# Assessment of the Knowledge of the Population about Hazards on Heat Exposure in Saudi Arabia 2023

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#### Abstract:

#### Background

Hazards on heat exposure are a public health concern. The impacts of hazards on heat on mortality and morbidity at the population scale are well documented, but little is known about specific exposures that individuals experience, human exposure to a hot environment may result in various heat-related illnesses (HRIs), which range in severity from mild and moderate forms to life-threatening heat exposure, heat illnesses and heatstroke, heat-related illnesses presenting to the emergency department are associated with high mortality and morbidity, especially in the elderly, define personal heat exposure as realized contact between a person and an indoor or outdoor environment that poses a risk of increases in body core temperature and/or perceived discomfort, the population hazards on heat exposure can be measured directly with wearable monitors or estimated indirectly through the combination of time–activity and meteorological data sets. Complementary information to understand hazards on heat exposure , susceptibility, and health and comfort outcomes can be collected from additional monitors, surveys, interviews, ethnographic approaches, and additional social and health data sets.

**Aim of the study:** To assessment knowledge of the population about hazards on heat exposure at Saudi Arabia 2023.

**Methods:** Across sectional descriptive study conducted among population who attending at primary Health care Center in Saudi Arabia 2023 during July, 2023 to September 2023, Our total Sample size of participants were (400)

**Results:** show distribution of the relation of participant to knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses regarding the knowledge the most of participants answer Yes knowledge were (71.0%) followed by No were (29.0%) and total were (100.0%)

while heave a significant relation were P-value <0.001 and  $X^2$  69.722 **Conclusion:** population heat exposure research provides more valid and precise insights into how often people encounter hazards on heat exposure, heat conditions and when, where, to whom, and why these encounters occur. Published literature on personal heat exposure is limited to date, but existing studies point to opportunities to inform the population practice regarding hazards on heat exposure fine-scale precision is needed to reduce health consequences of heat exposure

Keywords: Assessment, Knowledge, population, Hazards, Heat Exposure, Saudi Arabia.

#### Introduction

In recent decades, there has been an increase in awareness of the total public health burden of heat exposure– heat ranks as a leading weather-related cause of mortality in the in Saudi Arabia and elsewhere, [1] Continued advances in sensor technology and computational power are leading to new opportunities to measure, with more precision and validity, how people experience their environments. Within the realm of environmental health, measuring exposure to indoor and outdoor heat is a topic of considerable interest. [2]Despite decades of physiological, epidemiological, and climatological research about high temperatures, heat waves, and hot indoor and outdoor environments, information about the actual thermal conditions population experience as they go about their daily lives is scarce, leaving the potential for under-informed risk assessments, Policies, and intervention measures concerning heat exposure and health[3]

The main risk factor for skin cancer is exposure to ultraviolet radiation (UVR) from the sun and from artificial sources [4]

UVA is known to influence collagen, thereby causing wrinkles while UVB is the primary inducer of erythema. UVB has beneficial effects for humans as well. The most predominant being vitamin D production  $[5\pm7]$ , while a range of less well exploited mechanisms also exists [5]. It has been suggested that the majority of all skin cancers could be prevented by behavior changes [6]. Exposure to artificial sources of radiation could easily be prevented by structural prevention if supported politically [7] Heat illness and death occur when body core temperature exceeds at operable range for physiological functioning. Because Biometric body temperature information is not widely collected and shared, researchers commonly seek proxy indicators for personal heat stress.[8] Human exposure to a hot environment may result in various heat-related illnesses (HRIs), which range in severity from mild and moderate forms to life-threatening heat exposure, heat illnesses and heatstroke, heat-related illnesses presenting to the emergency department are associated with high mortality and morbidity, especially in the elderly and pregnant, also summer resorts is one of the largest annual mass gatherings globally and has historically been associated with heat exposure, heat illnesses. [9] Summer resorts attracts over two million population from more than countries.[10] Several modifiable and non-modifiable factors render Summer at increased risk of developing heat exposure, heat illnesses during Summer.[11] These include characteristics of the Summer, its location, population, and rituals, as well as population' knowledge of HRIs and their attitude and behavior. [12]

Although classic heat exposure and heat stroke is one of the most ancient conditions known to humans, the description of its early clinical manifestations, natural course, and

complications remains uncertain. [13]Heat exposure and heat stroke is a life-threatening condition characterized by a rapidly increasing core temperature above 40°C and neurologic alterations, such as delirium, convulsions, or coma, after exposure to extreme environmental heat alone or in combination with intense physical exertion. [14] Heat-related illnesses (HRIs), such as heatstroke (HS) and heat exhaustion (HE), are common complications during Summer . The Saudi Ministry of Health (MOH) developed guidelines on the management of HRIs to ensure the safety of all population, must be healthcare workers' (HCWs) adherence to the updated national guidelines regarding pre hospital and in-hospital management of HRIs[15] In addition, public health protocols are in place for recognition and prompt cooling therapy in field hospitals within walking distance to minimize heat-induced organ damage and maximize the chance of survival. In this, we comprehensively describe the demographics, clinical characteristics, biomarkers, therapy, and outcomes of HS in one of the largest cohorts to date[16].

#### **Literature Review**

Study showed average compliance in the overall pre-hospital cooling process. There was a below-average adherence to both immediate and continued cooling; however, HCWs adhered to the immediate transfer and cooling methods. This variation in compliance to pre-hospital cooling could reflect the need for more healthcare training about the importance of cooling. Factors like the distance to the heat exposure and heat-related illnesses unit, transportation availability, access to cooling tools, and overcrowded environment may affect the proper adherence to the cooling[17]

study by (Layton et al (2020) reported showed that out of 267 patients 80 (29%) patients had heatstroke, the most severe form of heat illnesses, with mortality of 6.3%. , the mean age of the patients was  $54.0 \pm 16$  years, with a predominant proportion of males. Moreover, diabetes mellitus was the most common comorbidity among both heatstroke and heat exhaustion patients. Previous epidemiological studies have shown that the elderly and those with comorbidities have an increased risk of hospitalization due to heatstroke [18]

Faurie et al (2022), report that excessive loss of water, salt, or both may increase the risk of heat illnesses. A previous study reported that on-the-spot oral hydration is an essential step for the patient treatment process [19]. However, starting oral hydration and placing patients in supine positions with elevated hips and legs had the lowest compliance scores. Such low compliance levels could be due to several reasons: the lack of proper knowledge among Healthcare Workers concerning the importance of proper hydration during heat exposure and heat-related illnesses attacks can represent an important reason for this inadequate adherence. Environment-related factors, including the presence of other critically ill patients needing more attention [20,21]

Another study by Fancello et al (2023) reported that elderly are usually at greater risk. That the majority fall into the older age group in their countries of origin . Excess mortality from heat exposure and heat-related illnesses is reported during the pilgrimage and it is possible that such deaths are heat induced. Excessively hot weather may also increase mortality from heat exposure disease. Excess deaths in the KSA from heat exposure and heat-related illnesses in the heat wave years .[22]

In other study reported Othman et al (2023) that Diarrhea and food poisoning Traveller's diarrhea is common during the Heat-related illnesses especially in the elderly, although few studies have documented its incidence and etiology. The last study was done in 2020 showing that heat exposure and Prevalence of heat illnesses was the third most common cause for hospitalization during Heat-related illnesses, also in elderly, Cholera and heat exposure and Prevalence of heat illnesses an acute bacterial enteric disease caused by Vibrio cholera accounted for several outbreaks [23]

#### **Rationale:**

A review of the literature shows that Excessive unprotected sun exposure is a significant risk factor for skin damage and skin cancers. In recent decades, the incidence of skin cancer has increased dramatically worldwide, reaching epidemic proportions. Skin cancer is the most common type of cancer worldwide, and the ninth most common malignancy in Saudi Arabia. Sun protection is a key primary preventive strategy against skin cancer and skin damage induced by sun exposure. knowledge of the epidemiology of heat exposure and Prevalence of heat-related illnesses on a global and regional level is still lacking, great importance and unique for the study of heat illness is the start of the hot cycle of the population which will continue for the next 15-16 years. Approximately two million people, the majority of whom are at great risk, will be exposed to the extremes of hot weather in May-September. Thousands of heat stroke cases are expected to occur.

**Aim of the study:** To assessment knowledge of the population about hazards on heat exposure at Saudi Arabia 2023.

## **Objectives:**

To assessment knowledge of the population about hazards on heat exposure at Saudi Arabia 2023.

## 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 Saudi Arabia . Saudi Arabia 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. is home to people and is situated within the hot , with average daily maximum air temperatures exceeding 46.8 °C for 8 month each year . Within the urbanized region, air and surface temperatures differ widely between neighborhoods, as do vulnerability to and incidences of heat related illness and mortality. Large contrasts in heat illness and mortality rates also exist between different demographic groups; those at higher risk of heat illness and death include lower-income and racial and ethnic minority residents, elderly individuals, men, outdoor workers, and those living in parts of the city with less green space and higher land surface, temperatures. This study compares experienced temperatures across five neighborhoods with contrasting environmental, socioeconomic, and demographic characteristics the Saudi government provides free health services through hospitals and

primary health centers (PHCs), including seasonal health facilities. Patients included in our survey were male and female adult (>40 years of age) who were diagnosed with heat Exposure and heat Illnesses attending at Primary Health care Center, during the study period. Data were collected for the (400) attending at Primary Health care Center. A team of two was deployed at primary Health care Center to collect data through a pathway checklist questionnaire, patients not attending at PHC , and patients who were not diagnosed with heat exposure and heat illnesses, the study has been conduct on a convenience sample of 700 matching the inclusion criteria and exclusion.

#### Selection criteria:

This difference translates into biological, socioeconomic and lifestyle differences

#### **Inclusion criteria:**

- > population who agree to participate in the study
- Residency Saudi Arabia .
- Over 18 years of age
- Able and willing to participate in the study.
- Diagnosed with heat exposure and heat illnesses

#### **3.3.3Exclusion criteria:**

- Residency outside Saudi Arabia .
- > > 50
- > population 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; (400). (Male and female) and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been 400. Computer generated simple random sampling technique was used to select the study participants. Data collection was done by the researcher during the 2023

#### **Data collection tools of the study:**

To collect data to determine the Knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses Saudi Arabia 2023. Structured questionnaire was used. It was developed by the researcher after reviewing of current national and international related literature. It composed of 30 questions. This included the following parts:

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

**Part two**: this part including questions to determine knowledge about hazards of heat exposure such as signs and symptoms of hazards of heat exposure , mode of transmission, methods of prevention, high risk groups, and line of treatment. Questions community reaction toward people with heat exposure, and sources of information about heat exposure . 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 primary health center. The study tool was developed by the researcher and checked for validity and reliability. Pilot study was done on 10 population to check and ensure the clarity,

applicability and feasibity 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 joint program Family Medicine program has be obtained. Permission from the Directorate, 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, Haji for, Level of education, Chronic diseases)

	N	0/0
	1	70
Age		
18-30	128	32
31-49	80	20
>50	192	48
Sex		
Male	156	39
Female	244	61
Marital status		·
Married	148	37
Single	48	12
Divorced	88	22
Widow	116	29
Do you have a tendency to burn and tan (skin type and sensitiv	rity)	
Type 1(fair skin that burns) easily and never tans	80	20
Type 11 (skin that burns easily and tans slowly)	128	32
Type 111(skin that tans easily and does not burn much)	80	20
Type 1V-V1(dark skin that tans well and never not burn)	112	28
Level of education		

Illiterate	80	20
Primary School	76	19
Intermediate School	72	18
Secondary School	80	20
University School	44	11
Postgraduate	48	12
Chronic diseases?		
No	168	42
Yes	232	58
History of skin cancer in family		
Yes	48	12
No	352	88
Hair color		
Light	32	8
Dark	368	92
Duit		
Eye color		
Eye color Light	72	18
Eye color Light Dark	72 328	18 82
Eye color         Light         Dark         Did you do vitamin D test any time in your life	72 328	18 82
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes	72 328 136	18 82 34
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No	72 328 136 264	18 82 34 66
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation	72 328 136 264	18           82           34           66
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes	72 328 136 264 124	18 82 34 66 31
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes         No	72 328 136 264 124 276	18         82         34         66         31         69
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes         No         Do you know about sunscreens	72 328 136 264 124 276	18         82         34         66         31         69
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes         No         Do you know about sunscreens         Yes	72 328 136 264 124 276 52	18         82         34         66         31         69         13
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes         No         Do you know about sunscreens         Yes         No	72 328 136 264 124 276 52 348	18         82         34         66         31         69         13         87
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes         No         Do you know about sunscreens         Yes         No         Do you use sunscreens	72 328 136 264 124 276 52 348	18         82         34         66         31         69         13         87
Eye color         Light         Dark         Did you do vitamin D test any time in your life         Yes         No         Do you take protective measures against solar irradiation         Yes         No         Do you know about sunscreens         Yes         No         Do you use sunscreens         Yes         No         Do you use sunscreens         Yes	72 328 136 264 124 276 52 348 84	18         82         34         66         31         69         13         87         21

Regarding socio demographic characteristics, this table shows that the highest proportion of participants age >50 years (48.0%) and 18-30 years of age (32.0%), while 31-49 were (20.0%), regarding the sex the majority of participant female were (61.0%), but male were (39.0%), regarding the marital status the majority of participant married were (37.0%) but Widow were (29.%) while divorced were (22.0%), regarding do you have a tendency to burn and tan (skin type and sensitivity) the majority of participant Type 11 (skin that burns easily and tans slowly) were (32.0%) but the Type 1V-V1(dark skin that tans well and never not burn) were (28.0%), followed by Type 111(skin that tans easily and does not burn much) and Type 1(fair skin that burns) easily and never tans respectively were (20.0%), regarding the level of education the majority of participant respectively illiterate and Secondary School were (20.0%), but the Primary School were (19.0%) while intermediate School were (18.0%) but the Postgraduate were (12.0%), regarding the have chronic diseases the majority of

participant answer Yes (58.0%) while No were (42.0%), regarding the history of skin cancer in family the majority of participant answer No (88.0%) while Yes were (12.0%), regarding the hair color the majority of participant dark were(92.0%) while light were(8.0%), regarding the eye color the majority of participant dark were(82.0%) but within Saudi Arabia were (8.0%), regarding did you do vitamin D test any time in your life the majority of participant answer No were (66.0%) but answer Yes were (34.0%), regarding do you take protective measures against solar irradiation the majority of participant answer No were (69.0%) but answer Yes were (31.0%), regarding the do you know about sunscreens the majority of participant answer No (87.0%) while Yes were (13.0%), regarding do you use sunscreens the majority of participant answer No (79.0%) while Yes were (21.0%),

	Ν	%			
What are the Comorbidities of patients with Heat Exposure and Heat Illnesses					
Cardiovascular disease					
Yes	168	42			
No	232	58			
Diabetes mellitus					
Yes	288	72			
No	112	28			
Hypertension					
Yes	264	66			
No	136	34			
Fever without clear cause that lasts more than day	/S				
Yes	208	52			
No	192	48			
What are the signs of Hazards of Heat Exposure a	nd Heat Illnesses				
Ongoing fatigue	140	35			
Increased Systolic blood pressure	48	12			
Increased Respiratory rate	76	19			
Increased Pulse rate	84	21			
All of them right	20	5			
Do not know	32	8			
Heat Exposure and Heat Illnesses effect Obstetrics	s and gynecological diseas	es			
Yes	264	66			
No	136	34			
Heat Exposure and Heat Illnesses effect diabetes n	nellitus in pregnancy				
Yes	212	53			
No	88	22			
Do not know	100	25			
How Heat Exposure and Heat Illnesses Manageme	ent				

 Table 2: distribution of the participants' knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses

Patient moved to a cooler place	264	66
Patient placed in supine position and elevate legs and hips	124	31
Patient clothes lightened up	192	48
Patient started oral hydration	148	37
Patient moved to a cooler place	100	25
All of them	88	22
Do not know	72	18
What an Advanced Case Management		
Intravenous fluid given when patient nauseated	168	42
Cooling and transferring the patient to health facility	156	39
If no improvement of signs and symptoms, other diagnosis	160	40
considered	100	40
All of them	260	65
Do not know	88	22

Regarding knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses, the table shows the Comorbidities of patients with Heat Exposure and Heat Illnesses regarding the cardiovascular disease the majority of participant answer No were (58.0%), but Yes were (42.0%), regarding the diabetes mellitus the majority of participant answer Yes were (72.0%) but No were (28.0%), regarding the hypertension the majority of participant answer Yes were (66.0%) but the No were (28.0%), regarding fever without clear cause that lasts more than days the majority of participant answer Yes were(52.0%), but answer No were(34.0%), regarding what are the signs of Hazards of Heat Exposure and Heat Illnesses the majority of participant answer ongoing fatigue (35.0%), Increased Pulse rate were (21.0%) but Increased Respiratory rate were (19.0%), regarding heat exposure and Heat Illnesses effect Obstetrics and gynecological diseases the majority of participant answer Yes were(66.0%) while No were(34.0%), regarding heat Exposure and Heat Illnesses effect diabetes mellitus in pregnancy the majority of participant answer Yes were(53.0%) but do not know were (25.0%) while answer No were (22.0%), regarding How Heat Exposure and Heat Illnesses Management the majority of participant answer Patient moved to a cooler place were (66.0%) but answer Patient clothes lightened up were(48.0%), but answer Patient started oral hydration were (37.0%), while Patient moved to a cooler place were (25.0%) and answer Patient placed in supine position and elevate legs and hips were (310%) while all of them were (18.0%), regarding what an Advanced Case Management the majority of participant answer All of them were (65.0%), while Intravenous fluid given when patient nauseated were (42.0%) but If no improvement of signs and symptoms, other diagnosis considered were (40.0%),

 Table 3 : distribution of the Signs and symptoms of patients with Heat Exposure and Heat Illnesses.

Signs and symptoms of patients with Heat Exposure?	Vital signs		
Signs and symptoms of patients with meat Exposure:	Ν	%	
Altered mental status	168	42	

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Tachycardia	216	54
Tachypnea	240	60
Hypotension	192	48
Convulsions	180	45
Diarrhea	204	51
Dizziness	172	43
Vomiting	176	44
Headache	248	62
Irritability	204	51
Nausea	244	61
Postural hypotension	44	11

Regarding Signs and symptoms of patients with Heat Exposure and Heat Illnesses, the table shows the majority of participant answer Headache were (62.0%), but Nausea were (61.0%) while Tachypnea were (60.0%) while diarrhea were (51.0%) while Hypotension were (48.05) while Convulsions were (45.0%), while dizziness were (43.0%) while altered mental status were (42.0%)

Table 4: distribution of the participants' general knowledge about Hazards of Heat				
Exposure and Prevalence of Heat Illnesses .				
	Ν	0/0		

	Ν	%					
Can Heat Exposure and Heat Illnesses be cured?							
Yes	248	62					
No	152	38					
How can someone with Heat Exposure and Heat Illnesses be cured?							
Cooling continued	84	21					
Skin and rectal temperature continuously monitored	92	23					
Skin temperature maintained $> 30 \text{ C}$	44	11					
Cooling stopped when rectal temperature is 39 C	168	42					
All of them	48	12					
Do not know	80	20					
Do you can Heat Exposure and Heat Illnesses effect in diabetes mellitus pregnant							
Female?							
Yes	168	42					
No	128	32					
Do not know	104	26					
Do you feel well informed about Heat Exposure and	Heat Illnesse	s?					
Yes	284	71					
No	116	29					
Who would you talk to about your illness if you had Heat Exposure and Heat							
Illnesses?							
Doctor or another medical worker	248	62					

Spouse	88	22				
Close friend	32	8				
No one	32	8				
What would you do if you thought you had sympto	oms of Heat E	<b>Exposure and Heat</b>				
Illnesses?						
Go to health facility	196	49				
Got to traditional healer	120	30				
Pursue other self-treatment options (herbs, etc.)	84	21				
Do you can Heat Exposure and Heat Illnesses effect	in Elderly					
Yes	284	71				
No	72	18				
Do not know	44 11					
What are the sources of information about general knowledge about Hazards of						
Heat Exposure and Prevalence of Heat Illnesses						
Newspapers and magazines	84	21				
Radio	72	18				
TV	44	11				
Billboards	40	10				
Brochures, posters and other printed materials	32	8				
Health workers	120	30				
Doctor	88	22				
Religious leaders	12	3				

Regarding general knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses the table shows the regarding Can Heat Exposure and Heat Illnesses be cured the majority of participant answer Yes were (62.0%), but No were (38.0%), regarding can someone with Heat Exposure and Heat Illnesses be cured the majority of participant answer cooling stopped when rectal temperature is 39 C were (42.0%) but Cooling continued and do not respectively were (21.0%), while Skin and rectal temperature continuously monitored were (23.0%), regarding can Heat Exposure and Heat Illnesses effect in diabetes mellitus pregnant Female the majority of participant answer yes were (42.05) not know were (26.0%) but No were (32.0%), regarding feel well informed about Heat Exposure and Heat Illnesses the majority of participant answer Yes were (71.0%), but answer No were (29.0%), regarding would you talk to about your illness if you had Heat Exposure and Heat Illnesses the majority of participant answer doctor or another medical worker (62.0%), but Spouse were (22.0%) but No one were (8.0%), regarding would you do if you thought you had symptoms of Heat Exposure and Heat Illnesses the majority of participant answer go to health facility were (49.0%) While got to traditional healer were (30.0%), regarding you can Heat Exposure and Heat Illnesses effect in Elderly pilgrims the majority of participant answer Yes were(71.0%) while No were(18.0%) but not know were (11.0%), regarding the sources of information about general knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses the majority of participant answer doctor were (22.0%) but health workers were (30.0%)while Radio were (18.0%) but newspapers and magazines were (21.0%).

	Knowled	Knowledge		
	N 9			
Yes	284	71		
No	116	29		
Total	400	100		
X <sup>2</sup>	69.722	69.722		
P-value	<0.001*	<0.001*		

Table 5 Distribution of the relation of participant to knowledge about Hazards of Heat
Exposure and Prevalence of Heat Illnesses

Table 5 show distribution of the relation of participant to knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses regarding the knowledge the most of participants answer Yes knowledge were (71.0%) followed by No were (29.0%) and total were (100.0%) while heave a significant relation were P-value <0.001 and X<sup>2</sup> 69.722.

# Figure (1) Distribution of the relation of participant to knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses



Knowledge					Chi squara				
		Yes No			Total				
		Ν	%	Ν	%	Ν	%	$\mathbf{X}^2$	<b>P-value</b>
	18 30	11	40.49		11.21	12	32.00		
	10-30	5	%	13	%	8	%		
Ago	31_/10		24.65				20.00	67 883	< 0.001
Age	31-49	70	%	10	8.62%	80	%	07.885	*
	> 50		34.86		80.17	19	48.00		
	>50	99	%	93	%	2	%		
	Mala		24.65		74.14	15	39.00		< 0.001
Sov	wiate	70	%	86	%	6	%	84 702	
Sex	Famala	21	75.35		25.86	24	61.00	04.793	*
	I'emale	4	%	30	%	4	%		
	Morried	12	42.25		24.14	14	37.00		
	wiaineu	0	%	28	%	8	%		
	Single		10.56		15.52		12.00		<0.001 *
Marital	Single	30	%	18	%	48	%	26.224	
status	Divorced		24.65		15.52		22.00	26.224	
	Divorceu	70	%	18	%	88	%		
	Widow		22.54		44.83	11	29.00		
		64	%	52	%	6	%		
	Illitorato				51.72		20.00	-	<0.001 *
	Interate	20	7.04%	60	%	80	%		
	Primary		19.37		18.10		19.00		
	School	55	%	21	%	76	%		
Lovel of	Intermediat		24.65				18.00		
ducatio	e School	70	%	2	1.72%	72	%	115.59	
n	Secondary		22.89		12.93		20.00	7	
11	School	65	%	15	%	80	%		
	University		11.62				11.00		
	School	33	%	11	9.48%	44	%		
	Postgraduat		14.44				12.00		
	e	41	%	7	6.03%	48	%		
	No		28.17		75.86	16	42.00		1
Chronic		80	%	88	%	8	%	76 904	< 0.001
diseases?	Ves	20	71.83		24.14	23	58.00	/0.904 *	*
	100	4	%	28	%	2	%		
History	Ves		13.73				12.00		
of skin	1 es	39	%	9	7.76%	48	%	2.783	0.095
cancer in	No	24	86.27	10	92.24	35	88.00		

# Table 6 Distribution of the relation of participant to knowledge about Hazards of HeatExposure and Prevalence of Heat Illnesses and demographic data

family	5	%	7	%	2	%	

Table (6) show that is a significant relation between knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses and demographic data regarding age increase in 18-30 years in Yes were (40.49%) while total (32.00%), follow by >50 year in No were (80.17%) while total (48.00%), were P-value=0.001, X<sup>2</sup> 67.883. Regarding the gender is a significant relation between knowledge and gender increase in Female in Yes were (75.35%) total (61.00%), follow male in No were (74.14%) also P-value=0.001, X<sup>2</sup> 84.793. Regarding the marital status is a significant relation between knowledge and marital status increase in married in Yes were (42.25%) total 37.00%, follow widow were (44.83%) total 29.00 also P-value=0.001, X<sup>2</sup> 26.224, regarding the Educational level a significant relation between Knowledge and Educational level increase in Intermediate School in Yes were (24.65%) total (18.00%), follow by Illiterate in No were (51.72%) total (20.0%) also P-value=0.001,  $X^2$ = 115.597. regarding the Chronic diseases is a significant relation between Knowledge and Chronic diseases increase in Yes were (71.83%) total (58.0%), follow No were (75.86%) total (42.00%) also P-value=0.001,  $X^2 = 76.904$ , regarding history of skin cancer in family is a significant relation between Knowledge and history of skin cancer in family increase in No were (86.27%) total 88.00%, follow by No were (86.27%) also P-value=0.095,  $X^2 = 2.783$ .





#### **Discussion:**

The results of the present study provide extensive data regarding the assessment the Knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses among population , morbidity, medical management, and mortality due to heat illness among

population, heat illness can be prevented with strategic planning and preventive measurements. A systematic review of weather and environmental hazards at mass gatherings showed that a one-degree increase in temperature, from $20\circ$ C to  $21\circ$ C, resulted in an 11% increase in the number of individuals requiring medical attention. Moreover, temperatures exceeding 48 °C resulted in an increase in the incidence of patient presentations (24). Thus, the government of Kingdom of Saudi Arabia, in collaboration with the Ministry of health, is taking measures to prevent health problems during the event (25) however, the results of the present study showed socio demographic characteristics, that the highest proportion of participants age >50 years (48.0%), the sex the majority of participant female were (61.0%), the marital status the majority of participant married were (37.0%), do you have a tendency to burn and tan (skin type and sensitivity) the majority of participant Type 11 (skin that burns easily and tans slowly) were (32.0%), the level of education the majority of participant respectively illiterate, the history of skin cancer in family the majority of participant answer No (88.0%), the eye color the majority of participant answer No were (66.0%) (See tabil1)

In Saudi Arabia, skin cancer ranks ninth among the cancer types for both men and women, with 319 cases accounting for 3.2% of the total amount of cancer diagnoses in 2019 (52.7% for men, 47.3% for women, male: female ratio = 111:100 [26]

The rate of skin cancer among the Saudi population is low due to their darker skin type [27]. Another impact factor that has been identified is that the Saudi community is an Islamic conservative society, and has a cultural norm of full-body coverage of clothing, particularly for women. The majority of women cover their faces as well, which may explain the male predominance with the disease . However, the sun protection viability of these clothes is not well known. In addition, because Saudi Arabia has a hot desert climate, people are more inclined to participate in indoor activities.[28]

There is very limited information on the knowledge and behavior of the Saudi people with respect to sun exposure and protection. We discovered only two studies conducted in Saudi Arabia that focused on this topic[29]. The results of our study indicated that female students were knowledgeable about the harmful consequences of sun exposure, including sunburn, hyperpigmentation, aging, and skin cancer. Their levels of awareness were higher than those in previous studies conducted in Saudi Arabia. For example, in the first study[30], only 56% of participants reported awareness of the relationship between sunburn and skin cancer, and in the second study by Al Ghamdi et al. (2016), only 55.3% of participants was aware of the relationship, [29] this is confirmed by the results of Tables (2 and 4). We also found that the time frame  $\omega$  ot only did we find that Day Hours and Night Hours exposures are correlated, we also found that some associations between independent variables and exposure metrics were very different between day and night. There have been multiple personal heat exposure studies regarding the nature of workplace heat exposure [31] which are often tied to daytime conditions. While our study did not focus on workplace exposures specifically, our analysis indicates that separation of daytime (often work and school time) and nighttime (often residential and sleeping time) periods for analysis is necessary to characterize diversity in individuals' cumulative thermal experiences. These results support the notion that temperature-health epidemiological studies that link (See Figure 2)

#### Conclusion

Heat exposure season which is a good guide to all needed precautions to ensure safe season for all population. This year, heat exposure season recommendations were published in the Journal of Infection and Public Health. Increasingly, international collaboration has become essential. Planning and supporting heat exposure season has become a forum for collaboration crossing any political considerations Although authorities of the government of Saudi Arabia are working on research and forming interdisciplinary teams to prevent health problems during the heat exposure season, the mortality rate from hazards of heat exposure's high and the majority of the patients had hazards of heat exposure and Heat Illnesses, must be planned that more emphasis will be placed on educating the population about prevention of heat exhaustion prior to their arrival in the Kingdom. It is also hoped that with the improvement in the services and immediate availability of first aid will witness better and safer heat exposure season in the future.

#### **Reference:**

- Neira, M., Erguler, K., Ahmady-Birgani, H., Al-Hmoud, N. D., Fears, R., Gogos, C., ... & Christophides, G. (2022). Climate change and human health in the Eastern Mediterranean and Middle East: Literature review, research priorities and policy suggestions. *Environmental research*, 114537.
- [2] Lelieveld, J., Proestos, Y., Hadjinicolaou, P., Tanarhte, M., Tyrlis, E., & Zittis, G. (2016). Strongly increasing heat extremes in the Middle East and North Africa (MENA) in the 21st century. *Climatic Change*, 137(1), 245-260.
- [3] Wondmagegn, B. Y., Xiang, J., Dear, K., Williams, S., Hansen, A., Pisaniello, D., ... & Bi, P. (2021). Impact of heatwave intensity using excess heat factor on emergency department presentations and related healthcare costs in Adelaide, South Australia. *Science of The Total Environment*, 781, 146815.
- [4] Ridda, I., Mansoor, S., Briggs, R., Gishe, J., & Aatmn, D. (2021). Preparedness for mass gathering during Hajj and Umrah. *Handbook of healthcare in the Arab World*, 1215-1235.
- [5] Yezli, S., Khan, A. H., Yassin, Y. M., Khan, A. A., Alotaibi, B. M., & Bouchama, A. (2023). Association of ambient temperature with mortality in resident and multiethnic transient populations in a desert climate, 2006–2014. *Environmental Health Perspectives*, 131(4), 047004.
- [6] Chen, X., Yang, J., Shen, M., Chen, Y., Yu, Q., & Xie, J. (2022). Structure, function and advance application of microwave-treated polysaccharide: A review. *Trends in Food Science & Technology*, 123, 198-209.
- [7] Han, D. L., Yu, P. L., Liu, X. M., Xu, Y. D., & Wu, S. L. (2022). Polydopamine modified CuS@ HKUST for rapid sterilization through enhanced photothermal property and photocatalytic ability. *Rare Metals*, *41*, 663-672.
- [8] Schneider, S., von Winning, A., Grüger, F., Anderer, S., Hoffner, R., & Anderson, L. (2022). Physical activity, climate change and Health—A conceptual model for planning public health action at the organizational level. *International Journal of Environmental Research and Public Health*, 19(8), 4664.

- [9] Saeed, F., Schleussner, C. F., & Almazroui, M. (2021). From Paris to Makkah: heat stress risks for Muslim pilgrims at 1.5° C and 2° C. *Environmental Research Letters*, *16*(2), 024037.
- [10] Balfagón, D., Sengupta, S., Gómez-Cadenas, A., Fritschi, F. B., Azad, R. K., Mittler, R., & Zandalinas, S. I. (2019). Jasmonic acid is required for plant acclimation to a combination of high light and heat stress. *Plant Physiology*, 181(4), 1668-1682.
- [11] Alkassas, W., Rajab, A. M., Alrashood, S. T., Khan, M. A., Dibas, M., & Zaman, M. (2021). Heat-related illnesses in a mass gathering event and the necessity for newer diagnostic criteria: a field study. *Environmental Science and Pollution Research*, 28, 16682-16689.
- Bidassey-Manilal, S., Wright, C. Y., Engelbrecht, J. C., Albers, P. N., Garland, R. M., & Matooane, M. (2016). Students' perceived heat-health symptoms increased with warmer classroom temperatures. *International journal of environmental research and public health*, 13(6), 566.
- [13] Saeed, M., Abbas, G., Alagawany, M., Kamboh, A. A., Abd El-Hack, M. E., Khafaga, A. F., & Chao, S. (2019). Heat stress management in poultry farms: A comprehensive overview. *Journal of thermal biology*, 84, 414-425.
- [14] Zhu, L., Liao, R., Wu, N., Zhu, G., & Yang, C. (2019). Heat stress mediates changes in fecal microbiome and functional pathways of laying hens. *Applied microbiology and biotechnology*, 103, 461-472.
- [15] Chen, G., Yi, X., Zhao, B., Li, Y., Qiao, X., Gao, H., ... & Wang, J. (2022). Genome-wide characterization of the Gα subunit gene family in Rosaceae and expression analysis of PbrGPAs under heat stress. *Gene*, 810, 146056.
- [16] Kusaka, H., Asano, Y., & Kimura, R. (2022). Wisteria trellises and tents as tools for improved thermal comfort and heat stress mitigation: Meteorological, physiological, and psychological analyses considering the relaxation effect of greenery. *Meteorological Applications*, 29(1), e2046.
- [17] Springer, B. (2016). Exertional Heat Illness. Sports Medicine for the Emergency *Physician: A Practical Handbook*, 2, 390.
- [18] Layton, J. B., Li, W., Yuan, J., Gilman, J. P., Horton, D. B., & Setoguchi, S. (2020). Heatwaves, medications, and heat-related hospitalization in older Medicare beneficiaries with chronic conditions. *PLoS one*, 15(12), e0243665
- [19] Faurie, C., Varghese, B. M., Liu, J., & Bi, P. (2022). Association between high temperature and heatwaves with heat-related illnesses: A systematic review and metaanalysis. *Science of The Total Environment*, 852, 158332.
- [20] Nizami, A. S., Rehan, M., Waqas, M., Naqvi, M., Ouda, O. K., Shahzad, K., ... & Pant, D. (2017). Waste biorefineries: Enabling circular economies in developing countries. *Bioresource technology*, 241, 1101-1117.
- [21] Springer, B. (2016). Exertional Heat Illness. Sports Medicine for the Emergency *Physician: A Practical Handbook*, 2, 390.
- [22] Fancello, V., Hatzopoulos, S., Santopietro, G., Fancello, G., Palma, S., Skarżyński, P. H., ... & Ciorba, A. (2023). Vertigo in the Elderly: A Systematic Literature Review. *Journal of Clinical Medicine*, *12*(6), 2182.

- [23] Othman, J. (2023). Determining the Knowledge about Hazards of Heat Exposure and Prevalence of Heat Illnesses among Elderly and pregnant pilgrims attending primary health care Center, Makkah Al-Mokarrama, Saudi Arabia. *Annals of the Romanian Society for Cell Biology*, 27(01), 199-215.
- [24] Abdelmoety, D. A., El-Bakri, N. K., Almowalld, W. O., Turkistani, Z. A., Bugis, B. H., Baseif, E. A., ... & Abu-Shaheen, A. (2018). Characteristics of heat illness during Hajj: a cross-sectional study. *BioMed Research International*, 2018.
- [25] Jokhdar, H., Khan, A., Asiri, S., Motair, W., Assiri, A., & Alabdulaali, M. (2021). COVID-19 mitigation plans during Hajj 2020: a success story of zero cases. *Health* security, 19(2), 133-139.
- [26] Almuqati, R. R., Alamri, A. S., & Almuqati, N. R. (2019). Knowledge, attitude, and practices toward sun exposure and use of sun protection among non-medical, female, university students in Saudi Arabia: A cross-sectional study. *International Journal of Women's Dermatology*, 5(2), 105-109.
- [27] Mufti, S. T. (2012). Pattern of cutaneous melanoma at king AbdulAziz university hospital, Jeddah, Saudi Arabia.
- [28] Melisse, B., Blankers, M., de Beurs, E., & van Furth, E. F. (2022). Correlates of eating disorder pathology in Saudi Arabia: BMI and body dissatisfaction. *Journal of eating disorders*, 10(1), 126.
- [29] AlGhamdi, K. M., AlAklabi, A. S., & AlQahtani, A. Z. (2016). Knowledge, attitudes and practices of the general public toward sun exposure and protection: A national survey in Saudi Arabia. *Saudi Pharmaceutical Journal*, 24(6), 652-657.
- [30] Al Robaee, A. A. (2010). Awareness to sun exposure and use of sunscreen by the general population. *Bosnian journal of basic medical sciences*, *10*(4), 314.
- [31] Sugg, M. M., Fuhrmann, C. M., & Runkle, J. D. (2020). Perceptions and experiences of outdoor occupational workers using digital devices for geospatial biometeorological monitoring. *International journal of biometeorology*, 64, 471-483.