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Deaf And Hard-Hearing Women' Knowledge And Health Beliefs Regarding Cervical Cancer: An Application Of Health Belief Model

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Abstract

Background: Cervical cancer (CC) is considered a common cause of gynecologic malignancy-related mortality and morbidity. **Objective:** This study aims to investigate the deaf and hard-hearing females' knowledge and health beliefs regarding CC through Health Belief Model (HBM) application. **Material and methods**: A descriptive cross-sectional study was conducted at Tabuk University, and secondary schools (which contain integrated students) at Tabuk city, KSA. A comprehensive sample of all deaf and hard-hearing married women was recruited in the study (n= 36 participants) from September to November 2021. A Structured interview schedule that involved the basic data and reproductive history, CC knowledge quiz, HBM scale, and CC screening intention scale were used to collect data. **Results:** All the study participants never received human papilloma virus vaccine or performed Papanicolaou smear test. Fair knowledge regarding CC was present among 58.35% of the study participants. Regarding CC health beliefs, 69.4% and 44.4% of the study participants had low perceived susceptibility and perceived seriousness to CC, respectively. Also, 50% and 44.4% of the participants had moderate health motivation and intention to perform CC screening, respectively. Bivariate correlations showed statistically significant correlations between the participants' overall CC knowledge and their perceived susceptibility, seriousness, health motivation, and intention of screening behaviors ($p<0.05$). **Conclusion**: The intention to practice CC screening was significantly correlated to all HBM constructs ($p<0.05$). Cervical cancer knowledge and health beliefs among deaf and hard-hearing females were lower than expected.

Keywords: Knowledge, health belief model, cervical cancer, screening intention.

Background

Cervical cancer (CC) is a prevalent cause of gynecologic malignancy-related mortality and morbidity [1]. According to World Health Organization (WHO), CC ranked the 8th among female malignancy worldwide, with approximately 604,127 newly diagnosed cases and 341,831 cancer related mortality in 2020. Most of these deaths occur in less-developed countries, with inadequate access to CC screening services such as Pap smear and pelvic exam [2]. However, the CC incidence and deaths were dramatically decreased because of CC screening programs optimization in these countries [3]. In the Kingdom of Saudi Arabia

(KSA), CC is the 7th prominent reason for cancer mortalities among females at the age 15- 44 years, with an estimated 358 newly diagnosed cases and 179 deaths occurring in 2020 [2]. However, about 40% of CC cases in KSA were diagnosed with advanced stage, compared to 25% among Canadian women. The delayed CC diagnosis may be attributed to low public awareness regarding CC preventive and screening programs in the KSA [4]. Due to social isolation, women with hearing impairment have lower chance to undergo CC services compared normal hearing women [5]. According to the WHO, over 5% (466 million) people worldwide complain from hearing impairment [6]. The hearing difficulties prevalence among Saudi citizens may differ by the region ranging from 1.75% to 7.12% [7-8]. Women with hearing disabilities have many health disparities related to cancer, including hearing disabilities have lower chance to join CC screening services such as the Pap smear test, pelvic examination, mammogram, and other cancer screenings measures [9]. Many studies conducted between 2010 and 2019 concluded that deaf and hard hearing women had low CC awareness, negative attitudes, and inadequate utilization of the screening programmes [10-12]. Studies have shown that normal hearing females have better intention to attend cancer screening programs, receiving related knowledge, and report better satisfaction by heath team interaction as well as comprehensive care compared with deaf and hard hearing women [13]. It is necessary to study the CC knowledge and health beliefs among deaf and hard hearing females and the psychological, mental, and environmental aspects that affect a deaf woman's intention to join a CC screening programmes. The Health Belief Model (HBM) is used widely in cancer studies, it concentrates on the individuals' health- behavior related to specific health problems to predict further actions. According to HBM, the persons' decision to participate in any preventive or screening programmes is determined by various aspects as the health problem perceived susceptibility, knowledge regarding the disease complications and influence on the health (perceived severity), screening and preventive services utilization perceived benefits, service utilization perceived barriers, and health motivation to access the health care services [14,15]. To our knowledge, there are no studies conducted in KSA to evaluate the adherence to CC screening among deaf and hard hearing women. Also, the literature on health inequities in deaf and hard hearing women is broadly outdated.

Objective

The current study aims to evaluate deaf and hard-hearing females' knowledge and health beliefs regarding CC through the application of HBM.

Materials and Methods

Study design and Setting

A descriptive cross-sectional design. The research was done at Tabuk University and secondary schools (which contain integrated students) at Tabuk city. A comprehensive sample of all deaf and hard-hearing women from the previously mentioned setting and matched the inclusion criteria were recruited in the study. Inclusion criteria were deaf and hard-hearing women, married, free from other disabilities and gave agreement to take part of the study. The total sample size was 36 participants.

Tools of data collection

Structured interview schedule: The researchers developed it in Arabic after reviewing concerned literature, then it was interpreted to American Sign Language by the hearing disabilities specialist during the interview. It consisted of four main parts:

Part I: Basic data and reproductive history

It was concerned with data such as age, residence, education, mothers' educational level, consanguinity, type of disability, family history of cancer/CC, current contraceptives use, history of Pap smear and HPV vaccine, age at marriage, marriage duration, gravidity, and parity.

Part II: Females' CC knowledge quiz

It comprises 11 dichotomous and multiple-choice questions (MCQs) about cervical cancer definition, symptoms, risk factors, diagnostic measures, treatment modalities, preventive measures, HPV

knowledge, and Pap smear. The correct answer scored "two" for the dichotomous questions, and the incorrect or don't know scored "zero". For MCQs, the complete answer scored "two", the incomplete answer scored "one", and the incorrect or don't know scored "zero". For questions that required multiple answers, the participant was considered to have a complete answer when selecting at least two correct alternatives. The overall knowledge score ranged from (0-22). The participant was considered to have poor knowledge if her score was less than 7.3, fair 7.4 – 14.6, good more than 14.7 – 22. The Cronbach's alpha coefficient was 0.765.

Part III: Health belief model scale for CC and Pap smear test

It was developed by Guvenc et al. The scale composed of 35 items distributed to five subscale susceptibility to CC (3 items), perceived seriousness of CC (7 items), barriers to Pap smear test (14 items), Pap smear test benefits (4 items), and health motivation (7 items). For each item, the participants have to select one of five alternatives: strongly agree= 5, agree =4, neutral =3, disagree =2 and strongly disagree=5). Higher scores reveal greater feelings regarding the construct. All scales have positive association with CC screening behavior except for barriers items, which have a negative association. Cronbach's alpha coefficients results for the five subscales ranged from (0·62 to 0·86) [15]. The following steps were followed to calculate each subscale's low, moderate, and high categories; first, minimum and maximum scores were calculated. Second, the difference between the minimum and maximum score was determined, then it was divided by three to obtain the level interval. Third, the level interval was calculated as low level (min score+ level interval), moderate level (upper limit of low level + level interval) and high level (upper limit of moderate level+ level interval).

Part IV: the CC screening intention scale

It was developed by the researchers to assess the deaf female intention to perform CC screening and HPV vaccination. It comprises seven items rated on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The total scale score was 35; the participant was considered to have low (7-16.3), moderate (16.4-25.6) or high (25.7-35) intention to practice CC screening and vaccination based on her score. The CC screening intention scale had a high-reliability score based on Cronbach's alpha coefficient results (r=0.812). The instrument's validity was evaluated for face, content, and construct validity by a jury of five experts in the obstetrics and gynecology nursing.

Ethical approval

The deanship of scientific research approved the research proposal then another ethical approval was taken from the ethics committee at Tabuk University. Formal approvals from the previously mentioned setting were obtained through formal authority lines. Informed consent was taken from each participant through American Sign Language. The participants were informed about their right to reject contribution or leave the research at any time. All data was confidential and utilized for the study purposes only.

Work plan

The data were collected from September to the end of November 2021. After approval of the research project, a hearing disabilities specialist visited each sitting to confirm approvals from the sitting administration and arrange for data collection. Hearing disabilities specialist interviewed 3 to 4 deaf participants each time. The responsibility of the hearing disabilities specialist is to translate the questionnaire to sign language and to ensure data completeness and accuracy. She approached and interviewed each woman individually to explain the aim and procedures of the study and take her consent for participation. Upon consent to participate, the woman will be interviewed to assess her basic data and reproductive history, knowledge, and health belief regarding CC prevention and screening.

Data analysis

Data analysis was completed by Statistical Package for Social Science (SPSS) software, version 23 (SPSS Inc. Chicago, IL, USA). The participants' basic data, reproductive history, knowledge, and health beliefs were described using descriptive statistics such as numbers, percentages, means, and

standard deviations. Bivariate correlations analysis was used to examine the correlations between the study variables. A P-value <0.05 was considered statistically significant.

Results

Table 1: Participants basic data and the reproductive history (N= 36)

Basic data	N (36)	%
Age		
– ≤20	8	22.2
– >20	28	77.8
Mean ± SD	24.08±3.37 years	
Residence		
– Urban	32	88.9
– Rural	4	11.1
Education		
– University	33	91.7
– Secondary School	3	8.3
Mother education		
– Illiterate	12	33.3
– Read and write	15	41.7
– Secondary education	3	8.3
– University education	6	16.7
Consanguinity		
– Yes	27	75.0
– No	9	25.0
Type of handicaps		
– Hard-hearing	13	36.1
– Deafness	23	63.9
Family history of cancer		
– Yes	6	16.7
– No	30	83.3
Family history of CC		
– Yes	3	8.3
– No	33	91.7
Current use of contraceptive		
– Yes	12	33.3
– No	24	66.7
history of pap smear screening or Human Papillomavirus (HPV) Vaccine		
– yes	0	0.0
– No	36	100
Age at marriage (mean ± SD)	20.75±2.55 years	
Marriage duration (mean ± SD)	3.66±1.95 years	

Gravidity (mean ± SD)	1.41±1.05 times	
Parity (mean ± SD)	1.00±1.14 times	

Basic data and reproductive history of the study participants are depicted in Table 1. About 77.2% of participants were more than 20 years old, with a mean age of 24.08±3.37 years. A great proportion (88.9%) of the participants were urban areas residents, and 91.7% were University students. The results further showed that 41.7% of the participants' mothers were read and write. A small percentage (16.7% and 8.35%) of the participants reported a family history of any cancer and CC, respectively. Besides, 66.7% of the participants reported current use of contraception**.** None of the participants had a history of Pap smear screening or HPV Vaccine. Furthermore, the mean age of marriage was 20.75±2.55 years and marriage duration 3.66±1.95 years. The participants mean gravidity and parity were 1.41±1.05 and 1.00±1.14, respectively.

Table 2: Study Participants' knowledge about CC (N= 36)

Participants' Knowledge	Incorrect answer		Incomplete		Correct answer	
	N	%	N	%	N	%
- CC Definition	25	69.4	-	-	11	30.6
- CC symptoms	18	50.0	12	33.3	6	16.7
- CC Risk factors	20	55.6	9	25.0	7	19.4
- CC diagnostic measures	24	66.7	7	19.4	5	13.9
- CC treatment modalities	28	77.8	4	11.1	4	11.1
- CC preventive measures	21	58.3	10	27.8	5	13.9
- Is human papilloma virus the common cause of CC	24	66.7	-	-	12	33.3
- Frequency for cervical cancer screening	21	58.3	-	-	15	41.7
- CC is curable if detected early	23	63.9	-	-	13	36.1
- Girls should be vaccinated against human papillomavirus	27	75.0	-	-	9	25.0
- CC can be prevented	24	66.7	-	-	12	33.3

Table 2 shows that 16.7% and 19.4% of the participants reported a correct answer regarding cervical cancer symptoms and risk factors, respectively. Only 13.9% of participants had correct knowledge about the CCs' diagnostic and preventive measures. The participants who had correct knowledge about the human papillomavirus as the comments cause of CC and the frequency for cervical cancer screening were 33.3% and 41.7%, respectively. Around one-tens (11.1%) of the participants knew about CC treatment modalities. More than one-third (36.1%) of the participants reported that CC is curable if early detected, and 33.3% of them knew that CC could be prevented. Also, 25.0% of the participants stated that the girls should be vaccinated against the human papillomavirus.

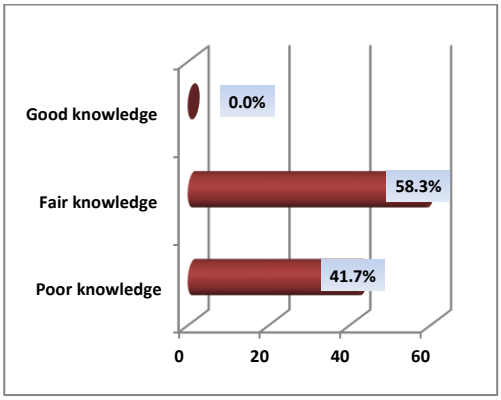

Figure 1: Participants overall knowledge (n=36)

It's clear from the fig. 1 that more than half (58.35%) of the participants had fair knowledge regarding CC, and 41.7% of them had poor knowledge.

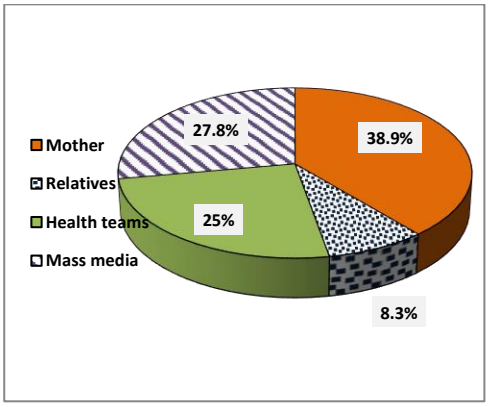

Figure 2: the participants' source of knowledge regarding CC (n=36)

Fig. 2 shows that the major source of CC knowledge was the mother (38.9%), followed by media and health team 27.8% and 25%, respectively.

Table 3: Participants' health beliefs regarding cervical cancer (N= 36)

HBM constructs	Low		Moderate		High	
	N	%	N	%	N	%
Perceived susceptibility	25	69.4	11	30.6	0	0
Perceived seriousness	16	44.4	9	25.0	11	30.6
Barriers to Pap smear test	6	16.7	13	36.1	17	47.2
Benefits of Pap smear test	12	33.3	24	66.7	0	0
Health motivation	15	41.7	18	50.0	3	8.3
Behavior intention	14	38.9	16	44.4	6	16.7
Total HBM score	12	33.3	21	58.3	3	8.3

Table 3 illustrates that 69.4% and 44.4% of the study participants had low perceived susceptibility and perceived seriousness to cervical cancer, respectively. Besides, 47.2% had high barriers to Pap smear test, and 66.7% had moderate benefits to Pap smear test. Also, 50% and 44.4% of the participants had moderate health motivation and intention to perform cervical cancer screening, respectively.

Table 4: Bivariate correlations analysis between the study variables.

		1	2	3	4	5	6
1. Overall knowledge	r						
	p-value						
2. Perceived susceptibility	r	.769**					
	p-value	.000					
3. Perceived seriousness	r	.351*	.664**				
	p-value	.036	.000				
4. Barriers to Pap smear test	r	-.222	-.651**	-.785**			
	p-value	.193	.000	.000			
	r	.210	.612**	.816**	-.597**		

5. Perceived benefits to Pap smear test	p-value	.218	.000	.000	.000		
6. Health motivation	r	.867**	.428**	.428**	-.572**	.710**	
	p-value	.000	.009	.009	.000	.000	
7. Behavior intention	r	.353*	.394*	.748**	-.554**	.927**	.675**
	p-value	.035	.018	.000	.000	.000	.000
*. Correlation is significant at the 0.05 level, **. Correlation is significant at the 0.01 level.							

Bivariate correlations analysis between the study variables shows that there were statistically significant correlations between the participants' overall CC knowledge and their perceived susceptibility (r=0.769, p=0.00), perceived seriousness (r=0.0.351, p=0.036), health motivation (r=0.867, p=0.00) and screening behaviors intention (r=0.353, p=0.035). Other positive significant correlations were observed between behavior intension and four HBM constructs; perceived susceptibility (r=.394, P= 0.018), seriousness (r=.748, P=0.000), benefits of Pap smear test, (r= .927, p=0.000) health motivation (r=0.675, p=0.000) and negative significant correlation with perceived barriers (r= -0.554, p= 0.000). Significant correlations were found between all HBM constructs (p< 0.05).

Discussion

The current study results indicated that none of the participants had a history of Pap smear screening or HPV Vaccine. This result indicates the low utilization of CC screening and preventive measures, especially for the marginalized deaf populations. In accordance with our study findings, Hill et al. assessed the need for providing culturally congruent care for deaf cancer patients. They concluded that the deaf patient utilization of cancer screening services is very low and, therefore, they are in urgent need of deaf suitable cancer services [16]. On the contrary, Wollin & Elder studied mammogram and Pap smears uptake among deaf Australian females. Surprisingly, they reported that most of their participants had mammograms and Pap smears at the appropriate time. They explained that the minority of deaf populations have special attention and care from health care providers [17]. The differences between the current study findings and the Wollin & Elder study may be attributed to different cultures. In KSA, sexual relation is restricted within the marriage framework, so the Pap smear screening and the HPV vaccine are uncommon. Furthermore, the deaf marginalized population have low awareness about the available preventive and screening services. Fang et al., 2016 investigated Pap smear utilization and barriers among women with visual disabilities. They found that nearly two-fifths of their study participants had Pap smears at a minimum age of 38.8 years at the time of performance [18]. The difference between the present study results and that of Fang et al. may be related to the difference in the participants' age, where the mean age of the current study participants was 24.08 years. The current study results revealed that more than one-half of the participants had fair knowledge regarding CC and the remaining study participants had poor knowledge. The deaf participant CC knowledge was much lower than expected at the same time; none of them had good knowledge. These findings reflect the urgent need to raise deaf population awareness about different health problems and their available preventive and screening services. In the same line with the current study, Spellun et al. explored the deaf adults' knowledge about the effectiveness of the HPV vaccine in preventing CC. They concluded that the deaf population had poor knowledge about CC and HPV vaccine compared to the normal-hearing population [12]. In addition, Jensen et al. conducted a video-based educational program for the deaf population to increase their awareness about gynecological cancer. They reported that the deaf population females had poor knowledge concerning gynecological cancer before the program compared to the normal-hearing population. They further elaborated that deaf population knowledge

significantly increased after the educational video. They added that the deaf populations are deprived of health education programs about cancers and need more efforts in this regard [11]. Besides, Wang et al. studied the role of health locus control in the prediction of CC knowledge among deaf women. The reported low level of CC knowledge among deaf populations before the intervention did not improve over time [10]. Moreover, Orsi et al. explored cancer-related knowledge, attitude, and screening behaviors among the deaf population. They stated that deaf women's knowledge regarding Pap smear was low, while the proportion of ever-hearing about it was comparable to normal hearing females [19]. The current study's findings should raise the awareness of the cancer-preventive services in KSA to pay more attention to minority populations with different types of disabilities. The current study results indicated that health beliefs related to CC and its screening test among deaf and hard-hearing married females were lower than expected. More than two-thirds of the participants perceived low CC susceptibility, and nearly half of them perceived that CC is a low-risk disease. Also, around half of them had high perceived barriers and moderate health motivation and benefits of Pap smear test. Besides, more than one-third of them reported a low intention to undergo CC screening. Thus, these low beliefs may contribute to the lack of utilization of screening tests, as none of the participants had previously performed the Pap test. The findings also confirmed significant positive correlations between participants' behavior intension to CC screening test and their perceived susceptibility, seriousness, benefits of Pap smear test, health motivation, and significant negative correlation with the perceived barriers. These findings are in line with the study conducted by Bayu et al. to assess factors associated with CC screening measures uptake using HBM. The study concluded that Pap smear utilization was associated with higher perceived susceptibility and seriousness [20]. Also, Sumarmi et al. showed that the participants with higher intention to utilize Pap smear had higher perceived susceptibility, seriousness, benefits of Papanicolaou smear test, health motivation, and lower perceived barriers concerning screening test compared to the participants with lower intention scores [21]. The higher participant's perceived barriers score has been associated with, the lower uptake of the CC screening test [22]. In contrast, the study conducted in the KSA by Aldohaian et al. reported high benefits of Papanicolaou smear test and health motivation scores and a low of perceived barriers scores among Saudi females regarding CC screening [23]. This discrepancy could be attributed to the lack of CC knowledge among deaf participants in the current study. In contrast, the Aldohaian et al. study was conducted on normal hearing women who are supposed to have sufficient knowledge about the disease. It is worth mentioning that this is the first study that used HBM to evaluate deaf population beliefs regarding CC; hence all comparative studies were conducted on normal-hearing populations in this regard. The current study findings showed positive statistically significant correlations between the participants' overall CC knowledge and their perceived susceptibility, seriousness, health motivation, and intention of screening behaviors. Similarly, Shirazi et al. performed a cross-sectional research to assess the preventive behavior for CC using HBM. They observed significant positive correlations between the women' knowledge score and the main HBM constructs scores as perceived susceptibility, seriousness, health motivation, benefits of Pap smear test and behaviors intention [24]. In addition, Hoque et al. reported that the participants who had a higher behavior intention score to Pap smear had significantly higher knowledge and health motivation scores than participants with lower scores [25]. Additionally, a survey done by Shojaeizadeh et al. to evaluate the impact of an educational intervention to increase CC screening behavior among Iranian women produced similar results [26]. Therefore, to increase the deaf and hard-hearing women' knowledge and increase their utilization of CC screening tests, active steps are needed to develop HBM based educational interventions. The HBM educational programs may empower this marginalized group and positively affect their attitudes and beliefs.

Limitations of the study

The current study has some limitations. First, data were gathered from deaf and hard-hearing married

females living in Tabuk city; the homogeneity of the study population may restrict the results generalizability to other deaf females living in Saudi Arabia. Second, a cross-sectional design was followed in the current study; therefore, no causal relationships could be drawn. To accommodate with such limitations, further studies are recommended in different geographical areas in KSA that include different segments of deaf Saudi populations.

Conclusion

None of the participants had a history of Papanicolaou smear screening or HPV Vaccine. More than half of the deaf and hard-hearing population had fair knowledge about CC, and the remaining had poor knowledge. Health beliefs related to CC and its screening test were lower than expected. Bivariate correlations showed statistically significant correlations between the participants' overall CC knowledge and their perceived susceptibility, seriousness, health motivation, and screening behaviors intention. Other significant correlations were observed between the other HBM constructs and the intention to practice CC screening. Based on the current study findings, there is a critical demand to raise deaf population awareness regarding CC through HBM based educational interventions using sign language.

Data availability statement

We sated that all data will be available in the case of paper accepted

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Conflict of interest disclosure

No conflict of interest

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Consent for Publications

The authors have read and approve the publication of the manuscript in its current form.

Conflict of Interests

None.

References

(1) Reichheld A, Mukherjee PK, Rahman SM, David KV, Pricilla RA. Prevalence of Cervical Cancer Screening and Awareness among Women in an Urban Community in South India-A Cross Sectional Study. Ann Glob Health. 2020 Mar 16; 86(1): 30, doi: 10.5334/aogh.2735. PMID: 32211300; PMCID: PMC7082824.

(2) Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX, de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Saudi Arabia. Summary Report 22 October 2021.

(3) WHO. Human papillomavirus (HPV) and cervical cancer 2016, http://www.who.int/mediacentre/factsheets/fs380/en/.

(4) Al-Mandeel HM, Sagr E, Sait K, Latifah HM, Al-Obaid A, Al-Badawi IA, et al. Clinical practice guidelines on the screening and treatment of precancerous lesions for cervical cancer prevention in Saudi Arabia. Ann Saudi Med. 2016; **36**: 313-320, doi: 10.5144/0256-4947.2016.313.

(5) Andresen EM, Peterson-Besse JJ, Krahn GL, Walsh ES, Horner-Johnson W, Iezzoni LI. Pap, mammography, and clinical breast examination screening among women with disabilities: a systematic review. Womens Health Issues. 2013 Jul-Aug; 23(4): e205-14, doi: 10.1016/j.whi.2013.04.002. PMID: 23816150; PMCID: PMC4452940.

(6) WHO. Deafness and hearing loss. 2022, https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss

(7) Alyami H, Soer M, Swanepoel A, Pottas L. Deaf or hard of hearing children in Saudi Arabia: Status of early intervention services. Int. J. Pediatr. Otorhinolaryngol. 2016; 86:142-149, doi: 10.1016/j.ijporl.2016.04.010.

(8) Al-Rowaily MA, Alfayez AI, AlJomiey MS, Albadr AM, Abolfotouh M. Hearing impairments among Saudi preschool children. Int. J. Pediatr. Otorhinolaryngol. 2012; 76: 1674-1677, doi: 10.1016/j.ijporl.2012.08.004.

(9) Xu X, Mann JR, Hardin JW, Gustafson E, McDermott SW, Deroche CB. Adherence to US Preventive Services Task Force recommendations for breast and cervical cancer screening for women who have a spinal cord injury. J Spinal Cord Med. 2017; 40(1): 76-84, doi: 10.1080/10790268.2016.1153293. Epub 2016 Mar 8. PMID: 27077580; PMCID: PMC5376149.

(10) Wang R, Aldridge AA, Malcarne VL, Choe S, Branz P, Sadler GR. Health locus of control and assimilation of cervical cancer information in Deaf women. J Cancer Educ. 2010; 25(3): 354-9, doi: 10.1007/s13187-010-0053-6. Epub 2010 Mar 6. PMID: 20229077; PMCID: PMC2933801.

(11) Jensen LG, Nakaji M, Harry KM, Gallegos N, Malcarne VL, Sadler GR. Ovarian cancer: Deaf and hearing women's knowledge before and after an educational video. J Cancer Educ. 2013; 28(4): 647-55, doi: 10.1007/s13187-013-0529-2. PMID: 23975658; PMCID: PMC3815506.

(12) Spellun AH, Moreland CJ, Kushalnagar P. Young Deaf Adults' Knowledge of Human Papillomavirus and Human Papillomavirus Vaccine's Effectiveness in Preventing Cervical, Anal, Penile, and Oral Cancer. J Pediatr Adolesc Gynecol. 2019; 32(3): 293-299, doi: 10.1016/j.jpag.2018.11.013. Epub 2018 Dec 7. PMID: 30529699; PMCID: PMC6555690.

(13) O'Hearn A. Deaf women's experiences and satisfaction with prenatal care: a comparative study. Fam Med. 2006; 38(10): 712-6. PMID: 17075744.

(14) Darvishpour A, Vajari SM, Noroozi S. Can Health Belief Model Predict Breast Cancer Screening Behaviors? Open Access Maced J Med Sci. 2018; 6(5): 949-953, doi: 10.3889/oamjms.2018.183. PMID: 29875878; PMCID: PMC5985873.

(15) Guvenc G, Akyuz A, Açikel CH. Health Belief Model Scale for Cervical Cancer and Pap Smear Test: psychometric testing. J Adv Nurs. 2011; 67(2): 428-37, doi: 10.1111/j.1365-2648.2010.05450.x. Epub 2010 Oct 15. PMID: 20946564.

(16) Hill C, Deville C, Alcorn S, Kiess A, Viswanathan A, Page B. Assessing and Providing Culturally Competent Care in Radiation Oncology for Deaf Cancer Patients. Adv Radiat Oncol. 2020; 5(3): 333-344, doi: 10.1016/j.adro.2020.02.007. PMID: 32529126; PMCID: PMC7276674.

(17) Wollin J, Elder R. Mammograms and Pap smears for Australian deaf women. Cancer Nurs. 2003; 26(5): 405-9, doi: 10.1097/00002820-200310000-00010. PMID: 14710803.

(18) Fang WH, Yen CF, Hu J, Lin JD, Loh CH. The utilization and barriers of Pap smear among women with visual impairment. Int J Equity Health. 2016; 15: 65, doi: 10.1186/s12939-016-0354-4. PMID: 27068132; PMCID: PMC4828796.

(19) Orsi JM, Margellos-Anast H, Perlman TS, Giloth BE, Whitman S. Cancer screening knowledge, attitudes, and behaviors among culturally Deaf adults: implications for informed decision making. Cancer Detect Prev. 2007; 31(6): 474-9, doi: 10.1016/j.cdp.2007.10.008. PMID: 18061367.

(20) Bayu H, Berhe Y, Mulat A, Alemu A. Cervical Cancer Screening Service Uptake and Associated Factors among Age Eligible Women in Mekelle Zone, Northern Ethiopia, 2015: A Community Based Study Using Health Belief Model. PLoS One. 2016; 11(3): e0149908, doi:10.1371/journal.pone.0149908. PMID: 26963098; PMCID: PMC4786115.

(21) Sumarmi S, Hsu YY, Cheng YM, Lee SH. Factors associated with the intention to undergo Pap smear testing in the rural areas of Indonesia: a health belief model. Reprod Health. 2021; 18(1): 138, doi: 10.1186/s12978-021-01188-7. PMID: 34193195; PMCID: PMC8244128.

(22) Karimy M, Azarpira H, Araban M. Using Health Belief Model Constructs to Examine Differences in Adherence to Pap test Recommendations among Iranian Women. Asian Pac J Cancer Prev. 2017; 18(5): 1389-1394, doi: 10.22034/APJCP.2017.18.5.1389. PMID: 28612592; PMCID: PMC5555552.

(23) Aldohaian AI, Alshammari SA, Arafah DM. Using the health belief model to assess beliefs and behaviors regarding cervical cancer screening among Saudi women: a cross-sectional

observational study. BMC Womens Health. 2019; 19(1): 6, doi: 10.1186/s12905-018-0701-2. PMID: 30621680; PMCID: PMC6323726.

(24) Shirazi Zadeh Mehraban S, Namdar A, Naghizadeh MM. Assessment of Preventive Behavior for Cervical Cancer with the Health Belief Model. Asian Pac J Cancer Prev. 2018; 19(8): 2155-2163, doi: 10.22034/APJCP.2018.19.8.2155. PMID: 30139219; PMCID: PMC6171406.

(25) Hoque ME, Ghuman S, Coopoosmay R, Van Hal G. Cervical cancer screening among university students in South Africa: a theory based study. PLoS One. 2014; 9(11): e111557, doi: 10.1371/journal.pone.0111557. PMID: 25387105; PMCID: PMC4227671.

(26) Shojaeizadeh D, Hashemi SZ, Moeini B, Poorolajal J. The Effect of Educational Program on Increasing Cervical Cancer Screening Behavior among Women in Hamadan, Iran: Applying Health Belief Model. J Res Health Sci. 2011; 11(1): 20-5, PMID: 22911943.