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ORIGINAL RESEARCH

Public Awareness and Perceptions of Congenital Disabilities in Saudi Arabia: A Cross-Sectional Study

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Objective: This cross-sectional study aimed to assess the public awareness, knowledge, and perception of congenital disabilities in Saudi Arabia, with a focus on identifying demographic factors that influence these perceptions.

Methods: A structured questionnaire was distributed to 1007 participants across various regions of Saudi Arabia. The questionnaire covered demographic information, knowledge of congenital disabilities, awareness of genetic and pharmacological risk factors, and engagement in preventive practices. Statistical analysis included descriptive statistics, correlation coefficients, and general linear modeling to understand the impact of demographic variables on awareness and preventive behaviors.

Results: The study showed moderate public awareness and knowledge about congenital disabilities, with 49.6% of respondents acknowledging awareness and only 8.3% demonstrating excellent understanding. Perceived risks associated with genetic and environmental factors were recognized by over half of the participants. The awareness did not consistently translate into engagement in preventive practices, which remained suboptimal across the population. Demographic factors such as age and having children significantly influenced both risk perception and engagement in preventive behaviors.

Conclusion: Despite moderate levels of awareness, there remains a significant gap in comprehensive knowledge and active engagement in preventive practices against congenital disabilities in Saudi Arabia. The findings suggest the need for targeted educational programs and public health initiatives to enhance understanding and proactive management of risk factors associated with congenital disabilities. These efforts should particularly focus on younger populations and those without children, where risk perception and engagement were lower.

Keywords: congenital disabilities, public awareness, risk perception, preventive health behaviors, Saudi Arabia

Introduction

Birth defects are structural or functional anomalies that occur during intrauterine life and can be detected at birth, during pregnancy, or afterward.[1–3] Globally, congenital disabilities affect approximately 3% to 6% of infants and contribute significantly to pediatric morbidity and mortality.[4] The etiology of these conditions is often multiple factors, with genetic, environmental, and behavioral risk factors playing critical roles.[5] In Saudi Arabia, the prevalence and impact of congenital disabilities are particularly significant, requiring comprehensive public health strategies aimed at prevention and early intervention.[6–8] The importance of public awareness and understanding of congenital disabilities is crucial for the effective prevention and management of these conditions.[9,10] Previous studies have shown that high levels of public knowledge and awareness correlate positively with the engagement in preventive behaviors and the utilization of healthcare services.[11–13] However, regardless of the advancements in healthcare and the availability of genetic counseling and prenatal screening technologies, gaps in public awareness and misconceptions about congenital disabilities persist. These gaps can reduce effective prevention programs and lead to lower outcomes for affected individuals and their families.

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Congenital disabilities include a wide range of physical and metabolic anomalies, which can vary from mild to life-threatening.[3] Common examples include neural tube defects, Down syndrome, heart defects, limb malformations, and cleft lip and palate.[3,14–17] The incidence of these conditions can be influenced by genetic factors, such as consanguinity, which is particularly prevalent in the Middle Eastern region, including Saudi Arabia.[18–20] The public health implications of congenital disabilities are substantial. They place a great burden on healthcare systems, families, and communities.[21] Therefore, effective prevention and management of congenital disabilities which involves early detection through prenatal screening, genetic counseling, and the adoption of preventive health behaviors.[22–26] Thus, public awareness and education are essential to encourage these practices. However, the effectiveness of such interventions heavily depends on the level of social awareness and the cultural acceptance of these preventive measures.

In Saudi Arabia, several factors contribute to the public's perception and knowledge of congenital disabilities.[6,27,28] Thus, it is important to explore the current state of knowledge, awareness, and perceptions regarding congenital disabilities among the Saudi population to identify public health interventions. In addition, cultural perceptions towards disabilities can influence both the stigma associated with these conditions and the engagement in preventive behaviors. The primary objective of this study was to assess the level of awareness, knowledge, and risk perception of congenital disabilities among the Saudi public. Additionally, the study aimed to explore demographic factors such as age, gender, education level, and region of residence as potential influences of public perceptions and knowledge. This understanding could help in shaping public health interventions that are effective and culturally appropriate.

Methods

Study Design and Setting

This cross-sectional study was conducted across various regions of Saudi Arabia, including the Central, Northern, Southern, Western, and Eastern regions between November and December 2024. The study aimed to assess the level of public awareness, knowledge, and perceptions regarding congenital disabilities within the Saudi population. This geographical diversity ensures the study captures a broad display of cultural, socioeconomic, and educational backgrounds, providing a comprehensive overview of the national perspective on congenital disabilities.

Participants and Data Collection Instrument

Participants were recruited using a convenience sampling technique included Saudi nationals aged 18 years and older, able to provide informed consent. The questionnaire was initially developed in English, based on a review of the literature and existing instruments previously validated in similar contexts. To ensure accuracy and consistency, the English questionnaire was translated into Arabic following standard translation and back-translation procedures. This process was conducted by bilingual experts to maintain the accuracy and contextual integrity of the survey items. The questionnaire consist of several sections, including demographic data, awareness of congenital disabilities, knowledge about their causes and preventability, and engagement in preventive practices. The instrument was pilot tested on a small sample to ensure clarity, relevance, and cultural appropriateness, with necessary adjustments made based on feedback.

Questionnaire Administration

Data collection was conducted using Google Forms, which facilitated broader reach and easier access for participants across various regions. This online method allowed participants to complete the questionnaire at their convenience, enhancing the response rate and reducing potential biases associated with face-to-face interviews. The link to the Google Form was distributed via email, social media platforms, and through local community organizations to ensure a wide and diverse participant base.

Ethical Considerations

The study protocol was reviewed and approved by the Biomedical Research Ethics Committee at Umm Al-Qura University (Approval No. HAPO-02-K-012-2024-10-2325) and was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical Analysis, Reliability and Validity

Data analysis was performed using IBM SPSS Version 27. A descriptive statistics were performed to summarize categorical and continuous variables and developed the Congenital Disabilities Awareness and Preparedness Index (CDAPI), which consists of four subdomains: Awareness, Knowledge, Risk Perception, and Engagement in Preventive Practices. Each subdomain was scored based on responses to relevant questions, with total possible scores ranging from 0 to 30 across the index. Comparisons between demographic groups were made using independent *t*-tests and one-way ANOVA with post hoc LSD tests, as appropriate. A General Linear Model was utilized to identify predictors of CDAPI scores. Statistical significance was considered at $p < 0.05$. The reliability of the survey instrument was confirmed using Cronbach's alpha to assess internal consistency. Construct validity was examined through factor analysis to ensure the questionnaire accurately reflected the constructs of awareness, knowledge, and risk perception.

Results

The study surveyed 1,007 participants from diverse demographic backgrounds across various regions in Saudi Arabia, as detailed in Table 1. The demographic distribution included a significant representation from the age groups 25–31

Table 1 Demographics of the Study Participants

Demographics		Count	%
Total		1007	100.0
Age	18–24	138	13.7
	25–31	314	31.2
	32–38	377	37.4
	More than 38	178	17.7
Gender	Male	447	44.4
	Female	560	55.6
Educational Level	Less than high school	135	13.4
	High School	316	31.4
	Bachelor's degree	327	32.5
	Master	163	16.2
	PH.D	66	6.6
Region of Residence in Saudi Arabia	Central	310	30.8
	Northern	70	7.0
	Southern	201	20.0
	Western	155	15.4
	Eastern	271	26.9
Marital Status	Single	177	17.6
	Married	398	39.5
	Divorced	274	27.2
	Widowed	158	15.7
Do you have children?	Yes	513	50.9
	No	494	49.1

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(31.2%) and 32–38 (37.4%), with a slight majority of female participants (55.6%). Education levels varied widely, showcasing a cross-section of the Saudi population. Approximately half of the participants (49.6%) were aware of congenital disabilities (Table 2). Awareness levels ranged from no understanding (11.8%) to excellent (8.3%). The primary perceived contributors to congenital disabilities, as shown in Figure 1, included medication/drug use during pregnancy (51.3%), lifestyle factors such as diet and exercise (49.8%), and environmental factors like pollution (48.0%).

Regarding the preventability of congenital disabilities, 38.3% believed they were preventable, while 40.7% did not, and 21.0% were unsure (Table 2). Familiarity with specific types of congenital disabilities varied, with 50.0% familiar with neural tube defects and lower familiarity with other types such as limb deformities (31.3%) (Figure 2). A majority (56.4%) believed that genetic factors could increase the risk of congenital disabilities. However, only 42.5% were aware

Table 2 Participant Awareness and Knowledge of Congenital Disabilities

Variables		**Count**	**%**
Total		1007	100.0
Have you heard of congenital disabilities before?	Yes	499	49.6
	No	508	50.4
How would you rate your understanding of congenital disabilities?	No understanding	119	11.8
	Limited understanding	297	29.5
	Moderate understanding	344	34.2
	Good understanding	163	16.2
	Excellent understanding	84	8.3
Which of the following do you believe can contribute to the development of congenital disabilities?[a]	Genetic factors	389	38.6
	Environmental factors (eg, pollution)	483	48.0
	Medication/drug use during pregnancy	517	51.3
	Lifestyle factors (eg, diet, exercise)	501	49.8
	Not sure	132	13.1
Do you believe congenital disabilities are preventable?	Yes	386	38.3
	No	410	40.7
	Not sure	211	21.0
Which types of congenital disabilities are you familiar with?[a]	Cleft lip/palate	415	41.2
	Down syndrome	381	37.8
	Heart defects	370	36.7
	Limb deformities	315	31.3
	Neural tube defects (eg, spina bifida)	503	50.0
	Not sure	101	10.0

Notes: [a]-Multiple-answer questions: avoid from adding counts and percentages.

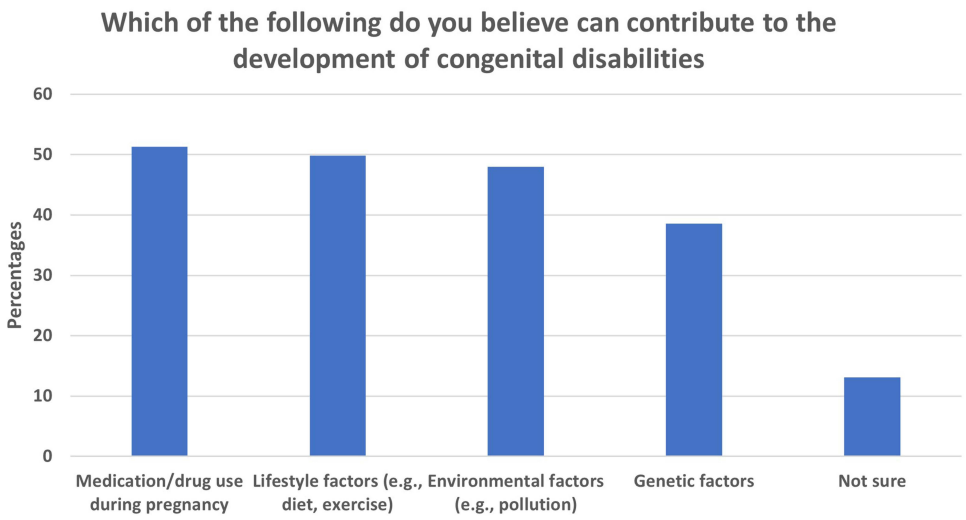

Figure 1 Perceived Contributors to the Development of Congenital Disabilities Among Study Participants.

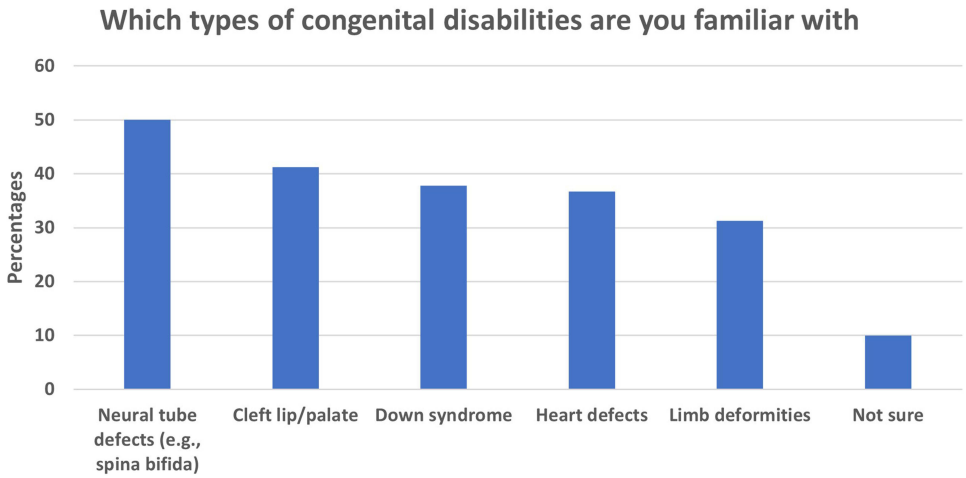

Figure 2 Public Familiarity with Different Types of Congenital Disabilities.

of genetic screening or counseling services available in Saudi Arabia (Table 3). Regarding personal consideration of genetic counseling, 43.2% were in favor if there was a family history of congenital disabilities.

Participants showed moderate awareness of the pharmacological risks associated with fetal development, with 46.5% acknowledging that certain medications could impact fetal development. Despite this awareness, only 44.3% were aware of specific medications that should be avoided during pregnancy (Table 3). Engagement varied, with 50.9% aware of the benefits of folic acid and 48.0% willing to consider lifestyle changes to prevent congenital disabilities. Consulting a healthcare provider before taking any medication during pregnancy was considered by 42.4% of respondents (Figure 3). Awareness correlated positively with knowledge, whereas risk perception showed negative correlations with both awareness and knowledge. Engagement in preventive practices correlated positively with risk perception

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Table 3 Public Awareness of Genetic and Pharmacological Factors Related to Congenital Disabilities

Variables		Count	%
Total		1007	100.0
Do you believe that genetic factors (such as family history) can increase the risk of congenital disabilities?	Yes	568	56.4
	No	365	36.2
	Not sure	74	7.3
Are you aware of any genetic screening or counseling services available in Saudi Arabia for those planning a family?	Yes	428	42.5
	No	450	44.7
	Not sure	129	12.8
Would you consider genetic counseling if you or your partner has a family history of congenital disabilities?	Yes	435	43.2
	No	372	36.9
	Not sure	200	19.9
Do you think that having a family history of certain diseases (eg, heart defects, Down syndrome) increases the likelihood of having a child with congenital disabilities?	Yes	446	44.3
	No	368	36.5
	Not sure	193	19.2
Are you aware of any national or local programs in Saudi Arabia that provide genetic testing or screening for families planning to have children?	Yes	624	62.0
	No	383	38.0
Are you aware that certain medications can impact fetal development and increase the risk of congenital disabilities?	Yes	468	46.5
	No	393	39.0
	Not sure	146	14.5
Would you consult a healthcare provider before taking any medication during pregnancy?	Yes	427	42.4
	No	399	39.6
	Not applicable	181	18.0
In your opinion, which of the following are risky medications or substances to take during pregnancy?[a]	Herbal remedies	511	50.7
	Over-the-counter pain relievers	387	38.4
	Prescription medications	509	50.5
	Supplements	456	45.3
	Not sure	196	19.5
Are you aware that some over-the-counter medications (eg, certain pain relievers) may carry risks for fetal development if taken during pregnancy?	Yes	475	47.2
	No	392	38.9
	Not sure	140	13.9
Have you heard of any specific medications or substances (eg, anti-seizure medications, certain antibiotics) that should be avoided during pregnancy due to potential risks to the fetus?	Yes, I am aware of specific medications	446	44.3
	No, I am not aware	439	43.6
	Not sure	122	12.1

(*Continued*)

Table 3 (Continued).

Variables		Count	%
Do you know that folic acid intake before and during pregnancy can reduce the risk of congenital disabilities?	Yes	513	50.9
	No	385	38.2
	Not sure	109	10.8
Would you consider changing lifestyle habits (eg, improving diet, avoiding smoking) if you knew it could prevent congenital disabilities?	Yes	483	48.0
	No	432	42.9
	Not sure	92	9.1
How often do you seek information on healthy pregnancy practices from healthcare professionals or reliable sources?	Never	141	14.0
	Rarely	288	28.6
	Often	197	19.6
	Sometimes	314	31.2
	Always	67	6.7
What do you believe are the most effective ways to prevent congenital disabilities?[a]	Avoiding harmful medications	541	53.7
	Genetic counseling	349	34.7
	Healthy lifestyle choices	461	45.8
	Improving environmental conditions	501	49.8
	Regular healthcare check-ups during pregnancy	303	30.1
	I do not know	102	10.1

Notes: [a]Multiple-answer questions: avoid from adding counts and percentages.

(Table 4). The most acknowledged effective strategies for preventing congenital disabilities included avoiding harmful medications, improving environmental conditions, and making healthy lifestyle choices, as detailed in Figure 4.

The mean scores for the subdomains of awareness, knowledge, and risk perception indicated moderate levels, while Engagement in preventive practices scored the lowest, suggesting room for improvement. The overall CDAPI score was

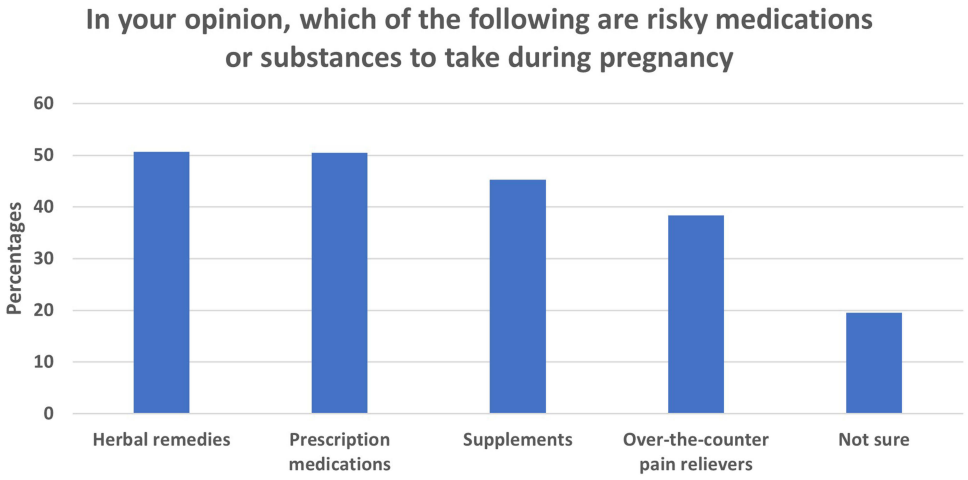

Figure 3 Perceptions of Risk Associated with Medications and Substances During Pregnancy.

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Table 4 Correlations Between Subdomains of the Congenital Disabilities Awareness and Preparedness Index

Domains		Knowledge	Risk Perception	Engagement in Preventive Practices
Awareness	r	0.062*	−0.111**	−0.103**
	p-value	0.048	0.000	0.001
	N	1007	1007	1007
Knowledge	r		−0.068*	0.022
	p-value		0.030	0.495
	N		1007	1007
Risk Perception	r			0.073*
	p-value			0.020
	N			1007

Notes: **Correlation is significant at the 0.01 level (2-tailed).* Correlation is significant at the 0.05 level (2-tailed).

15.41 ± 3.3, with 52.3% of participants categorized as having low awareness and preparedness (Table 5). Age significantly influenced risk perception and engagement in preventive practices (Table 6). The General Linear Model analysis identified age as a significant predictor of CDAPI scores, particularly for participants aged 25–31 and 32–38 (Table 7). The data reveals significant relationships for certain age groups (ages 25–31 and 32–38), while other demographic factors like gender and having children showed no significant impact (Table 8).

Discussion

This study showed a detailed examination of public awareness, knowledge, and preventive behaviors relating congenital disabilities in Saudi Arabia. By surveying 1,007 participants from different demographics. The findings revealed that moderate awareness does not necessarily translate into adequate knowledge or engagement in preventive practices. It was found that only 8.3% of respondents had an excellent understanding of congenital disabilities, underlining a critical gap in health education within the Saudi population. Although nearly half the participants recognized the term "congenital disabilities", their understanding does not extend beyond basic awareness. These points emphasize the need to enhance

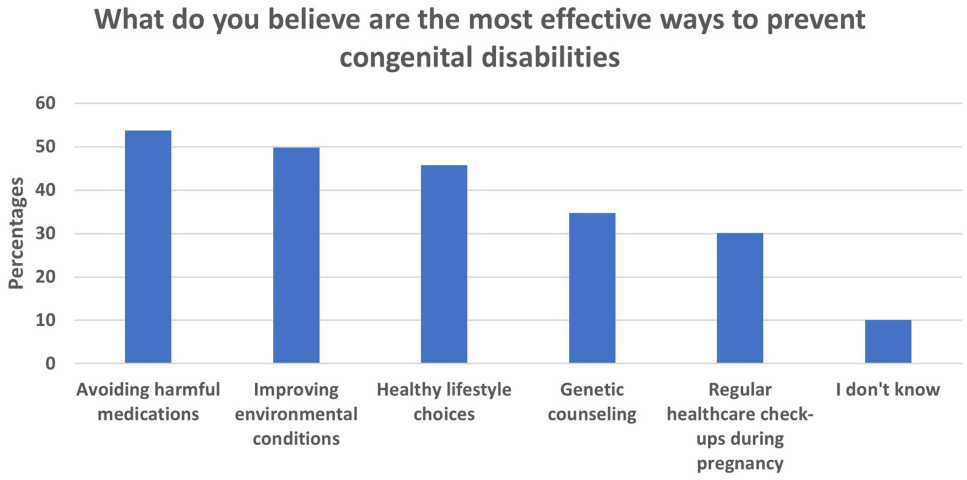

Figure 4 Public Perceptions of Effective Strategies to Prevent Congenital Disabilities.

Table 5 Summary of Subdomain Scores and Overall Congenital Disabilities Awareness and Preparedness Index

Variables n=1007		Min	Max	Mean	SD
Awareness		***0.0***	***8.0***	***4.28***	***1.8***
Have you heard of congenital disabilities before?		0.0	2.0	0.99	1.0
Are you aware of any genetic screening or counseling services available in Saudi Arabia for those planning a family?		0.0	2.0	0.98	0.9
Are you aware of any national or local programs in Saudi Arabia that provide genetic testing or screening for families planning to have children?		0.0	2.0	1.24	1.0
Are you aware that certain medications can impact fetal development and increase the risk of congenital disabilities?		0.0	2.0	1.07	0.9
Knowledge		***0.0***	***8.0***	***3.93***	***1.6***
How would you rate your understanding of congenital disabilities?		0.0	4.0	1.80	1.1
Do you know that folic acid intake before and during pregnancy can reduce the risk of congenital disabilities?		0.0	2.0	1.13	0.9
Have you heard of any specific medications or substances (eg, anti-seizure medications, certain antibiotics) that should be avoided during pregnancy due to potential risks to the fetus?		0.0	2.0	1.01	0.9
Risk Perception		***0.0***	***8.0***	***4.29***	***1.9***
Do you believe congenital disabilities are preventable?		0.0	2.0	0.98	0.9
Do you believe that genetic factors (such as family history) can increase the risk of congenital disabilities?		0.0	2.0	1.20	0.9
Would you consider genetic counseling if you or your partner has a family history of congenital disabilities?		0.0	2.0	1.06	0.9
Would you consider changing lifestyle habits (eg, improving diet, avoiding smoking) if you knew it could prevent congenital disabilities?		0.0	2.0	1.05	1.0
Engagement in Preventive Practices		***0.0***	***6.0***	***2.91***	***1.5***
How often do you seek information on healthy pregnancy practices from healthcare professionals or reliable sources?		0.0	4.0	1.88	1.2
Would you consult a healthcare provider before taking any medication during pregnancy?		0.0	2.0	1.03	0.9
Congenital Disabilities Awareness and Preparedness Index		***2.0***	***30.0***	***15.41***	***3.3***
			Count		%
Congenital Disabilities Awareness and Preparedness Index	Low awareness and preparedness		527		52.3
	High awareness and preparedness		480		47.7

Table 6 Demographic Influences on Subdomain Scores of the Congenital Disabilities Awareness and Preparedness Index

Demographics		Total	Awareness	Knowledge	Risk Perception	Engagement in Preventive Practices
Age	18–24	138	4.28 ± 2.0	3.84 ± 1.5	4.73 ± 1.8^{A}	2.69 ± 1.5^{A}
	25–31	314	4.29 ± 1.9	3.93 ± 1.7	4.31 ± 2.0^{B}	2.93 ± 1.5^{AB}
	32–38	377	4.33 ± 1.8	3.99 ± 1.6	4.22 ± 1.9^{B}	3.07 ± 1.5^{B}
	More than 38	178	4.16 ± 1.8	3.88 ± 1.5	4.06 ± 1.9^{B}	2.70 ± 1.4^{A}

(*Continued*)

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Table 6 (Continued).

Demographics		Total	Awareness	Knowledge	Risk Perception	Engagement in Preventive Practices
p-value			***0.771***	***0.775***	***0.014[a,b]***	***0.011[a,b]***
Gender	Male	447	4.37 ± 1.9	3.94 ± 1.6	4.23 ± 1.9	2.84 ± 1.5
	Female	560	4.21 ± 1.8	3.92 ± 1.7	4.34 ± 1.9	2.96 ± 1.5
p-value			***0.189***	***0.858***	***0.350***	***0.211***
Educational Level	Less than high school	135	4.57 ± 1.8	3.86 ± 1.5	4.47 ± 2.0	2.67 ± 1.4
	High School	316	4.28 ± 1.8	3.86 ± 1.7	4.31 ± 1.8	2.83 ± 1.5
	Bachelor's degree	327	4.17 ± 1.9	3.99 ± 1.6	4.13 ± 1.9	2.98 ± 1.5
	Master	163	4.25 ± 1.8	3.86 ± 1.7	4.45 ± 1.9	3.04 ± 1.5
	PH.D	66	4.35 ± 1.9	4.30 ± 1.8	4.24 ± 1.9	3.05 ± 1.4
p-value			***0.329***	***0.286***	***0.329***	***0.144***
Region of Residence in Saudi Arabia	Central	310	4.57 ± 1.8	3.86 ± 1.5	4.47 ± 2.0	2.67 ± 1.4
	Northern	70	4.28 ± 1.8	3.86 ± 1.7	4.31 ± 1.8	2.83 ± 1.5
	Southern	201	4.17 ± 1.9	3.99 ± 1.6	4.13 ± 1.9	2.98 ± 1.5
	Western	155	4.25 ± 1.8	3.86 ± 1.7	4.45 ± 1.9	3.04 ± 1.5
	Eastern	271	4.35 ± 1.9	4.30 ± 1.8	4.24 ± 1.9	3.05 ± 1.4
p-value			***0.297***	***0.816***	***0.205***	***0.250***
Marital Status	Single	177	4.28 ± 1.8	3.86 ± 1.7	4.36 ± 1.8	2.90 ± 1.6
	Married	398	4.26 ± 1.8	3.94 ± 1.6	4.38 ± 1.9	3.01 ± 1.5
	Divorced	274	4.37 ± 1.9	3.86 ± 1.6	4.34 ± 2.0	2.78 ± 1.4
	Widowed	158	4.18 ± 1.7	4.11 ± 1.6	3.91 ± 1.8	2.86 ± 1.4
p-value			***0.753***	***0.440***	***0.051***	***0.268***
Do you have children?	Yes	513	4.17 ± 1.9	3.91 ± 1.7	4.41 ± 1.9	2.90 ± 1.5
	No	494	4.40 ± 1.8	3.95 ± 1.6	4.17 ± 1.9	2.91 ± 1.5
p-value			***0.043[c]***	***0.676***	***0.044[c]***	***0.861***

Notes: asignificant using One-Way ANOVA Test at <0.05 level. b-Post-Hoc Test = LSD. c-significant using Independent *t*-test at <0.05 level.

Table 7 General Linear Model Analysis of Predictors for the Congenital Disabilities Awareness and Preparedness Index Scores

Dependent Variable: Congenital Disabilities Awareness and Preparedness Index					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**p-Value**
Corrected Model	222.757[a]	16	13.922	1.267	0.211
Intercept	129296.821	1	129,296.821	11,768.072	<0.001

(*Continued*)

Table 7 (Continued).

Dependent Variable: Congenital Disabilities Awareness and Preparedness Index					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**p-Value**
Age	83.887	3	27.962	2.545	0.055
Gender	0.143	1	0.143	0.013	0.909
Educational Level	45.719	4	11.430	1.040	0.385
Region of Residence	56.906	4	14.227	1.295	0.270
Marital Status	33.944	3	11.315	1.030	0.379
Do you have children?	2.277	1	2.277	0.207	0.649
Error	10877.215	990	10.987		
Total	250296.000	1007			
Corrected Total	11099.972	1006			

Notes: [a]R Squared = 0.020 (Adjusted R Squared = 0.004).

Table 8 Parameter Estimates for Demographic Predictors of Scores

Dependent Variable: Congenital Disabilities Awareness and Preparedness Index					
Parameter	**B**	**S.E.**	**95% Confidence Interval**		**p-Value**
			Lower Bound	**Upper Bound**	
Intercept	15.057	0.548	13.982	16.131	<0.001[a]
Age					
18–24	0.695	0.381	−0.054	1.443	0.069
25–31	0.628	0.315	0.010	1.246	0.046[a]
32–38	0.827	0.303	0.232	1.422	0.006[a]
Gender					
Male	−0.024	0.212	−0.441	0.393	0.909
Educational Level					
Less than high school	−0.438	0.506	−1.430	0.555	0.387
High School	−0.738	0.457	−1.634	0.159	0.107
Bachelor's degree	−0.750	0.455	−1.644	0.144	0.100
Master	−0.399	0.490	−1.360	0.562	0.416
Region of Residence					
Central	−0.054	0.279	−0.602	0.493	0.845
Northern	−0.042	0.452	−0.928	0.844	0.926
Southern	−0.020	0.312	−0.632	0.592	0.948
Western	0.634	0.338	−0.028	1.297	0.061

(*Continued*)

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Table 8 (Continued).

Dependent Variable: Congenital Disabilities Awareness and Preparedness Index					
Parameter	**B**	**S.E.**	**95% Confidence Interval**		**p-Value**
			Lower Bound	**Upper Bound**	
Marital Status					
Single	0.240	0.372	−0.490	0.971	0.519
Married	0.536	0.319	−0.090	1.161	0.093
Divorced	0.313	0.336	−0.346	0.972	0.351
Do you have children?					
Yes	−0.097	0.213	−0.514	0.320	0.649

Notes: [a]significant using General Linear Model at <0.05 level.

educational programs that not only elevate awareness but also expand understanding of congenital disabilities focusing on the causes, consequences, and preventive measures. In fact, studies have shown that effective educational strategies should be embedded within the local cultural context and utilize culturally appropriate messaging to effectively engage diverse demographic groups.[26,29,30] Therefore, improving educational content to address specific misconceptions and knowledge gaps in this study could help in significantly improving overall health literacy regarding congenital disabilities.

The difference between awareness and engagement in preventive practices could be attributed to several factors, including uncertainties about the effectiveness of preventive measures, inadequate access to genetic counseling and prenatal care, or prevalent cultural beliefs that may prevent proactive health behaviors. For example, although a significant number of participants acknowledged genetic factors as risks for congenital disabilities, less than half were aware of available genetic counseling services. This indicates substantial barriers to accessing or utilizing genetic services, suggesting a pressing need for public health initiatives that enhance service accessibility and public knowledge about these resources. Studies on access barriers to genetic services have highlighted multiple challenges. For instance, it has been reported that non-genetic healthcare professionals often lack awareness of genetic risk factors, adequate family history collection, and knowledge about genetics and genetic services, leading to inadequate referrals and mismanagement of patient care.[31] Also, affected individuals or those at risk often face personal barriers such as a lack of awareness of their own genetic risks, limited knowledge of their medical history, and insufficient awareness of available genetic services.[32] Furthermore, institutional barriers include issues such as coordination of care and insufficient genetic workforce, delaying efficient service delivery.[32] Overcoming these barriers requires targeted interventions to enhance the genetic competence of healthcare providers and public awareness of genetic conditions and services, supporting equitable access to genetic services across various populations.

The influence of demographic variables such as age and parenting status on awareness and engagement levels is great. Younger individuals and those without children show lower risk perception and engagement in preventive practices. In fact, it has been reported that mass media campaigns can benefit from incorporating interpersonal communication, which helps in tailoring messages to specific audiences, potentially increasing engagement and awareness among these groups.[33] Furthermore, it has been suggested that tailoring health messages to specific demographic groups can enhance their relevance and effectiveness. This emphasis that tailored interventions can be particularly effective in influencing behavior change.[34] Thus, highlighting the importance of targeted health communication strategies that specifically address groups less likely to engage with generic health messages, such as younger individuals and those without children. Therefore, to increase efficacy, strategies such as incorporating congenital disability education into school courses and utilizing digital media platforms popular among younger demographics which could potentially increase reach and efficacy. Additionally, family-oriented educational programs that offer information on congenital disabilities as part of prenatal care could engage potential and new parents more effectively. Therefore showing the importance of tailored messages, which consider

individual characteristics and situational contexts, can significantly enhance the relevance and impact of health communications, thereby improving engagement and preventive behaviors in targeted demographics.[35]

Cultural perceptions and social stigma associated with disabilities significantly influence public engagement with preventive practices.[36] In settings where disabilities might be stigmatized or misunderstood, individuals could be tentative to seek information or support for fear of social repercussions.[37] Initiatives that utilize community influencers to alter perceptions and encourage open discussions about congenital disabilities and their prevention could be highly effective in overcoming these cultural barriers.[38,39] Such community driven approaches can further greater acceptance and reduce stigma, making preventive practices more widely accepted.

The study's findings highlight a crucial need for policies supporting comprehensive public health education and enhanced prenatal care services that include genetic counseling and screening. Therefore, health policies should focus on integrating preventive care into primary health services, ensuring that knowledge and access to preventive measures are available across all population.[40,41] Thus, creating encouragements for healthcare providers to participate in public education and outreach efforts, to ensure that accurate information about congenital disabilities reaches the widest possible audience.

Nonetheless, further researches are needed to explore the specific barriers to engagement in preventive practices and to assess the effectiveness of different educational interventions across Saudi Arabia. Longitudinal studies could provide better understandings into how changes in public awareness and behavior might be achieved over time and how these changes impact the prevalence and management of congenital disabilities. Additionally, qualitative research could explore individual and community perceptions in more depth, providing deeper understanding of the cultural and social dynamics that influence health behaviors related to congenital disabilities.

Conclusion

This study highlighted a significant gap between awareness and practical engagement in preventive health behaviors concerning congenital disabilities in Saudi Arabia. Although there is moderate awareness, there is a clear lack of comprehensive knowledge and active engagement, influenced by demographic, cultural, and systemic factors. Bridging this gap requires concerted efforts from all relevant groups to implement educational and health service improvements that are culturally relevant and accessible to all segments of the Saudi population. By addressing these issues, it is possible to enhance the overall health outcomes and reduce the burden of congenital disabilities across the country.

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