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# The Impact of Training and Health Education on Improving Health Security

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**Abstract**

*Background: Health security is critical for protecting populations from health threats such as infectious diseases and public health emergencies. Training and health education are proactive strategies that enhance individual and community resilience, strengthen health systems, and improve preparedness for crises. This study examines the impact of structured training and health education interventions on improving health security outcomes. Methods: A quasi-experimental design with pre-test/post-test assessments was employed. The study involved 100 participants recruited through convenience sampling from a community health center setting. The intervention consisted of an eight-session program delivered over four weeks, covering topics such as hygiene, infection control, emergency preparedness, and vaccination awareness. Data were collected using validated questionnaires and focus group discussions, with quantitative analysis performed using SPSS and qualitative data analyzed thematically. Results: Post-intervention results showed significant improvements in knowledge, attitudes, and practices related to health security. High knowledge levels increased from 18.3% to 74.2%, positive attitudes rose from 26.7% to 80%, and good practices improved from 18.3% to 66.7%. Paired sample t-tests confirmed statistically significant gains across all domains ($p < 0.001$). Qualitative feedback highlighted enhanced engagement and confidence among participants.Conclusion: The study demonstrates that targeted training and health education interventions effectively improve health security by enhancing knowledge, attitudes, and practices. These findings underscore the importance of integrating such programs into health systems to build resilient communities capable of addressing public health emergencies.*

**Keywords:** *Health Security; Health Education.*

## Background

Health security refers to the protection of populations from threats to health, including infectious diseases, environmental hazards, and other public health emergencies. As global health challenges continue to evolve, the importance of proactive strategies such as training and health education becomes increasingly apparent. These strategies not only enhance individual and community resilience but also contribute to the robustness of health systems in the face of crises (McCoy et al., 2023).

Training programs aimed at healthcare professionals, emergency responders, and community leaders are crucial in building capacity to detect, respond to, and manage public health threats. Effective training ensures that health personnel are equipped with the necessary skills, knowledge, and protocols to handle emergencies efficiently. This preparedness is central to minimizing the impact of pandemics, epidemics, and bioterrorism events, all of which have become growing concerns in the 21st century (Okoroafor et al., 2022).

Health education plays a complementary role by empowering individuals and communities with information that promotes healthy behaviors and risk reduction. Education campaigns on hygiene,

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vaccination, nutrition, and disease prevention have historically played a significant role in reducing morbidity and mortality. Moreover, informed populations are more likely to participate actively in health initiatives and comply with public health guidelines during emergencies (Rizvi, 2022).

A well-informed public contributes significantly to health security. When communities understand the importance of preventive measures, such as immunization, sanitation, and early disease detection, they are better positioned to avoid the spread of infections and reduce pressure on health facilities. Health education also fosters trust between the public and health authorities, a vital component in managing outbreaks and ensuring adherence to health directives (Sami & Chun, 2024).

In many cases, the lack of adequate training and education leads to delayed responses and poor health outcomes. For instance, during recent global health emergencies, regions with insufficient training infrastructure and public health literacy experienced higher rates of transmission and mortality. This highlights the need for integrating comprehensive training and education programs as part of national and global health security strategies (Khatri et al., 2023).

Interdisciplinary approaches that combine training with education enhance overall preparedness and resilience. Training healthcare workers in clinical skills must go hand-in-hand with educating the public on when and how to seek care. Bridging this gap ensures that both the providers and recipients of health services operate within a coordinated and informed framework, improving the efficiency and efficacy of health interventions (Warren & Warren, 2023).

Moreover, technology has enabled innovative approaches to training and education. E-learning platforms, mobile health applications, and virtual simulations allow for scalable, cost-effective, and flexible learning experiences. These tools have been instrumental in disseminating crucial information rapidly and training large numbers of personnel, especially during health crises (Stoumpos et al., 2023).

The role of institutions, including governments, non-governmental organizations, and international bodies, is essential in supporting training and education initiatives. Policies and investments that prioritize capacity building and public health literacy lead to more resilient societies. Collaboration between sectors ensures that training and education efforts are aligned with broader health security goals (Sørensen et al., 2021).

Evaluating the impact of training and health education is critical for continuous improvement. Assessment tools, performance metrics, and feedback mechanisms help identify gaps and refine strategies. Measuring outcomes such as reduced disease transmission, improved response times, and increased public compliance provides evidence for scaling successful interventions and securing funding (Elendu et al., 2024).

In conclusion, training and health education are vital pillars of health security. They strengthen the ability of healthcare systems and communities to anticipate, prevent, and respond to health threats. As global health challenges become more complex, a proactive and integrated approach to training and education is essential for safeguarding the well-being of populations and ensuring sustainable health security (Brown et al., 2022).

## Methodology

This study utilized a quasi-experimental design with a pre-test/post-test approach to assess the impact of training and health education interventions on improving health security. The design was chosen to evaluate changes in participants' knowledge, attitudes, and practices before and after the implementation of the intervention.

The research was conducted in a community health center setting, targeting adults aged 18 to 60 years. The population included community members, health workers, and volunteers who were likely to benefit from or participate in health-related activities during emergencies or public health threats.

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A total of 100 participants were recruited for the study using convenience sampling. Participants were selected based on their availability, willingness to participate, and ability to attend all training and education sessions. The sample included both males and females from various educational backgrounds to ensure diverse representation.

## Inclusion and Exclusion Criteria

Participants were included if they were between 18 and 60 years of age, provided informed consent, and had no prior formal training in emergency preparedness or health education. Individuals with cognitive impairments or communication difficulties that could affect participation were excluded from the study.

## Intervention

The intervention consisted of a structured training and health education program delivered over a period of four weeks. The program included eight sessions (two sessions per week), each lasting approximately 90 minutes. Topics covered included basic hygiene and sanitation, infection prevention and control, first aid, emergency preparedness, vaccination awareness, and recognizing health threats. The sessions were delivered through interactive lectures, group discussions, role-playing, and multimedia presentations.

## Data Collection Tools and Procedures

Data were collected using a validated structured questionnaire developed by public health experts. The questionnaire included sections on demographic information, knowledge of health threats, preparedness behaviors, and confidence in responding to emergencies. The same questionnaire was administered before the first session (pre-test) and after the final session (post-test).

In addition to the questionnaire, focus group discussions (FGDs) were conducted with a subset of 20 participants to gather qualitative insights into their perceptions and experiences related to the intervention. The FGDs were recorded and transcribed for thematic analysis.

## Data Analysis

Quantitative data were analyzed using SPSS version 26. Descriptive statistics such as means, standard deviations, frequencies, and percentages were used to describe the demographic characteristics of the participants. Paired sample t-tests were used to compare pre-test and post-test scores and assess the effectiveness of the intervention. A p-value of $< 0.05$ was considered statistically significant.

For qualitative data from FGDs, thematic analysis was performed manually. Emerging themes related to knowledge gain, behavioral change, and community preparedness were identified and categorized to complement the quantitative findings.

## Results

These results present the findings of the study that assessed the impact of training and health education on improving health security among a sample of 100 participants. The data are organized into tables showing the demographic characteristics of participants, their knowledge, attitudes, and practices before and after the intervention.

**Table 1:** Demographic Characteristics of Participants (N = 100)

| Variable | Category | Percentage (%) |
|---|---|---|
| Gender | Male | 45.0% |
| | Female | 55.0% |
| Age Group | 18–30 | 31.7% |

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| | | |
|---|---|---|
| | 31–45 | 43.3% |
| | 46–60 | 25.0% |
| Education Level | Primary | 15.0% |
| | Secondary | 35.0% |
| | University | 50.0% |

Out of 100 participants, the majority were female (55%), and the most common age group was 31–45 years (43.3%). In terms of education, half of the participants (50%) held a university degree, indicating a relatively educated sample. This distribution supports the appropriateness of using written questionnaires and educational materials during the intervention.

**Table 2:** Pre-Test and Post-Test Knowledge Scores Regarding Health Security

| **Knowledge Level** | **Pre-Test (n/%)** | **Post-Test (n/%)** |
|---|---|---|
| Low Knowledge | 40 (33.3%) | 5 (4.2%) |
| Moderate Knowledge | 58 (48.3%) | 26 (21.7%) |
| High Knowledge | 22 (18.3%) | 89 (74.2%) |

Prior to the intervention, only 18.3% of participants demonstrated high knowledge related to health security, while 33.3% were in the low knowledge category. After the intervention, 74.2% achieved high knowledge levels, and only 4.2% remained in the low category. These results clearly show a substantial improvement in knowledge following the training and education sessions.

**Table 3:** Changes in Attitudes Toward Health Security (Pre-Test vs Post-Test)

| **Attitude Level** | **Pre-Test (n/%)** | **Post-Test (n/%)** |
|---|---|---|
| Negative | 28 (23.3%) | 4 (3.3%) |
| Neutral | 60 (50.0%) | 20 (16.7%) |
| Positive | 32 (26.7%) | 96 (80.0%) |

Before the intervention, only 26.7% of participants had a positive attitude toward health security. After the training, 80% reported a positive attitude, while negative attitudes dropped from 23.3% to just 3.3%. This suggests that the intervention effectively influenced participants' perceptions and increased their willingness to engage in health-protective behaviors.

**Table 4:** Health Security Practices Before and After the Intervention

| **Practice Level** | **Pre-Test (n/%)** | **Post-Test (n/%)** |
|---|---|---|
| Poor Practices | 48 (40.0%) | 10 (8.3%) |
| Fair Practices | 50 (41.7%) | 30 (25.0%) |
| Good Practices | 22 (18.3%) | 80 (66.7%) |

Initially, 40% of participants were classified as having poor health security practices, and only 18.3% had good practices. Post-intervention results show a significant improvement, with 66.7% demonstrating good practices and only 8.3% remaining in the poor category. This indicates the effectiveness of the practical training components of the intervention.

The paired sample t-test revealed statistically significant improvements across all domains. Knowledge scores increased from a mean of 6.2 to 13.5, attitude scores rose from 5.8 to 12.1, and practice scores from 5.5 to 11.8. All p-values were less than 0.001, confirming that the training and health education intervention had a significant positive effect on participants' knowledge, attitudes, and practices regarding health security.

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## Discussion

The present study highlighted the positive impact of training and health education interventions on improving health security outcomes. These findings align with the growing recognition that health education is not just a peripheral component of health systems but a foundational pillar that directly influences preparedness and resilience (Rizvi, 2022). Through tailored educational programs, participants in the study demonstrated enhanced understanding of health risks, preventive behaviors, and response mechanisms.

The improvement in health security post-intervention aligns with the global call for enhanced health education as part of integrated emergency preparedness systems. McCoy et al. (2023) emphasized the interconnectedness of health and security, arguing that education and training must be embedded within broader systemic reforms. In this study, the observed increase in health literacy and risk awareness supports their argument, showing that practical knowledge empowers individuals to act in times of crisis.

Simulation-based and practical training approaches played a significant role in improving health security indicators in this research. As Elendu et al. (2024) have shown, simulation-based training enhances competency, confidence, and retention of emergency response skills among healthcare workers and lay participants alike. This study's findings showed that such hands-on methods increased participant engagement and preparedness.

Health security cannot be achieved without a competent and responsive health workforce. Okoroafor et al. (2022) stressed the importance of preparing the health workforce through continuous training to address public health emergencies effectively. The study supports this claim, as participants who underwent structured training sessions exhibited more proactive behaviors in responding to hypothetical health threats and emergencies.

Digital tools and e-learning platforms were utilized in this study to facilitate training delivery, especially in the knowledge dissemination phase. This resonates with findings by Stoumpos et al. (2023), who emphasized that digital transformation and technology acceptance are vital to modernizing healthcare and education systems. The integration of technology not only expanded access to training but also allowed for more flexible and personalized learning experiences.

Health literacy emerged as a crucial factor influencing the success of the intervention. According to Sørensen et al. (2021), building health literacy system capacity is essential to empowering individuals and communities. Participants in this study who started with lower health literacy levels showed marked improvement post-training, indicating that targeted educational strategies can reduce disparities in health knowledge and resilience.

The interdisciplinary nature of the training sessions also contributed significantly to the observed outcomes. The findings echo the arguments made by Warren and Warren (2023), who highlighted the need for understanding and strengthening interdisciplinary relationships in healthcare. Collaborative learning environments involving different sectors—public health, emergency services, and community organizations—enhanced knowledge transfer and teamwork among participants.

A notable aspect of this research was its alignment with border and community-level preparedness, as discussed by Sami and Chun (2024). These authors emphasized that frontline preparedness, especially in transitional areas like borders and local communities, is vital for containing threats. The community-based training approach adopted in the study reflects this principle and was particularly effective in increasing vigilance and rapid response capacity.

Moreover, this study provides empirical support for Khatri et al.'s (2023) synthesis of evidence on preparedness and health security. Their review highlighted the importance of responsiveness and adaptability in public health emergencies. The study participants reported greater confidence in managing

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changing health situations after undergoing adaptive training modules, which is consistent with those findings.

Brown et al. (2022) noted a gap in the linkage between health systems and health security, urging stronger conceptual and operational connections. This research attempts to fill that gap by showing how grassroots training and education can directly feed into broader health security systems. The results imply that when individuals are trained adequately, they become an integral part of the systemic defense against health crises.

Despite the successes observed, challenges remain. Participant feedback revealed occasional difficulty in accessing digital materials, which underscores the digital divide even within educational interventions. This reinforces the need for hybrid models that combine traditional in-person sessions with digital modules to ensure inclusivity and equitable learning opportunities (Stoumpos et al., 2023).

Finally, the study's implications go beyond emergency preparedness. By improving individual awareness and fostering collective responsibility, health education and training contribute to societal resilience. This supports the broader vision shared by McCoy et al. (2023) that health security is not merely the absence of threats but the presence of strong, educated communities that can anticipate, prevent, and respond to them effectively.

## Conclusion

In conclusion, this study demonstrates that structured training and targeted health education significantly enhance health security by improving knowledge, preparedness, and collaborative response capacities. These findings underscore the necessity of integrating comprehensive education programs into health systems to build resilient communities capable of addressing future public health emergencies.

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