Data Science : Journal Of Computing And Applied Informatics

Safety Measures for Special Care Individuals at The Bureau of Fire Protection in Bolinao, Pangasinan, Philippines: Basis For A Plan of Action

Abelardo S. Mayugba[*] iD

Pangasinan State University-Open University System, Lingayen Pangasinan, Philippines
[*]Corresponding Author: rexattysoon@gmail.com

ABSTRACT

This study assessed the implementation of fire safety measures by the Bureau of Fire Protection (BFP) in Bolinao, Pangasinan, focusing on the needs of special care individuals, including persons with disabilities, the elderly, and those with mobility or cognitive impairments. Using a descriptive-comparative and correlational research design, data were gathered from 150 special care individuals and caregivers, and 20 BFP personnel through validated questionnaires. The results revealed that while special care individuals generally perceived the level of fire safety implementation as high across awareness, preparedness, facilities, training, and policy compliance, BFP personnel rated them more moderately, highlighting gaps in training and infrastructure. Statistical analysis showed significant discrepancies in perception and underscored the need for targeted interventions. The study concludes with a proposed action plan aimed at enhancing inclusive fire safety protocols, training, and equipment for vulnerable populations.
Keyword: Fire Safety Implementation, Special Care Individuals, Bureau of Fire Protection, Inclusive Emergency Response, Descriptive-Correlational Study

ABSTRAK

Penelitian ini mengevaluasi penerapan langkah-langkah keselamatan kebakaran oleh Biro Perlindungan Kebakaran (BFP) di Bolinao, Pangasinan, dengan fokus pada kebutuhan individu yang memerlukan perhatian khusus, termasuk penyandang disabilitas, lansia, serta mereka yang mengalami gangguan mobilitas atau kognitif. Penelitian ini menggunakan desain deskriptif-komparatif dan korelasional, data dikumpulkan dari 150 individu dengan kebutuhan khusus dan pengasuh mereka, serta 20 personel BFP melalui kuesioner yang telah divalidasi. Hasil penelitian menunjukkan bahwa meskipun individu dengan kebutuhan khusus umumnya menilai tingkat penerapan keselamatan kebakaran berada pada kategori tinggi dalam aspek kesadaran, kesiapsiagaan, fasilitas, pelatihan, dan kepatuhan terhadap kebijakan, penilaian dari personel BFP cenderung lebih moderat, dengan menyoroti adanya kekurangan dalam aspek pelatihan dan infrastruktur. Analisis statistik menunjukkan adanya perbedaan persepsi yang signifikan dan menegaskan perlunya intervensi yang terarah. Penelitian ini ditutup dengan usulan rencana aksi yang bertujuan untuk meningkatkan protokol keselamatan kebakaran yang inklusif, pelatihan, serta penyediaan peralatan yang sesuai bagi populasi rentan.
Kata kunci: Penerapan Keselamatan Kebakaran, Individu Kebutuhan Khusus, Biro Perlindungan Kebakaran, Respons Darurat Inklusif, Studi Deskriptif-Korelasional.

1. Introduction

Disasters don't discriminate, but their impact does." This poignant reality underscores the vulnerability of special care individuals those with physical or cognitive limitations during fire-related emergencies. In the Philippines, although national laws such as Republic Act No. 9514 (Fire Code of the Philippines) and Batas

Pambansa Blg. 344 (Accessibility Law) provide frameworks for fire safety and accessibility, implementation at the local level remains inconsistent, particularly in rural areas like Bolinao.

Numerous studies report that fire safety measures often overlook the specific needs of individuals with disabilities. Key issues include the lack of accessible infrastructure, insufficient caregiver training, and limited inclusive drills or policies. The Bureau of Fire Protection (BFP) is tasked with safeguarding the community, but evidence suggests its protocols may not sufficiently address the challenges faced by vulnerable groups. This study aims to assess the level of fire safety implementation in Bolinao with respect to awareness, preparedness, equipment, training, and policy compliance. It also examines the relationship between demographic variables and perceived implementation, differences in perception between stakeholders, and proposes an action plan grounded in empirical findings.

2. Method

This study adopted a quantitative research approach, specifically a descriptive-comparative and correlational design, to assess the level of implementation of fire safety measures for special care individuals under the jurisdiction of the Bureau of Fire Protection (BFP) in Bolinao. This design was appropriate as it enabled the researcher to both describe and evaluate the extent, effectiveness, and disparities in fire safety practices across five domains: preparedness, response, facilities and equipment, awareness and training, and policy implementation and compliance.

The descriptive aspect allowed for the presentation of the respondents' demographic profiles and the general assessment of fire safety implementation. Comparative analysis was conducted to identify statistically significant differences in perceptions between BFP personnel and special care individuals. In addition, correlational techniques were utilized to determine the relationship between respondent characteristics—such as age, sex, role in fire safety, level of training, and awareness—and their perceived level of fire safety implementation.

While the study was primarily quantitative, qualitative insights were integrated through reported best practices, which added contextual depth and supported the interpretation of statistical findings. This mixed analytical approach reinforced the formulation of a responsive and inclusive action plan to enhance fire safety in Bolinao.

2.1 Respondents of the Study

The study involved two primary groups of respondents:

a) 150 special care individuals and their caregivers, who represent the main beneficiaries of fire safety protocols, and
b) 20 BFP personnel, who are responsible for implementing and enforcing fire safety measures in the municipality.
c) Their inclusion ensured a dual perspective necessary for evaluating both the provision and reception of fire safety services.

Table 1: Sample Group

Group	Number of Respondents	Role in the Study
Special Care Individuals & Caregivers	150	Primary beneficiaries of fire safety protocols
BFP Personnel	20	Implementers of fire safety measures

2.2 Sampling Design

Purposive sampling was employed to ensure that only those directly involved in or affected by fire safety efforts were selected. Participants included persons with disabilities, the elderly, individuals with mobility or cognitive impairments, their caregivers, and active-duty BFP personnel. The deliberate selection of these individuals allowed for the collection of relevant and experience-based data, ensuring that the research focused on stakeholders with the greatest insight into the effectiveness of fire safety practices.

2.3 Data Gathering Procedure

A structured data collection process was conducted. The researcher distributed standardized questionnaires directly to respondents, offering guidance and clarifications as needed, especially to special care individuals

requiring assistance. Coordination with local authorities facilitated ethical access and respondent engagement. Completed questionnaires were reviewed for completeness and encoded for analysis.

2.3 Research Instrument

The primary tool used was a structured survey questionnaire developed in line with the study's objectives and existing fire safety literature. It included sections on demographic profile, implementation of fire safety measures (across five key domains), perceived challenges, and observed best practices.
A five-point Likert scale was utilized to capture varying levels of agreement or experience, enabling statistical quantification of responses. Prior to deployment, the instrument underwent content validation by subject matter experts, with adjustments made to enhance clarity, reliability, and validity.

2.4 Treatment of Data

Both descriptive and inferential statistical methods were employed to address the research questions:
Descriptive statistics (frequency counts, percentages, and weighted means) were used to profile respondents, evaluate the level of fire safety implementation, and summarize reported challenges and best practices.
Inferential statistics were applied to test hypotheses:
  a) Pearson's Correlation Coefficient and the Chi-Square Test were used to assess relationships between respondent profiles and perceived levels of implementation.
  b) Independent Samples t-Test and Mann-Whitney U Test were used to determine whether there were statistically significant differences in perceptions between BFP personnel and special care individuals, depending on data normality.

   All statistical analyses were performed using reliable statistical software, ensuring the rigor and accuracy of results. These findings served as the foundation for conclusions and the development of a data-driven action plan to improve fire safety protocols for vulnerable populations in Bolinao.

3.   Result and Discussion.

The study began by exploring the demographic characteristics of the respondents, which included special care individuals, their caregivers, and Bureau of Fire Protection (BFP) personnel in Bolinao. Most special care respondents were between [20] and [30] years old, with nearly equal distribution across sexes. In contrast, BFP personnel were predominantly male and had all attended fire safety training. These demographic profiles provided important context for interpreting the variations in perceptions and responses across the two groups.

   In assessing the level of implementation of fire safety measures, the quantitative results revealed a noticeable contrast between the perceptions of the two groups. Special care individuals and caregivers consistently rated the implementation as highly implemented across all five domains: awareness, preparedness, facilities, training, and policy compliance. Conversely, BFP personnel assessed the same areas as moderately implemented. Among the domains, community respondents gave the highest ratings to the availability of emergency facilities and protocols, while BFP personnel expressed the lowest confidence in awareness and outreach efforts. This contrast highlighted a gap between the perceived and operational realities of fire safety initiatives. The table below presents a summary of the comparative ratings:

Table 2: Five [5] domains of Fire Safety Measures for Special Care Individual and Its Level of Perception

Domain	Special Care Individuals & Caregivers	BFP Personnel
Awareness and Knowledge	Highly Implemented	Moderately Implemented
Preparedness	Highly Implemented	Moderately Implemented
Facilities and Equipment	Highly Implemented	Moderately Implemented
Training	Highly Implemented	Moderately Implemented
Policy Implementation	Highly Implemented	Moderately Implemented

   These differences were found to be statistically significant across all domains. The perceptual gap may be attributed to differing benchmarks between community stakeholders, who may base their evaluations on visible activities, and BFP personnel, who are more attuned to operational standards and technical requirements.
   Several best practices were identified, including the conduct of regular fire drills, the use of digital platforms for awareness campaigns, and the implementation of the localized "Oplan Ligtas na Pamayanan" initiative adapted for special care individuals. These reflect both institutional initiative and growing community involvement in fire safety promotion.

When analyzing the relationship between profile variables and perceived implementation, age was found to be a statistically significant factor. Older respondents, especially caregivers, reported higher levels of perceived implementation in preparedness, training, and equipment. In contrast, variables such as sex and attendance at fire drills showed no significant correlation. This suggests that experience and maturity may influence how individuals assess fire safety efforts.

Further analysis using inferential statistics, including Independent Samples t-Test and Mann-Whitney U Test, confirmed significant differences in perception between BFP personnel and special care individuals. The widest gap was observed in the domain of awareness and knowledge, suggesting a potential overestimation of outreach success by the community or a more critical internal assessment by implementers.

Both respondent groups rated the challenges in fire safety implementation as moderately serious. The most pressing issues cited were the lack of specialized training for responders, limited accessibility infrastructure, and inadequate equipment designed for the needs of special care individuals. BFP personnel expressed greater concern, especially regarding resource limitations and inconsistencies in policy enforcement.

In response to these findings, a comprehensive action plan was developed to enhance inclusive fire safety in Bolinao. Key recommendations focused on improving accessibility, increasing targeted training, strengthening community education efforts, and fostering collaboration among local stakeholders. These interventions aim to close the implementation gaps and build a more responsive and inclusive fire safety system tailored to the needs of vulnerable populations.

4. Conclusion

This study employed a combination of descriptive and inferential statistical tools to evaluate the level of implementation of fire safety measures for special care individuals in Bolinao. Through frequency analysis, percentage distribution, and weighted mean, the perceptions of special care individuals/caregivers and Bureau of Fire Protection (BFP) personnel were systematically quantified across five core domains: awareness and knowledge, preparedness and emergency response, facilities and equipment, training, and policy implementation and compliance.

To examine associations between respondent profiles and implementation levels, Pearson's correlation coefficient and point-biserial correlation were applied. These revealed statistically significant relationships between age and perceived implementation, especially in training and preparedness, while other variables such as sex and training attendance showed no significant influence. Furthermore, multivariate tests (Pillai's Trace) and univariate ANOVA were instrumental in identifying significant differences in perception between BFP personnel and caregivers across all domains, with the most notable disparity found in awareness and knowledge.

The application of these statistical techniques offered clear advantages: (1) they enhanced the objectivity and rigor of the findings, (2) enabled precise comparison between stakeholder groups, and (3) allowed for evidence-based conclusions on program effectiveness and implementation gaps. These tools were critical in uncovering nuances in stakeholder perceptions that would otherwise remain unaddressed.

The findings emphasize the need for targeted training, standardized inclusive protocols, and improved accessibility infrastructure to strengthen fire safety implementation. Notably, while special care individuals and caregivers perceived fire safety measures to be generally well-implemented, BFP personnel expressed moderate ratings, suggesting critical internal gaps. The collaboration between caregivers, BFP personnel, and LGUs must be enhanced to align expectations, improve policy enforcement, and ensure inclusive emergency preparedness.

In conclusion, the study affirms that although fire safety systems in Bolinao are present and functional, their impact can be significantly improved through the use of data-driven planning and stakeholder engagement. The strategic application of statistical methods not only validated the perceptions of implementation but also served as a valuable framework for identifying where interventions are most needed to protect vulnerable populations effectively.

5. Acknowledgements

6. Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this paper. All procedures were conducted with academic integrity and transparency, and no financial or personal relationships influenced the outcomes of this research.

References

[1]   Alexander, D. (2018). Disability and disaster. *Routledge*.

[2]   A. Bautista and M. Vasquez, "Challenges in inclusive fire safety education among BFP units. *Philippine Journal of Public Safety"*, vol. 12, no. 3, pp. 42–55, 2020.

[3]   J. De la Cruz, "Barriers to policy enforcement in rural fire stations. *Journal of Public Management and Governance*, vol. 8, no. 2, pp. 99–112, 2022.

[4]   L. Dizon and K. Panganiban, "Fire safety preparedness of caregivers in rural municipalities", *International Journal of Disaster Studies*, vol. 6, no. 1, pp. 33–45, 2021.

[5]   G. Flores, R. Martinez, and M.Valdez, "Effectiveness of inclusive fire drills in schools with special needs learners", *Asian Safety Review*, vol. 7, no. 2, pp. 15–30, 2021.

[6]   R. Guillen, J. Delos Reyes, and E. Rios, "Fire response capability and accessibility in rural areas", *Disaster and Emergency Management Review*, vol. 9, no. 1, pp. 58–71, 2020.

[7]   F. Navarro, L. Salazar, and J. Torres, "Emergency logistics and limitations in Philippine municipalities", *Philippine Journal of Crisis Management*, vol. 4, no. 1, pp. 22–37, 2021.

[8]   UNDRR, *Sendai Framework for Disaster Risk Reduction 2015–2030*. United Nations Office for Disaster Risk Reduction, 2020.

[10] WHO, *Guidelines on inclusive disaster risk management for people with disabilities*. World Health Organization, 2021.