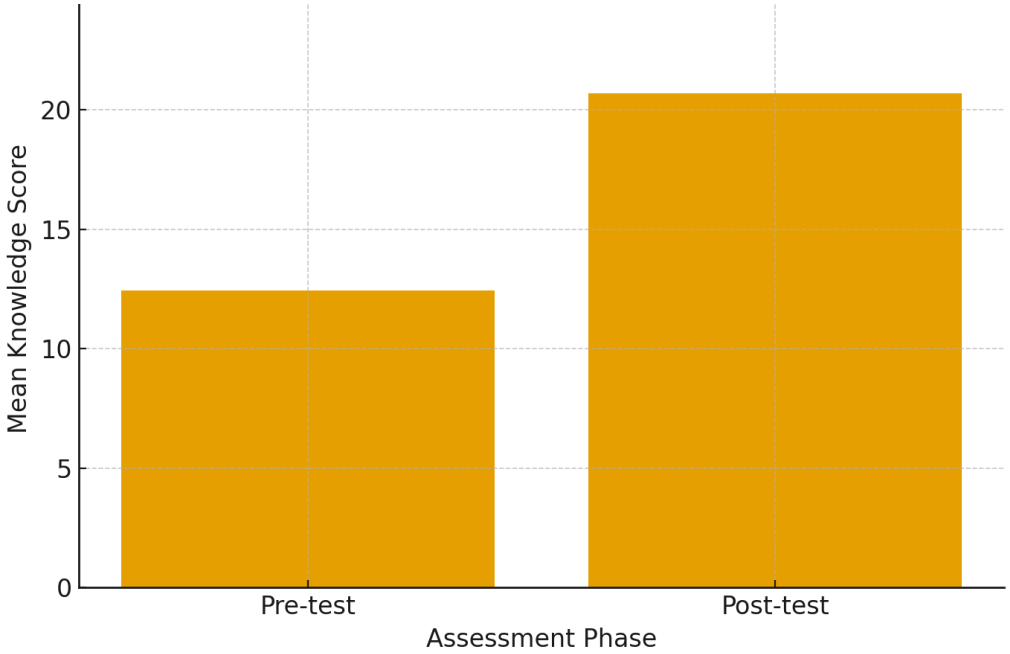

Figure 2: Comparison of pre-test and post-test mean knowledge scores.

The paired t-test had shown a statistically significant difference ($p < 0.001$) between pre-test and post-test scores for knowledge, which validated the efficiency of the information booklet to enhance mothers' knowledge in relation to immunization.

Relationship Between Knowledge Acquisition and Chosen Demographic Variables

Additional analysis was conducted to establish the relationship between post-test scores for knowledge and certain demographic variables including age, education, occupation, and socioeconomic status. An association was noted between mothers' education level and post-test scores for knowledge ($p < 0.05$). Yet, there was no significant association noted between knowledge gain and other variables like age or occupation.

Table 3. Association Between Post-test Knowledge Scores and Demographic Variables (N = 100)

Demographic Variable	Calculated χ^2 Value	df	p-value	Interpretation
Age	3.41	2	0.18	Not significant
Education	7.89	2	0.02	Significant*
Occupation	2.25	2	0.32	Not significant
Socioeconomic Status	4.18	2	0.12	Not significant

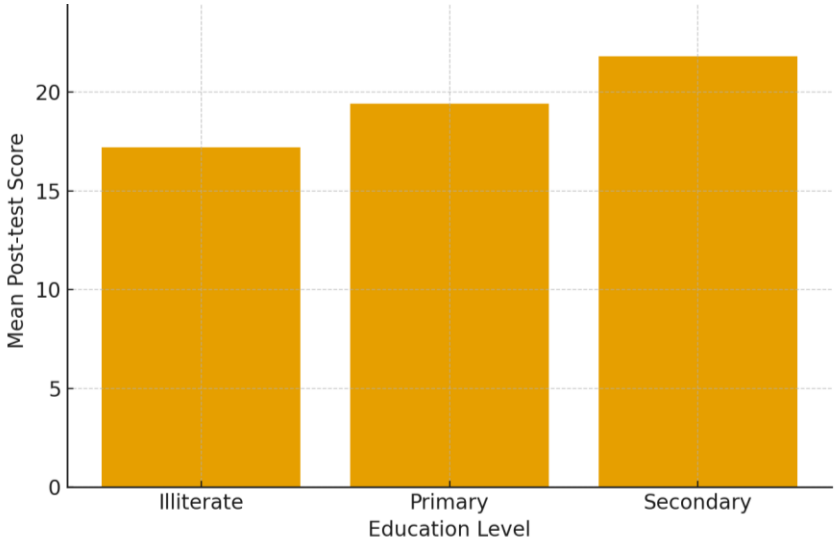

Figure 3: Relationship between education level and mean post-test knowledge scores.

The results of the study show that need-based information booklets significantly contributed to the improvement in the knowledge of mothers about immunization. The statistically significant increase in post-test scores points towards the health-education potency of a simple, organized education tool in improving health awareness among underprivileged urban slum dwellers. The educational level of the mothers was also found to be an important factor in the acquisition of knowledge, underpinning the need for literacy-sensitive communication strategies in health education.

DISCUSSION

Findings of the present research suggest a significant improvement in mothers' knowledge regarding immunization following the provision of a need-based information booklet. The improvement in post-test scores indicates that targeted educational interventions can significantly enhance awareness and comprehension among mothers living in urban slums. The findings are consistent with earlier research demonstrating that health education programs are essential to improving immunization coverage and minimizing dropout rates among underprivileged groups [9].

As in the present study, Mohapatra et al. found that information campaigns such as Mission Indradhanush greatly enhanced parental education and immunization service use in slum areas of cities, highlighting the role of information dissemination in encouraging vaccine acceptance [9]. Evidence from other low-resource settings, including Uganda and Pakistan, has also proved that community-level educational and outreach interventions are essential in improving immunization coverage [10,11]. These results validate the current study's findings that educating mothers directly is a key factor in improving immunization practices.

Earlier research has indicated that inadequate awareness, restricted health-seeking behavior, and unavailability of services are the major hindrances to the achievement of universal immunization coverage among urban and slum populations [12]. The current intervention, which introduced a simple, easy-to-read booklet, was able to overcome these hindrances by systemically enhancing maternal knowledge. Hargono et al. and Joy et al. also found that access to educational materials and mothers' awareness are strong predictors of children's complete immunization status [13,14]. This is consistent with the present study's results, which indicate that maternal education independently predicts higher post-test knowledge scores, indicating that educated mothers are more responsive to written health education materials.

Also, improving client satisfaction and faith in immunization services continues to be key to maintaining long-term involvement in vaccination programs. Kurkuri and Subramanian stressed that dissatisfaction with services, lack of information, and poor communication channels always limit vaccine uptake among migrant and slum populations [15]. In this regard, the use of a visually attractive and language-friendly information booklet in the current study assisted in filling these communication gaps through offering accurate information directly to mothers in their own language.

In general, findings from the current study are consistent with both national and global evidence that necessity-based, culture-specific educational interventions are extremely effective in enhancing knowledge, promoting positive attitudes, and enhancing participation in immunization program activities among vulnerable populations. The incorporation of such educational materials into existing national immunization efforts can substantially contribute to community mobilization and universal immunization coverage.

Limitations

While the study demonstrates the effectiveness of a need-based information booklet in improving mothers' immunization knowledge, it has some limitations. The research was conducted with a sample of 100 mothers from a single urban slum in Assam, which may not be representative of all urban slum populations. The study used a pre-test and post-test design without a control group, which limits the ability to attribute the knowledge gains solely to the information booklet conclusively. Additionally, the sample relied on self-reported data, which could introduce bias. Other factors influencing immunization behavior, such as cultural beliefs or healthcare access, were not comprehensively explored.

Future Aims and Scope

In the future, the integration of advanced technologies such as Artificial Intelligence (AI), the Metaverse, and Telehealth could significantly enhance the effectiveness of information interventions, such as the need-based booklet.

AI could be used to create personalized learning experiences for mothers, adapting content based on their specific knowledge gaps and learning styles. By analyzing user interactions, AI can refine educational materials and make them more engaging [16]. The Metaverse offers an immersive environment where mothers could participate in virtual health education sessions, interact with healthcare professionals, and engage in simulated experiences that demonstrate the importance of immunization. This could bridge the gap for those with limited access to in-person education [17]. Furthermore, Telehealth platforms can be used to provide remote consultations, enabling healthcare providers to answer questions in real time and offer personalized guidance to mothers. By leveraging these technologies, the scope of health education could expand far beyond traditional booklets, making it more accessible, interactive, and tailored to individual needs [18].

CONCLUSION

The current research concludes that the preparation and application of a need-based information booklet immensely enhanced mothers' knowledge on childhood immunization within urban slum environments. The increased post-test score observed identifies the efficiency of organized, context-oriented educational materials in filling information gaps and enhancing awareness among caregivers. Through the delivery of explicit, culturally relevant, and accessible information, the booklet was able to empower mothers to better appreciate why and how vaccination at the right time protects their children from childhood illness. The findings highlight that incorporating such focused educational interventions into routine community-level health programs would help reinforce immunization activities, maximize parental involvement, and eventually enhance the attainment of higher immunization coverage among disadvantaged groups.

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