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Gender-Based Evaluation of Dietary and Lifestyle Modifications in Diabetes Management

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Abstract

Diabetes mellitus continues to be a significant health burden in Bangladesh, where socioeconomic status, dietary patterns, and lifestyle choices strongly influence disease management. This study aimed to examine gender-based differences in the demographic, clinical, nutritional, and lifestyle profiles of individuals living with diabetes. A total of 360 diabetic patients participated in this cross-sectional study. Information was collected using a structured questionnaire covering sociodemographic characteristics, medical history, dietary habits, and lifestyle practices. Statistical analyses, including chi-square tests, were used to determine associations, with significance set at $p<0.05$. Among the participants, 228 were male (63.3%) and 132 were female (36.7%). Most patients had an SSC-level education and belonged to low-income households. A substantial portion (43.9%) were involved in business. Significant gender differences were observed in the age of diabetes diagnosis ($p=0.004$), regular blood glucose monitoring ($p=0.002$), and insulin use ($p<0.001$), with men showing greater engagement in disease management. Neuropathy was also more prevalent among males ($p=0.033$). In terms of nutrition, men were more likely to follow a dietary plan ($p=0.010$) and consume fewer meals, while women reported higher water intake ($p<0.001$). No meaningful gender differences were found in physical activity levels, sleep duration, or access to professional dietary advice. The findings highlight clear gender-related differences in diabetes management and health behaviors. Addressing these disparities through gender-sensitive education and intervention programs may help improve diabetes outcomes in the Bangladeshi population.

Introduction

Diabetes mellitus is a complex and chronic metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (Holt Ma et al., 1991); (Veves et al., 2024). The global burden of diabetes continues to rise at an alarming rate According to American Diabetes Association (ADA) (ElSayed et al., 2024) and International Diabetes Federation (IDF) (Sun et al., 2022a), approximately 537 million adults (20-79 years) were living with diabetes worldwide in 2021, a number projected to reach 643 million by 2030 and 783 million by 2045. Notably, three out of four adults with diabetes occupy in low- and middle-income countries, where health systems often struggle to provide essential care and supports (Sun et al., 2022a); (Zhang et al., 2022); (Rinaldi et al., 2024). The diabetes epidemic has worsened due to rapid urbanization, sedentary lifestyles, and dietary and/or nutrition transition (Fauzi et al., 2022); (Abdi et al., n.d.); (Kawalkar et al., 2025). The south Asian regions are commonly in forth phrase of nutrition transition by Barry Popkin (Abdi et al., n.d.); (Popkin & Ng, 2022); (Popkin & Laar, 2025). India currently has the second largest diabetic population worldwide, with over 77 million cases by IDF (Sun et al., 2022b). Pakistan ranks third with almost 33 million adults affected (Holt Ma et al., 1991), while Bangladesh reports over 13 million diabetic patients, with a national prevalence of 10.4%, afftecting mostly urban population both male

and females (Sun et al., 2022a). These regional patterns emphasize the urgency of gender-bases diabetes management strategies. Diabetes is mostly categories into mostly four types including, type-1 diabetes (T1D), type 2 diabetes (T2D), gestational diabetes mellitus (GDM) and specific forms due to genetic/other causes (Holt Ma et al., 1991); (Veves et al., 2024); (ElSayed et al., 2024); (Sun et al., 2022a). These diagnoses is based on criteria such as fasting plasma glucose (≥126 mg/dL), 2- hour plasma glucose during oral glucose tolerant test (≥200mg/dL), HbA1C (≥6.5%), or a random plasma glucose ≥200g/dL in patients with classic hyperglycemia symptoms. However, in many low-resource settings across South Asia regions, screening and diagnosis remain inconsistent, contributing to underreporting and late-stage complications. Besides the biological causes, gender plays an important role in how common diabetes is, how it appears, and how it affects people. Women with diabetes often have more difficulty getting healthcare are more likely to be overweight, and usually have worse blood sugar control than men (Rinaldi et al., 2024); (Choi et al., 2021); (Shikuma et al., 2022); (Ala et al., 2025); (Jeraiby et al., 2025); (Heredia-Pi et al., 2025). In Bangladesh and similar cultural contexts, established gender norms frequently limit women's autonomy over food choices, physical activity, and healthcare decisions (Abdi et al., n.d.); (Razon et al., 2025). Meanwhile male may be more susceptible to behavioral risk factors such as smoking and alcohol consumption, increasing their vulnerability to cardiovascular complications (Razon et al., 2025); (Sayeed et al., 2020). Despite the considerable and growing evidence of gender-based disparities, few multi-country studies have systemically examined sociodemographic, dietary, and lifestyle profiles of diabetic patients through a gender lens. This study aimed to examine gender-based differences in the demographic, clinical, nutritional, and lifestyle profiles of individuals living with diabetes. By doing this, the research determines to provide actionable insights for developing gender-responsive diabetes prevention and management strategies which essential in improving outcomes in diverse sociocultural and economical insights.

Materials and Methods

Study Design

This research utilized a cross-sectional observational study evaluated the dietary intake and lifestyle modification practices among adults with diabetes in Bangladesh. Data collection was conducted in Dhaka medical College at Secretariat road, Dhaka. This design aimed to provide a snapshot of the current status of patients with diabetes in selected region. Primary data collection was ensured through structured face-to-face interviews using a structured questionnaire (Sayeed et al., 2020); (Alsayed Hassan et al., 2022a); (Schmitt et al., 2021a). This cross-sectional study was conducted among 360 patients with diabetes mellitus at the outpatient department of renowned hospital.

Study Population and Sample

The study population comprised adults diagnosed with diabetes mellitus, including both type 1 and type 2 diabetes, residing in urban and rural areas of Bangladesh. The inclusion criteria required participants to be aged ≥ 25 years and have a confirmed diagnosis of diabetes based on medical records or physician reports. The exclusion criteria were as follows: individuals with severe complications requiring hospitalization, pregnant women with gestational diabetes, and those with cognitive impairments that could interfere with their ability to provide accurate information. Efforts were made to include participants of both sexes to examine potential gender-based differences in dietary habits and lifestyle practices. This comprehensive approach allowed the study to capture the variability and complexity of diabetes management across different population subgroups.

Sample Size

To justify the sample size of our study, we used the following equation to calculate the approximate sample size for this study, which has already been used in some similar studies (Haque et al., 2014); (Nawaz et al., 2025) and Books (Pallant, 2020); (Roni & Djajadikerta, 2021). To calculate the sample size:

$N_0 = \frac{Z2 \cdot P \cdot (1-P)}{E2}$

Here, Z (Z score) = 1.96 at 95% confidence level. P is the estimated proportion of the attribute. E is the margin of error (5% or 0.05).

Q = 1-P

We assumed that 95% of the students did not know their nutritional status during adolescence.

N= 384

However, we considered a sample size of 360 samples for our study because of the population size of diabetic patients in the selected regions and the expected prevalence of various socioeconomic and lifestyle factors. Our sample size was sufficient to detect significant differences and associations at a significance level of 0.05 (Pallant, 2020); (Roni & Djajadikerta, 2021).

Data Collection Tools and Techniques

Data were collected using structured questionnaires and anthropometric measurements to obtain comprehensive information about the participants (Sayeed et al., 2020); (Alsayed Hassan et al., 2022b); (Schmitt et al., 2021b). The questionnaire was designed to capture participants' demographic details, medical history, dietary habits, physical activity levels, and self-management practices. The questions were both closed- and open-ended, allowing participants to provide detailed responses where necessary. Dietary intake was assessed using a validated food frequency questionnaire (FFQ) that recorded the consumption of various food groups, portion sizes, and meal patterns over the previous month. Anthropometric measurements included height and weight, which were recorded using standardized protocols to ensure accuracy and consistency. Physical activity levels were evaluated using the International Physical Activity Questionnaire (IPAQ), which categorizes activities into light, moderate, and vigorous intensities. Blood glucose levels were assessed using fasting blood sugar (FBS) and glycated hemoglobin (HbA1c) tests conducted at certified laboratories. These tests provided objective markers of glycemic control and complemented the self-reported data on lifestyle practices. Data were collected by trained researchers and healthcare professionals who received standardized training to minimize interviewer bias and ensure data quality. Informed consent was obtained from all participants before data collection, and confidentiality was maintained throughout the study period.

Statistical Analysis

Statistical analysis was conducted to examine the relationship between demographic characteristics, diabetes-related medical history, nutritional habits, and lifestyle modification among participants, with a specific focus on gender differences. All collected data were entered and processed using SPSS version 22.0 (Statistical Package Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the participants' demographic information. Frequencies and percentages were calculated for categorical variables, such as gender, education level, income, type of diabetes, and presence of complications. Means and standard deviations (mean± SD) were computed for continuous variables, including age, height, and weight. A chi-square test was applied to determine the association between categorical variables and gender (Pallant, 2020); (Roni & Djajadikerta, 2021).

Results

From this study of the 360 patients with diabetes, 228 were male (63.3%) and 132 were female (36.7%). The majority of patients had an educational background at the Secondary School Certificate (SSC) level (132, 36.7%).

Table 1: Demographic Information

Variable		Frequency	Percent (%)
Gender	Male	228	63.3
	Female	132	36.7
Educational background of participants	Primary	121	33.6
	SSC	132	36.7
	HSC	72	20.0
	Honors	35	9.7
Income level of participants	Low income (below 15,000 taka)	189	52.5
	Lower -middle income (15,000-30,000 taka)	144	40.0
	Middle income (30,000-70,000 taka)	26	7.2
	upper middle income (70,000-150,000 taka)	1	.3
Profession of participants	Housewife	125	34.7
	Job	47	13.1
	Business	158	43.9
	Day labor	27	7.5
	other	3	.8

Individuals with a lower income accounted for 52.5% of the cases, suggesting a high prevalence of diabetes mellitus in this income group. Businessmen were found to be the most affected occupational group, comprising approximately 43.9% of diabetic patients.

Demographic Characteristics	Mean ± SD
Age of the participants	57.26 ± 10.805
Weight of the participants	66.79 ± 7.447
Height of the participants	156.00 ± 3.470

Table-2: Descriptive Statistics of participant's Demographic Characteristics

Table 2 presents the descriptive statistics of the key demographic and anthropometric characteristics of the study participants. The majority of people affected by diabetes mellitus are middle-aged (57.26 ± 10.805).

Table 3: Diabetes related medical history

Characteristics		Diabetes related medical history (%)		p-value
		Male (%)	Female (%)	
Type of diabetes	Type 1	100.0%	0.0%	.281
	Type 2	63.1%	36.9%	
Diabetes diagnosis year	(1991-2000)	50.0%	50.0%	.527
	(2001-2010)	69.8%	30.2%	
	(2011-2024)	62.7%	37.3%	
Diabetes diagnosis age	(25-40)	54.2%	45.8%	.004*
	(41-55)	58.4%	41.6%	
	(56-65)	79.8%	20.2%	
	(66-80)	66.7%	33.3%	
Family history of diabetes	Yes	61.4%	38.6%	.375
	No	66.0%	34.0%	
Regularly monitor blood level	Yes	69.5%	30.5%	.002*
	No	53.6%	46.4%	
Medication for diabetes	Yes	63.3%	36.7%	.904
	No	66.7%	33.3%	
Regularly taking diabetes medication as prescribed	Always	63.5%	36.5%	.649
	Most of the time	61.6%	38.4%	
	Occasionally	80.0%	20.0%	
	Rarely	50.0%	50.0%	
Monitor blood sugar level	Multiple times	63.2%	36.8%	.657
	Once a day	67.1%	32.9%	
	A few times a	61.2%	38.8%	

	week			
	Rarely	59.8%	40.2%	
Other medical condition	Yes	62.5%	37.5%	.397
	No	68.6%	31.4%	
Insulin	Yes	73.4%	26.6%	.000*
	No	54.5%	45.5%	
Complication	Neuropathy (Nerve damage)	68.8%	31.3%	.033*
	Retinopathy (Eye damage)	50.0%	50.0%	
	Nephropathy (kidney damage)	83.3%	16.7%	
	Cardiovascular issue	69.0%	31.0%	
	Foot problem	38.7%	61.3%	
	Other	61.5%	38.5%	
	None of above	62.9%	37.1%	

*= significant, p value < 0.05

The findings observed a significant gender difference in several diabetes-related history variables (table-3). Male patients were significantly more likely to be diagnosed with diabetes at an older age, particularly between 56 and 65 years (p = 0.004). Regular blood glucose monitoring was also significantly higher among males (69.5%) than females (30.5%) (p=0.002), suggesting better self-management behavior in male participants. Insulin showed a strong gender inequality, with a significantly greater proportion of males (73.4%) requiring insulin therapy than females (26.6%) (p=0.000). In addition, the occurrence of diabetic neuropathy was significantly higher among males (68.8%) than among females (31.3%) (p=0.003), highlighting a gender-related pattern in diabetes complications.

Table 4: Nutrition and dietary pattern

Characteristics		**Nutrition and dietary pattern (%)**		**p-value**
		Male (%)	**Female (%)**	
Meals per day	1	100.0%	0.0%	.001*
	2	68.7%	31.3%	
	3	78.1%	61.4%	
Dietary plan	Yes	67.9%	32.1%	.010*

	No	53.8%	46.2%	
Typically eat snakes between meals in one day	2-3 times per day	63.5%	36.5%	.421
	3-4 times per day	63.6%	36.4%	
	None of the above	0.0%	100.0%	
Eat whole grains regularly	Yes	65.6%	34.4%	.480
	No	62.3%	37.7%	
	Sometimes	57.9%	42.1%	
Eat food high in saturated fats and sugar	Yes	66.7%	33.3%	.561
	No	64.8%	35.2%	
	Sometimes	60.1%	39.9%	
	Occasionally	100.0%	0.0%	
Typical source of protein	Meat	79.5%	20.5%	.084
	Poultry	60.0%	40.0%	
	Fish	62.5%	37.5%	
	Plant based protein-pulse, nuts, and seeds, vegetables, etc.	55.7%	44.3%	
Absorb foods high in saturated fats	Yes	66.4%	33.6%	.429
	No	62.0%	38.0%	
Consumption of beverage daily	Water	42.1%	57.9%	.000*
	Sugary drinks	64.3%	35.7%	
	Coffee	72.7%	27.3%	
	Tea	75.8%	24.2%	
Eat at restaurants or order food	Monthly	100.0%	0.0%	.013*
	Weekly	71.4%	28.6%	
	Rarely/never	61.7%	38.3%	
	1-2l	66.7%	33.3%	.688

Liters of water drink per day	2-3l	62.9%	37.1%
	3-5l	100.0%	0.0%

(*= significant, p value < 0.05)

Significant gender differences were observed in several aspects of nutrition and dietary patterns (table-4). Male participants were more likely to consume fewer meals per day, with 100% of those eating only one meal being male (p=0.001). Similarly, males (67.9%) were significantly more likely to follow a dietary plan than females (32.1%) (p = 0.010). In contrast, beverage consumption patterns also varied significantly by gender (P =0.000), with females more likely to consume more water daily (57.9%), whereas males more frequently consumed tea (75.8%), coffee (72.7%), and sugary drinks (64.3%). However, males were significantly more likely to eat at restaurants or order food monthly (100%, males) than females (p=0.013). These findings highlight the detached gender-based differences in dietary behavior and preferences among individuals with diabetes.

Table 5: Lifestyle modification of diabetic patients

Characteristics		**Diabetes related medical history (%)**		**P value**
		Male (%)	**Female (%)**	
Regular physical activity	Yes	63.5%	36.5%	.733
	no	62.1%	37.9%	
Physical activity	daily	77.4%	22.6%	.229
	3-5 times/week	62.8%	37.2%	
	1-2 times/week	60.2%	39.8%	
	occasionally (less than once a week)	57.8%	42.2%	
	rarely/never	61.5%	38.5%	
Exercise	walking	63.5%	36.5%	.421
	running /jogging	50.0%	50.0%	
	strength training	40.0%	60.0%	
	other	73.7%	26.3%	
Time of exercise	30 minutes	62.9%	37.1%	.267
	1 hour	80.0%	20.0%	
Hours of sleep per night	7 hours	63.7%	36.3%	.071
	5 hours	0.0%	100.0%	

	8 hours	66.7%	33.3%	
Dietary guidance from a healthcare professional	yes	63.7%	36.3%	.766
	no	61.8%	38.2%	

No statistically significant gender differences were observed in lifestyle modification practices among patients (table-5). Male participants (63.5%) reported a higher percentage of regular physical activity than females (35.5%). Similarly, males (77.4%) were more conscious of their daily exercise routines. A higher proportion of females reported sleeping approximately 5 h per night (100%). Dietary guidance from healthcare professionals was equally accessed by both genders (p=0.766). These findings suggest that lifestyle improvement practices were generally similar among male and female patients with diabetes in this study.

Discussion

The current study gives a comprehensive perspective on the gender-specific disparities in sociodemographic, clinical, dietary, and lifestyle profiles among diabetic patients. Especially, male participants consisted off a higher proportion of incidents, which reflects similar patterns reported in South Asian contexts. For instance, studies conducted in Pakistan, India, Bangladesh have consistently reported higher prevalence of diabetes in males, implying a gendered risk assessment to occupational stress, urbanization, and sedentary routines (Abdi et al., n.d.); (Kawalkar et al., 2025); (Razon et al., 2025); (Sayeed et al., 2020). Findings from Japan coincided this male majority by (Fauzi et al., 2022), whereas studies from Sudan, Nigeria, and Qatar manifested a more balanced distribution, validating the idea that socio-cultural dynamics and healthcare accessibility may influence how the disease manifests across the Africa and middle east regions (Ala et al., 2025); (Alsayed Hassan et al., 2022a); (Awad et al., n.d.). Additionally, the present revealed that individual with SSC- level education and lower-income backgrounds were more sensitive to diabetes. This trend is relevant with global and regional data including studies from Qatar by (Alsayed Hassan et al., 2022b) and Bangladesh by (Nawaz et al., 2025) , were limited health literacy and financial instability were correlated with deficient disease management and delayed diagnosis. While education and income are generally considered separately, their combination will probably affect health care behavior including medication, dietary management, and healthcare spending. These findings highlight the importance for expanded community-based interventions, especially in communities with limited resources where disease management awareness is very low. The majority of business professionals among patients with diabetes is notably. Most professions are long-hours of desk-based jobs, with irregular meal patterns and emotional distress levels can facilitate significantly to metabolic dysfunctions (Sun et al., 2022a); (Fauzi et al., 2022). These lifestyle habits are common across various jobs but are more consistent among people in commercial and service roles. This highlights the importance of workplace health-care programs that include regular check-ups, planned meals, and ways to reduce stress.

Age-related statistics revealed that most diabetic patients were middle-aged, with an average of approximately 57 years. This coordinates with outcomes from Japan by (Shikuma et al., 2022), Nigeria by (Ala et al., 2025), and Mexico by (Choi et al., 2021) confirming the understanding that advancing age matches with decreasing insulin sensitivity, pancreatic and metabolic function. While aging is a non-revisable risk factor,

the data reinforce the necessity for preventive screening protocols isolating middle aged adults, especially in urban areas where lifestyle risk factors are more considerable. Gender-oriented clinical trial findings enhanced the understanding of disease diagnostic profiles and care management. Male patients were more likely to receive diabetes diagnosis in their late fifties to early sixties (p=0.004) and indicated higher checkup in regular blood glucose assessment. Additionally, insulin-based treatment was more predominant among males, revealing either advanced disease stage or greater compliance with treatment protocols. Similar patterns were observed in Bangladesh cohorts' studies, where insulin uptake and blood glucose monitoring were frequently reported among male patients (Abdi et al., n.d.); (Razon et al., 2025). While this demonstrates a proactive attitude towards disease control in males, it also key insights to probably delays in identifying or inadequate treatment among females. Health education efforts must therefore recognize most gender gaps in awareness, access and treatment pursuing behavior. This is recommended by Diabetes Care of USA from (ElSayed et al., 2024). When examining therapeutic side effects in diabetes, nephropathy was significantly more common in males, coinciding with findings from Nigerian Studies by (Ala et al., 2025), where enhanced creatinine levels suggested a higher risk of kidney dysfunction. Male patients also manifested higher incidences of cardiovascular disease and lipid irregularities, as found in different national and international research from Nigeria (Ala et al., 2025) and USA (Inciardi et al., 2022) . However, some European studies report higher risk of cardiovascular mortality in diabetic women, indicating the complexity of gender-bases cardiovascular outcome (Cherchi et al., 2020). These differences suggest that gender-specific genetic variations and socio-behavioral patterns interact in complex ways, prompting further investigation. Although equal reporting of retinopathy in this study, research from other countries showed male patients more prone to vision issues, most likely due to delays in eye screening (Jeraiby et al., 2025); (Cherchi et al., 2020); (Saadane et al., 2020). Therefore, it is essential to include gender-sensitive methods of screening into diabetes treatment in order to ensure an early diagnosis and lower risk of complications.

This investigation found the analysis of dietary practices variations in meal intake frequency, beverage choice, and adherence to dietary plans. Men were not only tended to follow structured dietary routines but also more likely to consume only one meal per day. This practice may not align with optimal glycemic regulation. On the contrary, women demonstrated a preference for water over sugared beverages or drinks, suggesting a healthier beverage profile. These observations align with earlier studies from Japan (Shikuma et al., 2022) and Bangladesh (Nawaz et al., 2025), where women showed stronger adherence to recommended dietary habits, despite reporting limited access to personal dietary nutritional counselling. Gender-based nutritional counseling could thus serve as an essential element in improving dietary adherence and long-term glycemic control. The tendency of eating out was reported mainly by male participants, indicating at greater financial flexibility and sociocultural freedom. Ethnographic study conducted in Mexico by (Heredia-Pi et al., 2025) revealed similar patterns, with urban male patients eating our more frequently that females. Although this is likely insignificant, eating out frequently linked to diets which are rich in calories and sodium, which could negatively impact glycemic control. Therefore, public health programs need to consider taking more seriously not only what people eat but also where and with whom they eat it. Physical activity and with sleep routines showed no significant gender differences. However, a greater proportion of men reported engaging in daily exercise. Despite not statistically associated with the results, this pattern matches with results from Korea by (Choi et al., 2021) and Nigeria by (Ala et al., 2025), where men were more likely to include exercise into daily activities. On the other hand, female participants reported more irregular sleep durations, especially reduced sleep hours. As inadequate sleep has been connected with

poor glycemic control and insulin resistance, these tends should not be neglected, particularly when planning interventions for women with diabetes (Abdi et al., n.d.); (Shikuma et al., 2022); (Sayeed et al., 2020). Unexpectedly, both male and female respondents reported the same level of access to dietary guidance from health care experts, indicating progress in equitable healthcare outreach. However, the real challenge is turning awareness into behavioral change. Cultural rules and regulations, limited time, and getting responsibilities, especially among women, may limit their capacity to follow expert guidance. This emphasizes the importance of customized medical approaches that consider into account every patient's expanded livelihood scenario.

Conclusion

This study highlights the necessity of contextualized, gender-specific approaches to diabetes prevention and control. Factors such as work, education, money, and social roles all combine in complex situations to influence the results of health care. The findings demonstrate that while adherence to dietary plans and physical activity is prevalent among participants, significant gaps in knowledge and practice, particularly regarding carbohydrate management and portion control, persist. These gaps are compounded by socioeconomic barriers, such as limited access to nutritious food and healthcare services, which disproportionately affect low-income groups. The association between dietary habits, physical activity levels, and glycemic control further reinforces the need for holistic and culturally tailored interventions in this population. By addressing these gaps and barriers, healthcare systems can foster better adherence to management strategies, ultimately improving the quality of life of individuals with diabetes. This study advocates for the integration of evidence-based dietary and lifestyle interventions into public health policies to ensure that they are accessible, affordable, and culturally sensitive. A concerted effort involving patients, healthcare providers, policymakers, and community organizations is essential to reduce the burden of diabetes and enhance public health outcomes.

Declarations

Statements and Declarations

Authors' Contributions: Israth Jahan Rimu conceptualized the study, and developed the questionnaire. Proma Banik coordinated the data collection process. Israth Jahan Rimu and Nuvia Nurain conducted the statistical analysis, interpreted the findings, and drafted the initial manuscript. All authors reviewed and approved the final version of the manuscript for submission.

Competing interests: Authors declare that there is no conflict of interest

Consent to participate: The study was conducted in accordance with ethical research standards. Data were collected using a structured questionnaire administered via face-to-face interview. Verbal consent was obtained from all participants prior to their participation, after explaining the purpose of the study, ensuring voluntary involvement, and assuring confidentiality and anonymity.

Availability of data and material: The data supporting the findings of this study are not publicly available in order to protect the privacy and confidentiality of the respondents. Although the interviews were anonymized, the inclusion of detailed demographic characteristics could potentially lead to the identification of individual participants.

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