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Saudi Hajj pilgrims' preparation and uptake of health preventive measures during Hajj 2017

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ABSTRACT

Background: Few studies have reported the uptake of health preventive measures among Hajj pilgrims from Saudi Arabia. Yet, none of these studies have explored their perceptions of health risks at Hajj or pretravel health-advice-seeking behavior.
Methods: A cross-sectional survey conducted among Hajj pilgrims from Saudi Arabia.
Results: Of 344 pilgrims who completed the survey, 44% sought some form of pretravel health information; among them, 38% from non-medical sources. About 67% of participants received an influenza vaccine, and 8.7% received a pneumococcal vaccine. Lack of aware of vaccine availability was the main reason for nonreceipt (26%). Being employed and having a high level of education were significant factors in vaccine uptake. Two thirds of pilgrims carried some medications to use during Hajj; analgesics, antipyretics and antibiotics were the most reported drugs. Various methods of hand hygiene were the most used preventive measures (≈65%) followed by facemask use (53%). Those who concerned about food poisoning at Hajj were more likely to cleaned their hands with hand sanitizers (aOR = 2.5, 95% CI = 1.1–5.4, $p = 0.01$) and avoid eating food from street vendors (aOR = 2.9, 95% CI = 1.1–7.5, $p = 0.02$).
Conclusion: Pretravel health-advice-seeking behavior and the use of preventive measures during Hajj were suboptimal among Saudi Hajj pilgrims.

Introduction

The transmission of diseases is very high among the Hajj congregation in Mecca, one of the world's largest mass gatherings. Overcrowding and congestion during the pilgrimage is one factor contributing to the high risk of infection [1]. Several studies have shown that acute respiratory infections are common among pilgrims, which results in influenza and pneumonia being the main causes of hospitalization in Saudi Arabia [2–5].

In an effort to reduce infectious disease risks during Hajj, various preventative health measures have been introduced to Hajj pilgrims. The Saudi Arabian Ministry of Health (MoH) requires a valid meningococcal vaccination for all pilgrims, and polio and yellow fever vaccination for pilgrims from endemic countries. Vaccinations against other diseases, such as influenza, pertussis and measles, are also recommended [6]. Preventive infection measures also incorporate low-cost measures such as hand hygiene and facemasks. Additionally, health authorities in pilgrims' countries of origin are encouraged to provide health education [6]. Nevertheless, the uptake of preventive measures including vaccines and facemasks has been found to vary among pilgrims from various countries [7–9]; lack of awareness is the main barrier of measures uptake [5,10]. Furthermore, pre travel health advice has been found to be an important factor in increasing the coverage of recommended health measures among pilgrims [10–12].

In Saudi Arabia, a very limited number of studies have reported the uptake of preventive measures among Hajj pilgrims [13–15]. The reported uptake of these measures was suboptimal; for instance, influenza vaccine coverage was 21.4% in Hajj 2013 and 48% in 2014, and similar results were found for uptake of non-pharmaceutical measures [15]. Nevertheless, no study has attempted to investigate further and explore pilgrims' pre travel advice-seeking behavior, their uptake of preventive measures including vaccines and other measures, or the factors affecting their uptake. To this end, this study aims to address this knowledge gap.

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Methods

Study design

A cross-sectional survey (self-reported questionnaire) was conducted among Saudi Arabian Hajj pilgrims aged ≥16 years who performed Hajj in 2017. The survey was conducted during the first three days of peak Hajj performance (August 28–30, 2017). This study was reviewed and approved by the Saudi Food and Drug Authority ethics committee (18-0003).

Participant recruitment

Potential participants were approached through their mobile phones. Saudi Hajj pilgrims must first register and obtain approval from the Ministry of Hajj to perform Hajj pilgrimage; thus, the list of phone numbers of approved Hajj pilgrims in 2017 was obtained from the Ministry of Hajj and Umrah in Saudi Arabia.

The participants took part in a computer-aided telephone interview (CATI); each participant received three call attempts before being dropped from the list. After providing verbal consent, participants were asked about their socio-demographic characteristics; their chronic conditions, such as diabetes, asthma, high cholesterol and hypertension; and their preparedness and uptake of pharmaceutical measures, including pre travel health advice seeking behavior, vaccinations and drugs. Barriers to and facilitators of vaccine uptake and their uptake of non-pharmaceutical measures while at Hajj were also collected.

Sample size

A convenience sampling technique was used in this study. Based on previous Hajj studies, it was assumed that at least 30% of respondents seek pre travel health advice and have general knowledge of health preventive measures. In addition, considering an error margin of 5% to be acceptable for this anonymous survey, a sample of 318 participants was considered to be sufficient for this study. Yet, based on the predicted response rate between 20% and 30%, 1100 phone numbers were randomly selected from the Ministry of Hajj and Umrah list.

Data analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) v.19.0 (SPSS, Inc., Chicago, IL, USA). Pearson correlation coefficients and chi-square tests were used to assess variables and determine associations and correlations. Univariate factors with p values <0.25 were entered into multivariable regression analyses. Binary logistic regression, using the backward Wald method and controlling for factors such as age, gender, chronic medical conditions, educational level, and employment status, was used to investigate variables related to pre travel health advice seeking behavior, vaccination and uptake of non-pharmaceutical preventive measures. Two-tailed p values ≤0.05 in the multivariable models were considered statistically significant.

Result

A total of 344 (31.2% response rate) pilgrims agreed to participate in the study. The main reason for the low response rate was not answering or busy network. The median age was 36.5 years (range: 16–79 years), 73% (250/344) of participants were male and 61% (210/344) had up to a university degree. About 18% (63/344) reported having one or more chronic medical condition. Details of participant characteristics are presented in Table 1.

Table 1
Demographic characteristics of surveyed participants.

	N (%)
Age	
Mean (SD)	38 (±10.7)
Gender	
Male	250 (72.7)
Female	94 (27.3)
Nationality	
Saudi	252 (73.3)
Not Saudi	92 (26.7)
Education	
None	11 (3.2)
Primary/elementary school certificate	19 (5.5)
High school certificate	63 (18.3)
Diploma	41 (11.8)
University degree	191 (55.5)
Higher university degree	19 (5.5)
Employments statues	
No	60 (17.4)
Student	25 (7.3)
Yes	259 (75.3)
Self-employed	27 (11.1)
Full time	193 (79.4)
Casual	15 (6.2)
Part-time	8 (3.3)
Chronic diseases	
No	281 (82)
Yes	63 (18)
Diabetes	28 (8.1)
Cancer	20 (5.8)
Immunosuppression (e.g. HIV, long-term steroid use)	11 (3.2)
Asthma	9 (2.6)
Heart diseases	9 (2.6)
Other lung diseases	6 (1.7)
Hypertension	4 (1.2)
Chronic kidney disease	1 (0.3)
High cholesterol	1 (0.3)

Pre travel advice-seeking behavior and associated factors

Less than half of participants (44%, [153/344]) sought some form of health information before Hajj. Of those, 62% (95/153) received pre travel health advice from medical sources, including 33% (50/153) who sought advice from a special travel clinic, 21% (32/153) from a family doctor/general practitioner and 8% (13/153) from the Saudi Arabia Ministry of Health website. On the other hand, 38% (58/153) received advice from nonmedical sources; 18% (27/153) received advice from general Internet websites, 14% (21/153) from family and friends who had previous Hajj experience and 7% (10/153) from a Hajj travel agent.

Less than half of participants reported a positive experience (i.e. providing the patient (pilgrim) adequate and useful health information related to Hajj) of pre travel advice (46%, [69/153]), yet 41% (61/153) reported negative experiences while the rest reported receiving mixed information (14%, [21/153]).

Using multivariate logistic regression analysis and controlling for all other potential variables (age, gender, educational level, employment status and health condition), we found that those who had chronic conditions were more likely to seek advice from medical sources than those who did not have any chronic conditions (adjusted odds ratio [aOR] = 2.6, 95% confidence interval (CI) = 1.1–6.4, p = 0.03).

Preparedness and uptake of pharmaceutical measures during Hajj

Vaccine uptake and associated factors

The majority of participants (83% [285/344]) reported receiving a meningococcal vaccine (compulsory vaccine). Also, 74%

Table 2
Uptake of vaccines and reported reasons for receipt and non-receipt.

Vaccine name	N (%)
Meningococcal vaccine[a]	285 (82.8)
Recommended vaccines	
No	89 (25.9)
Yes	255 (74.1)
Seasonal influenza vaccine	230 (67)
Pneumococcal vaccine	30 (8.7)
Pertussis (whooping cough) vaccine	8 (2.3)
Hepatitis A vaccine	8 (2.3)
Hepatitis B vaccine	5 (1.3)
Vaccinated reasons[b]	
I don't want to get sick	109 (43.8)
The vaccine is effective in protecting me against diseases	109 (43.8)
If I get sick my Hajj worship could be jeopardized	12 (4.8)
I am at risk because I'm elderly	12 (4.8)
I am at risk because I have chronic diseases	7 (2.8)
Not vaccinated reason[b]	
I didn't know about them	23 (25.8)
I don't think I will get a disease at Hajj, I'm under "ALLAH's" protection	18 (20.3)
I don't need them because I'm not at risk (elderly or have chronic conditions	17 (19.1)
I rely on my own body's immunity (healthy lifestyle)	4 (4.8)
The vaccines are too expensive, they should be free	3 (3.4)
I was afraid of having vaccine side effects	3 (3.4)
The vaccine is not effecting in protecting from diseases	2 (2.2)

[a] Compulsory vaccine.
[b] Some pilgrims cited more than one reason.

(255 /344) received other recommended vaccines, including an influenza vaccine (67% [230/344]) and pneumococcal vaccine (8.7% [30/344]); more details of vaccine coverage are reported in Table 2. The uptake of recommended vaccines among the at-risk group (those who have chronic conditions and/or are aged over 65 years) was 63% (39/62); of this group, 87% (34/39) had received an influenza vaccine and 15% (6/39) had received a pneumococcal vaccine.

After adjusting for age, gender, educational level, employment status and health condition, the multivariate analysis showed that being employed (aOR = 1.9, 95% CI = 1.1–3.6, $p = 0.03$) was significantly associated with the uptake of recommended vaccines compared with those who were not employed. Moreover, those who had a university level or higher education were more likely to be vaccinated than those who had a lower level of education (aOR = 1.8, 95% CI = 1.1–3.1, $p = 0.02$).

Concern about becoming ill during Hajj and believing in the effectiveness of vaccines in preventing infectious diseases were the most cited reasons (44% [109/255], respectively) for receipt of vaccines (Table 2). Conversely, not being aware of the recommended vaccines (26% [23/89]) was the main reason for not receiving vaccines (Table 2).

Participants also reported various sources of vaccination advice, including Hajj travel agents (31%, [80/255]), the Saudi Ministry of Health (MoH) website (13%, [35/255]), awareness campaigns on TV and social media (13%, [35/255]), general practitioners (GPs) (9% [23/255]), friends and family members with previous Hajj experience (8% [21/255]) and travel clinics (2%, [4/255]).

Medication preparedness for Hajj

About two thirds (61% [210/344]) of participants brought some medications to use during Hajj. These included analgesics (18% [61/344]), followed by antipyretics and antibiotics (6% [22/344], respectively). Participants also reported bringing some over-the-counter products such as skin care lotions (15% [51/344]), sunblock creams (8% [28/344]) and lotions for skin rashes (12% [41/344]).

Regarding those who had chronic diseases, 53% (33/63) of participants reported bringing the needed medications with them during Hajj. Of those, only 12% (4/33) reported having a large enough quantity of drugs covering their days stay at Hajj, and 24% (8/33) stored the medication in cool containers during their stay at Hajj.

Non-pharmaceutical preventive measures uptake

Participants also reported their use of non-pharmaceutical preventive measures during peak Hajj days: 65% (225/344) washed their hands with soap several times a day, 65% (225/344) cleaned their hands with hand sanitizers, 62% (215/344) used disposable handkerchiefs and 53% (183/344) used a facemask. Conversely, a lower proportion said they cleaned their hands with water only (45%, [156/344]), used an umbrella to avoid sunstroke (43%, [148/344]), avoided eating food from street vendors (38%, [130/344]) and avoided eating unclean fruits and vegetables (35%, [120/344]).

Based on the multivariate logistic regression analysis and controlling for all other potential variables (age, gender, educational level, employment status and health condition), males were less likely to use a facemask (aOR = 0.4, 95% CI = 0.2–0.7, $p = 0.02$) and disposable handkerchiefs (aOR = 0.3, 95% CI = 0.1–0.5, $p < 0.01$) than females. Moreover, those who had chronic diseases were more likely to wash their hand with soap and sanitizers (aOR = 2.4, 95% CI = 1.2–4.6, $p = 0.01$) compared to those who did not have chronic diseases.

Risk perception of diseases at Hajj

Pilgrims were reportedly concerned about sunstroke (34% [116/344]), food poisoning (30% [103/344]), accidents (27% [94/344]), influenza (26% [89/344]) and diarrhea (25% [86/344]). Those who were concerned about food poisoning were more likely to avoid eating food from street vendors (aOR = 2.9, 95% CI = 1.1–7.5, $p = 0.02$) and clean their hands with hand sanitizers (aOR = 2.5, 95% CI = 1.1–5.4, $p = 0.01$). Nevertheless, there was no association between the level of concern about influenza and pneumonia and the uptake of influenza and pneumococcal vaccines (all p values >0.2).

Discussion

This study showed that less than half of Saudi pilgrims sought pre travel advice before departing to Hajj. This rate was low compared to previous studies conducted among Arab pilgrims (including Saudi pilgrims) in 2006 and among Australian pilgrims in 2014. These studies found that 74% of Arab pilgrims and 65% of Australian pilgrims received some sort of health advice before departing to Hajj [10,16]. In this study we also found that about two thirds of participants obtained advice from medical sources, and that travel clinics and family doctors were the most sought sources. These findings are similar to those of a survey conducted among Australian Hajj pilgrims in 2014 [10]. Interestingly, only 4% of participants in this study reported the Saudi MoH as their main source of advice; this is different from the finding of a previous study that found that Arab pilgrims reported the ministry of health in their original country as their main source of pre travel advice [16]. Thus, it is necessary to improve access to the MoH website and provide more targeted appropriate health information on Hajj and preventive measures. Moreover, Saudi Hajj pilgrims need to be informed about the need to seek pre travel health advice, and this advice should be sought at least 6–8 weeks prior to travel [17]. This could be achieved by launching awareness campaigns prior to Hajj about the importance of seeking health advice [18]. Our

study identified that having a chronic condition was the only factor significantly associated with seeking pretravel health advice.

Interestingly, our study found that receiving advice from Hajj travel agents was less reported among the participants (3%) in this study than in previous studies of Australian Hajj pilgrims in 2012–2014 [10,19] and Arab pilgrims in 2006 [16]. However, participants reported Hajj travel agents as the most cited source of advice on vaccines. This could be explained by a qualitative survey among Australian Hajj pilgrims between 2009 and 2012 that demonstrated a high level of confidence in pre travel advice from travel agents and from family and friends who had previous Hajj experience [20]. Nevertheless, it has been noted that very few studies have aimed to investigate pre travel advice-seeking behavior among Hajj pilgrims, yet these studies found that pre travel advice was significantly associated with positive health practices among pilgrims during Hajj [10,16,21,22]. This association has not been fully explored; therefore, more studies are needed to cover this knowledge gap.

In this study, influenza vaccine coverage among Saudi Hajj pilgrims, including the at-risk group, was higher (67% overall and 87% for at risk group) than that reported studies among Saudi pilgrims from various Hajj years [5,14,22–24]. In contrast, the uptake of other recommended vaccines was suboptimal among the participants. For instance, the uptake of pneumococcal vaccine was only 8.7%, similar to the rate reported by Hajj studies conducted in France, where the coverage ranging between 1.7% and 8.9% [25,26]. However, this rate of uptake is very low compared to those of other countries. For instance, Australian pilgrims reported coverage between 26% and 30% during the Hajj 2013 and 2014 [10,27]. This is concerning because pneumonia has been reported as the leading cause of hospital admission during Hajj [28]. Community-acquired pneumonia (CAP) accounted for 27.2% of ICU admissions during Hajj 2009–2010 [29] and 45.4% of ICU admission in 2016 [30]. The results also show that the uptake of recommended vaccines, including influenza and pneumococcal vaccines, was significantly higher among individuals with higher education levels. This result is in agreement with a study among Australian Hajj pilgrims in 2014 [10]. In addition, the coverage rates of hepatitis A and B vaccines among our participants were 2.3% and 1.3%, respectively, which was lower than the uptake rate recorded among Saudi pilgrims (6% for each hepatitis A and B) in 2010 [31]. Similarly low uptake has also been reported previously among French pilgrims (12% for hepatitis A in 2005) [32] and Australian pilgrims (17% for both hepatitis A and B) in 2014 [10].

In this study, the participants cited several reasons for not receiving the recommended vaccines; not knowing the vaccines were recommended was the most cited reason. This result concurs with the findings of previous studies conducted with Saudi Hajj pilgrims between 2013 and 2015 and Australian Hajj pilgrims in 2014 that reported lack of knowledge to be a significant factor in poor uptake of recommended vaccines, including seasonal influenza vaccines [10,15,33]. Therefore, enhancing awareness among Hajj pilgrims, especially elderly adults and those with preexisting illnesses, about the importance of seeking professional pre travel advice could be an important strategy for improving the uptake of preventive measures, including vaccines. Although the MoH and other Saudi health-related authorities have an annual awareness campaign, there is a lack of messages targeted to subgroups using various media channels, which may have caused the number of people who do not know the vaccines are recommended to remain steady for years. Moreover, providing travel clinics and family doctors with appropriate health information on Hajj and preventive measures could also facilitate uptake.

This study shows that over two thirds of Hajj pilgrims brought some medications with them when traveling. Analgesics were the most reported medications, while antibiotics and antipyretics were reported by less than 6% of participants. Azeem et al. found that over 34% of Australian Hajj pilgrims used unprescribed antibiotics during their stay at Hajj, and 26% obtained them in Saudi Arabia [34]. This study is unique in showing that over half of pilgrims with chronic conditions such as diabetes brought their medications during their stay at Hajj. Yet, only 12% reported having a large enough quantity, and 24% stored the medications in cool containers. Therefore, it is necessary to improve awareness among pilgrims with chronic conditions regarding the importance of bringing enough drugs and educate them on the proper way of storing their medications during Hajj. Hence, such information also needs to be included in the official annual Hajj recommendations for pilgrims and health care providers.

The uptake of non-pharmaceutical preventive measures among participants of this study was acceptable. Hand hygiene was the most reported measure, followed by facemask use. These results are consistent with those of most Hajj studies from different countries reporting on the uptake of preventive measures among pilgrims [5,10,11,35–37]. In recent years, Hajj has fallen in the summer season in Saudi Arabia, where summer temperatures can reach 49 °C. This poses a risk of heat-related illness such as sunstroke and gastrointestinal illness. Our study found that sunstroke and food poisoning were major concerns among pilgrims. In contrast, participants complied less with measures for preventing these risks, such as avoiding unclean fruits and vegetables, avoiding food vendors and using an umbrella. Sunstroke and gastrointestinal illness have been reported frequently among pilgrims in recent years [38,39]. For instance, in Hajj 2015, about 1737 sunstroke cases were reported [39]. Despite this, measures of avoiding unclean fruits and vegetables, avoiding food vendors and using an umbrella are not listed in the recent Saudi MOH recommendations for Hajj pilgrims [40]. Consequently, health authorities in Saudi Arabia need to take into account the seasonal variability of Hajj and therefore refine and revise Hajj health recommendations.

This study has some limitations. First, the cross-sectional design of the analyses cannot be used to explore causal associations between pilgrims' knowledge, perceptions, and pretravel advice and health practice during Hajj. Secondly, recall bias may occur, as the data were collected through a self-reported survey. Thirdly, about 73% of participants were male, which leads to potential selection bias. Despite these limitations, this study has uniquely explored the pretravel advice, knowledge, perceptions and health practices of Saudi Hajj pilgrims. Furthermore, it has identified factors associated to the uptake of preventive measures.

To conclude, this study highlights that there are significant opportunities for improving awareness among Hajj pilgrims about the importance of using preventive health measures. Moreover, this study emphasizes the need for better communication between official health authorities in Saudi Arabia and local Hajj pilgrims regarding Hajj health information.

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Ethical approval

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Authors' contribution

Amani S Alqahtani: designing the study, analyzing data and drafting the manuscript. Nora A. Althimiri: collecting the data. Nasser F BinDhim: designing the study, supervising data collection. All the authors have made substantial contributions to editing the manuscript.

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