Review

Management of Acute Respiratory Infections in Earthquake Disasters: A Literature Review on Prevention, Diagnosis, and Medical Interventions

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ABSTRACT

Acute Respiratory Infection (ARI) is among the most common health problems following earthquake disasters, resulting from overcrowded evacuation environments, poor ventilation, inadequate sanitation, and limited access to healthcare services. These conditions significantly increase the risk of pneumonia, upper respiratory infections, and exacerbation of chronic lung diseases. This literature review aimed to synthesize evidence on prevention, diagnosis, and medical interventions for ARI in earthquake disaster settings. A literature review was conducted using the PICO framework. A systematic search of PubMed, ScienceDirect, ProQuest, ResearchGate, and Google Scholar identified 16 eligible studies published between 2011 and 2025. Studies were selected based on predefined inclusion and exclusion criteria, and data were synthesized qualitatively. The literature consistently documented increased ARI cases following earthquakes, driven by shelter overcrowding, poor sanitation, dust exposure, psychological stress, and loss of routine medical access, particularly among children, the elderly, and patients with chronic obstructive pulmonary disease (COPD). Dominant pathogens included rhinovirus, respiratory syncytial virus (RSV), *Streptococcus pneumoniae*, and *Haemophilus influenzae*. Molecular diagnostics such as RT-qPCR improved early pathogen detection, while preventive measures including proper ventilation, mask use, hand hygiene, and strengthened surveillance systems effectively reduced ARI incidence. Managing ARI in earthquake settings requires a multidisciplinary approach encompassing improvement of evacuation environments,

enhanced diagnostic capacity, prioritized triage for vulnerable groups, and comprehensive medical interventions to reduce morbidity and mortality among disaster-affected populations.

Keyword : Acute respiratory infection; diagnosis; earthquake disaster; medical intervention; prevention.

Introduction

Acute respiratory infections (ARI), particularly pneumonia, remain one of the leading causes of death among children worldwide. The WHO reported that in 2019, pneumonia accounted for approximately 740,180 deaths in children under five, equivalent to 14% of all deaths in that age group globally, making it the single largest infectious cause of death among young children[1]. In many developing countries, particularly in South Asia and regions with limited access to immunization and healthcare services, the incidence of ARI remains high. A community-based study in India found that the prevalence of ARI in children under five in rural areas and urban slums exceeded 50%, influenced by factors such as low maternal education levels, poor sanitation, and high household density[2]. These findings highlight that ARI is a serious public health problem, with the greatest burden found in low-income countries and regions vulnerable to environmental disruption, including natural disasters.

Acute Respiratory Infection (ARI) remains one of the most common infectious diseases in Indonesia, with the highest burden among children under five. According to data from the Basic Health Research (Riskesdas), the prevalence of ARI in Indonesia was recorded at 25.5% in 2007[3]. This prevalence was relatively stable in 2013 at approximately 25.0%[4]. However, in the 2018 Riskesdas survey, ARI figures dropped significantly to 4.4% based on healthcare professional diagnoses, and approximately 9.3% when including symptomatic cases[5]. The latest data from the 2023 Indonesian Health Survey (SKI 2023) showed that ARI prevalence (based on diagnosis or symptoms in the past month) rose again to 23.5%. By characteristic, Papua Province consistently recorded the highest ARI prevalence in Indonesia year after year, except in the 2018 Riskesdas data where Bengkulu Province showed the highest prevalence at 14% based on healthcare professional diagnoses. By age group, children aged 1–4 years consistently showed the highest prevalence across all years[3–5].

ARI is a heterogeneous group of diseases caused by various infectious agents, primarily viruses, that attack the upper respiratory mucosa, including the nasal cavity, pharynx, middle ear, and paranasal sinuses. The condition is characterized by inflammation

of the respiratory mucosa due to viral infection primarily rhinovirus as the most common causative agent transmitted through direct contact or aerosols. ARI is generally self-limiting with symptoms including nasal congestion, rhinorrhea, sneezing, sore throat, cough, and occasionally fever, especially in children. Although generally mild, viral infections can lead to complications such as acute otitis media in children, or sinusitis and pneumonia in adults and the elderly[6]. The pathophysiology of ARI begins when viruses such as Human Rhinovirus (HRV) or Respiratory Syncytial Virus (RSV) infect the airway epithelial cells via droplets. After attaching to cell surface receptors, viruses replicate, damaging the epithelium, disrupting tight junctions, and weakening mucosal barrier function. This damage triggers innate immune activation through PRRs such as TLRs, RIG-I, MDA5, and NLRP3 inflammasome, which subsequently increases production of pro-inflammatory cytokines and interferons. This inflammatory response causes edema, increased mucus secretion, and airway lumen narrowing. RSV can also suppress the interferon pathway through NS1 and NS2 proteins, resulting in more severe inflammation. The combination of epithelial damage, inflammation, and mucosal obstruction produces ARI symptoms such as cough, rhinorrhoea, and dyspnea[7–8].

Earthquakes as natural disasters can directly increase the risk of ARI through their impact on the physical environment and healthcare systems. Following the major earthquake that struck southern Turkey in 2023, a significant surge in pneumonia cases was reported, accounting for more than one-third of total respiratory diagnoses in non-traumatic patients. This retrospective study also documented increased pneumonia mortality and showed that post-earthquake conditions such as dust exposure, disrupted ventilation, and evacuation overcrowding greatly affected the population's vulnerability to respiratory infections10. In addressing such situations, WHO recommends administering first-line antibiotics such as amoxicillin for childhood pneumonia, supportive interventions such as oxygenation, and long-term prevention through basic immunization, improved ventilation, and promotion of hygiene practices[1]. Appropriate management and adequate emergency response are crucial to reducing ARI morbidity and mortality among earthquake-affected populations.

Therefore, this paper is written to highlight that Acute Respiratory Infection (ARI) remains a significant public health problem both globally and nationally, particularly among children in vulnerable regions. The fluctuation in ARI prevalence from Riskesdas 2007 to SKI 2023 demonstrates that the disease burden remains high, especially in provinces with environmental and healthcare limitations such as Papua. Meanwhile, an understanding of ARI pathophysiology, involving airway epithelial damage, inflammatory processes, and

mucosal barrier disruption, explains how seemingly mild infections can progress to serious complications such as pneumonia. External factors such as natural disasters further worsen conditions, as seen in the surge of post-earthquake pneumonia cases in Turkey due to dust exposure, inadequate ventilation, and shelter overcrowding. This discussion is therefore necessary to provide a comprehensive overview of the ARI burden, its biological mechanisms, and the environmental factors that exacerbate its occurrence, in order to support more effective public health intervention planning and response.

Material and Methods

The type of research used in this study is the literature review method. This type of research involves the process of reviewing, identifying, interpreting, and evaluating several studies based on previous research that have formed answers to several questions. The search strategy used the PICO format with exclusion and inclusion criteria. Exclusion criteria included all items not meeting the inclusion criteria of this study. Inclusion criteria consisted of: scientific journals sourced from PubMed, ScienceDirect, ProQuest, ResearchGate, and Google Scholar; open access format; publications within the last 10 years (2015–2025); use of primary data; and discussion of Acute Respiratory Infection (ARI) with a focus on earthquake disaster situations accompanied by strategies for prevention, diagnosis, and medical intervention. Keywords used in this study were: “Respiratory Tract Infection,” “Earthquake Disaster,” “Prevention,” “Diagnosis,” and “Intervention.”

To define the scope of this study, the following describes the PICO method (Population/Problem, Intervention, Comparison, Outcomes) in table format:

Outcomes Prevention, diagnosis, and medical intervention strategies for acute respiratory infections in earthquake disaster situations

Table 1. PICO Summary

Component	Description
Population/Problem	Acute respiratory infections in earthquake disasters
Intervention	Prevention, diagnosis, and medical intervention strategies
Comparison	N/A
Outcomes	Prevention, diagnosis, and medical intervention strategies for acute respiratory infections in earthquake disaster situations

The article search process of this study is as follows:

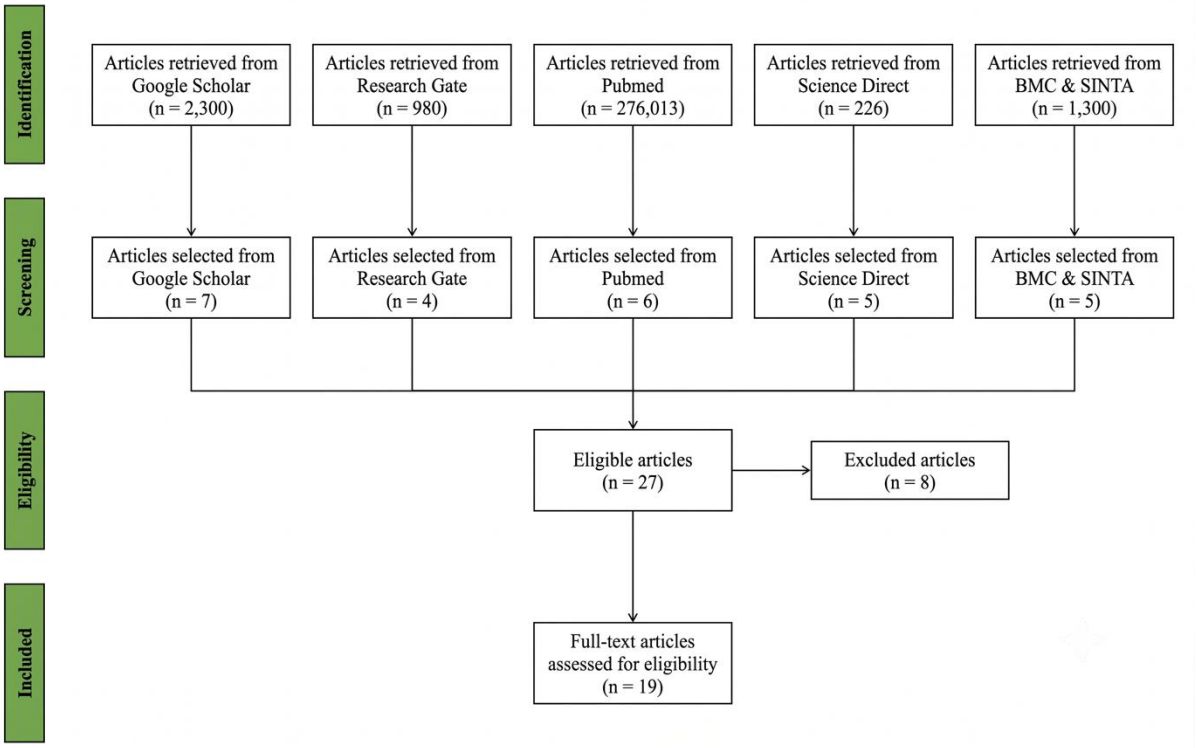


Figure 1. Article selection scheme based on inclusion and exclusion criteria

Results

Characteristics of Included Studies

A total of 16 unique studies met all eligibility criteria and were included in the qualitative synthesis. The included studies comprised retrospective observational studies (n=7), systematic/scoping reviews and meta-analyses (n=4), literature/narrative reviews (n=3), a qualitative content analysis (n=1), and an ecological study (n=1). Studies originated predominantly from Turkey (n=7), Japan (n=3), and international multi-country collaborations (n=5), with one study from Indonesia. The malignancies and populations studied included earthquake evacuees, ICU patients, COPD patients, and general disaster-affected populations. A summary of the included studies is presented in Table 2.

Table 2. Summary of Included Studies

No	Author (Year)	Country	Design	Main Findings
1	Kawano et al. (2016)[9]	Japan	Observational; ARI surveillance	Shelter overcrowding significantly increased ARI incidence; shelter management interventions reduced transmission risk

2	Dogantekin et al. (2024)[10]	Turkey	Laboratory survey; RT-qPCR	Rhinovirus, RSV, *S. pneumoniae*, and *H. influenzae* were dominant; RT-qPCR essential for rapid diagnosis
3	Saatchi et al. (2024)[11]	Multi-country	Systematic scoping review (72 studies)	Large increase in upper and lower ARI post-earthquake; overcrowding, poor sanitation, limited healthcare access were key triggers
4	Kobayashi et al. (2013)[12]	Japan	Retrospective cohort (100 COPD patients)	Increased COPD exacerbations; disrupted oxygen access; increased hospitalizations
5	Sugimura et al. (2022)[13]	Japan	Observational (J-SPEED data)	ARI incidence decreased significantly when COVID-19 interventions (masks, ventilation, distancing) were applied
6	Mavrouli et al. (2021)[14]	International	Systematic/narrative review	ARI increased post-disaster; risk factors included overcrowding, poor ventilation, low temperatures
7	Daffa et al. (2024)[15]	International	Systematic review and meta-analysis	Increased ARI prevalence after natural disasters compared to baseline
8	Güngör et al. (2025)[16]	Turkey	Retrospective observational	Increased hospitalizations for pneumonia, COPD, and asthma post-earthquake
9	Avcu (2023)[17]	International	Desk review	ARI common after earthquakes; overcrowding, poor nutrition, poor ventilation were triggers
10	Kouadio et al. (2012)[18]	International	Literature review	Prevention: surveillance, vaccination, hygiene, WASH in shelters
11	Kaya EK et al. (2025)[19]	Turkey	Retrospective observational (ICU)	Half of ICU patients had confirmed infections; early presence of multidrug-resistant

				pathogens
12	Kaya SB (2025)[20]	Turkey	Retrospective study (1,122 patients)	Air pollution and power outages worsened chronic lung disease; pneumonia incidence increased
13	Yavuz et al. (2024)[21]	Turkey	Literature review	Earthquakes release respiratory pollutants; PPE and management strategies crucial
14	Akbarbegloo et al. (2024)[22]	Iran	Qualitative (25 participants)	Countries must improve disaster management capacities to address health challenges
15	Robinson et al. (2011)[23]	International	Literature review	Pulmonary complications common post-disaster (direct injury and indirect infections)
16	Isnaini et al. (2024)[24]	Indonesia	Ecological design	Post-earthquake ARI higher in women and those with poor nutritional status; rhinorrhea most common symptom

Burden and Risk Factors of ARI in Earthquake Settings

Across all 16 studies, ARI consistently emerged as a leading health problem following earthquakes. The increase in cases was attributed not solely to pathogen transmission but to an accumulation of environmental and systemic factors: shelter overcrowding, poor ventilation, inadequate sanitation, dust and pollutant exposure from debris, cold temperatures, psychological stress, and disrupted access to healthcare services. Vulnerable groups particularly children, the elderly, and patients with chronic respiratory diseases such as COPD experienced disproportionately higher complication rates.

Pathogens and Diagnostic Approaches

The dominant pathogens identified in post-earthquake ARI included rhinovirus, RSV, *Streptococcus pneumoniae*, and *Haemophilus influenzae*.[10] Molecular diagnostic approaches, particularly multiplex RT-qPCR panels, proved effective in improving early pathogen detection and informing targeted clinical intervention.[10] Clinical surveillance and radiological diagnosis remained the most commonly used methods in resource-limited settings.

Prevention and Medical Management Strategies

Preventive measures consistently reported to reduce ARI incidence included: proper shelter

ventilation, mask use, hand hygiene, social distancing, sanitation and clean water provision, and strengthened epidemiological surveillance systems.[13],[14],[18] Medical interventions included early antibiotic therapy for bacterial pneumonia, oxygen therapy for hypoxemic patients, and continuation of routine care for patients with chronic lung diseases. The implementation of COVID-19-era protocols (masks, ventilation, distancing) was associated with a significant reduction in ARI incidence in evacuation shelters.[13]

Discussion

Environmental and Systemic Drivers of Post-Earthquake ARI

The findings of this review confirm that ARI is the most prevalent health problem following earthquake disasters, driven by a combination of drastically altered environmental conditions people living in tents, polluted air, and far less accessible healthcare rather than by pathogen spread alone. Nearly all reviewed studies share a similar narrative: after a disaster, people gather in evacuation shelters with poor ventilation and inadequate sanitation, followed by the emergence and gradual increase of ARI cases. The psychological state of survivors stressed or fatigued was also noted to accelerate transmission by compromising immune function, as already-vulnerable individuals encounter an unhealthy environment that readily triggers ARI.

Kawano et al. (2016) emphasized that the primary issue is not merely the presence of sick individuals with coughs and colds at evacuation sites, but rather the physical conditions: overcrowded shelters, poor air quality, cold temperatures, and confined spaces. Shelter space planning is therefore not merely a technical matter of bed placement but a critical component of disease prevention.[9] Saatchi et al. (2024) and Mavrouli et al. (2021) highlighted that poor sanitation, limited access to clean water, and substandard living spaces create conditions where population density, poor sanitation, and scarce clean water cause ARI to erupt into outbreaks.[11],[14]

Pathogen Diversity and Diagnostic Advances

Dogantekin et al. (2024) demonstrated that post-disaster ARI causative agents are not singular but include RSV, rhinovirus, and pneumonia-causing bacteria. The use of molecular diagnostic methods provided a more precise understanding of the early post-disaster phase and transmission patterns.[10] The identification of multidrug-resistant pathogens in ICU patients by Kaya EK et al. (2025) further underscores the need for robust infection control and antimicrobial stewardship in disaster settings.[19]

Vulnerable Populations and COPD Exacerbation

Vulnerable groups children, the elderly, and patients with chronic diseases were

reported to have a higher risk of complications. Kobayashi et al. (2013) demonstrated a significant increase in COPD exacerbation cases following the Japan earthquake due to loss of access to routine oxygen therapy, showing that comorbid conditions can worsen disease progression and that survivors with chronic respiratory disorders should receive priority in disaster triage systems.[12] The release of particulate pollutants and chemical substances from debris and demolition work such as rubble dust, silica, and asbestos further exacerbates respiratory disease. Yavuz et al. (2024) explained that pollutants such as silica and asbestos carry high risk and can trigger surges in influenza, pneumonia, reactive airways dysfunction syndrome (RADS), and exacerbations of COPD and asthma.[21]

Prevention and Multidisciplinary Management

From a management perspective, Sugimura et al. (2022) showed that implementing COVID-19 health protocols mask use, ventilation, physical distancing, and hand hygiene can substantially reduce ARI incidence.[13] Güngör et al. (2025) and Daffa et al. (2024) recommended strengthening epidemiological surveillance systems, providing emergency healthcare facilities, and ensuring logistical readiness of medicines and medical equipment.[15],[16] Kouadio et al. (2012) emphasized surveillance, risk-based vaccination, and water, sanitation, and hygiene (WASH) interventions in shelters.[18]

Limitations

This review has several limitations. First, the heterogeneity of included study designs, populations, and outcome measures precluded quantitative meta-analysis. Second, the review was limited to English-language, open-access publications, which may have excluded relevant local-language studies from earthquake-prone regions. Third, several studies relied on retrospective or surveillance data with potential underreporting. Fourth, the inclusion of older foundational studies (2011–2013) means some findings may not fully reflect current disaster response practices, although their core principles remain relevant. Finally, the absence of standardized diagnostic criteria across studies limits comparability of ARI incidence estimates.

Implications for Practice and Research

The findings support the following practical recommendations: (1) integrate respiratory disease surveillance into routine disaster response protocols; (2) prioritize shelter ventilation, spacing, and sanitation in evacuation planning; (3) ensure availability of molecular diagnostic capacity (e.g., RT-qPCR) in referral hospitals serving disaster-affected areas; (4) prioritize vulnerable groups children, the elderly, and COPD patients in triage and resource allocation; and (5) develop standardized reporting frameworks for ARI in disaster

settings to enable future comparative analyses.

Conclusion

Acute Respiratory Infection (ARI) emerges as a dominant health problem following earthquakes, with increases in cases driven not only by pathogen transmission but primarily by post-disaster environmental deterioration: shelter overcrowding, poor ventilation, inadequate sanitation, dust exposure from debris, and limited access to healthcare services. Various studies indicate that pathogens such as rhinovirus, RSV, and pneumonia-causing bacteria play a major role, while vulnerable groups particularly children, the elderly, and patients with chronic diseases experience higher rates of complications, including COPD exacerbations from exposure to pollutants such as silica and asbestos. Although basic health protocols such as masks, ventilation, and hand hygiene have proven effective in reducing ARI cases, an effective response requires a multidisciplinary approach encompassing environment-based prevention, accurate diagnosis, and comprehensive interventions. These findings affirm that robust respiratory health mitigation is essential in post-disaster management to prevent increased morbidity and mortality among earthquake-affected populations.

Declaration of Generative AI in Scientific Writing

The authors declare that Generative AI technologies (ChatGPT) were used in the preparation of this manuscript. Specifically, AI-assisted tools were used to support language editing, translation, and improvement of English language clarity and readability. The AI tools were not used to generate research data, perform data analysis, interpret findings, or formulate scientific conclusions. All scientific content, data interpretation, and conclusions presented in this manuscript were conceived, verified, and approved by the authors, who take full responsibility for the accuracy, integrity, and originality of the work. The authors confirm that the use of AI did not compromise the scientific validity or ethical standards of this publication.

References

1. World Health Organization. Pneumonia in children [Internet]. Geneva: WHO; 2022 [cited 2025 Jun 1]. Available from: https://www.who.int/news-room/fact-sheets/detail/pneumonia
2. Murarkar S, Gothankar J, Doke P, Dhumale G, Pore PD, Lalwani S, et al. Prevalence of the acute respiratory infections and associated factors in the rural areas and urban slum areas of western Maharashtra, India: A community-based cross-sectional study. *Front*

Public Health. 2021;9:723807. doi:10.3389/fpubh.2021.723807.

3. Badan Penelitian dan Pengembangan Kesehatan. *Riset Kesehatan Dasar (Riskesdas) 2007: Laporan Nasional 2007*. Jakarta: Departemen Kesehatan RI; 2008.
4. Badan Penelitian dan Pengembangan Kesehatan. *Riset Kesehatan Dasar (Riskesdas) 2013*. Jakarta: Kementerian Kesehatan RI; 2013.
5. Badan Penelitian dan Pengembangan Kesehatan. *Laporan Nasional Riskesdas 2018*. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2018.
6. Thomas M, Bomar PA. Upper respiratory tract infection. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [updated 2023 Jun 26; cited 2025 Jun 1]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532961/
7. Kombe AJK, Fotoohabadi L, Gerasimova Y, Nanduri R, Tamang PL, Kandala M, et al. The role of inflammation in the pathogenesis of viral respiratory infections. *Microorganisms*. 2024;12(12):2526. doi:10.3390/microorganisms12122526.
8. Sun Y, López CB. The innate immune response to RSV: Advances in our understanding of critical viral and host factors. *Vaccine*. 2016;35(3):481-488. doi:10.1016/j.vaccine.2016.09.030.
9. Kawano T, Tsugawa Y, Nishiyama K, Morita H, Yamamura O, Hasegawa K. Shelter crowding and increased incidence of acute respiratory infection in evacuees following the Great Eastern Japan Earthquake and tsunami. *Epidemiol Infect*. 2016;144(4):787-795. doi:10.1017/S0950268815001713.
10. Dogantekin E, Caliskanturk G, Aslan S, Dogantekin A. Epidemiology of respiratory infection pathogens using multiplex RT-qPCR in big earthquakes area in Turkey (2023). *Clin Epidemiol Glob Health*. 2024;29:101753. doi:10.1016/j.cegh.2024.101753.
11. Saatchi M, Khankeh HR, Shojafard J, Barzanji A, Ranjbar M, Nazari N, et al. Communicable diseases outbreaks after natural disasters: A systematic scoping review for incidence, risk factors and recommendations. *Prog Disaster Sci*. 2024;23:100334. doi:10.1016/j.pdisas.2024.100334.
12. Kobayashi S, Hanagama M, Yamanda S, Satoh H, Tokuda S, Kobayashi M, et al. The impact of a large-scale natural disaster on patients with chronic obstructive pulmonary disease: The aftermath of the 2011 Great East Japan Earthquake. *Respir Investig*. 2013;51(1):17-23. doi:10.1016/j.resinv.2012.10.004.
13. Sugimura M, Chimed-Ochir O, Yumiya Y, Taji A, Kishita E, Tsurugi Y, et al. Incidence of acute respiratory infections during disasters in the absence and presence of COVID-19 pandemic. *Prehosp Disaster Med*. 2022;37(1):142-144.

doi:10.1017/S1049023X21001369.

14. Mavrouli M, Mavroulis S, Lekkas E, Tsakris A. Respiratory infections following earthquake-induced tsunamis: Transmission risk factors and lessons learned for disaster risk management. *Int J Environ Res Public Health*. 2021;18(9):4962. doi:10.3390/ijerph18094962.
15. Daffa MB, Khansa F, Ghifari MH, Zaskia SR, Jung Y. Global prevalence of natural disaster-induced acute respiratory infections: A systematic review and meta-analysis of 290,380 participants. *Narra X*. 2024;2(3):e181. doi:10.52225/narrax.v2i3.181.
16. Güngör Ö, Erçen Diken Ö, Berik Safcı S, Avcı A, Aslan Aİ. Respiratory diseases and mortality in non-traumatic patients exposed to the 2023 Türkiye earthquake disasters: A retrospective observational study. *BMJ Open*. 2025;15(1):e092177. doi:10.1136/bmjopen-2024-092177.
17. Avcu G. Infections after the earthquake disaster. *J Pediatr Res*. 2023;10(4):235-237. doi:10.4274/jpr.galenos.2023.99997.
18. Kouadio IK, Aljunid S, Kamigaki T, Hammad K, Oshitani H. Infectious diseases following natural disasters: Prevention and control measures. *Expert Rev Anti Infect Ther*. 2012;10(1):95-104. doi:10.1586/eri.11.155.
19. Kaya EK, Halacli B, Guven G, Yildirim M, Seven AE, Gemcioglu E, et al. Infections among adults hospitalized in intensive care after the 2023 earthquake in the southeastern part of Türkiye: A multi-center observational study. *BMC Infect Dis*. 2025;25:35. doi:10.1186/s12879-024-10432-8.
20. Kaya SB. The disastrous earthquake in Turkey and its effects on respiratory disease. *Bratisl Med J*. 2025;126:1032-1041. doi:10.4149/BLL_2025_102.
21. Yavuz MY, Ayık Türk M, Oral B, Coşkun Beyan A. Earthquake and respiratory pollutants. *Eurasian J Pulmonol*. 2024;26:1-9. doi:10.14744/ejp.2024.78901.
22. Akbarbegloo M, Heydari A, Sanaeefar M, Fallah-Aliabadi S. Exploring the health challenges of affected people in the 2023 Khoy earthquake: A content analysis. *BMC Emerg Med*. 2024;24:204. doi:10.1186/s12873-024-01126-3.
23. Robinson B, Alatas MF, Robertson A, Steer H. Natural disasters and the lung. *Respirology*. 2011;16(3):386-395. doi:10.1111/j.1440-1843.2011.01923.x.
24. Isnaini, Yani FF, Jurnalis YD, Mariko R. The incidence and characteristics of acute respiratory infection (ARI) after the earthquake in West Pasaman and Pasaman Districts, West Sumatra Province in 2022. *E3S Web Conf*. 2024;604:16005. doi:10.1051/e3sconf/202460416005.