



## EVALUATING HEALTH RISK PERCEPTIONS DURING THE HAJJ: PRE-TRAVEL COUNSELING AND COMPLIANCE WITH PREVENTATIVE HEALTH PRECAUTIONS

Khalid Shaaf Almalki<sup>1\*</sup>, Waleed Saad Alhudali<sup>2</sup>, Saif Mutair Alhuzali<sup>3</sup>, Osama Mukhdir Aldadi<sup>4</sup>, Sultan Khelifa Althubiani<sup>5</sup>, Sultan Ruddah Alghamawe<sup>6</sup>, Fawaz Hamdan Mubark Al Huzali<sup>7</sup>, Saud Hassan Al-Sakhri Job<sup>8</sup>, Nawaf Ateeq Alfadhli<sup>9</sup>

### 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. This study aimed to evaluate the risk perception and the source of health counseling by the pilgrims.

**Methods:** a cross-sectional survey was conducted 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 counseling, recommended preventative health measures, and effective preventative measures.

**Results:** A total of 233 pilgrims from 28 different countries completed the survey. The majority (94%) of the respondents considered the Hajj as safe while (88%) sought pretravel health counseling. The most popular source of pre-travel health advice among the pilgrims was from medical professionals (25.6%) and other pilgrims (18.9%). Diversity and carelessness were believed to be the main factors influencing public health safety during the Hajj by (79%) and (78%) of the respondents respectively. Yellow fever (50%) and wearing face masks (24%) were the most and least adopted recommended public health measures respectively while most pilgrims believed handwashing (59%) and wearing of face mask (51%) are the most effective preventative health measures.

**Conclusion:** Our study shows a reduced perception by pilgrims of the health risks of the Hajj and highlights the need to improve how information is channeled to prospective pilgrims about preventative health measures. The discordance between recommended preventative health measures and adherence 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

<sup>1\*</sup>,<sup>3</sup> Family Medicine Consultant, Makkah healthcare cluster, Saudi Arabia.

<sup>2,4</sup> Health administration senior specialist, forensic medical services center, Saudi Arabia.

<sup>5</sup> Specialist health & hospital administration, King Faisal Hospital, Saudi Arabia.

<sup>6</sup> Technician-Health Administration, forensic medical services center, Saudi Arabia.

<sup>7</sup> Health administration specialist, forensic medical services center, Saudi Arabia.

<sup>8</sup> Medical secretarial technician, Death Department at the Forensic Medical Services Center, Saudi Arabia.

<sup>9</sup> Health Care Administration, Makkah healthcare cluster, Saudi Arabia.

**\*Corresponding Author:** Khalid Shaaf Almalki

\*Family Medicine Consultant, Makkah healthcare cluster, Saudi Arabia.

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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 kinds of 'physical stress' or 'pre-existing' medical conditions <sup>(1)</sup>. 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 <sup>(2)</sup>. 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 <sup>(3)</sup>. 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 <sup>(4)</sup>. 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 aware of 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 several 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 travelers <sup>(5)</sup>. Sadly, however, the uptake of the recommended preventative health measures is lacking in certain pilgrim populations <sup>(6)</sup>. 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 to seek pre-travel health advice and adopt recommended preventative health measures are greatly influenced by their beliefs and attitudes that have

been shaped by years of cultural and social influences. As such, aggressive public awareness and education are needed to sensitize pilgrims about the need to seek pre-Hajj health advice and act on all recommended preventative health measures. Therefore, this study aims to determine the level of risk awareness among external and internal Hajj pilgrims, in particular, the nature of pre-travel counsel-seeking behavior and how they influence the preventative health measures recommended by the Saudi Ministry of Health.

## Methods

A cross-sectional design was selected to provide an overall picture of the state of health risk perception among pilgrims using the limited time available <sup>(7)</sup>. A total of 233 pilgrims were approached, of whom were from 28 different countries outside of Saudi Arabia. The first section of the survey was to collect demographic information. The second section of the instrument assessed the pilgrim's pre-travel advice-seeking behavior 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 into six languages, Arabic, Urdu, Indonesian, Malay, Turkish, and Persian. The translation was conducted by an 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 approval to access all the holy places in Mecca during Hajj. The first quantitative data collection was carried out between August 4th to 25th 2022 in Mecca, aiming to gather as much quantitative data as possible, within that time frame. We randomly approached 233 pilgrims in different places in Mecca.

**Statistical analysis:** Descriptive statistics using the SPSS 24 version were used to analyze 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, ethical

approval was not required as this survey was voluntary with no patient involvement. Additionally, each participant was provided with a consent form that they would have to sign before participating in the study.

### Results

Table (1) revealed that most respondents were from Malaysia 26 (11.1%) and Pakistan 21 (9%). The mean age ( $\pm$  Standard Deviation) was  $42.88 \pm 12.15$  and 130 (55.8%) of them were male. Of the respondents, 90 (38.6%) had undergraduate

degrees and only 29 (12.4%) did not attend high school. The intended duration of stay in Mecca for the whole sample was  $23.25 \pm 11.02$ . Table (2) demonstrated that 219 (94%) considered the Hajj as 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 1:** Demographic data on the pilgrims (n= 233)

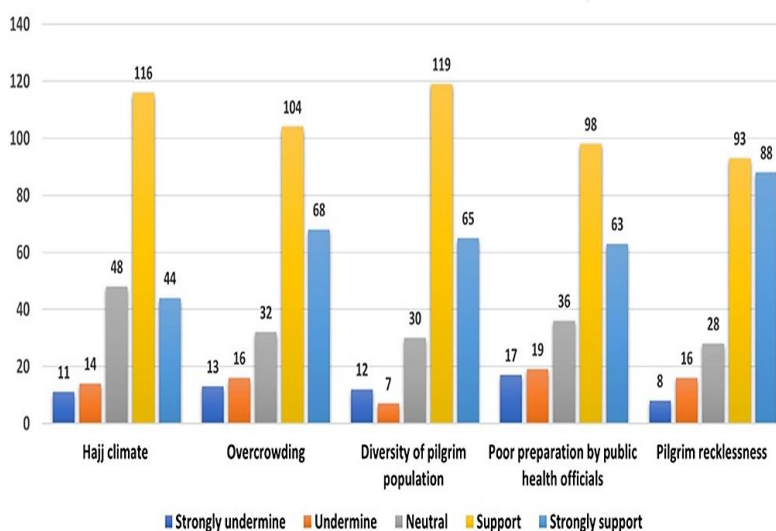
Nationality	NO	%
Afghanistan	8	3.4
Algeria	16	6.8
Australia	4	1.7
Egypt	16	6.8
France	5	2.1
German	5	2.1
India	10	4.3
Indonesia	8	3.4
Iran	1	0.4
Iraq	5	2.1
Jordan	10	4.3
Kuwait	4	1.7
Lebanon	11	4.7
Libya	10	4.3
Malaysia	26	11.1
Morocco	8	3.4
Nigeria	4	1.7
Pakistan	21	9.0
Palestine	3	1.3
Philippines	14	6.0
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
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
Gender		
Male	130	55.8
Female	103	44.2
Age		(Mean $\pm$ SD) $42.88 \pm 12.15$
Intended Duration of Hajj (Days)		(Mean $\pm$ SD) $23.25 \pm 11.02$
Number of Hajj per- formed		(Mean $\pm$ SD) $1.97 \pm 3.18$

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

	N0	%
<b>Do you consider the Hajj safe?</b>		
Yes	219	94%
No	14	6%
<b>Have you sought pre-travel health advice before embarking on the Hajj?</b>		
Yes	205	88%
No	28	12%
<b>How would you describe your experience of seeking pre-travel advice?</b>		
Negative	4	2%
Positive	201	98%
<b>Do you think there is a risk of a global infectious disease outbreak starting at the Hajj?</b>		
Yes	112	48%
No	121	52%
<b>Do you think the weather at Hajj poses a risk to your health?</b>		
Yes	104	44.6%
No	129	55.4%
<b>Are you satisfied with the current enforcement level of the preventative health measures at the Hajj?</b>		
Yes	189	81.1%
No	44	18.9%

**Factors influencing public health safety at the Hajj** Respectively, 184 (79%) and 181 (78%) of the respondents believed the diversity of the 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 those not educated (29) in terms 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 was 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 the medical professionals and 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.

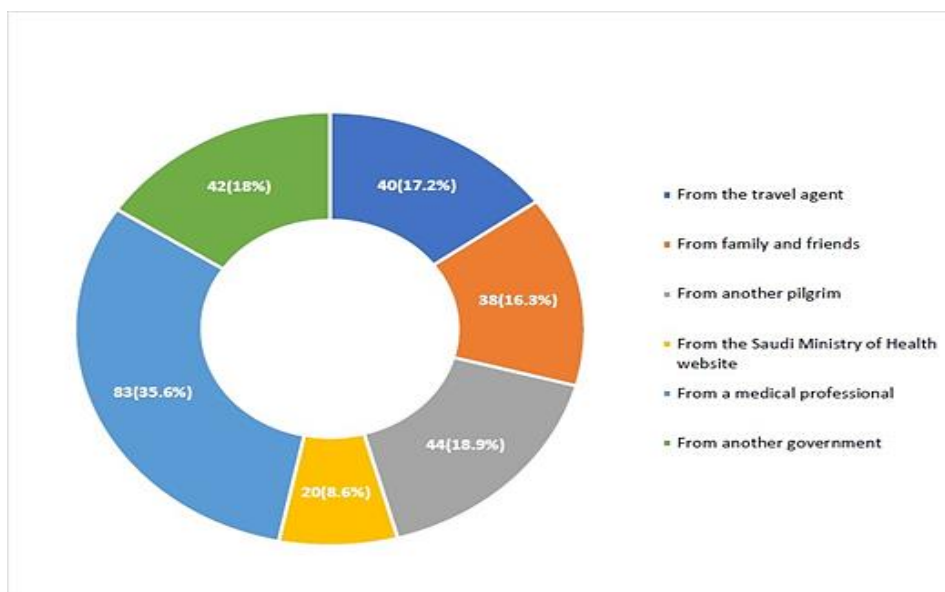


Figure 2: Seeking pre-travel health advice among external and internal hajj pilgrims

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 preventative health measure adopted by 177 of the pilgrims. This is closely followed by

the Polio vaccine (114) and meningitis vaccine (113). Hand washing and face masks were not used frequently by pilgrims. There were no differences between educated and non-educated pilgrims regarding the preventative health measures adopted.

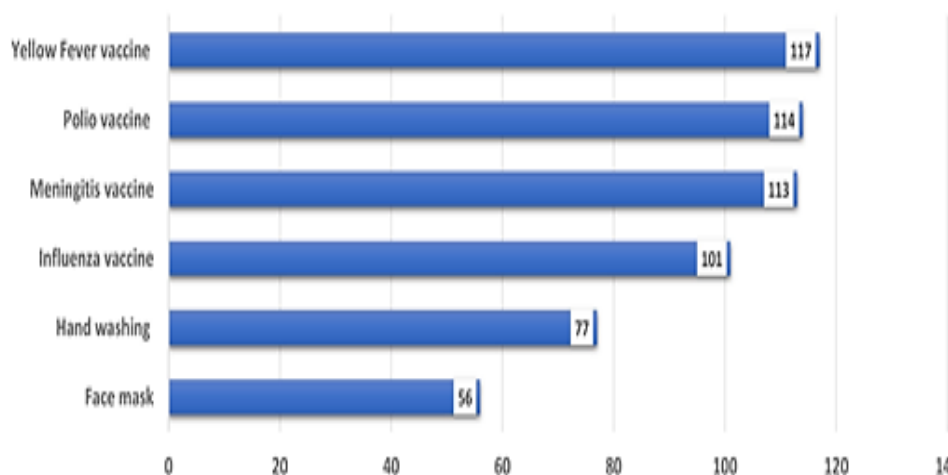
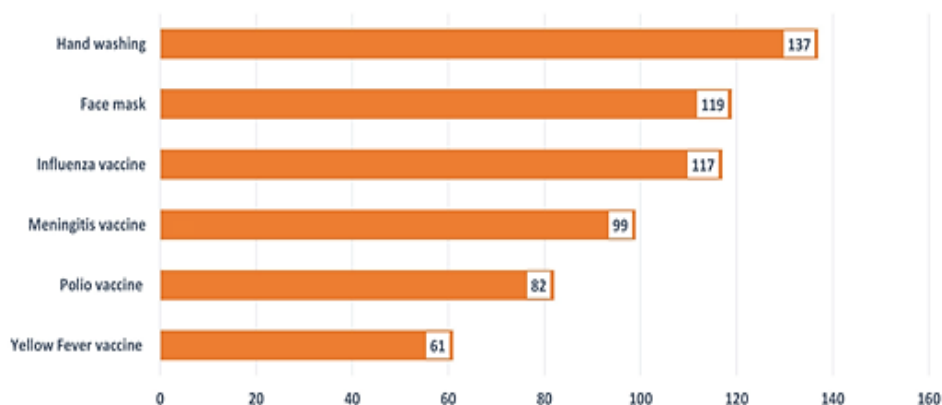


Figure 3: Preventative recommended health measures that have adopted among Hajj pilgrims

**The preventative measures that have been effective among hajj pilgrims.** Hand washing and wearing of face masks were believed to be effective by most pilgrims (Figure 4) despite being the least adopted preventative health measures (Figure 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 year to year <sup>(11)</sup>.

### Discussion

The present research for the first time the Hajj pilgrims' perception of health risks associated with the pilgrimage to the holy city with a 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 the pilgrims' population at any point in time is often made up of pilgrims with diverse races, ages, genders, and medical backgrounds to mention but a few <sup>(8)</sup>.

This diversity presents a public and global health challenge and has attracted global health players such as the World Health Organization's attention in the past regarding the design and implementation of preventative measures against public health risks posed by mass gatherings <sup>(9, 10)</sup>. 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.

Furthermore, 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

Because of the geographical location of 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 <sup>(12, 13)</sup>. Several preventative measures have been implemented by the Saudi government over the years to prevent heat-related incidents. These included increased awareness campaigns, installation of cooling units along the route of the pilgrimage, and provision of facilities to prevent heatstroke. However, despite these measures, the problem persists <sup>(14)</sup>. This suggests 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 <sup>(15, 16)</sup>. Among others, we found that the major source of health advice remained medical professionals. This agrees with previous studies where two-thirds 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. (2019) <sup>(16)</sup> 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 for prospective Hajj pilgrims. This should help boost awareness of Hajj-related health risks and available preventative health measures. Indeed, the importance of an awareness campaign about the benefits of seeking

travel health advice before the Hajj pilgrimage cannot be overemphasized and is associated with improved health consciousness and behaviors in Hajj pilgrims.

In this study, we report the recommended preventative health measures adopted by Hajj pilgrims. Of all respondents, the Yellow Fever vaccine was the most popular preventative health measure 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%) varies considerably compared to other studies where higher and lower coverages have been reported<sup>(17-19)</sup>.

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 visits during the Hajj pilgrimage<sup>(20)</sup>. The 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<sup>(21)</sup>. Various measures have been recommended by the Saudi MoH including donning face masks, handwashing, and reasonable distancing; all of which have been reported to reduce the spread of respiratory tract infections (RTI)<sup>(22)</sup>.

In the 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<sup>(23, 24)</sup>. This is especially important in the face of the recent global outbreak of the SARS-CoV-2 virus which is prevalent and more severe in people with comorbidities<sup>(25, 26)</sup>.

In this study, 137 and 119 participants believed hand-washing and facemask donning to be effective preventative health measures followed by vaccination for influenza, meningitis, polio, and yellow fever. This study is consistent with a previous study which reported that the majority of pilgrims believed handwashing is the most effective preventative health measure against respiratory infections<sup>(15)</sup>. However, hand washing and wearing of facemasks are also the least adopted preventative health measures even though most pilgrims believe they are efficient.

This can be considered an archetypical case of unconflicted inertia whereby pilgrims maintain their status quo even when aware of the health risks

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 risks associated with Hajj among pilgrims.

Finally, this study emphasizes the need to re-vamp how Hajj-related preventative health measures are communicated and enforced especially by the Saudi MoH with special consideration of pilgrims' diversity. This study shows that there is significant scope for improving the perception of public health risks associated with Hajj among pilgrims. We emphasize the need to revamp how Hajj-related preventative health measures are 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 risks associated with the Hajj pilgrimage. We prove that lack of centralized and a unified information source leads to 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 campaigns, centralized and informed recommendations, and enforcement programs to ensure adherence.

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