

Knowledge, attitude, and practice toward type 2 diabetes screening among adults in Bisha province: A community-based cross-sectional study

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Abstract

Objective: To assess the knowledge, attitudes and practices of adult individuals regarding type 2 diabetes screening.

Method: The community-based, cross-sectional study was conducted from October 2023 to June 2024 after approval from the ethics review committee of Bisha College of Medicine, Saudi Arabia, and comprised adult residents of Bisha province regardless of gender. Data were collected using a structured questionnaire, and relationships between categorical variables and sociodemographic factors were explored. Data was analysed using SPSS 26.

Results: Of the 512 respondents, 316 (61.7%) were female, 383 (74.8%) lived in Bisha city, 299 (58.4%) were married, and 229 (44.7%) were aged 18-30 years. Overall, 288 (56.3%) subjects showed good knowledge of type 2 diabetes screening, 394 (77.2%) had a positive attitude, and 391 (76.4%) practiced screening well. Knowledge was linked to marital status ($\chi^2=13.13$, $p = 0.011$) and attitude toward education level ($\chi^2 = 8.5$, $p = 0.037$), while practice had significant associations with age ($\chi^2=41.05$, $p < 0.001$), education level ($\chi^2=15.78$, $p = 0.001$), and marital status ($\chi^2=29.35$, $p < 0.001$). Divorced individuals had lower odds of having good knowledge ($\chi^2 = 13.13$, $p = 0.011$). Participants aged 30 - <50 years had lower odds of good practices than those aged 18-30 years ($p=0.002$).

Conclusion: Knowledge of and attitudes towards type 2 diabetes screening were consistent across demographics, but practices varied. Improving community screening may require addressing behavioural and structural barriers, particularly for older adults, rather than just increasing awareness.

Keywords: Diabetes mellitus, Type 2, Mass screening, Health knowledge, Attitudes, Practice, Adult, Cross-sectional studies. (JPMA 76: 1711; 2026) DOI: <https://doi.org/10.47391/JPMA.21825>

Introduction

Diabetes mellitus (DM) is a chronic disease characterised by high blood sugar levels.¹ The most common type, the type 2 D (T2DM), involves elevated blood glucose levels, insulin resistance and reduced insulin secretion.² In Saudi Arabia, the prevalence of diabetes is 17.7%, making it a significant public health issue in the Middle East and North Africa (MENA) region.³ Factors such as genetics, obesity and a sedentary lifestyle play major roles in the development of T2DM.⁴ Screening methods include biochemical tests like venous or capillary glucose measurement, glycated haemoglobin (HbA1c) and urinary glucose analysis.⁵ Early screening can enable interventions before symptoms appear.⁶

The current study was planned to assess the knowledge, attitudes and practices (KAP) of adult individuals regarding T2DM screening.

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Subjects and Methods

The community-based, cross-sectional study was conducted from October 2023 to June 2024 after approval from the ethics review committee of Bisha College of Medicine, Saudi Arabia. The Bisha province is part of the Aseer Region in southwestern Saudi Arabia. Those included were adults aged 18 or older residing in Bisha province who were willing to participate voluntarily. Those excluded were diagnosed T2DM patients, and those with cognitive impairments and language barriers as well as those without access to social media. Incomplete questionnaire responses were also excluded.

The sample was raised through social media platforms using non-probability convenience sampling method after the sample size was calculated using the formula $n = (Z^2 * P * (1 - P)) / (d^2)$,⁷ where n was the minimum sample size, Z was the Z-value (2.58 for a 99% confidence level), P was the proportion of individuals with good practice (0.719),⁸ q was the complementary probability ($1 - P = 0.281$), and d was the margin of error (0.05).

Data were collected using an online questionnaire based on Google Forms that included an informed consent section. The standardized, self-administered questionnaire was adapted from a validated tool⁹ and included both a

dichotomous Yes/No scale and a five-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree". To address potential language issues, a detailed back-translation process was implemented: the English questionnaire was first translated into Arabic by a professional bilingual translator, then back-translated into English by a separate independent translator. The original and back-translated versions were compared meticulously to confirm that meaning and nuances were preserved, ensuring the questionnaire was culturally and linguistically suitable for the target population. Content validity was confirmed through expert review, leading to necessary revisions. Pilot-testing with a small group identified unclear questions and allowed for further improvement. Reliability was assessed using Cronbach's alpha, with a threshold of 0.70 indicating acceptable consistency.

The questionnaire was structured into three separate sections. The first section explored sociodemographic characteristics through 6 questions focusing on the participants' age, gender, education level, marital status, income and place of residence. The second section assessed the knowledge of the participants about T2DM and its screening, using 17 questions. Dichotomous questions allowed for a detailed assessment of each knowledge area. The third section explored attitude with 5 questions and practice with 7 questions regarding T2DM screening. Likert-scale questions assessed attitudes, while dichotomous questions gauged practices.

Participants' responses to dichotomous questions were scored as Yes = 1 and No = 2, for knowledge levels, which were categorised poor = <50% and good = 50% or above. With respect to practice, scores <60% were considered poor, indicating lack of regular screening and avoiding tests, while scores of 60% or higher were viewed as good.

Mean attitude scores on the Likert scale 3.85 or higher indicated a positive attitude towards T2DM screening, while a score <3.85 signified a negative attitude, reflecting misconceptions, fear, or a perceived lack of risk.

Data was exported to Excel 2010, and was analysed using SPSS 26. Data was expressed as mean +/- standard deviation, median with interquartile range (IQR), or frequencies and percentages, as appropriate. Chi-square and Fisher's exact tests identified significant links between demographics and KAP responses. Three multivariable logistic regression models were fitted with good knowledge, positive attitude, and good practice as dependent variables. The independent variables included age group, gender, marital status, education, occupation, and income (in Saudi Riyal [SAR]). $P < 0.05$ was considered statistically significant.

Results

Of the 512 respondents, 316 (61.7%) were female, 383 (74.8%) lived in Bisha city, 299 (58.4%) were married, and 229 (44.7%) were aged 18-30 years, followed by 193 (37.7%) aged 31-45 years and 83 (16.2%) aged 46-60 years. Most participants had primary or intermediate education (329; 64.3%), and income was fairly evenly distributed across the three categories.

Of the total, 393 (76.8%) respondents had heard about diabetes screening; 227 (44.4%) identified being 40 years or older as a risk factor; 296 (57.8%) recognized having first-degree relatives with diabetes as a risk factor; and 318 (62.1%) considered an inactive lifestyle a risk factor. The majority (404; 78.9%) recognized obesity or overweight as a risk factor, while 149 (29.1%) identified pregnancy and 318 (62.1%) viewed inactivity as a risk factor (Figure 1).

Regarding knowledge of T2DM screening, nearly half of the participants (224; 43.75%) demonstrated poor knowledge, and 288 (56.25%) had good knowledge. Most participants (394, 77.15%) held positive attitudes towards screening, while 118 (22.85%) held negative views. In terms of screening practices, 391 (76.37%) exhibited good practices, and 221 (23.36%) showed poor practices (Figure 2).

Knowledge of screening was significantly associated only

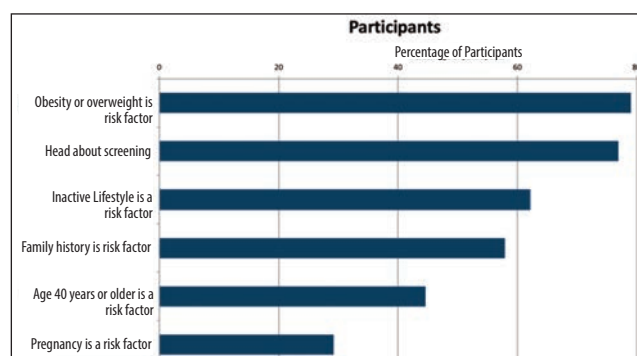


Figure-1: Participants' knowledge about diabetes screening and selected risk factors for type 2 diabetes mellitus.

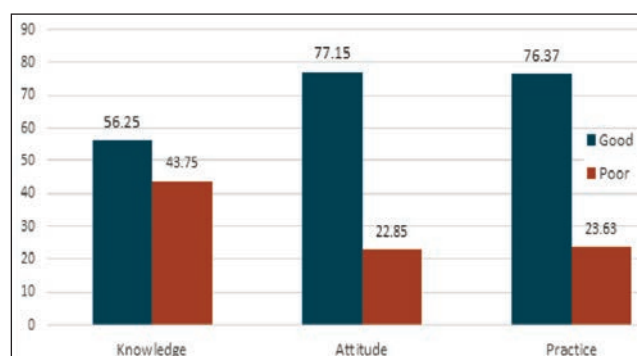


Figure-2: Participants' knowledge, attitudes and practices regarding type 2 diabetes screening.

Table 1: The association of socio-demographic characteristics with knowledge, attitude, and practice related to type 2 diabetes screening.

Variable	Items	Good	Poor	χ^2	p-value	Attitude +ve	-ve	χ^2	p-value	Practice Good	Poor	χ^2	p-value
Age	18-30	139 (60.7%)	90 (39.3%)	5.57	0.135	174 (76.0%)	55 (24.0%)	2.16	0.540	204 (89.1%)	25 (10.9%)	41.05	* <0.001
	31-45	100 (51.8%)	93 (48.2%)			151 (78.2%)	42 (21.8%)			133 (68.9%)	60 (31.1%)		
	46-60	47 (56.6%)	36 (43.4%)			66 (79.5%)	17 (20.5%)			51 (61.4%)	32 (38.6%)		
	Above 60	2 (28.6%)	5 (71.4%)			4 (57.1%)	3 (42.9%)			3 (42.9%)	4 (57.1%)		
Gender	Male	110 (56.1%)	86 (43.9%)	0	1.000	157 (80.1%)	39 (19.9%)	1.31	0.252	154 (78.6%)	42 (21.4%)	0.67	0.414
	Female	178 (56.3%)	138 (43.7%)			238 (75.3%)	78 (24.7%)			237 (75.0%)	79 (25.0%)		
Residency	Urban	219 (57.2%)	164 (42.8%)	0.39	0.530	300 (78.3%)	83 (21.7%)	0.95	0.330	300 (78.3%)	83 (21.7%)	2.82	0.093
	Rural	69 (53.5%)	60 (46.5%)			95 (73.6%)	34 (26.4%)			91 (70.5%)	38 (29.5%)		
Education	Primary/ intermediate	185 (56.2%)	144 (43.8%)	0.03	0.998	263 (79.9%)	66 (20.1%)	8.5	0.037	269 (81.8%)	60 (18.2%)	15.78	*0.001
	High school degree	77 (56.2%)	60 (43.8%)			97 (70.8%)	40 (29.2%)			89 (65.0%)	48 (35.0%)		
	Bachelor's degree/ diploma	15 (57.7%)	11 (42.3%)			17 (65.4%)	9 (34.6%)			19 (73.1%)	7 (26.9%)		
	Postgraduate degree	11 (55.0%)	9 (45.0%)			18 (90.0%)	2 (10.0%)			14 (70.0%)	6 (30.0%)		
Marital status	Single	2 (18.2%)	9 (81.8%)	13.13	0.011	9 (81.8%)	2 (18.2%)	4.33	0.363	9 (81.8%)	2 (18.2%)	29.35	* <0.001
	Married	159 (53.2%)	140 (46.8%)			235 (78.6%)	64 (21.4%)			203 (67.9%)	96 (32.1%)		
	Divorced	2 (50.0%)	2 (50.0%)			3 (75.0%)	1 (25.0%)			3 (75.0%)	1 (25.0%)		
	Widow	125 (63.5%)	72 (36.5%)			148 (75.1%)	49 (24.9%)			175 (88.8%)	22 (11.2%)		
Income in SAR	Separated	0 (0.0%)	1 (100.0%)	0.1	0.950	0 (0.0%)	1 (100.0%)	0.49	0.781	1 (100.0%)	0 (0.0%)	5.12	0.077
	< 5000	104 (56.8%)	79 (43.2%)			138 (75.4%)	45 (24.6%)			138 (75.4%)	45 (24.6%)		
	5000-10000	85 (55.2%)	69 (44.8%)			120 (77.9%)	34 (22.1%)			127 (82.5%)	27 (17.5%)		
	> 10000	99 (56.6%)	76 (43.4%)			137 (78.3%)	38 (21.7%)			126 (72.0%)	49 (28.0%)		

*Fisher's Exact Test was used

with marital status ($\chi^2=13.13$, $p=0.011$), whereas age, gender, residence, education, and income were not ($p>0.05$). Attitudes were significantly related only to education level ($\chi^2=8.5$, $p=0.037$), while the other factors were not significantly associated ($p>0.05$). Practice was notably associated with age ($\chi^2=41.05$, $p<0.001$), education ($\chi^2=15.78$, $p=0.001$), and marital status ($\chi^2=29.35$, $p<0.001$), but not with gender, residence, or income ($p>0.05$). Overall, sociodemographic factors influenced screening behaviour more than knowledge or attitude (Table 1).

In the adjusted logistic regression analysis, age, gender, residence, education, and income were not significant predictors of good knowledge; only marital status was significant: divorced participants had lower odds of good knowledge than single participants ($\chi^2=13.13$, $p=0.011$). For a good attitude, no factors remained significant after adjustment ($p>0.05$). Good practice was associated with age: those aged 30-50 years had lower odds of good practice, and the odds decreased with increasing age ($\chi^2=41.05$, $p<0.001$). Moreover, good practice was associated with income: those with incomes >10,000 Saudi Riyals had lower odds of good practice ($p=0.010$). This made age the most consistent factor associated with diabetes screening ($p=0.002$) (Table 2).

Discussion

The current study aimed at assessing adults in the Bisha province of Saudi Arabia regarding their knowledge, attitudes and practices related to T2DM screening. The findings indicate that 56.25% of participants had a good knowledge of T2DM screening. This is lower than the 93.3% reported in Iraq,¹⁰ highlighting regional differences in awareness. Conversely, a study in Pakistan¹¹ showed a 50.89% rate of good knowledge, which closely matches the current results. This suggests that the level of awareness in Bisha province is similar to regions with comparable socioeconomic backgrounds. Regarding attitude, 77.15% of the current participants expressed a positive outlook towards diabetes screening, aligning with findings from a South African study.¹² In contrast, a study in rural India revealed that only 60% of its participants held a positive attitude towards screening, highlighting the potential need for enhanced health education in rural areas.¹³ In terms of practice, 76.37% of the current participants engaged in good screening practices, significantly higher than the rates reported in Iraq.¹⁰ This might be attributed to better access to healthcare facilities or more effective public health campaigns.

Educational level was significantly associated with higher KAP scores in Bisha province, consistent with findings from Bangladesh.¹⁴ The current study also revealed specific

Table-2: Intergroup comparison of balance indicators.

Variable	Category	Positive attitude		Good practice	
		Adjusted OR 95% CI	p-value	Adjusted OR 95% CI	p-value
Age group	18 to 29	Ref		Ref	
	30 to 39	2.32 (1.06 to 5.08)	0.035	0.32 (0.15 to 0.65)	0.002
	40 to 49	5.18 (1.91 to 14.08)	0.001	0.28 (0.12 to 0.64)	0.002
	50+	1.06 (0.18 to 6.18)	0.950	0.48 (0.09 to 2.64)	0.399
Gender	Male	Ref		Ref	
	Female	1.93 (1.22 to 3.05)	0.005	0.86 (0.58 to 1.28)	0.463
Marital Status	Single	Ref		Ref	
	Married	0.84 (0.51 to 1.37)	0.477	0.89 (0.58 to 1.38)	0.602
Education	Primary	Ref		Ref	
	Secondary	3.18 (1.01 to 9.97)	0.047	0.88 (0.32 to 2.42)	0.811
	University	2.13 (0.71 to 6.43)	0.178	1.55 (0.57 to 4.16)	0.389
	Postgraduate	1.20 (0.31 to 4.69)	0.792	1.00 (0.28 to 3.54)	0.995
Occupation	Employed	Ref		Ref	
	Unemployed	1.45 (0.69 to 3.04)	0.326	1.19 (0.58 to 2.43)	0.638
	Retired	2.48 (0.28 to 21.78)	0.413	1.77 (0.39 to 7.96)	0.458
	Student	Suppressed*	0.732	Suppressed*	0.796
	Other	0.51 (0.06 to 4.22)	0.528	Suppressed*	0.186
Income	<5,000 SAR	Ref		Ref	
	5,000 to 10,000 SAR	0.93 (0.54 to 1.60)	0.805	0.69 (0.43 to 1.14)	0.146
	>10,000 SAR	0.62 (0.35 to 1.09)	0.097	0.50 (0.30 to 0.85)	0.010

OR: Odds ratio, CI: Confidence interval, Ref: Reference category, SAR: Saudi Riyal; Bold P values indicate statistical significance at $p < 0.05$. Suppressed estimates were retained in the model, but are not displayed because sparse data produced unstable CIs.

knowledge gaps about T2DM risk factors, with only 44.4% of the participants recognising age as a risk factor. Similar gaps have been seen in studies from other areas, suggesting a widespread deficiency in diabetes education across the Gulf region.¹⁵ The current research highlights the importance of increased engagement with healthcare providers in managing diabetes. The current study found that healthcare providers are key to raising diabetes awareness and facilitating screening, consistent with studies in the United Kingdom.¹⁶ These studies also emphasise the value of regular contact with healthcare professionals for better diabetes management. A study in Mexico revealed that limited access to healthcare providers reduces diabetes screening and treatment.¹⁷

The present study showed that participant characteristics were differentially associated with the domains of knowledge, attitude and practice. In the bivariate analysis, knowledge was associated with marital status, attitude with education level, and practice with age, education and marital status. In the adjusted analysis, age was the principal independent predictor of practice, while knowledge and attitude showed no strong independent associations. These findings suggest that awareness and perception do not necessarily translate into preventive behaviour, and that the transition from knowledge to practice is shaped more by social and behavioural factors than by information alone.^{18,19} The association of knowledge with marital status likely reflects family-

mediated health information exchange, a pattern consistent with studies in Saudi Arabia that report fair diabetes-related awareness but persistent gaps in specific knowledge domains.^{19,20} The education-attitude association may indicate that higher educational attainment facilitates interpretation of health risk and receptiveness to screening, rather than simply improving factual knowledge.^{21,22} This is supported by local evidence linking education with better pre-diabetes knowledge and e-health literacy.^{20,23}

Practice showed the most consistent sociodemographic pattern in the current study. The decline in good practice among older age groups is notable, given that older adults carry a greater diabetes risk. This may reflect mobility constraints, competing health burdens, reduced preventive orientation, and limited practical access to primary healthcare services. In the Bisha province, these

barriers are compounded by geographical dispersion of communities, dependence on family support for healthcare navigation, and variation in health literacy across educational strata.^{24,25} Local studies from Bisha confirm that while awareness of diabetes risk is relatively good, translating that awareness into sustained preventive behaviour remains a challenge, as evidenced by suboptimal medication adherence and a high burden of obesity among diabetic patients.^{26,27}

From the national policy perspective, these findings align with documented needs in Saudi Arabia to strengthen preventive services at the primary care level and reduce the burden of undiagnosed diabetes.^{23,28} Targeted strategies for Bisha should include age-prioritised screening, opportunistic case-finding during routine primary care visits, mobile or community-based outreach for geographically dispersed populations, and family-centred risk communication that leverages household influence on health behaviour. Moving beyond generic health education towards structured, access-focused implementation is essential to converting the existing awareness level into actual screening uptake.^{28,29}

Implications for local health policy suggest shifting from broad awareness campaigns to targeted socio-behavioural interventions, aligned with Saudi Vision 2030.³⁰ Key areas include educational targeting with the aim of developing literacy-sensitive materials to emphasise 'perceived benefits' for less-educated populations.³¹ Family-centred

screening initiatives are necessary to leverage social encouragement, especially involving couples, Decentralised outreach in the shape of mobile units and opportunistic screening in community settings are needed to reduce travel barriers in rural villages.³² Finally, age-specific interventions are necessary to promote early detection campaigns among younger adults to encourage proactive screening habits.³³

The current study has its limitations. The cross-sectional design prevents causal conclusions. Measures based on responses may introduce selection bias, limiting external validity since the sample was self-selected and limited to social media users. Some groups, especially digitally connected or interested individuals, may be overrepresented, such as younger and more educated respondents, while others may be underrepresented. To mitigate selection bias, the survey was distributed across platforms, with neutral recruitment messages, consistent eligibility criteria, and data-collection at different times. Respondents might over-report "good KAP" or under-report "poor KAP", leading to social desirability bias. To lessen this bias, the study used self-administered online surveys, kept anonymity, used neutral language, included forced-choice questions, and conducted a pilot study before the actual research. Still, the non-random sample requires cautious interpretation. Small subgroup sizes, especially for marital status, may have led to imprecise estimates. These limitations should be considered when interpreting the significant association for divorced participants in the knowledge model.

Conclusion

The KAP level was found to be fairly good regarding T2DM diabetes screening in the Bisha province of Saudi Arabia. Strategies to improve screening uptake should move beyond health education alone and incorporate targeted measures that facilitate access and promote actual participation in screening.

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IAEI, AMJ, ASA, AMMA, AASA & AFA: Concept, design, data acquisition, analysis, interpretation, drafting, revision, final approval and agreement to be accountable for all aspects of the work.