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# Identification of potential health risks in mass gatherings: A study from Sabarimala pilgrimage, Kerala, India

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ABSTRACT

In India mass gatherings are especially common in religious congregations. Sabarimala is one of the most crowded sacred places in India and the most crowded in the state of Kerala, in southern India. This pilgrim destination attracts over 30 million pilgrims in a short period of 41 days (during which the temple is open to the devotees). Such mass gatherings pose special challenges for the community's existing health system. The present study aims to identify the potential health risk and the main difficulties faced by health care professionals in this world famous mass gathering destination. A total number of 46 doctors were interviewed with a structured questionnaire. The data thus obtained was analyzed with a modified health risk ranking method developed for this study based on literature survey and Microsoft Excel spread sheet. Risk prioritization index (RPI), likelihood level index (LLI) and corresponding consequences level index (CLI) were determined for the risk ranking. Human stampedes and person-to-person communicable disease have the highest rank in the risk identification. Lack of coordination, difficulty in access to medical facilities and shortage of paramedical staff are the main issues faced by doctors. The tools developed in this study can be effectively used in any mass gathering destination for identifying key health risks.



## 1. Introduction

A common definition for mass gathering is difficult [1,2]. Amongst many definitions the one by WHO is widely accepted – it defines a mass gathering as'more than a specified number of persons (which may be as few as 1000 persons although much of the available literature describes gatherings as those exceeding 25,000 persons) at a specific location for a specific purpose (a social function, large public event or sports competition) for a defined period of time' [3–6]. With the increase in population and urbanization, there has been a quantum jump in the number of people at mass gathering events especially religious congregations in India [6]. Around the world there are about 23 highly crowded religious places visited by more than 250 million people annually, and amongst these nine are situated in India [8]. The Sabarimala shrine in Kerala, where the present study was conducted, is one amongst the nine (Fig. 1).

Mass gatherings have the potential to turn into high morbidity and mortality incidents [9]. Such gatherings can lead to an increase in critical health risks when compared to other natural gatherings with similar number of people present [6]. At mass gatherings the crowd disasters like human stampedes or crush injuries are one of the main causes of mortality [10–12] and occur frequently with relatively high fatality rate, therefore becoming a matter of concern [9,13–16]. Other health-related incidents such as heat or cold related illness [17], food and water-borne illness [18], communicable diseases [19,20], drugs related illness and injury [21], large outbreak of meningococcal disease [22], and even crimes and terrorist attacks [23,24] could also occur. It could be said that such events have the potential to disrupt the health care system of the local medical infrastructure and medical community. The impact at the state level or the national level is limited, but the loss of confidence amongst the pilgrims could translate to their reduced inflow, which could impact the local economy to a certain extend [25].

The identification of potential risks is the key factor in every disaster management measure. The present study proposes a methodology adopted and modified from the original Northwest Center for Public Health Practice documents [26] for the potential health risk identification in mass gatherings (MG). The thrust of

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**Fig. 1.** Location map of the study area.

the study has a disaster management perspective, though it is rooted in the responses of the medical practitioners. Risk assessment is a continuous process that should occur throughout the period leading up to the MG and during the MG itself. It should include ongoing assessment of how the public health system, the health care system and the broader community will cope or are coping with increases in communicable diseases or disease-risk related to the MG. Mass gatherings represent many struggles for health care professionals [27–30]. The present study deals with the key health considerations for establishing plans and structures to manage health security outbreaks or incidents at mass gatherings. Also the challenges faced by health care professionals in mass gatherings are also a matter of concern.

## 2. Research questions

The two main research questions posed in the present study are:

- What are the potential health risks associated with Indian religious gatherings?
- What are the difficulties faced by doctors in a mass gathering?

## 3. Materials and methods

A direct in-depth interview was conducted among 46 doctors at district, sub-district level and in the Government Medical College, Kottayam with the help of a questionnaire between January and March 2014. The questionnaire for the interview was prepared based on review of literature and other research instruments used in similar studies. The questionnaire was pilot tested but not subjected to any peer review, except for discussions amongst the team. The questionnaire was mainly open ended and administrated by the interviewer. The doctors from hospitals who are deputed every year to the 'Sabarimala mass gathering' were selected to participate and the majority of the research population have had experience in mass gathering management.

In addition to health risks, experience of handling mass gathering medical emergencies, participation in training programmes in this field and the main difficulties faced by them in mass gathering management were queried through the questionnaire.

Pre-medical records associated with Sabarimala mass gathering such as common health issues for pilgrims, human stampede incidents were reviewed at the district medical office. A total number of 11 health risk categories associated with mass gatherings were recognized from the doctor's perspective. Data analysis was done with modified health risk ranking method developed for this study (Fig. 2) and Microsoft Excel spread sheet for basic statistics.

The identified risk was further categorized according to their cause i.e. infectious diseases, non-infectious illnesses, and physical injury and trauma. Risk Prioritization Index, Likelihood Level Index and Consequences Level Index (the terminology is after Northwest Center for Public Health Practice documents [26]) were conducted for the identification of the potential health risk. In the final step, the appropriate risk ranking was assigned in between 1 and 4 to each health risk by comparing the risk prioritization index (RPI), likelihood level index (LLI) and corresponding consequences level index (CLI) to determine its severity at Sabarimala pilgrimage destination. Rank one means the risk factor having the highest priority and rank four means having least priority. For assigning RPI, LLI and CLI various geo-environmental parameters and previous incidents in this particular mass gathering were considered.