

Assessment of the Effectiveness of a Planned Teaching Programme on Knowledge Regarding Disaster Preparedness Among Adults Residing in Rural Area of Ragyan Shimla, HP: A Quasi Experimental Study

Pooja Kaundal¹, Usha Thakur²

¹Post Graduate Student, Department of Community Health Nursing, Sister Nivedita Govt. Nursing College, IGMC, Shimla, H.P., India
Corresponding Author Email: [kaundalpooja5\[at\]gmail.com](mailto:kaundalpooja5[at]gmail.com)

²Tutor cum Clinical Instructor, Sister Nivedita Govt. Nursing College, IGMC, Shimla, H.P., India

Abstract: ***Background:** Mountainous terrains such as Himachal Pradesh are intrinsically vulnerable to recurring geological and hydrometeorological disasters, including landslides, flash floods, cloudbursts, and seismic tremors. Community health literacy and pre-disaster readiness constitute vital determinants for minimizing casualties, psychological distress, and economic destruction. **Objectives:** The study aimed to assess baseline knowledge regarding disaster preparedness among rural adults, design and administer a structured Planned Teaching Programme (PTP), evaluate the effectiveness of the intervention, and ascertain associations between knowledge levels and socio-demographic factors. **Methods:** A quantitative, quasi-experimental one-group pre-test post-test design was conducted in April 2026 among 66 adults aged 20–40 years residing in rural Ragyan, Shimla, selected via simple random sampling. Baseline knowledge was captured using a validated 35-item structured questionnaire ($r = 0.856$). The PTP intervention incorporated audio-visual media, structured guidelines on disaster phases, mountain hazard mitigation, triage tagging, and emergency alert software (SACHET app). A post-test was administered seven days post-intervention. Data were analysed using paired t-tests and Chi-square tests. **Results:** Prior to the PTP, 71.2% ($n = 47$) demonstrated poor knowledge, 28.8% ($n = 19$) had average knowledge, and 0.0% achieved good knowledge. Post-intervention, 92.4% ($n = 61$) attained good knowledge, 7.6% ($n = 5$) had average knowledge, and none remained in the poor category. The mean knowledge score improved significantly from 15.55 ± 2.56 (44.4%) at pre-test to 28.27 ± 1.83 (80.8%) at post-test, reflecting an absolute mean gain of 12.73 (36.4%). Paired t-test verified a statistically significant increase ($t = 8.541$, $p < 0.001$). No statistically significant association was observed between pre- or post-intervention knowledge levels and demographic variables ($p > 0.05$). **Conclusion:** The Planned Teaching Programme demonstrated substantial efficacy in empowering rural adults with essential disaster mitigation, preparedness, and triage knowledge. Grassroots educational interventions led by community health nurses provide a viable, high-impact framework for disaster risk reduction in ecologically sensitive mountain regions.*

Keywords: Disaster Preparedness, Planned Teaching Programme, Community Health Nursing, Triage, Rural Population

1. Introduction

A disaster is defined as a serious disruption of the functioning of a community or society involving widespread human, material, economic, or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. Historically originating from the Old French 'Desastre' and Italian 'disastrous'- meaning 'ill-starred'- disasters represent abrupt, high-impact events resulting from the intersection of hazard exposure, vulnerability, and inadequate coping capacity. Developing economies experience over 95% of disaster-induced fatalities globally, bearing economic damages nearly twenty times greater relative to gross domestic product compared to industrialized economies.

India features diverse geoclimatic zones that make it highly vulnerable to natural catastrophes: roughly 60% of the landmass is prone to seismic vibrations of moderate to severe intensity, 40 million hectares are vulnerable to riverine floods, 8% is susceptible to tropical cyclones, and nearly 68% of cultivable land is exposed to recurring droughts. The northwestern Himalayan state of Himachal Pradesh is

particularly vulnerable to hydro-meteorological and seismic hazards due to complex topography, fragile geology, steep slopes, and changing precipitation patterns. Recent catastrophic monsoon events across Mandi, Kullu, and Shimla districts- characterized by cloudbursts, flash floods, and massive debris flows- have caused extensive infrastructure destruction, road blockages, and loss of life and livestock. Disaster management has shifted from post-impact relief and rehabilitation toward proactive disaster risk reduction (DRR) through community preparedness, hazard mitigation, and capacity building. Because local community members serve as first responders during the critical golden hours following a crisis, equipping rural adults with emergency health literacy, early warning familiarity (such as the NDMA's SACHET mobile platform and Common Alerting Protocol), household evacuation planning, and emergency triage prioritization is essential. Community health nurses play a key role in designing and implementing structured educational interventions in these settings. Therefore, this study was conducted to evaluate the effectiveness of a Planned Teaching Programme on disaster preparedness knowledge among rural adults in Ragyan, Shimla.

2. Materials and Methods

2.1 Research Approach and Design

A quantitative research approach utilizing a quasi-experimental one-group pre-test post-test design ($O_1 \rightarrow X \rightarrow O_2$) was adopted. This design enabled the measurement of baseline knowledge (O_1), administration of the Planned Teaching Programme (X), and re-evaluation of knowledge (O_2) to assess intervention effectiveness.

2.2 Conceptual Framework

The conceptual framework was adapted from Ludwig von Bertalanffy's General System Theory (1968), structured into Input, Throughput (Process), and Output. The 'Input' comprised the baseline profile and pre-existing disaster preparedness knowledge of adults. The 'Throughput' represented the pedagogical intervention—the development, validation, and delivery of the Planned Teaching Programme. The 'Output' was operationalized as post-test knowledge scores, categorized into improved versus unimproved knowledge levels.

2.3 Setting and Target Population

The study was conducted in rural Ragyan, under Gram Panchayat Bhont, District Shimla, Himachal Pradesh. The area was selected based on geographic exposure to mountain hazards, lack of structured community disaster training, administrative feasibility, and local cooperation. A preliminary pilot investigation was conducted in rural Mashobra, Shimla.

2.4 Sample Size and Sampling Technique

The sample consisted of 66 adults residing in Ragyan. A simple random sampling technique was utilized to select participants from the village register. Inclusion criteria were: (a) adults aged 20–40 years; (b) residents present during data collection; and (c) ability to read and comprehend Hindi or English. Exclusion criteria were individuals with acute debilitating medical conditions or those unwilling to participate.

2.5 Description of the Tool

Measurement Instruments: Data were collected using a comprehensive self-structured questionnaire divided into two sections:

- **Section A (Socio-Demographic Profile):** Comprised 9 demographic variables: age (years), gender, religion, marital status, monthly family income (₹), educational qualification, occupation, prior participation in disaster drills, and primary source of disaster preparedness information.
- **Section B (Knowledge Questionnaire):** Contained 35 single-choice objective questions covering: general concepts of disaster management; hazard-specific mechanisms and countermeasures (landslides, earthquakes, flash floods, wildfires); pre-event safety kits and family evacuation plans; universal emergency contacts; mass casualty triage categorization (Red, Yellow,

Green, Black); and state/national disaster alert systems (SACHET App and SAMARTH mass awareness campaign). Each correct response scored 1 mark; incorrect options scored 0 (total range: 0–35). Knowledge levels were categorized as Poor (0–17 marks, $\leq 50\%$), Average (18–25 marks, 51–75%), and Good (26–35 marks, 76–100%). Content validity was established through review by 19 experts across Community Health Nursing, Medical-Surgical Nursing, and community Medicine. Reliability was confirmed via the test-retest method with Karl Pearson's correlation coefficient ($r = 0.856$).

2.6 Planned Teaching Programme (Intervention)

The Planned Teaching Programme (PTP) was developed following instructional design principles and bilingual educational materials (English and Hindi). The curriculum covered: (a) definitions and classifications of natural and man-made disasters; (b) the 5-phase disaster management cycle (prevention, mitigation, preparedness, response, recovery); (c) mountain hazard protocols (landslide pre-event indicators, Drop-Cover-Hold earthquake drill, cloudburst safety); (d) mass casualty triage and emergency first-aid priorities; (e) digital preparedness tools (SACHET mobile application and CAP alerts); and (f) household emergency kit preparation. The intervention was delivered in group sessions using audiovisual aids, illustrated flashcards, and interactive question-and-answer discussions.

2.7 Ethical Considerations and Data Collection Procedure

Ethical approval was granted by the Institutional Ethics Committee of Sister Nivedita Govt. Nursing College, IGMC Shimla (Ref No. 286). Administrative permission was obtained from the Panchayat Secretary of Gram Panchayat Bhont. Written informed consent was secured from every participant, guaranteeing voluntary participation, anonymity, and data confidentiality. Pre-test data collection was conducted in April 2026, followed immediately by the Planned Teaching Programme. The post-test was administered seven days later using the identical instrument.

2.8 Statistical Analysis

Data were analyzed using SPSS and Python data analysis packages. Descriptive statistics (frequency, percentage, mean, median, standard deviation, and range) described baseline demographics and knowledge levels. Inferential statistics included the paired t-test to evaluate pre- versus post-intervention knowledge gains, and the Chi-square test (χ^2) to examine associations between demographic variables and knowledge levels. Statistical significance was set at $p < 0.05$.

3. Results

3.1 Socio-Demographic Characteristics of the Participants

Among the 66 participants, 66.7% ($n = 44$) were aged 20–30 years, and 33.3% ($n = 22$) were aged 31–40 years. Males comprised 57.6% ($n = 38$) and females 42.4% ($n = 28$). The predominant religion was Hindu (98.5%, $n = 65$), and 56.1%

(n = 37) were unmarried. Economically, 40.9% (n = 27) reported a monthly family income of ₹20,001–40,000, while 39.4% (n = 26) earned ≤ ₹20,000. Regarding educational attainment, 39.4% (n = 26) completed higher secondary education, 24.2% (n = 16) were graduates, 19.7% (n = 13) completed secondary education, and 16.7% (n = 11) held postgraduate qualifications. By occupation, 47.0% (n = 31) were private employees, 19.7% (n = 13) engaged in business, 15.2% (n = 10) were farmers, and 12.1% (n = 8) were government employees. Notably, 80.3% (n = 53) had never participated in a disaster drill or training program. Primary sources of disaster information were mass media (40.9%, n = 27) and social media/internet (39.4%, n = 26).

Table 1: Socio-Demographic Profile of Adults in Rural Ragyan (N = 66)

Demographic Variable	Frequency (f)	Percentage (%)
Age (in years)		
20 – 30 years	44	66.7
31 – 40 years	22	33.3
Gender		
Male	38	57.6
Female	28	42.4
Religion		
Hindu	65	98.5
Christian	1	1.5
Marital Status		
Single	37	56.1
Married	27	40.9
Divorced / Separated	1	1.5
Widowed	1	1.5
Monthly Family Income (₹)		
≤ ₹20,000	26	39.4
₹20,001 – ₹40,000	27	40.9
₹40,001 – ₹60,000	11	16.7
> ₹60,000	2	3
Education Level		
Secondary Education	13	19.7
Higher Secondary Education	26	39.4
Graduate	16	24.2
Post Graduate or above	11	16.7
Occupation		
Government Employee	8	12.1
Private Employee	31	47

Business	13	19.7
Farmer	10	15.2
Others	4	6.1
Attended Disaster Training or Drill		
Yes	13	19.7
No	53	80.3
Primary Information Channel		
Mass Media (TV/Radio/Newspaper)	27	40.9
Social Media / Internet	26	39.4
Health Professionals	10	15.2
Friends / Community Volunteers	3	4.5

3.2 Pre-Test and Post-Test Knowledge Level Distribution

In the pre-test evaluation, the majority of respondents (71.2%, n = 47) exhibited poor knowledge regarding disaster preparedness (scores 0–17), while 28.8% (n = 19) had average knowledge (scores 18–25). None attained good knowledge. Following the administration of the Planned Teaching Programme, 92.4% (n = 61) attained good knowledge (scores 26–35), 7.6% (n = 5) scored in the average category, and none remained in the poor category.

Table 2: Comparison of Pre-Test and Post-Test Knowledge Levels (N = 66)

Knowledge Category	Score Range	Percentage Range	Pre-Test f (%)	Post-Test f (%)
Poor	0 – 17	≤ 50.0%	47 (71.2%)	0 (0.0%)
Average	18 – 25	51.0 – 75.0%	19 (28.8%)	5 (7.6%)
Good	26 – 35	76.0 – 100.0%	0 (0.0%)	61 (92.4%)
Total	0 – 35	100.00%	66 (100.0%)	66 (100.0%)

3.3 Evaluation of the Effectiveness of Planned Teaching Programme

Descriptive and inferential analysis confirmed the effectiveness of the Planned Teaching Programme. The baseline mean knowledge score was 15.55 ± 2.56 (mean % = 44.4%, median = 16.0, score range = 10–19), which improved to 28.27 ± 1.83 (mean % = 80.8%, median = 28.0, score range = 24–33) in the post-test. The absolute mean improvement was 12.73 points (36.4% gain). Paired t-test analysis revealed a calculated t-statistic of 8.541 (df = 65), exceeding the critical table value (2.00) at $p < 0.001$. This rejects the null hypothesis (H_{01}) and supports the research hypothesis (H_{11}).

Table 3: Comparison of Pre-Test and Post-Test Knowledge Scores and Paired t-Test Analysis (N = 66)

Test	Mean	SD	Median	Mean %	Mean Gain	Paired t	df	p-value
Pre-Test	15.55	2.56	16	44.40%	—	—	—	—
Post-Test	28.27	1.83	28	80.80%	12.73 (36.4%)	8.541***	65	< 0.001*

*Statistically highly significant at $p < 0.001$; Maximum Score = 35, Minimum Score = 0.

3.4 Association Between Knowledge Scores and Demographic Variables

To evaluate the second hypothesis (H_2), Chi-square analysis was performed between demographic variables and knowledge scores. As presented in Table 4, no statistically

significant association was found between pre-test or post-test knowledge levels and age, gender, religion, marital status, monthly income, educational status, occupation, prior disaster training, or information channels ($p > 0.05$). Consequently, the null hypothesis (H_{02}) was accepted.

Table 4: Association of Pre-Test and Post-Test Knowledge Levels with Demographic Variables (N = 66)

Demographic Variable	df	Pre-Test χ^2	Table χ^2	Pre p-value	Post-Test χ^2	Post p-value
Age (in years)	1	0.037	3.841	0.848 (NS)	0.108	0.742 (NS)
Gender	1	0.001	3.841	0.973 (NS)	0.013	0.909 (NS)
Religion	1	0.41	3.841	0.522 (NS)	0.083	0.773 (NS)
Marital Status	3	3.617	7.815	0.306 (NS)	0.18	0.981 (NS)
Monthly Family Income	3	2.722	7.815	0.437 (NS)	0.202	0.977 (NS)
Educational Qualification	3	2.38	7.815	0.497 (NS)	2.074	0.557 (NS)
Occupation	4	4.434	9.488	0.350 (NS)	2.256	0.689 (NS)
Prior Drill Attendance	1	0.031	3.841	0.860 (NS)	1.327	0.249 (NS)
Source of Disaster Information	3	0.795	7.815	0.851 (NS)	1.548	0.671 (NS)

NS = Statistically Not Significant ($p > 0.05$).

4. Discussion

Baseline data revealed that 71.2% of rural adults demonstrated poor disaster preparedness knowledge, with an overall pre-test mean of 15.55 ± 2.56 (44.4%). Moreover, 80.3% had never engaged in formal disaster drills or training. These observations align with findings by Pascal et al. (2019) and Ceeba (2019), who observed widespread deficits in disaster mitigation literacy across vulnerable communities. In addition, Bogdan et al. (2024) noted that limited risk literacy and misjudgments of vulnerability contribute to low readiness. In contrast, Alkalash et al. (2023) observed higher baseline preparedness knowledge among secondary school students in Saudi Arabia, which was likely facilitated by institutional curricula and proactive social media exposure.

Following the Planned Teaching Programme, post-test knowledge scores increased significantly to 28.27 ± 1.83 (80.8%), with 92.4% achieving good knowledge status. The calculated paired t-value of 8.541 ($p < 0.001$) confirms the pedagogical effectiveness of the structured intervention. These findings are consistent with intervention studies by Fatmah et al. (2022), Bhattacharya et al. (2020), Chandana et al. (2020), and Patidar et al. (2019), which demonstrated substantial improvements in emergency and disaster management knowledge following structured educational programs.

The lack of statistically significant associations between knowledge levels and demographic variables (age, gender, income, education, occupation) indicates that the Planned Teaching Programme was equally accessible and beneficial across diverse demographic segments. This observation aligns with Shanableh et al. (2023), who found that disaster readiness is driven primarily by targeted training interventions rather than inherent socio-demographic characteristics.

5. Limitations

This study has several limitations: (1) it was confined to a single rural geographical cluster (Ragyan, Shimla), which restricts broader generalizability across urban centers or diverse cultural landscapes; (2) the sample was limited to 66 adults aged 20–40 years; (3) outcomes were assessed through self-reported questionnaires, which may introduce response bias; and (4) the post-test was administered seven days post-intervention, precluding assessment of long-term knowledge retention and practical skill mastery.

6. Nursing Implications

- **Nursing Practice:** Community health nurses are well-positioned to deliver community-wide disaster preparedness education. Nursing practice should incorporate structured health teaching regarding household evacuation mapping, first-aid techniques, mass casualty triage systems, and early warning software into routine rural home visits and village health sanitation days.
- **Nursing Administration:** Nursing administrators and public health policymakers should establish standard operating protocols for deploying nursing personnel in community disaster preparedness networks. Multi-sectoral collaborations between Primary Health Centers, Panchayati Raj Institutions, and State Disaster Management Authorities can strengthen local early-response capabilities.
- **Nursing Education:** Nursing curricula should incorporate disaster management, emergency simulation drills, and mobile warning literacy into community health and emergency nursing modules.
- **Nursing Research:** This study provides baseline data on rural disaster preparedness in Himachal Pradesh. Future research should evaluate multi-center comparative cohorts, long-term retention patterns, and practical drill performance.

7. Conclusion and Recommendations

The study demonstrated that rural adults in Ragyan initially possessed inadequate knowledge regarding disaster preparedness, but the Planned Teaching Programme produced statistically significant and meaningful gains in knowledge. These results underscore the importance of community-based health education programs in strengthening rural resilience against mountain hazards.

7.1 Recommendations

Based on these conclusions, the following recommendations are offered:

- 1) Conduct comparative studies assessing disaster preparedness between rural and urban populations.
- 2) Implement prospective longitudinal studies with follow-up intervals at 3, 6, and 12 months to evaluate knowledge retention.
- 3) Integrate hands-on simulation drills, table-top exercises, and practical triage demonstrations alongside didactic modules.

- 4) Expand community outreach programs promoting mobile early warning platforms (e.g., SACHET) and state hazard initiatives (e.g., SAMARTH).

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