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Effectiveness Of Occupational Safety Package On Knowledge Regarding Hazards Of Petroleum Factories Among Staff Working In Refinery, Bina M.P.

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Abstract

Introduction: Occupational safety in petroleum refineries is a critical concern due to the inherently hazardous nature of the industry, which involves exposure to flammable substances, toxic chemicals, and high-pressure systems. Staff working in such environments must possess a comprehensive understanding of safety protocols and potential risks to prevent accidents and ensure workplace well-being. The implementation of structured safety education programs, such as occupational safety packages, aims to enhance employees' knowledge and awareness regarding these hazards. This study focuses on evaluating the effectiveness of such a safety package in improving the knowledge of refinery staff at Bina, Madhya Pradesh, with the goal of promoting safer work practices and reducing the incidence of occupational injuries and illnesses.

Aims: The primary aim of this study is to evaluate the effectiveness of an occupational safety package in enhancing the knowledge of staff regarding the hazards associated with working in petroleum refineries. Specifically, the study seeks to assess the improvement in awareness, understanding, and preparedness among refinery staff at Bina, Madhya Pradesh, after the implementation of the safety package, with the ultimate goal of promoting a safer working environment and minimizing occupational risks.

Objectives: 1) To assess the pre-test level of knowledge regarding the hazards of petroleum factories among staff working in the refinery at Bina, MP. 2) To develop a structured occupational safety package aimed at improving knowledge related to workplace hazards in petroleum refineries. 3) To administer the occupational safety package among staff working in the refinery at Bina, MP. 4) To assess the post-test level of knowledge regarding the hazards of petroleum factories among the refinery staff. 5) To evaluate the effectiveness of the occupational safety package by comparing pre- and post-test knowledge scores. 6) To determine the association between the pre-test knowledge scores and selected demographic variables of the refinery staff.

Materials and Methods: The present study adopted a quantitative evaluative research approach to assess the effectiveness of an occupational safety package on knowledge regarding hazards in petroleum factories among staff working at the refinery in Bina, Madhya Pradesh. A pre-experimental two-group pre-test post-test design was used, involving 60 staff members selected through non-probability convenient sampling. The independent variable was the occupational safety package, while the dependent variable was the knowledge of refinery staff regarding petroleum hazards. Data was collected using a structured self-administered questionnaire consisting of 30 multiple-choice questions, developed through expert consultation, literature review, and pilot testing. The questionnaire also included demographic details such as age, gender, religion, education, and income. Content validity was ensured by subjecting the tool to review by seven experts, and reliability was established using the split-half method, yielding a reliability coefficient of $r = 0.89$. A pilot study was conducted in the same setting to test feasibility, and data collection was carried out after obtaining administrative permission and informed consent from participants. Pre-test data was followed by the administration of the safety package, and post-test data was collected using the same tool. Descriptive statistics (frequency, percentage, mean, median, mode, and standard deviation) and inferential statistics (paired t-test and chi-square test) were used for data analysis. Ethical approval was obtained, and participants' confidentiality and rights were strictly maintained throughout the study.

Findings: The findings of the study revealed that prior to the administration of the occupational safety package, the majority of staff working in the refinery (58.33%) had inadequate knowledge regarding hazards of petroleum, with a mean pre-test score of 9.8 and standard deviation of 4.162. After the intervention, a significant improvement was observed, with 80% of participants demonstrating adequate knowledge, reflected in a post-test mean score of 22.68 and standard deviation of 4.031. The mean difference between pre- and post-test scores was 12.88, and the paired t-test value of 7.79 confirmed a statistically significant improvement in knowledge at the 0.05 level, thereby supporting the effectiveness of the occupational safety package. Furthermore, chi-square analysis showed a significant association between pre-test knowledge scores and religion ($\chi^2 = 44.476$) and educational status ($\chi^2 = 9.983$), while no significant associations were found with variables such as age, gender, income, or place of residence. These results affirm the positive impact of structured safety education on improving awareness of occupational hazards among refinery staff.

Conclusion: The present study aimed to evaluate the effectiveness of an occupational safety package on knowledge regarding hazards of petroleum factories among staff working in the refinery at Bina, Madhya Pradesh. The findings revealed a significant improvement in the knowledge levels of staff following the intervention, with the majority shifting from inadequate to adequate knowledge post-training. The structured occupational safety package proved to be an effective educational tool in enhancing awareness and understanding of petroleum-related workplace hazards. The statistical analysis confirmed a significant difference between pre-test and post-test scores, supporting the research hypothesis. Additionally, a significant association was observed between pre-test knowledge scores and selected demographic variables such as religion and educational status. The study concludes that regular implementation of structured safety training programs is essential to promote a culture of safety and prevent occupational risks in hazardous industries like petroleum refining.

Keywords: Occupational Safety Package, Petroleum Factories, Refinery Staff, Workplace Hazards, Knowledge Assessment, Pre-test and Post-test, Safety Education, Industrial Safety, Bina Refinery, Hazard Awareness.

Introduction:

Petroleum refineries are complex industrial environments where workers are routinely exposed to various occupational hazards such as flammable substances, toxic gases, high-pressure systems, and mechanical risks. These hazards, if not properly managed, can lead to serious health issues, accidents, and even fatalities. Ensuring the safety of staff in such settings is crucial, and this can be achieved through effective training and awareness programs. Occupational safety packages are structured educational tools designed to inform and prepare workers to recognize, prevent, and respond to potential workplace dangers. In light of this, the present study focuses on evaluating the effectiveness of an occupational safety package in enhancing the knowledge of refinery staff regarding the hazards of petroleum factories at the Bina refinery in Madhya Pradesh. By assessing the knowledge before and after the implementation of the safety package, the study aims to determine its impact on improving safety awareness and promoting a safer work environment.

Background of the Study

Petroleum refining is a high-risk industry that involves the processing of flammable, explosive, and toxic substances, posing significant health and safety threats to workers. According to the International Labour Organization (ILO), approximately 2.3 million people die annually due to work-related accidents or diseases, with the oil and gas sector being one of the most hazardous industries globally. In India, the Ministry of Petroleum and Natural Gas has reported multiple incidents of fire outbreaks, gas leaks, and explosions in refineries, often attributed to human error, lack of safety awareness, or inadequate training. For example, a report from the Directorate General of Mines Safety (DGMS) indicated that over 300 occupational incidents occurred in the Indian petroleum sector in a recent five-year period, many of which were preventable through

proper safety education. Despite technological advancements, the human factor remains crucial in ensuring workplace safety, emphasizing the need for structured and continuous training. This study was undertaken to assess the effectiveness of an occupational safety package in enhancing the knowledge of refinery staff at Bina, Madhya Pradesh, aiming to reduce risks and improve overall safety performance through education and awareness.

Significance and Need for the Study

Petroleum refineries are inherently dangerous workplaces, where exposure to chemical, thermal, and mechanical hazards is a daily reality for staff. Ensuring worker safety in such environments requires more than just protective equipment—it demands a strong foundation of knowledge, awareness, and consistent safety practices. The significance of this study lies in its aim to bridge the knowledge gap among refinery workers by evaluating the effectiveness of a structured occupational safety package. According to a study conducted by Kumar et al. (2020) on occupational safety awareness among oil refinery workers in India, only 40% of the workforce demonstrated adequate knowledge of workplace hazards, and over 60% reported that they had not received formal safety training in the past year. This highlights a critical gap in ongoing education and risk management practices. Moreover, the National Institute of Occupational Health (NIOH) emphasizes that regular training significantly reduces workplace incidents and promotes a safety-first culture. In the context of the Bina refinery in Madhya Pradesh, where industrial processes and operational complexity are high, it becomes essential to provide structured and evidence-based safety training. Therefore, this study is vital to assess whether an occupational safety package can effectively improve staff knowledge and contribute to a safer, more informed working environment.

Statement of the Problem

A study to evaluate the effectiveness of Occupational Safety Package on knowledge regarding hazards of petroleum factories among staff working in refinery Bina M.P.

Objectives of the Study:

- To assess the pre-test level of knowledge regarding the hazards of petroleum factories among staff working in the refinery at Bina, M.P.
- To develop a structured occupational safety package aimed at improving knowledge related to workplace hazards in petroleum refineries.
- To administer the occupational safety package among staff working in the refinery at Bina, M.P.
- To assess the post-test level of knowledge regarding the hazards of petroleum factories among the refinery staff.
- To evaluate the effectiveness of the occupational safety package by comparing pre- and post-test knowledge scores.

- To determine the association between the pre-test knowledge scores and selected demographic variables of the refinery staff.

Research Hypothesis

RH_1: There will be significant difference in pre-test and post-test knowledge scores regarding hazards of petroleum among staff working.

RH_2: There will be significant association between pre-test knowledge score with their selected demographic variables at the 0.05 level.

Null Hypothesis

RH_0: There will be no significant difference in pre-test and post-test knowledge scores regarding hazards of petroleum among staff working.

RH_0: There will be no significant association between pre-test knowledge score with their selected demographic variables at the 0.05 level.

Assumptions

- The staff members working in the refinery are exposed to various occupational hazards due to the nature of their work in the petroleum industry.
- All participants have a basic understanding of occupational safety, which can be enhanced through structured educational interventions.
- The Occupational Safety Package is comprehensive, relevant, and appropriate to the workplace setting of the refinery and addresses the key hazards specific to petroleum factories.
- Participants will respond honestly and accurately to the knowledge assessment tools (pre-test and post-test).
- There is no major change in working conditions or safety protocols during the study period that could influence the outcome other than the intervention itself.
- The sample selected is representative of the larger population of refinery staff in Bina, M.P., in terms of their exposure to hazards and baseline safety knowledge.
- All staff included in the study have the ability to understand and comprehend the content of the Occupational Safety Package.
- The environment during training and testing is conducive to learning and concentration, ensuring that external factors do not affect knowledge gain.
- Participants have not undergone any similar safety training recently that could confound the results of the study.
- The tools and methods used to measure knowledge are valid and reliable for assessing changes due to the intervention.

Operational Definitions

Effectiveness

In this study, effectiveness refers to the measurable improvement in knowledge scores of staff working in the refinery, assessed through a structured questionnaire, before and after the administration of the Occupational Safety Package. It is evaluated by comparing pre-test and post-test scores using statistical analysis.

Occupational Safety Package

The Occupational Safety Package refers to a structured educational intervention developed by the investigator, consisting of information related to hazards in petroleum factories, preventive safety measures, emergency procedures, and safe working practices. It is administered to enhance the knowledge and awareness of staff regarding workplace hazards.

Hazards of Petroleum Factories

In this study, hazards of petroleum factories refer to the potential dangers and risks commonly encountered in petroleum refining environments, which include exposure to toxic chemicals, fire and explosion risks, gas leaks, machinery-related injuries, and environmental pollution. These hazards pose significant threats to the safety and health of refinery staff. The level of knowledge regarding these hazards is assessed using a structured knowledge questionnaire designed to evaluate the awareness and understanding of staff working in the refinery.

Staff Working in Refinery

In this study, staff working in refinery refers to the permanent or contract employees engaged in various operational, technical, or support roles at the Bina Refinery, Sagar (MP), who were present during the period of data collection, able to understand Hindi, and willing to voluntarily participate in the study.

Delimitations

- The study is delimited to staff working in Bina Refinery, Sagar (M.P.) only and does not include workers from other petroleum refineries or industrial settings.
- The study includes only those staff members who were present during the data collection period and willing to participate.
- The study is delimited to participants who can understand Hindi, as the intervention and questionnaire were administered in Hindi.

- The study focuses only on knowledge regarding hazards of petroleum factories and does not assess attitudes, practices, or behavior.
- The sample size is limited to 60 staff members, selected using non-probability convenient sampling technique.
- The effectiveness of the occupational safety package is assessed through a pre-test and post-test design only, with no long-term follow-up.

Scope of the Study

- The study focuses on assessing the effectiveness of an occupational safety package in improving the knowledge of refinery staff regarding hazards associated with petroleum factories.
- It is confined to employees working in Bina Refinery, Sagar (M.P.), including both permanent and contract staff from various operational, technical, and support departments.
- The study is designed to measure the pre-test and post-test knowledge scores of participants using a structured questionnaire, thereby quantifying the impact of the safety intervention.
- The study aims to contribute to the enhancement of workplace safety awareness and can serve as a reference for developing similar training modules in other industrial or refinery settings.
- The findings of the study may help refinery management and safety officers to implement evidence-based training programs to minimize occupational hazards.
- This study supports the broader goal of occupational health and safety promotion by emphasizing the importance of structured educational interventions in high-risk industries like petroleum refining.

Conceptual Framework

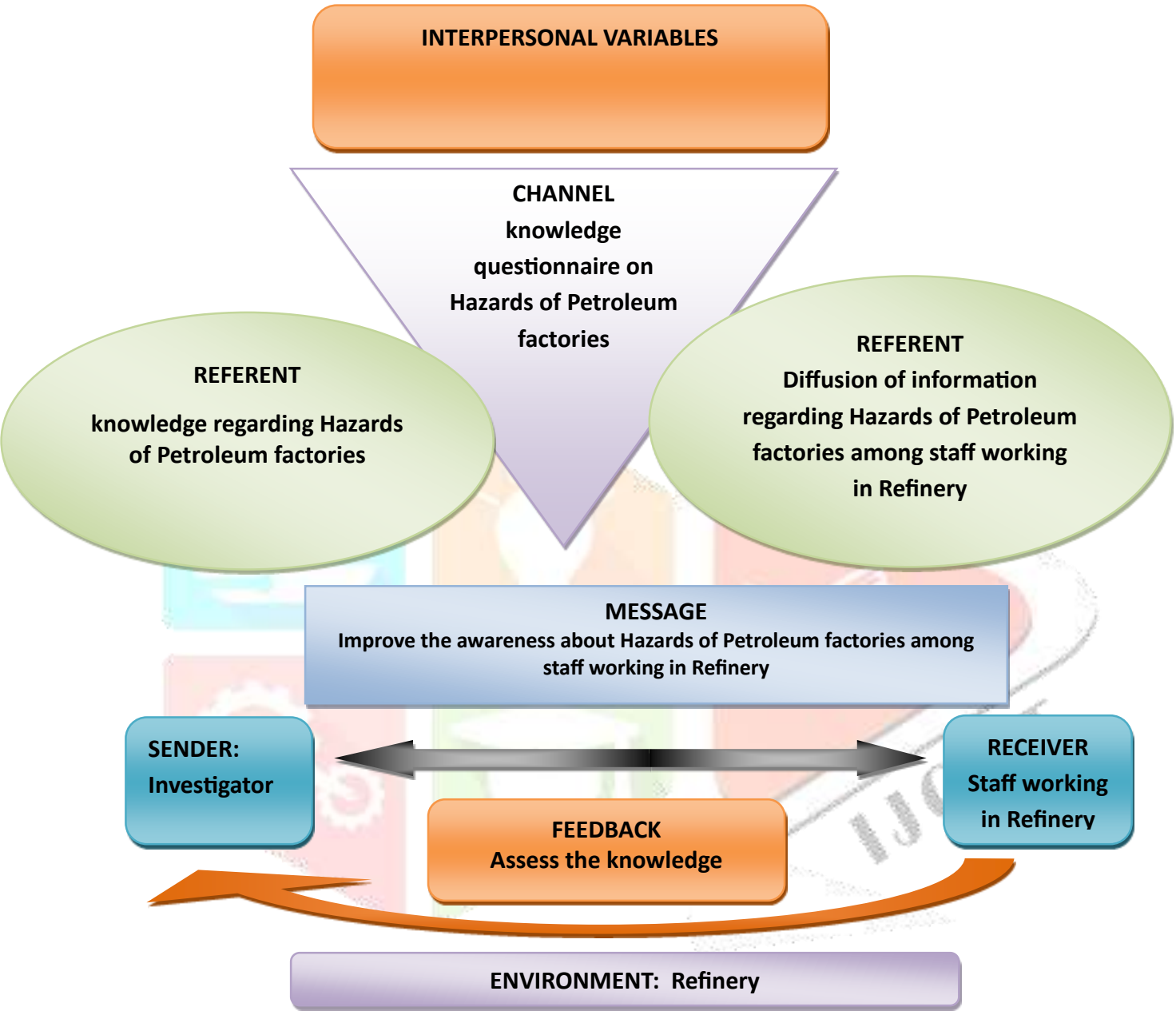


Fig:1.1 Theoretical Framework Based on Interpersonal Communication Model to assess the knowledge regarding Hazards of Petroleum factories

RESEARCH METHODOLOGY:

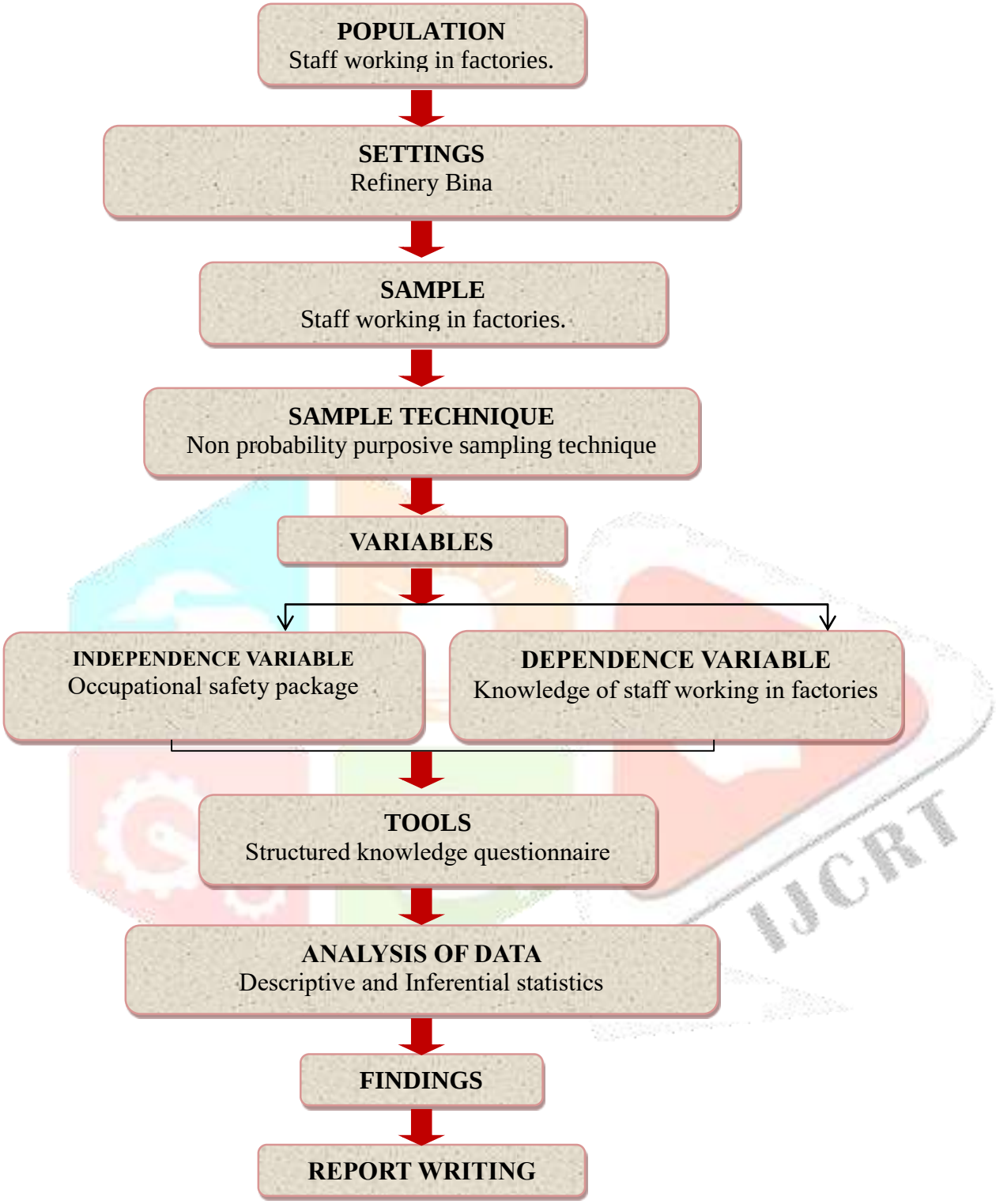


Figure-3.1 : Schematic representation of research design.

Research approach: Quantitative Evaluative Research Approach.

Research design: Pre – experimental one group pre – test post – test research design.

Variables:

Independent Variable: Occupational Safety Package on hazards of petroleum factories. This is the intervention introduced by the researcher to bring about a change in knowledge.

Dependent Variable: Knowledge of staff regarding hazards of petroleum factories. This is the outcome being measured to assess the effect of the intervention.

Extraneous Variables:

Factors that may influence the knowledge level but are not the focus of the study. These may include:

- Age
- Educational qualification
- Work experience
- Job role/designation
- Previous exposure to safety training
- Language proficiency
- Attitude toward occupational safety

Population:

The population for this study includes all staff members working in petroleum factories, specifically those employed at Bina Refinery, Sagar (M.P.).

Accessible Population:

The accessible population includes those staff members working in Bina Refinery who were present and available during the data collection period, and who met the eligibility criteria.

Sample:

The sample for this study comprises staff members working in the Bina Refinery who were selected for participation based on the inclusion and exclusion criteria.

Sample Size:

The total sample size for the study is 60 staff members working in the refinery during the period of data collection.

Sampling Technique:

A non-probability convenient sampling technique was used for the selection of participants. This method was chosen based on the availability and willingness of the participants.

CRITERIA FOR SAMPLE SELECTION

Inclusion Criteria

Participants who:

- Are working in Bina Refinery, Sagar (MP)
- Are present during the period of data collection
- Understand Hindi
- Are willing to participate in the study

Exclusion Criteria

Participants who:

- Are not working in Bina Refinery
- Are absent during the period of data collection
- Are unwilling to participate in the study
- Are unable to understand Hindi or English

DEVELOPMENT AND DESCRIPTION OF TOOL

The tool used for data collection in this study was a structured self-administered questionnaire designed to assess the knowledge of staff regarding the hazards of petroleum factories. The development of the tool followed a systematic process to ensure validity and reliability.

Development of the Tool

The development of the structured knowledge questionnaire and occupational safety package was carried out through the following steps:

- **Extensive Literature Review:**

A comprehensive review of existing research studies, safety manuals, training materials, and guidelines related to occupational hazards in petroleum industries was conducted.

- **Expert Consultation:**

Inputs were taken from subject matter experts in medical-surgical nursing, occupational health, industrial safety, and research methodology to ensure content relevance and appropriateness.

- **Personal Experience:**

The investigator utilized personal clinical and field experience in occupational health to ensure the tool's practical applicability.

- **Language and Clarity:**

The questionnaire was prepared in simple and clear language (Hindi and English) to ensure it is easily understood by the participants.

- **Pilot Study:**

A pilot study was conducted among a small group of refinery staff to check the clarity, feasibility, and reliability of the tool.

Description of the Tool

The structured questionnaire consisted of three main sections:

Section A: Demographic Variables

This section included items related to age, gender, religion, educational qualification, monthly income, and years of experience in the refinery.

Section B: Knowledge Questionnaire

This section comprised 30 multiple-choice questions designed to assess knowledge regarding hazards of petroleum factories. Each question had four options, with one correct answer.

Section C: Occupational Safety Package (Intervention Material)

The occupational safety package included educational content related to:

- Common hazards in petroleum industries
- Preventive safety measures
- Fire and gas leak safety
- Personal protective equipment (PPE)
- Emergency response and first aid

Scoring System

Each correct answer in the knowledge questionnaire was awarded 1 mark. Incorrect or unanswered questions were scored as 0. The maximum possible score was 30. The level of knowledge was categorized as follows:

The scoring system is divided into three categories based on score ranges. A score between 0 and 10 is classified as Inadequate, indicating a low level of performance or quality. Scores ranging from 11 to 20 fall under the Moderate category, reflecting an average or acceptable level. Finally, a score between 21 and 30 is considered Adequate, representing a satisfactory or good level of performance.

PILOT STUDY

A pilot study was conducted prior to the main research to evaluate the feasibility, clarity, and reliability of the structured questionnaire and the Occupational Safety Package. It was carried out among a small sample of refinery staff who met the inclusion criteria but were not part of the final study sample. The pilot study helped identify ambiguities in the language, refine the structure of the knowledge questionnaire, and assess the time required for completion. Based on the feedback and observations, necessary modifications were made to enhance the tool's validity and ensure it was comprehensive, easily understandable, and appropriate for the target population. The pilot study confirmed that the tool was suitable for assessing the knowledge of refinery staff regarding occupational hazards and effective in delivering the intended educational content.

PROCEDURE FOR DATA COLLECTION

Data collection for the study was carried out in a systematic manner over a defined period at Bina Refinery, Sagar (M.P.). After obtaining necessary administrative permissions and ethical clearance, eligible participants were selected using a non-probability convenient sampling technique. Informed consent was obtained from each participant, ensuring their voluntary participation and confidentiality of responses. Initially, a structured self-administered pre-test questionnaire was distributed to assess the baseline knowledge of staff regarding hazards of petroleum factories. Following the completion of the pre-test, the Occupational Safety Package—comprising comprehensive educational content on workplace hazards, safety measures, and emergency protocols—was administered through an interactive session in Hindi, using visual aids and discussions to enhance understanding. Adequate time was given for queries and clarifications during the session. After a suitable interval post-intervention (typically 7–10 days), the same structured questionnaire was re-administered as a post-test to the same group of participants to assess changes in knowledge. The collected data were then organized, coded, and statistically analyzed to evaluate the effectiveness of the Occupational Safety Package.

DATA ANALYSIS AND INTERPRETATION OF DATA:

DESCRIPTION OF DEMOGRAPHIC VARIABLES OF HEALTH WORKERS IN SELECTED HOSPITAL, BHOPAL (M.P.)

Sr. No.	DEMOGRAPHIC VARIABLES	FREQUENCY (F)	PERCENTAGE (%)
1.	**Age in year**		
	a) 20-25	0	0
	b) 26-30	13	21.66
	c) 31-35	26	43.33
	d) 36 & above	21	35.
2.	**Gender**		
	a) Male	50	83.33
	b) Female	10	16.66
3.	**Religion**		
	a) Hindu	28	46.66
	b) Christian	23	38.33
	c) Muslim	0	0
	d) Other	9	15
4.	**Monthly income in rupees**		
	a) 5000-10000	9	15
	b) 10001-15000	51	85
	c) 15001-20000	0	0
	d) 20001 & above	0	0
5.	**Educational status**		
	a) Primary school	34	56.66
	b) High school	24	40
	c) Higher secondary school	2	3.33
	d) Higher secondary school & above	0	0
6.	**Place of residence**		

	a) Rural	28	46.66
	b) Urban	15	25
	c) Slums	17	28.33

Frequency and distribution of pre-test knowledge mean score and standard deviation among staff working in refinery, on hazards of petroleum to prior administration of occupational package.

N = 60

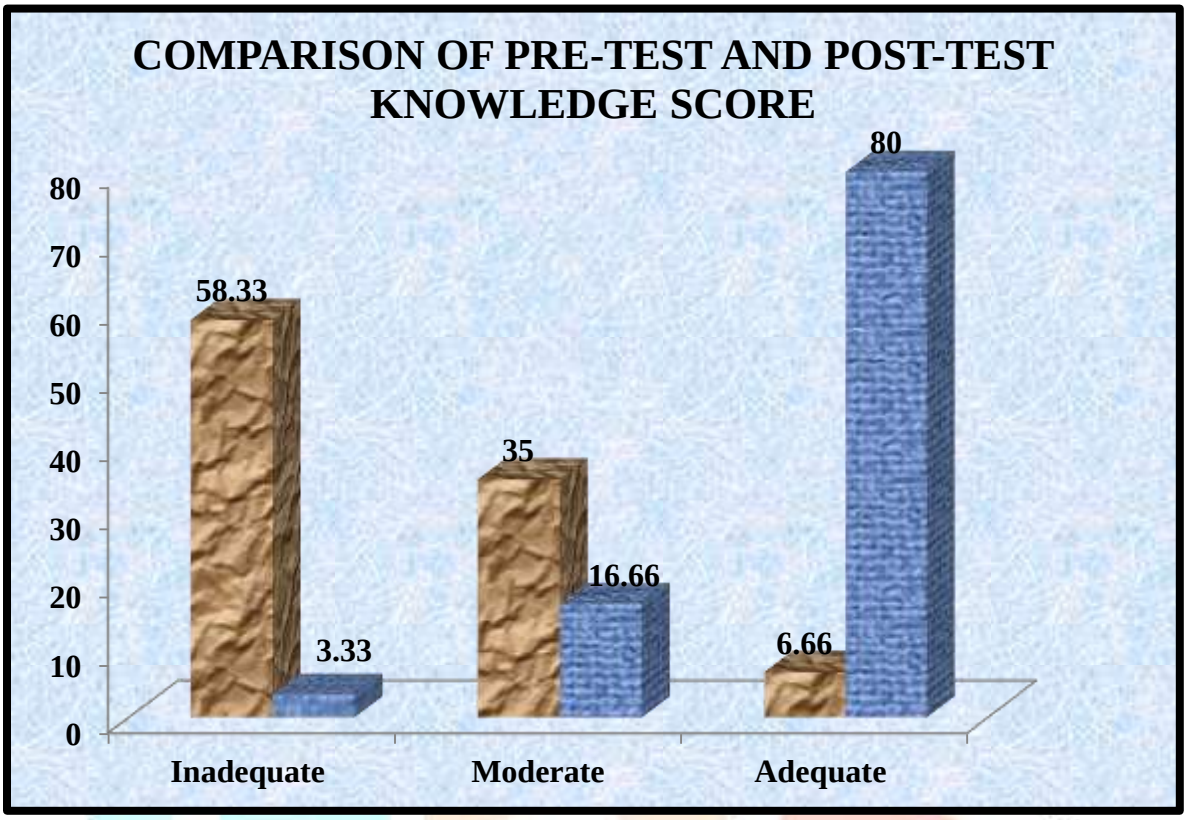
S. No.	Score	Grade	Total response	Percentages (%)	Mean	Standard deviation
1.	0 – 10	Inadequate	35	58.33	9.8	4.162
2.	11 – 20	Moderate	21	35		
3.	21 – 30	Adequate	4	6.66		

Frequency and distribution of post-test knowledge mean score and standard deviation among staff working in refinery, on hazards of petroleum after administration of occupational safety package.

N = 60

S. No.	Score	Grade	Total response	Percentages (%)	Mean	Standard deviation
1.	0 – 10	Inadequate	2	3.33	22.68	4.031
2.	11 –20	Moderate	10	16.66		
3.	21 –30	Adequate	48	80		

Frequency and percentage distribution according to the knowledge score on hazards of petroleum among staff working in refinery.



Association between the pre-test knowledge scores and selected demographic variables of the refinery staff.

Sr. No.	DEMOGRAPHIC VARIABLES		KNOWLEDGE SCORE			df	CHAI SQUARE
			Inadequate	Moderate	Adequate		
1.	Age in years	a) 20 - 25	0	0	0	4	1.2316 Not Significant
		b) 26-30	8	5	0		
		c) 31-35	15	9	2		
		d) 36 & above	12	7	2		
2.	**Gender**	Male	30	18	2	2	3.39 Not Significant
		Female	5	3	2		
3.	**Religion**	a) Hindu	20	6	2	4	44.476* Significant
		b) Christian	10	11	2		
		c) Muslim	0	0	0		
		d) Other	5	4	0		
4.		a) 5000-10000	4	3	2		

	Monthly income	b) 10001-15000	21	18	2	2	4.2005 Not Significant
		c) 15001-20000	0	0	0		
		d) 20001 & above	0	0	0		
5.	**Educational status**	a) Primary school	21	11	2	4	9.983* Significant
		b) High school	14	9	1		
		c) Higher secondary school	0	1	1		
		d) Higher secondary school & above					
6.	**Place of residence**	a) Rural	15	11	2	4	0.963 Not Significant
		b) Urban	10	4	1		
		c) Slums	10	6	1		

Summary

The study titled "A study to evaluate the effectiveness of Occupational Safety Package on knowledge regarding hazards of petroleum factories among staff working in refinery, Bina MP." was conducted to assess how structured educational interventions can improve awareness about occupational hazards in petroleum refineries. Using a quantitative evaluative approach with a pre-experimental one-group pre-test post-test design, the research involved 60 refinery staff members selected through non-probability convenient sampling. A structured questionnaire was developed and validated to assess knowledge levels before and after the intervention. The Occupational Safety Package included content on common petroleum-related hazards, safety measures, PPE, fire and gas safety, and emergency responses. Pre-test data were collected, followed by the educational intervention, and then a post-test was conducted to measure knowledge gain. The data were analyzed to compare pre- and post-test scores and evaluate associations with demographic variables. The study aims to contribute to safer industrial practices by promoting evidence-based training programs within high-risk environments like petroleum refineries.

NURSING IMPLICATIONS

The findings of this study have several important implications for nursing practice, education, administration, and research, particularly in the field of occupational health and industrial safety:

Nursing Practice:

- Occupational health nurses can play a crucial role in identifying workplace hazards and educating staff about safety protocols in petroleum refineries.
- Nurses can use structured educational packages to promote safety awareness, reduce injury risks, and enhance preventive behaviors among industrial workers.
- By regularly conducting health and safety training sessions, nurses can actively contribute to the development of a safety-oriented workplace culture.

Nursing Education:

- The study emphasizes the need to integrate occupational health and industrial safety into the nursing curriculum, especially for nurses working in or near industrial areas.
- Nursing students can be trained in designing, implementing, and evaluating educational interventions aimed at workplace hazard prevention.

Nursing Administration:

- Nurse administrators can use the results to advocate for regular in-service training programs focused on occupational hazards in high-risk industries like petroleum refining.
- They can also help in policy development and implementation of health and safety standards at the organizational level.

Nursing Research:

- This study opens avenues for further research on long-term impacts of occupational safety training programs and their influence on behavior, not just knowledge.
- Future research can explore the effectiveness of different teaching methods or digital platforms for occupational safety training among industrial workers.

Community Health Nursing:

- Community health nurses can extend similar safety awareness programs to workers in other industries and collaborate with local health departments to ensure wider dissemination of occupational safety knowledge.
- Overall, the study highlights the critical role of nurses as educators, advocates, and change agents in promoting occupational safety and preventing work-related injuries in industrial settings.

Recommendations

- Organize periodic occupational safety training sessions using structured educational packages.
- Include safety education in the induction/orientation programs for all new and contract staff.
- Provide training materials in multiple languages and include visual aids for better understanding.
- Appoint trained occupational health nurses to conduct regular safety education for workers.
- Conduct pre- and post-training knowledge assessments to evaluate the effectiveness of safety programs.
- Customize safety training content based on the job roles and specific risks faced by employees.
- Promote a positive safety culture through regular safety drills, open communication, and incentives.
- Implement short refresher courses at regular intervals to reinforce knowledge and awareness.
- Utilize digital tools such as mobile apps, videos, and virtual reality to deliver engaging safety training.
- Encourage further research on long-term knowledge retention and behavior change after safety interventions.

Conclusion

The present study concluded that the Occupational Safety Package was effective in significantly improving the knowledge of staff working in the Bina Refinery regarding the hazards associated with petroleum factories. The comparison of pre-test and post-test knowledge scores revealed a marked improvement, indicating that structured educational interventions can play a vital role in enhancing workplace safety awareness. The study also found that certain demographic variables had a significant association with pre-test knowledge levels, highlighting the importance of tailoring training programs to the specific needs of different staff groups. Overall, the study emphasizes the need for regular, targeted, and evidence-based occupational safety training to reduce risk, promote safe practices, and ultimately protect the health and well-being of refinery workers. The findings reinforce the role of occupational health nurses and safety officers in fostering a proactive safety culture in high-risk industrial environments.

REFERENCES

1) Gupta, P., & Gupta, V. (2020). Occupational health and safety in petroleum industries. New Delhi: Jaypee Brothers Medical Publishers.
2) Park, K. (2021). Preventive and Social Medicine (26th ed.). Jabalpur: Banarsidas Bhanot Publishers.
3) Basavanthappa, B. T. (2019). Nursing research and statistics (3rd ed.). New Delhi: Jaypee Brothers Medical Publishers
4) Polit, D. F., & Beck, C. T. (2022). Nursing research: Generating and assessing evidence for nursing practice (11th ed.). Philadelphia: Wolters Kluwer.
5) Sharma, R. (2018). Industrial safety management. New Delhi: Himalaya Publishing House.
6) World Health Organization. (2017). Occupational safety and health in the oil and gas industry. Retrieved from https://www.who.int/occupational_health/publications/en/

7) Ministry of Petroleum and Natural Gas. (2020). Petroleum safety standards in India. Government of India. Retrieved from https://mopng.gov.in/
8) International Labour Organization (ILO). (2019). Guidelines on occupational safety and health management systems (ILO-OSH 2001). Retrieved from https://www.ilo.org
9) Ghosh, P. (2016). Environmental and occupational health hazards of petroleum industry workers: A review. Indian Journal of Occupational and Environmental Medicine, 20(3), 142–147. https://doi.org/10.4103/0019-5278.197540
10) National Safety Council. (2018). Petroleum industry safety manual. Chicago: NSC Publications.
11) Ghosh, P., & Chakraborty, M. (2016). Environmental and occupational health hazards of petroleum industry workers: A review. Indian Journal of Occupational and Environmental Medicine, 20(3), 142–147. https://doi.org/10.4103/0019-5278.197540
12) Ahmed, H. O., & Abdullah, A. S. (2019). Knowledge and practice of occupational safety among oil refinery workers. Safety and Health at Work, 10(3), 306–311. https://doi.org/10.1016/j.shaw.2019.02.005
13) Kunar, B. M., Bhattacharya, S., & Saha, A. (2017). Occupational hazards in the petroleum refining industry: A review. Indian Journal of Occupational and Environmental Medicine, 21(2), 62–68. https://doi.org/10.4103/ijoem.IJOEM_146_16
14) Tadesse, S., & Admassu, M. (2017). Occupational health and safety practices among workers in Ethiopia's petroleum sector. Journal of Environmental and Public Health, 2017, Article ID 9362716. https://doi.org/10.1155/2017/9362716
15) Rajan, B., & Dey, S. (2019). Effectiveness of a structured teaching program on knowledge regarding industrial hazards among factory workers. International Journal of Community Medicine and Public Health, 6(4), 1671–1676. https://doi.org/10.18203/2394-6040.ijcmph20191329
16) Abdulrahman, S. A., & Alharbi, M. A. (2020). Awareness of occupational hazards and use of personal protective equipment among refinery workers. International Journal of Occupational Safety and Ergonomics, 26(4), 751–757. https://doi.org/10.1080/10803548.2019.1572201
17) Ezenwa, A. O. (2016). A study of fire risk awareness among workers in oil and gas installations. Journal of Safety Research, 58, 69–76. https://doi.org/10.1016/j.jsr.2016.06.001
18) Kumar, R., & Sharma, V. (2018). Impact of educational intervention on knowledge regarding occupational hazards among workers in chemical industries. International Journal of Nursing Education, 10(3), 99–104. https://doi.org/10.5958/0974-9357.2018.00075.9
19) Palaniappan, M., & John, A. (2019). Knowledge, attitude, and practice regarding occupational hazards among refinery workers in South India. International Journal of Community Medicine and Public Health, 6(9), 3914–3919. https://doi.org/10.18203/2394-6040.ijcmph20193967

20) Yassin, M. H., & Naeem, M. (2017). Occupational injuries and self-reported occupational hazards among workers in the oil and gas industry. Journal of Occupational Medicine and Toxicology, 12(1), 1–7. https://doi.org/10.1186/s12995-017-0169-4