



Assessing Women's Awareness and Preparedness for Industrial Disasters in India: Challenges and Gaps.

Author: Dr. Deepak Vishwakarma, Assistant Professor, P P Savani University, Surat & PhD PIPH, Parul University; **Dr. Naresh Raghunathram Godara**, Professor & Head, Dept. of Community Medicine, Parul Institute of Medical Sciences & Research, Parul University.

Abstract

The Bhopal Gas Disaster of 1984 revealed that women are disproportionately affected by such catastrophes and suffer long-term health implications[1]. This disaster had a significant impact on industrial practices globally. Women's readiness and resilience in industrial disasters are assessed in this study, which was carried out in a Western Indian town that is highly industrialised. The study used a quantitative methodology to investigate the awareness, readiness, and factors influencing these qualities of 445 female participants who lived close to industrial zones. A multilevel sampling technique was used to collect data. The findings provide important demographic information, with young Hindu women making up the majority and having a high level of education but little work experience. Awareness of local industries and hazardous substances is limited. Despite good basic knowledge of emergency preparedness, such as knowing local police and hospital contact numbers, there is a lack of advanced preparation among women, including emergency exercises and emergency kits. There is also low participation in personal disaster planning and government-led initiatives. Correlation analysis indicates significant relationships between demographic variables like education, employment status, and age. The study underscores the necessity for targeted educational programs and greater female inclusion in disaster management to bridge the identified gaps in knowledge and practice, thereby promoting comprehensive community resilience.

Keywords: Industrial Disasters, Women's Awareness, Disaster Preparedness, Community Resilience, Gender and Disasters, India.

1. Introduction

Historical and contemporary data consistently underscore the need for enhanced disaster preparedness among women. The Bhopal Gas Disaster on December 2, 1984, one of history's most severe industrial catastrophes, starkly revealed the unique vulnerabilities of women and the long-lasting health effects they endure [2]. Pandemics and Disasters have significant impact on the mental aspect of the population [3]. Even four decades later, women continue to be a particularly susceptible group, highlighting an urgent need for more effective resilience strategies.

Globally, women are often depicted as victims of disasters, and their high representation among casualties emphasizes their critical role in post-disaster recovery and resilience-building efforts[3]. This is particularly true in disaster-prone regions like India. The issue is compounded by the low participation of women in disaster preparedness and recovery activities, signalling a clear need for policy reform. Conversely, disasters can also create opportunities for women to assume leadership roles. Studies have shown that women can be highly effective in crisis leadership; for instance, nations led by women reported lower mortality rates during the COVID-19 pandemic[4]. An initiative by ACF in southern Bangladesh serves as a powerful example, where training provided to over 4,000 households, mostly led by women, empowered them to manage disaster risks and protect their communities. Despite their crucial contributions to disaster relief, their roles are often overlooked.

This study was conceptualized to address a gap in existing research, which frequently overlooks the specific vulnerabilities of women and their critical roles in disaster response.

The aim of this study was to evaluate women's preparedness and resilience in the context of industrial disasters. The primary objectives were:

- To determine the level of awareness of industrial disasters among women.
- To assess women's readiness to respond to such disasters.
- To identify the variables affecting women's awareness and preparedness for industrial disasters.

2. Methodology

Study Design and Area: A quantitative study was conducted in a highly industrialized town in Western India with a population of approximately 30,000. The research focused on females living in residential areas situated near industrial zones.

Sampling Technique: A multi-level sampling technique was employed for data collection. The residential area was stratified into nine zones, and from each zone, data from 50 women was collected. Within each zone, researchers started at the entry point and selected every third house for data collection until the target for that

zone was met. If a household declined to participate or the house was locked, the next third house was approached. Only one participant was selected per household.

Sample Size: The sample size was calculated using Open Epi trial version for an unlimited population, with a 95% confidence interval and a 5% margin of error. The initial sample size was determined to be 385, but data was ultimately collected from 445 females to ensure robustness.

Inclusion Criteria: Female participants who provided consent and faced no language barriers were included in the study.

Data Collection and Analysis: Ethical approval was obtained from the relevant authorities before data collection commenced. The research instrument was validated by subject matter experts through pilot testing.

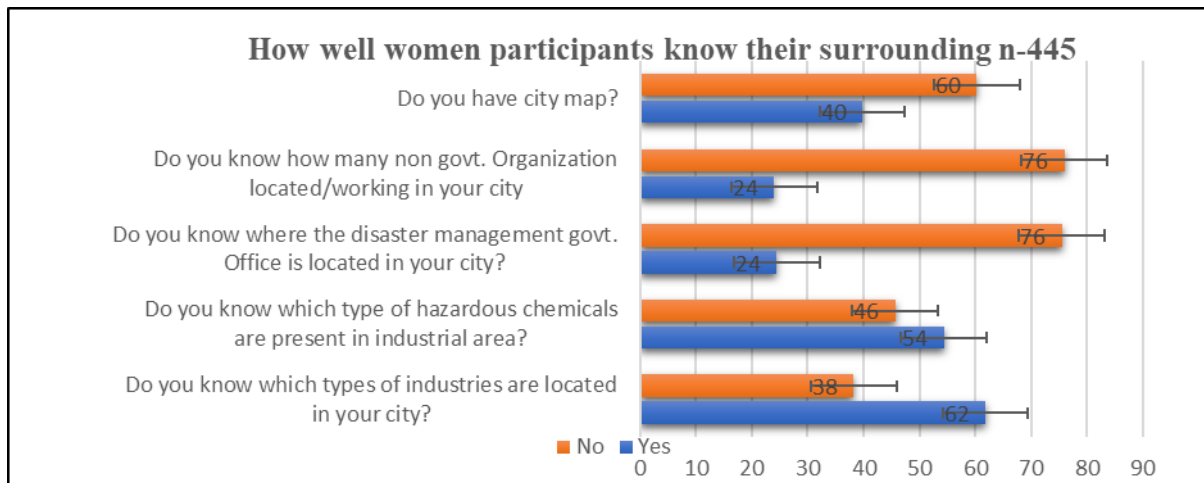
3. Results

3.1. Demographic Profile of Participants The demographic data of the 445 participants is summarized below. The majority of participants were between 18 and 37 years old (73.9%), of Hindu faith (89.7%), and had attained undergraduate or postgraduate education (63.1%). The largest employment categories were students (42.7%) and homemakers (37.1%). Most households consisted of 4-6 family members (71.0%).

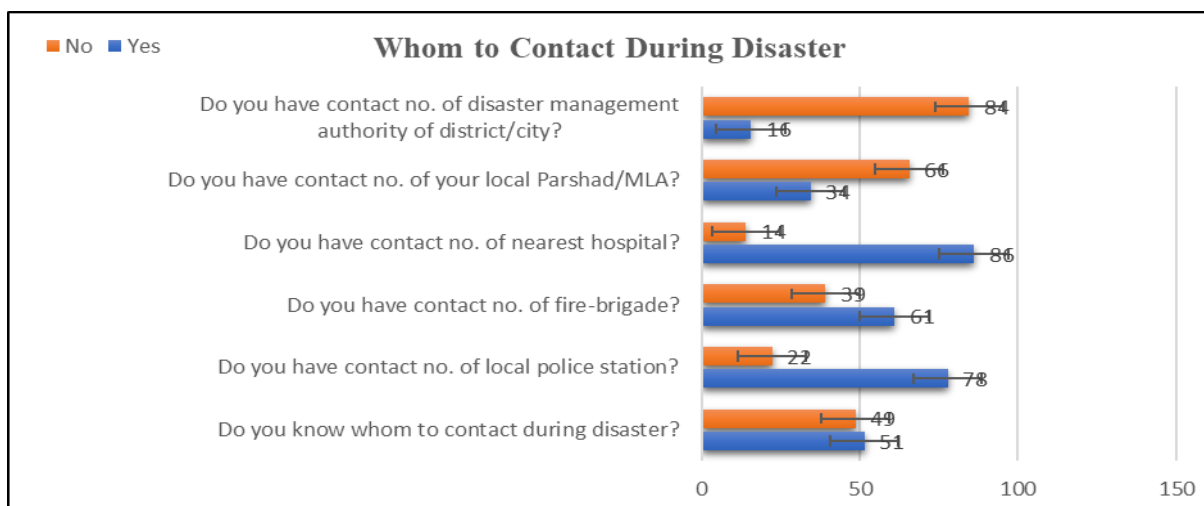
Particular	Category	Frequency	Percent
Age of participating females	18 years -37 years	329	73.9
	38 years -57 years	92	20.7
	58 years -77 years	22	4.9
	78 years and above	2	0.4
Religion of participating females	Hindu	399	89.7
	Muslim	35	7.9
	Christian	11	2.5
Education Status of participating females	Illiterate	4	0.9
	Primary and Secondary	136	30.6
	UG and PG	281	63.1
	Other	24	5.4
Employment status of participant females	Business	15	3.4
	Daily wage worker and Private job	39	8.8
	Govt. Job	26	5.8
	Homemaker	165	37.1
	Unemployed	10	2.2
	Student	190	42.7
No. of family members living in household of Participant	1-3 people in house	77	17.3
	4-6 people in house	316	71
	7-9 people in house	45	10.1
	10-12 people in house	6	1.3

	13 -15 people in house	1	0.2
	Total	445	100

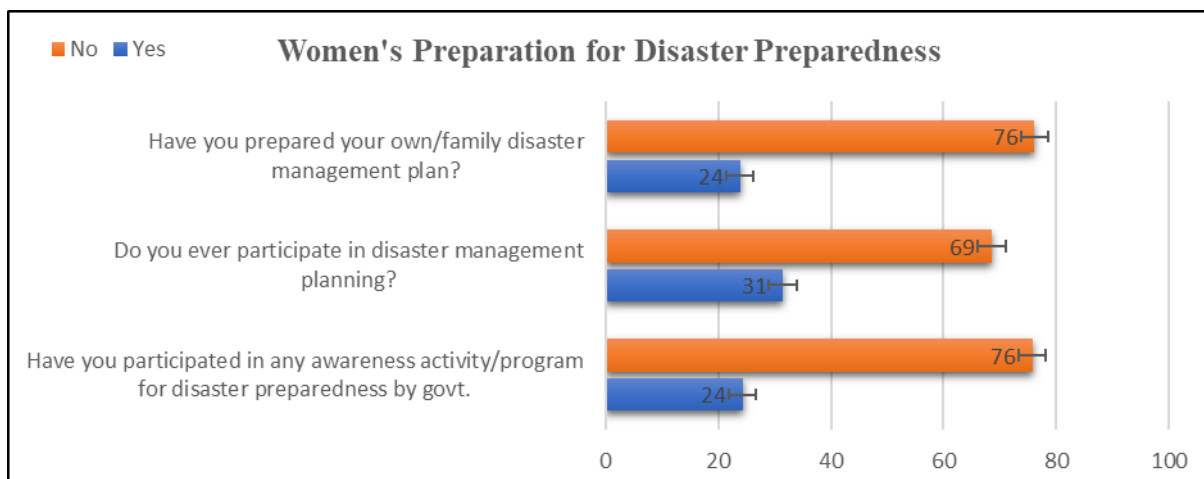
Table 1: Demographic Profile of Women Participants



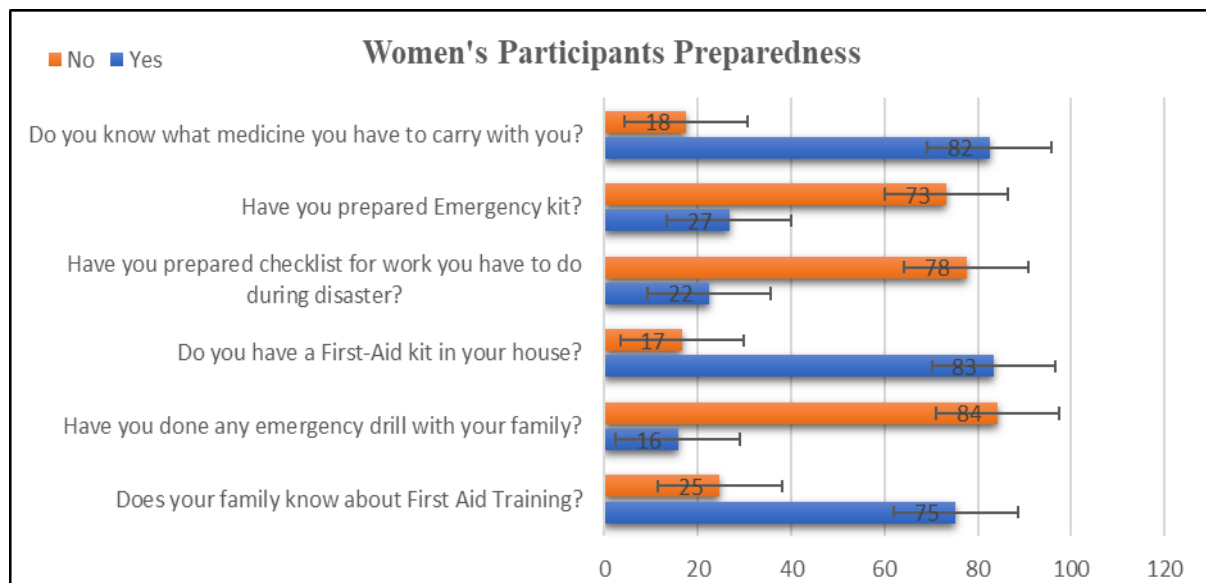
Graph 1 How well women participants know their surrounding



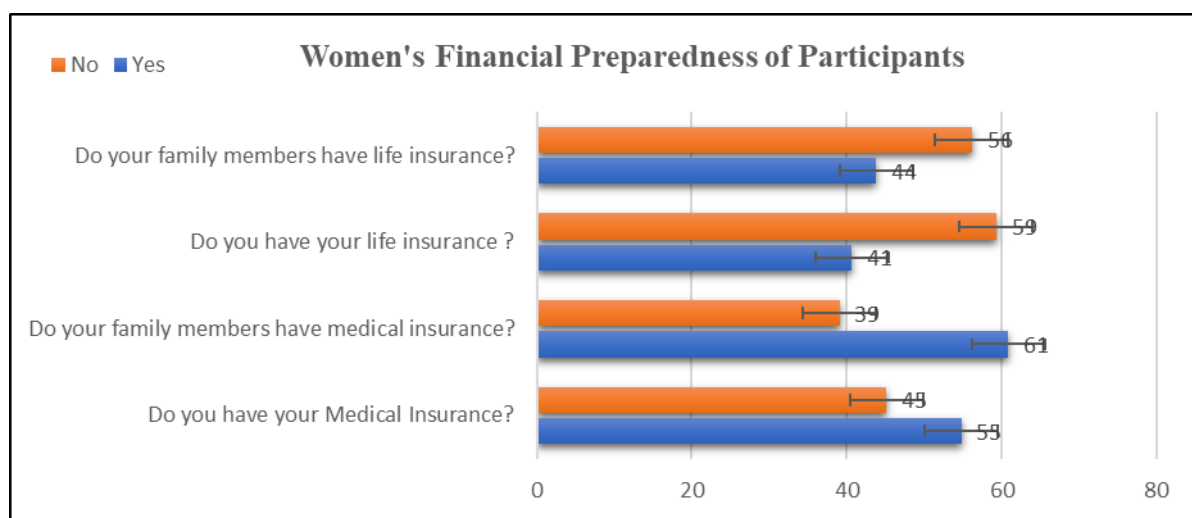
Graph 2 Whom to Contact During Disaster



Graph 3 Women's Preparation for Disaster preparedness



Graph 4 Women's Participants Preparedness



Graph 5 Women's Financial Preparedness of Participants

3.2. Awareness and Preparedness Analysis

- Knowledge of Surroundings:** A majority of the women (62%) were aware of the different industries in their city, and 54% had some knowledge of the hazardous chemicals present in these settings. However, awareness of disaster management infrastructure was low, with only 24% knowing the location of the disaster management office and the same percentage being aware of the NGOs in their community. Additionally, 40% of the women did not own a city map.
- Emergency Contacts:** Basic preparedness was strong, with 78% of participants knowing the local police station's number and an impressive 86% knowing the contact number for the nearest hospital.

Knowledge of the fire department's number was also decent at 61%. However, awareness of governance and specialized agency contacts was poor, with only 34% knowing their local political representative's number and a mere 16% knowing the number for the city or district's emergency management agency.

- **Participation in Preparedness Activities:** There were significant gaps in female participation in government-led awareness programs. Only one-third of the women had been involved in any disaster management planning, indicating low public engagement. A majority of the participants lacked personal or family disaster management plans, pointing to a critical deficit in household-level preparedness.
- **Household Preparedness:** While there was widespread recognition of the importance of first aid, actual preparedness was lacking. Many households had a first aid kit and necessary medications, representing a basic level of readiness. However, advanced preparedness measures such as maintaining checklists, having well-stocked emergency kits, and conducting family disaster drills were largely absent.
- **Financial Preparedness:** The survey revealed that more women had health insurance for their family members than for themselves, though individual coverage was low. Life insurance coverage was markedly lower, with few women having a policy for either themselves or a family member. This suggests that health insurance is prioritized over life insurance.

3.3. Correlation Analysis The correlation analysis revealed significant relationships between the demographic variables.

	Age	Religion	Education Status	Employment Status	Number of Family Members
Age	1	-0.08	-0.38**	-0.36**	-0.04
Religion	-0.08	1	0.04	0.15**	-0.05
Education Status	-0.38**	0.04	1	0.24**	0.01
Employment Status	-0.36**	0.15**	0.24**	1	0.24**
Number of Family Members	-0.04	-0.05	0.01	0.24**	1
Note: ** Represent Significant Corelation					

Table -2 Corelation Analysis of Demographic Variables

Interpretation of correlation analysis; **A strong negative correlation was found between age and both education level and employment status**, suggesting that older participants were likely to have less education and be in lower-paying jobs. **There was a significant positive correlation between education and employment**, indicating that higher educational attainment was associated with better employment opportunities. **Employment status was also positively correlated with family size**, implying that those with better employment could support larger families. **Religion showed only a minor impact** on other variables.

4. Discussion

The study reveals a critical gap between basic awareness and comprehensive preparedness. While 62% of women are aware of local industries and 54% know about hazardous substances, their knowledge of disaster management resources is alarmingly low. Only 24% could identify the location of the disaster management office or knew about local NGOs, and 40% lacked a city map. This suggests that while a fundamental understanding of risks exists, there is a need to significantly improve public education on accessing disaster management services.

The high awareness of police (78%) and hospital (86%) contact numbers indicates a good level of basic preparedness, as noted by Mileti[5]. However, the low awareness of contacts for the district emergency authority (16%) and political representatives (34%) points to a disconnect from the broader governance and disaster management systems. This aligns with Haddow and Bullock[6], suggesting that while immediate emergency contacts are known, education on comprehensive disaster governance is needed.

The findings also show a significant lack of female participation in disaster management programs. The fact that only one-third of women are involved in disaster planning highlights the need to boost public engagement in these processes. The widespread absence of personal and family disaster plans indicates a critical vulnerability at the household level, emphasizing the urgent need for targeted strategies to enhance self-preparedness among women.

While many homes have basic first aid supplies, advanced readiness measures like emergency kits and drills are uncommon. This gap underscores the need for educational campaigns that promote sophisticated preparedness tactics and the importance of regular disaster exercises[7].

5. Limitations

- The findings of this study should be considered in light of its limitations.
- The research was conducted in a single urban setting, which may limit the generalizability of the findings to rural or other urban areas.
- The quantitative approach provided valuable statistical data, but a qualitative investigation could offer a deeper understanding of the nuances and underlying reasons for the observed awareness and preparedness gaps.

6. Conclusion

The research concludes that there are significant disparities in women's awareness and preparedness for industrial disasters in the studied area. While there is a foundational knowledge of local hazards and key emergency contacts, critical gaps exist concerning disaster management offices, NGOs, and navigational tools like city maps. The low participation rate in disaster planning and the lack of personal disaster plans reflect a broader issue of insufficient preparedness. India has a robust system for managing industrial disasters for industries and workers, but community readiness remains a vital component that needs strengthening. By enhancing community preparedness, especially among women, a safer environment can be created for all, building a resilient society capable of effectively mitigating the risks posed by industrial disasters.

7. Recommendations

- Based on the findings, the following recommendations are proposed:
- Enhance Female Participation: Actively encourage and ensure the participation of women in all phases of disaster preparedness, including planning, decision-making, and implementation.
- Strengthen Financial Preparedness: Promote and strengthen policies that prioritize health and life insurance coverage for women and their dependents to improve financial resilience.
- Promote Community-Led Initiatives: Encourage disaster management initiatives that are led by families and the community to build preparedness and resilience from the ground up.

8. References

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