



Women's Reproductive Health in Disasters: A Systematic Review

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Abstract

Introduction: Reproductive health services have remained a top priority in humanitarian emergencies. As more people are displaced, and their mobility areas become more diverse, emergency response efforts must ensure access to standard RH care services. This systematic review aimed to evaluate and interpret the research on reproductive health in disasters conducted in 2022.

Methods: From January 2010 to December 2022, a systematic search was conducted in the PubMed, Cochran Library, Scopus, and EMBASE databases, as well as Science Direct, Web of Science, and ProQuest databases. The author chose the articles based on keywords. Inclusion and exclusion criteria were also considered for the selection of articles, and the quality of the articles was checked with the relevant checklists. Finally, the articles were mined for information on Reproductive health (RH) in disasters.

Results: 213 articles were extracted after searching the databases. 7 articles were completely in line with the study objective after their titles, abstracts, and texts were evaluated. A cross-sectional article, a combined article, two qualitative articles, an experimental article, and a case report were among the chosen articles. These 6 studies uncovered a diverse range of RH issues. Most women's problems in disasters are caused by lack of awareness and knowledge, lack of support and protection equipment, lack of support from organizations in charge, and ignorance of cultural factors.

Conclusion: The most vulnerable individuals in society are women and girls. Women's living conditions are worsened, and they experience mental, psychological, and physical stress due to emergencies and disasters. Therefore, the issue of RH among women should be given special consideration by health policymakers. Creating RH programs for women affected by disasters is essential to disaster management. Therefore, to lessen their suffering and issues during disasters, countries should develop thorough guidelines and programs to improve the RH of women and girls of childbearing age.

Keywords: Reproductive health, Sexual and reproductive health, Disasters

● **Article History:**
Received: 15 March 2023
Accepted: 06 June 2023

● **Please cite this paper as:**
Ahmadi Marzaleh M, Peyravi MR, Moradi HA, Raeyat Mohtashami A. Women's Reproductive Health in Disasters: A Systematic Review. Health Man & Info Sci. 2023; 10(2): 54-61. doi: 10.30476/JHMI.2023.100416.1188.

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Introduction

Disasters are harmful events resulting from human error, to destroy an individual, group, or country, or as a result of natural phenomena that disrupt the natural process of human life (1). In the last twenty years, unexpected events have killed ten million people and cost more than \$1 billion (2). Iran is one of the most accident-prone countries in Asia, with a disaster risk rating of 8 out of 10 in this country (3).

168 million of the world's 1.8 billion people require humanitarian assistance. A quarter of those living in vulnerable areas are women and girls of reproductive age (4-6). Over the last decade, many

non-governmental organizations, including the United Nations, World Health Organization, and World Group of Women, have prioritized women's reproductive health (RH) (7). Women's RH was characterized by the International Summit on Population Development in Cairo as "a state of complete well-being of physical, mental, and social and not just the absence of disease or failure in all matters relating to the reproductive system and its functions and processes."(8-10).

The epidemics in the past have shown that sexual and RH issues are the leading causes of death and illness among women of reproductive age. Poor health outcomes worsen when life-saving services such as

emergency obstetric care, contraception to prevent unwanted pregnancies, and abortion complications are unavailable or disrupted.

On the other hand, gender-based violence and sexual exploitation and abuse may increase during outbreaks due to incarceration, increased exposure to perpetrators at home, pre-pregnancy expenditures, and decreased access to protection services. Caring for children and others at home reduces the women's ability to care for themselves(11-13). In humanitarian emergencies, RH services have remained a top priority. As more people are displaced, and their mobility areas become more diverse, all types of emergency response efforts must consider ensuring access to standard RH care services. Priority RH services were identified in 1996 and included in RH in refugee situations as the Minimum Initial Services Package (MISP). The MISP is a coordinated set of activities which aim at prevention and management of the consequences of sexual violence, reduction of HIV transmission, prevention of mother-to-child transmission of HIV, and access to menstrual health supplies which are among the additional priority activities (14, 15).

Previous research found that increasing severity of earthquakes led to an increase in the use of injectable materials (as the most common method of contraception in the current pregnancy). Furthermore, path analysis revealed that the magnitude of earthquakes increased the unmet needs of women to start a family and reduced their access to condoms. Several studies have shown that disruptions in health services following a natural disaster can have a negative impact on women's RH (16, 17)

The effective operation of the health system is one of the pillars of disaster response. The Pan-American Organization has also reported numerous inconsistencies among post-disaster healthcare providers (18). In general, effective disaster response, to minimize negative consequences, necessitates public preparedness and coordinated action in all areas. As a result, society must have adequate knowledge and awareness to participate in crisis management. Furthermore, education is the most effective way to raise public awareness.

Based on the foregoing, this systematic review aimed to review the research on RH in disasters conducted in 2020 to identify the factors affecting women's RH in disasters and to provide recommendations for better preparedness and future response interventions.

Methods

Inclusion Criteria and Search Strategies

This systematic review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A systematic search was conducted in peer-reviewed English texts related to the state of women's RH in disasters from January 2010 to the end of December 2022. First, a quick and thorough search of the Cochrane Library database was conducted to ensure no systematic reviews in this area have been carried out. The databases PubMed, Cochran Library, Scopus, and EMBASE, Science Direct, Web of Science, and ProQuest were then searched. Gray literature such as books, websites, conference papers, and dissertations was also searched.

The "AND" operator was used to search for terms that count as separate terms. The "OR" operator was also used between synonyms. The titles, abstracts, and keywords of the articles were searched. Mesh terms were used to find articles in the PubMed database. Table 1 depicts the search strategy used in the study.

It should be noted that studies on coronavirus disease of 2019 (COVID-19) were outside the scope of this study. C, or the same comparison group, was not considered in patient/population, intervention, comparison and outcomes (PICO) because there was no comparison group in this study. The researcher chose the search keywords. Finally, the factors were extracted from the selected articles.

The researchers then prepared a complete list of all the article references and reviewed the titles of the articles. The articles unrelated to the purpose of the study were then excluded. All of the search steps were repeated for extra assurance. END NOTE: X9 software was used to manage the resources.

Inclusion Criteria

First, the articles were chosen based on RH in disasters based on their titles, keywords, or abstracts. The abstracts were then studied, and the full texts were analyzed using evaluation tools. As previously stated, this systematic review was conducted on articles extracted between 2010 and the end of December 2022. In addition, unpublished articles (gray literature), protocols, conference papers, guidelines, and reports from reputable organizations were reviewed. We chose reviews, quantitative, and qualitative articles. The articles that were evaluated during the peer review process were also chosen. It is worth noting that the articles had to be relevant to the research question.

Table 1: The search strategy used in the study

PIO	#1 AND #2 AND #3	Strategy
P	Women OR woman OR girl OR Girls	#1
I	Disasters OR disaster planning OR strategic stockpile OR mass casualty incidents OR medical countermeasures OR Natural Disasters OR Climate Change OR public health emergenc OR global warming OR flood OR earthquake OR drought OR hurricane OR manmade disaster OR storm OR tornado OR wildfire OR volcan OR Orextreme weather	#2
O	Reproductive Medicine OR Reproductive Health Services OR Sexual Health OR Reproductive Health OR Family Planning	#3

Exclusion Criteria

COVID-19 articles were excluded from the search. Articles in languages other than English were also excluded.

Screening

The researcher began by reviewing the titles of all articles in the database. As a result, only articles that met the inclusion criteria and were relevant to the research question were chosen. The researcher then read the abstracts of the articles that were chosen. The researcher then read and evaluated the full texts of the articles that were completely in line with the purpose of the study and met the inclusion criteria. Articles that addressed three disasters, women, and RH at the same time were chosen.

Furthermore, if the article lacked one of these factors, it was rejected at each stage of the screening process. Finally, the articles that mentioned RH in disasters were chosen. The articles were evaluated using the PRISMA guidelines. Citation and print biases were also considered, and articles with a high citation count were carefully scrutinized. Strengthening the reports of observational studies in epidemiology (STROBE) checklist was used to evaluate quantitative articles; the Consolidated criteria for reporting qualitative research (COREQ) checklist for qualitative articles; the CONsensus-based Standards for the selection of health Measurement Instruments (COSMIN) checklist for mixed methods articles, and the PRISMA checklist for review articles. The preceding stages were carried out twice.

Extraction of the Data

After perusing the article, the researcher extracted the necessary information using the abstract/abstract form. The title, corresponding authors, study sample, country and time of the study, objectives, study design, methodology, results, and conclusions were all included in this form. A summary form was completed for each selected item. Two researchers analyzed all forms, and all items were reviewed and tabulated. Other researchers also commented on the conflicting themes of the article. Finally, these forms

were created in Microsoft Word 2019.

Quality Assessment of the Articles

Regarding the type of studies considered here, the checklist of the Critical Appraisal Skills Programme was used to evaluate the quality of the studies (19). This includes eight different checklists, and the selected checklist here consisted of 10 questions that divided the articles into three levels of quality: high, medium, and low; also, most investigated studies in this systematic review were in the intermediate level.

Results

213 articles were extracted after searching the databases. However, 88 articles were excluded because they appeared in multiple databases. After reviewing 79 titles, we eliminated 13 articles because they were inconsistent with the objectives of the study. The abstracts of the remaining 66 articles were then examined, and 33 articles were excluded because they were irrelevant to the study goals. Then, 22 full texts were chosen. Finally, 7 articles were completely consistent with the purpose of the study. Figure 1 displays the flow diagram of the article selection process.

Among the selected articles, there was one cross-sectional article (20), three qualitative articles (14, 21, 22), one mixed-method article (14), one experimental article (1), and one case report (22). Table 2 summarizes the full texts of these six articles. The information includes the title, corresponding author, study sample, country and time of study, purpose, study design, method, results, and conclusion.

Discussion

The aim of this study was to review and summarize the evidence in the field of RH in disasters, as well as young women's and girls' access to pregnancy services and related humanitarian issues. There have been very few studies on RH in the world to date.

A previous study conducted by Soghand Turani et al. assessed the health consequences of natural disasters as both an opportunity and a challenge (10).

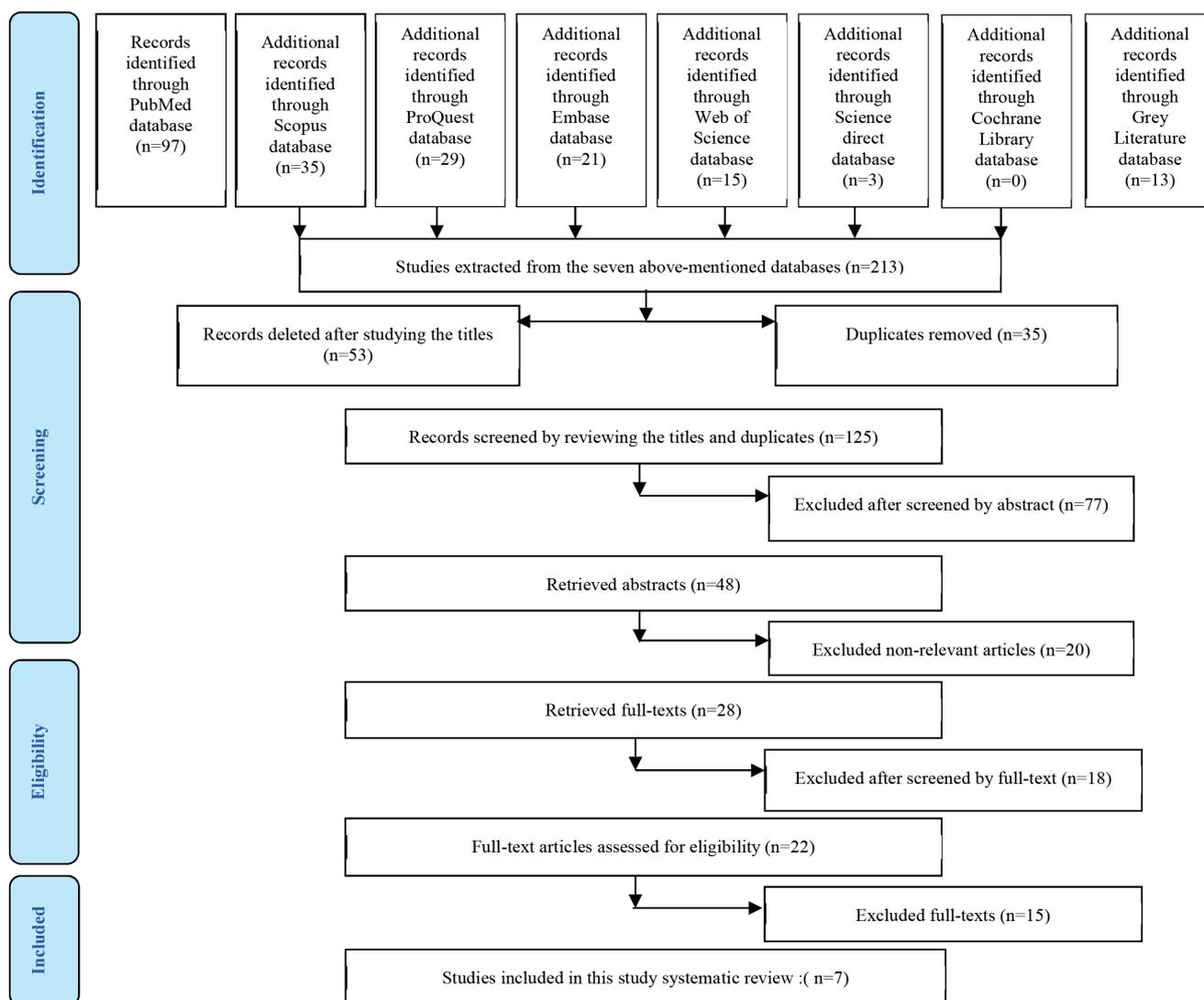


Figure 1: PRISMA flow diagram for the article screening process

This qualitative study investigated various aspects of RH in disasters. Based on the findings, two categories were derived from interviews with 22 key individuals who were directly affected by disasters (women's psychological and physical dimensions, as well as women's health and reproductive status). All participants had psychological dimensions such as fear, anxiety, depression, and Post-Traumatic Stress Disorder (PTSD). Furthermore, deterioration in physical health caused most women to feel weak or to fall victim. All the older women reported physical injuries that limited their mobility.

Furthermore, poor living conditions put women and children at risk of death or illness (running out of birth control pills and increasing unwanted pregnancies). Furthermore, observations and interviews revealed that living in unhealthy conditions impacted women more than other post-disaster groups. Women frequently engage in a

series of activities that put them in direct contact with environmental threats. They were involved in housekeeping, taking care of others, and activities such as planting, gardening, and carpet weaving. Most women had to leave their homes to do so, facing an unsafe environment and inadequate facilities (10).

A previous study found that 79.8% of female Afghan refugees in Iran had experienced some form of sexual violence (severe or minor). Partner violence had a significant relationship with some demographic characteristics (age: $P < 0.001$; religion: $P < 0.03$; and women's level of education: $P < 0.06$). Furthermore, the number of children and household size were significant predictors of contraceptive use. In general, partner violence against women was common among the refugee population (20).

The findings of a Nepalese study contributed to the positive global trend of considering RH priorities from the start of an emergency (14).

Table 2: Summary of the selected articles

No.	Author, year (ref)	Country	Result
1	Ali Ardalan / Prevalence of intimate partner violence and RH outcomes among Afghan refugee women in Iran	Iran	The questionnaires were completed by all 188 participants, yielding a 100% response rate. Sexual violence was experienced by 79.8% of Afghan women (severe or maneuvering). Partner violence had a significant relationship with some demographic characteristics (age: $P < 0.001$, religion: $P < 0.03$, and women's education level: $P < 0.06$). The number of children (0.001) and household size (0.038) were significant predictors of contraceptive use in multivariate logistic regression. The researchers discovered that among women who had experienced IPV, those who used modern contraception (52.3%) were more exposed to IPV than those who did not use contraception at all (18.1%) or traditional methods.
2	Sogand Tourani / Women and Health Consequences of Natural Disasters: Challenge or Opportunity	Iran	All participants were between the ages of 17 and 60, with the majority falling between 31 and 45 (41%). The participants were 82% female (16 infected women and two key informants), with the remaining 18% male (two key individuals and two injured men). The majority (36%) only had primary education and lived in affected cities.
3	Anna Myers / Facilitators and barriers to implementing the MISP for RH in Nepal post-earthquake	Nepal	Priority RH services have been implemented in both regions. Emergency RH services were launched in Kathmandu a few days after the earthquake. Disaster preparedness, leadership, commitment among national, international, and regional actors, resource mobilization, strong national-level coordination, existing reproductive and child health services and community development programs, and supply chain management all contributed to successful implementation. Inadequate MISP training for RH coordinators and managers; poor communication between national and regional stakeholders; insufficient staff; lower resources and facilities in rural areas; limited attention to local GBV and HIV organizations; a lack of clinical management of rape services; and a lack of awareness of GBV services and timely care benefits were among the barriers.
4	Vijayan K / The Effects of Disaster on Women's RH in Developing Countries	USA	The findings extended beyond the previously assumed negative relationship between RH and the severity of natural disasters. The standardized regression coefficient was -0.108, statistically significant at the 0.05 level. The model was highly suitable, with a CFI of 0.967 and an NFI of 0.932. Natural disasters appear to be linked to poor RH. Standardized effects can be compared using absolute values for armed conflict rates and natural disasters. The standardized coefficient for armed conflict was 120/120 (absolute value), and the coefficient for natural disasters was 1,108 (absolute value).
5	P Chaudhary / Humanitarian response to reproductive and sexual health needs in a disaster: the Nepal Earthquake 2015 case study	Nepal	Since the disaster, structural and environmental conditions have posed significant challenges to RH's response. First, the Ministry of Defense's National Disaster Response and Planning Framework, published a year before the earthquake clearly described Nepal's major challenges as a large-scale disaster must occur. "Private and public hospitals could not meet health needs," and "no comprehensive disaster management guidelines were in place."
6	Katayoun Jahangiri / RH in the recent disasters of Iran: a management perspective	Iran	The data were categorized into six categories of RH management issues in disasters. Ignoring cultural factors, a lack of planning, a lack of education, insufficient data collection, ignoring men's RH, and a lack of monitoring devices were among the categories.
7	Kristen Beek, Robyn Drysdale/ Preparing for and responding to sexual and reproductive health in disaster settings: evidence from Fiji and Tonga	Fiji and Tonga	Across contexts, disruptive events worsened the availability of and women's access to SRH services, contributed to decreased utilization of SRH services, and often resulted in lower use of family planning, particularly methods requiring facility-based interaction. In Tonga, key informants reported that training had been implemented well before the onset of cyclone Gita. This training had been conducted alongside other preparedness activities, including a national stakeholder meeting on the MISP, training on long-acting reversible contraceptives (LARC), orientation to Sexual and Gender Based Violence in Emergencies (SGBViE), and attendance at cluster meetings and interagency coordination with stakeholders.

RH: Reproductive health; IPV: Intimate partner violence; MISP: Minimum Initial Service Package; GBV: Gender Based Violence; HIV: Human immunodeficiency virus; CFI: Comparative Fit Index; NFI: Normed Fit Index; SRH: Sexual and Reproductive Health

This was accomplished through the disaster preparedness of the government; commitment to RH before and immediately following the earthquake; a pre-existing health system and development plan; and the effectiveness of coordination, particularly at the national level. The implementation of MISP in Nepal following the earthquake provided valuable lessons for national governments and humanitarian actors on the factors that facilitated and prevented RH problems.

Thus, paying attention to MISP when preparing for and responding to disasters will significantly reduce deaths among women and girls (14)

In a combined study conducted by Myere and colleagues in Nepal (2015), disaster readiness, leadership, and commitment among national, international and regional actors, resource mobilization, strong national level coordination, existing reproductive and child health services,

community advancement programs, and supply chain management were considered as the components that facilitated the successful implementation of the plan. Lack of trained staff, insufficient funding, direct and indirect costs, discrimination and HIV disease, and logistical challenges, on the other hand, were barriers to the implementation of RH services. This study assessed the activities that helped reduce women's mortality and served as an important lesson for environmental actors and executives (14)

To play an effective role in disaster management, society and organizations must have an appropriate level of knowledge and awareness, which cannot be attained without proper training. A review of Iranian studies revealed that education and community participation were important factors in better disaster management. The active presence of people in all stages of prevention, mitigation, disaster preparedness, and response is referred to as "community participation in crises." In other words, people participate in all stages of the crisis management cycle, from start to finish, and then return to their original state. The burden of crisis management falls on policymakers and government officials without the participation of society. As a result, if society is confronted with major disasters, the possibility of disaster management success is reduced due to the limited authority of the governments. Public participation entails the participation of various disaster management stakeholders, such as students, environmental activists, residents, and non-governmental organizations (NGOs) such as the Red Crescent.

A study was conducted in the United States by Vijayan and colleagues to determine the experimental effects of natural and man-made disasters, such as armed conflict and their effects on RH. Because armed conflicts occur more frequently in developing countries, there was a significant difference in mortality and RH complications between these countries and developed countries (1).

The National Disaster Response Framework (NDRF) reported a year before the earthquake that it would be a large-scale disaster in a study by Chaudhary in Nepal on humanitarian responses to reproductive and sexual health needs in 2015. According to the findings, private and public hospitals could not meet health needs, and no comprehensive disaster management guidelines were in place. Following the initial evaluation, however, obstetricians sent medical camp kits, together with nurses with birth attendance skills to help organize RH development camps, provide the health facilities

with RH emergency kits and midwifery kits, and give psychosocial counseling. Furthermore, shelters and transfer houses for pregnant women and their infants were established (22).

According to a study conducted by Jahangiri and colleagues in Iran in 2018, the factors that could affect RH in disasters were classified into six categories: ignorance of cultural factors, lack of planning, lack of education, insufficient data collection, male RH ignorance, and lack of monitoring systems (14, 15). As a result, it was concluded that the affected people's RH could be improved by considering cultural factors, planning, education, data collection, a monitoring system, and a focus on male RH. In accordance with international RH strategies and policies, health organizations require national and local programs to meet people's RH needs during disasters and emergencies. Access to essential information on sexual and reproductive healthcare, and non-discriminatory services should also be included in the plans. Furthermore, paying attention to cultural and religious factors can be important to effective RH management in countries with diverse ethnicities. Overall, disasters can be viewed as an opportunity to improve RH management in disaster situations (23).

A systematic review by Beek and colleagues found little evidence of midwives' activities and roles throughout the disaster. The lack of evidence was more noticeable during the disaster mitigation, preparedness, and response phases than during recovery. To ensure the recognition of the potential of midwives and optimization throughout the disaster management cycle, research-informed rules and strategies are required to better adjust the scope of practice of midwives with the objectives of multi-agency guidelines and agreements, as well as the activities of the MISP (14, 15). The findings of this study are nearly identical to those of the current study. Most RH issues are nearly identical across countries. The presence of midwives and health personnel in disaster areas can help reduce RH issues and improve these women's sexual health.

A systematic review conducted by Sohrabizadeh and colleagues revealed six categories of RH management issues in disasters, including a lack of awareness of cultural factors, a lack of planning, a lack of training, insufficient data collection, a lack of knowledge about male RH, and a lack of monitoring systems. The findings suggest that by considering cultural factors, planning, training, data collection, a monitoring system, and focusing on men's RH, the affected people's RH can be improved. In accordance

with international RH strategies and policies, Iranian health systems require national and local plans to meet people's RH needs during disasters and emergencies (10).

Harville and colleagues demonstrated that various types of disasters might reduce the fetal growth in some women. However, no effect on gestational age at birth appears to exist. The degree of exposure is the most important predictor of mental health problems in pregnant and postpartum women. Following a disaster, the mother's mental health may have a greater influence on the child's development than any direct effect of disaster-related prenatal stress. There is evidence that disasters impact maternal mental health and some perinatal health outcomes, particularly among high-risk women. Future research should concentrate on previously unstudied outcomes, such as spontaneous abortion (24). Relief workers and clinicians should focus on the most vulnerable women, particularly those with mental illnesses.

There have been very few studies on RH in the world to date. Future research into the fertility experiences of women in disasters is, therefore, recommended. One of the limitations of the study was that national databases lacked sufficient quality (search tools) and quantity (number of registered articles) and did not include all of the scientific journals in the country. Another limitation of the study was that only articles written in English were included. Another limitation of this study was the inability to access the full texts of the articles.

Conclusion

The most vulnerable individuals in society are women and girls. Women's living conditions are worsened, and they experience mental, psychological, and physical stress due to emergencies and disasters. Therefore, the issue of RH among women should be given special consideration by health policymakers. Creating RH programs for women affected by disasters is essential to disaster management. Therefore, to lessen their suffering and issues during disasters, countries should develop thorough guidelines and programs to improve the RH of women and girls of childbearing age.

Conflict of Interest: None declared.

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