



Exploring the Relationship Between Sauna Habits and Knowledge of Cardiovascular Health Benefits of Sauna use among Adults in Saudi Arabia: A Cross-Sectional Study

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Abstract Objectives: Sauna use has numerous cardiovascular health benefits and has been shown to decrease the risk of cardiovascular disease (CVD). This study investigates the prevalence and determinants of sauna use in Saudi Arabia, focusing on public knowledge and attitudes toward its cardiovascular health benefits. **Methods:** We conducted a cross-sectional survey among 576 adults using a structured questionnaire distributed via social media. The questionnaire assessed sauna habits and knowledge of cardiovascular benefits and identified key motivators and barriers to sauna use. **Results:** Our findings reveal that sauna usage is notably low, with (N = 428, 74.3%) of participants reporting they do not use saunas. Knowledge of the cardiovascular benefits is equally limited with most of the population having poor levels of awareness (N>318, >55%); particularly, only a small fraction of the population is aware of the reduced risk of cardiovascular mortality associated with regular sauna use (N = 43, 7.5%). Increased knowledge of the knowledge parameters was associated with increased sauna visitation frequencies (p<0.003). Men and smokers generally displayed higher awareness of the circulatory benefits. The motivators with major importance in reinforcing sauna use included personal enjoyment (N = 211, 36.6%) and the availability of free time (N = 211, 36.6%), while the main barriers were lack of time (N = 250, 43.4%), lack of motivation (34.9%, N = 201), financial constraints (25.7%, N = 148) and limited awareness of health benefits (N = 131, 22.7%). **Conclusion:** The study underscores a critical gap in the adoption and understanding of sauna use as a preventive health measure in Saudi Arabia. Enhanced public health initiatives are essential to improve awareness and accessibility, which could facilitate wider adoption of sauna use.

Key Words Sauna use, Cardiovascular health, Health awareness, Adult population, Saudi Arabia

INTRODUCTION

Sauna bathing involves staying in a room with a temperature ranging from 80-100 degrees Celsius with humidity levels around 15-20%. The recommended duration varies based on individual comfort but usually ranges from 5-20 minutes [1]. Prolonged exposure can be harmful, potentially causing dehydration and orthostatic hypotension but these risks can be mitigated with adequate hydration during and after sauna sessions. The traditional form of heat exposure offers numerous benefits, including hormonal, psychiatric and most importantly, cardiovascular health improvements [2,3].

Acute heat exposure triggers a cardiovascular response similar to exercise, such as cutaneous vasodilation to

promote sweating and dissipate excess heat. Therefore, heart rate increases, leading to a rise in cardiac output by approximately 70% [4]. During a sauna session, BP temporarily rises but decreases acutely afterward, an effect similar to that of moderate-to-vigorous physical exercise [5]. Repeated sauna exposure increases nitric oxide levels, improving vascular endothelial function in both macrovasculature and microvasculature through increased shear stress. This can lead to lower blood pressure and a reduced incidence of cardiac events [6]. Such effects are particularly beneficial for individuals with hypertension, offering a potential non-pharmacological treatment option [7].

Several well-designed studies have demonstrated a link between long-term sauna exposure and a reduced risk of cardiovascular diseases, such as sudden cardiac death and coronary artery disease, independent of other cardiac risk factors. This correlation follows a dose-response pattern, with no apparent threshold effect. Moreover, the benefits also extend to patients with a history of myocardial infarction, stable angina, heart failure or low fitness levels [8,9]. A meta-analysis on the acute and short-term effects of sauna therapy on cardiovascular function demonstrated significant reductions in both systolic and diastolic blood pressure. Furthermore, the study revealed that sauna treatment has a significant positive effect on cardiovascular function, including improvements in blood pressure, heart rate and vascular function [2]. In addition, a decrease in the risk of new-onset stroke was observed in Finnish men and women who underwent weekly sauna sessions [3]. Saunas also benefit individuals with chronic obstructive pulmonary disease, chronic fatigue, chronic pain and addiction [10]. These benefits have also been observed in patients with chronic heart failure. Following a 4-week regimen of sauna use (five times a week), the left ventricular ejection fraction rose from 24 ± 7 to $31\pm 9\%$ and the left ventricular end-diastolic dimension was reduced from 66 ± 6 to 62 ± 5 mm [11]. The literature highlights the potential cardiovascular benefits of sauna exposure in healthy patients as well as in those with predetermined cardiac conditions, indicating the importance of this tool for public health.

These key aspects of deliberate heat exposure on the cardiovascular system may help prevent major adverse cardiovascular events by improving risk factors associated with CVD. There is a lack of data, especially in Saudi Arabia, regarding the public's knowledge and perceptions of sauna use as an effective lifestyle intervention for improving cardiovascular health and managing hypertension. In this study, we aimed to analyze the knowledge and perception of sauna exposure-related cardiovascular health benefits and their relationship with sauna habits among the general healthy adult population of the Kingdom of Saudi Arabia (KSA).

METHODOLOGY

This study aims to investigate the knowledge of cardiovascular health benefits related to sauna exposure among adults in KSA, in relation to their sauna habits, using a cross-sectional quantitative approach.

Study Design, Sampling and Subjects

This study was done as an analytical cross-sectional study. A convenient sampling method was used to recruit participants from the adult population of KSA with a sample size of 576 participants. This exceeded the minimum sample needed which was determined with the Raosoft sample size calculator in order to generalize our results and to incorporate the nonresponse rate. An online survey was distributed via social media to ensure fast and wide distribution throughout the country. The questionnaire was provided bilingually in English and Arabic to accommodate a broad spectrum of respondents. The data collected included

participants' knowledge of sauna exposure-related cardiovascular benefits, personal sauna habits, motivators and barriers to sauna use, as well as personal information such as age, region of residency, general health status and personal history of risk factors for cardiovascular disease.

Questionnaire Validation

The process of building and validating the questionnaire consisted of a series of steps:

Firstly, the questionnaire was built on Google Forms with the primary aim of assessing the knowledge of the Saudi population of the cardiovascular health benefits of sauna use. Formulation of the questions included in the survey was from the studies assessing these cardiovascular parameters [4-9,12]. Another important aim was gaining information on habits of sauna use alongside barriers and motivators to entering the sauna.

The first section consisted of the consent form. The second section addressed the socio-demographic information of the participants as well as screening and determining cardiovascular risk factors with 7 items. Smoking frequency was assessed weekly with the options including "non-smoker" and "once or twice a week". "Occasional smoker every couple of months" and "daily smoker". A subsequent question asked if the participants have a family history of CVD in a yes/no format. All these questions helped characterize the participants according to the presence of these cardiovascular risk factors.

The third section consisted of questions analyzing the sauna habits of participants and barriers or motivators to their use of saunas with 19 items. Frequency of sauna use was measured weekly with options including "never", "every couple of months", "1 or 2 times a week", "3 to 5 times a week" and "daily". The length in which participants stayed in saunas was assessed with options including "less than 5 minutes", "for 5 to 10 minutes", "more than 10 minutes" and "I do not use saunas". These 2 questions helped characterize the patients according to their sauna habits and tendencies. The next group of items assessed motivators as well as barriers to sauna use; their effects on participants were classified into "no significance", "minor significance", "moderate significance" and "major significance". This allowed for a 4-tiered evaluation of the increasing impact of a specific factor as perceived by the participant towards sauna use and habits. Details on the specific motivators and barriers assessed are presented in Table 1.

The fourth section checked for the knowledge of cardiovascular health benefits of sauna use with 5 questions, including knowledge that it can decrease the risk of dying from heart attacks, its ability to improve circulation and endothelial function, its use to maintain cardiac health, potential to lower blood pressure in hypertensive patients and the awareness of the need to consult physicians in people with cardiac histories. The answers were placed into 1 of 3 categories including "Yes I am aware", "No, I was unaware" and "I had an idea but I am unsure". In this way, an adequate understanding of the grasp the participants had on the information presented to them could be grouped into 3 categories for analysis.



Figure 1: Flowchart of the Validation Process

Table 1: Motivators and Barriers Assessed in the Survey

Motivators	Barriers
Knowledge of general health benefits	I don't see the benefits of sauna use
Ease of access (distance and transportation)	Lack of motivation
Relaxation and recovery	I don't have the time to go to a sauna
Activity with friends	Financial inaccessibility
Personal enjoyment	Religious/cultural reasons
Pressured by those around me and social media	I feel self-conscious of my body
Availability of free time	Lack of access (distance and transportation)
Advice from physicians and other experts	Social anxiety
	Heat intolerance

The translation was done initially by the research team. Participants' native to both languages during pilot testing helped in ensuring cultural adaptation. Reverse translation was done with a proficient Arabic and English speaker to ensure validity of the translation and a comparison was done to perform the adequate adjustments. Content validity was established through a review by 2 subject cardiologists. The items checked included the quality of the questions placed to check if they were appropriate scientifically and checking if the questions were in line with the objectives of the study. Face validity was established through a review by 3 physicians in which they checked for the clarity of the language as well as checking themes, demographics and a proper quantity of questions. Afterward, edits were made to the language and order of the questions. There was one question omitted for repetitiveness upon review by the expert committee. Pilot testing was done on a population of 37 participants that had similar characteristics. The participants were of varying ages and were selected through convenience sampling. An extra section was added to the questionnaire where feedback was requested from the participants. Reliability was then calculated through analysis of Cronbach alpha with SPSS V21. The Cronbach alpha value for all the items together was 0.771, the value for items specific to the sauna habits section was 0.79 and the value for items specific to the knowledge of cardiovascular health benefits section was 0.834. Figure 1 represents a flowchart of the validation methodology incorporated.

Data Analysis

The data collected was initially placed in a Microsoft Excel sheet on a secure server. Subsequently, analytical and descriptive statistics were calculated using the Statistical Package for the Social Sciences (SPSS), employing a chi-squared test to determine associations among categorical variables, with the level of significance set at a p-value <0.05.

To ensure the privacy of participants, all personal information was kept anonymous and only accessible to the primary investigator and co-authors. Participants were asked

to provide consent to participate, with an option to withdraw from the study at any time.

RESULTS

Table 2 shows the demographic characteristics of the participants. The study surveyed a total of 576 participants ranging from ages 18 to 65 with a median age of 21 (IQR = 19-25). Details are presented in Table 2.

Table 3 shows the sauna habits of the participants enrolled in the study. When asked about the frequency of sauna usage, a substantial majority of the participants (N = 428, 74.3%) claimed they never went to the sauna, while a minority reported going once every couple of months (N = 124, 21.5%).

Participants were also asked, "If you use saunas, how long do you stay in them?". In the survey, the majority of participants, 65.5% (N = 377), reported that they do not use saunas. For those who do, 17.4% (N = 100) stay in a sauna for 5 to 10 minutes, 7.8% (N = 45) for less than 5 minutes and 9.4% (N = 54) for more than 10 minutes.

'Availability of free time' and 'Personal enjoyment' were the top motivators, each cited by 36.6% of subjects (N = 211). Following closely were 'Ease of access (distance and transportation)', significant for 28.0% (N = 161) and 'Knowledge of general health benefits', important for 26.4% (N = 152). However, 'Advice from doctors and other experts' was viewed as having 'no significance' by most participants, at 50.7% (N = 292) and 'Activity with friends' was not considered significant by 49.3% (N = 284). The most significant obstacle cited was lack of time, noted by 43.4% of participants (N = 250). The next most common barriers were lack of motivation (34.9%, N = 201) and financial inaccessibility (25.7%, N = 148). Additionally, 22.7% (N = 131) did not see the benefits of sauna use. On the other hand, the least significant barriers included religious or cultural reasons (62.2%, N = 358), body self-consciousness (56.4%, N = 325), social anxiety (54.0%, N = 311) and heat intolerance (44.1%, N = 254), which many participants did not view as obstacles. Details on the attitudes toward sauna usage are provided in Figure 2 and 3.

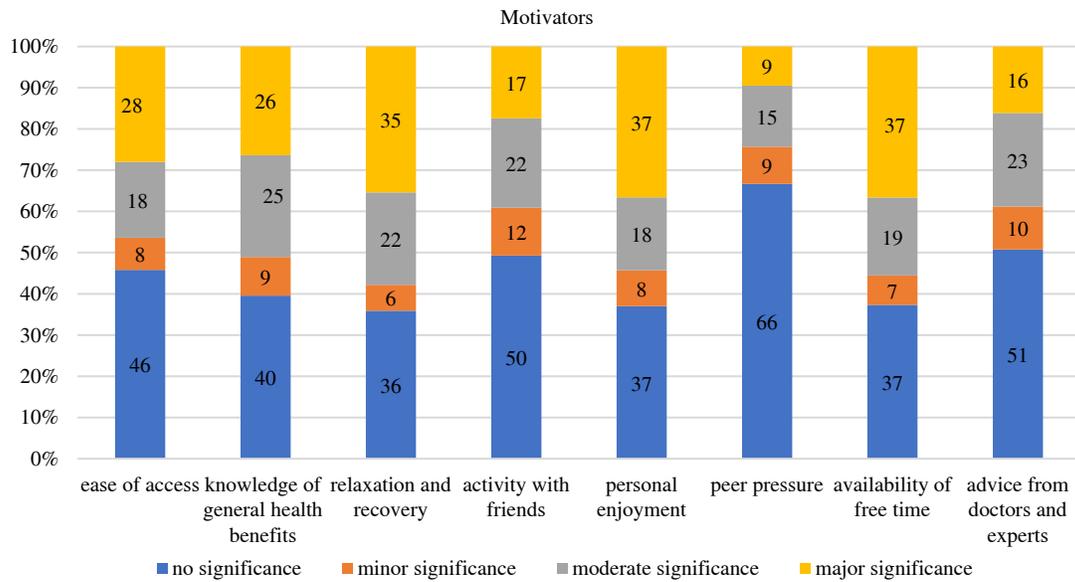


Figure 2: Depiction of the Significance Level of Each Motivator

Table 2: Demographic Characteristics of Participants

Characteristics	n	Percentage
Age [median = 21, Q1 = 19, Q3 = 25]		
30 or younger	451	78.3
31 or older	125	21.7
Gender		
Male	138	24.0
Female	438	76.0
Region		
Western region	339	58.9
Central region	122	21.2
Southern region	37	6.4
Northern region	26	4.5
Eastern region	52	9.0
Suffer from Obesity		
No	506	87.8
Yes	70	12.2
Suffer from Dyslipidemia		
No	547	95
Yes	29	5.0
Suffer from Hypertension		
No	544	94.4
Yes	32	5.6
Suffer from Diabetes		
No	553	96.0
Yes	23	4.0
Family Members that Suffered from CVD		
No	270	46.9
Yes	306	53.1

Table 3: Sauna Habits

Items	n	Percentage
How Many Times Do You Go to Sauna per Week		
Never	425	74.3
Every couple of months	124	21.5
Once or twice a week	17	3.0
3 to 5 times a week	5	0.9
Daily	2	0.3
If You Use Saunas How Long Do You Stay in Them		
less than 5 minutes	45	7.8
For 5 to 10 minutes	100	65.5
More than 10 minutes	54	9.4
I do not use saunas	377	65.5

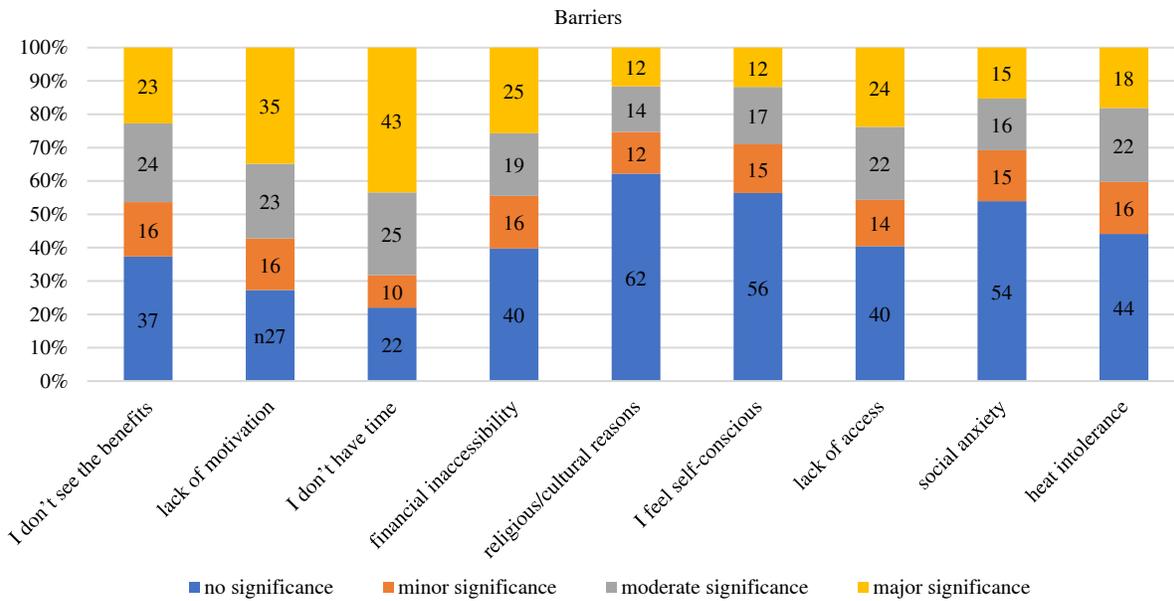


Figure 3: Depiction of the Significance Level of Each Barrier

Table 4: Sauna Knowledge

Items	n	Percentage
Are you aware that saunas can help improve circulation and endothelial function		
No I was unaware	319	55.4
I have an idea but unsure	174	30.2
Yes I am aware	76	13.2
Are you aware that the use of saunas helps to maintain cardiac health		
No I was unaware	384	66.7
I have an idea but unsure	116	20.1
Yes I am aware	76	13.2
are you aware that anyone with cardiovascular morbidity should consult a physician beforehand?		
No I was unaware	380	66.0
I have an idea but unsure	107	18.6
Yes I am aware	89	15.5
Are you aware that sauna use is associated with decreased risk of overall cardiovascular mortality		
No I was unaware	457	79.3
I have an idea but unsure	76	13.2
Yes I am aware	43	7.5
Are you aware that saunas can help lower blood pressure in people with hypertension		
No I was unaware	421	73.1
I have an idea but unsure	85	14.8
I am aware	70	12.2

The statistical analyses consistently revealed significant associations between the increasing importance of motivators to individuals and increased sauna visitation frequencies ($p < 0.02$). However, as the importance of barriers (lack of motivation, lack of time availability, lack of access) to visiting saunas increased, individuals were more likely to never have visited a sauna or go less often than those in which these barriers played a minor role ($p < 0.002$). In contrast, all other barriers had no significant association with sauna visitation frequencies.

When participants were asked about the ability of saunas to improve vascular endothelial function ($N = 319$, 55.4%) more than half were unaware ($N = 319$, 55.4%) and 30.2% ($N = 174$) had some idea but were unsure. A minority

were fully aware ($N = 83$, 14.4%). Regarding sauna use for maintaining cardiac health, the majority ($N = 384$, 66.7%) of participants were unaware, while one-fifth ($N = 116$, 20.1%) were somewhat aware but unsure and a small fraction ($N = 76$, 13.2%) were completely aware. This trend of awareness is also seen when asked about knowledge of the association between saunas and decreased cardiovascular mortality, the need to consult a physician in people with underlying heart conditions and the knowledge that sauna exposure can help reduce blood pressure. The specific data on awareness is provided in Table 4. Categorical data analysis on the relationship between sauna knowledge and visiting frequency reveals that as knowledge of saunas increased the frequency of visits increased ($p < 0.003$) (Table 5).

Table 5: Awareness and Frequency of Sauna Visits

Items	Frequency of visits N (%)					p-value (fisher's exact)
	Never	Every couple of months	Once or twice a week	3 to 5 times a week	Daily	
Are you aware that saunas can help improve circulation and endothelial function						
No I was unaware	265 (83.1)	48 (15)	4 (1.3)	2 (0.6)	0 (0)	<0.001
I have an idea but unsure	119 (68.4)	48 (27.6)	7 (4)	0 (0)	0 (0)	
Yes I am aware	44 (53)	28 (33.7)	6 (7.2)	3 (3.6)	2 (0.3)	
Are you aware that the use of saunas helps to maintain cardiac health						
No I was unaware	318 (82.8)	61 (15.9)	3 (0.8)	1 (0.3)	1 (0.3)	<0.001
I have an idea but unsure	74 (63.8)	34 (29.3)	6 (5.2)	2 (1.7)	0 (0)	
Yes I am aware	36 (47.4)	29 (38.2)	8 (10.5)	2 (2.6)	1 (1.3)	
Are you aware that anyone with cardiovascular morbidity should consult a physician beforehand?						
No I was unaware	298 (78.4)	70 (18.4)	10 (2.6)	2 (0.5)	0 (0)	0.001
I have an idea but unsure	72 (67.3)	33 (30.8)	2 (1.9)	0 (0)	0 (0)	
Yes I am aware	58 (65.2)	21 (23.6)	5 (5.6)	3 (3.4)	2 (2.2)	
Are you aware that sauna use is associated with decreased risk of overall cardiovascular mortality						
No I was unaware	362 (79.2)	81 (17.7)	11 (2.4)	2 (0.4)	1 (0.2)	<0.001
I have an idea but unsure	44 (57.9)	28 (36.8)	2 (2.6)	2 (2.6)	0 (0)	
Yes I am aware	22 (51.2)	15 (34.9)	4 (9.3)	1 (2.3)	1 (2.3)	
Are you aware that saunas can help lower blood pressure in people with hypertension						
No I was unaware	330 (78.4)	78 (18.5)	10 (2.4)	3 (0.7)	0 (0)	0.002
I have an idea but unsure	57 (67.1)	24 (28.2)	3 (3.5)	1 (1.2)	0 (0)	
Yes I am aware	41 (58.6)	22 (31.4)	4 (5.7)	1 (1.4)	2 (2.9)	

Subgroup Analysis

Table 6. demonstrates the association between age groups and attitudes towards sauna baths. When assessing the relationship between gender and knowledge parameters, males showed more awareness of sauna circulatory benefits when compared to their female counterparts (p<0.03) as well as its ability to maintain cardiac health (p<0.002). the presence of chronic conditions such as diabetes, hypertension, dyslipidemia and obesity had no significant relationship with knowledge. Daily smokers had higher levels of awareness of saunas' ability to maintain cardiac health and improve vascular health (p<0.04). The data highlights that participants over the age of 31 reported having more knowledge of the fact that they should consult a cardiologist before visiting a sauna with a significance of (p<0.003). Participants from the southern region were found to be more aware (p<0.006) of the beneficial sauna circulatory and endothelial effects when compared to other regions.

It was found that certain barriers and motivators were significantly age-dependent. Participants aged ≤30 reported religious/cultural reasons, financial inaccessibility and lack of access due to distance or transportation as major barriers statistically supported with (p<0.005). In contrast, participants older than 31 viewed these as less significant barriers. In terms of motivators, ease of access had significant importance to those over 31 (p<0.047). Younger participants, those 30 or younger, were mainly motivated by the knowledge of health benefits and relaxation and recovery from work, with the relationship showing statistical significance (p<0.012).

Table 6 association between age group and attitudes toward sauna use. Associations were tested using the Pearson Chi-Square test (χ²), with a significance level of

p<0.05. Statistically significant findings are reported in the table. Corresponding chi-square values: Financial inaccessibility (χ² = 19.681), religious/cultural reasons (χ² = 13.558), lack of access (χ² = 19.936), ease of access (χ² = 7.912), knowledge of general health benefits (χ² = 10.917).

DISCUSSION

This study aimed to assess the Saudi population's knowledge of sauna use and its association with frequency of sauna visits. The main findings indicated that the majority of the population had poor knowledge of saunas. Additionally, there was a positive association between increased knowledge and a higher frequency of sauna visits. The increase in cardiovascular risk factors, exacerbated by a lack of activity, has been a concerning trend in recent years [14]. Despite this, sauna use remains low in the KSA, 74.3% of the participants reporting they have never visited one. The main motivators for sauna visits were personal enjoyment, free time, ease of access and health benefit awareness, indicating that saunas are viewed as leisure activities. These motivators were linked to more frequent visits, emphasizing the need for accessible, well-maintained saunas to maximize their health benefits for the Saudi public.

The main barriers to sauna use were a lack of free time, low motivation, financial constraints and limited awareness of the health benefits of sauna. Limited knowledge appears to result in people not prioritizing sauna use. Financial barriers are notable, as saunas in the KSA are mostly subscription-based facilities, unlike in Finland, where they are accessible and part of daily life. Finnish studies have reported lower cardiovascular disease mortality rates, highlighting the potential benefits of frequent sauna use. Increasing the availability of saunas in Saudi Arabia could

Table 6: Association Between Age Group and Attitudes

Items	Level of importance N(%)				p-value (Chi-square)
	No significance	Minor significance	Moderate significance	Major significance	
Barrier (Financial Inaccessibility)					
Age ≤30	N = 175 (38.8)	N = 67 (14.9)	N = 75 (16.6)	N = 134 (29.7)	<0.001
Age ≥31	N = 54 (42.2)	N = 24 (19.2)	N = 33 (26.4)	N = 14 (11.2)	
Barrier (Religious/Cultural Reasons)					
Age ≤30	293 (65.0)	N = 52 (11.5)	N = 51 (11.3)	N = 55 (12.2)	0.004
Age ≥31	N = 65 (52.0)	N = 20 (16.0)	N = 28 (22.4)	N = 12 (9.6)	
Barrier (Lack of Access (Distance or Transportation))					
Age ≤30	N = 186 (41.2)	N = 58 (12.9)	N = 85 (18.8)	N = 122 (27.1)	<0.001
Age ≥31	N = 47 (37.6)	N = 22 (17.6)	N = 41 (32.8)	N = 15 (12.0)	
Motivator (Ease of Access (Distance and Transportation))					
Age ≤30	N = 220 (48.8)	N = 33 (7.3)	N = 76 (16.9)	N = 122 (27.1)	0.047
Age ≥31	N = 44 (35.2)	N = 12 (9.6)	N = 30 (24.0)	N = 39 (31.2)	
Motivator (Knowledge of General Health Benefits)					
Age ≤30	N = 190 (42.1)	N = 35 (7.8)	N = 105 (23.3)	N = 121 (26.8)	0.012
Age ≥31	N = 38 (30.4)	N = 19 (15.2)	N = 37 (29.6)	N = 31 (24.8)	
Motivator (Relaxation and Recovery Post-Workout or Post-Event)					
Age ≤30	N = 159 (27.5)	N = 20 (4.4)	N = 95 (21.1)	N = 167 (37.0)	0.001
Age ≥31	N = 38 (30.4)	N = 16 (12.8)	N = 34 (27.2)	N = 37 (29.6)	
Motivator (Activity with Friends)					
Age ≤30	N = 230 (51.0)	N = 45 (10.0)	N = 89 (19.7)	N = 87 (19.3)	0.003
Age ≥31	N = 54 (43.2)	N = 22 (17.6)	N = 36 (28.8)	N = 13 (10.4)	
Motivator (Personal Enjoyment)					
Age ≤30	N = 171 (37.9)	N = 33 (7.3)	N = 72 (16.0)	N = 175 (38.8)	0.011
Age ≥31	N = 42 (33.6)	N = 17 (13.6)	N = 30 (24.0)	N = 36 (28.8)	
Motivator (Pressured by those Around Me and Social Media)					
Age ≤30	N = 315 (69.8)	N = 36 (8.0)	N = 50 (11.1)	N = 50 (11.1)	<0.001
Age ≥31	N = 69 (55.2)	N = 16 (12.8)	N = 35 (28.0)	N = 5 (4.0)	

align with the focus of the healthcare system on primary prevention. Religious and cultural barriers were the least significant, indicating widespread public acceptance of sauna use.

The most significant barriers to reducing sauna visits were a lack of motivation and time constraints, which were likely linked to poor knowledge of the health benefits of sauna. Over 50% of the participants were unaware of any cardiovascular benefits and 79.3% were unaware of the link between sauna use and decreased cardiovascular mortality. This underscores the need for better public education regarding saunas and their cardiac benefits. Greater awareness may correlate with more frequent sauna visits. Improved access could motivate individuals to learn more, with medical professionals playing a key role in promoting sauna use for heart health. This could potentially reduce healthcare costs and support workforce well-being.

Regarding sex differences, male participants demonstrated greater awareness of the circulatory benefits of sauna than their female counterparts. This disparity can be explained in two ways. First, the prevalence of cardiovascular disorders is higher among men in the KSA (1.9%) than among women (1.4%) [15]. This higher incidence may prompt men to seek more information on the topic and take preventive measures. Second, the availability of saunas in gyms, which are more accessible to men in the KSA, may have contributed to this awareness. Daily smokers displayed greater awareness of knowledge parameters. This may be attributed to the higher likelihood of unplanned doctor visits, particularly among those with diabetes, which often leads to more discussions with

physicians regarding cardiovascular health. Additionally, participants aged ≥31 years showed a better understanding of the need to consult a cardiologist before using saunas. This awareness could stem from increased research and education on the topic, as well as more frequent cardiology visits. This is consistent with the observation that the average age of onset for cardiovascular disease is 64.5 years in men and 70.3 years in women [17]. Ease of access, personal enjoyment, social pressure and knowledge of general health benefits were the major motivators for participants aged ≥31 years. This may be related to the statistically significant relationship this age group and consulting a cardiologist before using saunas, as well as the increasing priority placed on this activity with age.

Financial barriers were significant for participants aged ≤30 years, likely because of their early careers or ongoing education. Lack of access owing to distance was another key obstacle, aligning with the financial challenges in this group, as sauna use was not a priority. Relaxation was a major motivator for this age group, indicating that younger individuals saw saunas more as a stress-relief activity than a health measure. Improving the accessibility of saunas and public knowledge can enhance health outcomes. Future efforts should focus on addressing these barriers and leveraging motivators to promote saunas in preventive health care.

This study had some limitations. Convenience sampling was used, which led to an incomplete representation of the Saudi population. The study design also prohibited the establishment of a causal relationship between the variables assessed. Further studies are warranted to

emphasize the different age groups and regions of the country to provide more information on this health intervention.

CONCLUSIONS

This study highlights the underutilization of saunas in the KSA, with over 75% of participants not using saunas and half being unaware of their cardiovascular benefits, particularly the reduced cardiovascular mortality from their regular use. Men and smokers were more aware of circulatory benefits, suggesting that targeted education may help. Personal enjoyment and free time were key motivators, indicating that saunas were viewed more as leisure tools than as health tools. Barriers, such as lack of time, motivation, finances and low awareness of health benefits, call for public health strategies. Increasing sauna use requires accessible facilities and clear educational campaigns on its health benefits.

Ethical Approval

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of KAUH (protocol code 418-23 and date of approval 20, 09, 2023). Informed consent was obtained from all subjects involved in the study.

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