Investigating health risk perceptions during the Hajj: Pre-Travel advice and adherence to preventative health measures

Mater Almehmadi*, Gianluca Pescaroli, Jaber S Alqahtani, Tope Oyelade

Abstract

Background: Every year, over 2 million people gather together to observe the Hajj pilgrimage in Mecca. This presents a public health risk to both Saudi and the pilgrims' country of origin. The aim of this study was to evaluate the risk perception and the source of health advice by the pilgrims.

Methods: We conducted a cross-sectional survey among internal and external pilgrims performing the Hajj. The survey evaluates the general safety and preventative measures applied, factors influencing public health safety at Hajj, source of pre-travel health advice, recommended preventative health measures, and the effective preventative measures.

Results: A total of 280 pilgrims from 28 different countries were approached of which 233 completed the survey with response rate of 83%. The majority (219 [94%]) of the respondents considered the Hajj as safe while 205 (88%) sought pretravel health advice. The most popular source of pre-travel health advice among the pilgrims were from medical professionals (83 [25.6%]) and other pilgrims (44 [18.9%]). Diversity and carelessness were believed to be the main factors influencing public health safety in the Hajj by 184 (79%) and 181 (78%) of the respondents respectively. Yellow fever (117 [50%]) and wearing of face masks (56 [24%]) were the most and least adopted recommended public health measures respectively while most pilgrims believed handwashing (137 [59%]) and wearing of face mask (119 [51%]) are the most effective preventative health measures.

Conclusion: Our study shows a reduced perception by pilgrims of the health risk of the Hajj and highlights the need to improve how information is channelled to prospective pilgrims about preventative health measures. The discordance between recommended preventative health measures and adherences by pilgrims shows a need for a comprehensive enforcement program underpinned by the Saudi Ministry of Health (MoH).

Keywords: Saudi Arabia; Pilgrims; Mass gathering; Risk; Preventive Measures

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Introduction

Healthcare is one of the essential elements to consider in planning for mass gatherings. Even in events where everything is managed smoothly, it has been noted that approximately 1.5% of people will require medical assistance, associated both with different kind of 'physical stress' or 'pre-existing' medical conditions.[1] Every year, approximately three million Muslims from all over the world journey to the Saudi city of Mecca to complete the Hajj pilgrimage. The event is distinguished by intense congestion, a hot climate, diverse hygiene standards and shared accommodation.[2] The combination of these circumstances creates a facilitative environment for health risks.

The Hajj pilgrimage has been strictly observed for centuries. It is one of the five pillars of the Islamic religion and must be observed at least once by every able Muslim.[3] As the global Muslim population has grown over the centuries, the number of those willing and able to complete the annual pilgrimage has increased significantly, with the 2019 edition attracting approximately 2.5 million visitors.[4] As the host country of the most sacred sites in the Islamic world, the Saudi government has the responsibility to safeguard the health of all pilgrims. As such, Saudi public health officials are constantly engaged in the process of managing the prevalent health risks associated with the Hajj. Additionally, foreign governments and international health agencies are awake to the mass gathering's health risks as there is a possibility that pilgrims will import infectious diseases presumably to their countries of origin. To address the health risks that pilgrims face while in Mecca, the Saudi Ministry of Health decrees a number of preventative health measures before every Hajj cycle. In addition to these measures, pilgrims have a wide array of sources for health education that they access before embarking on the Hajj. This is advantageous, as studies have consistently shown that pre-travel health preparation, including seeking education, improves the health outcomes of international travellers.[5] Sadly, however, the uptake of the recommended preventative health measures has been found to be lacking in certain pilgrim populations.[6] The underlying reasons for this are still largely unclear, as there has been very limited research into pilgrims' perceptions of the health risks that exist during the Hajj and the preventative health measures recommended by the Ministry of Health. Ultimately, the decisions by Hajj pilgrims on seeking pre-travel health advice and adopting recommended preventative health measures are greatly influenced by their beliefs and attitudes that have been shaped by years of cultural and social influenc-

es. As such, aggressive public awareness and education are needed in order to sensitize pilgrims about the need to seek pre-Hajj health advice and act on all recommended preventative health measures. Therefore, the aim of this study is to determine the level of risk awareness among external and internal Hajj pilgrims, in particular the nature of pre-travel advice seeking behaviour how they influence the preventative health measures recommended by the Saudi Ministry of Health.

Methods

Survey development

We designed a survey to provide quantitative data on risk perceptions based on the questions identified in the literature. A cross-sectional design was chosen to provide an overall picture of the state of health risk perception among pilgrims using the limited time available.[7] A total of 280 pilgrims were approached, 233 of which are from 28 different countries outside of Saudi Arabia responded with a response rate of 83%. The first section of the survey was to collect demographic information. The second section of the instrument assessed pilgrim's pre-travel advice seeking behaviour and uptake of preventative health measures. This section also enquired about pilgrim's attitudes towards various health risks and preventative measures recommended by the Saudi Ministry of Health. The questions in the survey questionnaire were created by the researchers and tested for face and content validity with a panel of experts. The survey was then translated from English to six languages, Arabic, Urdu, Indonesia, Malay, Turkish, and Persian. The translation was conducted by official language translation agency and tested by official translators in each consulate general of the countries.

Survey administration

To identify all the external and internal pilgrims, we contacted the Institute of Hajj and Umrah Research in Mecca. We received an approval to access all the holy places in Mecca during Hajj 2019. A first quantitative data collection was carried out between August 4th to 25th 2019 in Mecca, aiming to gather as much quantitative data as possible, within that time frame. We randomly approached 294 pilgrims in different places in Mecca.

Statistical analysis: Descriptive statistics using SPSS 24 version was used to analyse the collected responses. A P value of 0.05 was accepted as significant.

Ethical considerations: Permission was sought from the Saudi Ministry of Health to conduct a public health study at the Hajj. Indeed, the ethical approval was not required as this survey was voluntary with no patient's involvement. Additionally, each participant was provided with a consent form that they will have to sign before participating in the study.

Results

Most respondents were from Malaysia 26 (11.1%) and Pakistan 21 (9%). The mean age (± Standard Deviation) was 42.88 ± 12.15 and 130 (55.8%) of them were male. Of the respondents, 90 (38.6%) had undergraduate degree and only 29 (12.4%) did not attend high school. The intended duration of stay in Mecca for the whole sample was 23.25 ± 11.02 (Table 1). 219 (94%) considered Hajj as a safe, while 205 (88.0%) had sought pre-travel health advice before embarking on the Hajj. 121 (52%) did not think there is a risk of a global infectious disease outbreak starting at the Hajj and 189 (81.1%) were satisfied with the current enforcement level of the preventative health measures at the Hajj, (Table 2).

Table 1: *Demographic data on the pilgrims*

Demographics (n=233)	Mean ± SD N (%)
Nationality	
Afghanistan	8 (3.4%)
Algeria	16 (6.8%
Australia	4 (1.7%)
Egypt	16 (6.8%)
France	5 (2.1%)
German	5 (2.1%)
India	10 (4.3%)
Indonesia	8 (3.4%)
Iran	1 (0.4%)
Iraq	5 (2.1%)
Jordan	10 (4.3%)
Kuwait	4 (1.7%)
Lebanon	11 (4.7%)
Libya	10 (4.3%)
Malaysia	26 (11.1%)
Morocco	8 (3.4%)
Nigeria	4 (1.7%)
Pakistan	21 (9%)
Palestine	3 (1.3%)
Philippines	14 (6%)
Saudi Arabia	12 (5.1%)
Sudan	3 (1.3%)
Sweden	1 (0.4%)
Syria	5 (2.1%)
Tunisia	4 (1.7%)
Turkey	15 (6.4%)
UAE	2 (0.9%)
United Kingdom	2 (0.9%)
Age (Mean ± SD)	42.88 ± 12.15
Gender	
Male	130 (55.8%)
Female	103 (44.2%)
Intended Duration of Hajj (Days, Mean ± SD)	23.25 ± 11.02

Number of Hajj performed (Mean ± SD)	1.97 ± 3.18
Level of education	
Did not attend high school	29 (12.4%)
High school diploma	50 (21.5%)
Postgraduate	64 (27.5%)
Undergraduate	90 (38.6%)

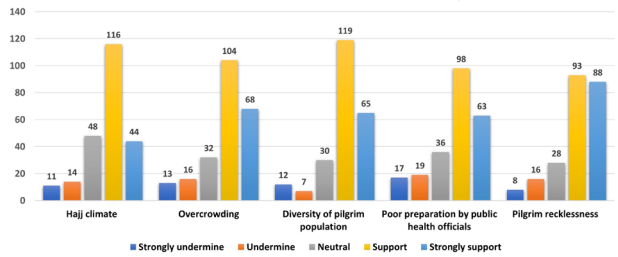
Table 2: *General questions about safety and applied measures*

	N (%)
Do you consider the Hajj safe?	
Yes	219 (94%)
No	14 (6%)
Have you sought pre-travel health advice before embarking on the Hajj?	
Yes	205 (88.0%)
No	28 (12.0%)
How would you describe your experience of seeking pre-travel advice?	
Negative	4 (2%)
Positive	201 (98%)
Do you think there is a risk of a global infectious disease outbreak starting at the Hajj?	
Yes	112 (48%)
No	121 (52%)
Do you think the weather at Hajj poses a risk to your health?	
Yes	104 (44.6%)
No	129 (55.4%)
Are you satisfied with the current enforcement level of the preventative health measures at the Hajj?	
Yes	189 (81.1%)
No	44 (18.9%)

Factors influence public health safety at the Hajj

Respectively, 184 (79%) and 181 (78%) of the respondents believed diversity of pilgrims' population and carelessness to be the two main factors influencing health safety at Hajj. Overcrowding at Hajj, poor preparation by public health officials and Hajj climate were ranked third, fourth and fifth respectively, (Figure 1). Indeed, 36 (15.5%) of the respondents believed poor preparation by public health officials is not an important contributing factor affecting public health safety at the Hajj. There were no major differences between those who were educated (204) and not educated (29) in term of their selection except that the educated believed poor preparation by public health officials is not an influencing factor. Those who were not educated believed there is no significant relationship between preparation by public health officials and public health safety at Hajj (Figure 2).

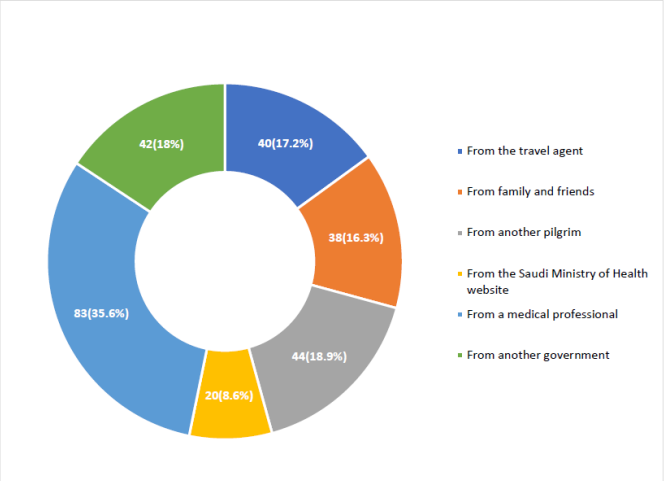
Figure 1: *Factors influence public health safety at the Hajj*



Seeking pre-travel health advice among external and internal hajj pilgrims

In total, 83 (35.6%) and 44 (18.9%) of the respondents sought pre-travel health advice from medical professionals and from other pilgrims respectively. Out of the 205 (88.0%) respondents who sought pre-travel health advice before embarking on the Hajj, 20 (8.6%) sought it from the Saudi Ministry of Health Website (Figure 2). No differences were found between educated and non-educated pilgrims regarding pre-travel advice seeking.

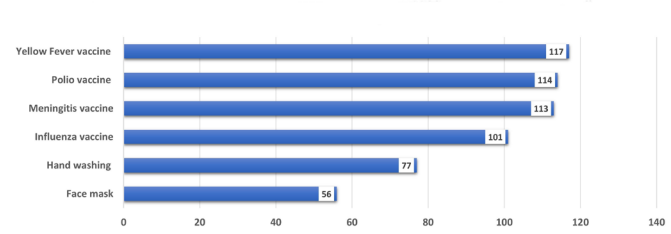
Figure 2: *Seeking pre-travel health advice among external and internal hajj pilgrims*



Recommended preventative health measures adopted by Hajj pilgrims

Figure 3 shows the breakdown of the six preventive health measures among the pilgrims. Yellow fever vaccine was the most popular preventive health measure adopted by 177 of the pilgrims. This is closely followed by Polio vaccine (114) and meningitis vaccine (113). Hand washing and face mask were not used frequently by pilgrims. There were no differences between educated and non-educated pilgrims regarding the preventative health measures adopted.

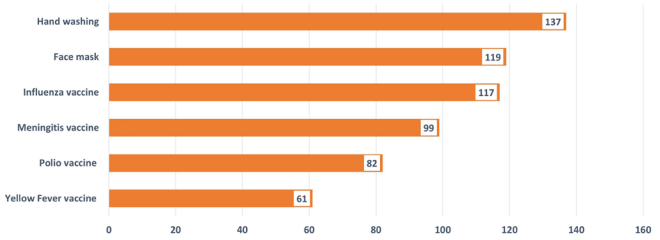
Figure 3: *Preventative recommended health measures that have adopted among Hajj pilgrims*



The preventative measures that have be effective among hajj pilgrims

Hand washing and wearing of face mask were believed to be effective by most pilgrims (Figure 4) despite being the least adopted preventative health measures (Figures 3). A minority of participants indicated that vaccines in general were effective compared to other preventive health measures. Regarding the preventative health measures believed to be effective, there was no observable difference in choice between educated and non-educated pilgrims.

Figure 4: *The preventative measures that pilgrims believe in to be effective*



Discussion

We present here for the first time the Hajj pilgrims' perception of health risk associated with pilgrimage to the holy city with focus on the use and source of pretravel health advice and adoption of preventative health measures.

This study reports the various factors influencing public health safety at the Hajj. According to 79% of the respondents, the main factor influencing public health safety is the diversity of the pilgrims' populations. Considering the religious significance of Hajj, it is no surprise that pilgrims' population at any point in time is often made up of pilgrims with diverse race, age, gender, and medical background to mention but a few.[8] This diversity presents a public and global health challenge and have attracted global health players such as the World Health Organisation attentions in the past regarding the design and implementation of preventative measures against public health risks posed by mass gatherings.[9,10] Diversity may manifest for instance, in the form of reduced perception of health risks by pilgrims coming from parts of the world with less developed health systems. This may affect how public health advice, recommendations and regulations are received and followed by the pilgrims.

Further, 78% of these study participants also believe that pilgrims' carelessness is another main factor influencing public health safety at the Hajj. Other factors that were reported by the respondents include overcrowding, poor preparedness by public health officials and the climate. With over two million people converging every year for the Hajj, overcrowding is a specific feature of the holy pilgrimage often resulting in an increased risk of spread of communicable diseases and stampeding. This overcrowding also put significant pressure on the medical facilities available during the Hajj especially since the number of pilgrims varies from year to year.[11] Because of the geographical location of the Mecca; one of the main public health issues has been the hot weather conditions. With temperatures that go above 40°C in summer, Heatstroke, heat exhaustion, sunburn and dehydration are a common occurrence during the Hajj.[12,13] Several preventative measures have been implemented by the Saudi government over the years to prevent heat related incidence. These include increased awareness campaign, installation of cooling units along the route of the pilgrimage and provision of facilities to prevent heatstroke. However, despite these measures, the problem persists.[14] This suggest the need for improvement in how these problems are tackled.

In total, 205 of 233 (88%) of the participants in this study sought pre-travel health advice. Our study corroborates previous studies that looked at Saudi Arabian and Australian pilgrims to the Hajj.[15,16] Among others, we found that the major source of health advice remained medical professionals. This agrees with previous studies where two third of Hajj pilgrims were reported to have sought health advice from medical professionals including family doctors and travel clinics. The Saudi Ministry of Health (MoH) remains the least source of Hajj-related health advice in this study with only 8.6% of pilgrims consulting the ministry for health advice. This agrees with the study by Alqahtani et al. where only 4% of Saudi Hajj pilgrims reported Saudi MoH as their source of health advice. We recommend a complete overhaul of the Saudi MoH information system to improve accessibility especially by prospective Hajj pilgrims. This should help boost awareness of Hajj-related health risks and available preventative health measures. Indeed, the importance of awareness campaign about the benefits of seeking travel health advice before the Hajj pilgrimage cannot be overemphasized and have been found to be associated with improved health consciousness and behaviours in Hajj pilgrims.[17]

In this study, we report the recommended preventative health measures adopted by Hajj pilgrims. In all respondents, Yellow Fever vaccine was the most popular preventative health measures with 117 adopters. Polio, Meningitis and Influenza vaccines were adopted by 114 (48.9%), 113 (48.5%) and 101 (43.4%) respondents respectively. The coverage of influenza vaccine among Hajj pilgrims in this study (43.4%) vary considerably compared to other studies where higher and lower coverages has been reported.[18,19] This is especially noteworthy, as respiratory tract infections, especially from Influenza viruses, are very

contagious and have been reported as the main cause of outpatient department visit during the Hajj pilgrimage.[20] High and rapid rate of genetic mutation makes the influenza virus strains a global public health concern and this is exacerbated by the continuous close contact and overcrowding intrinsic to the Hajj pilgrimage.[21] Various measures have been recommended by the Saudi MoH including donning of face masks, handwashing and reasonable distancing; all of which have been reported to reduce the spread of respiratory tract infections (RTI).[22] In future, the Saudi MoH should also consider the possibility of introducing and enforcing further preventative public health measures including making vaccination against the various strains of influenza and other RTI viruses a prerequisite for performing the Hajj pilgrimage to prevent outbreak and its associated burden on health care systems.[23,24] This is especially important in the face of the recent global outbreak of the SARS-CoV-2 virus which have been shown to be prevalent and more severe in people with comorbidities.[25,26]

In this study, 137 and 119 participants believed handwashing and facemask donning to be effective preventative health measure followed by vaccination for influenza, meningitis, polio and yellow fever. This study is consistent with previous study which reported that majority of pilgrims believed handwashing is the most effective preventative health measure against respiratory infections. [15] However, hand washing and wearing of facemask are also the least adopted preventative health measures even though most pilgrims believe they are efficient. This can be considered as an archetypical case of unconflicted inertia whereby pilgrims maintain their status quo even when aware of the health risk associated with not following preventative guidelines. Accordingly, yellow fever, polio, meningitis, and influenza vaccines are the most adopted preventative health measures by the respondents.

Some limitations associated with this study include the smallness of the sample size which may reduce the statistical power of the findings and limit the extension of the results to a wider, larger global population. Also because of the heterogeneity of the study population, it presents a challenge when trying to control for pilgrims' medical history and country of origin both of which may affect the perception of health risk and adoption of preventative health measures. A larger, targeted cohort study will address these limitations.

This study shows that there is significant scope for improving the perception of public health risk associated with Hajj among pilgrims. We emphasize the need to revamp how Hajj-related preventative health measures is communicated and enforced especially by the Saudi MoH with special consideration of pilgrims' diversity.

Conclusion

This study shows that there is a lapse in pilgrims' perception of health risk associated with the Hajj pilgrimage. We prove that lack of centralized and a unified information source leads in the difference in perception of risk and adherence to preventative health measures. Although most pilgrims understand the effective preventative health measures, adherence or use of these measures does not align with this understanding. This could be improved by wide ranged and inclusive public health campaign, centralized and informed recommendations and enforcement programs to ensure adherence.

Acknowledgment

None

Conflict of Interest

The authors declare that there are no conflicts of interest.

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