

## Impact Of The Infectious Diseases Systems On Healthcare Worker During The Hajj In Makkah Al Mukarramah At Saudi Arabia 2023

Hattan Kamal Khan<sup>1</sup>, Khalid Marzoug Alluhibi<sup>2</sup>, Aziza Al-Asmari<sup>3</sup>, Aisha Al-Jaeed<sup>3</sup>, Roaa Badr El-Din<sup>3</sup>, Sultan Mhoammad S Khan<sup>4</sup>, Hassan Atiah H Allihiebi<sup>5</sup>, Mohammad Matar Jarow Alanazi<sup>6</sup>, Sameer Ahmed Hassan Jafari<sup>7</sup>, Anwar Matar Jarow Alanazi<sup>8</sup>

### Abstract

#### **Background:**

*Hajj is one of the largest and the most ethnically and culturally diverse mass gatherings worldwide. The use of appropriate Infectious diseases systems on healthcare worker during the Hajj that ensures timely information management for effective planning and response to infectious diseases threats during the pilgrimage, and protection from infectious diseases prevention and control strategies for Hajj but with limited information on the operations and characteristics of the existing Hajj infectious diseases systems. Saudi Arabia has extensive experience of providing health care at mass gatherings acquired through decades of managing millions of pilgrims at the Hajj. The risk of infectious diseases transmission may extend to the healthcare workers during the Hajj, local Saudi population and to the home population of returning pilgrims after Hajj. This could strain the public health services in Saudi Arabia and may threaten global health security. **Aim of the study:** To assessment the Impact of the Infectious Diseases Systems on healthcare worker during the Hajj in Makkah Al Mukarramah at Saudi Arabia 2023. **Methods:** A cross-sectional study was conducted at healthcare workers in the hospitals and primary health sector in Makkah City, Kingdom of Saudi Arabia during Hajj season from June to July 2023 including 200 healthcare workers (HCWs). Data were collected using a written questionnaire was developed based on a literature review, to assessed the impact of the infectious diseases systems on healthcare worker during the Hajj **Results:** shows that most of the participants (32.0%) were in the age group(30-49), female was higher compared to male(57.0% and 43.0%) , regarding the marital status most of participants married were(54.0%), nationality the majority of participant are Saudi were(79.0%), majority of participant are nurse were(49.0%) while Physicians were(23.0%), regarding the reading the written guidelines majority of participa<sup>1</sup>nt answer No were (53.0%). **Conclusion:** the infectious diseases systems in Hajj and management systems and to implement syndromes' surveillance as an early warning system for infectious disease control during Hajj. The HCWs have difficulties in some preventive measures, especially among physicians, nursing and health inspector those with less years of experience, and those who did not read the written guidelines,*

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<sup>1</sup>General physician, Al Jumum primary healthcare Makkah, Saudi Arabia.

<sup>2</sup> Technician Nursing, Communicable Diseases Administration, Saudi Arabia.

<sup>3</sup>Nurse at Children's Hospital, Taif Health, Saudi Arabia.

<sup>4</sup>Technician Nursing, MOH Makkah, Saudi Arabia.

<sup>5</sup>Specialist-Public Health - Environment Health, Saudi Arabia.

<sup>6</sup>Nurse Technician, Qurayyat Mental Health Hospital, Saudi Arabia.

<sup>7</sup>Epidemiology Supervision Technician, Health Affairs In Jazan, Saudi Arabia.

<sup>8</sup>Nursing technician, Qurayyat Specialized Dental Center, Saudi Arabia.

*which highlighted the importance of training courses before Hajj season about the infectious diseases systems*

**Keywords:** *Impact, Infectious, diseases, Systems, healthcare, worker, Hajj, Makkah .*

### **Introduction**

Hajj, the pilgrimage to Mecca, Saudi Arabia, is the largest and most long-standing annual mass gathering event on earth. Today, following an exponential rise in the numbers of non-Saudi pilgrims attending the Hajj in the last decade, 2 million people from over 140 countries assemble annually. [1] The potential for spread of infectious diseases associated with mass gatherings is well recognized. Hajj, the unique annual mass gathering of over 2 million Muslims from all over the world, presents enormous challenges to the authorities in Saudi Arabia. [2] This presents an enormous challenge to Saudi Arabian authorities who, as functionaries to the Custodians of the two Holy Sites (Mecca and Medina), provide extensive, multi-faceted programs to serve these ‘Guests of God’, as protect from infectious diseases systems on healthcare workers during the Hajj [3]

They have infectious diseases systems on healthcare worker during the Hajj updated annually, to ensure that all aspects of Hajj rituals are conducted safely and not outbreak of multiple infectious diseases [4]. The inevitable overcrowding in a confined area of such large numbers increases infectious diseases as the risk of respiratory infections. Of these ‘Hajj cough’ for example is the most frequently reported complaint and is caused by a variety of viruses and bacteria. [5]

Collaboration between health policy makers and community leaders in the Saudi Arabia and used of infectious diseases system resulted in a rapid reduction of these infections. On-going infectious diseases surveillance and data analysis is necessary to better understand health risks and strengthen evidence base for health policy and prevention.[6] Protection and health education to the healthcare worker during the Hajj very important to deal with the battle against spread of travel-related infections also is a shared responsibility. Countries sending pilgrims should co-ordinate preventive measures by healthcare professionals and community groups[7]. Infectious diseases on healthcare workers during the Hajj lead to considerable morbidity. infectious diseases systems on healthcare worker during the Hajj are a major protection issue for healthcare providers, infection control specialists, public health authorities, and patients during the Hajj [8]. The risk of infected healthcare workers during the Hajj is estimated to be up to 20 times higher [9], equivalent to an infection rate of up to 25% [10]. The Saudi MOH collaborates with other organizations, such as the municipality and the ministry of Hajj to ensure food and water safety, infectious diseases control, waste management and to provide other public health services during Hajj. [11] also regular Infectious diseases Surveillance this indicator-based is implemented country-wide in Saudi Arabia for routine facility-based notification of infectious diseases events all year round, including during Hajj.[12]

The Hajj poses enormous logistical and planning challenges for the protection of the health of pilgrims, healthcare worker and Saudi residents and for the maintenance of national and global health security [13]. The Saudi Government’s success in alert and response planning for infectious diseases is attributable to a multidisciplinary group of experts from various government sectors who are involved in the advance planning of health services, logistical support, and communications for the Hajj [14]. Continuous monitoring of emerging infectious diseases ensures that, for example, infection with the Middle East respiratory syndrome infectious diseases in an individual [15] is not transmitted to other pilgrims, thereby avoiding a worldwide epidemic. The Saudi Government coordinates the Hajj activities through a supreme committee and 24 subcommittees for the Hajj to protect the health of pilgrims, healthcare worker.[16]

### **Literature Review**

Aljuhani et al (2023) report that Hajj is the largest and the most diverse mass gathering of people in the world . This mass gathering entails some of protection from most important public health and infectious disease hazards through applied of Infectious Diseases Systems[17]

Johari et al (2021) report that Jeddah is the main port for pilgrims who arrive from around 184 countries in the world to Makkah for Hajj or Umrah, making it one of the largest multicultural mass gatherings in the world [18]. Such a mass gathering as always been challenging for the Saudi government . The Saudi MOH has years of experience in dealing with this situation and tackling the danger of infectious diseases and heave infectious diseases systems on healthcare worker during the Hajj . However, there is always a potential risk of importing infectious diseases and spreading them locally and internationally [19].

Li et al (2022) found that many of these infections can be avoided or averted by adopting appropriate preventive measures. Prevention of these infections needs effort to raise awareness on the health hazards during Hajj among HCWs, especially those working with pilgrims to be able to conduct effectively preventive measures, such as infectious diseases systems and immunization and health education.[20]

Khatami et al (2014) reported that the largest cluster of pediatric cases in Europe occurred in East London [21], where eight children developed meningococcal W135 disease after a single case of W135 meningococcal infection in an elderly (returned) pilgrim. None of the children had travelled to the Hajj and only three of them were direct contacts of pilgrims. The likely explanation was that adults who had been to the Hajj (and only been immunized with A, C polysaccharide meningococcal vaccine) had returned as carriers of W135 and the organism had spread within their contacts in the local community. This wave of meningococcal.W135 infections which resulted in almost 20% mortality directly influenced health policy in the UK. [22]

Iskandar et al (2021) Training about infectious diseases systems and continuous medical education during the Hajj by many studies to increase knowledge level, create positive attitude during the Hajj , and improve the quality of service provided by healthcare workers .[23] In other study Saeedi et al (2022) reported efforts are ongoing globally to evaluate such public health risks, and regular evaluation of Infectious Diseases Systems on healthcare worker during the Hajj is a necessity. The Infectious Diseases Systems in Saudi Arabia is well established and improving. However, most of the previous evaluations had either concentrated on attributes of timeliness and completeness or focused on specific diseases and national programs. Unfortunately, Saudi Arabia's Infectious Diseases was seldom evaluated completely on healthcare worker during the Hajj. [24] The lack of knowledge of healthcare worker during the Hajj about the Infectious Diseases Systems existing or unavailability of Internet access could explain the low rate of case detection compared with a previous study in Jeddah. Hopefully, continuous supervisory visits, which were frequently conducted (80%), may improve this situation.[25]. The current manual was updated and easily accessible. It was published in Arabic language only, which is the primary language of the country; however, all healthcare worker had received their medical education in the English language. The digital version of the manual lacked an outline and had problems in text encoding that made it not searchable and challenging to navigate Saudi Ministry of Health: Guidelines for surveillance and control of infectious diseases . Saudi Ministry of Health, Riyadh, Saudi Arabia; 2017 .[26]

All healthcare worker awareness about health education and the diverse cultural, ethnic, and language differences of the pilgrims are taken into consideration in the educational and health awareness campaigns for the prevention of the Infectious diseases during Hajj. The Ministry of Health liaises with relevant stakeholders (travel agents, Muslim councils, healthcare worker and tour organizer's) in the countries where the pilgrims come from to develop appropriate material for education and information including requirements' for vaccinations and the

precautions to be taken before travel about the Infectious Diseases Systems and during the Hajj.[27]

**Rationale:**

The spread of infectious diseases at a gathering of large numbers of pilgrims within a short space of time might be expected to compromise the health system of the host country. Additionally, infectious diseases pose a threat to global health security and show the importance of planning, communication, and public health surveillance and response at these religious events. Saudi Arabia has much experience of providing health care during religious mass gatherings through decades of managing millions of pilgrims who undertake Hajj. The best sector in reporting infectious diseases is hospitals and primary health sector, this could be partly due to the awareness of the staff in the hospitals and healthcare workers of their responsibility to report infectious diseases. The PHCCs report high result, which is close to the hospital results, possibly because the prevention and control of infectious diseases is one of the elements of primary health care.

**Aim of the study:**

To assessment the Impact of the Infectious Diseases Systems on healthcare worker during the Hajj in Makkah Al Mukarramah at Saudi Arabia 2023 .

**Objectives:**

To assessment the Impact of the Infectious Diseases Systems on healthcare worker during the Hajj in Makkah Al Mukarramah at Saudi Arabia 2023..

**Methodology:**

**Study design:**

This study is descriptive type of cross-sectional study was conducted among 200 candidates this study included healthcare workers, in hospitals and primary health sector in Makkah Al Mukarramah.

**Study Area**

The study has been carried out in the city of Makkah Al-Mokarramah Makkah is the holiest spot on Earth. It is the birthplace of the Prophet Mohammad and the principal place of the pilgrims to perform Umrah and Hajj. It is located in the western area in Kingdom of Saudi Arabia and called the Holy Capital. Contains a population around 3 million. This study has been conducted in Makkah in the hospitals and primary health sector in Makkah. Saudi Arabia. During the June to July 2023, and it reflects a diversified demographic profile with a considerable portion of the population comes from rural descent, while others come from an urban one. This difference translates into biological, socioeconomic and lifestyle differences in the Makkah population.

**Study Population**

The study has been conducted regarding healthcare workers, in June to July 2023 in hospitals and primary health sector in Makkah Al Mukarramah.

**Selection criteria:**

**Inclusion criteria**

- Healthcare workers in hospitals and primary health sector in Makkah Al Mukarramah.

- All nationalities

**Exclusion criteria :**

No specific exclusion criteria.

**Sample size**

Healthcare workers in hospitals and primary health sector in Makkah Al Mukarramah around.

The sample size has been calculated by applying Raosoft sample size calculator based on (The margin of error: 5%, Confidence level: 95%, and the response distribution was considered to be 20%) accordingly the Sample size is (200) in hospitals and primary health sector after official communication with the hospitals and primary health sector in the Makkah and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been 200. Computer generated simple random sampling technique was used to select the study participants.

**Sampling technique:**

Systematic random sampling technique is adopted. After that, by using random number generator, then simple random sampling technique has been applied to select from hospitals and primary health sector. Also, convenience sampling technique will be utilized to select the participants in the study. By using systematic sampling random as dividing the total students by the required sample size; (200 ).

**Data collection tool**

The self-administered questionnaire is designed based on previous studies and frameworks to assessment the Impact of the Infectious Diseases Systems on healthcare worker during the Hajj in Makkah Al Mukarramah . The questionnaire has been developed in English. The questions were first pre-tested and were revised and finalized after it has been pilot tested. Before completing the survey, participants were required to indicate their consent using a forced response question followed by the survey questionnaires. The survey is estimated to take 6 min to complete .

To collect the information, a set of questions were constructed and developed. All questions were closed-ended, with tick boxes provided for responses; participants answered the questionnaires from the June to July 2023 the period of study in 2023.

The questionnaire consisted of questions that

**First part** General and Socio demographic information. These variables included contact data (email or mobile phone number),(age, gender, Sources of information). Other variables were education level, economic level.

A questionnaire has been developed that had Socio demographic data and questions related to knowledge. The two senior faculty members checked the questionnaire's validity and comprehension, and it was revised according to their suggestions. A pilot study has been conducted on secondary students to check the questionnaire's understanding and responses further, and its Cronbach's alpha was 0.75. The results of the pilot study were not included in the final analysis.

The assessment the Impact of the Infectious Diseases Systems on healthcare worker during the Hajj as per each topic/question, and also as per each response/answer . Data entry and analysis were carried out using the Statistical Package for the Social Sciences.

**Data collection technique:**

Researcher has been visits the selected hospitals and primary health sector after getting the approval from the ministries of health. The researcher has been obtained permission from participants.

After the arrival of the participants has been explained the purpose of the study to all participants attending .

#### **Data entry and analysis:**

The Statistical Package for Social Sciences (SPSS) software version 24.0 has been used for data entry and analysis. Descriptive statistics (e.g., number, percentage) and analytic.

#### **Pilot study**

A pilot study has been conducted in the same sector due to the similarity to the target group using the same questionnaire to test the methodology of the study. As a feedback, the questionnaire has been clear and no defect has been detected in the methodology

#### **Ethical Approval**

This study was approved from regional research center in Makkah. Each participant gave a verbal consent prior to recruitment and confidentiality was assured for each situation.

#### **Budget: Self-funded**

#### **Results**

**Table 1 Distribution of socio demographic characteristics of the healthcare workers during the Hajj at Saudi Arabia. (n=200)**

	N	%
<b>Age</b>		
<20-29	38	19
30-39	44	22
30-49	64	32
50-60	54	27
<b>Gender</b>		
Male	86	43
Female	114	57
<b>Marital status</b>		
Unmarried	52	26
Married	108	54
Divorced	24	12
Widowed	16	8
<b>Nationality</b>		
Saudi	158	<b>79</b>
Non-Saudi	42	21
<b>Occupation</b>		

Physicians	46	<b>23</b>
Nurse	98	<b>49</b>
Health inspector	36	<b>18</b>
Others	20	10
<b>Years of experience</b>		
1-10 years	64	32
11–20 years	48	24
> 20 years	88	44
<b>Received training in infectious diseases systems</b>		
Yes	74	<b>37</b>
No	126	63
<b>Received training on preventive measures at entry points</b>		
Yes	44	22
No	156	78
<b>Received written guidelines</b>		
Yes	68	<b>34</b>
No	132	66
<b>Reading the written guidelines</b>		
Yes	94	<b>47</b>
No	106	53

Table 1 shows that most of the participants (32.0%) were in the age group(30-49) years follow by the age 50-60 were (27.0%) followed by 30-39 years were (22.0%), the majority of them female was higher compared to male(57.0% and 43.0%) , regarding the marital status most of participants married were(54.0%) while unmarried were(26.0%), regarding nationality the majority of participant are Saudi were(79.0%) while non-Saudi were(21.0%), regarding occupation the majority of participant are nurse were(49.0%) while Physicians practitioner were(23.0%) but the Health inspector were (18.0%), regarding Years of experience the majority of participant are > 20 years were(44.0%) while 1-10 years practitioner were(32.0%), but the 11–20 years were (24.0%), regarding received training in infectious diseases systems the majority of participant answer No were(63.0%) while Yes were(37.0%), regarding the received training on preventive measures at entry points the majority of participant answer No were (78.0%) while Yes were (22.0%), regarding the received written guidelines majority of participant answer No were (66.0%) while Yes were (34.0%), regarding the reading the written guidelines majority of participant answer No were (53.0%) while Yes were (47.0%).

**Table 2 . Distribution of healthcare professionals employed in infectious diseases systems during the Hajj at Saudi Arabia**

	N	%

<b>Percentage of Saudi Workforce healthcare worker during the Hajj</b>	144	72
<b>Percentage of Foreign Workforce healthcare worker during the Hajj</b>	56	28
<b>Work place:</b>		
Hospital	54	27
PHC	120	60
Other	26	13
<b>Is there support from laboratories?</b>		
Yes	24	12
No	150	<b>75</b>
Don't Know	26	13
<b>Do you have Microbiology Lab Support</b>		
Yes	40	<b>20</b>
No	136	<b>68</b>
Don't Know	24	12
<b>Monthly income, SAR</b>		
Low income <5000	64	32
Moderate income 5000–15,000	56	28
High income >15,000	80	40
<b>Presence of chronic diseased</b>		
Yes	58	29
No	58	29
Don't Know	84	42
<b>Is there monitoring and Evaluation for healthcare worker during the Hajj</b>		
Yes	64	<b>32</b>
No	112	56
Don't Know	24	12

Table 2 shows the categories of Healthcare Professionals, regarding the percentage of Saudi Workforce healthcare worker during the Hajj were (72.0%), regarding the percentage of Foreign Workforce healthcare worker during the Hajj were (28.0%), regarding work place the majority of participant work in primary health care were (60.0%) while work in hospital were (27.0%) but in other were (13.0%), regarding is there support from laboratories the majority of participant are answer No were (75.0%) while do not know were (13.0%) but answer Yes were (12.0%), regarding do you have Microbiology Lab Support the majority of participant are answer No were (68.0%) while answer Yes were (20.0%), but do not know were (12.0%), regarding monthly income, SAR the majority of participant high income >15,000 were (40.0%) while low income <5000 were (32.0%) but the moderate income 5000–15,000 were (28.0%), regarding the presence of chronic diseased the majority of participant answer do not know were (42.0%) while No and Yes respectively were (29.0%), regarding is there monitoring and Evaluation for healthcare worker during the Hajj majority of participant answer No were (56.0%) while Yes were (32.0%) but do not know were (12.0%).



**Table 3. Distribution the Impact of the Infectious diseases knowledge on healthcare worker during the Hajj .**

	N	%
<b>during the Hajj who had been investigated for infectious diseases and the duration from sample taking and releasing the result</b>		
One day	76	38
2 days	90	45
3 days	22	11
More	12	6
<b>Infectious diseases has spread from ill people to others through close contact</b>		
Yes	62	31
No	102	51
Don't Know	36	18
<b>Infectious diseases has been diagnosed in patients in the during the Hajj</b>		
Yes	62	31
No	84	42
Don't Know	54	27
<b>Clinical experience of the HCWs in the last 2 years or less regarding</b>		
Working in place where Infectious diseases	16	8
Patient was diagnosed or admitted.	64	32
Infectious diseases patient Cared a	120	60
<b>The impact of suspicion of having Infectious diseases on the HCWs work performance, social and psychological life during the Hajj</b>		
Work performance:	110	55
Social life	44	22
Psychological life	24	12
all of them	22	11
<b>Some infected people had mild symptoms (such as cold-like symptoms)</b>		
Yes	118	59
No	64	32
Don't know	18	9
<b>Some infected people had no symptoms</b>		
Yes	46	23
No	110	55
Don't know	44	22
<b>Do you know that infected patient need isolation during the Hajj</b>		
Yes	130	65
No	54	27

Don't know	16	8
<b>Most of the people who died during the Hajj had an underling medical condition not Infectious Diseases</b>		
Yes	134	67
No	46	23
Don't know	20	10

Table 3 shows the distribution the Impact of the Infectious diseases knowledge on healthcare worker during the Hajj, regarding during the Hajj who had been investigated for infectious diseases and the duration from sample taking and releasing the result the majority of participant 2 days were (45.0%), followed by One day were (38.0%) but the 3 days were (11.0%), regarding the infectious diseases has spread from ill people to others through close contact the majority of participant answer No were(51.0%) followed by Yes were (31.0%) but don't Know were (18.0%), regarding infectious diseases has been diagnosed in patients in the during the Hajj majority of participant answer No were(42.0%) while answer Yes were(31.0%) but don't Know were (27.0%), regarding clinical experience of the HCWs in the last 2 years or less regarding the majority of participant infectious diseases patient Cared a were(60.0%) while Patient was diagnosed or admitted were (32.0%) but working in place where Infectious diseases were (8.0%), regarding impact of suspicion of having Infectious diseases on the HCWs work performance, social and psychological life during the Hajj the majority of participant work performance were(55.0%) while social life were(22.0%), but psychological life were (12.0%) while all of them were (11.0%), regarding some infected people had mild symptoms (such as cold-like symptoms) majority of participant answer Yes were(59.0%) but answer No were (32.0%) while don not know were (9.0%), regarding some infected people had no symptoms the majority of participant answer No were (55.0%) but Yes were (23.0%) while do not Know were (22.0%) , regarding you know that infected patient need isolation during the Hajj majority of participant answer Yes were (65.0%) while No were (27.0%) but do not know were (8.0%), regarding Most of the people who died during the Hajj had an underling medical condition not Infectious Diseases majority of participant answer Yes were (67.0%) while No were (23.0%) but do not know were (10.0%).

### Discussion

Hajj is the largest and the most diverse mass gathering of people in the world. This mass gathering entails some of the applied the infectious diseases systems to protect pilgrims, healthcare worker and avoid the hazards during the Hajj.[28]

Many of these infections can be avoided or averted by adopting appropriate preventive measures. Prevention of these infections needs effort to raise awareness on the health hazards during Hajj among HCWs, especially those working with pilgrims to be able to conduct effectively preventive measures, such as immunization and health education.[29] This study revealed that shows that most of the participants (32.0%) were in the age group(30-49) years, female was higher compared to male(57.0% and 43.0%) , marital status most of participants married were(54.0%) , nationality the majority of participant are Saudi were(79.0%) , occupation the majority of participant are nurse were(49.0%) while Physicians practitioner were(23.0%) but the Health inspector were (18.0%), Years of experience the majority of participant are > 20 years were(44.0%) while 1-10 years practitioner were(32.0%), received training in infectious diseases systems the majority answer No were(63.0%), the received training on preventive measures at entry points the majority of answer No were (78.0%) , regarding the received written guidelines majority of participant answer No were

(66.0%), reading the written guidelines majority of participant answer No were (53.0%) .(See Table 1)

Applying of the Infectious Diseases Systems on healthcare worker during the Hajj pilgrims is a crucial step in preventing the possible outbreaks during Hajj. Identifying healthcare workers' difficulties is of concern in order to improve the uses of Infectious Diseases Systems of work during the Hajj [23]. The most frequent difficulties facing healthcare workers were refusal of vaccine and chemoprophylaxis by some pilgrims, language barriers, and difficulties in organizing pilgrims. The MOH statistics during 2022 showed that the total number of pilgrims was 2 million people from over 146 countries assemble annually, from different countries.[14] This number did not include pilgrims coming from different regions of KSA. This wide diversity of nationalities with different languages imposes a real challenge for healthcare workers to provide high quality service, as they have to communicate with them. Sometimes, language barrier hinders understanding of pilgrims to the necessary procedures at during the Hajj, appropriate training courses before the Hajj season may solve this problems.[30] regarding the distribution of healthcare professionals employed in infectious diseases systems during the Hajj at Saudi Arabia shows the categories of Healthcare Professionals, percentage of Saudi Workforce healthcare worker during the Hajj were (72.0%), percentage of Foreign Workforce healthcare worker during the Hajj were(28.0%), work place the majority of participant work in primary health care were(60.0%) while work in hospital were(27.0%), regarding is there support from laboratories the majority of participant are answer No were(75.0%) , regarding do you have Microbiology Lab Support the majority of participant are answer No were(68.0%) , regarding monthly income, SAR the majority of participant high income >15,000 were(40.0%) regarding the presence of chronic diseased the majority of participant answer do not Know were (42.0%) .(See Table 2)

Increasingly electronic surveillance systems are gaining international recognition as effective public health tools for real-time data management by stakeholders operating from different locations. Overall, electronic surveillance systems were operational during the Hajj the health electronic surveillance network (HESN) is a web-based electronic solution, introduced by the Saudi MOH to improve communication among public health professionals involved in outbreak management as well as to provide quality health data for planning and effective allocation of resources. [26].(See Table 3).

During the 2022 Hajj, in addition to the traditional data capture and reporting tools, the hospital surveillance teams also collated and entered infectious diseases data directly into Electronic Surveillance Systems once a notification was received from the laboratory, emergency rooms, isolation wards and other departments in hospitals. The uploaded data were immediately displayed on electronic dash boards in the CCC's situation rooms. Data were analyzed and reports generated in real-time that could be immediately accessed by public health officials and decision makers or disseminated through phone messages to responsible persons for immediate action.[31]

## **Conclusion**

Large proportion of healthcare worker during the Hajj did not receive training courses regarding common infectious diseases during Hajj, or the preventive measures that should be applied at during the Hajj in Makkah before the Hajj season. They had difficulties in some preventive measures, especially among non-physicians, those with less years of experience, and those who did not read the written guidelines of preventive measures, which highlighted the importance of arrangement of training courses before Hajj season. Further studies are needed to monitor changes Impact of the Infectious Diseases Systems on healthcare worker during the Hajj in Makkah, the formation of the center for Mass Gathering Medicine and its

network will serve as a unique platform for providing a research evidence base and for sharing knowledge about the safeguarding and improvement of the health of attendees at Hajj.

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