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Public Health Risks Threatening Health of People Participating in Mass Gatherings: A Qualitative Study

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Introduction

Mass gatherings (MGs) are held for **religious**, **social**, **cultural**, **political**, and **sport** reasons, and they prone to health hazards and events.

According to the World Health Organization, a MG is a planned or unplanned event in which planning and responsible resources are under pressure at local, state, or national levels due to a large number of people.

MGs have made many problems for the health system and potentially threaten the health of those participating in these gatherings.

Introduction

MGs account for a range of public health risks including communicable diseases, waterborne diseases, and outbreaks.

Meanwhile, international travel for participating in MGs increases the risk of infectious diseases, which are not endemic.

In fact, the prevalence of infectious diseases in international MGs is a health threat for the whole world.

Introduction

Therefore, MG planners should pay particular attention to sudden health emergencies such as the incidence of diseases and pandemic disasters, which require planning and preparation and, ultimately, increased response capacity in the health sector.

Provision of services through health facilities is different from ordinary conditions since these services are provided temporarily.

Many of health risks related to MGs have been developed because of lack of risk management strategies.

Prevention, diagnosis, and treatment of diseases will be achieved when health authorities are aware of threatening health risks.

Introduction

To achieve risk reduction measures, in the first step, health risk factors and their aggravating conditions should be identified, then a comprehensive risk assessment should be accomplished.

Furthermore, to gain better results in relation to the management of MGs, challenges, strategies, and lessons learned should be documented, studied, and evaluated.

The main objective

The present study aimed to identify public health risks threatening the health of people participating in MGs in Iran.

Materials and Methods

Study design

A qualitative study was conducted from December 2018 to February 2019 as a part of a larger research on explaining the health risks threatening the health of participants in MGs in Iran.

The study was conducted using a conventional content analysis approach. In this approach, coding and categorizing are done directly from the raw data.

In this process, an inductive coding is used to extract the themes and categories from the data through exact texts and continuous comparisons by the researcher.

Materials and Methods

Study population – Selection and data collection

The study population included those who had the necessary experience in the field of health of MGs in Iran. The study participants were selected using a purposive sampling method.

Participants were selected among the managers and staff of the Emergency Departments of Medical Service Centers, Public Health Deputy of Medical Sciences Universities, and the Red Crescent Society, who had professional experience in the field of health of MGs. Finally, a total of 16 such participants were included and studied.

Materials and Methods

Study population – Selection and data collection

Data were collected by an in-depth interview. Interviews were conducted from December 2018 to February 2019.

Initially, participants were explained about the purpose of the study, as well as conduction of the interview and the right of individuals to participate or withdraw from it at any stage of the research.

Subjects were interviewed through individual in-depth interviews after obtaining informed consent. Semi-structured interviews were used to collect the data.

Materials and Methods

Study population – Selection and data collection

Interviews were conducted by a member of the research team and then were shared with other members of the team to extract the themes, fix any potential problems, and provide better questions for subsequent interviews.

All interviews were conducted face-to-face. In some cases, if there was any ambiguity, a phone call was made after the interview. Interviews were conducted at a place convenient for the participants.

Each interview began with an open question to clarify the concept; follow-up questions were presented based on the information provided by the participants. Interviews lasted between 17 and 50 min (on average 30.3 min).

The criterion for stopping sampling was data duplication or data saturation.

Materials and Methods

Analysis and presentation

To analyze the data, the content of recorded interviews was written word by word. Preliminary data were repeatedly and simultaneously retrieved by the study team members to give a general understanding of them.

Then, they were analyzed by continuous comparison and inductive analysis. Semantic units of the data as sentences or paragraphs were determined from speeches and texts of the interviews; afterward, primary or open codes were extracted. Finally, subcategories, main categories, and themes were summarized.

Materials and Methods

Analysis and presentation

After the coding process, categorized codes and meanings derived from them were interpreted as the theme. Following the addition of each interview, the analysis was repeated and codes and categories were modified.

In this study, data validation was improved by integrating data and repeated overview using different strategies such as adequate involvement and interaction with the participants, diversity among the participants in terms of age, experience, and various occupations.

To achieve confirmability, data review methods were used by the participants (member check), the results of which were reviewed by external observers (peer-check).

Ethical considerations

This study was approved by the Ethics Committee on Research at the School of Public Health, Shahid Sadoughi University of Medical Sciences, on July 10, 2017, with a reference number of IR. SSU. SPH. REC.1396.66.

Principles of presenting objectives of the study to the participants, confidentiality of information, obtaining informed consent for conduction of the interview, and recording of the conversation and the right to withdraw from the research at any stage were followed in this study.

Results

A total of 16 interviews were conducted with 16 participants. All the participants were male, with median age being 46.5 years (range: 36–52 years) and median years of work experience being 20 years (range: 15–30 years); 37.5% of the participants had a bachelor degree of education and the rest had above bachelor degree education.

Results

Totally, 552 codes were produced without calculating the overlaps. For more accurate coding and facilitating the study process, code merge was performed; and eventually, 38 codes remained, which were placed in eight subcategories.

Ultimately, four main thematic categories were obtained. Thematic categories were conceptualized as 1- **food hygiene deficiencies**, 2- **risk of communicable diseases**, 3- **defects in health supervision**, and 4- **Environmental contamination**.

The main theme as public health risks was also conceptualized from these main categories.

Table 1: Themes, subthemes, and codes in relation to public health risks of mass gatherings as extracted from in-depth interviews

Thematic categories	Subcategories	Extracted codes
Food hygiene deficiencies	Risks related to water health	Improper water treatment Water, liquids , and ice supply from uncertain sources
	Risks related to food health	Food preparation from uncertain sources and lack of centralized cooking Unhygienic distribution of food
Risk of communicable diseases	Outbreaks and spread of diseases	Spread of respiratory diseases due to population density Spread of gastrointestinal diseases due to common source of food contamination
	Deficiencies in disease surveillance system	Insufficient disease monitoring centers Inefficient patient detection
	Lack of coordination regarding presence of health supervisor	Lack of compulsion to obtain health permissions before gathering Weekend program for recalling the public health team
Defects in health supervision	Defects in health supervision authority	MGs without certification from department of Health MGs personals without individual health certification card
	Deficiencies in venue hygiene	Improper collection and disposal of the waste Disruption in resource balance due to presence of unorganized participants and vendors
Environmental contamination	Sanitary toilets deficiencies	Disproportionate number of sanitary toilets relative to the participants Insufficient number of sanitary toilets in some paths with mobile population

Theme: Food hygiene deficiencies

Subcategories: Risks related to water health

Improper Water Treatment

Distribution of water between the participants is a crucial health issue. The following is an example of participants' quotations:

“In a mass gathering, pumps are placed in the river, and this water is introduced into urban water supply system with a transient treatment. In our opinion, this water is inappropriate not only for drinking but also for bathing and washing the dishes and fruit”

Water, liquids , and ice supply from uncertain sources

Another participant mentioned, “In religious gatherings, health care monitoring is very difficult because many people are involved in supplying and distributing the water, juice, and tea, and therefore there are many sources of supply”

Theme: Food hygiene deficiencies

Subcategories: Risks related to food health

Food preparation from uncertain sources and lack of centralized cooking

Food health monitoring is possible when food is prepared in a well-defined and hygienic location for the participants in MGs. Regarding an epidemic in a religious gathering, a participant said:

“In an outbreak of diarrhea, 16 people were referred to the health facility; and it was found that the source of the disease was consuming a common votive food. Although, the place of gathering was clear to us, but we did not know where the food has been cooked and distributed”

“In case of the Arbreen gathering, the pilgrims use votive foods from indigenous people, and they do not know who has made them, thus there are more risks, and it is more difficult to manage the situation”

Theme: Food hygiene deficiencies

Subcategories: Risks related to food health

Unhygienic Distribution of Food

Conditions for preparation of food may be completely hygienic and healthy, but poor distribution conditions cause health problems and hazards for the participants in MGs.

“Usually, because of lack of washing facilities, disposable container is used in gatherings, there are different types of container, each of which has been designed for a specific use, and on this basis health certification is achieved. But, people without any knowledge about this standard use them in unrelated and unhealthy cases”

Theme: Risk of communicable diseases

Subcategories: Outbreaks and spread of diseases

Spread of respiratory diseases due to population density and spread of gastrointestinal diseases due to common source of food contamination

Infectious and communicable diseases are among the public health hazards that can lead to a catastrophic event in MGs. In the following, participants' quotations were presented in this regard:

“Because in MGs different people come together in one place and their contact rate is very high, the outcomes of communicable diseases can be more pronounced such as respiratory diseases, and if they receive food on a common source, they may suffer from diarrhea and gastrointestinal problems”

Theme: Risk of communicable diseases

Subcategories: Deficiencies in disease surveillance system

Inefficient patient detection

Detection of illnesses is also inefficient during MGs. One of the participants stated, “In some gatherings such as Hajj and Arbaeen, there is a system for identifying cases of illness at the entrance to the country, which is not sufficient for complete checkup of the pilgrims. Pilgrims are asked for some symptoms and some of them are denied. This system is not efficient”

Insufficient Disease Monitoring Centers

One participant opined, “In some gatherings, monitoring system of diseases is present, and suspected cases are reported right after the detection, but this system is not sufficient for the gatherings where the population is scattered, and some cases of disease are not observed”

Theme: Defects in health supervision

Subcategories: Lack of coordination regarding presence of health supervisor

Lack of compulsion to obtain health permissions before gathering

MGs are indicators of multidisciplinary management of the events. Health is one of the most important sectors. Without coordination for the presence of the public health experts, MGs will threaten serious risks. The example quotation related to this issue is as follows:

“A food business unit in the community should be licensed both from office of Public Places and Public Health administrations. But this is not the case for MGs, and only the license from public places office is enough, which is a problem in holding the MGs”

Theme: Defects in health supervision

Subcategories: Lack of coordination regarding presence of health supervisor

Weekend program for recalling the public health team

The example quotation related to this issue is as follows:

“In many gatherings which are in coordination with public health administration, we send the team immediately and we are ready at any hour, but some of gatherings hold spontaneously and there isn't recalling program for public health team”

Theme: Defects in health supervision

Subcategories: Defects in health supervision authority

MGs without certification from the department of health

“In MGs that have not been coordinated with the health sector, and we attend there spontaneously and through being informed from other sources, our authority is weak as they have not a public health certification to be canceled. Any sanitary hint or notification would be suppressed because there is no leverage”

MGs personals without individual health certification card

“In circumstances other than gatherings, and in the places where we are allowed to interfere, we will not at all be allowed to license the individuals who do not have a certified health Card to prepare food for people, but in some gatherings, we have people who have not received any sanitary approvals. This is a risk for the population and participants”

Theme: Environmental contamination

Subcategories: Deficiencies in venue hygiene

Improper collection and disposal of the waste

“Environmental health unit should be very active in MGs; they should pay attention to some conditions providing the context for transmission of diseases, for example, collection and disposal of the waste and sewage”

Disruption in resource balance due to the presence of unorganized participants and vendors

“In MGs, there are two groups, which disrupt health balance of the venue. One group includes those coming in unorganized way, because the official system does not feed on them, pollution of their waste is even greater. Other groups are vendors. They cause the pollution in the environment and passages”

Theme: Environmental contamination

Subcategories: Sanitary toilets deficiencies

Disproportionate number of sanitary toilets relative to the participants

“In the gathering of Hajj holding in a few days, when pilgrims are outside the city, health facilities are not proportional to the population, number of sanitary toilets is low, and they are crowded and dirty causing a decline in the level of environmental hygiene in the gathering”.

Insufficient number of sanitary toilets in some paths with mobile population “In mobile mass gathering like Arbaeen, in which the population is moving, there are not many hygienic toilets in some walking paths”

Discussion

In this study, subcategories were obtained through integration of primary codes, and four main categories including food hygiene deficiencies, communicable disease risks, defects in health supervision, and the risk of environmental contamination were obtained from subcategories. Then, the **main theme** of the study as “**public health risks**” was extracted from these categories.

There are many reports of foodborne disease outbreaks in MGs. In international MGs, the outbreak of diseases occurs as a result of communicable diseases; these outbreaks have been more focused on gastrointestinal diseases.

Discussion

This suggests special attention to the health of the water and food. Furthermore, the outbreak of waterborne disease has occurred in MGs due to a lack of personal and public hygiene.

To reduce concerns about waterborne and foodborne diseases in gatherings, in addition to pay attention to hand hygiene, it is recommended to avoid receiving water and food from an unknown source (e.g., vendors).

This recommendation also applies to ice consumption. Participants in the MG are also recommended to use packaged water to ensure the health of drinking water.

Discussion

In MG of Hajj, the risk of waterborne diseases has been shown to be low due to provision of healthy water during the Hajj, but the use of ice from an unknown source has been reported to increase the risk of water pollution.

Previous studies stated that the use of water and food with an uncertain source is referred to purchases of food and ice from vendors; but in our study, it was demonstrated that, in addition to vendors, peoples- vow to provide the foods and drinks in religious ceremonies is one of these uncertain and high-risk sources. Furthermore, many studies suggested that vaccination programs can reduce the incidence of infectious diseases, especially in international gatherings.

Discussion

In MGs, human-to-human transmission of airborne diseases is facilitated due to high spatial population density. Most infectious diseases occurring in MGs are respiratory diseases and gastrointestinal infections. Meningitis outbreaks have also been reported in some cases.

Respiratory tract and ear, nose, and throat infections, influenza, pyogenic pneumonia, whooping cough, and tuberculosis are most commonly observed in the time of Hajj MG. Regarding infectious diseases, febrile systemic diseases, malaria, diarrhea, and respiratory infections have been common in MGs.

This evidence is consistent with our study results; naturally, some of reported cases are different from those in our study, probably due to differences in the context of the studies.

Discussion

Many studies have found that there should be a system for identification, reporting, and monitoring of diseases to detect incidence and prevalence of a disease and to address its outbreaks in MGs. The disease surveillance system can also be very helpful in identifying bioterrorism attacks.

In addition to designing instructions for endemic and seasonal diseases, it is useful to have a preventive plan and disease monitoring system. Traditional surveillance systems and rate of disease detection can be improved using novel systems such as Internet, mobile applications, and wireless networks.

Our findings revealed that, in Iranian MGs, disease surveillance systems are traditional and imperfect, highlighting the need for new decisions and modern technologies to promote them.

Discussion

In many MGs, particularly those lasting more than 1 day, if proper health supervision is not carried out over food and water supplies, then the incidence of disease would be inevitable.

Microbial testing of the water used in MG should be performed at various locations on a daily program. For instance, a team in Mina (a location in Hajj ceremony) carries out comprehensive monitoring on health of food preparation and distribution, this team greatly contributes in the prevention of diarrheal diseases.

Discussion

Findings of the above-mentioned studies have demonstrated that there is an increased risk of disease incidence and health problems in MGs without strict health supervision.

Furthermore, herein, it can be concluded that there is a lack of coordination for presence of health observers in some MGs. This issue is considerable in raising health risks in MGs.

Providing a safe and healthy environment in MGs requires a multi-sector approach; host cities should increase their capacities such as food and water supply, waste management, physical safety, and health care beyond routine and everyday conditions.

Discussion

Improper management of public and environmental health in terms of food, water, waste, land and traffic threatens the health and well-being of participants and employees.

Considerations should be given to personal health hygiene such as a sufficient number of toilets and soap in MGs. Furthermore, consumables such as soap and sanitary towels should be quickly replaced if consumed.

As reported in these papers, attention to the health of MG environments is effective in reducing health risks.

Discussion

Furthermore, in our study, unorganized individuals were mentioned as a disruptive factor in the balance of health facilities, consequently causing more pollution in the gathering environment.

Involvement of vendors in MGs is another challenge, which was considered a public health threat. Many studies have reported presence of vendors as a risk factor for reducing the health of food and beverages. In addition, in our study, vendors were considered as a factor increasing environmental pollution in MGs.

Limitations and suggestions

In this study, in-depth interviews were conducted with professionals who had experiences in providing health services in this field. Certainly, more in-depth interviews with other people involved in this area including security forces and even the participants can yield more complete results.

Furthermore, qualitative and quantitative researches with larger sample sizes and in other contexts should be conducted separately to determine more risks and themes threatening the health of people in MGs.

Conclusion

Public health risks are one of the most important issues of MGs, as they will not only threaten the health of the MGs participants but also threaten the health of the community.

The first step in managing health risks is identifying health risks.

This study by designing a qualitative study using the experiences of managers and health professionals in Iran has explained the health risks of MGs. Health managers can use these results to reduce these risks and improve participants' safety in MGs.

