



Pattern of diseases among visitors to Mina health centers during the Hajj season, 1429 H (2008 G)

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KEYWORDS

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Abstract

Background: While performing the Hajj, hajjis face different risks related to the environment, their behaviors and their health conditions that can result in a variety of diseases. The objective of this study was to determine the pattern of diseases among pilgrims seeking medical services in Mina primary health care centers (PHCCs) during the Hajj season in 1429 (2008).

Methods: This is a descriptive study based on the medical records of a random sample of 4136 patients who attended 13 randomly selected Mina PHCCs from 8 to 12 Dhu-Alhijja, 1429 H (6–10 December 2008).

Results: The majority of the patients were men (70.7%), and most of the patients were between 45 and 64 years of age (42.8%). One-fifth (20.2%) of the patients suffered from multiple diseases. Respiratory diseases were the most common (60.8%), followed by musculoskeletal (17.6%), skin (15.0%) and gastrointestinal (13.1%) diseases. Diabetes, asthma and hypertension each constituted less than 3% of the total diseases. Respiratory diseases were the most common independent of nationality or the day of visit, while the frequency of the other diseases varied according to nationality and the day of visit. The most frequently prescribed drugs were analgesics, antipyretics, antibiotics and cough syrups.

Conclusion: This study describes the pattern of diseases among pilgrims attending Mina PHCCs, which may aid in providing the best possible health care services to pilgrims.

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Introduction

The Hajj is the largest annual Islamic pilgrimage to Mecca. While performing the Hajj, pilgrims face different risks related to the environment, their behaviors and their underlying health conditions that can result in a variety of diseases. For these reasons, pilgrims are vulnerable and require focused medical support. The Saudi authorities spare no effort to ensure a safe and healthy environment during the Hajj period by providing guidance on pre-departure vaccination in the pilgrims' countries of origin, providing free health services in-Kingdom throughout the Hajj premises, improving housing and crowding conditions and educating and supervising all pilgrims and local support staff operating on the Hajj premises. Understanding the pattern of disease that occurs during the Hajj provides health policy makers with important information for the optimal provision of health services during the Hajj.

Although several studies have been conducted in the past few years to determine the pattern of diseases occurring among pilgrims, most of these were among pilgrims registered in hospitals, who constitute the minority of those seeking medical services and are usually have more advanced or severe diseases [1–4]. Compared to hospitals, primary health care centers (PHCCs), which are also open 24 h a day, receive more pilgrims (according to data from the Hajj in 1428 H data, 287,756 hajjis visited PHCCs, but only 78,762 visited hospitals), are considered first-level care facilities, and are more accessible and better distributed throughout the Mina area (there are only five hospitals but 25 PHCCs serving pilgrims in Mina, as shown in [Appendix A](#)). However, no studies have been conducted to determine the pattern of diseases in Mina PHCCs since 1998, and no pattern of diseases in Mina PHCCs has been reported by the Ministry of Health (MoH) statistical department [5,6].

This study aims to determine the pattern of diseases among pilgrims seeking medical services at Mina PHCCs to provide evidence-based information to guide the optimal allocation of health resources during future Hajj seasons.

Materials and methods

A descriptive study was carried out among pilgrims seeking medical services in Mina PHCCs during the period from 8 to 12 Dhu al Hijjah 1429 H (6–10 December 2008). A sample size of 3732 was used to determine which diseases probably affected 2.5% or more of the study population with a precision of

0.5% at a 95% confidence level. The sample size was then increased to 5000 to compensate for the anticipated incompleteness of the forms. A two-stage, stratified, systematic sampling technique was used to select cases randomly. In the first stage, 13 out of the 25 centers were chosen using a simple random sampling technique ([Appendix A](#)). The sample was stratified according to the participating PHCC and the date of the patient visit. The size of the sample allocated to each center was based on the proportion of patients attending each participating health facility on a given date during the last Hajj season. In the second stage, a systematic technique was used to randomly select patient forms from the available forms in accordance with both the sample size allocated to each center on a given date and the actual number of patients who attended the health facility on a given date.

Upon entering a PHCC, each pilgrim is assigned a standard form ([Appendix B](#)) that documents the date, duty shift, demographic data (name, age, gender and nationality), diagnosis, treatment and type of intervention (referral to hospital, dressing or observation). Each form is completed by a doctor according to the pilgrim's condition and is then sent to the pharmacy so that medications can be dispensed and the form can be reported and stored. Each center sends a summary report on the demographic characteristics of its patients (total number of visitors, Saudis or non-Saudis, pilgrims or non-pilgrims, gender and age) three times daily to the statistical department of the Mina health center's administration, which in turn compiles these data to prepare summarized reports for Mina. However, at no stage are the data on diseases transmitted or analyzed.

Based on the prescription form, an electronic form was designed using the "make view" module of Epi info statistical software version 3.5.3 (centers for disease control and prevention), and all collected data were entered into the database.

For administrative purposes and according to the guidelines of the Ministry of Hajj, global nationalities were categorized into eight groups: Saudi Arabia; other Arab countries; non-Arab African countries; Iran; Turkey and developed countries (Europe, America and Australia); South Asian countries; Southeast Asian countries; and other or non-specified nationalities. Diseases were categorized, as on the prescription form, into five subgroups according to the anatomical system involved (cardiovascular, respiratory, gastrointestinal, skin and "eye and ear" diseases). The category "others" includes four types of disease that cannot be classified under the main anatomical systems (diabetes, urinary tract infections, musculoskeletal

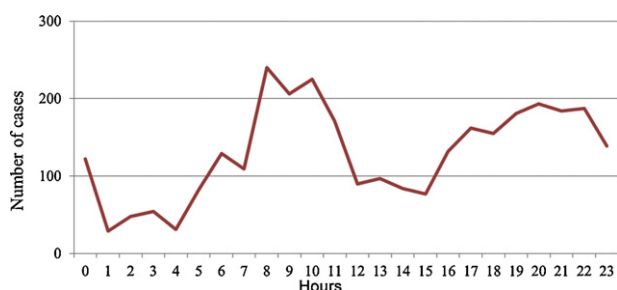


Fig. 1 Hourly distribution of patients to Mina PHCCs during Hajj season 1429 H.

diseases and “obstetric and gynecological” diseases). In addition, dental problems and injuries were documented manually by the physicians, creating another group of unspecified diseases. In patients with more than one disease, each disease was assessed as a separate case.

The proportion of the forms assigned to each PHCC was based on the Mina PHCCs’ statistics for the Hajj season of 1428 H, under the assumption that a similar pattern of patient presentation existed in 1429 H. However, to adjust for the actual patient presentation pattern at each PHCC on a given date during the current year, data were obtained from the general directorate of statistics in the MoH after the Hajj (in 1429 H, 232,384 prescription forms were registered), and weights were calculated to adjust for the differences between 1428 H and 1429 H.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 18.0 based on the adjusted, weighted values of the variables. Descriptive statistics, including frequencies for variables, means, standard deviations and cross tabulations, were performed as appropriate. Confidence intervals (95%) were calculated for the differences in proportions. The chi squared test was used to evaluate the distribution of categorical data, and statistical significance was set at less than 0.05 throughout the analysis.

Because the objective of the study was to assess the pattern of diseases, forms with missing diagnoses were excluded, leaving 4136 records (83%) in the final sample.

Results

Of the 4136 included patients who attended the surveyed centers during the study period, the number of patients seeking medical care was lowest on day 9 and highest on day 11. Most of the patients presented during the morning shift (58.2%), and there was a bimodal pattern of attendance (at 8:00 am and at 8:00 pm) (Fig. 1).

Table 1 Demographic characteristics of patients attending PHCCs in Mina during Hajj season 1429 H.

	<i>N</i>	%	95% <i>CI</i>
Gender			
Male	2925	70.7	69.3–72.1
Female	1211	29.3	27.9–30.7
Total	4136	100.0	
Age groups			
0–14 years	69	2.9	2.2–3.6
15–24 years	179	7.6	6.5–8.6
25–44 years	928	39.2	37.3–41.2
45–64 years	1013	42.8	40.8–44.8
65+ years	177	7.5	6.4–8.5
Total	2366	100.0	
Hajj status			
Hajj	3696	94.9	94.3–95.6
Non Hajj	197	5.1	4.4–5.7
Total	3893	100.0	
Residency status			
Domestic	679	17.6	16.4–18.8
International	3170	82.4	81.2–83.6
Total	3849	100.0	
Nationality			
Saudi Arabia	316	8.3	7.4–9.2
Other Arab countries	1691	44.4	42.8–46
Non-Arab countries	422	11.1	10.1–12.1
African countries			
Iran	148	3.9	3.3–4.5
Turkey and developed countries ^a	122	3.2	2.6–3.8
South Asian countries	1030	27.0	25.6–28.5
Southeast Asian countries	30	0.8	0.5–1.1
Others	50	1.3	1.0–1.7
Total	3809	100.0	

CI: confidence interval.

^a Turkey, Europe, American countries and Australia.

The demographic characteristics of the patients whose records were reviewed in this study are summarized in Table 1. Of the patients whose age and sex are known, men were predominant in all groups except those under 15 years of age, and there was a relatively higher proportion of women in the 45–64 age group (M:F ratio of 1.7:1) when compared to the 15–24 (M:F ratio of 2.6:1), 25–44 (M:F ratio of 2.8:1) and 65+ (M:F ratio of 2.8:1) age groups. The patients represented more than 82 nationalities;

Egyptians (720; 18.9%) and Pakistanis (666; 17.5%) were the most frequent attendees at the surveyed centers, followed by Saudis (316; 8.3%), Nigerians (254; 6.7%) and Indians (216; 5.7%). Among nationality groups, males also predominated in all of the groups except the non-Arab Africans (M:F ratio of 0.9:1) and the Southeast Asians (M:F ratio of 1:1). In the Saudi and other Arab nationalities groups, the ratios of males to females were much higher than for the other nationalities, with M:F ratios of 5.6:1 and 3.7:1, respectively.

Among the 3606 patients whose nationality and residency status were known, most patients from domestic group were Saudis (48.1%), followed by other Arabs (38.9%).

During the study period, 4136 patients were diagnosed with 5025 diseases, with an average number of diseases per patient of 1.21 (± 0.44). The majority of the patients (79.8%) suffered from a single disease, but 20.2% had multiple diseases.

The most frequently occurring diseases (Table 2) were those pertaining to the respiratory system (2516; 60.8%), followed by musculoskeletal diseases (727; 17.6%), skin diseases (620; 15.0%) and gastrointestinal diseases (540; 13.1%).

Pharyngitis and the common cold were the most common diseases—982 cases (23.7%) and 850 cases (20.6%), respectively—followed by musculoskeletal diseases (727; 17.6%) and allergic skin diseases (426; 10.3%) (Table 2).

Among the chronic diseases, diabetes and asthma were the most common—106 cases (2.6%) and 104 cases (2.5%), respectively—followed by hypertension (81; 2.0%) (Table 2).

As shown in Table 3, apart from the respiratory diseases that made up the majority of cases during the study period, most of the patients who attended on days 8, 11 and 12 had musculoskeletal diseases; most of those who attended on day 9 had gastrointestinal diseases and most of those who attended on day 10 had skin diseases.

Compared to female patients, male patients had a higher percentage of skin diseases (17.6% of men compared to 8.4% of women; p value < 0.0001). In contrast, the percentage of women with musculoskeletal diseases was higher (22.8% of women compared to 15.4% of men; p value < 0.0001) (Table 4).

Table 5 shows the prevalence of the registered diseases among the different age groups. Cardiovascular diseases were more frequently observed in the older age groups, ranging from 0.6% among those aged 15–24 years to 4.5% among those aged 65 years and older (p value = 0.0017). A similar trend was observed for musculoskeletal diseases, where the percentage ranged from 8.7% among

those under 15 years of age to 22.6% among those aged 65 years and older (p value < 0.0001). In contrast, respiratory diseases were more common among children under 15 years of age (78.3%; p value < 0.0062). Moreover, there was a bimodal distribution of injuries within the age groups; the cases were clustered among those 65 years of age and older (4.4%) and among the younger age groups (2.9% among those under 15 years of age and 3.4% among those 15–24 years of age). Furthermore, some diseases were more common among different age groups. Gastrointestinal and liver diseases were most common among children under 15 years of age (10.1%). Musculoskeletal diseases were most common among those 15–24 years of age, 45–64 and 65 or older (12.3%, 20.8% and 22.6%, respectively). Skin diseases were most common among adults 24–45 years of age (19.8%).

Regarding the proportional frequencies of the different diseases according to nationality, respiratory diseases were most common among all nationalities (59.3% of the total diseases). The next most common diseases among specific nationalities included gastrointestinal diseases among Saudis (19.3%); skin diseases among other Arabs (21.5%) and those from Turkey and developed countries (13.9%); and musculoskeletal diseases among non-Arab Africans (28.9%), South Asians (21.6%), Iranians (19.6%) and Southeast Asians (6.0%) (Table 6). Respiratory diseases, musculoskeletal diseases, skin diseases and gastrointestinal diseases all showed statistically significant differences (p values < 0.05).

A total of 9704 drugs were prescribed to the 4136 patients, with an average number of drugs per patient of 2.35 ± 0.97 . Of the patients included in this study, 19.0% received monotherapy and 80.2% received multiple therapies; only 0.8% received no medication. The most frequently prescribed drugs were analgesics and antipyretics (79.4%), followed by antibiotics (53.9%) and cough syrups (37.1%).

A review of the collected prescription forms showed that only one patient was referred to a hospital. There were 205 patients (4.96%) who were referred from the clinics to the dressing room and 25 patients (0.60%) who were referred to the observation room.

Discussion

The Hajj is a special event that attracts a large number of people from different cultures. It is a major challenge for the Saudi Ministry of Health to provide health services, especially preventive services, for this event. This study provides information that will

Table 2 Distribution of diseases among patients attending PHCCs in Mina during Hajj season 1429 H.

Diseases groups ^a	Disease	Patients (<i>n</i> = 4136) ^b	% ^c
Cardiovascular diseases	Hypertension	81	2.0
	Others	6	0.2
	Total	87	2.1
Respiratory diseases	Common cold	850	20.6
	Pharyngitis	982	23.7
	Tonsillitis	172	4.2
	Bronchitis	401	9.6
	Bronchial asthma	104	2.5
	Pneumonia	7	0.2
	Total	2516	60.8
GIT diseases	Gastritis	233	5.6
	Gastroenteritis	155	3.8
	Diarrhea	51	1.2
	Cholecystitis	3	0.1
	Hepatitis	10	0.2
	Others	83	2.0
	Piles	5	0.1
	Total	540	13.1
Skin diseases	Allergic	426	10.3
	Infectious	193	4.7
	Nail diseases	1	0.0
	Total	620	15.0
Eye and ear diseases	Conjunctivitis	124	2.8
	Trachoma	2	0.1
	Blephritis	2	0.1
	Otitis externa	5	0.1
	Otitis media	7	0.2
	Others	2	0.1
	Total	142	3.4
Diabetes mellitus	Diabetes	106	2.6
Urinary tract infections	UTI	61	1.5
Musculoskeletal diseases	Musculoskeletal	727	17.6
OBs & Gyn diseases	OBsG	7	0.2
Injuries	Burns	12	0.3
	Trauma	8	0.2
	Wounds	46	1.1
	Insect bites	1	0.0
	Total	67	1.6
Dental diseases	Dental diseases	40	1.0
Other diseases	Others	112	2.7

^a GIT (gastrointestinal, liver and gall bladder) disease; OBs & Gyn (obstetric and gynecological) diseases.

^b More than one disease may be recorded per patient. Total number of diseases = 5025.

^c Percentage according to the number of patients (*n* = 4136).

Table 3 Distribution of disease groups according to the date of visit for patients attending PHCCs in Mina during Hajj season 1429 H.

Diseases groups ^a	Day					Total (n=4196) ^b	P**
	8 (n=484)	9 (n=184)	10 (n=1046)	11 (n=1432)	12 (n=1050)		
Cardiovascular diseases	6	5	19	30	26	86	0.1525
% within disease	7.0	5.8	22.1	34.9	30.2	100.0	
% within day	1.4	2.7	1.8	2.1	2.5	1.7	
Respiratory diseases	243	89	524	926	733	2515	<0.0001
% within disease	9.7	3.5	20.8	36.8	29.1	100.0	
% within day	57.3	48.4	50.1	64.7	69.8	50.1	
GIT diseases	57	39	145	177	121	539	0.1379
% within disease	10.6	7.2	26.9	32.8	22.4	100.0	
% within day	13.4	21.2	13.9	12.4	11.5	10.7	
Skin diseases	57	34	228	202	99	620	0.0004
% within disease	9.2	5.5	36.8	32.6	16.0	100.0	
% within day	13.4	18.5	21.8	14.1	9.4	12.4	
Eye and ear diseases	12	4	44	50	31	141	0.7802
% within disease	8.5	2.8	31.2	35.5	22.0	100.0	
% within day	2.8	2.2	4.2	3.5	3.0	2.8	
Diabetes mellitus	8	3	25	45	25	106	0.2061
% within disease	7.5	2.8	23.6	42.5	23.6	100.0	
% within day	1.9	1.6	2.4	3.1	2.4	2.1	
Urinary tract infections	6	7	20	17	12	62	0.1726
% within disease	9.7	11.3	32.3	27.4	19.4	100.0	
% within day	1.4	3.8	1.9	1.2	1.1	1.2	
Musculoskeletal diseases	78	29	206	254	159	726	0.4127
% within disease	10.7	4.0	28.4	35.0	21.9	100.0	
% within day	18.4	15.8	19.7	17.7	15.1	14.5	
OBs & Gyn diseases	0	1	0	4	2	7	0.3535
% within disease	0.0	14.3	0.0	57.1	28.6	100.0	
% within day	0.0	0.5	0.0	0.3	0.2	0.1	
Injuries	7	4	30	14	12	67	0.0727
% within disease	10.4	6.0	44.8	20.9	17.9	100.0	
% within day	1.7	2.2	2.9	1.0	1.1	1.3	
Dental diseases	6	1	9	9	15	40	0.6701
% within disease	15.0	2.5	22.5	22.5	37.5	100.0	
% within day	1.4	0.5	0.9	0.6	1.4	0.8	
Other diseases	15	15	36	28	17	111	0.0003
% within disease	13.5	13.5	32.4	25.2	15.3	100.0	
% within day	3.5	8.2	3.4	2.0	1.6	2.2	

^a GIT (gastrointestinal, liver and gall bladder) disease; OBs & Gyn (obstetric and gynecological) diseases.

^b More than one disease may be recorded per patient. Total number of diseases = 5020.

** *p* value based on chi squared for the trend.

Table 4 Distribution of disease groups according to gender for patients attending PHCCs in Mina during Hajj season 1429 H.

Diseases groups ^a	Male (n = 2925)		Female (n = 1211)		p ^{***}
	N ^b	% ^c	N ^b	% ^c	
Cardiovascular diseases	44	1.5	42	3.5	<0.0001
Respiratory diseases	1718	58.7	750	61.9	0.0565
GIT diseases	337	11.5	193	15.9	0.0001
Skin diseases	516	17.6	102	8.4	<0.0001
Eye and ear diseases	78	2.7	64	5.3	<0.0001
Diabetes mellitus	77	2.6	29	2.4	0.6597
Urinary tract infections	39	1.3	22	1.8	0.2406
Musculoskeletal diseases	451	15.4	276	22.8	<0.0001
OBs & Gyn diseases	—	—	7	0.6	—
Injuries	52	1.8	14	1.2	0.1465
Dental diseases	32	1.1	8	0.7	0.1950
Other diseases	86	2.9	26	2.1	0.1527

^a GIT (gastrointestinal, liver and gall bladder) disease; OBs & Gyn (obstetric and gynecological) diseases.

^b More than one disease may be recorded per patient. Total number of diseases = 4963.

^c Percentage according to gender.

^{***} p value based on chi squared.

be useful in planning the health care services provided by the Saudi Arabian government during the Hajj.

To our knowledge, this is the first study to determine the health problems diagnosed in Mina PHCCs since Abodahish et al. conducted a similar study in 1998, in which the main objective was to assess the utilization of primary health care services and one hospital was included in addition to 15 PHCCs [5]. Another similar study was conducted in Al-Madinah Al-Munawwarah by Al-Quwaidhi et al. in the second half of Dhul Qidah (the 11th month of the lunar calendar, just 15–20 days before the Hajj) in 1428 H (2007); this was the first station for some pilgrims, while others visited Al-Madinah after performing the Hajj [7]. It is also well known that pilgrims spend shorter periods there than in the Mina area (about 2 days), and that area has a different environment and different places to visit. For these reasons, comparisons with our study may not be entirely accurate.

The observed changes in the caseload at the clinics during the study period coincided with the frequent movements of the pilgrims during the performance of their rituals. On day 8, which saw a major influx of pilgrims into Mina, the pilgrims were often more fit than on the following days, so the number of patients who attended the health facilities at Mina was lower than the number attending later (10.3%). By the end of day 8, some pilgrims were traveling to Arafat, and the rest would follow them in the early morning of day 9. Therefore, the number of patients who attended the health

centers in Mina reached its minimum on day 9 (4.5%). The pilgrims were most likely to suffer from health problems that caused them to attend PHCCs during the first hours of day 10, while traveling from Arafat towards Mina and passing by Muzdalifa after a full day of activities, which explains the stepwise increase in the number of cases over the following two days.

Patients primarily attended PHCCs during the morning shift, which reflects the normal daily activities of the pilgrims. Our results suggest that there was an accumulation of patients between the two working shifts, as indicated by the bimodal pattern of the caseload during the day. This is similar to results published ten years ago by Abodahish et al. [5].

Men and physically fit pilgrims are usually responsible for taking care of their families, and it is common for women and elderly pilgrims to assign men and younger pilgrims to perform Jamarat rituals in their stead. All these factors could explain the higher proportions of males (70.7%) and those 25–64 years of age (82.0%) who attended the health centers in Mina. Moreover, a woman cannot go on the Hajj without a male to accompany her (usually her husband or an eternally mahram relative whom she can never marry), which also explains the higher percentage of males.

Respiratory diseases (60.8%), musculoskeletal diseases (17.6%), skin diseases (15.0%) and gastrointestinal diseases (13.1%) represent the greatest burdens. These were also among the most common diseases evident in previous studies, which

Table 5 Distribution of disease groups according to age for patients attending PHCCs in Mina during Hajj season 1429 H.

Diseases groups ^a	0–14 years (n = 69)		15–24 years (n = 179)		25–44 years (n = 928)		45–64 years (n = 1013)		65+ years (n = 177)		Total* (n = 2366)	p ^{***}
	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c		
Cardiovascular diseases	0	0.0	1	0.6	14	1.5	24	2.4	8	4.5	47	0.0017
Respiratory diseases	54	78.3	115	64.2	537	57.9	590	58.2	98	55.4	1394	0.0062
GIT diseases	7	10.1	19	10.6	121	13.0	133	13.1	20	11.3	300	0.6179
Skin diseases	3	4.3	15	8.4	184	19.8	148	14.6	17	9.6	367	0.9006
Eye and ear diseases	2	2.9	5	2.8	26	2.8	45	4.4	7	4.0	85	0.1106
Diabetes mellitus	0	0.0	0	0.0	9	1.0	30	3.0	8	4.5	47	<0.0001
Urinary tract infections	4	5.8	4	2.2	13	1.4	19	1.9	2	1.1	42	0.1618
Musculoskeletal diseases	6	8.7	22	12.3	155	16.7	211	20.8	40	22.6	434	<0.0001
OBs & Gyn diseases	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	1	0.6016
Injuries	2	2.9	6	3.4	9	1.0	11	1.1	7	4.0	35	0.915
Dental diseases	0	0.0	5	2.8	14	1.5	5	0.5	2	1.1	26	0.0804
Other diseases	2	2.9	3	1.7	32	3.4	19	1.9	4	2.3	60	0.308

^a GIT (gastrointestinal, liver and gall bladder) disease; OBs & Gyn (obstetric and gynecological) diseases.
^b More than one disease may be recorded per patient. Total number of diseases = 2838.
^c Percentage according to age groups.
^{***} p value based on chi squared for trend.

Table 6 Distribution of disease groups according to nationality for patients attending PHCCs in Mina during Hajj season 1429 H.

Diseases groups ^a	Saudi Arabia (n = 316)		Arab (n = 1691)		Non-Arab Africa (n = 422)		Iran (n = 148)		Turkey and developed countries (n = 122)		South Asia (n = 1030)		Southeast Asia (n = 50)		Others (n = 30)		Total (n = 3809)		p ^{***}
	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	N ^b	% ^c	
Cardiovascular disease	5	1.6	33	2.0	7	1.7	0	0.0	6	4.9	26	2.5	2	4.0	0	0.0	79	2.1	0.1210
Respiratory disease	182	57.6	918	54.3	273	64.7	110	74.3	79	64.8	640	62.1	22	44.0	35	116.7	2259	59.3	0.0001
GIT diseases	61	19.3	224	13.2	56	13.3	11	7.4	12	9.8	128	12.4	2	4.0	4	13.3	498	13.1	0.0053
Skin diseases	32	10.1	364	21.5	43	10.2	14	9.5	17	13.9	119	11.6	1	2.0	9	30.0	599	15.7	0.0001
Eye and ear disease	6	1.9	54	3.2	22	5.2	9	6.1	4	3.3	31	3.0	1	2.0	3	10.0	130	3.4	0.0421
Diabetes mellitus	7	2.2	61	3.6	1	0.2	3	2.0	2	1.6	19	1.8	0	0.0	0	0.0	93	2.4	0.0022
UTI	5	1.6	28	1.7	4	0.9	1	0.7	0	0.0	9	0.9	0	0.0	1	3.3	48	1.3	0.3696
Musculoskeletal disease	44	13.9	238	14.1	122	28.9	29	19.6	10	8.2	222	21.6	3	6.0	4	13.3	672	17.6	0.0001
OBs & Gyn diseases	0	0.0	4	0.2	0	0.0	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	5	0.1	0.8894
Injuries	6	1.9	27	1.6	3	0.7	0	0.0	0	0.0	27	2.6	1	2.0	1	3.3	65	1.7	0.0718
Dental diseases	1	0.3	15	0.9	2	0.5	0	0.0	1	0.8	10	1.0	0	0.0	0	0.0	29	0.8	0.7802
Other diseases	11	3.5	49	2.9	7	1.7	0	0.0	7	5.7	22	2.1	0	0.0	3	10.0	99	2.6	0.0047

^a GIT (gastrointestinal, liver and gall bladder) disease; OBs & Gyn (obstetric and gynecological) diseases.

^b More than one disease may be recorded per patient. Total number of diseases = 4567.

^c Percentage according to nationality groups.

^{***} p value based on chi squared for trend.

demonstrates that they are the main diagnoses of PHCC physicians [5,8].

Although the above mentioned diseases have been found in other studies in different orders, respiratory diseases are always at the top of the list, even in some studies conducted on hospitals [1,2,5,8]. This can be attributed to the Hajj environment, which includes crowds, cramped accommodations and adverse weather [9,10]. In this Hajj season, which took place in December, the highest temperature was 38 °C. The Abodahish et al. study conducted in April 1998 (high temperature of 55 °C) reported a lower prevalence of respiratory diseases than that reported in our study (49% and 60.8%, respectively), which might suggest the impact of ambient temperature on respiratory diseases [6,11,12]. In the Abdulkareem et al. study, respiratory diseases were observed in outpatients at a rate similar to that reported by Abodahish et al. (46.2%), but when grouped according to hajji status, it was found that respiratory diseases were reported more often in non-pilgrims than in pilgrims (62.2% and 43.9%, respectively) [7]. This high proportion among non-pilgrims, which was similar to the proportion of respiratory diseases among the sample in our study, might suggest that the length of stay in this environment could be a risk factor for developing respiratory diseases (as pilgrims in Al Madinah usually spend only 2 days there). Two questionnaire-based studies conducted among pilgrims assigned to camps and muftaresheen pilgrims (unofficial, internal pilgrims who have not been granted permission to undertake the Hajj and do not have official accommodations provided by a Hajj company, necessitating that they sleep in the streets) showed that respiratory diseases were their main complaints (67.3% and 70.8%, respectively), which is similar to the results of our study [13,14].

The extra physical effort expended during the performance of rituals (long-distance walking, uncomfortable sleeping conditions and carrying heavy weights) may explain the high percentage of musculoskeletal diseases (17.6%). This is much higher than the proportion reported in 1998 by Abodahish et al. (7.0%), which can be explained partly by the subsequent restriction of buses with fewer than 15 passengers from entering the sacred places [5]. Musculoskeletal diseases were also more prevalent in women than in men and displayed an upward trend as age increased, which has been reported in other studies [15–17]. Furthermore, the high proportion of women among non-Arab Africans may partially explain the increased percentage of musculoskeletal diseases among these nationalities.

The high incidence of skin diseases correlates well with other studies that reported skin diseases

as one of the common causes to seek care from a health provider [18,19]. Long distance walking and overcrowding may also contribute to the development of skin diseases, which may explain why men, who are responsible for their families' needs, developed skin diseases more than women (15.0%, compared with 6.7%, respectively) [20]. Among non-Saudi Arabs, skin diseases were more common than any other disease except respiratory diseases, especially on day 10, which was similar to the findings of Abodahish et al. [5].

The high occurrence of gastrointestinal diseases (13.1%) could reflect the low standard of food sanitation during the Hajj (e.g., illegal street vendors), irregular meals, or poor storage of leftover foods in Mina or Arafat [21]. The outbreaks of food poisoning that occurred in some domestic pilgrims' camps explains the substantial increase in the proportion of patients with gastrointestinal problems among Saudis, who constituted most of the domestic hajjis.

The movement of pilgrims on day 9 followed by the rush for stoning Jamarat on day 10 increases the likelihood of injuries on day 10 (45% of injury cases were presented on day 10). The elderly and younger age groups were more prone to injury than the age groups in between, which are composed of more physically fit people. Contrary to previous studies, which reported high numbers of trauma cases, the low incidence of injuries in our study (1.6%) could be due to the improved regulation of traffic, the new expansion of the Jamarat area, and the absence of any disaster this year [3,22].

The upward trend of cardiovascular diseases and diabetes with increasing age fits with the natural history of the diseases. Our results were lower than those found in questionnaire-based studies, which might be because not all patients with chronic diseases seek medical advice unless they are out of their medications, their condition deteriorates or they have a new complaint [14,23].

The medications prescribed were consistent with the pattern of the diseases.

In our study, there was only one patient who was transferred to a hospital, and we later found that the forms were transferred along with the patients who were referred to a hospital and were never sent back to the PHCCs.

There are a few limitations in our study. The major limitation is the incompleteness of the forms. Some missing data could result in bias, but we assume that the missing data were random in nature and unlikely to have distorted the results of the survey. Another limitation is that we used data collected from governmental centers only, while some country-specific medical missions (more than 59%)

provide health services to their registered pilgrims, as revealed by some studies, and therefore, our results may not be an exact representation of the disease pattern for all pilgrims [23,24]. However, this is a valid assessment of the diseases of patients who attended PHCCs, which was the objective of the study. Furthermore, the disease pattern also agrees with those reported in studies conducted in camps, indicating the absence of any major difference in patterns of illness between PHCCs and camps. An additional limitation was the absence of the forms that are marked with hospital referrals, which could lead to an underestimation of the number of severe diseases diagnosed in Mina health centers.

In conclusion, respiratory, musculoskeletal, skin and gastrointestinal diseases were the most common complaints among all patients visiting the primary health care centers in Mina during the Hajj season.

Our recommendations include three major areas: (1) strengthening the supervision efforts to ensure the completeness of prescription forms by the centers' reception staff and physicians to allow for the accurate assessment of patterns of illnesses; (2) distributing the statistical results of last year's patient data to policy makers and each centers'

administrator to allow for better management of the PHCCs in Mina; and (3) reporting the patient disease patterns and medications along with the demographic data to the MoH to produce the optimal information about the health services delivered during the Hajj seasons.

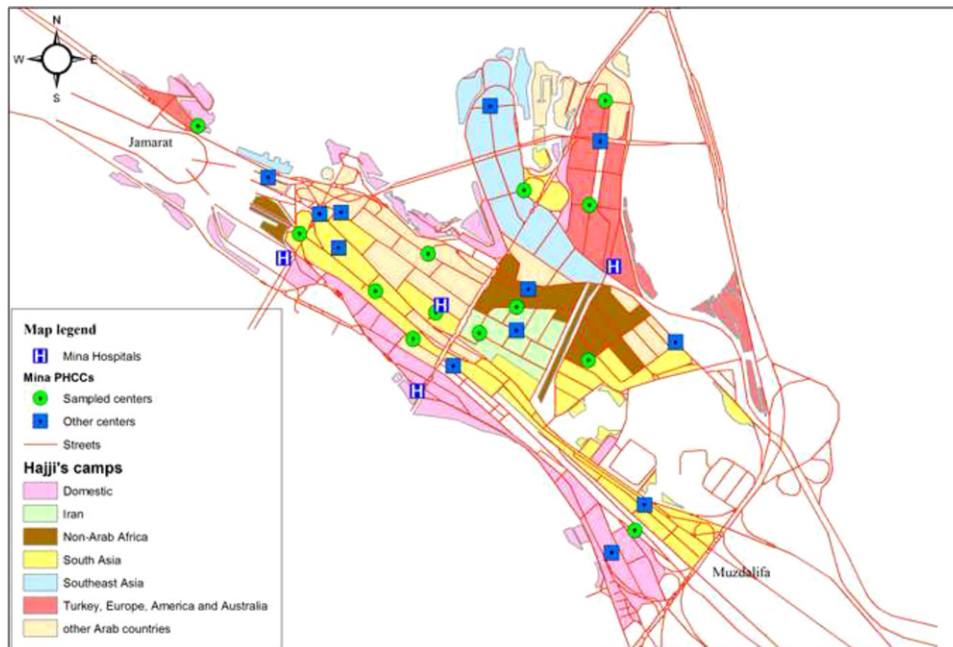
Conflict of interest

We have no conflict of interest to declare.

Acknowledgements

We would like to thank the health authorities in the Makkah general directorate for their support for this project. We would like to thank Dr. Essam Hammo, the Director of Mina PHCC administration, whose cooperation was highly appreciated, as well as all the staff in the centers for their assistance with the data collection.

Appendix A. Map of Mina area showing the distribution of PHCCs, hospitals, and hajji's camps, Mina, Hajj season 1429 H



Appendix B. Prescription form used in Mina PHCCs during Hajj season 1429 H

MIISTRY OF HEALTH GENERAL DIRECTORATE OF HEALTH CENTERS PILGRIMIC SEASON:14		وزارة الصحة Ministry of Health		وزارة الصحة الإدارة العامة لمراكز الصحية موسم حج 14													
استشارة الأجرادات الطبية لمرضى المراكز الصحية																	
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Physician Name: _____																	
Signature: _____																	

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