

## CONSEQUENCES OF EARTHQUAKE (AUGUST 2012) ON IRANIAN WOMEN'S REPRODUCTIVE HEALTH: A QUALITATIVE STUDY

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### ABSTRACT

**Aim:** Natural disasters have numerous effects on vulnerable groups, particularly pregnant women and women in labor. There is little information available about the aftermath of earthquakes on women's reproductive health in Iran and other Middle East countries. Hence, this study aimed to investigate the status of women's reproductive health following East Azerbaijan province earthquakes of August 12, 2012 in Iran.

**Methods:** In this qualitative study, 16 earthquake-affected women and 14 health providers from the three struck towns and their villages, and health center and deputy for healthcare of Red Crescent Society of East Azerbaijan province in Iran, participated in semi-structured interviews and data were analyzed by means of qualitative content analysis.

**Results:** Four main categories were extracted including psychological complications, reproductive system physical damages, sexual health damages, and fertility regulation. The first category had two subcategories (short term and long term effects).

**Conclusion:** Results showed that the earthquake had severe effects on some aspects of women's reproductive health, particularly on pregnant women and women in labor. Providing such cares, must therefore be prioritized in services for earthquake-affected women. This issue shows a demand for decision-makers' and service providers' greater attention to women needs during natural disasters.

**Key words:** disasters, earthquakes, Iran, reproductive health, women's health.

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### Introduction

Natural disasters are a global concern<sup>(1)</sup> which affect a large number of people every year world-wide<sup>(2)</sup>. Each natural disaster is a unique incident and imposes different health challenges depending on the geographical nature and extent of struck areas<sup>(3)</sup>. Natural disasters still lead to many short- and long-term health problems<sup>(4)</sup>, have various effects on human health<sup>(5)</sup> and are a great threat to the health of society<sup>(6)</sup>.

Health interventions during disaster must be planned based on the most valid research evidence. Nevertheless, there is little research on how to offer services to people, especially health services, at the time of natural disasters<sup>(1, 7)</sup>. Although numerous studies have investigated psychological aftermaths of disasters such as post-traumatic stress disorder<sup>(8, 9, 10)</sup>, depression symptoms<sup>(11, 12)</sup>, general distress, grief and substance abuse<sup>(13, 14)</sup>, there is little information available about physical health of survivors.

For instance, findings of Low et al. in New Orleans showed that Hurricane Katrina (2005) caused increased prevalence of recurrent headaches and digestive and back problems among survivors<sup>(15)</sup>.

In order to address the needs of individuals affected by natural disasters<sup>(16)</sup>, it is necessary to identify vulnerable groups who need more help<sup>(17)</sup>. One of these groups are women who are more exposed to and major victims of disasters because of poorer access to resources<sup>(18, 19)</sup> and physical, social, economic and biological differences<sup>(20)</sup>. In addition, overlooking women's needs during disasters may affect the health of the whole damaged society because of women's critical roles<sup>(16)</sup>. Reproductive health is one of women's most important needs especially in emergencies<sup>(21)</sup> and ignoring it can lead to numerous adverse outcomes including increased maternal mortality, sexual violence, sexually transmitted diseases, unintended pregnancy and unsafe abortion<sup>(22)</sup>. Few studies have examined the effects of natural disasters on women's reproductive health. For example, some studies showed that during disasters pregnant women are exposed to preterm delivery, low birth weight and infant mortality<sup>(23)</sup> and their access to contraceptives becomes more limited<sup>(24)</sup>.

Urrutia et al. (2009) showed that Haitian earthquake-affected women had great health and educational needs<sup>(25)</sup>. Lack of information about the effects of disasters on different aspects of women's reproductive health is apparent<sup>(15, 26)</sup> and therefore more research is required for better plans in order to meet women's reproductive health needs<sup>(20, 26)</sup>.

Although provision of reproductive health services is a minimum standard for providing health services in crisis situations<sup>(27)</sup>, establishment of such services in the form of minimum initial service package for reproductive health requires special consideration of religious beliefs and cultural values of different societies<sup>(22)</sup>. Moreover, not much information was found in literature about women's reproductive health needs in disaster conditions in Iran and other Middle East countries. Accordingly, this qualitative study examined the status of women's reproductive health following East Azerbaijan earthquake of August 12, 2012.

## Background in Iran

Iran is the sixth country in the world regarding the incidence of natural disasters<sup>(28)</sup>. Earthquake,

flood and drought are the most common natural disasters in this country<sup>(29)</sup>. Earthquake is one of the most severe natural disasters in Iran so that 18 earthquakes of magnitude over 8 have been recorded so far<sup>(28)</sup>. The most recent earthquakes were those of August 12, 2012 which measured 6.3 (occurred at 16:53) and 6.4 (occurred at 17:04) on the Richter scale. The earthquakes occurred in East Azerbaijan Province located in northwest of Iran in a mountainous and hard to pass region which is 5500 square kilometers in area. They hit near the towns of Ahar, Heriss and Varzaghan along with 345 villages in the middle of summer and affected about 264000 people of whom 44000 were women of childbearing age.

## Methods

### *Study design*

This study was performed two years after the earthquake and conventional qualitative content analysis was employed for data analysis. Qualitative content analysis is the subjective interpretation of the content of textual data through systematic process of coding and identifying themes or patterns. The aim of conventional content analysis is to describe a phenomenon or emotional reactions of participants<sup>(30)</sup>.

### *Setting and participants*

Research setting included towns of Ahar, Heriss and Varzaghan and villages damaged by the earthquake. Centers involved in the incident were urban and rural health centers of Ahar, Heriss and Varzaghan, Ahar hospital, East Azerbaijan Red Crescent Society, two large obstetrics and gynecology hospitals in Tabriz (the capital city of East Azerbaijan), and in some cases participants' houses.

The researcher (F.B) selected some of managers and health providers involved in the earthquake as preliminary participants by referring to health centers of East Azerbaijan Province and struck towns. Then, by consulting local health providers, several women who were affected by the earthquake and qualified to participate in this research were identified and contacted. The criterion to choose health providers was planning or providing reproductive health services at the time of earthquake, and the criteria to choose women were being in the range of childbearing age (15-49) regardless of marital status and having reproductive health issues at the time of earthquake such as preg-

nancy, labor and delivery, using contraceptives, breastfeeding or menstruation. Also, maximum variation sampling based on important characteristics of participants such as age, marital status, education level, reproductive status and location were used for increasing data transferability. Participants were selected through purposive sampling. Finally, 16 earthquake-affected women and 14 health providers were selected and participated in in-depth interviews. Analysis of data from each interview guided the next interview and sampling was continued until data saturation was achieved. In the present study, lack of new codes extracted from three consecutive interviews was the criterion for data.

### **Data collection**

Data were collected through interactive semi-structured in-depth interviews. Prior to each interview, participants agreed upon the time and place of interview over the phone, and the places where interviews were held were chosen by participants to be their homes, health centers or workplace of interviewers. Each interview began with a couple of general questions in order to establish trust and build a relationship with the participants. Then preliminary questions were asked from affected women and health providers like: Would you please describe the day of earthquake? What sort of problems did you face in terms of reproductive health after the earthquake? Do you think your problems were caused or exacerbated by earthquake? As a woman, what kind of problems did you have after the earthquake (from affected women)? What sort of obstetrics and gynecology problems did earthquake-affected women have when they referred to you (from health providers)? Next questions were asked according to the answers provided. For example, what did you do for this? Can you give an example? Interviews were recorded with participants' consent. Interviews lasted from 30 to 60 minutes.

Twenty seven participants were interviewed only once and three were interviewed twice for further data collection. Four interviews with earthquake-affected women and 14 interviews with health providers were held in Persian and 12 interviews with earthquake-affected women were held in Azeri which were translated into Persian by the researcher (F.B). It is noteworthy that the researcher is fluent in both languages.

### **Data analysis**

The data analysis was performed by using conventional content analysis. To get a general impression of the data, the researcher listened to each recorded interview several times and transcribed it word by word. Data were analyzed by means of conventional content analysis and based on Granheim and Lundman's<sup>(31)</sup> model: through data preparation (data transcription); identification of meaning units (words, sentences or paragraphs in utterances of participants which included important points about the subject of the research); text coding (translation of the meaning units into codes which expressed the meanings of such units); classification and expansion of main categories and subcategories based on similarity and proportionality; revision of subcategories and re-comparison with data in order to ensure data rigor; precise identification of main categories; comparison of categories and report findings. It is noteworthy that data analysis proceeded continuously and simultaneously along with data collection.

### **Trustworthiness**

To insure data rigor, the criteria of credibility, dependability, conformability and transferability (32, 33) were implemented. In terms of credibility, researcher's long-term involvement with the subject, control of preliminary codes by some participants and interviews with earthquake-affected women and health providers were used. Maximum variation sampling was employed to retain data dependability. In terms of conformability, two external supervisors assessed and reviewed the codes and confirmed the findings (34). For data transferability, participants' demographic information was expressed in detail.

### **Ethical considerations**

Prior to data collection, the research proposal was reviewed and approved by Regional Research Ethics Committee of the authors' institution and ethical principles such as informed consent, anonymity, confidentiality, and right to quit the study were completely observed. All the participants were informed about the study's purpose and method. They were informed that participation in the study was voluntary and that they could refuse to participate or withdraw from the study at any time.

Moreover, they were assured that their responses would be kept confidential and that their identity would not be revealed at any stage of study. Lastly, written consent was obtained from those health providers and earthquake-affected women who willingly accepted to participate in the study.

## Results

Fourteen health providers (12 females and 2 male managers) with different levels of education, job, age and service were selected who were somehow affected by the earthquake and most of them experienced consequent psychological damages. In addition, 16 earthquake-affected women both single and married and ranging from 15 to 49 years old were selected who had reproductive health issues at the time of earthquake and following days. Four main categories were emerged from analysis of interviews: psychological complications, reproductive system physical injuries, sexual health problems, and fertility regulation.

### *Psychological complications*

Psychological complications were among the effects of earthquake on women's reproductive health including various reactions to earthquake and aftershocks and their aftermaths. These general psychological reactions, directly or indirectly, affected other aspects of reproductive health such as physical injuries, sexual relationships and fertility regulation. This category consists of two subcategories namely short-term and long-term effects.

### *Short-term effects*

Short-term effects included psychological reactions from the time of earthquake until three months after. Women's experiences indicated that at the time of earthquake and aftershocks, they showed severe reactions such as screaming, crying, distress, shock, fear and anxiety.

"... everything was shaking strongly under our feet ... all of us were screaming ... I was so scared ... I feared that I might get neurological problem ..." (participant 14).

However, these symptoms subsided a few days after the incident and other symptoms emerged along with above reactions such as depression and post-traumatic stress disorder which in some cases, lasted for months.

"... I'm still scared. When my child slams the door, I think it is earthquake. Or when someone is

running on the roof, I think it is earthquake ... I panic again ..." (participant 19).

These psychological reactions caused disappointment and severe impairments in women's functions so that in several cases, they had refused to attend to health centers to their reproductive health check. Also, sometimes they couldn't talk about their problems with health providers in healthcare centers.

"... All of them were panicked and frustrated. They were even unable to tell which part of their body is in pain. ... they were distracted ... they were panicked ..." (participant 5).

Fear of their own death and fetus injury, concern about damaging the family members and fear of incapability to breastfeed the infant were the reasons women expressed as the main causes of such reactions. The worst psychological reactions were related to women who gave birth at time of earthquake and a few days after. Some of these women did not want to leave their tents because of extreme fear and preferred delivery in tents to referring to hospital and the possibility of delivery on the way to hospital. The reaction was so intensive that many of these women suffered from postpartum depression.

"... parturient women in labor were extremely stressed out. some of them preferred to deliver in tent or home and didn't go to hospitals ... they were afraid they would give birth or die on the way ... they were very agitated. They were worried even on the delivery bed ..." (participant 12).

Following the early days of earthquake, women's most important psychological concerns were the possibility of strangers, wild animals or vermin entering the tents and conex homes, and lack of security. In this regard, rural women said that they had fewer problems than urban women because all the villagers were familiar and their tents were close to each other.

"... we were extremely scared ... our men did not sleep. Do you think our men slept comfortably in the tents? No! They took turn to guard the tents ... we were afraid of both earthquake and bad people ..." (participant 27).

### *Long-term effects*

Most of psychological effects of earthquake on women lasted for more than three months or even two years. These effects were so severe that some of participants became extremely saddened when remembering the earthquake. The most important

long-term psychological symptoms were continuous stress and fear of earthquake recurrence, post-traumatic stress disorders, and depression due to destruction of property and loss of loved ones. In cases where a woman had lost one of her loved ones, the mourning period was not completed yet.

"... well I missed her ... I thought my child was with me. Suddenly, I realized that she is gone. ... I thought my child was with me and now she's disappeared. I'm still sad at this very moment ..." (participant 29).

### ***Reproductive system physical injuries***

Reproductive system physical injuries included trauma, urogenital infections, menstruation-related complications, pregnancy complications and problems associated with labor and delivery and breastfeeding. Major reasons expressed by participants were earthquake or psychological complications. Some of these disorders emerged a few hours or days after the earthquake and some others occurred or continued long after the incident.

Urinary tract infections and pyelonephritis were examples of physical injuries especially among pregnant women. Women had genital infections during the weeks and months after the incident due to lack of access to hygienic restrooms, no regular bathing, failure to regularly replace underwear in the tents, contaminated environment, and inappropriate sanitary pads.

"... I went to a restroom with no hot water ... I was ashamed because of the men ... doctors said I had severe infection. I had uterine infection. I always sat on the ground. It was damp ..." (participant 16).

Menstrual complications such as polymenorrhea, menorrhagia, metrorrhagia, amenorrhea, dysmenorrhea, and even premature menopause were the most common physical injuries in women's reproductive health system.

"... I went through premature menopause because of that stress. Doctors said it was because of stress; before the earthquake I had no problem. I'm a postmenopausal woman in 39 because of stress ..." (participant 28).

Incident-related trauma caused pregnancy complications including threatened abortion with vaginal bleeding because of physical trauma caused by the destruction or because of fear and anxiety caused by the earthquake, placental abruption because of falling and being trapped beneath the rubble, vaginal discharge or even idiopathic oligo-

hydramnios, preeclampsia, cervical rupture during delivery; onset of labor and delivery symptoms such as preterm delivery and consequently prematurity and low birth weight or onset and rapid progress of labor pain; and aftermaths of rapid labor including delivery on the way to hospital, in tents or home, or precipitate delivery in hospital.

"... When we arrived there, one patient's mother shouted help us! Help us! I said what happened? ... She said my daughter is in labor. I didn't believe her. I said I examined her recently, the cervix measured two fingers ..." (participant 9).

These problems turned pregnancy during the earthquake into women's worst memory of their whole lives because of severe complications, lack of rest during pregnancy, lack of access to desired foods, and no desire to eat caused by long-term psychological complications.

"... May God destroy the pregnancy forever? It was awful ... my heart yearned to eat everything I wanted. ... It was a terrible pregnancy. I had neither peace nor rest ..." (participant 17).

Breastfeeding women also complained about temporary low milk supply or no milk at all caused by stress and fear of the earthquake, which in some cases led to feeding by formula milk despite mother's desires.

"... My breasts completely stopped producing milk after ten weeks. The baby didn't suckle too. ... I wanted to breastfeed. ... but I had no choice ..." (participant 30).

### ***Sexual health problems***

Other effects of earthquake on women's reproductive health were decreased sexual intercourse and sexual desire among married couples and in a few cases, increased affairs and infidelity.

Several women reported that they did not have sexual intercourse with their husbands long after the incident because of post-earthquake severe stress and depression and increased work and exhaustion. Living in shared tents, closeness of tents to each other, and people's walking around the tents were other reasons. In majority of interviewed women, this issue lasted for a month, but it lasted for two years in some cases.

"Tents were very close to each other ... say, there were about 20 to 30 tents with a one meter or one and half meter space between them. We were not comfortable ..." (participant 20).

Given the religious culture of the region, most women considered sexual abuse against themselves

unlikely. Rural women in particular felt gathering of relatives in close tents as protective against sexual abuse. In some rare cases however, unethical sexual relationships and cheatings were reported by women and health providers.

“... No we weren't afraid. Our men were with us. We weren't afraid of this issue. Such problem didn't exist here. Everyone was kind ... a lot of people had come here but we didn't feel insecure ...” (participant 15).

### **Fertility regulation**

Other effects of earthquake were issues associated with fertility regulation and use of contraceptives. Some women had no more interest in pregnancy due to the disappointment in life and poor living conditions after the earthquake. Others stated that they had not used contraceptive pills for several days to several months because of being busy, lack of access to these pills and no sexual intercourse.

“... I didn't take my pills for several days. For example, I didn't take them for about two months. No one was focused back then! Sex was completely off the table ...” (participant 22).

Women who used Intra Uterine Device (IUD) had forgotten to check it within the first months after the earthquake, and health providers stated that they could not check on IUDs in all affected women due to lack of equipment especially in rural areas.

“... I remembered it (the IUD) after seven months. No one thought about themselves for six or seven months. We thought about our children only ...” (participant 18).

Some women became pregnant in the tents with several cases being unintended pregnancy which led to increased criminal abortion. Another reason for criminal abortion was mothers' fear of fetal complications due to taking antidepressants and sedatives after the earthquake.

“They came to my office. They were many of them. They said we had (intentional) abortion because we didn't want children ... but now we are bleeding. We performed curettage for those with fetal death or incomplete abortion. But we said no to women with viable fetus despite the fact that they had taken sedative drugs ...” (participant 10).

### **Discussion**

The present study is one of the firsts to exam-

ine the consequences of earthquake on women's reproductive health in Iran and other Middle East countries. Results showed that earthquake has various consequences on different aspects of women's reproductive health.

One significant finding of this study was that earthquake causes short- and long-term psychological reactions, relevant to reproductive health problems, in affected women. Particularly, it was found that even after two years, many women still had symptoms of depression and post-traumatic stress disorders. In this regard, the research of Forbes et al. (2009) on survivors of the Black Saturday bush-fire in Australia showed that there was a direct relationship between being affected by this incident and mental health outcomes, with this relationship being more significant in women<sup>(35)</sup>.

In a study on 16 to 24 year old women, Hirth et al. (2013) suggested that Hurricane Katrina increased symptoms of post-traumatic stress disorders<sup>(36)</sup>. Rezaeian (2013) reported in a narrative review that following a natural disaster, near one third of the whole affected population would suffer mental distress such as post-traumatic disorder, depression and anxiety disorders and that women are the most vulnerable groups to these symptoms<sup>(37)</sup>. Therefore, supporting and paying more attention to affected people in disasters specially those who lost family members, are necessary<sup>(38)</sup>.

Physical injuries of reproductive system such as menstrual disorders and urogenital infections are the most frequent aftermaths of the earthquake. In line with these findings, a study by Liu et al. (2008) on Chinese earthquake-affected women revealed that genital infections and menstrual disorders increased after the earthquake and that women's satisfaction with their sexual life decreased significantly. In addition, in this study, most women reported reduced or temporary interruption of sexual intercourse which is supported by previous studies<sup>(39)</sup>.

Participants also reported that pregnant women experienced various complications like placental abruption, premature rupture of membranes, preterm delivery and related complications, and rapid labor. Oyarzo et al. (2010) studied Chilean earthquake-affected pregnant women and concluded that the rates of preterm delivery, premature rupture of membranes, and intrauterine growth restriction had increased compared to previous year (40). The main problems of breastfeeding women in this study were low milk supply or temporary or permanent stop of lactation and use of formula milk.

One of the most interesting findings of the present study was that earthquake-affected women felt safety and security especially in rural areas and there were few cases of sexual abuse and infidelity. In contrast to this finding, an investigation by Women's Refugee Commission showed that reproductive health risks and particularly sexual violence against female adolescents had increased in several cases such as Haiti earthquake<sup>(41)</sup>.

Another research also reported sexual violence against women after Hurricane Katrina<sup>(24)</sup>. Possibly, fear and shame of victims about reporting sexual abuse and violence and infidelity were the main reason for this finding, as mentioned by some health care providers. Lack of sexual abuse and violence reporting system is also reported in previous studies<sup>(42)</sup> and cultural norms and associated taboos about sexual issues are probable obstacles to reporting sexual violence against women especially in small towns and rural areas<sup>(43)</sup>. The main reason for the small number of sexual abuse and violence in the present study might be the religious culture of the region which was repeatedly mentioned by women and health providers.

Another finding of the present study was that most earthquake-affected women had no interest in becoming pregnant again because of frustration and poor living conditions. In this regard, He et al. (2008) stated that pregnancy rate decreased during 12 weeks after Wenchuan earthquake but increased again after 12 weeks<sup>(44)</sup>. Women also faced other problems such as stopping contraceptive pills and forgetting to check on IUD due to personal reasons or lack of access to such services. These led to unintended pregnancy and illegal abortions in several cases. In a study on women affected by Indonesia tsunami in 2006, Hapsari et al. (2009) found that 11% of women had difficulty in accessing contraceptives which in turn led to increased unintended pregnancy<sup>(45-46-47-48)</sup>.

Results of the present study may help to provide better reproductive health cares for women affected by natural disasters. Results showed that most of women's problems even physical ones are rooted in psychological complications which may last for years. Therefore, psychological support must be provided by experts for affected women in order to help earthquake-affected women to cope with this traumatic experience. Another finding of this study was that pregnant women and women in labor must have priority in earthquakes and getting all sorts of cares.

Moreover, given the prevalence of infections in women and failure to constantly use oral contraceptives and to control IUD, it is necessary to provide education in terms of following hygiene principles to prevent urogenital infections or constantly taking oral contraceptives and also to prepare specialists and to provide essential facilities such as hygienic toilets and bathrooms, mobile reproductive health clinics in affected regions, better shelters and temporary housing. It is also necessary to provide education and consultation on sex and sexual assault based on women's cultural and social conditions.

This study has some limitations. First, two years had passed from the earthquake at time of interviews and it was possible that some participants were unable to remember all consequences of the earthquake. Second, the present study examined the consequences of East Azerbaijan earthquake on affected women's reproductive health and the results cannot be generalized to other parts of the country and women affected by other natural and unnatural disasters.

## Conclusion

Results showed that the earthquake had severe effects on some aspects of women's reproductive health, particularly on pregnant women and women in labor. Providing such cares, must therefore be prioritized in services for earthquake-affected women. This issue shows a demand for decision-makers' and service providers' greater attention to women needs during natural disasters.

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