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SAUDI ARABIAN AWARENESS OF LOUD NOISES, EAR HEALTH, AND NOISE-INDUCED HEARING LOSS

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ABSTRACT

The detrimental effects of loud noises on ear health and the subsequent development of noise-induced hearing loss (NIHL) have become a growing concern in today's society. Despite the availability of ear protection devices, there needs to be more knowledge about their importance and the risks associated with noise exposure. The main objective of this study is to assess the knowledge and awareness level among the Saudi Arabian population regarding loud noises and their impact on the ear, specifically focusing on noise-induced hearing loss (NIHL). This study used a cross-sectional design and an electronic questionnaire as the primary data collection tool. It was conducted in Saudi Arabia. The sample recruited from various settings, including occupational and recreational noise exposure scenarios. The study included 964 participants, the majority of them falling within the 20-30 age bracket (40.0%), followed by those aged 31-40 (16.3%). 56.1% were females and 43.9% males. 5.2% of participants had good knowledge of loud noises and their impact on ear and noise-induced hearing loss, 19.7% had a moderate knowledge score, and 75.1% had a poor knowledge score. As for attitude, the majority of responses 55.8% indicated a neutral attitude, 19.8% had a positive attitude and 24.4% had a negative attitude. Our study shows poor awareness and negative attitude from the Saudi population towards loud noises and their impact on ear and noise-induced hearing loss. Knowledge scores were significantly associated with participants' occupations.

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Introduction

The detrimental effects of loud noises on ear health and the subsequent development of noise-induced hearing loss (NIHL) have become a growing concern in today's society.

Hearing loss is a major global disability that affects a significant portion of the population and is expected to increase with age. This condition can have a negative impact on one's quality of life, leading to social isolation, workplace challenges, and negative effects on psychological, social, and economic well-being [1].

Noise-induced hearing loss (NIHL) is a persistent hearing impairment brought on by prolonged exposure to loud noise, either in short bursts or continuously, affecting individuals and society [2].

This results in the degeneration of auditory nerve fibers due to the damage of cochlear hair cells and supporting cells [3]. The impact of noise on hearing loss is influenced by how long and intense the exposure is and the noise type. NIHL refers to a

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decrease in hearing ability, partially or completely, in one or both ears. One of the most prevalent occupational hazards that can negatively affect the hearing system is exposure to Occupational noise for extended periods of time [4].
Excessive noise exposure can lead to various auditory and non-auditory health effects. It is a major avoidable factor responsible for permanent hearing loss on a global scale. Such exposure can also bring about psychological, physiological, and biochemical changes in the body [5].
NIHL has been a recognized concern for hearing loss, predating modern data collection methods and scientific standards. Earplugs were first patented in 1864. During the Industrial Revolution in the United States, workers involved in creating engines that powered transportation and industry experienced hearing loss, leading to the term "boilermaker's disease" being used to describe NIHL [6].
NIHL, which often impairs speech perception and functional hearing among military personnel and fighter pilots, is the second-most common impairment associated with service. This is particularly true when background noise is loud [7]. According to estimates from the World Health Organization, exposure to loud noises continues to put billions of people at risk for NIHL [8].
According to previous studies, one study was conducted by Saad M. Alharthi. Showed that there was a high prevalence of hearing problems in Makkah, Saudi Arabia. Most participants understood the risk factors linked to NIHL [9]. Another showed that the participants were aware of the negative implications of listening to music at more significant volumes. However, they were unaware of hearing care professionals. One of this study's key findings is that there is a lack of information regarding ear protection devices. Users of portable entertainment players were at higher risk of tinnitus, vertigo, headaches, and poor sleep quality [10].
A study was published in 2019 on the knowledge, practice, and attitude of dental students and practitioners in Riyadh. Scores were weak for knowledge and practice and average for attitude. Many factors affected their scores regarding NIHL [11].
The results of these studies show the need for action by the relevant authorities and institutes to enhance public knowledge of NIHL, as it was shown that there is an apparent lack of knowledge about the importance of using earplugs and hearing protection [12].
For several reasons, it is crucial to assess the general public's understanding of Saudi Arabia:
Public Health Concern: An earlier study performed a noise assessment at the industries in Saudi Arabia's Eastern Province to ascertain the occupational noise exposure levels among the workers. They stated that 75% of the employees were exposed to noise levels over the 85 dB(A) recommended exposure limit (REL) of the National Institute for Occupational Safety and Health (NIOSH), as well as that the overall noise levels observed at the two plants varied from 72 to 102 dB(A). So, public health interventions and educational programs can be tailored to address the potential obstacle [13].
According to the WHO, 1.1 billion young people globally may be at risk for NIHL due to their use of personal audio systems (PAS) and their exposure to amplified music at concerts, pubs, and other public events. Therefore, by assessing the knowledge and awareness level of the population of Saudi Arabia specifically, authorities can design effective hearing health promotion campaigns to educate individuals about the importance of protecting their hearing prevalence [14].
Hearing Health Promotion: Saudi Arabia, like many other countries, is experiencing an increasing prevalence of hearing loss due to various factors, including exposure to loud noises. By assessing the knowledge and awareness level of the population, authorities can design effective hearing health promotion campaigns to educate individuals about the importance of protecting their hearing.
This study aimed to assess the knowledge and awareness level among the Saudi Arabian population about Loud noises and their impact on ear and noise-induced hearing loss.

Materials and Methods

Study Design
This study was conducted as a cross-sectional study that includes the analysis of an electronic questionnaire. It was conducted in Saudi Arabia.

Study Setting: Participants, Recruitment, and Sampling Procedure
Utilizing a validated version of a self-administered questionnaire in the Arabic and English languages, participants' demographics, history of hearing loss, risk factors, beliefs, and knowledge about NIHL were examined, as well as the general population's awareness of NIHL in Saudi Arabia.

Inclusion and Exclusion Criteria
Adolescent & adult Saudi residents who have been exposed to loud noises either occupationally or recreationally with various levels of educational backgrounds and who are willing to consent were included. Non-Saudi residents with pre-existing hearing loss or any other hearing impairments and a history of ear-related diseases that may affect their hearing and individuals unable to understand or communicate effectively in the language used for data collection were excluded.

Sample Size
(Raosoft, Inc., Seattle, WA, USA) estimated the sample size at 384 people using the following formula:

$$n = P(1-P) * Z\alpha\ 2 \quad (1)$$

/ d 2 with a confidence level of 95%.
n: Calculated sample size
Z: The z-value for the selected confidence level (1- a) = 1.96.
P: An estimated knowledge
Q: (1 – 0.50) = 50%, i.e., 0.50
D: The maximum acceptable error = 0.05.
So, the calculated minimum sample size was:
n = (1.96)2 X 0.50 X 0.50/ (0.05) 2 = 384.

Method for Data Collection and Instrument (Data Collection Technique and Tools)
A structured questionnaire was used as the main data-collecting instrument for the study, which sought to determine the population's level of knowledge and awareness about loud noises, their effects on the ear, and noise-induced hearing loss (NIHL). This questionnaire's design and development followed a methodical process that drew inspiration from pertinent domestic and international studies. The final questionnaire was divided into sections that focused on various aspects of knowledge and awareness surrounding the subject.

Section 1: Characteristics of the Socioeconomic Background
The purpose of the questionnaire's first portion was to collect key demographic and socioeconomic data from the participants. Age, gender, education, employment, and location were among the information provided. These traits are crucial when evaluating possible variances in knowledge and awareness based on various sociodemographic parameters.

Section 2: Exposure To and Knowledge of Noise
The second half of the discussion was on the participant's own experiences and awareness of loud noises around them. The questions aimed to extract information regarding the sources of loud noises people experience regularly, the frequency of exposure, and how they perceive the dangers to their hearing health.

Section 3: Understanding Hearing Loss Caused By Noise
Participants' understanding of noise-induced hearing loss was explored in this section. It includes questions about their knowledge of the etiology, symptoms, and treatment options for NIHL. The questions were designed to test the participant's knowledge of the physiological effects of loud sounds on hearing and any potential long-term effects.

Section 4: Knowledge Evaluation
In the fourth portion, participants were asked a series of questions to gauge their awareness of the facts around safe noise exposure limits, typical scenarios that can result in NIHL, and the significance of wearing hearing protection in noisy locations. This section was designed to highlight participants' knowledge gaps and any potential misconceptions they could have.

Section 5: Individual Habits and Beliefs
The final component was focused on the individual behaviors and viewpoints of the participants regarding noise exposure. Asking about their use of hearing protection devices, their behavior in noisy settings, and whether they were open to forming better behaviors to prevent NIHL.

Data Gathering With a Survey Questionnaire
Medical students and other qualified surveyors gave the subjects the structured questionnaire in order to collect the relevant data. The survey approach made it possible to gather data consistently, guaranteeing that each participant answers the same set of questions. Additionally, by organizing the data gathered and permitting quantitative comparisons, the use of a questionnaire made the analysis simple.

Scoring System
Overall, twenty-four statements were used to assess the level of knowledge and attitude about loud noises, their effects on the ear, and noise-induced hearing loss (NIHL).

Knowledge Score
Seventeen statements for knowledge scoring, one point was given for correct answers, and zero points for incorrect answers or I don't know. The scoring system was divided as follows: ≥ 14 for a high level of knowledge, 11-13 for a medium level of knowledge, and ≤ 10 for a low level of knowledge.

Attitude Score

A total of seven statements were used to assess the attitude towards loud noises, their effects on the ear, and noise-induced hearing loss (NIHL), using six statements for each one. A six-point Likert scale was used and regarded from 5-0 as a strongly agree to strongly disagree. The score ≥ 28 considered a positive attitude, 22-27 considered a neutral attitude, and ≤ 21 considered a negative attitude.

The second section is to determine the participant's own experiences and awareness of loud noises around them. Subsequently, respondents' awareness was divided into three categories: low awareness (0–10), average awareness (11-13), and good awareness (14-17).

The third section is to determine the participants' understanding of noise-induced hearing loss. Subsequently, respondents' understanding was divided into three categories: low understanding (0–10), average understanding (11-13), and good understanding (14-17).

The fourth section is to highlight participants' knowledge gaps and any potential misconceptions they could have. Subsequently, respondents' knowledge was divided into three categories: low knowledge (0–10), average knowledge (11-13), and good knowledge (14-17).

The fifth section is to determine the individual attitudes and viewpoints of the participants regarding noise exposure. Subsequently, respondents' attitude was divided into three categories: low attitude (0–21), average attitude (22-27), and good attitude (28-35).

Pilot test: The questionnaire was distributed to 15 individuals and they were asked to fill them out. It was done to test the questionnaire's simplicity and the study's feasibility. Data from the pilot study was excluded from the final data of the study.

Analyzes and Entry Method

The data was gathered using Google Forms. Data was transferred into the Microsoft Office Excel 2016 Software. Then, data was analyzed using the 28th version Statistical Package of Social Science Software program (IBM SPSS Statistics 28).

Results and Discussion

The study included 964 participants, the majority of them falling within the 20-30 age bracket (40.0%), followed by those aged 31-40 (16.3%) and 41-50 (16.4%). Notably, individuals aged less than 20 and over 60 constitute 11.6% and 4.7% of the sample, respectively, indicating a broad age range. 56.1% were females and 43.9% males. The highest proportion of participants live in the East (34.3%) and the lowest in the North (3.5%). 53.6% of participants hold a bachelor's degree and 24.4% have high school or lower education. Occupation diversity is evident, with full-time employees constituting the largest group (36.6%), followed by students (32.9%) and those not employed (13.7%). Annual income distribution reveals a wide range of financial statuses, with 43.4% earning less than 5,000 Saudi Riyals and 22.0% earning over 15,000. The marital status distribution indicates a relatively even split between married and single individuals, each accounting for 47.7% of the sample, and the remainder was split between (3.3%) divorced and (1.2%) widowed.

Table 1. Sociodemographic characteristics of participants (n=964)

Parameter		No.	Percent
Age	Less than 20	112	11.6
	20- 30	386	40.0
	31- 40	157	16.3
	41- 50	158	16.4
	51 - 60	106	11.0
	More than 60	45	4.7
Gender	Male	423	43.9
	Female	541	56.1
Location	East	331	34.3
	Middle	268	27.8
	North	34	3.5
	South	87	9.0
	West	244	25.3
Education Level	Illiterate	4	.4
	High school or less	235	24.4
	diploma	124	12.9
	Bachelor's degree	517	53.6
	Master's degree	46	4.8

	Doctorate or higher	38	3.9
Occupation	Part-time employee	21	2.2
	Full-time employee	353	36.6
	Not employed	132	13.7
	Retired	102	10.6
	student	317	32.9
	Other	39	4.0
Annual Income (in Saudi Riyals)	Less than 5,000	418	43.4
	5,000 - 10,000	210	21.8
	11,000 - 15,000	124	12.9
	Over 15,000	212	22.0
Marital Status	Married	460	47.7
	Single	460	47.7
	Divorced	32	3.3
	Widowed	12	1.2

According to **Table 2**, the majority of respondents recognize the importance of using earplugs or earmuffs to safeguard their hearing, with 47.5% opting for earplugs and 27.8% for earmuffs. Additionally, an overwhelming 94.5% believe that high sound levels can indeed affect hearing. Living or working in a noisy environment was acknowledged as a potential risk factor for hearing health by 89.5% of respondents, highlighting the widespread awareness of this issue. Furthermore, 82.4% understand that noise can damage hearing at any age. The survey also revealed that the inner ear is recognized as the part most affected by noise, with 69.1% of respondents correctly identifying this. However, it's concerning that 24.0% indicated not knowing which part of the ear is most affected. In terms of hearing evaluations, a significant portion of respondents (59.8%) reported never having had a hearing test, indicating a potential gap in proactive hearing health management. Encouragingly, 18.3% have had a hearing evaluation at least once.

Table 2. Knowledge of participants of noises and their impact on ear and noise-induced hearing loss (n=964)

Parameter		**No.**	**Percent**
The best strategy to keep your hearing safe from noise is to use...	Earplugs	458	47.5
	Earmuffs	268	27.8
	I don't know	238	24.7
Do high sound levels affect hearing?	Yes	911	94.5
	No	21	2.2
	I don't know	32	3.3
Does living or working in a noisy environment affect your hearing?	Yes	863	89.5
	No	48	5.0
	I don't know	53	5.5
Noise in general will only harm your hearing if...	Noise will damage your hearing at any age	794	82.4
	You are over 40 years old	78	8.1
	I don't know	92	9.5
What part of the ear is most affected by noise?	External ear	67	7.0
	inner ear	666	69.1
	I don't know	231	24.0
Have you ever had a hearing evaluation (hearing test)?	Once	176	18.3
	2-3 times	77	8.0
	4-5 times	23	2.4
	More than 5 times	28	2.9
	never	576	59.8
	not sure	84	8.7

Table 3 shows the public's understanding of noise-induced hearing loss. Firstly, the perception that exposure to loud sounds for a long time is the main cause of hearing loss is a prevalent belief, with 65.5% of respondents indicating this. The second question addresses whether ringing in the ears is a common symptom of hearing loss caused by loud sounds. The responses reveal that only 54.8% of participants correctly associate ringing in the ears with noise-induced hearing loss. Moving on to the treatment options for hearing loss caused by loud sounds, it is concerning that only 50.7% of respondents recognize hearing aids as a common treatment. Furthermore, the data shows that there is confusion regarding the timing of noise-induced hearing loss, with 42.1% of participants believing that it occurs immediately after exposure to loud sounds. The survey also addresses the prevalence of noise-induced hearing loss in Saudi Arabia, with 44.3% of respondents acknowledging it as a common problem. Another important aspect is the misconception that noise-induced hearing loss usually affects only one ear, with 42.1% of respondents holding this belief. The data also reveals that 70.0% of participants recognize that intermittent exposure to high-frequency noise for long periods can lead to hearing loss. While 68.5% of respondents correctly associate these activities with potential hearing impairment. One misconception that stands out is the belief that ear discharge is a symptom of hearing loss, with 47.1% of participants indicating this. Furthermore, the survey results indicate a lack of understanding regarding the potential for complete hearing recovery through the avoidance of noise after experiencing hearing loss. Only 13.8% of respondents believe this to be true. The data also reveals misconceptions about the treatment of advanced hearing loss, with 54.6% of participants believing that it can be treated surgically. Lastly, the survey indicates a lack of awareness about the prevention of noise-induced hearing loss, with only 9.3% of respondents recognizing that it cannot be prevented by vaccines.

Table 3. Participants's understanding of noise-induced hearing loss (n=964)

	Correct	Wrong	Don't know
Is exposure to loud sounds for a long time the main cause of hearing loss?	631 65.5%	128 13.3%	205 21.3%
Is ringing in the ears (eardrums) a common symptom of hearing loss caused by loud sounds (noise)?	528 54.8%	69 7.2%	367 38.1%
Are hearing aids a common treatment option for hearing loss caused by loud sounds?	489 50.7%	103 10.7%	372 38.6%
Does noise-induced hearing loss usually occur immediately after exposure to loud sounds?	287 29.8%	406 42.1%	271 28.1%
Do you think noise-induced hearing loss is a common problem in Saudi Arabia?	384 39.8%	153 15.9%	427 44.3%
Does noise-induced hearing loss usually affect only one ear?	187 19.4%	406 42.1%	371 38.5%
Does intermittent exposure to high-frequency noise for long periods of time lead to hearing loss?	675 70.0%	55 5.7%	234 24.3%
Can activities or hobbies such as archery and listening to loud music lead to hearing loss?	660 68.5%	121 12.6%	183 19.0%
Is ear discharge a symptom of hearing loss?	204 21.2%	306 31.7%	454 47.1%
Does the patient's avoidance of noise after hearing loss lead to complete hearing recovery?	133 13.8%	391 40.6%	440 45.6%
Can advanced hearing loss be treated surgically?	320 33.2%	118 12.2%	526 54.6%
Can noise-induced hearing loss be prevented by vaccines?	90 9.3%	443 46.0%	431 44.7%

Table 4 indicates that a significant percentage of respondents agree that listening to music at very high volume levels can be harmful to hearing, with 45.1% strongly agreeing and 36.1% agreeing. Similarly, 39.8% strongly agree and 41.3% agree that excessive exposure to noise can cause hearing loss. The use of earplugs to avoid noise-induced hearing loss was seen as necessary by 20.9% of respondents and agreed upon by 35.1%. Furthermore, 44.5% of respondents believe it is necessary to take breaks or find quiet places in noisy areas to protect their hearing. On the other hand, 21.9% of respondents strongly disagree and 27.1% disagree that noise in their workplace bothers them. Finally, almost half of the respondents (47.4%) strongly agree that ear examinations should be performed by a doctor to detect noise-induced hearing loss.

Table 4. Participants' attitude towards loud noises and its impact on ear and noise-induced hearing loss (n=964)

	Strongly Agree	Agree	Agree less	Disagree less	Disagree	Strongly Disagree
Listening to music at very high volume levels can be harmful to hearing	435 45.1%	348 36.1%	112 11.6%	31 3.2%	24 2.5%	14 1.5%
Excessive exposure to noise can cause hearing loss	384 39.8%	398 41.3%	117 12.1%	29 3.0%	17 1.8%	19 2.0%
Earplugs should be used to avoid noise-induced hearing loss	201	338	276	86	36	27

	20.9%	35.1%	28.6%	8.9%	3.7%	2.8%
It is necessary for me to take breaks or find quiet places in noisy areas to protect my hearing	429 44.5%	370 38.4%	100 10.4%	32 3.3%	20 2.1%	13 1.3%
Noise in my workplace doesn't bother me	86 8.9%	161 16.7%	128 13.3%	117 12.1%	211 21.9%	261 27.1%
Ear examinations should be performed by a doctor to detect noise-induced hearing loss	457 47.4%	372 38.6%	74 7.7%	22 2.3%	22 2.3%	17 1.8%

According to **Figure 1**, 5.2% of participants had a good knowledge score, 19.7% had a moderate knowledge score, and 75.1% had a poor knowledge score. The majority of responses 55.8% indicate a neutral attitude, 19.8% had a positive attitude and 24.4% had a negative attitude.

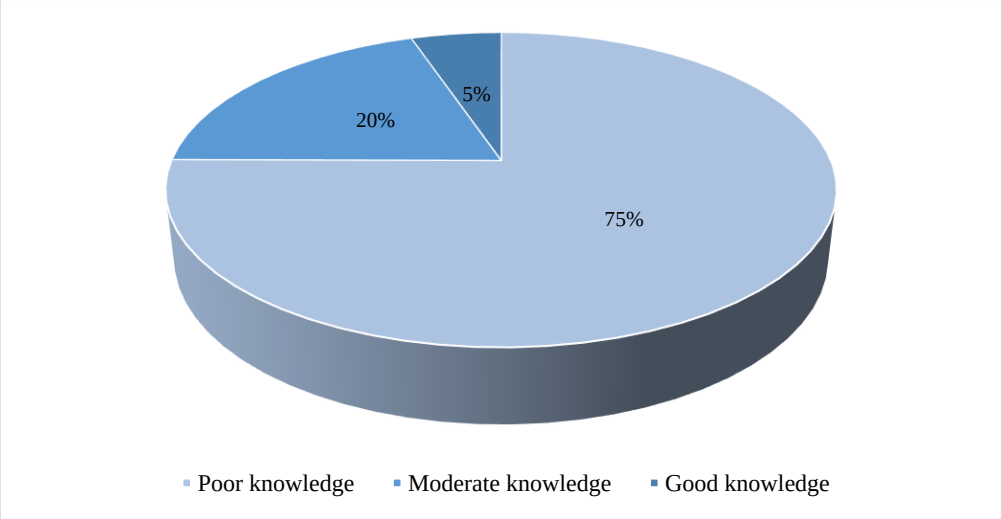

Figure 1. Participants' knowledge scores of loud noises, ear health, and noise-induced hearing loss

As illustrated in **Table 5**, it is evident that the majority of respondents fall within the 20-30 and 31-40 age groups, comprising 40.0% and 16.3% of the total sample, respectively. Interestingly, the percentage of individuals with good knowledge appears to decrease with age, with the highest proportion of individuals with good knowledge observed in the 20-30 age group. However, it is important to note that the differences in knowledge scores across age groups were not statistically significant (P = 0.265). Furthermore, the analysis of knowledge scores by marital status reveals that the majority of respondents are either single or married, with 47.7% of the total sample falling into each category. The distribution of knowledge scores among different marital status groups does not appear to exhibit significant variations, as indicated by the P value of 0.547. Gender-based analysis of knowledge scores demonstrates a slightly higher proportion of females with good knowledge compared to males (11.1% vs. 8.6%, respectively). However, the difference in knowledge scores between genders was not statistically significant (P = 0.998). Geographically, the distribution of knowledge scores varies across different regions, with the highest proportion of individuals with good knowledge residing in the Middle region (5.8%). However, the differences in knowledge scores across regions were not statistically significant (P = 0.216). Education level also plays a crucial role in determining knowledge scores, with individuals holding a Bachelor's degree representing the largest proportion of respondents with good knowledge (39.8%). However, the differences in knowledge scores across education levels were not statistically significant (P = 0.365). Occupation-based analysis of knowledge scores indicates that individuals in full-time jobs exhibit the highest proportion of good knowledge (8.3%). The differences in knowledge scores across different occupations were found to be statistically significant (P = 0.008). Finally, the distribution of knowledge scores by annual income shows that individuals with an annual income of over 15,000 Saudi Riyals have the highest proportion of good knowledge (5.6%). However, similar to other variables, the differences in knowledge scores across income levels were not statistically significant (P = 0.185).

Table 5. Participants' knowledge scores in association with their sociodemographic characters (n=964)

		Knowledge score			**Total (N=964)**	**P value**
		Good knowledge	**Moderate knowledge**	**Poor knowledge**		
Age	less than 20	10	16	86	112	0.265
		1.0%	1.7%	8.9%	11.6%	
	20 -30	19	72	295	386	
		2.0%	7.5%	30.6%	40.0%	
	31 - 40	8	42	107	157	

		0.8%	4.4%	11.1%	16.3%	
	41- 50	5	28	125	158	
		0.5%	2.9%	13.0%	16.4%	
	51- 60	6	22	78	106	
		0.6%	2.3%	8.1%	11.0%	
	more than 60	2	10	33	45	
		0.2%	1.0%	3.4%	4.7%	
Marital status	Single	27	81	352	460	0.547
		2.8%	8.4%	36.5%	47.7%	
	Married	21	102	337	460	
		2.2%	10.6%	35.0%	47.7%	
	Divorced	1	6	25	32	
		0.1%	0.6%	2.6%	3.3%	
	widow	1	1	10	12	
		0.1%	0.1%	1.0%	1.2%	
Gender	Male	22	83	318	423	0.998
		2.3%	8.6%	33.0%	43.9%	
	Female	28	107	406	541	
		2.9%	11.1%	42.1%	56.1%	
Location	East	11	77	243	331	0.216
		1.1%	8.0%	25.2%	34.3%	
	Middle	23	56	189	268	
		2.4%	5.8%	19.6%	27.8%	
	North	4	6	24	34	
		0.4%	0.6%	2.5%	3.5%	
	South	3	12	72	87	
		0.3%	1.2%	7.5%	9.0%	
	West	9	39	196	244	
		0.9%	4.0%	20.3%	25.3%	
Education Level	Illiterate	0	2	2	4	0.365
		0.0%	0.2%	0.2%	0.4%	
	Secondary	16	42	177	235	
		1.7%	4.4%	18.4%	24.4%	
	Diploma	4	19	101	124	
		0.4%	2.0%	10.5%	12.9%	
	Bachelor	25	108	384	517	
		2.6%	11.2%	39.8%	53.6%	
	Master	1	11	34	46	
		0.1%	1.1%	3.5%	4.8%	
	Doctorate or higher	4	8	26	38	
		0.4%	0.8%	2.7%	3.9%	
Occupation	Part-time job	1	6	14	21	0.008
		0.1%	0.6%	1.5%	2.2%	
	Full-time job	15	80	258	353	
		1.6%	8.3%	26.8%	36.6%	
	Student	19	50	248	317	
		2.0%	5.2%	25.7%	32.9%	
	Retired	6	17	79	102	

		0.6%	1.8%	8.2%	10.6%	
	Not working	8	30	94	132	
		0.8%	3.1%	9.8%	13.7%	
	Others	1	7	31	39	
		0.1%	0.7%	3.2%	4.0%	
Annual Income (in Saudi Riyals)	Less than 5,000	22	76	320	418	0.185
		2.3%	7.9%	33.2%	43.4%	
	5,000 - 10,000	8	35	167	210	
		0.8%	3.6%	17.3%	21.8%	
	11,000 - 15,000	6	25	93	124	
		0.6%	2.6%	9.6%	12.9%	
	Over 15,000	14	54	144	212	
		1.5%	5.6%	14.9%	22.0%	

The provided data in **Table 6** reveals interesting patterns. Individuals aged 20-30 exhibit the highest percentage of positive attitudes at 6.8%, while those aged 41-50 have the lowest at 3.0%. Furthermore, the statistical significance of these differences is confirmed by the p-value of 0.001, indicating that age does indeed play a role in shaping attitudes. Moving on to marital status, the data showcases how attitudes vary across different relationship statuses. For instance, singles demonstrate a higher prevalence of negative attitudes at 25.1% compared to married individuals at 27.9%. This disparity is also supported by a p-value of 0.001, suggesting that marital status significantly impacts attitudes. Gender-based differences in attitudes are also evident, with males exhibiting a higher proportion of negative attitudes at 10.0% compared to females at 14.4%. The statistical significance of this variation is confirmed by the p-value of 0.001, indicating that gender is a significant factor in shaping attitudes. When considering location, the data indicates that individuals from the East region display the highest percentage of positive attitudes at 7.7%, while those from the North exhibit the lowest at 0.5%. However, the p-value of 0.691 suggests that the differences in attitudes across locations may not be statistically significant. Education level also plays a role in shaping attitudes, with individuals holding a bachelor's degree showing the highest percentage of positive attitudes at 10.4%, while those who are illiterate have the lowest at 0.0%. The statistical significance of these variations is confirmed by the p-value of 0.003, indicating that education level significantly influences attitudes. Occupation is another influential factor, as evidenced by the data. Full-time job holders exhibit the highest proportion of positive attitudes at 8.8%, while part-time job holders have the lowest at 0.5%. The statistical significance of these differences is confirmed by the p-value of 0.001, indicating that occupation significantly impacts attitudes. Finally, annual income in Saudi Riyals also demonstrates a clear association with attitudes. Individuals earning over 15,000 Riyals exhibit the highest percentage of positive attitudes at 6.1%, while those earning less than 5,000 Riyals have the lowest at 6.3%. The statistical significance of these differences is confirmed by the p-value of 0.001, indicating that income level significantly influences attitudes.

Table 6. Participants' attitude scores in association with their sociodemographic characters (n=964)

		Attitude score			**Total (N=964)**	**P value**
		Positive attitude	**Neutral attitude**	**Negative attitude**		
Age	less than 20	11	60	41	112	0.001
		1.1%	6.2%	4.3%	11.6%	
	20 -30	66	210	110	386	
		6.8%	21.8%	11.4%	40.0%	
	31 - 40	43	81	33	157	
		4.5%	8.4%	3.4%	16.3%	
	41- 50	29	96	33	158	
		3.0%	10.0%	3.4%	16.4%	
	51- 60	24	68	14	106	
		2.5%	7.1%	1.5%	11.0%	
	more than 60	18	23	4	45	
		1.9%	2.4%	0.4%	4.7%	
Marital status	Single	71	147	242	460	0.001
		7.4%	15.2%	25.1%	47.7%	
	Married	111	80	269	460	

		11.5%	8.3%	27.9%	47.7%	
	Divorced	9	4	19	32	
		0.9%	0.4%	2.0%	3.3%	
	widow	0	4	8	12	
		0.0%	0.4%	0.8%	1.2%	
Gender	Male	108	219	96	423	0.001
		11.2%	22.7%	10.0%	43.9%	
	Female	83	319	139	541	
		8.6%	33.1%	14.4%	56.1%	
Location	East	74	185	72	331	0.691
		7.7%	19.2%	7.5%	34.3%	
	Middle	51	151	66	268	
		5.3%	15.7%	6.8%	27.8%	
	North	5	21	8	34	
		0.5%	2.2%	0.8%	3.5%	
	South	13	47	27	87	
		1.3%	4.9%	2.8%	9.0%	
	West	48	134	62	244	
		5.0%	13.9%	6.4%	25.3%	
Education Level	Illiterate	0	0	4	4	0.003
		0.0%	0.0%	0.4%	0.4%	
	Secondary	35	135	65	235	
		3.6%	14.0%	6.7%	24.4%	
	Diploma	34	65	25	124	
		3.5%	6.7%	2.6%	12.9%	
	Bachelor	100	291	126	517	
		10.4%	30.2%	13.1%	53.6%	
	Master	10	29	7	46	
		1.0%	3.0%	0.7%	4.8%	
	Doctorate or higher	12	18	8	38	
		1.2%	1.9%	0.8%	3.9%	
Occupation	Part-time job	5	9	7	21	0.001
		0.5%	0.9%	0.7%	2.2%	
	Full-time job	85	197	71	353	
		8.8%	20.4%	7.4%	36.6%	
	Student	39	177	101	317	
		4.0%	18.4%	10.5%	32.9%	
	Retired	31	60	11	102	
		3.2%	6.2%	1.1%	10.6%	
	Not working	25	73	34	132	
		2.6%	7.6%	3.5%	13.7%	
	Others	6	22	11	39	
		0.6%	2.3%	1.1%	4.0%	
Annual Income (in Saudi Riyals)	Less than 5,000	61	236	121	418	0.001
		6.3%	24.5%	12.6%	43.4%	
	5,000 - 10,000	38	118	54	210	
		3.9%	12.2%	5.6%	21.8%	
	11,000 - 15,000	33	66	25	124	

		3.4%	6.8%	2.6%	12.9%
	Over 15,000	59	118	35	212
		6.1%	12.2%	3.6%	22.0%

Noise-induced hearing loss is a significant public health concern, with millions of people around the world experiencing some degree of hearing impairment as a result of exposure to loud noises. This type of hearing loss is entirely preventable, making it all the more important to educate the public about the steps they can take to protect their hearing [4]. This study aimed to assess the knowledge and awareness level of the Saudi Arabian population about loud noises and their impact on ear and noise-induced hearing loss.

The literature on awareness and attitude of loud noises, ear health, and noise-induced hearing loss in Saudi Arabia has provided valuable insights into the current state of knowledge and understanding among the population. Several studies have been conducted to assess the level of awareness and attitude toward loud noises and their impact on ear health and hearing loss.

Based on our results, it can be inferred that a significant proportion of the participants possess poor knowledge regarding loud noises and their impact on ear and noise-induced hearing loss. The statistics indicate that only a mere 5.2% of the participants have a good knowledge score, while a larger percentage of 19.7% have a moderate knowledge score. However, the majority of the participants, accounting for 75.1%, exhibit a poor knowledge score. A cross-sectional study done in Saudi Arabia published a survey in 2017 that aimed to evaluate the participant's beliefs and knowledge regarding NIHL. With 739 responses, 25% reported having mild-to-severe hearing loss. Uniquely, most of them were males and used a volume level of more than 80%. Nonetheless, approximately 75% of participants preferred reducing the volume level over reducing the number of sessions per day for listening [15]. A study conducted by Alzhrani *et al*. (2018) aimed to assess the awareness and attitudes of university students in Saudi Arabia towards noise-induced hearing loss reported a significant proportion of the students had limited knowledge about the potential risks of exposure to loud noises and their impact on their hearing health. Furthermore, the study also revealed that there was a lack of awareness about the importance of preventive measures such as using ear protection devices in noisy environments [3]. Similarly, another study by Alshehri *et al*. (2019) focused on assessing the awareness and attitudes of healthcare professionals in Saudi Arabia towards noise-induced hearing loss. The findings of the study highlighted the need for increased awareness and education among healthcare professionals about the potential risks of noise-induced hearing loss and the importance of early intervention and preventive measures [16]. Furthermore, a study by Alsubaie *et al*. (2019) investigated the awareness and attitudes of the general population in Saudi Arabia towards ear health and the potential impact of loud noises on hearing. The results of the study indicated that there was a lack of awareness about the potential risks of noise-induced hearing loss and the importance of regular hearing screenings and preventive measures [17]. Overall, the literature on awareness and attitude of loud noises, ear health, and noise-induced hearing loss in Saudi Arabia has highlighted the need for increased awareness and education among the population, including university students, healthcare professionals, and the general public.

Regarding attitude, the majority of our study participants 55.8% indicated a neutral attitude, 19.8% had a positive attitude and 24.4% had a negative attitude. Similarly, a study by Alsaab *et al*. (2021) explored the attitudes of Saudi university students towards loud noises and their impact on ear health. The findings revealed that a significant proportion of the participants were not aware of the potential harm caused by exposure to loud noises. This lack of awareness was attributed to a lack of education and public health campaigns on the importance of protecting one's hearing from excessive noise [18].

One of the most effective ways to prevent noise-induced hearing loss is through the use of hearing protection, such as earplugs or earmuffs, when in noisy environments. This is particularly important for individuals who work in industries with high levels of noise, such as construction or manufacturing. By wearing hearing protection, individuals can significantly reduce their risk of developing hearing loss [5].

In addition to using hearing protection, it is also important for individuals to be mindful of their exposure to loud noises in their everyday lives. This includes being aware of the volume levels when listening to music or using headphones, as well as avoiding prolonged exposure to loud environments, such as concerts or sporting events. By being conscious of their exposure to loud noises, individuals can take proactive steps to protect their hearing and reduce their risk of developing noise-induced hearing loss [7].

Furthermore, individuals need to prioritize their ear health by seeking regular check-ups with an audiologist. Regular hearing screenings can help identify any potential issues early on, allowing for prompt intervention and treatment if necessary. Additionally, individuals should be proactive in addressing any concerns about their hearing, such as ringing in the ears or difficulty understanding speech, as these could be early signs of hearing loss [10].

Conclusion

In conclusion, our study shows poor awareness and negative attitude from the Saudi population towards loud noises and its impact on ear and noise-induced hearing loss. Knowledge scores were significantly associated with participants' occupations. However, attitude scores were significantly associated with participants' age, gender, educational level, and occupation. Raising awareness about the dangers of loud noises and the importance of maintaining good ear health is crucial in preventing noise-induced hearing loss. By adopting an attitude of vigilance and taking proactive steps to protect their hearing, individuals

can significantly reduce their risk of developing hearing impairment. It is our hope that through education and advocacy, we can work towards a future where noise-induced hearing loss is a rare occurrence, and where individuals can enjoy healthy hearing for years to come.

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