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Knowledge and attitudes of school teachers toward hearing problems with students in general elementary schools in Makkah, 2019

Abdullah F. AlOtaibi[1]✉, **Hisham Abdulsalam Bashawri**[2], **Hind Furaij AlOtaibi**[3], **Ali H. Alqahtani**[4], **Ahmed S. Alzahrani**[5], **Moteab Sayer AlOtaibi**[6]

[1]Public Health Administration, Ministry of Health, Makkah, Saudi Arabia
[2]Consultant Family and Public Health, Ministry of Health, Makkah, Saudi Arabia
[3]Family Medicine, Ministry of Health, Jeddah, Saudi Arabia
[4]Public Health Administration, Ministry of Health, Jeddah, Saudi Arabia
[5]Preventive medicine department, Armed Forced Hospital, Medina, Saudi Arabia
[6]Community Medicine (Preventive Medicine), Ministry of National Guard, Saudi Arabia

✉**Corresponding author:**
Public Health Administration, Ministry of Health,
Makkah, Saudi Arabia
Email: a.f.1990tb@gmail.com

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ABSTRACT

Background: Schoolteachers can play a significant role in maintaining and improving student's health. Hearing loss causes delays in speech and language, which often result in poor school performance. *Objectives:* To identify the level of knowledge and attitude of elementary school teachers in Makkah toward hearing problems in children in the classroom setting. *Subjects and methods:* Analytical cross-sectional study was conducted from May 2019 to December 2019 among 390 of elementary schoolteachers working in governmental schools, in Makkah. Self-administered Arabic questionnaire was used. It includes demographic and professional criteria, knowledge of teachers regarding children with hearing problems and their attitudes towards children with hearing problems. *Results:* The study included 390 teachers. Their age ranged from 26 to 60. Only 4.9% expressed good level of knowledge about hearing problems. Younger, lowest income, more qualified teachers, computer sciences and special education teachers, those having a degree in special education, lower experienced, had ≤20 students in a class, teaching students with hearing problems, who had currently students with hearing problems, and had currently students using hearing aids were more knowledgeable about children`s hearing problems compared to their counterparts. Overall, 14.6% of teachers had positive attitude towards children with hearing problems. The most obstacles the teachers feel that the students with hearing loss may suffer in classroom were bullying/ignorance, communications, and educational process. Most of the teachers recommended -as the most appropriate educational placement for DHH students-residential institute and special schools for deaf students. *Conclusion:* Knowledge and attitude of elementary school teachers in Makkah regarding hearing problems was mostly poor-intermediate.

Keywords: schoolteachers, student's health, hearing problems

1. INTRODUCTION

Literature review and background

Schoolteachers are an important front-line who can play a significant role in maintaining and improving student's health, especially the young. Further, they should be acquainted with the disease itself, its consequences in its common essential aspects (Plisková and Snopek, 2018). For children, especially hearing is a key to learning spoken language, performing academically, and engaging socially. Hearing difficulty poses a barrier to education and social integration (Organization, 2010). Worldwide, around 360 million people (5% of the world's population) live with hearing loss (HL) is consider disabling; of these, nearly 32 million are children. Around 60% of childhood HL could be avoided through adequate prevention (Organization, 2010). Unfortunately, since poor academic performance accompanied by inattention and sometimes poor behavior, children HL are often misidentified as having learning disabilities such as Attention deficit –hyperactivity disorder (ADHD) (Bagatto *et al.*, 2011).

Definitions and Terminology

Hearing loss: involves the volume of sounds that can understand without amplification. It classifies as borderline or slight, mild, moderate, severe or profound.

"Deaf": it applies to whose hearing loss is extensive that he cannot communicate with another person using only voice (Organization, 2010; Vos *et al.*, 2019).

From the medical viewpoint too, if the average of the frequencies at 500Hz, 1000Hz, and 2000Hz is 90dB or higher, the person is considered deaf (Goldsworthy and Markle, 2019).

Hard of hearing refers to an individual who has a mild-to-moderate HL.

Hearing impairment (HI): It represents a broad term used to describe an individual with any degree of HL.

Overview of the elementary school system in KSA

The elementary school network in Makkah is part of a vast educational system accommodating all children mandated educational demand. Geographically, Makkah schools are distributed over five major districts (North, South, East, West; Central) in addition to three other sub-districts (Bahra, Al Jumoom, Al Kamel) (Ministry of Education- General Directorate of Education, 2014). As of 2018, the current total number of Makkah elementary schools reached 666 schools with total 214235 students, and 15046 teachers.

Aim of the study

To identify the level of knowledge and attitude of elementary school teachers in Makkah toward hearing problems in children in the classroom setting.

Objectives

1- To measure score level knowledge and attitude of elementary schoolteachers toward children with hearing problems in general schools in Makkah. 2019

2- To compare knowledge and attitude level of elementary schoolteachers toward children with hearing problems among deferent schools in Makkah. 2019.

Secondary objectives

To compare knowledge and attitude between those have special or additional qualification and those not had.

To compare score of knowledge and attitude between male and female schoolteachers

2. METHODOLOGY

Study design: Analytical cross-sectional.

Study period: From May to December 2019.

Study population: Schoolteachers working in governmental elementary schools, in Makkah.

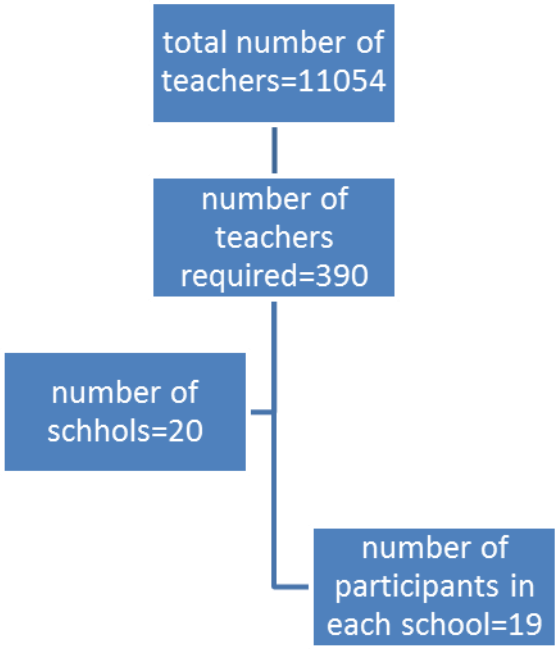

Figure 1: Flow chart of sampling in our study.

Inclusion criteria:

- Being assigned to the school of selection for at least one academic year the time of the study.
- Elementary teachers from both sexes.
- Teachers of all academic specialties taught in the elementary school curriculum.

Exclusion criteria:

- Bahra, Al Jumoom, and Al Kamel sectors.
- Spending less than one academic year in the selected school.
- Temporary or visiting teachers.
- Those with non-teaching activities.

Sample size:

The study sample size "n" calculated by using Epi-Info software (version 7) (given the following assumptions: a) population size (for finite population correction factor or (N) = 100, 0000; hypothesized % frequency of outcome factor in the population (p) = 15% ±5;

confidence limits as % of 100 (absolute ± %) (d)= 5%; design effect (for cluster surveys-DEFF) =1.8. Accordingly, "n" = 353 was obtained. To correct for withdrawal and invalid responses, this sample may be increased by 10% (=353 * 0.1≈ 35), so that a total "n" ≈ 390. Thereby, the number of teachers to randomly select from Makkah primary school network to recruit mounts up to 390 teachers (see figure 1).

Sampling technique:

Simple random sampling technique was used. First, 20 schools will choose randomly, ten schools for boys and another for girls. Second, teachers in the selected schools were invited to the study; from whom the required number per school needed to formulate the total sample cohort will be selected and included in the analysis. Accordingly, the number of teachers choose randomly from administration attendance list, each school equals 19 (390 / 20 = 19), i.e., 19 male teachers from each school and a similar number and distribution for female teachers. Statistics regarding schools shows the following:

- The total number of elementary schools = 447 (225 boys and 222 girls).
- The total number of teachers = 11054 (5675 males, 5397 female). As of 2018, the General Department of Education in Makkah statistics (MOE, 2018)

Data collection tool:

A self-administered questionnaire in the Arabic language (UNESCO, 1994; Antonak and Larrivee, 1995; Busa *et al.*, 2007; Organization, 2010; W Ward, G Marx and Goshorn, 2015; Leal *et al.*, 2016; Liming *et al.*, 2016; Vos *et al.*, 2019). It consists of relevant questions under similar scales addressing study areas of interest such as age, sex, qualifications, experience, school accommodating facilities for HL children, demographic, health status, SEN conditions, HL severity of children). Suggested scales are as follows:

Demographic criteria: This includes items such as age, nationality, marital status, children, residence and housing.

*Professional criteria***:** Teachers' professional information may include education, qualifications, academic specialty, teaching experience and duration in a current position: extra credentials or additional qualifications such as health or environmental education.

Knowledge: The level of knowledge of teachers toward children with hearing problems was explored, focusing on the DHH spectrum, including the degree and quality of knowledge of hearing problems, such as:

- Causes, risk factors, and distribution.
- Symptoms and presentation.
- HAs and assisted in hearing technology, and how to deal with it.
- Prevention of hearing problems in early childhood.
- Sources of information about hearing problems and dealing with them in the classroom.

Attitudes: Thorough inquiry about the teachers' trends exhibited toward children's HL conditions was carried on thoroughly three major components, cognition, affect, and behavior, as follows:

- The cognitive component of HL, touching on learning and inclusion of DHH children between the mainstream GE vs. placing them in SEN institutions. Questions revolving around "what the teacher thinks about DHH integration and inclusion within the mainstream education" may be stated to reflect the following information:
    - Consequences and implications of impaired hearing upon student education, psychology, and development.
    - Potential obstacles to DHH learning in a GE classroom setting.
    - Whether the DHH child should be placed in a special education setting.
    - Whether the teacher mind having the HH student in his or her classroom.
    - Willingness to cooperate with TODHH when the need arises to provide better professional educational care for students with impaired hearing
- *Affect and behavior*: The affective component revolves around the "way the teacher feels about DHH inclusion in mainstream classroom education." Examples include the "teacher's feeling toward the inclusion of children with any of DHH problems in his/her general classroom with the additional specialized support, such as interpreters, speech therapists, and psychologist. The behavioral component is focused on finding out "how would the teacher manage and cope with DHH children inclusion in his/her classroom onsite?
- Examples of items to address these concepts include questions such as:
    - Willingness to collaborate with the parents and the school administration to design and support optimum educational plans to fulfill a successful DHH children's learning process.

- Facilitate DHH student's learning and accommodation in the mainstream classroom such as slowing down the pace of lessons and place them in the frontlines.
- Make use of technology and assure DHH students are wearing their hearing aids.
- Avoid labeling the DHH children negatively and giving them equal due respect as to their hearing peers.

The questionnaire design allows scoring for items and scales addressing the main study's concepts. Each question will give a score ranging from 1 (minimum) to 5 (maximum); in which case the middle point (median) equals 3, which also represents both the 50th percentile (also mean score for the item).

Questionnaire validation:

Three consultants reviewed the proposed questionnaire; its face, construct, criterion, and content validity evaluated until a validated instrument becomes on hand. All experts' remarks will take into consideration in the finally developed tool.

Data collection technique:

The questionnaire was distributed to teachers by hand to self-administer. Participants were first met in each participating school, be orient of the aim and importance of the study. They were further be reassured of the confidentiality of the data they provide; that no personal information may be disclosed, and only generic and grouped data may be disseminated in the scientific setting.

Study variables:

The independent variables are education, housing, marital status, academic specialty, while continuous variables represent data on age and years of experience.

Scoring:

Teachers scored below the median value were considered having poor knowledge/attitude, those scored between the median value and below the 75th percentile were considered having intermediate knowledge/attitude whereas those scored at or above the 75th percentile were considered having good knowledge/attitude.

Statistical analysis:

SPSS version 25 was used. Continuous variables were expressed as means (standard deviation [SD]) whereas categorical variables were expressed as frequency and percentage. The chi-square test was used to assess the significance of categorical variables. Whereas one-way analysis of variance test, followed by ad hoc least significant difference tests were applied to compare means of a continuous variable between more than two groups. P value < 0.05 was considered statistically significant.

3. RESULTS

Demographic characteristics

The study included 390 teachers. Their age ranged from 26 to 60 (41.2±6.2 years). They were equally distributed according to gender (Table 1).

Table 1: Demographic characteristics of the participants (n=390)

	Frequency	Percentage
Gender		
Male	195	50.0
Female	195	50.0
Marital status		
Single	28	7.2
Married	322	82.5
Divorced/widowed	40	10.3
Having children (n=361)		
No	33	9.1
Yes	328	90.9
Number of children (n=316)		

One	28	8.9
Two	49	15.5
Three	67	21.2
Four	65	20.6
More than four	107	33.9
Median	4	
Range	1-9	
Income (SR/month) (n=384)		
<8000	11	2.9
8000-11000	123	32.0
12000-15000	170	44.3
>15000	80	20.8
Highest qualification		
Diploma	34	8.7
Bachelor	346	88.7
Postgraduate (Master/PhD)	10	2.6

Professional characteristics

Result shows that 20.8% of the teachers were specialized in Arabia language whereas 15.6%, 14% and 13% were specialized in Mathematics, Islamic studies and social studies, respectively. Only 12.1% of them had a degree in special education. More than half of them (50.8%) had an experience ranged between 11 and 20 years in teaching whereas 23.6% of them their experience exceeded 20 years. Regarding experience in elementary education, 50.8% had an experience of 10 years or less and only 13.8% had an experience exceeded 20 years. Average number of students in the class ranged between 31 and 40 students, according to 44.4% of teachers and between 21 and 30 students, according to 43.8% of them. More than a quarter of teachers (27.4%) reported teaching students with hearing problems and 17.4% claimed that they currently have students with hearing problems. Minority of teachers (7.9%) reported that they have currently students using hearing aids.

Knowledge about hearing problems

Table 2 shows the knowledge of the teachers. Overall, slightly more than half of them (51%) had intermediate level of knowledge, whereas 44.1% had poor knowledge and only 4.9% expressed good level of knowledge about hearing problems as clear from Figure 2.

Table 3 shows that younger teachers were more knowledgeable about children`s hearing problems compared to older teachers=0.007. Lowest income teachers expressed higher rate of good knowledge about children`s hearing problems, p=0.022. One–fifth Postgraduate teachers compared to none of diploma holders expressed good knowledge about children`s hearing problems, p=0.023. Other factors (gender, marital status, having children, and number of children) were not significantly associated with teachers` knowledge about children`s hearing problems.

Table 4 shows the professional factors associated with knowledge of the elementary school teachers about children`s hearing problems.

Table 2: Knowledge of the elementary schoolteachers in general schools in Makkah, 2019 about hearing problems

Statements	Answer	Right answer	
		No.	%
Are you aware of some of the main causes and risk factors for HL?	**YES**	99	25.4
Does high fever and infection to the mother during pregnancy cause HL in the child?	**YES**	192	49.2
German measles in the last few months of pregnancy; causes HL in a child?	**NO**	61	15.6
Can middle ear inflammation and ear discharge affect hearing ability of a child?	**YES**	266	68.2
Head injuriesand ear trauma are not a common cause to HL as has been	**YES**	96	24.6

thought?			
Is there any relation between consanguineous marriage and HL?	**YES**	150	38.5
Knowingly, HL is measured by the volume of sounds that can be heard without amplification, thus, it is classified as: borderline, slight, mild, moderate, severe profound	**YES**	262	67.2
The term "Deaf" applies to HL so extensive that the person cannot communicate with another person using only voice.	**YES**	229	58.7
Are you fully aware of the effects of significant HL on a child's development (language, education, social skills)?	**YES**	142	36.4
Do you think auditory verbal therapy is necessary after the child wears hearing aid?	**YES**	144	36.9
If the child is identified and rehabilitated early, can't they learn optimum speech and language?	**NO**	193	49.5
If the child is not identified and rehabilitated early, can they attend GE school and does the child have similar educational opportunities as hearing peers?	**NO**	263	67.4
The following infectious diseases are potential cause for HL children: Meningitis YES Measles YES Mumps YES AIDS YES Dysentery NO		 226 262 164 21 390	 57.9 67.2 42.1 5.4 100
If not born with it, at what age HL is usually seen?	**>6 years**	27	6.9
Common symptoms of HL include the following Speech is not clear Does not follow directions Often says "Huh?"	 **NO** **NO** **YES**	 237 216 332	 60.8 55.4 85.1

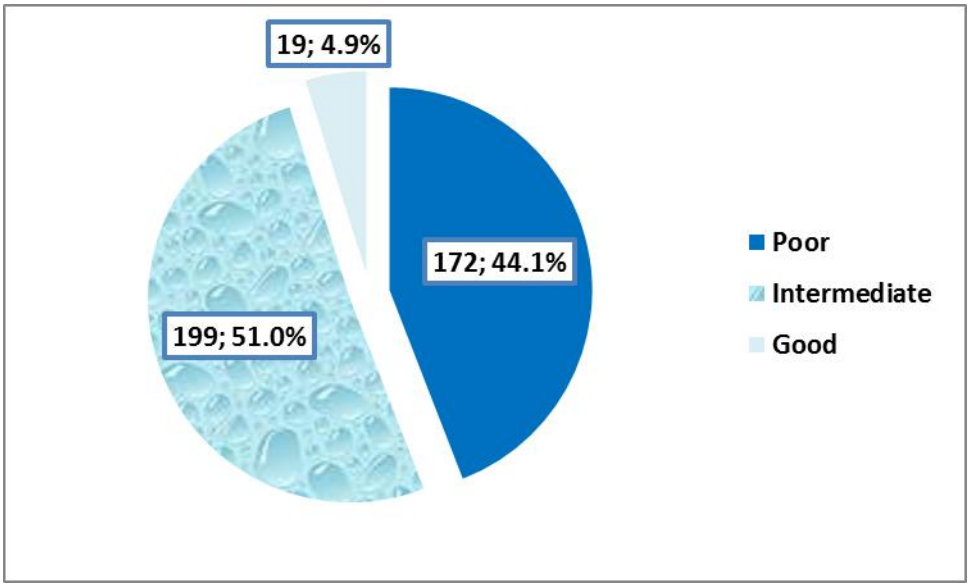

Figure 2: Overall level of the elementary schoolteachers` knowledge regarding hearing problems

Table 3: Demographic factors associated with knowledge of the elementary school teachers about children`s hearing problems

	Hearing loss knowledge level			p-value
	Poor N=172 N (%)	Intermediate N=199 N (%)	Good N=19 N (%)	
Gender				
Male (n=195)	83 (42.6)	103 (52.8)	9 (4.6)	
Female (n=195)	89 (45.6)	96 (49.3)	10 (5.1)	**0.776***
Age (years) Mean±SD	41.0±6.2ǂ	41.8±6.1˚	37.4±4.7ǂ˚	**0.007****
Marital status				
Single (n=28)	17 (60.7)	9 (32.1)	2 (70.1)	
Married (n=322)	139 (43.2)	168 (52.2)	15 (4.7)	
Divorced/widowed (n=40)	16 (40.0)	22 (55.0)	2 (5.0)	**0.347***
Having children (n=361)				
No (n=33)	18 (54.5)	15 (45.5)	0 (0.0)	
Yes (n=328)	137 (41.8)	174 (53.0)	17 (5.2)	**0.204***
Number of children (n=316)				
One (n=28)	9 (32.1)	17 (60.7)	2 (7.1)	
Two (n=49)	21 (42.9)	24 (49.0)	4 (8.2)	
Three (n=67)	27 (40.3)	37 (55.2)	3 (4.5)	
Four (n=65)	27 (41.5)	35 (53.8)	3 (4.6)	
More than four (n=107)	49 (45.8)	54 (50.0)	4 (3.7)	**0.911***
Income (SR/month) (n=384)				
<8000 (n=11)	7 (63.6)	3 (27.3)	1 (9.1)	
8000-11000 (n=123)	66 (53.7)	51 (41.5)	6 (4.9)	
12000-15000 (n=170)	65 (38.2)	94 (55.3)	11 (6.5)	
>15000 (n=80)	34 (42.5)	46 (57.5)	0 (0.0)	**0.022***
Highest qualification				
Diploma (n=34)	18 (52.9)	16 (47.1)	0 (0.0)	
Bachelor (n=346)	152 (43.9)	177 (51.2)	17 (4.9)	
Postgraduate (Master/PhD) (n=10)	2 (20.0)	6 (60.0)	2 (20.0)	**0.023***

*** Chi-square test** **** ANOVA test**

ǂp=0.040 and ˚p=0.007 using post-hoc Tukey test

Table 4: Professional factors associated with knowledge of the elementary school teachers about children`s hearing problems

	Hearing loss knowledge level			p-value*
	Poor N=172 N (%)	Intermediate N=199 N (%)	Good N=19 N (%)	
Specialty (n=385)				
Arabic (n=80)	37 (46.3)	41 (51.2)	2 (2.5)	
Mathematics (n=60)	27 (45.0)	33 (55.0)	0 (0.0)	
Islamic studies (n=54)	21 (38.9)	32 (59.3)	1 (1.9)	
Social studies (n=50)	24 (48.0)	23 (46.0)	3 (6.0)	
Science (n=39)	17 (43.6)	20 (51.3)	2 (5.1)	
Computer sciences (n=8)	2 (25.0)	3 (37.5)	3 (37.5)	
English (n=20)	10 (50.0)	8 (40.0)	2 (10.0)	
General (n=17)	8 (47.1)	9 (52.9)	0 (0.0)	

Arts (n=22)	11 (50.0)	11 (50.0)	0 (0.0)	
Special education (n=16)	2 (12.5)	10 (62.5)	4 (25.0)	
Others (n=19)	9 (47.4)	8 (42.1)	2 (10.5)	**0.001**
Having a degree in special education				
No (n=343)	169 (49.3)	168 (49.0)	6 (1.7)	
Yes (n=47)	3 (6.4)	31 (66.0)	13 (27.7)	**<0.001**
Experience in education (years)				
≤5 (n=17)	10 (58.8)	5 (29.4)	2 (11.8)	
6-10 (n=83)	34 (41.0)	43 (51.8)	6 (7.2)	
11-15 (n=99)	44 (44.4)	46 (46.5)	9 (9.1)	
16-20 (n=99)	43 (43.4)	54 (54.5)	2 (2.0)	
>20 (n=92)	41 (44.6)	51 (55.4)	0 (0.0)	**0.043**
Experience in elementary education (years)				
≤5 (n=94)	43 (45.7)	44 (46.8)	7 (7.4)	
6-10 (n=104)	47 (45.2)	53 (51.0)	4 (3.8)	
11-15 (n=75)	31 (41.3)	37 (49.3)	7 (9.3)	
16-20 (n=63)	27 (42.9)	35 (55.6)	1 (1.6)	
>20 (n=54)	24 (44.4)	30 (55.6)	0 (0.0)	**0.289**
Average number of students in a class				
≤20 (n=39)	11 (28.2)	21 (53.8)	7 (17.9)	
21-30 (n=171)	82 (48.0)	81 (47.4)	8 (4.7)	
31-40 (n=173)	74 (42.8)	95 (54.9)	4 (2.3)	
>40 (n=7)	5 (71.4)	2 (28.6)	0 (0.0)	**0.001**
Teaching students with hearing problems				
No (n=283)	144 (50.9)	134 (47.3)	5 (1.8)	
Yes (n=107)	28 (26.2)	65 (60.7)	14 (13.1)	**<0.001**
Having currently students with hearing problems				
No (n=253)	118 (46.6)	133 (52.6)	2 (0.8)	
Yes (n=68)	14 (20.6)	40 (58.8)	14 (20.6)	
Don`t know (n=69)	40 (58.0)	26 (37.7)	3 (4.3)	**<0.001**
Having currently students using hearing aids				
No (n=292)	132 (45.2)	152 (52.1)	8 (2.7)	
Yes (n=31)	4 (12.9)	21 (67.7)	6 (19.4)	
Don`t know (n=67)	36 (53.7)	26 (38.8)	5 (7.5)	**<0.001**

*** Chi-square test**

Attitude towards children with hearing loss

Two thirds of the teachers agreed that DHH students would achieve better academically in a special school for DHH and almost half of them agreed that DHH students feel more isolated when being taught in special self-contained classrooms (57.7%), inclusion of DHH students could lead to unfair comparison with their hearing counterparts (56.4%) and self-contained classrooms have a negative impact upon social and emotional development of DHH students (48.7%). On the other hand, 42.3% of them disagreed that mainstream schools limit DHH friendship networks.

Overall, 62.8% of them had an intermediate attitude (cognition component), whereas 22.6% had negative attitude and only 14.6% had positive attitude towards children with hearing problems. Table 6 shows demographic factors associated with attitude (cognition) of the elementary school teachers towards children`s hearing problems. Table 7 shows the professional factors associated with attitude (cognition) of the elementary school teachers towards children`s hearing problems.

Table 5: Responses of the elementary school teachers to the cognitive component scale

Statements	Agree N (%)	Neutral N (%)	Disagree N (%)
DHH students would achieve better academically in a special school for DHH	260 (66.7)	87 (22.3)	43 (11.0)
Self-contained classrooms have a negative impact upon social and emotional development of DHH students	190 (48.7)	119 (30.5)	81 (20.8)
Inclusion of DHH students could lead to unfair comparison with their hearing counterparts	220 (56.4)	102 (26.2)	68 (17.4)
DHH students feel more isolated when being taught in special self-contained classrooms	225 (57.7)	106 (27.2)	59 (15.1)
Mainstream schools limit DHH friendship networks	108 (27.7)	117 (30.0)	165 (42.3)

Table 6: Demographic factors associated with attitude (cognition) of the elementary school teachers towards children`s hearing problems

	Attitude towards students with hearing loss			p-value
	Negative N=88 N (%)	Intermediate N=245 N (%)	Positive N=57 N (%)	
Gender				
Male (n=195)	37 (19.0)	126 (64.6)	32 (16.4)	
Female (n=195)	51 (26.2)	119 (61.0)	25 (12.8)	**0.193***
Age (years)				
Mean±SD	40.7±6.3	41.5±6.0	41.0±6.6	**0.594****
Marital status				
Single (n=28)	12 (42.9)	14 (50.0)	2 (7.1)	
Married (n=322)	66 (20.5)	207 (64.3)	49 (15.2)	
Divorced/widowed (n=40)	10 (25.0)	24 (60.0)	6 (15.0)	**0.096***
Having children (n=361)				
No (n=33)	13 (39.4)	18 (54.5)	2 (6.1)	
Yes (n=328)	63 (19.2)	213 (64.9)	52 (15.9)	**0.016***
Number of children (n=316)				
One (n=28)	3 (10.7)	19 (67.9)	6 (21.4)	
Two (n=49)	5 (10.2)	38 (77.6)	6 (12.2)	
Three (n=67)	19 (28.4)	35 (52.2)	13 (19.4)	
Four (n=65)	13 (20.0)	42 (64.6)	10 (15.4)	
More than four (n=107)	22 (20.6)	70 (65.4)	15 (14.0)	**0.223***
Income (SR/month) (n=384)				
<8000 (n=11)	5 (45.5)	5 (45.5)	1 (9.0)	
8000-11000 (n=123)	31 (25.2)	79 (64.2)	1 (10.6)	
12000-15000 (n=170)	37 (21.8)	102 (60.0)	31 (18.2)	
>15000 (n=80)	15 (18.8)	54 (67.5)	11 (13.8)	**0.264***
Highest qualification				
Diploma (n=34)	17 (50.0)	12 (35.3)	5 (14.7)	
Bachelor (n=346)	69 (19.9)	228 (65.9)	49 (14.2)	
Postgraduate (Master/PhD) (n=10)	2 (20.0)	5 (50.0)	3 (30.0)	**0.001***

*** Chi-square test** **** ANOVA test**

ǂp=0.040 and ˚p=0.007 using post-hoc Tukey test

Table 7: Professional factors associated with attitude (cognition) of the elementary school teachers towards children`s hearing problems

	Attitude towards students with hearing loss			p-value*
	Negative N=88 N (%)	Intermediate N=245 N (%)	Positive N=57 N (%)	
Specialty (n=385)				
Arabic (n=80)	16 (20.0)	53 (66.3)	11 (13.8)	
Mathematics (n=60)	12 (20.0)	41 (68.3)	7 (11.7)	
Islamic studies (n=54)	17 (31.5)	28 (51.9)	9 (16.7)	
Social studies (n=50)	11 (22.0)	35 (70.0)	4 (8.0)	
Science (n=39)	9 (23.1)	26 (66.7)	4 (10.3)	
Computer sciences (n=8)	0 (0.0)	7 (87.5)	1 (12.5)	
English (n=20)	5 (25.0)	14 (70.0)	1 (5.0)	
General (n=17)	5 (29.4)	10 (58.8)	2 (11.8)	
Arts (n=22)	4 (18.2)	17 (77.3)	1 (4.5)	
Special education (n=16)	0 (0.0)	6 (37.5)	10 (62.5)	
Others (n=19)	7 (36.8)	6 (31.6)	6 (31.6)	**<0.001**
Having a degree in special education				
No (n=343)	88 (25.7)	221 (64.4)	34 (9.9)	
Yes (n=47)	0 (0.0)	24 (51.1)	23 (48.9)	**<0.001**
Experience in education (years)				
≤5 (n=17)	5 (29.4)	10 (58.8)	2 (11.8)	
6-10 (n=83)	18 (21.7)	50 (60.2)	15 (18.1)	
11-15 (n=99)	26 (26.3)	59 (59.6)	14 (14.1)	
16-20 (n=99)	18 (18.2)	70 (70.7)	11 (11.1)	
>20 (n=92)	21 (22.8)	56 (60.9)	15 (16.3)	**0.762**
Experience in elementary education (years)				
≤5 (n=94)	23 (24.5)	61 (64.9)	10 (10.6)	
6-10 (n=104)	22 (21.2)	61 (58.7)	21 (20.2)	
11-15 (n=75)	14 (18.7)	50 (66.7)	11 (14.7)	
16-20 (n=63)	15 (23.8)	40 (63.5)	8 (12.7)	
>20 (n=54)	14 (25.9)	33 (61.1)	7 (13.0)	**0.746**
Average number of students in a class				
≤20 (n=39)	6 (15.4)	16 (41.0)	17 (43.6)	
21-30 (n=171)	37 (21.6)	116 (67.8)	18 (10.5)	
31-40 (n=173)	40 (23.1)	111 (64.2)	22 (12.7)	
>40 (n=7)	5 (71.4)	2 (28.6)	0 (0.0)	**<0.001**
Teaching students with hearing problems				
No (n=283)	70 (24.7)	180 (63.6)	33 (11.7)	
Yes (n=107)	18 (16.8)	65 (60.7)	24 (22.4)	**0.015**
Having currently students with hearing problems				
No (n=253)	61 (24.1)	164 (64.8)	28 (11.1)	
Yes (n=68)	8 (11.8)	35 (51.5)	25 (36.8)	
Don`t know (n=69)	19 (27.5)	46 (66.7)	4 (5.8)	**<0.001**
Having currently students using hearing aids				
No (n=292)	65 (22.3)	190 (65.1)	37 (12.7)	
Yes (n=31)	2 (6.5)	15 (48.4)	14 (45.2)	
Don`t know (n=67)	21 (31.3)	40 (59.7)	6 (9.0)	**<0.001**

*** Chi-square test**

Affective & behavioral components

Almost two-thirds of the teachers definitely agreed with the use of technology to assist in teaching DHH students (69.2%), DHH students sit in the front lines (69.2%), encourage hearing, DHH students to interact and learn together (67.9%), collaborate with parents of DHH students to design an individualized educational plan that suits their child's learning (67.4%) and all DHH students should wear their hearing aids, particularly during lessons (67.2%). However, only 41% agreed that they should slow down the pace of lessons to enable DHH students to learn at the same level as their hearing peers.

Over half of them had an intermediate attitude (affection & behavioral component), whereas 31.3% had negative attitude and only 14.1% had positive attitude towards children with hearing problem. Table 9 shows the demographic factors associated with attitude (affection & behavioral) of the elementary school teachers towards children`s hearing problems. Table 10 shows the professional factors associated with attitude of the elementary school teachers towards children`s hearing problems.

Table 8: Responses of the elementary school teachers to the Affective & behavioral components scale

Statement	Definitely	Probably	Undecided
Encourage hearing, DHH students to interact and learn together	**260 (67.9)**	**90 (23.1)**	**35 (9.0)**
Collaborate with parents of DHH students to design an Individualized Educational Plan that suits their child's learning	**263 (67.4)**	**99 (25.4)**	**28 (7.2)**
Adopt new teaching styles and modify testing methods to match DHH characteristics	**216 (55.4)**	**122 (31.3)**	**52 (13.3)**
Slow down the pace of lessons to enable DHH students to learn at the same level as their hearing peers	**160 (41.0)**	**174 (44.6)**	**56 (14.4)**
Make use of technology to assist in teaching DHH students	**270 (69.2)**	**90 (23.1)**	**30 (7.7)**
Make sure that all DHH students are wearing their hearing aids, particularly during lessons	**262 (67.2)**	**105 (26.9)**	**23 (5.9)**
Make sure that DHH students sit in the front lines	**271 (69.2)**	**83 (21.3)**	**36 (9.2)**

Table 9: Demographic factors associated with attitude (affection & behavioral) of the elementary school teachers towards children`s hearing problems

	Affective and behavioral attitude towards hearing problems			**p-value**
	Negative N=122 N (%)	**Intermediate N=213 N (%)**	**Positive N=55 N (%)**	
Gender				
Male (n=195)	57 (29.2)	114 (58.5)	24 (12.3)	
Female (n=195)	65 (33.3)	99 (50.8)	31 (15.9)	**0.291**
Age (years) Mean±SD	41.3±6.1	41.5±6.3	40.1±5.7	**0.321**
Marital status				
Single (n=28)	8 (28.6)	14 (50.0)	6 (21.4)	
Married (n=322)	103 (32.0)	172 (53.4)	47 (14.6)	
Divorced/widowed (n=40)	11 (27.5)	27 (67.5)	2 (5.0)	**0.269**
Having children (n=361)				
No (n=33)	18 (54.5)	12 (36.4)	3 (9.1)	
Yes (n=328)	96 (29.3)	186 (56.7)	46 (14.0)	**0.012**
Number of children (n=316)				
One (n=28)	8 (28.6)	15 (53.5)	5 (17.9)	
Two (n=49)	18 (36.7)	30 (61.3)	1 (2.0)	

Three (n=67)	16 (23.9)	36 (53.7)	15 (22.4)	
Four (n=65)	18 (27.7)	36 (55.4)	11 (16.9)	
More than four (n=107)	32 (29.9)	63 (58.9)	12 (11.2)	**0.159**
Income (SR/month) (n=384)				
<8000 (n=11)	1 (9.1)	6 (54.5)	4 (36.4)	
8000-11000 (n=123)	58 (47.2)	53 (43.1)	12 (9.8)	
12000-15000 (n=170)	46 (27.1)	98 (57.6)	26 (15.3)	
>15000 (n=80)	17 (21.3)	50 (62.5)	13 (16.3)	**<0.001**
Highest qualification				
Diploma (n=34)	14 (41.2)	16 (47.1)	4 (11.8)	
Bachelor (n=346)	107 (30.9)	190 (54.9)	49 (14.2)	
Postgraduate (Master/PhD) (n=10)	1 (10.0)	7 (70.0)	2 (20.0)	**0.448**

*** Chi-square test** **** ANOVA test**

ǂp=0.040 and ˚p=0.007 using post-hoc Tukey test

Table 10: Professional factors associated with attitude of the elementary school teachers towards children`s hearing problems

	Affective and behavioral attitude towards hearing problems			**p-value***
	Negative N=122 N (%)	**Intermediate N=213 N (%)**	**Positive N=55 N (%)**	
Specialty (n=385)				
Arabic (n=80)	28 (35.0)	39 (48.7)	13 (16.3)	
Mathematics (n=60)	14 (23.3)	35 (58.4)	11 (18.3)	
Islamic studies (n=54)	17 (31.5)	31 (57.4)	6 (11.1)	
Social studies (n=50)	14 (28.0)	26 (52.0)	10 (20.0)	
Science (n=39)	15 (38.5)	22 (56.4)	2 (5.1)	
Computer sciences (n=8)	2 (25.0)	5 (62.5)	1 (12.5)	
English (n=20)	5 (25.0)	13 (65.0)	2 (10.0)	
General (n=17)	9 (52.9)	7 (41.2)	1 (5.9)	
Arts (n=22)	8 (36.4)	14 (63.6)	0 (0.0)	
Special education (n=16)	1 (6.3)	11 (68.7)	4 (25.0)	
Others (n=19)	7 (36.8)	8 (42.1)	4 (21.1)	**0.277**
Having a degree in special education				
No (n=343)	120 (35.0)	178 (51.9)	45 (13.1)	
Yes (n=47)	2 (4.3)	35 (74.4)	10 (21.3)	**<0.001**
Experience in education (years)				
≤5 (n=17)	1 (5.9)	15 (88.2)	1 (5.9)	
6-10 (n=83)	30 (36.1)	38 (45.8)	15 (18.1)	
11-15 (n=99)	34 (34.3)	51 (51.5)	14 (14.1)	
16-20 (n=99)	30 (30.3)	52 (52.5)	17 (17.2)	
>20 (n=92)	27 (29.3)	57 (62.0)	8 (8.7)	**0.063**
Experience in elementary education (years)				
≤5 (n=94)	22 (23.4)	54 (57.4)	18 (19.1)	
6-10 (n=104)	40 (38.5)	51 (49.0)	13 (12.5)	
11-15 (n=75)	22 (29.3)	41 (54.7)	12 (16.0)	
16-20 (n=63)	22 (34.9)	32 (50.8)	9 (14.3)	
>20 (n=54)	16 (29.6)	35 (64.8)	3 (5.6)	**0.214**
Average number of students in a class				
≤20 (n=39)	6 (15.4)	26 (66.7)	7 (17.9)	

21-30 (n=171)	55 (32.2)	92 (53.8)	24 (14.0)	
31-40 (n=173)	58 (33.5)	94 (54.3)	21 (12.1)	
>40 (n=7)	3 (42.9)	1 (14.3)	3 (42.9)	**0.064**
Teaching students with hearing problems				
No (n=283)				
Yes (n=107)	98 (34.6)	151 (53.4)	34 (12.0)	
	24 (22.4)	62 (58.0)	21 (19.6)	**0.028**
Having currently students with hearing problems				
No (n=253)	83 (32.8)	130 (51.4)	40 (15.8)	
Yes (n=68)	9 (13.2)	50 (73.5)	9 (13.2)	
Don`t know (n=69)	30 (43.5)	33 (47.8)	6 (8.7)	**0.001**
Having currently students using hearing aids				
No (n=292)	84 (28.8)	164 (56.2)	44 (15.1)	
Yes (n=31)	5 (16.1)	23 (74.2)	3 (9.7)	
Don`t know (n=67)	33 (49.3)	26 (38.8)	8 (11.9)	**0.003**

*** Chi-square test**

Problems of students with hearing loss at classroom

Figure 3 shows the opinion of the teachers regarding the most obstacles they feel a hard of hearing student may suffer in classroom. Regarding the most appropriate educational placement for DHH students, most of the teachers recommended residential institute (70.8%) and special schools (69%) for deaf students whereas 58.2% recommended full inclusion with all necessary support such as in-class interpreter, speech and language therapy unit, and clinical psychologist for hard of hearing students (Table 11).

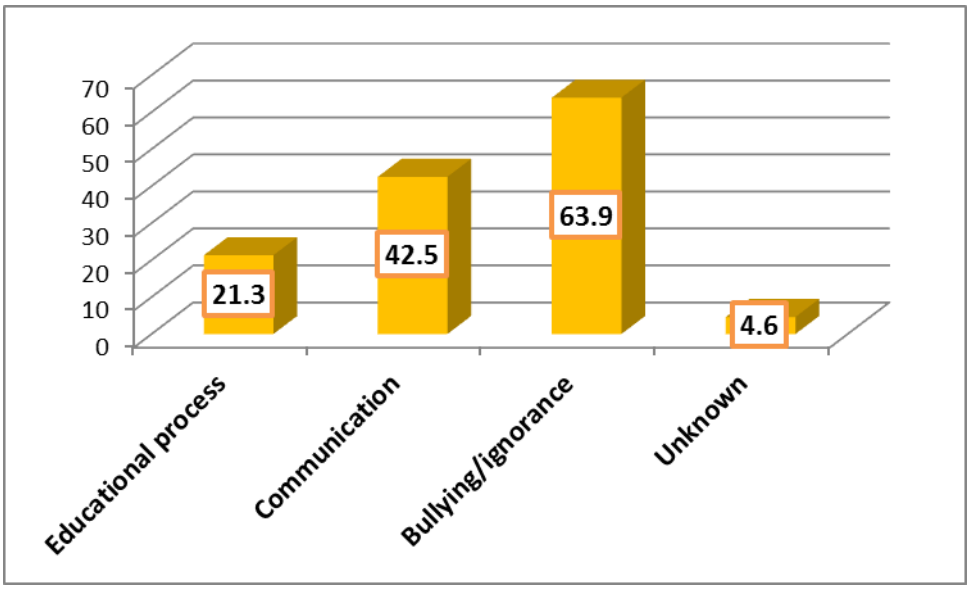

Figure 3: Teachers' opinion regarding the most obstacles they feel a hard of hearing student may suffer in classroom

Table 11: Opinions of the elementary school teachers regarding the most appropriate educational placement for DHH students in Makkah

Alternative placement	**Deaf N (%)**	**Hard of Hearing N (%)**
Residential institute for DHH	276 (70.8)	114 (29.2)
special schools for DHH	269	121

	(69.0)	(31.0)
Self-contained classrooms (special classes) within mainstream school	193 (49.5)	197 (50.5)
Partial inclusion with resource-room and speech and language therapy unit	209 (53.6)	181 (46.4)
Full inclusion with all necessary support such as in-class interpreter, speech and language therapy unit, and clinical psychologist	163 (41.8)	227 (58.2)

4. DISCUSSION

Hearing impairment in children leads to speech problems, problems in language acquisition, communication problems and educational difficulties (Apuzzo and Yoshinaga-Itano, 1995). Many elementary school students cannot access the services they need, because of their hearing problems. This is mainly result from the lack of awareness of teachers as well as the healthcare professionals about how to deal properly with such students (Swanepoel *et al.*, 2010).

This study was carried out to assess level knowledge and attitude of elementary schoolteachers in Makkah, KSA toward children with hearing problems in general schools and identify factors associated with them, particularly gender and having special or additional qualification.

In the current study, most of the elementary teachers knew the definition and classification of HL. Additionally, most of them could recognize that if the child with HL is identified and rehabilitated early, they can attend general education school and have similar educational opportunities as hearing peers. However, minority of them could recognize that if a child is not born with HL, it is usually seen at age >6 years. In a similar study carried out in India, knowledge of reasons, investigation and therapy of HI among teachers were poor (Tuli *et al.*, 2018).

In this study, almost a third of teachers thought that auditory verbal therapy is necessary after the child wears hearing aid. In New Zealand, teachers were unsure about the adding in hearing level by using amplification in a hearing-impaired person (Coombe, 2018).

Overall, almost half of teachers in the present study had poor knowledge and only 4.9% expressed good level of knowledge about hearing problems. The same has been observed by others (Coombe, 2018; Tuli *et al.*, 2018).

In the current study, younger teachers were more knowledgeable compared to older teachers. Also, lowest income teachers expressed higher rate of good knowledge compared to those with highest income and as expected, more educated teachers expressed good knowledge about children`s hearing problems. Therefore, more educational efforts should be done with other and less educated teachers to improve their knowledge regarding hearing loss. Comparative data were not observed in other studies.

As expected, in the present study, teachers having a degree in special education were more likely to have good knowledge compared to others and also lowest experienced teachers (≤5 years) had higher rate of good knowledge, which could be also explained by having younger age. In accordance with these findings, others (Alghazo and Naggar Gaad, 2004; Prakash, 2012; Parhoon *et al.*, 2014) reported that favorable teacher' attitudes towards inclusion of students with hearing impairment in normal classes are more likely to be observed among teachers with greater experience with students with hearing impairment and those who well prepared to deal with such students.

Regarding average number of students in a class, teachers who taught a smaller number of students in a class were more knowledgeable regarding HI. Further in-depth study could be needed to explain this finding.

As quite expected, teachers who reported previous history of teaching students with hearing problems and those who had currently students with hearing impairment or using hearing aids in their classes were more likely to express good level of knowledge.

Attitude of elementary school teachers towards children with hearing loss is inconclusive in the present study as most of them agreed that DHH students would achieve better academically in a special school for DHH. On the other hand, almost half of them believed that DHH students feel more isolated when being taught in special self-contained classrooms and also another half agreed that inclusion of DHH students could lead to unfair comparison with their hearing counterparts and self-contained classrooms have a negative impact upon social and emotional development of DHH students. Also, almost half of teachers disagreed that mainstream schools limit DHH friendship networks. Many governments and organizations on global base, have shown a great interest in teaching students with disabilities in mainstream schools together with their peers without disabilities, following the concept of "least restrictive environment" that have emerged in response to the growing pressure of human rights organizations. However, the international community of special need education recognized "inclusive education" to be the best practice of

teaching students with disabilities (Peppler-Barry and Fiske, 2000). In Iran and Botswana teachers' attitudes towards the inclusion of students with HI in classrooms of mainstream schools were positive (Chhabra et al., 2010; Coombe, 2018).

Overall, in the present study about two-third of them had an intermediate attitude and only 14.6% had positive attitude towards children with hearing problems. This finding is consistent with others (Chhabraet al. 2010; Reusen et al. 2019).

Teachers who have children and more qualified expressed more positive attitude compared to their counterparts. Some other studies reported that female teachers have more positive attitude towards the inclusion of hearing impairment students in mainstream schools than their male counterparts (Parhoon *et al.*, 2014). However, in the present study we did not observe a significant difference between male and female teachers.

In this study, the most obstacles the teachers feel that the students with hearing loss may suffer in classroom were bullying/ignorance, communications, and educational process. It has been reported that HI schoolchildren usually experience obstacles when attending mainstream schools as they may be not properly integrated, fail to communicate properly with their colleagues and teachers as they cannot hear what they are saying (Gudyanga et al., 2014). Additionally, HI would impact the social activities of affected children as they prefer not to take part in classroom activities (Desalegn, 2016).

Regarding the most appropriate educational placement for DHH students, in the present study, most of the teachers recommended residential institute and special schools for deaf students. Currently in the Kingdom of Saudi Arabia, 78% of DHH students attend regular schools while only 22% included in special schools for the deaf. Compared to the situation in the developed world as in the US 86% of DHH students placed in regular schools vs. 14% who attend specialized educational settings (Hussar *et al.*, 2020). In spite of such a high figure of DHH students' inclusion in regular education schools, that most DHH students placed in special classes within the regular schools. These students only get the opportunity to interact with hearing peers before classes, during recess, and in arts and sports periods but they do not receive instruction in the regular classrooms most of school-day. Also, the majority of students who go to regular schools have mild to moderate HL, and use Hearing aids, while most students with severe/profound HL typically attend special schools for the deaf (MOE, 2018). Probably, obstacles to inclusion in Saudi Arabia may be a result of negative perceptions of parents of DHH students about inclusive settings; the negative attitudes of the society towards people with disabilities; the schools' physical environments, being not prepared to receive SEN students; or the requirements by regular schools to accept students with disabilities (Al-Mousa, 2010).

The present study is not without limitations. The cross-sectional design is the prominent limitation as does not confirm the cause-effect relationship as it only confirms an association between them. It includes elementary school teachers working at governmental schools in Makkah and ignoring those working at private schools, therefore the results cannot be generalized over all elementary school teachers in Makkah. Despite limitations of the present study, up to our knowledge, it is the first of its kind in our region, therefore it could have public health importance in exploring this important issue which expected to be common in our society.

5. CONCLUSION

Knowledge and attitude of the elementary school teachers in Makkah city are mostly poor to intermediate. Younger, low-income, more qualified, computer sciences and special education teachers, those having a degree in special education, lower experienced, had less students in a class, teaching students with hearing problems, who had currently students with hearing problems and had currently students using hearing aids were more knowledgeable about children`s hearing problems compared to their counterparts. Teachers who have children, more qualified teachers, special education teachers, those having a degree in special education, had less students in a class, reported teaching students with hearing problems, had currently students with hearing problems and using hearing aids were more likely to express more positive attitude towards children with hearing loss than others. As regards attitude ,teachers who have children, low-income teachers, teachers having a degree in special education, who reported teaching students with hearing problems, who have currently students with hearing problems and using hearing aids were more likely to express negative attitude towards children`s hearing loss than their counterparts.

The most obstacles the teachers feel that the students with hearing loss may suffer in classroom were bullying/ignorance, communications and educational process.

Most of the teachers recommended residential institute and special schools for deaf students whereas recommended full inclusion with all necessary support such as in-class interpreter, speech and language therapy unit, and clinical psychologist for hard of hearing students.

Recommendations

1.Continuing education for teachers to provide them with more information about hearing problems among students that would support their knowledge and improve their attitude and skills in working with students with hearing problems at classrooms
2.Inclusion of deaf students into special schools for deaf students.
3.Inclusion of hard of hearing students into mainstream schools with all necessary support such as in-class interpreter, speech and language therapy unit, and clinical psychologist.
4.Further research included teachers in governmental and private schools to be at a wider scale is recommended.

List of abbreviations

ADHD: Attention deficit –hyperactivity disorder, dB: Decibel, DHH: Deaf or Hard of Hearing, HI: Hearing Impairment, HL: Hearing Loss, Hz: Hertz, KSA: Kingdom of Saudi Arabia, MOH: Ministry of Health, SD: Standard Deviation, SEN: Special Educational Needs, SPSS: Statistical Package for Social Sciences.

Ethical considerations:

Ethical approval was obtained from the research ethics committees in the General Directory of Health Affairs of Makkah, with ethical approval number (H-02-K-076- 0319-103). Permission from the relevant official in the General Department Education in Makkah, Ministry of Health (MOH), was also sought. Likewise, an arrangement with the selected schools to collect data and sample the teaching staff was carried out. Teacher's written consent to participate in the study may be obtained. Consent forms were delivered to participants with the first invitation encounter and collected back with the first questionnaire session.

Pilot study

The study was piloted to test for feasibility, validity and reliability of the questionnaire.

Conflict of interest

The authors declare that they have no conflict of interest.

Informed Consent

Written and Oral informed consent was obtained from the participant included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Data and materials availability

All data associated with this study are present in the paper.

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