

## Systematic Review

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# Oral Health Interventions in Natural Disasters: A Scoping Review

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## Abstract

**Objectives:** This work aimed to identify, appraise, and summarize existing knowledge about oral health interventions in the context of natural disasters and verify the main research gaps.

**Methods:** We searched in PubMed (National Library of Medicine, Maryland, USA), EMBASE (Elsevier, Amsterdam, Netherlands) and Epistemonikos (Epistemonikos Foundation, Santiago, Chile) until 2021 for primary studies and systematic reviews, assessing any oral health intervention in the context of natural disasters. The interventions were classified according to Cochrane Effective Practice and Organization of Care (EPOC) categories, and the type of natural disaster was defined according to the classification by the Centre for Research on the Epidemiology of Disasters (CRED).

**Results:** We assessed a total of 19 studies (majorly in Japan, n = 8), all performed in the context of an earthquake or mixed natural disasters (earthquake and tsunami). Regarding interventions, 12 studies reported a promotional/ preventive intervention, with oral examination being the most frequent. 7 studies reported therapeutic interventions, mainly related to emergency management of fractures and injuries.

**Conclusions:** The evidence accessed in our study was limited, highlighting the need for further research to focus on different oral health care interventions and outcomes in the context of different natural disasters, thus enhancing the formulation and implementation of recommendations and protocols worldwide.

## Introduction

A significant public health problem, oral diseases and conditions burden billions of people with a negative impact on their quality of life.<sup>1,2</sup> Individuals who suffer oral diseases and conditions are at risk of pain, tooth loss, and masticatory dysfunction, thereby affecting their nutrition, quality of life, and self-esteem.<sup>3–6</sup>

Several contextual factors may influence oral health care services. Among these, natural disasters (ND) are unpredictable events produced by nature, which are outside human control. They may cause loss of life, other health impacts, property damage, and loss of livelihoods and services.<sup>7–9</sup> This disruption of the normal functioning of the community generally provokes an alteration of the normal habits of the population, such as hygiene, shelter, and proper nutrition, and it is common to have major structural losses in homes, workplaces, and health centers.<sup>10–12</sup> This context can trigger a significant impact on lives and health,<sup>13,14</sup> as well as deterioration of oral health in the population, with an over-demand for health services and a shortage of oral health care.<sup>15</sup>

In the context of natural disasters, dental professionals form an integral part of the health care community through different roles. They help with oral health promotion in shelters, temporary housing, and disaster recovery public housing; they also provide airway management, general first aid, surgical assistance, and cavity-prevention efforts for disaster-affected children; as well as prevent disaster-related death by aspiration pneumonia, and ultimately, help to identify corpses by tooth and dental treatment information.<sup>15–19</sup>

To appropriately fulfill these roles, all members of the dental office staff should be trained to promptly recognize and efficiently manage emergencies.<sup>20</sup> Preparedness requires that many areas should be addressed: risk analysis, prevention and surveillance planning, response efforts,

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as well as training, storing additional equipment and supplies, and increasing the medical/ dental manpower available to meet the demands of these events. A surge capacity must be built by drawing on, and training other professionals to complement the traditional medical and public health workforce.<sup>21</sup> Dentists, with their health training and clinical skills, are an ideal group of professionals with these requirements for a standby public health/ medical group in the context of natural disasters.<sup>17,21</sup>

However, our understanding and knowledge of oral diseases and dental care reality during a natural disaster is still incomplete. This study therefore aims to identify, appraise, as well as summarize existing knowledge about oral health interventions in the context of natural disasters, and verify the main research gaps.

## Methods

We performed a scoping review with the aim to describe and map the current available literature regarding oral health care interventions in the context of natural disasters. This article adheres to PRISMA-ScR guidelines.<sup>22</sup>

### Eligibility criteria

We based our eligibility criteria based on the PICO (Population, Phenomena of Interest, Context) framework.

### Population

We considered as eligible any population receiving an oral health intervention in a natural disaster context. We did not restrict by age, geographic location, or any other variable.

### Phenomena of interest

Our areas of interest were oral health interventions, defined as any promotional, preventive, or therapeutic intervention comprehending oral health, made by any health worker, with or without other co-interventions. We excluded forensic studies.

### Context

We considered oral health interventions in the context of natural disasters; defined as any catastrophic event linked to geophysical, hydrological, meteorological, or climatological natural hazards, according to a prespecified framework.<sup>12,23</sup> These include widespread fires, floods, storms, earthquakes, and drought, among others, with the potential of causing significant damage. We excluded biological and extra-terrestrial natural hazards, as well as non-natural hazards.

### Study design

We considered eligible primary studies (descriptive, observational, or experimental designs) with at least 10 patients receiving an oral health intervention, or systematic reviews. We excluded case reports, case series, non-systematic reviews, and clinical guidelines. We included only studies published in peer-review journals in English, Spanish, or Japanese. We did not apply any publication date restriction.

### Search methods for identification of studies

We searched PubMed (National Library of Medicine, Maryland, USA), EMBASE (Elsevier, Amsterdam, Netherlands) and Epistemonikos (Epistemonikos Foundation, Santiago, Chile) from

inception until February 2021. Appendix 1 provides the full search strategy. We also asked experts in the field for relevant studies. We conducted a forward and backward citation-chasing strategy, starting from the included studies.<sup>24–42</sup>

### Selection of studies

2 authors (among KS-B, AT, JS-Ch) performed an independent title and abstract screening of the results obtained from the search, solving any discrepancy by consensus. Also, 2 reviewers (among KS-B, AT, JS-Ch) screened studies in full-text, solving any discrepancy by consensus. For the screening process, we used Covidence.

### Data extraction

1 of the authors extracted the following data from each included study using a previously piloted data extraction sheet: methodological design, year, country and population, as well as type of natural disaster, and type of interventions, according to predefined criteria.<sup>12,23,43</sup> A second author cross-checked this process. Appendix 2 provides the data extraction sheet.

### Data management and synthesis

We narratively described all the included studies in terms of their included population, type of intervention, and natural disaster context. We created matrices of evidence as grids. The rows corresponded with the type of natural disaster according to the following classification defined by the Centre for Research on the Epidemiology of Disasters (CRED)<sup>12,23</sup>:

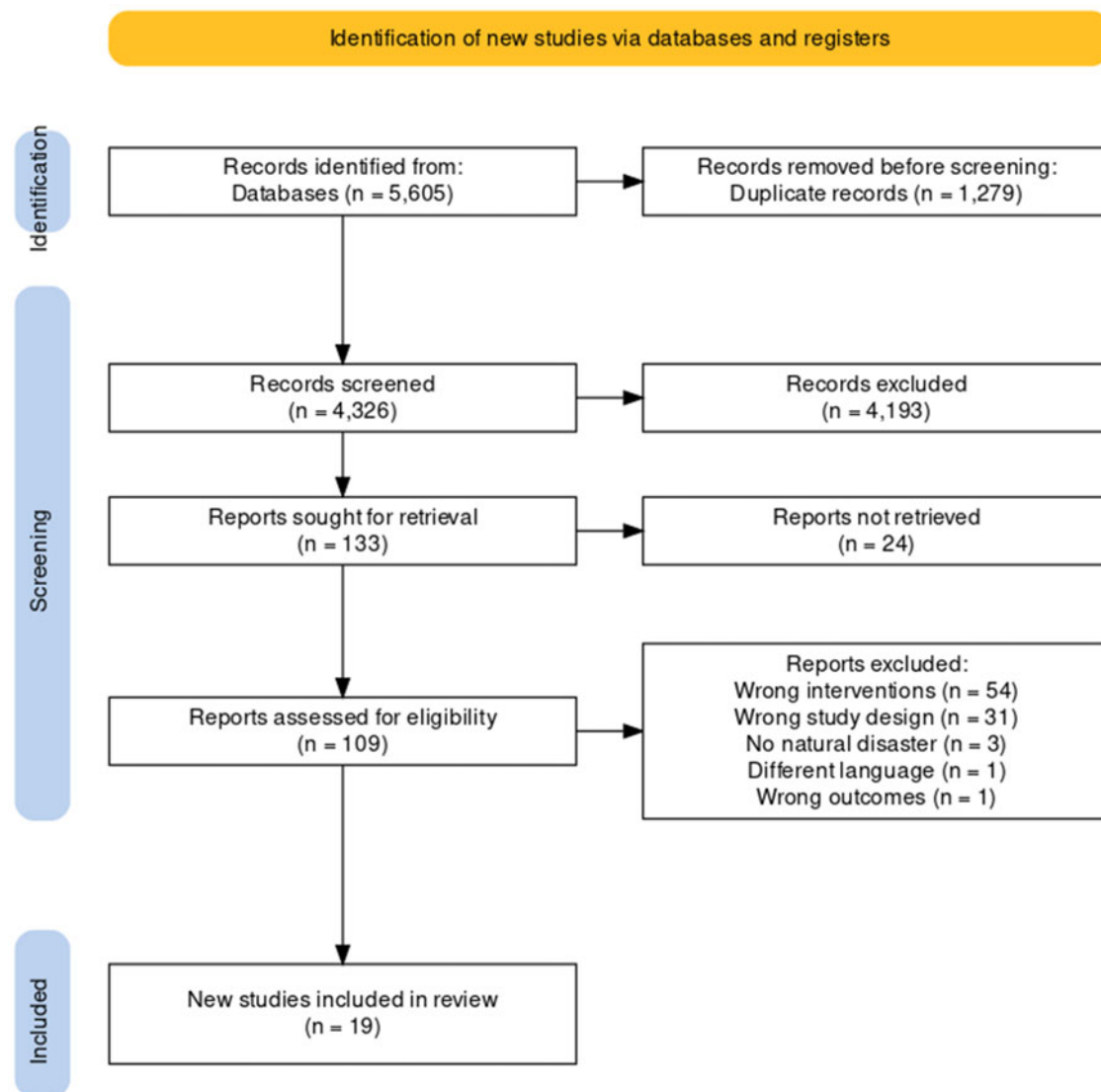
- **Geophysical:** Hazard caused by solid earth. Examples: earthquake; mass movement (dry); volcanic activity.
- **Hydrological:** Hazard caused by occurrence, movement, or distribution of water. Examples: flood; landslide; wave action.
- **Meteorological:** Hazard produced by short-term extreme weather and atmospheric conditions. Examples: extreme temperature; fog; storm.
- **Climatological:** A hazard originating from a long-term, macro-scale atmospheric process. Examples: drought; glacial lake outburst; wildfire.

The columns contained the interventions classified according to Cochrane EPOC's categories.<sup>43</sup> Appendix 3 provides EPOC categories.

## Results

Our initial search strategy yielded a total of 5605 references. After title and abstract screening, we assessed a total of 109 studies by full text. We excluded 90 references for the following reasons: wrong interventions ( $n = 54$ ), wrong study design ( $n = 31$ ), no natural disaster ( $n = 3$ ), different language ( $n = 1$ ), and wrong outcomes ( $n = 1$ ). Appendix 4 provides the list of the excluded studies with reasons. A total of 19 studies met our eligibility criteria and were included in the scoping review<sup>24–42</sup> (Figure 1).

Most of the included studies ( $n = 8$ ) were conducted in Japan.<sup>29,32,33,35,39–42</sup> 6 studies were conducted in China,<sup>26,30,31,34,36,37</sup> 2 in Pakistan,<sup>24,28</sup> 1 in Haiti,<sup>25</sup> as well as 1 in Nepal,<sup>38</sup> and another 1 in Japan and Haiti.<sup>27</sup> The studies were performed in the context of an earthquake ( $n = 10$ ) or mixed natural disasters ( $n = 9$ ) (earthquake and tsunami: Great East Japan Earthquake of 2011) (Table 1).



**Figure 1.** PRISMA flowchart.

Regarding specific interventions, 12 studies reported a promotional/ preventive intervention, mainly referring to clinical oral examinations performed after the natural disaster.<sup>26,27,29,32,33,35,37–42</sup> Moreover, 7 studies reported therapeutic interventions, and mostly, emergency management of fractures and injuries was performed (Table 1).<sup>24,25,28,30,31,34,36</sup> According to the EPOC taxonomy, we considered by consensus that natural disasters implied a change to the healthcare environment; for this reason, all the included studies fall into this category. Thus, the set of reported interventions was grouped mainly in the category of ‘coordination of care and management of care processes’ and ‘how and when the care is delivered’ (Table 2). Table 3 provides the matrix of evidence concerning the type of natural disaster and EPOC taxonomy.

As a *post-hoc* analysis, we also considered studies describing oral health status among people in the context of a natural disaster, without reporting a specific intervention. We found 5 studies,<sup>44–48</sup> of which the reported outcomes were maxillofacial injuries, tooth loss, periodontal diseases, and temporomandibular disorders. Overall, most studies found that the changes caused by an earthquake such as deteriorating socioeconomic circumstances (for

example, housing damage or temporary housing) appeared to impair oral health care practice, oral hygiene habits, and nutritional intake, among others. Appendix 5 provides an overall description of these studies.

## Discussion

Our scoping review identified 19 studies with providing an oral intervention in the context of a natural disaster. All of them were performed in the context of an earthquake or mixed natural disasters (earthquake and tsunami) and most of the included studies (n = 8) were conducted in Japan, with oral examination as the intervention most reported. It is important to note that there were only 5 countries included (Japan, China, Pakistan, Nepal, and Haiti), and the types of natural disasters researched were only earthquakes, and earthquakes followed by tsunamis. According to this, there is a critical evidence gap regarding the context of the studies with the absence of other types of natural disasters in other countries.

**Table 1.** Matrix of evidence and general characteristics of included studies

First Author	Year	Title	Country	Population studied	Number of Participants	Type of Natural Disaster	Specify Natural Disaster	Type of Intervention	Specific type of intervention	Duration
Abbas Iram	2013	Presentation of maxillofacial injuries in the 2005 earthquake victims	Pakistan	2 - 70 years old (patients)	378 patients	Geophysical	Earthquake	Therapeutic	Initial emergency management, stabilization, clinical and x - ray examination, fracture management	From October 8, 2005, to January 8, 2010. 3 months after earthquake.
DeGenaro	2012	Accelerating surgical training and reducing the burden of surgical disease in Haiti before and after the earthquake	Haiti	18 years or older (medical surgeons)	12 - 14 physicians	Geophysical	Earthquake	Therapeutic	Surgical procedures (cleft lip repair, cleft palate repair, facial tumor resection, tongue procedures)	From 2004 to 2011
Guo	2011	Analysis of maxillofacial injuries caused by the 2010 Yushu earthquake in China	China	3 - 75 years old	126 patients	Geophysical	Earthquake	Promotional/preventive intervention	Physical examinations	From April 16 to April 19, 2010
Hosokawa	2012	Roles of dentists and dental hygienists in 2 major Earthquakes	Haiti Japan	Children and elderly people	Haiti (120 children) Japan Children and elderly people	Geophysical Mixed	Earthquake Earthquake + tsunami	Promotional/preventive intervention	Education, delivery of oral health products, examination, fluoride gel application and oral cleaning	Haiti: 10 months after 2010 earthquake. Japan: immediately after 2011 earthquake and 2 months after tsunami
Karim	2009	Caries prevalence in Chikar, Kashmir, post - earthquake: implications for service provision	Pakistan	5 - 20 years old	311 school children	Geophysical	Earthquake	Therapeutic	Clinical oral examinations, assessing previous treatments by dental technician	Not clearly specified
Kishi	2015	Oral health - related quality of life and related factors among residents in a disaster area of the Great East Japan Earthquake and giant tsunami	Japan	18 years or older	1987 residents (survivors in Otsuchi)	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Clinical oral examination	From December 8 to December 22, 2011
Li ( <i>Dental Traumatol</i> )	2010	Analysis of maxillofacial fracture victims in the Wenchuan earthquake and Yushu earthquake	China	0 - 90 years old (survivors)	419 (Wenchuan) + 46 (Yushu)	Geophysical	Earthquake	Therapeutic	Clinical and x - ray examination, fracture management	Not clearly specified
Li ( <i>J Trauma</i> )	2010	Maxillofacial Injuries in the Wenchuan Earthquake	China	0 - 100 years old (survivors)	419 (Wenchuan)	Geophysical	Earthquake	Therapeutic	Clinical and x - ray examination, fracture, and infection management	1.5 years after earthquake
Liu	2010	Periodontitis in 65 - 74 - year - old victims in Wenchuan, China post-earthquake: implications for service provision	China	65 - 74 years old	1495 patients (earthquake survivors)	Geophysical	Earthquake	Promotional/preventive intervention	Relocation from home. Clinical oral examination	From April 1 to May 30, 2009

Table 1. (Continued)

Matsuyama	2018	Copayment exemption policy and healthcare utilization after the Great East Japan earthquake	Japan	0 - 74 years old	People living in Miyagi Prefecture	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Copayment exemption	Not clearly specified
Rokaya	2017	A Survey on oral health and practice of Nepalese in areas affected by earthquake in 2015	Nepal	16 - 80 years old	500 subjects living in transitional shelters	Geophysical	Earthquake	Promotional/preventive intervention	Relocation from home. Clinical oral examination	From September to December 2015
Sato	2015	Impact of loss of removable dentures on oral health after the Great East Japan earthquake: a retrospective cohort study	Japan	18 years old or older	715 individuals with 1 or more removable dentures before the disaster	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Clinical oral examination	9 - week period between June and August 2011
Sato	2017	Prevalence of <i>Candida albicans</i> and <i>non-albicans</i> on the tongue dorsa of elderly people living in a post - disaster area: a cross - sectional survey	Japan	60 years old or older	266 community dwellers	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Relocation from home. Clinical oral examination	During 2014
Tang	2009	Analysis of 46 maxillofacial fracture victims in the 2008 Wenchuan, China earthquake	China	7 - 66 years old	46 patients	Geophysical	Earthquake	Therapeutic	Clinical examination, fracture management	From May 12 to July 23, 2008
Tsuboi	2020	Design and progress of oral health examinations in the Tohoku medical megabank project	Japan	Children 5 - 16 years old and adults between 20 - 90 years old	32185 participants	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Clinical oral examination, oral plaque, and saliva sampling	October 28, 2013, to June 30, 2017
Tsuboyama - Kasaoka	2017	Analysis of an oral health report from dietitians dispatched to the areas affected by the Great East Japan Earthquake	Japan	Babies and Adults (age not specified)	195 support dietitians that assessed patients in shelters in Kesennuma, Ishinomaki, and Tono cities.	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Education, dysphagia and nutritional support, and follow up	Not clearly specified
Tsuchiya (Community Dent Oral Epi)	2019	High prevalence of toothache among Great East Japan earthquake survivors living in temporary housing	Japan	18 years or older	2398 (1102 men and 1296 women) survivors	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Relocation from home. Clinical oral examination	From June 2011 to February 2015
Wang	2009	Dentists' role in treating facial injuries sustained in the 2008 earthquake in China; how dental professionals can contribute to emergency response	China	Children 14 years or younger and adults	4582 patients with earthquake related trauma	Geophysical	Earthquake	Therapeutic	Clinical examination, fracture management	From May 12 to May 25, 2008
Yamamoto	2013	'Let me check your mouth'- The way to open ones' heart. The 3.11 Great East Japan Earthquake, oral health support program in Minami Sanriku - cho, Miyagi Prefecture	Japan	0 to 64 years old	427 people (155 men, 272 woman)	Mixed	Earthquake + tsunami	Promotional/preventive intervention	Oral screening of survivors and education	From January to July 2012

**Table 2.** Classification of each intervention according to the EPOC taxonomy

Study ID	EPOC taxonomy									
First author	How and when care is delivered	Where care is provided and changes to the healthcare environment		Who provides care and how the healthcare force is managed		Coordination of care and management of care processes	Information and communication technologies	Collection of funds	Insurance schemes	Mechanisms for the payment of health services
Abbas Iram		1								
DeGenaro	1	1				1	1			
Guo		1								
Hosokawa	1	1								
Karim	1	1								
Kishi	1	1								
Li ( <i>Dental Traumatology</i> )		1								
Li ( <i>Journal of Trauma</i> )		1								
Liu		1								
Matsuyama		1								1
Rokaya		1								
Sato		1				1				
Sato		1				1				
Tang		1								
Tsuboi		1				1				
Tsuboyama-Kasaoka		1				1				
Tsuchiya ( <i>Community Dent Oral Epi</i> )		1								
Wang		1								
Yamamoto		1				1				
Study ID	EPOC taxonomy									
First author	Targeted financial incentives for health professionals and healthcare organizations	Authority and accountability for health policies	Authority and accountability for organizations	Authority and accountability for commercial products	Authority and accountability for health professionals	Interventions targeted at healthcare organizations	Interventions targeted at healthcare workers	Interventions targeted at specific types of practice, conditions, or settings	Comments	
Abbas Iram									Environment	
DeGenaro			1				1		Coordination of care diff provider; environment; outreach services; size of organizations; teams; health information systems; multi-institutional arrangements; Educational outreach visits or academic detailing	
Guo									Environment	

Table 2. (Continued)

Hosokawa			Coordination of care diff provider; environment; outreach services; site of service delivery
Karim			Coordination of care diff provider; environment; outreach services; site of service delivery
Kishi			Coordination of care diff provider; environment; outreach services; site of service delivery
Li ( <i>Dental Traumatology</i> )			Environment
Li ( <i>Journal of Trauma</i> )			Environment
Liu			Environment; outreach services; site of service delivery
Matsuyama			Environment; method of paying healthcare organizations
Rokaya			Environment; outreach services; site of service delivery
Sato			Environment; outreach services; site of service delivery; comprehensive geriatric assessment
Sato			Environment; outreach services; site of service delivery; comprehensive geriatric assessment
Tang			Environment
Tsuboi	1	1	Environment; communication between providers; organizational culture; continuous quality improvement
Tsuboyama-Kasaoka		1	Environment; care pathways, continuous quality improvement
Tsuchiya ( <i>Community Dent Oral Epi</i> )			Environment, Outreach services
Wang			Environment
Yamamoto			Environment, comprehensive geriatric assessment; teams

**Table 3.** Matrix of evidence comprehending the type of natural disaster and EPOC taxonomy

Natural disaster	EPOC taxonomy							
	How and when care is delivered	Where care is provided and changes to the healthcare environment	Who provides care and how the healthcare force is managed	Coordination of care and management of care processes	Information and communication technologies	Collection of funds	Insurance schemes	Mechanisms for the payment of health services
Geophysical: Earthquake	2	10		1	1			
Geophysical: Mass Movement								
Geophysical: Volcanic activity								
Hydrological: Flood								
Hydrological: Landslide								
Hydrological: Wave action (Mixed Tsunami caused by earthquake)	2	9		5				1
Meteorological:								
Extreme Temperature								
Meteorological: Fog								
Meteorological: Storm								
Climatological: Drought								
Climatological: Glacial Lake Outburst								
Climatological: Wildfire								
Natural disaster	EPOC taxonomy							
	Targeted financial incentives for health professionals and healthcare organizations	Authority and accountability for health policies	Authority and accountability for organizations	Authority and accountability for commercial products	Authority and accountability for health professionals	Interventions targeted at healthcare organizations	Interventions targeted at healthcare workers	Interventions targeted at specific types of practice, conditions, or settings
Geophysical: Earthquake			1				1	
Geophysical: Mass Movement								
Geophysical: Volcanic activity								
Hydrological: Flood								
Hydrological: Landslide								
Hydrological: Wave action (Mixed Tsunami caused by earthquake)						1	2	
Meteorological:								
Extreme Temperature								
Meteorological: Fog								
Meteorological: Storm								
Climatological: Drought								
Climatological: Glacial Lake Outburst								
Climatological: Wildfire								



1 of the possible reasons why most of the included studies were conducted in Japan, is the geography of the country. Since Japan is an island, the flatlands where many people live are on the side of rivers and the sea. As a result, many places are vulnerable to flood damage and earthquakes, making Japan a country with a high incidence of natural disasters like tsunamis, typhoons, heavy rains, and windstorms.<sup>49</sup> Since 20% of the world's earthquakes with magnitude 6 or higher occur in Japan, there is a high awareness of natural disasters.<sup>50</sup> After the Great Hanshin-Awaji Earthquake in 1995, there was a need for disaster emergency assistance in Japan, so DMAT (Disaster Medical Assistance Team) was established, and research started under the name of 'Health Crisis Management.'<sup>51</sup> In 2011, after the Great East Japan Earthquake, people became more conscious of the importance of disaster medicine, hence the Japanese government allocated budgets for research, education and training (e.g., team building).<sup>50</sup> Part of this budget is also used in dentistry for 'Disaster dental health system training' and "Disaster dental health advanced training' by the Ministry of Health, Labor and Welfare through the subsidized Disaster Medical Team Training Support Project.<sup>52</sup> Moreover, the Japanese Society for Disaster Public Health Dentistry (DPHD),<sup>53</sup> was founded as a private organization that aims to provide concrete and practical support to deliver the necessary dental and oral support during a natural disaster.<sup>11</sup>

We can hypothesize that other countries with a high incidence of natural disasters have not established emergency assistance and budgets for research, education, and training for disaster emergencies. However, the reason why such countries with a high incidence of natural disasters have not published studies in this regard, requires a deeper analysis. We based our eligibility criteria on oral health interventions. Some studies may approach health care during natural disasters without reporting oral health care interventions specifically, thus, they may not have been included in our review. Moreover, most of the evidence found in the context of natural disasters were reports and comments which were excluded for not meeting our eligibility criteria regarding study design.

Since a protocol is essential during a natural disaster, the Pan American Health Organization has worked to build a post-disaster guideline for oral health,<sup>54</sup> and the Association of State and Territorial Dental Directors in the United States developed a manual for Emergency Preparedness and Response for State Oral Health Programs.<sup>55</sup> However, even in Japan where there is an established budget for disaster emergencies, there is no detailed protocol for dental care in times of disaster at the national level. The Japan Dental Association,<sup>52</sup> and the Japan Dental Hygienists Association have proposed such a system. An industrial organization called the 'Japan Disaster Dental Health Liaison Council,'<sup>56</sup> is working to establish a nationwide system.<sup>57</sup> Additionally, it is included in the core curriculum for dental students and dentists in Japan to learn 'the ability to explain the need for dental care in times of disaster.'<sup>58</sup>

From the clinical point of view, most of the included studies demonstrate the importance of oral clinical examinations and initial emergency management.<sup>24,26-31,33-40</sup> Some of them have a special focus on maxillofacial trauma management,<sup>24,26,30,31,34,36</sup> emphasizing the importance of dental and maxillofacial trauma knowledge of the entire multidisciplinary team. Also the included studies demonstrate the relevance of preventive care through providing oral care products, and education in orphanages, elementary schools, and shelters with elderly survivors, as the first approach to the survivors.<sup>27</sup> This approach from the evacuation centers, welfare shelters, temporary housing, or even afterward

when people move to reconstructed houses, should be long-term to maintain good oral health and prevent oral diseases.<sup>59</sup> On the other hand, the proposal of a partnership between universities, hospitals and local governments from different countries (developed and developing countries for example) offer a new model and an interesting initiative for reducing the burden of access to care, and also improving the education and training of the professionals.<sup>25</sup> In the case of Japan, it was suggested to categorize the victims into 3 groups: those who have been victims, those who are currently in trouble, and those who are not currently in trouble.<sup>60</sup> For the first group, those who have been victims, dental records can be useful for the body's identification. For the second group, those who are currently with dental pain or oral disease need immediate access to oral care, so it is necessary to establish a system for emergency dental treatment, as well as mobile clinics and temporary clinics to treat the patients. The third group is people who don't have dental problems now but are likely to have problems in the future; for this group it is necessary to take action to prevent problems. In the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake, pneumonia accounted for about a fourth of all disaster-related deaths, and many of them were suspected to be aspiration pneumonia,<sup>61</sup> with the elderly and children being the highest risk groups. In this sense, the role of dental professionals must constantly change to meet the needs of the community during natural disasters.<sup>18</sup>

Our study has some limitations. We included only studies published in peer-review journals in English, Spanish, or Japanese, therefore, studies in other languages may not have been included. Among the strengths of our study, our broad eligibility criteria concerning the phenomena of interest allowed us to probably identify most of the relevant evidence. Also, we performed an exhaustive search strategy, and we conducted a screening and data extraction process by two authors. Furthermore, from our knowledge, this is the first scoping review of oral health in the context of natural disasters.

Further research is needed in areas in which we found scarce evidence, including the diversification and comparison of the types of intervention in oral health, the types of natural disasters, and the countries where the studies are carried out. The studies included in our review emphasize that the effective management of natural disaster survivors requires a multidisciplinary team with a focus on oral health preventive and therapeutic approaches. Moreover, a protocol to address oral health care should be established and implemented with an immediate and comprehensive approach during a natural disaster context. With all this information, we consider that we have comprehensively described the current body of evidence regarding oral health interventions during natural disasters. The evidence accessed in our study was limited, highlighting the need for further research to focus on different oral health care outcomes in the context of different natural disasters, thus enhancing the formulation and implementation of recommendations and protocols worldwide.

**Supplementary material.** To view supplementary material for this article, please visit <https://doi.org/10.1017/dmp.2023.62>

**Author contributions.** KS-B designed the scoping review, analyzed, and interpreted the data, as well as drafted and revised the paper. AT analyzed and interpreted the data, drafted and revised the paper. JS-Ch analyzed the data, drafted, and revised the paper. KN drafted and revised the paper. JB designed the scoping review, wrote the search strategy, interpreted the data, drafted, and revised the paper.

**Competing interest.** None declared.

**Abbreviations.** CRED, Centre for Research on the Epidemiology of Disasters; DMAT, Disaster Medical Assistance Team; DPHD, Japanese Society for Disaster Public Health Dentistry; EPOC, Effective Practice and Organisation of Care; ND, Natural Disasters; PICo, Population, Phenomena of Interest, Context.

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