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MORALITY BEFORE KNOWLEDGE

Strategic approaches in disaster management: Analyzing the roles of public health professionals from emergency response to post-disaster recovery

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ABSTRACT
Disaster management presents a global challenge requiring the coordinated efforts of various sectors, especially public health professionals. The COVID-19 pandemic, declared by WHO in March 2020, marked a paradigm shift in disaster management and public health responses. This study examines the role of public health professionals during different disaster management phases, with a focus on Indonesia and global examples. Findings from Siti Marlina et al. (2022) and O. Olu (2017) highlight the critical role of community health centers and resilient health systems. The research also explores the Lombok earthquake response (Xu et al., 2018; Skinner, 2018; Kunugita et al., 2018; Brun & Pakenham-Walsh, 2018) and the broader implications of disaster management trends in Spain (Arcos González et al., 2023) and nuclear event concerns (Dallas, 2022). The study underscores the importance of mental health support (Peppou et al., 2021; Raesi et al., 2020) and offers recommendations for improving disaster management, including enhancing training, integrating public health into planning, and leveraging technology.

KEYWORDS: disaster management; public health; emergency response.

1. Introduction

Disaster management is a global challenge that requires coordinated responses from various sectors, including public health professionals. At the international level, we have witnessed how the COVID-19 pandemic, declared by the WHO in March 2020, has shifted the paradigm of disaster management and public health responses. A study by Siti Marlina et al. (2022) highlights how community health centers (puskesmas) and clinics in Indonesia have been at the forefront of managing and preventing the transmission of COVID-19, emphasizing the importance of adequate resources and service protocols to protect both patients and healthcare workers from the risk of infection (Marlina et al., 2022).

Beyond Indonesia, another example of these challenges can be seen in the management of the pandemic in Africa, as described by O. Olu (2017). Here, the complex interaction between the health system and disaster management illustrates how a weak healthcare system can exacerbate the impact of disasters and vice versa (Olu, 2017). This underscores the importance of building resilient health systems as part of disaster risk management.

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Focusing again on Indonesia, the country is geographically vulnerable to various natural disasters such as earthquakes, tsunamis, and volcanic eruptions. In this context, the role of public health professionals becomes critically important. For instance, the handling of crisis communication during the mitigation of the COVID-19 outbreak in Indonesia, as explained by Dwinarko and Erita Riski Putri (2022), highlights the significance of crisis management and communication in disaster response (Dwinarko & Putri, 2022).

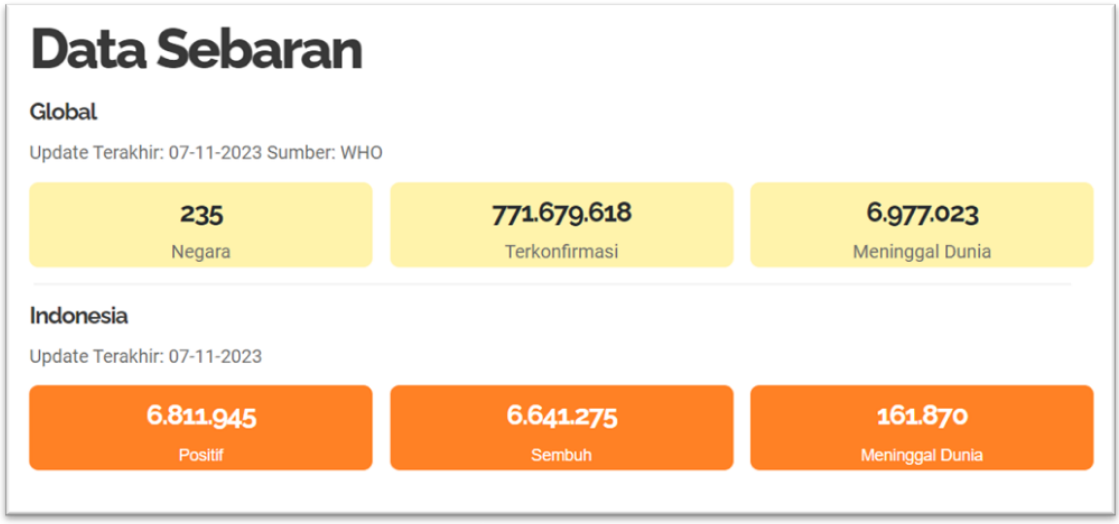

Fig 1. COVID-19 distribution data
(COVID19.go.id, 2023)

Indonesia frequently experiences natural disasters such as earthquakes, tsunamis, volcanic eruptions, and floods due to its location along the Pacific Ring of Fire. These disasters have significant impacts on public health, including injuries, loss of life, and the spread of diseases resulting from displacement and overcrowding in temporary shelters. For instance, the 2004 Indian Ocean earthquake and tsunami resulted in over 200,000 deaths in Indonesia and had profound public health consequences (R. Paris et al., 2021).

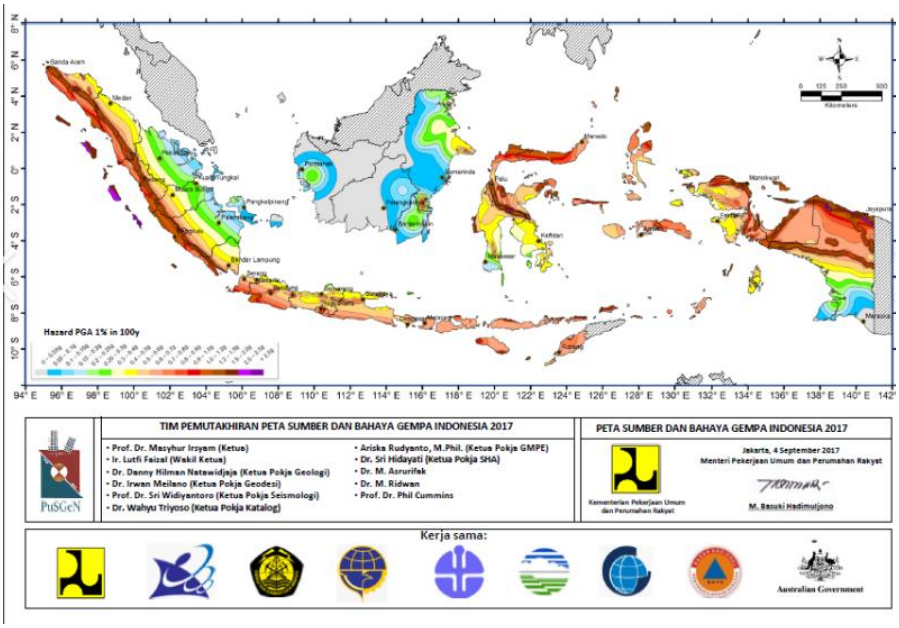

Fig 2. Indonesia earthquake fault map
(PUPR, 2023)

In addition to COVID-19, Indonesia also faces outbreaks of other infectious diseases that pose public health challenges, such as dengue fever, tuberculosis, and avian influenza.

The country's tropical climate and high population density can facilitate the spread of vector-borne diseases like dengue fever, which is a recurring public health issue.

Indonesia also confronts environmental health problems such as air pollution, water contamination, and sanitation issues, which can lead to respiratory diseases, diarrheal diseases, and other health conditions. The capacity of Indonesia's health system to respond to public health emergencies is often limited during crises. Limited access to healthcare services in rural and remote areas exacerbates the situation.

Efforts to enhance disaster risk reduction and emergency preparedness are ongoing. The Indonesian government has been working to strengthen public health infrastructure and develop better early warning systems and response mechanisms.

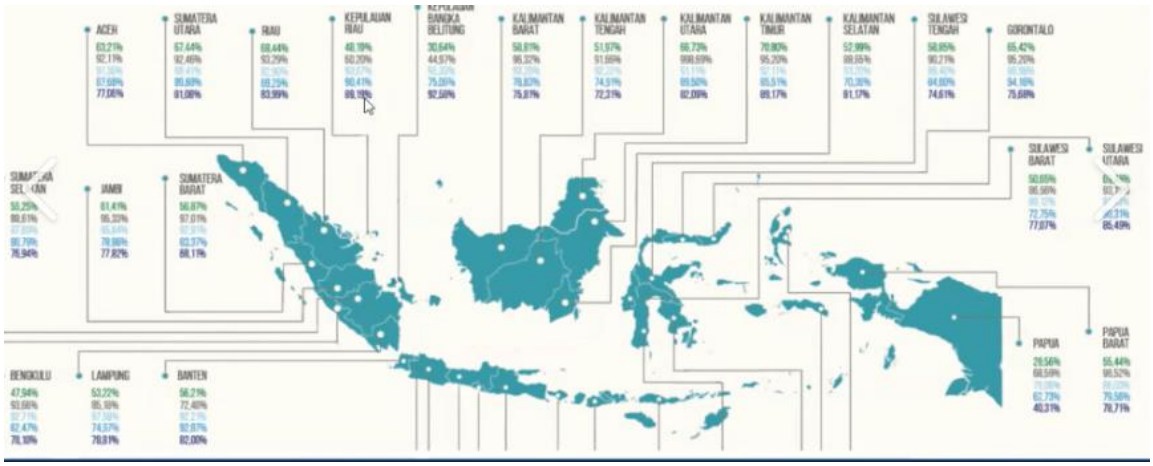

Fig 3. Indonesia sanitation status
(ITS, 2022)

At the international level, conflicts such as the one in Ukraine in 2022 have created a humanitarian crisis with significant public health impacts, including mass migration and mental health trauma (Patel & Erickson, 2022). Meanwhile, the challenges posed by climate change, such as the increased incidence of vector-borne diseases and altered disease transmission dynamics, demand serious attention in public health management (EPIDEMIOLOGY AND PUBLIC HEALTH (EPH)).

Considering these global and local case studies, it becomes clear that public health professionals play a crucial role in all phases of disaster management—from emergency response, through transition, to post-disaster recovery. They are not only responsible for the direct care of disaster victims but also for preparing and strengthening health systems to withstand and recover from the impacts of disasters.

2. Methods

This study employs a comprehensive methodology to explore disaster management and the role of public health professionals across different phases of disaster response. The research began with an extensive literature review, aiming to gather a broad understanding of existing knowledge and practices. Peer-reviewed journal articles, case studies, and reports from reputable organizations such as the WHO and CDC were systematically searched through databases including PubMed, Web of Science, and Google Scholar, using targeted keywords related to disaster management and public health.

In addition to the literature review, the study incorporated case studies to provide practical examples of disaster management. These case studies were selected based on their relevance and impact, including recent events such as the COVID-19 pandemic, natural disasters in Indonesia, and historical data on disasters in Spain. Each case study was analyzed to understand the roles and challenges faced by healthcare professionals during

various disaster management phases—emergency response, transition, and post-disaster recovery.

Data analysis involved both qualitative and quantitative methods. Qualitative analysis focused on identifying themes and patterns from case studies, while quantitative analysis involved examining disaster frequency and impact data using statistical software. The synthesis of these findings aimed to integrate insights from both literature and case studies, offering a cohesive understanding of public health professionals' roles in disaster management.

The study's implementation phase concentrated on specific disaster management phases. In the emergency response phase, the focus was on the roles of healthcare professionals in triage, injury management, and disease prevention, with detailed examples from the 2018 Lombok Earthquake and the COVID-19 pandemic. The emergency transition phase examined strategies for moving from immediate response to long-term recovery, emphasizing infrastructure rehabilitation and psychosocial support, with insights from studies on mental health and disease outbreak prevention post-disaster. The post-disaster phase analysis explored efforts in health service rehabilitation, facility reconstruction, and long-term recovery planning, illustrated by the Mount Merapi eruption case study.

Based on these findings, the study offers several recommendations for enhancing disaster management practices. These include strengthening training and capacity for public health professionals, integrating these professionals into disaster planning, developing and implementing standardized protocols, fostering cross-sector collaboration, leveraging technology for data and information management, and ensuring adequate funding and resources for disaster-related public health initiatives. This methodology provides a thorough and evidence-based approach to understanding and improving disaster management, highlighting the critical contributions of public health professionals throughout all phases of disaster response and recovery.

3. Results and Discussion

3.1 Emergency response phase

During the emergency response phase of a disaster, healthcare professionals play a crucial role in the initial response. They are responsible for triage, injury management, and disease prevention. Triage, as the first step in disaster management, involves the rapid assessment and categorization of victims based on the severity of their injuries, ensuring that those in critical condition receive immediate care (Antosia & Cahill, 2006). Injury management includes providing first aid, stabilizing the patient's condition, and preparing for transport to more comprehensive healthcare facilities if needed. Disease prevention, particularly in temporary shelters, is essential to avoid the spread of infectious diseases in the aftermath of a disaster (Olayinka & Akpinar-Elc, 2016).

In Indonesia, the disasters that occurred across the country in 2022 were predominantly climate-related, such as floods, landslides, droughts, and forest and land fires. There is a trend of increasing disaster incidents each year, with a total of 1,945 events recorded in 2022. This indicates that disasters are dynamic and continuously evolving phenomena, requiring deep understanding and comprehensive management (Yulianto et al., 2021).

Fig 4. Disaster happens in Indonesia
(BNPB, 2022)

Disaster management is not limited to response efforts after a disaster has occurred but also includes mitigation and adaptation strategies to reduce disaster risk. Disaster mitigation involves activities designed to prevent disasters from occurring or to minimize the impact of unavoidable disasters. Adaptation, on the other hand, involves adjustments in human behavior or social systems that reduce vulnerability to environmental changes, including disasters.

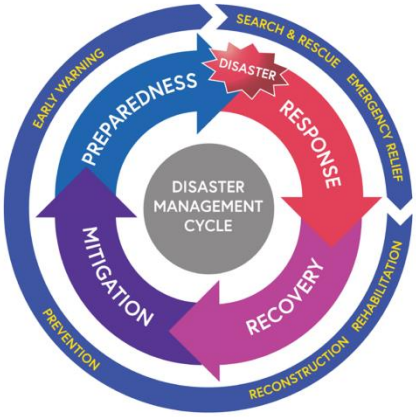

Fig 5. Disaster management cycle
(UNDRR, 2022)

3.1.1 National security and disaster risk management

Safeguarding national security through effective disaster risk management is essential for a country's sovereignty. Effective disaster management serves as a form of protection for the entire nation against various threats, particularly national security threats originating from non-military aspects of disasters. This underscores the importance of a national security approach in disaster management, which not only protects citizens from the immediate impacts of disasters but also ensures that the country's critical infrastructure, economy, and social systems can withstand and recover from such events (Yulianto et al., 2021).

3.1.2 Case study: Lombok earthquake 2018

In the case of the 2018 Lombok Earthquake, the role of healthcare professionals during the emergency response phase was crucial. Healthcare workers faced significant challenges in treating victims, including conducting triage, managing injuries, and preventing disease outbreaks. According to Xu, Fang, and Jin (2018), emergency logistics, including the placement of healthcare facilities and the distribution of supplies, are key aspects of rescue operations during disasters like earthquakes (Xu et al., 2018). In the context of Lombok, this meant the rapid deployment of healthcare personnel and medical equipment to the most affected areas.

Additionally, Skinner (2018) emphasized the importance of emergency planning in hospitals, including emergency transportation for staff and patients, which is highly relevant in the context of an earthquake (Skinner, 2018). This highlights that, in emergencies like the one in Lombok, the transportation of healthcare workers and patients is a top priority.

Kunugita, Shimura, Terada, and Yamaguchi (2018) also underscored the importance of public health management in complex disasters that involve significant damage to infrastructure and the environment (Kunugita et al., 2018). This is relevant to the situation in Lombok, where healthcare workers had to adapt to rapidly changing conditions, often without adequate infrastructure.

Brun and Pakenham-Walsh (2018) highlighted the critical role of health information in crisis situations (Brún & Pakenham-Walsh, 2018). In the case of Lombok, this meant providing accurate and timely information to healthcare workers and the general public to manage health and prevent disease spread.

From this case study, it is evident that healthcare professionals play a key role in disaster response, from triage and injury management to disease prevention and health information management.

3.1.3 Further insights: Disaster trends in Spain

Another study examining disasters in Spain from 1950 to 2020 found a significant increase in the frequency of disasters during this period, with a disaster profile that combines natural disasters with technological ones. Climate-related disasters were the most frequent, reflecting a trend similar to that of Europe as a whole (Arcos González et al., 2023).

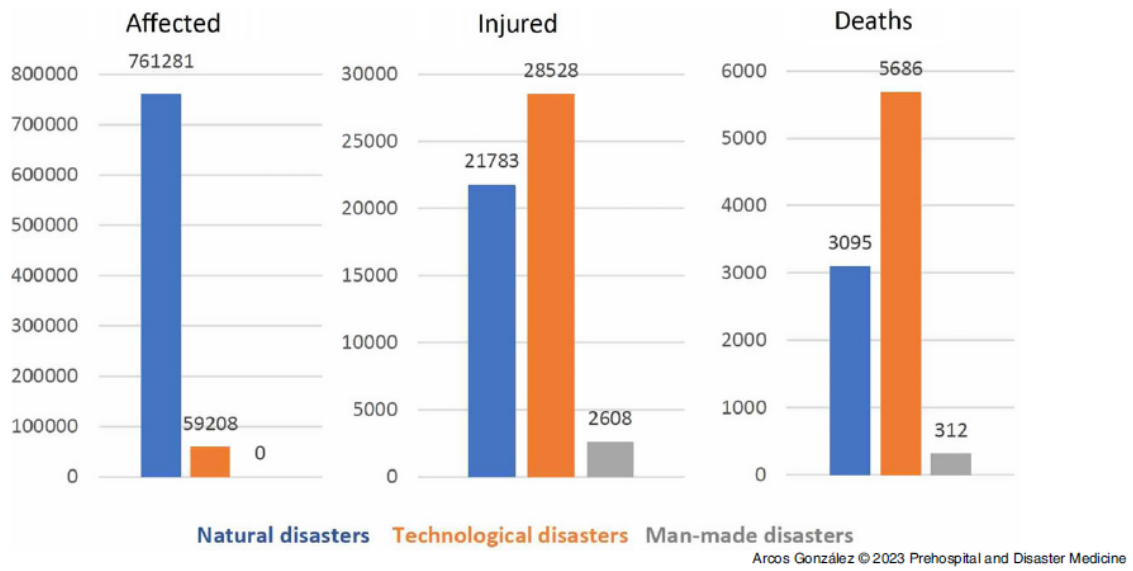

Fig 6. Disaster data Spain
(Acros Gonzalrz, 2023)

Research conducted by Yang et al. (2022) utilized knowledge mapping analysis to evaluate public health emergency management based on the Web of Science, identifying three research periods: exploration, growth, and outbreak periods. This study highlights the evolution from major disease medical and health care to emergency management and emergency risk assessment, and subsequently to research on the COVID-19 pandemic.

Additionally, there is growing concern about the potential for nuclear events, both large-scale and small, as a new challenge in disaster medicine and public health. Recent surveys indicate that 75-80% of respondents worldwide believe that nuclear war is more likely to occur now than in the past, reflecting an increased awareness of nuclear threats despite limited preparation for such events (Dallas, 2022).

3.2 Emergency transition phase

The emergency transition phase in disaster management is the period during which relief efforts shift from immediate response to medium- and long-term recovery measures. This phase involves planning and implementing strategies to restore communities to normal or improved conditions post-disaster. The primary focus of this phase is on infrastructure rehabilitation, economic recovery, and psychosocial support for disaster survivors.

According to Welch, disaster and crisis management involves several distinct phases, including strategic risk assessment, preparedness and planning, effective response, recovery, and post-crisis evaluation. It is crucial for those facing such threats to understand, appreciate, and implement appropriate responses for each phase. Public service organizations, which increasingly take on additional tasks and responsibilities not originally within their scope, must operate in increasingly unstable and chaotic environments (Welch, 2022).

In disaster management, the emergency transition phase requires a different approach compared to the initial emergency response phase. This involves greater coordination among various stakeholders, including government bodies, non-governmental organizations, and local communities, to ensure that the long-term needs of disaster survivors are effectively met.

During the emergency transition phase, mental health management and psychosocial support become critically important. A study by Peppou et al. (2021) underscores the importance of mental health support services during crises, as observed during the COVID-19 pandemic in Greece (Peppou et al., 2021). The mental health of disaster-affected populations is often overlooked, yet the long-term psychological impact can be significant. Psychosocial support not only helps individuals cope with trauma but also builds community resilience against ongoing disaster impacts.

3.2.1Disease outbreak prevention post disaster

The emergency transition phase also involves preventing disease outbreaks following a disaster. According to Raesi et al. (2020), addressing community mental health is a fundamental aspect of crisis management programs during the COVID-19 pandemic in Iran (Raesi et al., 2020). This is relevant in the context of natural disasters, where the risk of disease spread increases due to poor sanitation conditions and crowded refugee settings. Disease outbreak prevention requires effective coordination among healthcare workers, local authorities, and humanitarian organizations to ensure hygiene, vaccination, and public health education.

3.3 Post-disaster phase

The post-disaster phase is a critical stage in disaster management where communities and stakeholders focus on recovery and reconstruction following a disaster. This phase

involves various activities aimed at restoring conditions to normal or even improving them beyond pre-disaster levels.

One of the primary challenges in the post-disaster phase is the rehabilitation of health services and the reconstruction of damaged or destroyed healthcare facilities. This phase requires coordinated and sustained efforts to restore healthcare services and ensure long-term well-being for affected communities.

The 2010 eruption of Mount Merapi in Indonesia serves as a significant example of the post-disaster phase. The eruption caused substantial damage to infrastructure, including healthcare facilities, and affected the physical and mental health of local residents. In addressing this situation, health rehabilitation measures included not only the physical reconstruction of healthcare facilities but also the recovery of health services, including medical care, mental health support, and psychosocial programs. Additionally, long-term recovery strategies and future disaster prevention became critical focuses. This involved evaluating and strengthening the health system to be more resilient to disasters, developing contingency plans, and training communities and healthcare workers in disaster preparedness. This approach aims to reduce vulnerability and enhance community resilience to future disasters. In the case of the Mount Merapi eruption, recovery efforts included cooperation among the government, non-governmental organizations, and the community. This included rebuilding healthcare facilities, public health education programs, and initiatives to increase disaster awareness and preparedness among local residents.

4. Conclusions

Public health professionals are crucial throughout disaster management, providing direct health services, coordinating efforts, and engaging in planning and education. They manage urgent health needs, injuries, and disease prevention in the emergency response phase. During the transition phase, they focus on mental health, psychosocial support, and disease outbreak prevention. In the post-disaster phase, they handle health rehabilitation, facility reconstruction, and long-term recovery planning.

Recommendations for improving disaster management include: strengthening training and capacity, integrating public health professionals into disaster planning, developing standard protocols, fostering cross-sector collaboration, leveraging technology, and ensuring adequate funding and resources.

Author Contribution

All author contributed fully to the writing of this article.

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The author declare no conflict of interest.

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