

## Improving knowledge of antemortem dental records through community empowerment programs in disaster-prone areas of Indonesia

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### Abstract

**Background:** Indonesia is situated in the ring of fire area, which is vulnerable to natural disasters. Data from the National Board of Disaster Management (BNPB) revealed that 4650 disasters occurred in Indonesia in 2020, killing over 350 people.

**Aim and Objectives:** The current study was conducted as part of a community empowerment program in a disaster-prone area of Indonesia. This study aimed to assess the community's understanding of the importance of dental records as antemortem data and disaster mitigation awareness.

**Materials and Methods:** A series of lectures, counseling, and training on the management of antemortem dental records and disaster knowledge were delivered to 58 community health promoters (18 males and 40 females; ages 24–57) from the disaster-prone area. Pre-test and post-test questionnaires were used to evaluate participants' knowledge of disaster preparedness, antemortem data, and dental records.

**Results:** This study found that participants with a high school education had the highest average pre-test questionnaire score (78.5/100), while those with a bachelor's degree had the highest average post-test questionnaire score (91.0/100). An improvement in the post-test scores was obtained by 55.2% of participants. However, 17.2% of the participants' post-test scores were lower than their pre-test scores. The Wilcoxon Signed Ranks Test revealed that post-test scores increased significantly when compared to pre-test scores ( $p < 0.05$ ).

**Conclusion:** The present study suggests that the community empowerment program positively impacts community awareness of the antemortem dental records data and disaster preparedness in disaster-prone areas.

**Keywords:** Antemortem data; Community health; Disaster preparedness; Human identification; Human rights; Legal identity

### 1. Introduction

Indonesia is situated in the Circum-Pacific Belt, which features numerous active volcanoes and frequent earthquakes. According to data from Indonesia's National Board of Disaster Management (BNPB), 4650 disasters occurred in 2020, killing over 350 people [1]. Because of these circumstances, Indonesia has earned the moniker "Supermarket of Disaster," implying that natural disasters are inextricably linked to Indonesian culture and society [2]. A massive landslide disaster struck Banaran village in the Ponorogo region of Indonesia in April 2017, killing approximately 27

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people and forcing more than 175 people to evacuate. Many factors, including geomorphological aspects, rain characteristics, and human errors, are predicted to be the causes of the Ponorogo landslide [3–5].

In response to societal realities, the Department of Forensic Odontology Faculty of Dental Medicine Universitas Airlangga organized a community empowerment program to raise public awareness of disaster preparedness and the importance of antemortem data, particularly dental records. This program was a pilot project carried out in the disaster-prone area of Banaran village, Ponorogo, Indonesia. In addition to the main goal of the community empowerment program, the community's understanding of the importance of dental records as antemortem data and disaster preparedness was assessed.

## 2. Materials and Methods

The current study was conducted as part of the community empowerment program of the Department of Forensic Odontology, Faculty of Dental Medicine, Universitas Airlangga. The ethical clearance approval was obtained from the Health Research Ethical Clearance Commission, Faculty of Dental Medicine, Universitas Airlangga (number: 410/HRECC.FODM/IX/2020). This study involved 58 community health promoters (CHP) from Banaran village, Ponorogo, Indonesia, who voluntarily participated in this study. The participants of the present study were limited because this community empowerment program was performed during the coronavirus disease 2019 (COVID-19) pandemic. This program was carried out under strict health protocols.

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**DATA PRIBADI**  
(personal data)

Photo 4x6 cm

**Nama Lengkap** (full name): \_\_\_\_\_

**Jenis Kelamin** (sex):  L (M) /  P (F)

**Tempat Lahir** (place of birth): \_\_\_\_\_

**Tanggal Lahir** (date of birth): \_\_\_\_\_

**Agama** (religion): \_\_\_\_\_

**Suku bangsa/ etnis** (tribe/ ethnicity): \_\_\_\_\_

**No. KTP/ SIM/ Passport** (ID card number): \_\_\_\_\_

**Alamat lengkap** (full address): \_\_\_\_\_

**No. Telp** (telephone number): \_\_\_\_\_

**Tanda tangan** (signature)

Rekam Identifikasi Pribadi (Personal Identification Records) | 3

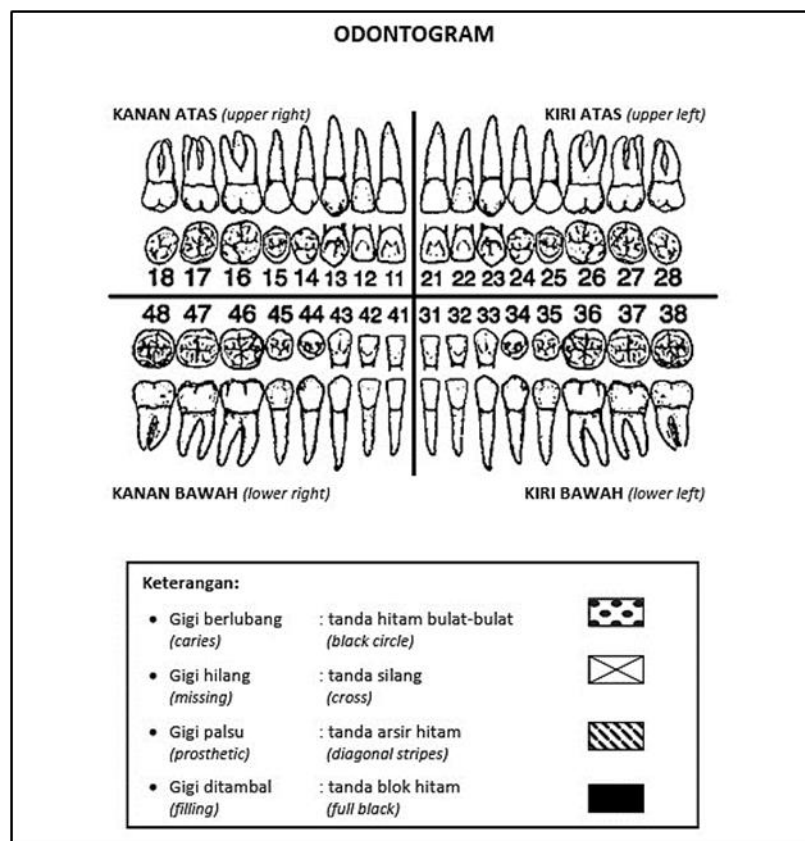
**Figure 1** Personal Identification Record (PIR) pocketbook for the antemortem data collection in disaster-prone area

This community empowerment program was divided into four sessions: a pre-test, a lecture series, a training session, and a post-test. An online pre-test questionnaire (using Google form) was used to determine whether participants understood the questions as well as if they were familiar with disaster preparedness, antemortem data, and dental records. The second session included a lecture series on disaster preparedness, antemortem data management, and the importance of dental records. Following the second session, was socialization and training on *Personal Identification Records (PIR)*. *Personal Identification Records* is a pocketbook for antemortem data collection created by the Department of Forensic Odontology, Faculty of Dental Medicine, Universitas Airlangga (Figure 1). Each participant received two copies of the PIR for personal documentation and a database in the Community Healthcare Center (Puskesmas). The participants were trained on how to properly inspect their teeth and fill out the PIR, which included fingerprints, pedigree, and dental records with a simple code for tooth condition (Figure 2).

At the end of the session, participants were given an online post-test questionnaire to evaluate the impact of the lecture and training program. The pre-test and post-test questionnaires were divided into three sections as follows: (1) disaster knowledge; (2) antemortem data; and (3) dental records. Microsoft® Excel® 2019 and IBM® SPSS® Statistics version 25 were used to tabulate and analyze the questionnaire results.

### 3. Results and Discussion

This study involved 58 CHP participants (18 males and 40 females, ages 24–57), with education levels ranging from elementary school to bachelor's degrees (Table 1). The pretest questionnaire results revealed that participants with a high school education had the highest average score (78.5/100). On the other hand, the post-test questionnaire results showed that participants with a bachelor's degree had a significant score increase, with a 91.0/100. The pre-test questionnaire had an overall average score of  $77.41 \pm 11.7$ , while the post-test questionnaire had an average score of  $83.79 \pm 12.0$ .



**Figure 1** Simple odontogram and dental code in the Personal Identification Record

Based on the post-test questionnaire (Table 2) section 1, 96% of respondents knew about the description of the *ring of fire area*, 88% of respondents knew about the vulnerable area of landslides, 94% of respondents knew the causes and signs of landslides, and 90% of respondents understood how to minimize the landslide risks. Based on the questionnaire section 2, more than 90% of respondents understood the definition, identification purpose, and antemortem data types. Section 3 of the questionnaire reveals that all respondents knew that human dentition is important for individual identification. Furthermore, 96% of respondents understood the advantage of teeth as the primary identifier. More than 88% of respondents knew the importance of dental medical records for human identification.

The *Wilcoxon Signed Ranks Test* revealed a significant increase in post-test scores compared to pre-test scores ( $p < 0.05$ ). Thirty-two participants (55.2%) out of 58 had an increasing post-test score. However, 10 participants (17.2%) had a decreasing post-test score (Table 1).

**Table 1** Descriptive analysis of the respondents based on sex, education level, pre-test score, post-test score, and the result of the Wilcoxon Signed Ranks Test

Sex	N	Based on Education Level					Score Ranks			Sig.
		Education Level	N	%	Pretest score	Posttest score	Ranks	N	%	
Male	18	ES	4	6.9%	77.5	82.5	A	32	55.2%	<i>p</i> <0.05*
Female	40	JHS	10	17.2%	78.0	87.0	B	16	27.6%	
		HS	34	58.7%	78.5	80.9	C	10	17.2%	
		BD	10	17.2%	73.0	91.0				
Total	58		58	100%	77.41±11.7	83.79±12.0		58	100%	

ES= elementary school; JHS= junior high school; HS= high school; BD= bachelor degree; \*denotes a significant difference; Rank description: A: Post-test > pre-test; B: Post-test = pre-test; C=Post-test < pre-test

**Table 2** The post-test questionnaire to evaluate the participant's knowledge after a lecture and training about disaster preparedness, antemortem data, and the importance of dental records

Section 1: The knowledge of disaster		
Question	Answer	% Response
Which areas are vulnerable to landslides?	Mountains	8.00 %
	Hills	1.00 %
	Steep slopes	3.00 %
	Sloping plantation land	0.00 %
	All answers are correct	88.00 %
What factors contribute to landslides?	Heavy rainfall	0.00 %
	Deforestation	3.00 %
	Steep slopes	3.00 %
	Earthquakes	0.00 %
	All answers are correct	94.00 %
What are the warning signs of landslides?	There are cracks on the slopes	6.00 %
	The puddle of water after the rain	0.00 %
	The emergence of a new spring	0.00 %
	Low tide	0.00 %
	All answers are correct	94.00 %
What can we do to reduce the likelihood of landslides?	Cutting down trees	0.00 %
	Make terraces in the farm fields	90.00 %
	Make farm field under the slopes	0.00 %
	Digging holes	0.00 %
	All answers are correct	10.00 %
Ring of fire refers to areas with a high number of:	Mainland	4.00 %
	Ocean	0.00 %
	Volcanoes	96.00 %
	Forest	0.00 %
	Rivers	0.00 %
Section 2: The knowledge of the importance of antemortem data		

The procedure for revealing a person's identity is known as:	Reconciliation Identification Authorization Interpretation Validation	6.00 % 94.00 % 0.00 % 0.00 % 0.00 %
What is the antemortem data?	Data of a person during his/her life Data of a person after death Data of a person stored in the hospital Data obtained from a dentist Data obtained by a doctor	90.00 % 3.00 % 2.00 % 2.00 % 3.00 %
Antemortem data can be obtained from the following sources:	Fingerprints Teeth DNA Medical records All answers are correct	0.00 % 4.00 % 0.00 % 0.00 % 96.00 %
<b>Section 3: The importance of dental records for identification</b>		
Individual identification can be accomplished through the use of teeth and orofacial conditions	Yes No	100.00 % 0.00 %
Teeth can be used for individual identification because:	The strongest tissue in the human body The individuality and uniqueness Does not undergo decomposition All answers are correct All answers are wrong	4.00 % 0.00 % 0.00 % 96.00 % 0.00 %
Dental medical records can be used for identification as:	Postmortem data Antemortem data Information about the disease history Information about the treatments All answers are correct	12.00 % 6.00 % 4.00 % 0.00 % 88.00 %
What should be included in the dental medical records?	Odontogram Information about the dentist Postmortem data Antemortem data Family identity	90.00 % 4.00 % 3.00 % 0.00 % 3.00 %

A disaster is defined as a major vulnerability in the function of a community that impacts human, material, economic, or environmental losses [6]. The geology and geographic location of Indonesia make the entire region vulnerable to natural disasters, such as earthquakes, tsunamis, landslides, and volcanic eruptions [7]. As a result, appropriate disaster management strategies involving the cooperation and collaboration of the government, educational institutions, and the community are needed. Disaster management involves policy development, disaster prevention, emergency response, and rehabilitation (Figure 3). The primary goals of disaster management are to protect communities, harmonize regulations, ensure disaster management implementation, encourage cooperation, and create peace in society and the nation [8].

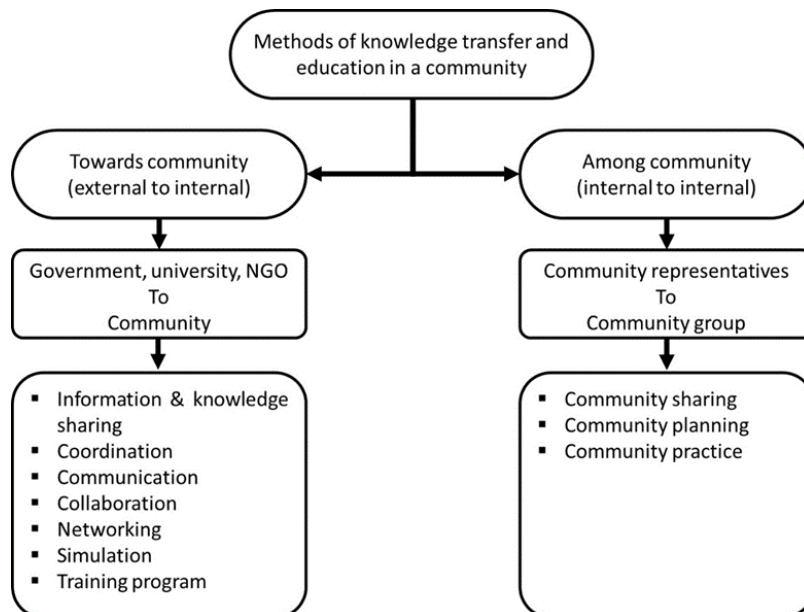
In a mass disaster situation, forensic identification is critical for establishing a victim's identity. The Interpol Disaster Victim Identification (DVI) Guide classifies DNA, fingerprints, and dental examination as the primary and most reliable means of identification. There are also secondary methods of identification, such as personal description, medical

findings, evidence, and clothing recovered from the body [9–11]. Teeth are considered primary identifiers because of their uniqueness, individuality, and durability [12–15]. The scientific basis of forensic dental identification is the comparison of the antemortem (AM) and postmortem (PM) dental findings. AM dental records being available from dentists, hospitals, and community health care centers. In several situations, information from family or relatives, dental technicians, and written evidence of the oral condition may be helpful to construct a dental AM record [9, 16, 17].



**Figure 3** Disaster management involves policy development, disaster prevention, emergency response, and rehabilitation.

Every country has its regulations for managing and documenting dental records as antemortem data [18]. The Indonesian Ministry of Health has established a national standard for dental medical records. According to the national guideline, dental records in Indonesia must include information about the patient’s identity, odontogram, diagnosis and treatment, and complimentary attachment. However, previous studies indicate that good dental records are implemented at a lower level in Indonesia. Some institutions in Indonesia, such as the Indonesian National Armed Forces (TNI), police, pilots, and flight attendants, can provide good-quality dental records as antemortem data. However, most Indonesians in rural areas are unaware of the importance of routine dental check-ups and treatments [19, 20]. This condition has the potential to complicate the process of identifying victims of mass disasters due to the lack of antemortem dental data.



**Figure 4** Knowledge transfer method about disaster preparedness to the community in disaster-prone area

The present study was conducted as part of the community empowerment program by the Department of Forensic Odontology, Faculty of Dental Medicine, Universitas Airlangga. The main goal of this program is to improve community awareness about the importance of dental records as antemortem data and disaster preparedness. A series of lectures, counseling, and training programs were delivered to the CHP in a disaster-prone area. Education through community representatives is considered to be an effective method during the COVID-19 pandemic situation. The important roles of the CHP are educating, delivering information, and coordinating the small group of a community. The CHP as representatives of a small group community is responsible for conveying information about disaster mitigation and antemortem data management to their community group (Figure 4) [4].

Focusing on teeth as primary identifiers, the participants of this program are trained to perform a simple dental recording using PIR. PIR is intended to be an alternative database for storing various information such as fingerprints, dental records, medical findings, personal characteristics, and pedigree. A simple dental record is important for people who live in disaster-prone areas. Even if they have never been to the dentist, it is expected that they will have a simple dental record in their PIR. This pocketbook is designed in a bilingual version to ensure that the information stored is understood by the forensic team in Indonesia as well as the forensic team worldwide. Two methods are commonly used for dental identification. The first step is to examine the suspected person's dental records and look for similar dental characteristics in the deceased person. If no previous dental records are available, the second method entails conducting a PM dental profiling, which will provide clues to narrow the search for the AM evidence required to identify the deceased person [21].

This community empowerment program also aims to assist people in becoming more self-reliant in their ideas and actions. Community independence is characterized by cognitive, conative, psychomotor, and emotional capacities, as well as control over community-owned resources [22]. Therefore, active community participation, community healthcare centers, and government coordination in disseminating disaster preparedness information and education are critical components of disaster risk reduction. The present study found that the participants had effectively absorbed the information from a lecture, training, and counseling series. Hence, it is critical to developing a structured curriculum of antemortem data management and disaster preparedness programs to strengthen the community's capacity in disaster-prone areas.

Disaster mitigation is a set of actions to reduce the risk of disaster through physical development, increased awareness, and capacity building to deal with both physical and non-physical threats [23]. Effective mitigation and community awareness can reduce disaster-related material and immaterial losses. According to Nursa'ban *et al.* 2010, structural and non-structural approaches are needed in disaster prevention. Structural approaches are efforts to reduce disaster risks through the physical development and technical engineering of disaster-resistant structures. Non-structural approaches to disaster prevention include non-physical development, such as community empowerment, institutional strengthening, awareness, and governmental policies [24]. Non-structural approaches to disaster mitigation are thought to be more sustainable because they involve community and government participation. Following the 2017 landslide, attention was drawn to the need to strengthen the community's disaster capacity in Banaran village, as a result of assessing the devastating impact of the landslide. The past disaster raises community awareness about the importance of disaster preparedness knowledge. Therefore, several people in Banaran village were actively searching for disaster-related information from mass media, social media, and the internet [25].

#### *Abbreviation*

AM= Antemortem

BNPB= Badan Nasional Penanggulangan Bencana/ *National Board of Disaster Management*

CHP= Community Health Promoter

DVI= Disaster Victim Identification

PIR= Personal Identification Records

PM= Postmortem

TNI= Tentara Nasional Indonesia/ *Indonesian National Armed Force*

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#### **4. Conclusions**

The present study suggests that the community empowerment program involving a lecture series, counseling, and training on disaster preparedness positively impacts the community in disaster-prone areas. It is also critical to develop a structured curriculum for antemortem data management and disaster preparedness to improve the community's capacity. Therefore, effective collaboration between educational institutions, community healthcare centers, and the government is urgently needed to reduce the disaster risk in Indonesia.

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## Compliance with ethical standards

### *Acknowledgments*

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### *Disclosure of conflict of interest*

The authors declare that they have no competing interests.

### *Statement of ethical approval*

This study was approved by the Health Research Ethical Clearance Commission Faculty of Dental Medicine Universitas Airlangga (number: 410/HRECC.FODM/IX/2020)

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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