

## Impact Of Knowledge Towards Vaccine Preventable Diseases And Vaccination Among Prospective Hajj Pilgrims In The Pilgrimage Season In Saudi Arabia 2022

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### Abstract:

#### **Background**

Hajj is a unique religious mass gathering among Muslims hosted by Kingdom of Saudi Arabia (KSA) annually. It is a fifth pillar that is compulsory to be carried among Muslim. Infections due to *Neisseria meningitidis*, *Streptococcus Pneumonia* and *Influenza virus* are very high among Hajj pilgrims in KSA. Study shows knowledge towards vaccine preventable disease and vaccination which is very important for the prevention of these infectious diseases. The transmission of infectious diseases is high at mass gatherings such as the annual Hajj pilgrimage in Makah, Saudi Arabia. Hajj is the largest annual mass gathering on the planet, with around two to three million people attending from over 180 countries. Intense congestion, shared accommodation, air pollution, and compromised hygiene all contribute to the transmission of infections at Hajj, most notably acute respiratory infections (ARIs). Hajj presents a public health challenge for Saudi Arabia, as the authorities need to cater for an increasing number of pilgrims and respond to emerging infections such as the Middle East respiratory syndrome coronavirus (MERS-CoV).<sup>3,4</sup> It is also challenging for the countries sending pilgrims, since these pilgrims can import epidemic diseases to their home countries upon return. **Aim of the study:** To determine knowledge among the prospective in Saudi Arabia hajj pilgrims on vaccine preventable disease and vaccination in Makah during the Pilgrimage Seasons 2022. **Methods:** Across sectional descriptive study conducted among pilgrims who resident in Makah city during August, 2022 to October 2022 Hajj 2022, Our total Sample size of pilgrims participants were (700) **Results:** shows that the majority of participants were (48.14%) have average knowledge followed by weak were (30.43%) but high were (21.43%) while Range (3-15) Mean  $\pm$  SD (9.01  $\pm$  2.91) while shows a significant correlation between level of knowledge correlation and vaccinations while  $\chi^2$  77.591 **Conclusion:** There is a lack of knowledge among the Saudi Arabia hajj pilgrims about these vaccine preventable diseases and vaccination, especially those who have lower education level and also unemployed. are highly advised to focus on these group and prepare a special course that focused on these vaccine preventable diseases so that Saudi Arabia Hajj pilgrims will be protected .

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**Keywords:** *Determine, knowledge, prospective, Saudi Arabia, hajj pilgrims, vaccine preventable, vaccination.*

### **Introduction**

Hajj is a unique religious mass gathering among Muslims hosted by Kingdom of Saudi Arabia (KSA) annually. It is a fifth pillar that must be carried out as stated in the five Pillars of Islam. This religious duty must be performed by Muslims at least once in their lifetime for those who are physically and financially capable to do it (1). Apart from being obligatory duty for Muslims, this eventful religious gathering can bring together and stronger the brotherhood among Muslims from different parts of the world irrespective of their socio demographic characteristics.(2)

According to the General Authority for Statistics of KSA, there has been substantial increase in the number of pilgrims during the last five years from the year 2016 to 2022 which is from 1,980,249 increase to 2,371,675 pilgrims. 612,953 of the total pilgrims in 2022 were from domestic pilgrims and 1,758,722 of them were from other countries' pilgrims (3). Higher risk of transmission of infectious disease can be found with increased in the number of pilgrims to the Kingdom of Saudi Arabia annually. (4). Before this outbreak, vaccination against Neisseria meningitides was required only for pilgrims from sub-Saharan countries to obtain a visa for the Kingdom of Saudi Arabia (KSA). (5) After this outbreak, vaccination with bivalent A and C vaccine became compulsory for all pilgrims, and oral ciprofloxacin became compulsory to pilgrims from sub-Saharan countries.(6) Higher risk of transmission of infectious disease can be found with increased in the number of pilgrims to the Kingdom of Saudi Arabia annually. However, it is not known whether their health is safely protected. Infections of some type of bacteria and virus like Neisseria meningitidis, Streptococcus Pneumonia and Influenza virus are very high among Hajj pilgrims in KSA. (7) This may be associated with the high density and extreme congestion population from various geographical areas over the world (8). An international outbreak of serogroup W135 meningococcal disease occurred during the Hajj pilgrimages of 2000 and 2001.(9) Several reports from all over the world have shown that this W135 outbreak strain affected not only the pilgrims, but also the household contacts of returning pilgrims, and the community at large with the potential of non-Hajj-related further epidemics.(10) As a result, the Ministry of Health (MOH) in KSA changed its policy for meningococcal vaccination for the Hajj season in 2002, and mandated quadrivalent meningococcal vaccination (A, C, Y, and W135)(11) Although the Saudi Arabia health authority recommends vaccination and other measures to control infections, and despite the fact that the government of the Kingdom of Saudi Arabia provides free health services for pilgrims, many pilgrims are not seeking medical advice. In addition, many of them do not spend the necessary time in hospitals to avoid missing any of Hajj's rituals. (12)The Saudi Arabia Ministry of Health recommended that national health authorities provide health education to pilgrims about symptoms of infectious diseases, transmission methods, complications, and means of prevention, as well as changes in temperature that may have adverse health effects.(13) The performers of Hajj and Umar need to be reminded to drink enough fluid; and to have a healthy diet with enough fresh vegetables and fruits Also, the consumption of salt containing food and drink helps to replenish electrolytes should be recommended in case of heat exhaustion and after excessive sweating, it should also be recommended that pilgrims be educated about personal hygiene, food poisoning during Hajj and ways of protecting against it, diseases that may affect their health. Countries and individuals should raise awareness of health hazards among pilgrims and develop self-care measures to prevent and manage health hazards.(14) During this Holy Pilgrimage Trip, the countries and pilgrims also encouraged their consideration of health preventive measures. However, several studies have identified variable take-up among pilgrims of these measures, and the reasons for this variability remain unclear.(15)

### **Literature Review**

There was similar study in Malaysian regarding the fundamental of Hajj demand for healthcare services within congestion in only 35.6% of Hajj pilgrims were reported to have good knowledge. This result generally showed relatively poor knowledge among Malaysian Hajj pilgrims towards vaccine preventable diseases and vaccination. Similar study conducted on knowledge of Hajj pilgrims towards infectious diseases and vaccination demonstrated a significant lack of knowledge (16). However, it can be improved after educational intervention as shown in the study conducted in the year 2011 in which they used health educator to improve knowledge of healthy behaviour among Hajj pilgrims (17). For question regarding the mode of transmission, it was noted that most of the pilgrims (73.3%) were able to identify the mode of transmission for influenza but only 44.4% and 47.4% of them were able to identify the mode of transmission for meningococcal and pneumococcal respectively(18) .

Several studies have been documented to show the KAP of pilgrims from many countries towards the prevention of RTIs,(19) However, data on the knowledge and preventive practices toward respiratory tract infections among Saudi Arabia Hajj pilgrims are still lacking. With an increasing prevalence of respiratory tract infections among pilgrims during Hajj and Umrah, there is a critical need to gather essential data for effective control and preventive plans(20). This is on par with the research conducted in Egypt as only 23% among the Egypt Hajj pilgrims were able to identify the transmission of meningococcal disease (21). Majority of the respondents (69.6%) identified that Hajj pilgrims are at risk of contracting the diseases in Mecca and slightly more than half of them (56.3%) were able to identify the meningococcal vaccine as a mandatory vaccine. These results show it is important to further educate Malaysian Hajj pilgrims regarding vaccination to ensure their safety throughout their journey to Mecca(23) Notably, all pilgrims arriving Saudi Arabia must have received a single dose of quadrivalent meningococcal vaccine and provide proof of a valid vaccination or prophylaxis in the five years before arrival to allow the issue of a Hajj or Umrah visa by the Saudi Arabian Authorities (24). However, this study reported less than half of the pilgrims = 418, 41.3%) surveyed actually had this vaccination, an issue that has been raised before which should be examined again to avoid the spread of contagious disease. This is especially important during the COVID-19 pandemic, as recent studies have noted (25). The Center for Disease Control and Prevention (CDC) goes further in strongly recommending that hajjis receive a seasonal influenza vaccine, which is recommended for high risk pilgrims to reduce their own morbidity and mortality, but also to reduce transmission of the disease (3). As raised by Barasheed et al. (2014) others more recently (26) the crowded conditions On the other hand, 88.9% of Hajj pilgrims were reported to have good attitude. Almost all of them (98.5%) stated that they followed the obligatory vaccination provided by Tubing Haji and it is important to receive vaccine if it is required while, 78.5% of the respondents also agreed to receive vaccines if it is just recommended. (27)

### **Rationale:**

Pre travel health-advice-seeking behavior and the use of preventive measures during Hajj were suboptimal among Saudi Hajj pilgrims. 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. 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. 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 . Additionally, health authorities in pilgrims' countries of origin are encouraged to provide health education this study aims to address this knowledge gap .

**Aim of the study:**

To determine knowledge among the prospective in Saudi Arabia hajj pilgrims on vaccine preventable disease and vaccination in Makah during the Pilgrimage Seasons 2022

**Objectives:**

- To assess the knowledge of Hajj and Umrah Pilgrims toward towards vaccination

**Methodology:**

**Study design:**

This study is a cross-sectional study design was used in carrying out of this study.

**Study Area:**

The study has been carried out in the city of Makah. Makah 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 2.578 million. This study was conducted conduct to pilgrims who resident in Makah city during, during August, 2022 to October 2022. Hajj 2022 ,the study has been conduct on a convenience sample of 700 pilgrims' residents in Makah city matching the inclusion criteria and exclusion, it reflects a diversified demographic profile with a considerable portion of the pilgrims to perform Umrah and Hajj comes from rural descent, while others come from an urban one. This difference translates into biological, socioeconomic and lifestyle differences.

**Selection criteria:**

This difference translates into biological, socioeconomic and lifestyle differences

**Inclusion criteria:**

- hajj pilgrims who agree to participate in the study
- Residency in In Makah city .
- Over 40 years of age
- Able and willing to participate in the study.

**Exclusion criteria:**

- Residency outside Makah city .
- > 60
- Pilgrims that refusing sign Informed consent .

**The sample size**

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 to sample size from hajj pilgrims by the required sample size; (700). (Male and female) and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been 700. Computer generated simple random sampling technique was used to select the study participants. Data collection was done by the researcher during the 2022

**Data collection tools of the study:**

To collect data knowledge structured questionnaire was used. It was developed by the researcher after reviewing of current national and international related literature. It composed of questions. This included the following parts:

Part one: biosocial demographic characteristics: as name, pilgrim number, age, sex, phone number, leader name, frequency of hajj, years of education, area of residence, and presence of chronic diseases as diabetic mellitus.

Part two: this part including questions to assess the knowledge regarding vaccination such as signs and symptoms of pneumococcus, mode of transmission, methods of prevention, high risk groups, and line of treatment. Community reaction toward people with infection, and sources of information about infection and vaccination .

Following a short briefing about the study, informed consent will obtain from each participant who agreed to join the survey. Ethics approval will obtain from research center. The study tool was developed by the researcher and checked for validity and reliability using Cronbach's alpha ( $r=0.76$ ). Pilot study was done on 10 pilgrims Hajj to check and ensure the clarity, applicability and feasibility of tools. Pilgrims completed the surveys themselves; however, research team members helped those who were unable to complete the questionnaires themselves.

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

The Statistical Package for Social Sciences (SPSS) software version 24.0 has be used for data entry and analysis. Descriptive statistics (e.g., number, percentage) and analytic statistics using Chi-Square tests ( $\chi^2$ ) to test for the association and the difference between two categorical variables were applied. A p-value  $\leq 0.05$  will be considered statistically significant

#### **Pilot study**

A pilot study has be conducted in hajj pilgrims 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 will be clear and no defect has be detected in the methodology

#### **Ethical considerations**

Permission from the Makah joint program Family Medicine program has be obtained. Permission from the Directorate of hajj, verbal consents from all participants in the questionnaire were obtained. All information was kept confidential, and a result has be submitted to the department as feedback .

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

#### **Results :**

**Table 1:** distribution of participants according to socio demographic characteristics (Age, Sex, Hajj for, Level of education, Chronic diseases)(n=700)

	N	%
<b>Age</b>		
<40	147	21
40-50	273	39
$\geq 50$	280	40
<b>Gender</b>		
Male	511	73
Female	189	27
<b>Education</b>		
Illiterate	133	19
Primary	308	44
Secondary	147	21
University	112	16
<b>Residence</b>		
Rural	539	77
Urban	161	23

<b>Number of times in Hajj is performed</b>		
First	546	78
2-3.	91	13
>4	63	9
<b>Marital status</b>		
Married	539	77
Single	161	23
<b>Received written guidelines to pilgrims about the type of vaccinations and their importance</b>		
Yes	483	69
No	217	31
<b>History of vaccination</b>		
Influenza (flu) vaccine	462	66
Pneumococcal vaccine	238	34
<b>Occupation</b>		
No	203	29
Yes	497	71
<b>Economic level</b>		
Low	147	21
Medium	294	42
High	259	37
<b>Chronic diseases</b>		
Yes	301	43
No	399	57
<b>Sources of health recommendations for knowledge for pilgrims Hajj about the type of vaccinations and their importance</b>		
Booklets and brochures	154	22
Mass media	217	31
Own personal experience	259	37
Educational films	56	8

Regarding socio demographic characteristics, this table shows that the highest proportion of participants age  $\geq 50$  years (40.0%) and 40-50 years of age (39.0%), regarding gender most of participant male (73.0%), but female were (27.0%), regarding level of education most of participant Primary were (44.0%) followed by Secondary, regarding the residence most of participant were rural were (77.0%), regarding number of times in Hajj is performed majority of participant were first times were (78.0%), but 2-3 were (13.0%), regarding Marital status majority of participant were Married were (77.0%), but single were (23.0%), regarding Received written guidelines to pilgrims about the type of vaccinations and their importance majority of participant answer Yes were (71.0%), but answer No were (31.0%), regarding History of vaccination majority of participant answer Influenza (flu) vaccine were (66.0%), but Pneumococcal vaccine were (34.0%), regarding Occupation majority of participant answer Yes were (71.0%), but answer No were (29.0%), regarding Economic level majority of participant answer Medium were (42.0%), but answer High were (37.0%), regarding have chronic diseases majority of participant answer No were (57.0%), but answer Yes were (43.0%), regarding Sources of health recommendations for knowledge for pilgrims Hajj about the type of vaccinations and their importance majority of participant answer Own personal experience were (37.0%), but Mass media were (31.0%).

**Table 2: Distribution of medical history of the pilgrims in studied sample**

Variable (n=301)	N	%
Types of chronic illness		

Diabetes	141	46.84
Hypertension	63	20.93
Renal disorder	102	33.89
Liver disorder	99	32.89
<b>Doctor counseling</b>		
Yes	111	36.88
No	190	63.12
<b>Immunization</b>		
Yes	69	22.92
No	232	77.08
<b>Healthy package to pilgrims about the type of vaccinations</b>		
Yes	87	28.90
No	214	71.10

Regarding table 2 show regarding distribution of medical history of the pilgrims, this table shows that the highest proportion of participants regarding types of chronic illness most of participant Diabetes were (46.84%), but Renal disorder were(33.89%),while Liver disorder were (32.89%), regarding Doctor counseling most of participant answer No were (63.12%) followed by answer Yes were(36.88%), regarding the Immunization most of participant answer No were(77.08%),but Yes were(22.925) regarding Healthy package to pilgrims about the type of vaccinations majority of participant were answer No were(71.10%), but answer Yes were(28.90%).

**Table 3 Distribution of knowledge of vaccines and reported reasons for accept and non-receipt.**

	N	%
<b>Meningococcal vaccines</b>		
No	504	72
Yes	196	28
<b>Recommended vaccines</b>		
No	434	62
Yes	154	22
Both	112	16
<b>Do you stop aerobic exercise for two consecutive days or more per week?</b>		
Always	455	65
Sometimes	224	32
No	21	3
<b>Vaccinated reasons</b>		
I don't want to get sick	525	75
The vaccine is effective in protecting me against diseases	448	64
If I get sick my Hajj worship could be jeopardized	567	81
I am at risk because I'm elderly	231	33
I am at risk because I have chronic diseases	322	46

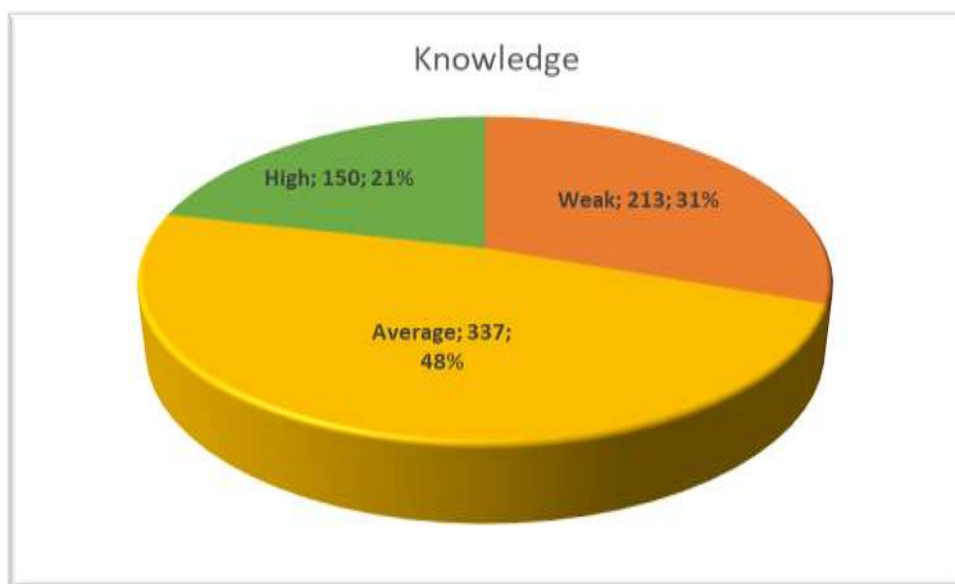
Regarding table 3 show regarding distribution of knowledge of vaccines and reported reasons for accept and non-receipt that the highest proportion of participants regarding Meningococcal vaccines most of participant answer No were (72.0%), but answer Yes were(28.0%), regarding Recommended vaccines most of participant answer No were (62.0%) followed by answer Yes were(22.0%), but both were(16.0%), regarding you stop aerobic exercise for two consecutive days or more per week most of participant answer Always were(65.0%),but Sometimes were(32.0%), regarding Vaccinated reasons majority of participant were answer If I get sick my Hajj worship could be jeopardized were (81.0%) but I don't want to get sick were(75.0%), but answer Yes were(28.90%), followed by the vaccine is effective in protecting me against diseases were(64.0%)

**Table 4: distribution of participant's total knowledge regarding type of vaccinations .**

		Knowledge		Score	
		N	%	Range	Mean±SD
<b>Weak</b>		213	30.43	3-15.	9.01±2.91
<b>Average</b>		337	48.14		
<b>High</b>		150	21.43		
<b>Total</b>		700	100.00		
<b>Chi-square</b>	<b>X<sup>2</sup></b>	77.591			
	<b>P-value</b>	<0.001*			

This table 4 shows that the majority of participants were (48.14%) have average knowledge followed by weak were(30.43%) but high were (21.43%) while Range (3-15) Mean± SD (9.01±2.91) while shows a significant correlation between level of knowledge correlation and vaccinations while  $X^2$  77.591

**Figure (1): distribution of participant's total knowledge regarding type of vaccinations**





**Table (5) Distribution the relation between Knowledge associated with socio demographic characteristics**

			Knowledge			Chi-square	
			Weak	Average	High	X <sup>2</sup>	P-value
Age	<40	N	0	37	110	731.216	<0.001*
		%	0.0%	25.2%	74.8%		
	40-50	N	1	235	37		
		%	.4%	86.1%	13.6%		
	≥50	N	212	65	3		
		%	75.7%	23.2%	1.1%		
Gender	Male	N	154	249	108	0.264	0.876
		%	30.1%	48.7%	21.1%		
	Female	N	59	88	42		
		%	31.2%	46.6%	22.2%		
Education	Illiterate	N	133	0	0	700.181	<0.001*
		%	100.0%	0.0%	0.0%		
	Primary	N	80	208	20		
		%	26.0%	67.5%	6.5%		
	Secondary	N	0	109	38		
		%	0.0%	74.1%	25.9%		
	University	N	0	20	92		
		%	0.0%	17.9%	82.1%		
Residence	Rural	N	165	262	112	0.583	0.747
		%	30.6%	48.6%	20.8%		
	Urban	N	48	75	38		
		%	29.8%	46.6%	23.6%		
Marital status	Married	N	166	261	112	0.595	0.743
		%	30.8%	48.4%	20.8%		
	Single	N	47	76	38		
		%	29.2%	47.2%	23.6%		
Occupation	Yes	N	61	97	45	0.094	0.954
		%	30.0%	47.8%	22.2%		
	No	N	152	240	105		
		%	30.6%	48.3%	21.1%		
Economic level	Low	N	45	102	0	155.648	<0.001*
		%	30.6%	69.4%	0.0%		
	Medium	N	125	126	43		
		%	42.5%	42.9%	14.6%		
	High	N	43	109	107		
		%	16.6%	42.1%	41.3%		

Table (5) show relation between Knowledge associated with socio demographic characteristics regarding the age results show a significant relation between age and Knowledge were X<sup>2</sup> 731.216 and P-value=0.001, increase in age ≥50 in weak were (75.7%) followed by age 40-50 in average were(86.1%) but age <40 in high were(74.8%), regarding the gender results show no significant relation between gender and Knowledge were X<sup>2</sup> 0.264 and P-value=0.876, increase in Male in average were (48.7%) followed by female in average were(46.6%) , regarding the Education results show a significant relation between Education and Knowledge were X<sup>2</sup> 700. 181 and P-value=0.001, increase in Illiterate in weak were (100.0%) followed by Secondary in average were(74.1%) but University in high were(82.1%), regarding the Residence results show no significant relation between Residence and Knowledge were X<sup>2</sup> 0.583 and P-value=0.747, increase in

Rural in average were(48.6%) but Urban in average were(46.6%), regarding the Marital status results show no significant relation between Marital status and Knowledge were  $X^2$  0.595 and P-value=0.743, increase in Married in average were (48.2%) followed by Single in average were(47.2%) , regarding the Occupation results show no significant relation between Occupation and Knowledge were  $X^2$  0.094 and P-value=0.954, increase in answer Yes in average were (47.8%) followed by answer No in average were(48.3%), regarding the Economic level results show a significant relation between Economic level and Knowledge were  $X^2$  155.648 and P-value=0.001, increase in low in average were (69.4%) followed by medium and high in average were(42.9%, 42.1%) .

**Continue Table (5)** Distribution the relation between Knowledge associated with socio demographic characteristics

			Knowledge			Chi-square	
			Weak	Average	High	$X^2$	P-value
<b>Number of times in Hajj is performed</b>	<b>First</b>	<b>N</b>	213	263	70	176.768	<0.001*
		<b>%</b>	39.0%	48.2%	12.8%		
	<b>2-3.</b>	<b>N</b>	0	47	44		
		<b>%</b>	0.0%	51.6%	48.4%		
	<b>&gt;4</b>	<b>N</b>	0	27	36		
		<b>%</b>	0.0%	42.9%	57.1%		
<b>Received written guidelines to pilgrims about the type of vaccinations and their importance</b>	<b>Yes</b>	<b>N</b>	73	318	92	246.545	<0.001*
		<b>%</b>	15.1%	65.8%	19.0%		
	<b>No</b>	<b>N</b>	140	19	58		
		<b>%</b>	64.5%	8.8%	26.7%		
<b>Chronic diseases</b>	<b>Yes</b>	<b>N</b>	0	218	83	312.742	<0.001*
		<b>%</b>	0.0%	72.4%	27.6%		
	<b>No</b>	<b>N</b>	213	119	67		
		<b>%</b>	53.4%	29.8%	16.8%		

show regarding the Number of times in Hajj is performed results show a significant relation between Number of times in Hajj is performed and Knowledge were  $X^2$  176.768 and P-value=0.001, increase in 2-3 in average were (51.6%) followed by first in average were(48.2%) but >4 in high were(57.1%) but 2-3 in high were(48.4%), regarding the Received written guidelines to pilgrims about the type of vaccinations and their importance results show a significant relation between Received written guidelines to pilgrims about the type of vaccinations and their importance and Knowledge were  $X^2$  246.545 and P-value=0.001, increase in answer Yes in average were (65.8%) followed by answer No in weak were(64.5%) , regarding the Chronic diseases results show a significant relation between Chronic diseases and Knowledge were  $X^2$  312.742 and P-value=0.001, increase in answer in Yes average were (72.4%) followed by answer No in average were(53.4%) .

#### **Discussion:**

This current study, which is believed to be the important among Saudi Arabia Hajj and Umrah pilgrims sought to assess their knowledge towards the type of vaccinations and their

importance to pilgrims. Several studies have been documented to show the knowledge of pilgrims from many countries towards the importance of vaccinations to pilgrims(28). However, data on the knowledge and preventive practices toward Outbreak of multiple infectious diseases have been reported repeatedly during and following the Hajj among Saudi Arabia Hajj pilgrims are still lacking. With an increasing prevalence of respiratory tract infections among pilgrims during Hajj and Umrah, there is a critical need to gather essential data for effective control and preventive plans (29)

Results of this study revealed average knowledge score among the study participants towards importance of vaccinations. also the weak knowledge score was which also indicates a low level of knowledge.(See taibl4)shows that the majority of participants were (48.14%) have average knowledge followed by weak were(30.43%) but high were (21.43%) while Range (3-15) Mean± SD (9.01±2.91) while shows a significant correlation between level of knowledge correlation and vaccinations while  $X^2 77.591$ .

The annual Hajj has been connected with a wide range of viral and bacterial upper and lower respiratory tract infections, Pneumonia is a common reason for hospitalization . The probable incidence of respiratory tract infections amid pilgrims ranges from 20 to 80 percent (30). Understanding the diseases, their causative agents, and modes of transmission can help manage and avoid them.

An earlier study with 200 suspected pneumonia patients concluded that direct laboratory examination of sputum and leukocyte count must be implemented consistently in patients with suspected pneumonia as leukocyte (>25) and epithelial (<10) counts in sputum samples per low-power field seem to be the most significant criterion for expecting a positive culture (23)

There was a significant association between level of knowledge with age, economic level, number of times in Hajj is performed, Received written guidelines to pilgrims about the type of vaccinations and their importance, Chronic diseases. (See table 5). Similar result was found in the study conducted towards healthcare provider at Mecca hospital whereby age ( $p=0.882$ ), gender and occupation ( $p=0.39$ ) were not significantly affecting the level of attitude (13). However, study about antibiotic used among pilgrims in 2015 reported that there was a significant association between the age, education and occupation with the level of attitude (14). Similarly, there was a study showed that marital status was a significant factor in determining the level of attitude (15). This may be due to the unbalanced number of respondents between unmarried to married where married had higher in number compared to unmarried respondents. Other than that, strict implementation of vaccination among Hajj pilgrims which have been forced by the government despite age group might be the cause of insignificant result,(31) Own awareness about vaccination and the disease as it's being highlighted by Tabung Haji and other health authority during Hajj preparatory course regarding vaccination and prevention of the disease related to it. performing Hajj rituals is a risk factor for pneumococcal acquisition .Numerous studies have shown a high prevalence of respiratory symptoms among pilgrims. Respiratory viruses, especially influenza virus, rhinovirus and Streptococcus pneumonia infections are the most common cause of acute respiratory infections among pilgrims.(27) The lower pneumococcal acquisition might be caused by several reasons. One of the possible reasons be lack of pilgrim Hajj about the disease; causes, mode of transmission, clinical manifestation, high risk groups, ways of prevention and line of treatment. In addition to negative attitude toward the disease . (32). The results of the study revealed weak level of knowledge were. This results was in line with Zhang et al (2016) who conduct a study entitled with vaccination knowledge, attitude and practice among Chinese travelers who visit travel clinics in Preparation for international travel and found a low level of knowledge regarding vaccination as a protective measure among participants (30)

## **Conclusion**

This study has identified several issues relating to the preventative measures that were practiced by Hajj and Umrah in Saudi Arabia in 2022. This highlighted inadequate

vaccination and insufficient hygiene and safety practices, such as availability and proper wearing of face masks during Hajj and Umrah . The Saudi MOH has the option to enforce mandatory proof of vaccination. The behavioral and practice issues amongst pilgrims have been shown in the literature to pose a high risk for acquiring respiratory and other infections. The worsening of pre-existing medical conditions is particularly relevant for Hajj and Umrah who tend to be older and with multi-morbidities. This is especially the case during the COVID-19 pandemic, given that these pilgrims fit the profile of those more likely to experience more severe symptoms and death. must be promote health education and basic preventative measures in order to promote public health. Further studies should focus on development of accessible health education content in a form that engages pilgrims from diverse backgrounds to promote comprehensive preventative measures during mass religious gatherings and pilgrimages.

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