

A Study to Assess the Effectiveness of Planned Teaching Program on Knowledge Regarding Food Handling and Storage Techniques Among Mess Workers in NMCH Hostel

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Abstract: *Background:*

In hostels and similar institutions, where many people are served each day and the risk of foodborne illness is high, food safety remains a major public health concern. Diseases such as typhoid, hepatitis, and diarrhea often result from mess workers not knowing enough about safe storage, personal hygiene, proper food handling, and how to prevent cross-contamination. Additional risks in these kitchens come from factors like low income, limited education, frequent staff changes, and inconsistent training.

The objectives of this study were to identify any gaps in current procedures, assess the efficacy of a structured, situation-specific training program, and systematically evaluate the knowledge levels of mess workers at NMCH Hostel regarding food handling and storage. Establishing demographic correlations with knowledge gains for food safety compliance was another goal.

Methods:

A pre-experimental, single-group pre-test/post-test design was used. Sixty mess workers were selected using purposive sampling. A validated, structured questionnaire with sections on demographic data and 16 knowledge questions (scoring: poor, 0–5; average, 6–11; good, 12–16) was administered before and one week after a 30 – 45-minute educational intervention featuring lectures, demonstrations, and visual aids tailored to varying educational levels. Statistical analysis included descriptive statistics, paired t-tests, chi-square testing for demographic associations, and reliability/validity checks for the research instrument. Ethical approvals were secured, and participant confidentiality was rigorously maintained.

Results:

Baseline data revealed substantial deficits in fundamental food safety knowledge. After the training intervention, the proportion of workers with adequate knowledge increased from 12% to 55%, and no participants remained in the poor knowledge category. Statistically significant improvements ($p < 0.01$) were observed across age, gender, education, work experience, and all job roles (cooking, cleaning, serving, storage). Workers with little or no formal education showed significant improvement, indicating that the interactive, visual method is effective even for those with low literacy levels. Most participants reported increased confidence, satisfaction with the instructional methods, and intent to apply improved practices. The findings were robust across all analyzed demographic subgroups, with no significant difference in gains based on prior training, supporting the value of recurring and inclusive training sessions.

Conclusion:

A planned, skill-based teaching program significantly improves food safety knowledge among



institutional mess workers, transcending educational and experiential barriers. Sustainable improvements in food safety demand integration of such structured training into institutional policies, periodic refreshers, and engagement of all worker categories, regardless of prior experience. Further research is encouraged to assess long-term practice changes and outcomes on foodborne illness rates.

Implications:

The study underscores the need for regular, comprehensive food safety education reinforced by policy mandates. Institutional kitchens should implement supervision, periodic evaluations, and infrastructural support to maintain compliance. Adapting teaching methods to the language and literacy of workers and using visual, participatory materials enhances reach and efficacy. These interventions have broad potential to reduce foodborne disease risks and improve public health outcomes across diverse institutional settings.

Keywords: Food Safety, Food Handling Practices, Food Storage Techniques, Mess Workers, Institutional Food Handlers, Educational Intervention, Structured Teaching Program, Knowledge Assessment, Pre-test and Post-test Design, Paired t-test, Chi-square Test, Hostel Settings, India, Public Health, Foodborne Illness Prevention.

I. INTRODUCTION

Food safety encompasses the measures, techniques, and practices employed throughout the food supply chain—from production, processing, distribution, to consumption—to prevent foodborne illnesses and ensure the delivery of safe and wholesome foods to consumers¹. Unsafe food containing harmful bacteria, viruses, parasites, or chemical substances is responsible for more than 200 diseases worldwide, ranging from gastrointestinal infections such as diarrhea, typhoid, and hepatitis, to more severe outcomes like cancers and neurological disorders². Globally, an estimated 1 in 10 people fall ill annually from consuming contaminated food, with profound impacts on health systems, economies, and quality of life³. Institutional settings such as hostels, hospitals, schools, and prisons represent high-risk environments for foodborne disease outbreaks due to the scale and frequency of meal preparation and service⁴. Here, food handlers and mess workers are the critical points of contact responsible for maintaining hygiene standards that prevent contamination⁵. However, many mess workers lack formal education on food safety principles and are frequently exposed to risk factors including poor personal hygiene, improper storage temperatures, cross-contamination, and limited access to safe water and sanitation facilities⁶. These factors are compounded by socio-demographic challenges such as low literacy, insufficient training opportunities, culturally ingrained food handling practices, and transient employment, which hinder standardization of food safety practices⁷. Improving food safety knowledge among mess workers not only protects the immediate consumers—often vulnerable populations like children and the elderly—but also reduces the socioeconomic burden associated with foodborne diseases, including healthcare costs, lost productivity, and trade disruptions⁸. Thus, there is an urgent and enduring need for targeted, practical education and training interventions tailored to the educational levels and cultural contexts of institutional food handlers⁹. This study addresses this gap by evaluating a structured teaching program aimed at improving food handling and storage knowledge among mess workers in a hostel setting¹⁰.

Need for the Study

The burden of foodborne illnesses remains disproportionately high in developing countries, where infrastructure, regulatory oversight, and public awareness are often insufficient¹¹. Surveillance data in India and many low- and middle-income countries are underreported, but available statistics highlight alarming incidences of diarrhea, hepatitis A, typhoid, and other foodborne diseases causing significant morbidity and mortality, especially among children under five years of age¹². For instance, the National Institute of Nutrition in India reports that hundreds of thousands of children die annually due to diarrheal diseases linked to poor food and water hygiene¹³. In institutional hostels such as the NMCH Hostel, mess workers serve a critical role in ensuring the health and safety of residents through proper food



handling, cooking, and storage techniques¹⁴. Yet, these workers frequently have limited knowledge of food safety principles, which elevates the risk of contamination and food poisoning outbreaks¹⁵. Factors such as inadequate prior training, lack of consistent supervision, and socio-cultural habits further exacerbate this issue¹⁶. Research indicates that knowledge deficits among food handlers significantly contribute to unsafe practices like incorrect food storage temperatures, poor personal hygiene, and cross-contamination between raw and cooked foods¹⁷. Moreover, increasing urbanization, the shift toward mass catering, and evolving food supply chains heighten exposure risks to foodborne pathogens, necessitating ongoing education and behavioral change interventions¹⁸. While some food safety initiatives exist, there is a lack of systematic, evidence-based educational programs tailored for institutional settings in India, especially within hostel environments¹⁹. This study responds to this critical need, aiming to assess baseline knowledge, implement a contextualized teaching program, and measure its effectiveness, ultimately contributing to safer food handling practices and improved public health outcomes²⁰.

Statement of the Problem

A study to assess the effectiveness of planned teaching program on knowledge regarding food handling and storage techniques among mess workers in NMCH hostel.

Objectives

- To assess the pre-intervention level of knowledge regarding food handling and storage techniques among mess workers in NMCH hostel.
- To evaluate the effectiveness of the planned teaching program by comparing pre-test and post-test knowledge scores.
- To determine the association between post-test knowledge scores and selected demographic variables.

Hypotheses

H₁: Significant difference between pre-test and post-test knowledge scores regarding food handling and storage after teaching program.

H₂: Significant association between post-test scores and demographic variables.

Conceptual Framework

This study draws on the Knowledge-Attitude-Practice (KAP) Model, which posits that behavior change proceeds from knowledge acquisition to attitude shifts, culminating in changes in practical behavior. The research intervention is thus designed to first increase knowledge, with the expectation that improved attitudes and practices will follow.

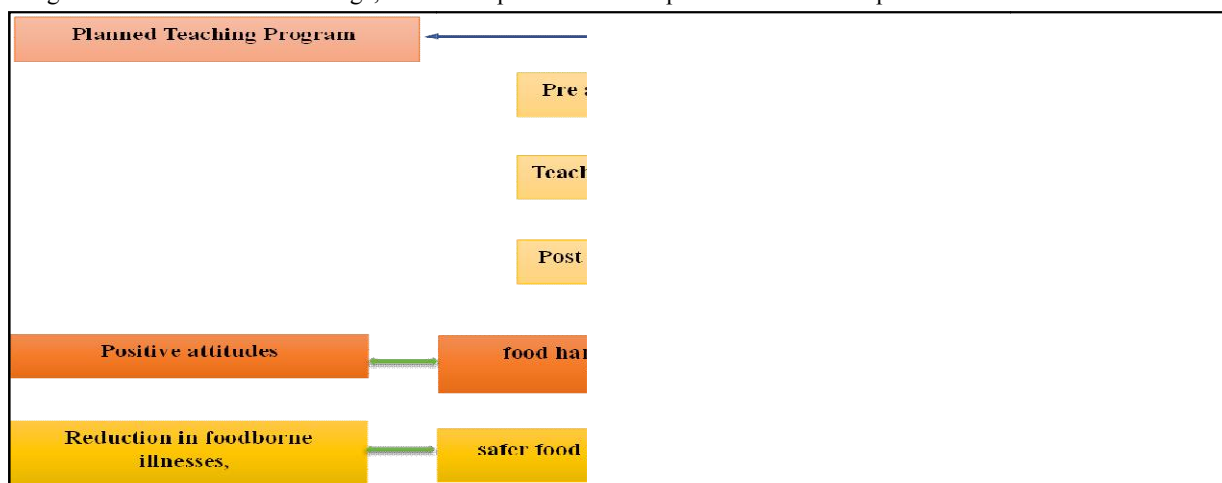


Fig 1.1 - Knowledge-Attitude-Practice (KAP) Model



II. METHODOLOGY

Research Design

- **Approach:** Quantitative, pre-experimental, one group pre-test/post-test.
- **Setting:** NMCH hostel mess, Narayan Medical College and Hospital, Jamuhar, Bihar.
- **Sample:** 60 mess workers selected using purposive sampling.
- **Inclusion Criteria:** Mess workers in NMCH hostel, available and willing during data collection.
- **Exclusion Criteria:** Workers with prior formal food safety training, and those unwilling/unavailable.

Data Collection:

Tool A validated, structured questionnaire consisting of demographic and knowledge questions (16 items; scored 0-16) marked as poor (0-5), fair (6-11), and high (12-16).

Tool developed by reviewing literature and through expert validation by RN, PH, and Food Safety Professionals.

Reliability was tested using Cronbach's alpha/split-half method prior to main data collection, to ensure internal consistency.

The tool was pilot tested on a small sample (10% of total), to refine wording and feasibility.

Intervention

Educational session (~30-45 minutes) which consisted of lectures and visual aids.

Pre-test conducted, followed immediately by teaching, retested 7 days following teaching.

Content was based on personal hygiene, safe food storage, how to avoid cross-contamination, temperature control, clean hand-washing techniques. Illustrated charts were used along with flipbooks and short video clips to enhance learning.

Printed handouts were provided for participants that summarized key food safety practices.

The educational opportunity also consisted of a chance for interactive discussion with Q&A for clarification.

III. DATA ANALYSIS

Descriptive Statistics: Mean, percentages, standard deviation **Inferential Statistics:** A paired t-test to analyze effectiveness, chi-square test for associations Confidence level was set at 95% ($p < 0.05$ was considered statistically significant).

Data entered into a database using MS Excel / SPSS for analysis, and double entries were performed to help decrease errors.

Pre and post-test were analyzed, and results were visually displayed using graphs (bar charts and pie charts) to display changes in knowledge categories.

IV. RESULTS

Demographic Profile

Age: Majority below 20 years (30%), evenly distributed across other age brackets.

Gender: 55% male, 45% female.

Education: 31.7% primary school; significant fraction with no formal education (21.7%).

Work Experience: 30% with <1 year, 30% with >10 years.

Monthly Income: Largest group (33.3%) in 10,001–15,000 range.

Training: Only half had prior food handling/storage training.

Employment Type: 58.3% permanent, 41.7% contractual.

Table 4.1 frequency and percentage of demographic variables

S. No.	Category	Subcategory	Frequency	Percent (%)
1	Age	Below 20 years	18	30



		21–30 years	13	21.7
		31–40 years	15	25
		Above 40 years	14	23.3
2	Gender	Male	33	55
		Female	27	45
3	Educational Qualification	No formal education	13	21.7
		Primary school	19	31.7
		Secondary school	13	21.7
		Higher secondary & above	15	25
4	Work Experience	Less than 1 year	18	30
		1–5 years	10	16.7
		6–10 years	14	23.3
		More than 10 years	18	30
5	Monthly Income	Below ₹5,000	14	23.3
		₹5,001–₹10,000	10	16.7
		₹10,001–₹15,000	20	33.3
		Above ₹15,000	16	26.7
6	Previous Training on Food Handling/Storage	Yes	30	50
		No	30	50
7	Type of Employment	Permanent	35	58.3
		Temporary/Contractual	25	41.7
8	Area of Work in Mess	Cooking	19	31.7
		Cleaning	18	30
		Food serving	13	21.7
		Storage & handling	10	16.7

Effectiveness of Intervention

Pre-test scores revealed substantial gaps in food safety knowledge, with most workers demonstrating average or poor understanding. Post-test scores increased markedly, indicative of statistically significant improvement ($p < 0.05$). Participants showed increased understanding of hygiene, storage temperatures, cross-contamination prevention, and contamination awareness. Most expressed satisfaction and intent to apply new practices daily.

Table 4.2: Level of Knowledge Pre and Post Planned Teaching Program

Level of Knowledge	Pre-test No. of Mess Workers	Pre - test (%)	Post-test No. of Mess Workers	Post -test (%)	Pearson Chi-square Test
Poor	6	10	0	0	$X^2 - 28.3054$, $p - 0.001^*$
Moderate	47	78	27	45	
Adequate	7	12	33	55	

***Significant at $p < 0.01$**

The comparison of pre-test and post-test knowledge levels among the 60 mess workers clearly indicates the effectiveness of the planned teaching program. Initially, only 12% (7 out of 60) of the participants possessed adequate knowledge of food handling and storage techniques, while the vast majority — 78% (47 participants) — had moderate knowledge, and 10% (6 participants) demonstrated poor knowledge. Following the intervention, there was a marked



improvement in the knowledge level distribution: the proportion of those with adequate knowledge increased substantially to 55% (33 participants), the moderate knowledge category reduced to 45% (27 participants), and importantly, no participants remained in the poor knowledge category. The statistical analysis using Pearson's Chi-square test showed a highly significant difference between pre-test and post-test levels ($X^2 = 28.3054$, $p = 0.001$), confirming that the planned teaching program effectively enhanced the knowledge of mess workers regarding safe food handling and storage practices.

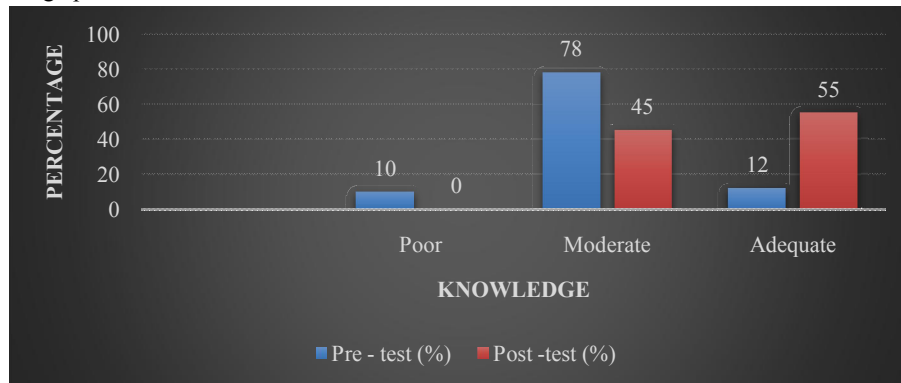


Fig 1.2: Level of Knowledge Pre and Post Planned Teaching Program

V. DISCUSSION

The results validate planned, structured education as an effective tool for improving food safety knowledge among mess workers. Such programs reduce the risk of foodborne diseases and are essential in institutional settings. Literacy and language barriers may hinder effectiveness, so interventions should be tailored accordingly. Periodic refresher courses and visual reinforcement (posters, demonstrations) are recommended.

Limitations

- No control group
- Reliance on self-reported knowledge (not practices)
- Limited long-term follow-up
- Restricted to NMCH hostel mess

VI. CONCLUSION

The teaching program as planned had excellent success at increasing mess workers' knowledge of food handling and storage techniques. There was a significant increase in knowledge scores from pre-test to post-test. The increased number of workers with adequate knowledge from 12% to 55% illustrates the benefit of structured educational interventions. Improvement was seen for all demographic variables (age, gender, education level, work experience and training) illustrating that this intervention can be applied broadly with success. The lack of a relationship between pre-test and post-test scores suggest that an individual's starting knowledge does not define their ability to learn and emphasizes the importance of training for everyone, regardless of experience or background. Mess workers with no formal education were also able to significantly improve their knowledge, which demonstrates that properly devised, visual and participatory teaching methods can surmount barriers posed by reading and literacy. The results highlight that one training session is not enough; ongoing repetitive training, assessment and updates are necessary to ensure ongoing high standards of food safety in institutional kitchens. The study supports the need for regularly mandated inclusive training sessions as part of institutional policy to ensure food safety and compliance with hygiene procedures.



Implications

The implications of the study are discussed under four major areas: nursing practice, nursing education, nursing administration, and nursing research.

Implications for Nursing Practice

Nurses working in community and institutional settings can play a key role in educating mess workers about safe food practices.

Health education sessions should be established as a standard part of practice in hospitals, hostels, schools, and colleges.

Community health nurses and nutrition educators need to routinely conduct a food safety audit once a month in educational settings and do on-site demonstrations of food handling procedures.

Implications for Nursing Education

Food hygiene and community food safety education modules should be part of nursing students' curriculum so they can be trained various educator and facilitator roles.

Nursing interns should be incorporated into the planning and implementation of food safety programs with the mess workers.

Simulation-based learning strategies and practice modules could increase training efficiency.

Implications for Nursing Administration

Nursing administrators and public health officials should institute mandatory, regular training programs for mess workers or food handlers.

Tools to monitor compliance with food safety guidelines should be constructed as well as checklists for site auditing.

Policies should develop that state every mess workers or food handler must have a food safety program once a year minimum and preferably twice a year.

Implications for Nursing Research

More research needs to be performed long-term retention of knowledge and the practice change after the food safety training program.

More comparative studies could be done comparing trained food handlers and the comparison of food safety practices of untrained food handlers would support greater policy changes.

Action research project could be conducted with student groups to create lower-cost, customized food hygiene work kits that could be used for teaching and food hygiene assessments.

RECOMMENDATIONS

For Institutional Implementation

Implement mandatory food safety orientation for all newly appointed mess workers.

Designate a food safety supervisor in every institutional kitchen responsible for periodic inspection and education.

Introduce standard operating procedures (SOPs) for food handling, temperature monitoring, and storage.

For Policy Makers and Public Health Authorities

Integrate food safety education as part of the State Health Mission initiatives.

Develop state-level certification programs for food handlers in collaboration with nursing colleges and health departments.

Ensure licensing and inspection of institutional kitchens at least bi-annually.

For Continuous Education

Conduct quarterly refresher courses for mess workers using a mix of audio-visual methods and real-life case studies.

Distribute illustrated manuals and posters in regional languages to reinforce safe practices.

Introduce peer-learning and mentorship programs, where experienced and trained workers help others improve.

For Further Research

Longitudinal studies are recommended to evaluate the sustained impact of training programs over time.

Studies should assess behavioral changes and real-time practices post-training using observational methods.

Future research could include interventional comparisons between online, classroom, and blended training models.



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