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Complete List of Authors:	Getie, Eskedar; University of Gondar College of Medicine and Health Sciences, Reproductive and child health; University of Gondar College of Medicine and Health Sciences, Reproductive and child health Takele, Wubet; University of Gondar, School of Nursing; University of Gondar College of Medicine and Health Sciences, Nursing Gonete, Almaz ; University of Gondar College of Medicine and Health Sciences, Pediatrics and Child Health Nursing
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Sexual health-seeking behavior and associated factors in men with diabetes mellitus attending at the three hospitals of northwest Amhara region, Ethiopia.

Eskedar Getie Mekonnen[1], Almaz Tefera Gonete [2], Wubet Worku Takele[3]

Corresponding Author: Eskedar Getie Mekonnen

Email: eskedargetie18@gmail.com

[1]Department of Reproductive and Child Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

Email: EGM: eskedargetie18@gmail.com

ATG: almazteferag3@gmail.com

WWT: wubetakele380@gmail.com

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Abstract

Objective: This study aimed to determine the sexual health-seeking behavior and identify factors among men with diabetes mellitus attending at the three hospitals of the Amhara region, Ethiopia.

Design: An institutional-based cross-sectional study was conducted from 20th of February to 30th April, 2020 at the three hospitals of Northwest Amhara region.

Participants and setting: A total of 389 men diabetic patients attending at the three hospitals of northwest Amhara region were approached through systemic random sampling and face-to-face interviewer administered questionnaire was used.

Main outcome measure: The sexual-health seeking behavior.

Results: Precisely a quarter (25%:23.4%-27.6%) of diabetic men has sought sexual health service. The participants sexual health seeking behavior was impacted by educational status (can't read and write AOR=0.43(0.22-0.82) and primary and secondary AOR=0.34(0.17-0.7), living longer time with diabetes mellitus (AOR=2.7(1.2-6.03)), and experiencing sexual dysfunction (AOR=5.6(1.5-20.8)).

Conclusions: The study remarks that just one fourth of participants have sought sexual health service, and the practice has been affected by their educational status, experiencing sexual dysfunction, and staying longer time since the onset of diabetes mellitus. Hence, improving the sexual health seeking behavior of these vulnerable population through designing comprehensive and integrated sexual and reproductive health service that encompasses education, counseling, and prevention as well as curation service is recommended to improve the health seeking behavior.

Keywords: Diabetes; Ethiopia; Factors; Sexual health seeking

Article summary

Strength and limitation of the study

- ✓ The study highlighted the sexual health seeking behavior of men with diabetes who are the most liable group of population for different SRH problems.
- ✓ The study might notably introduce social desirability bias due to the nature of data collection method (face-to-face interview).
- ✓ Further, it would have been better if the knowledge and perceptions towards to sexual health had been explored.

Background

Diabetes mellitus (DM), a growing public health concern in the world jeopardizing the lives of dozens of people. The number of people with diabetes would rise to 642 million by the year 2040, according to the International Diabetic Association's (IDA) estimate (1). In Ethiopia, in the year 2015 alone, diabetes case was accounted 2,567,900(1). Patients with diabetes are at higher risk of developing different sexual problems like sexual dysfunction (SD) associated with the psychogenic, hemodynamic, neurogenic, and hormonal impacts of the disease in men's sexuality (2-4). The burden of SD among diabetic patient is three-folds higher than healthy individuals and most importantly, it occurs earlier with its severest form (4, 5). The sexual health problems in diabetic patients have shown an upward trend (6, 7). In spite of almost half of all sexually active diabetic patient have experienced at least one form of sexual problems, less than a fifth(18%) of them had attempted to seek medical help(8). Likewise, diabetic patients are also at a greater risk of sexually transmitted infections related to immunosuppression and high blood glucose level (9, 10).

Sexual and reproductive health (SRH) problems account for 18% of the total global disease burden, and thus, strengthening the service is a core for people to support the normal physiologic function of the reproductive system (11-13). The goal of SRH service was believed to deliver care for both women and men, nevertheless, it remains biased and it fails to meet the sexual and reproductive health care needs of men(11, 13). SRH services are absent or of poor quality and underused in many countries because: the issue is presumed to be culturally sensitive to disclose and underway a discussion (12, 13). The progress to scale-up the SRH care has been undermined by the increasing influence of conservative political, religious, and cultural forces around the

world(12). Particularly, in countries like Ethiopia, the service provision is highly threatened and diluted by strong bond of cultural and religious beliefs (14).

While help-seeking behavior provides a means to improve access to treatment and reduce human suffering (8), the lack of professional consensus regarding standard sexual health care is, an important hitch for men to pursue adequate levels of SRH service (11). In other words, neither men themselves nor their providers receive a clear message about the types of services that men needs to receive, how often they should get and which group of individuals need special emphasis(11). Indeed, studies indicated, less than 10% of patients had been asked about their sexual health in a routine follow-up visit(8).

Although the progress made towards universal health coverage, the unmet need of SRH interventions is a pressing agenda that requires urgent attention and innovative solutions. To facilitate the required care to be delivered, evidence showing the burden and related factors is imperative. In general, men regardless of their health status are a segment of the population with substantially less access to SRH care. On top of this, individuals with DM are the most vulnerable and ignored group of individuals to different SRH challenges associated with their health status and psychosocial matters. Even though the need for SRH service for this group of population is clearly appreciable, there is a small body of evidence regarding their health-seeking behavior, service utilization, and contributing factors. Therefore, this study was aimed to investigate the sexual health-seeking behavior as well as contributing factors among men with diabetes.

Methods and materials

Study design and setting

Institutional-based cross-sectional study was conducted between February 20 and April 30, 2020 among men with DM attending at the three hospitals of northwest the Amhara region. Participants were recruited from chronic out-patient department (OPD) of Felege Hiwote comprehensive and specialized hospital (FHCSH), Debre Markos referral hospital, and Debre Tabor general hospital. Chronic OPD is the one among other OPDs in each health institution, where diabetic patients account the largest proportion of chronic out-patient visit.

Sample size estimation, procedure, and technique

The sample size was estimated using Epi info version 7 software. A pilot study was conducted in 50 diabetic male patients, to estimate the prevalence of sexual health-seeking behavior, and it was 18%. The sample size was estimated using single population formula, considering different statistical assumptions: a) margin of error (d): 4%(0.04); b) a standard Z-score of 1.96 corresponding to 95% confidence interval; c) none response rate:10%(0.1) to get a final sample size of 389.

The estimated sample size was proportionally allocated to each hospital. The participants were chosen by using systemic random sampling technique using k^{th} interval calculated as $k=\frac{N}{n}$ given $\frac{1046}{389}= 2.7$ that was approximately assumed to be 3.

Study population

Men patients who have an established DM and had been visiting the chronic OPDs for regular follow-up during the data collection period in the selected hospitals were enrolled. Prior to the enrollment, patient's general insight was checked; patients who were disoriented and unable to communicate were excluded.

Variables of the study

Sexual health-seeking behavior: if a respondent ever seek sexual and reproductive health service since the diagnosis of DM.

Sexual dysfunction: Total scores below the cutoff points (47) out of the 70 scores of the change in the sexual functioning questioner (CSFQ)(15).

Couple satisfaction: A score of above 20 from the summation of relationship assessment scale (CSI) was considered as satisfied(16).

Comorbid illness: The presence of additional chronic illness/s among patient with DM, which include hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer, asthma, multiple sclerosis, and so forth.

Diabetic complication: The co-existence of one or more diabetic related complications such as retinopathy, neuropathy, nephropathy, and diabetic foot ulcer.

Poor glycemic control: current fasting blood glucose level greater than 130mg/dl(17).

Alcoholic: The daily alcohol consumption of respondents was calculated as the product of the average alcoholic percentage (%/ml) of each drink and the volume (ml) of the drink and volumetric mass density (which is 0.8g/ml). The, participants were labeled to be alcoholic provided they consume more than 12g ethanol daily for the past six months of the survey (18).

Smoker: a respondent was deemed to be smoker if ≥12 cigarettes smokes per day for the past six month of the survey (19).

Data collection tool, procedure and quality control

A face-to-face interviewer administered pretested questioner was used. The tool was prepared in English and translated to local (Amharic) language and retranslated into English to see its consistency. The questionnaire had comprised of five sections: socio-demographic characteristics; medical and behavioral related factors; psychosocial factor; change in sexual function; and sexual health seeking behavior. The data collection was facilitated by two trained nurses and a supervisor in each health institution.

Data quality was assured through careful designing of the questionnaire. Data collectors and supervisors had received a two days training on the purpose of the study, the question items, the data collection procedure, participant selection and, the rights of study participants. Pre-test was done prior to the actual data collection. The collected data were checked for its completeness and consistency in daily basis over the course of the data collection period.

Data processing and analysis

The data were entered into Epi Data version 3.1 and then exported to SPSS version 21.0 for analysis after checking for consistency, coding errors, missing value, and completeness. All continuous independent variables were categorized.

The wealth status of the participants was analyzed using factor analysis, employing the principal component analysis (PCA) method. All categorical and continuous variables were categorized to

be between '0' and '1'. All statistical assumptions of factor analysis were checked. Descriptive statistics were used, to describe the study population in relation to relevant variables.

The outcome variable, sexual health-seeking behavior of diabetic men, was dichotomized ('1', '0'), to inform those who have sought sexual-health service and who didn't. Further, for continuous variables, like age and duration of diagnosis with diabetes, the Shapiro-Wilk test was used, to determine the appropriate measure of central tendency. Frequency, percentage, and measures of central tendency with its corresponding measure of dispersion were used for describing demographic and other variables. Tables', graph, and texts were used to present the findings.

The binary logistic regression analysis was run to examine the presence of association between each independent variable and sexual health-seeking behavior. The bivariable and dmulti-variable analysis were applied to ascertain the associations among the dependent and independent variables, taking into account the 95% level of confidence. Independent variables having a p-value of 0.2 and less in the bi-variable analysis were included in a multivariable logistic regression model to control the potential impact of confounding variables and to declare the presence of association. The Hosmer and Lemeshow model fitness of test was appliedto examine the model adequacy. Moreover, variance inflation factor (VIF) was used to check for multicollinearity problem between independent variables, and none of the variables exhibited the problem.

Patient and public involvement

The patient and public were not involved in any way in the study design, or conduct, or reporting, or dissemination plans of research.

Results

Socio-demographic characteristics

A total of 376 participants, making a response rate of 96.7 % were involved. The mean (SD) age of respondents was 47.93(15.01) years. The majority (88.9%) of the respondents were orthodox Christian followers. Close to two-thirds (63.3%) of the respondents had lived in urban residence. Moreover, slightly more than a quarter (25.8%) and a third (36.7%) of the participants had attending secondary education and had a private work, respectively (Table 1).

Table 1: Socio-demographic characteristics of men with diabetes mellitus at three hospitals found in Northwest Amhara region, Ethiopia from February 20- April 30 2020(n=376)

Variable	Frequency (n)	Percent (%)
Age		
<40	127	33.8
40-50	77	20.5
>50	172	45.7
Religion		
Orthodox	334	88.9
Muslim	36	9.7
Protestant	6	1.4
Marital status		
Single	35	9.3
Married	323	85.9
Divorced	8	2.1
Widowed	10	2.7
Educational status		
Can't read and write	78	20.7
Grade 1-8	88	23.4
Grade 8-12	97	25.8
Diploma	20	5.4
Degree & above	93	24.7
Occupation		
Government employee	80	21.3
Private work	138	36.7
Farmer	102	27.1
Student	14	3.7
Job seeker	7	1.9
Retired	35	9.3
Wealth quantile		
Poorest	79	21
Poor	102	27
Middle	97	26
Rich	61	16.2
Richest	37	9.8

Health and psychosocial related factors

The median year of participants lived with diabetes was 8.22(IQR 1-30 years). The proportion of type-I diabetic patients was 50%. Neuropathy was the most predominant diabetic complication observed that accounted for 16.5%. Moreover, hyperlipidemia was the most prevalent comorbid illness (16%) stood behind hypertension (37.2%) (Table 2).

Table 2: Health and psychosocial factors of men diabetic patients at the three hospitals of northwest Amhara region, Ethiopia from February 20- April 30 2020 (n=376)

Variable	Frequency (n)	Percent (%)
Duration of diagnosis		
Short (<5)	147	39.1
Long (≥5)	229	60.9
Metabolic control		
Controlled	84	22.3
Un-controlled	292	77.7
Comorbid illnesses		
Yes	191	50.8
No	185	49.2
Diabetic complications		
Yes	123	32.7
No	253	67.3
Physical activity		
Yes	282	75
No	94	25
Alcohol		
Yes	220	58.5
No	156	41.5
Couples satisfaction		
Satisfied	345	91.8
Un-satisfied	31	8.2

Sexual health-seeking behavior

Exactly a quarter (25% (23.4%, 27.6%)) of men with DM sought sexual health service, of whom the vast majority (97.9%) have claimed to have SD. Of all participant that had sought professional help, just over one-third (34.04%) of them reported to have a relationship problem with their partners associated with sexual difficulty. Despite participants witnessed to have different social and health problems (like divorce and infertility) following their sexual health problem, about half 50.4% of them failed to seek professional help (Fig 1).

Reason for not seeking sexual health service

Sixty percent of respondents have never sought sexual health service, assuming that the SRH service is tailored only for individuals exhibiting sexual problem(s). The predominant reason that stopped them to seek sexual health is, feeling ashamed (15.4%) followed by believing it has no solution or remedy for it (11.7) (Fig 2).

Factors associated with sexual health seeking behavior

Older age, rural residence, educational status, type of DM, physical inactivity, living longer duration with DM, concomitant diabetic complications, having comorbid illness, poor metabolic control, being alcoholic, and experiencing SD were factors identified in the bi-variable analysis. In multivariable analysis, however, only educational status, lived longer duration with DM, and SD have shown an independent association with sexual-health-seeking behavior. Accordingly, the likelihood of seeking sexual health was 57% and 66% lower among patients who can't read and write AOR=0.43(0.22-0.82) and participants attended primary and secondary education AOR=0.34(0.17-0.7), respectively than participants who attained diploma and above. Patients living longer duration with DM were two-folds (AOR=2.7: 1.2-6.04) higher to seek sexual health service than participants with shorter duration. Further, the odds of sexual health seeking behavior was more than five 5.6 (1.52-20.8) 9.15(2.0-41.6) times among participants who had SD than participants with no SD (Table 3).

Table 3: Factors associated with sexual help seeking among men patients with diabetes attending at the three hospitals of northwest Amhara region, Ethiopia from February 20- April 30, 2020(n=376).

Variable	Sexual health seeking		Odds ratio (95% CI)	
	Yes	No	Crude(COR)	Adjusted(AOR)
Age				
<40	54	73	1	1
40-50	27	50	1.45(0.54-7.74)	1.92(0.7-5.14)
>50	121	51	3.25(2.13-12.47)	1.41(0.53-3.73)
Resident				
Urban	147	91	1	1
Rural	43	95	0.28(0.22-0.65)	0.76(0.33-1.75)
Education				
Can't read & write	24	54	0.22(0.11-0.83)	0.43(0.22-0.82)*
Primary & secondary	88	97	0.21(0.17-0.76)	0.34(0.17-0.7)*
Diploma and above	93	20	1	1
Comorbid illnesses				
No	20	172	0.16(0.09-0.28)	0.53(0.24-1.18)
Yes	75	109	1	1
Duration of the illness				
<5 years	59	88	1	1
≥5 years	154	75	3.08(1.18-12.76)	2.7(1.2-6.04)*
Metabolic control				
<130 mg/dl	10	79	0.28(0.07-0.42)	0.68(0.24-2.01)
≥130 mg/dl	88	199	1	1
SD				
No	5	110	1	1
Yes	92	169	12.1(6.68-34.78)	5.6 (1.52-20.8)**
Existence of complications				
No	45	213	1	1
Yes	51	67	3.45(2.13-5.56)	1.13(0.57-2.25)

*indicates significant at p-value <0.05 and ** (<0.01), and *** (<0.001), COR= crude odds ratio and AOR=adjusted odds ratio

Hosmer and Lemshow goodness of fit (p-value=0.89)

Discussion

SRH service is a crucial element of reproductive health care in which its wide range of access is an individual's reproductive right (12). People with diverse chronic diseases primarily, diabetes have several sexual and reproductive health challenges that could be prevented through several interventions, including conducting studies to demonstrate the magnitude of the problem and responsible factors so as to forward recommendations to the most responsible bodies(20). Regardless of exhibiting sexual health problems, this segment of population deserves sexual health counseling, education, partner communication and safe-sexual behaviors (21). Therefore, determining the sexual health seeking behavior and identifying factors associated with sexual health-seeking pattern among men with diabetes will urge policymakers and program planner to work on identified problems and strengthening the integration of SRH service with chronic illness healthcare services.

The study indicates a quarter (25%) of men with diabetes had sought sexual health service; the pattern of sexual health-seeking was higher among participants from urban residence than rural in that about two-thirds of them had sought sexual health service. The higher information and healthcare service accessibilities in the urban resident could contribute to the observed heterogeneity(22). Ethiopia is a country where rural population makes about 78.8% of the total population, and the higher burden of the problem among this population would impact the sexual and reproductive health coverage of the county (23). Hence, making the sexual health service accessible to the wider range of the community and awareness creation is essential in order to improve the health-seeking behavior of men in particular of rural residents.

Participants with lower educational status were less likely to seek sexual health service than their counterparts, which is supported by another study (22). It's utterly known that education is crucial weapon to build knowledge, and help to anticipate the risk of failing to get medical consultation (24). Studies also witnessed that the awareness of a person about sexual health increases with educational level; and poor utilization of different health services is the result of low literacy (22, 25). Moreover, educated individuals are also less likely to be influenced by harmful cultural and social beliefs that are the biggest bottlenecks of sexual health service utilization (26). From this finding, in the presence of poor educational coverage in Ethiopia, where the adult literacy level is 51.7%, surplus people could be affected by the adverse consequences of low sexual health-seeking behavior, including infertility, relationship instability,

and psychological health problems(27). In light of this, improving the literacy level of respondents is recommended to enhance their sexual health-seeking behavior, and thereby to tackle the associated stubborn consequences.

Similarly, participants who have lived with diabetes for longer period have higher odds of sexual health seeking. The perceived risk of major diabetic complications, including sexual problem is higher among patients who have lived with diabetes for longer period of time, rather than short time (28, 29). In addition, patients lived longer time are at higher risk of having diabetic complications and other comorbid illnesses, which might exacerbate their existing health problem and increase the risk of different sexual problems, including sexual dysfunction that might urge them to seek professional help (8, 21, 29).

SD has a positive effect on an individual's sexual health-seeking behavior. Consistent with various literature, patients who have SD were more likely to seek sexual health service (21, 30). This could be due the perception of individuals to seek sexual health service, in which seeking professional help for screening and counseling service prior to experiencing a problem is unusual particularly in developing country like Ethiopia, related to cultural taboos and fear of judgments. Beside this, as this study also evidenced, respondents with SD have different social (marital instability and divorce) and health problems (infertility) that might be a pushing factor to seek sexual health service. Although seeking help once experiencing a sexual health problem is appreciated, the better is working to improve sexual health seeking behavior of all vulnerable individual regardless of the clinical presentation of sexual disorder so as to limit the reproductive and associated health impacts.

Conclusions

The study shows that just one fourth of participants have sought sexual health service. Having lower educational status, experiencing SD and lived longer duration with DM were significantly associated with sexual health-seeking behavior. A comprehensive and integrated sexual as well as reproductive health service that considers improving of the education status of the participants, health promotion, and prevention as well as curation service is recommended for diabetic patients to prevent and get them over from different sexual and reproductive health problems.

Abbreviations

AOR	Adjusted Odd Ratio
COR	Crude Odd Ratio
CSFQ	Change in Sexual Function Questionnaire
CSI	Couple Satisfaction Index
DM	Diabetes Mellitus
OPD	Outpatient Department
SD	Sexual Dysfunction
SRH	Sexual and reproductive health
WHO	World Health Organization

Declarations

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Author contributions: EGM, ATG and WWT was contributed on conceptualization, formal analysis, investigation, methodology, project administration, validation, Writing-original draft, writing-review and editing and, supervision.

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Competing interest: We declare we have no any competing interests.

Consent for publication: Not applicable.

Ethics approval and consent to participate: This study was approved by the ethical review board of University of Gondar, College of Medicine and Health Sciences, and each respective hospital was approached with support letter. Oral informed consent was taken from all study participants and they were informed that participation was on voluntary bases and have full right to withdraw at time of need during the interview process. Moreover, all information taken from them kept confidential and the entire data collected was used for the purpose of the current study only.

Availability of data and materials: All data generated during this study are included in this manuscript. The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author information: [1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

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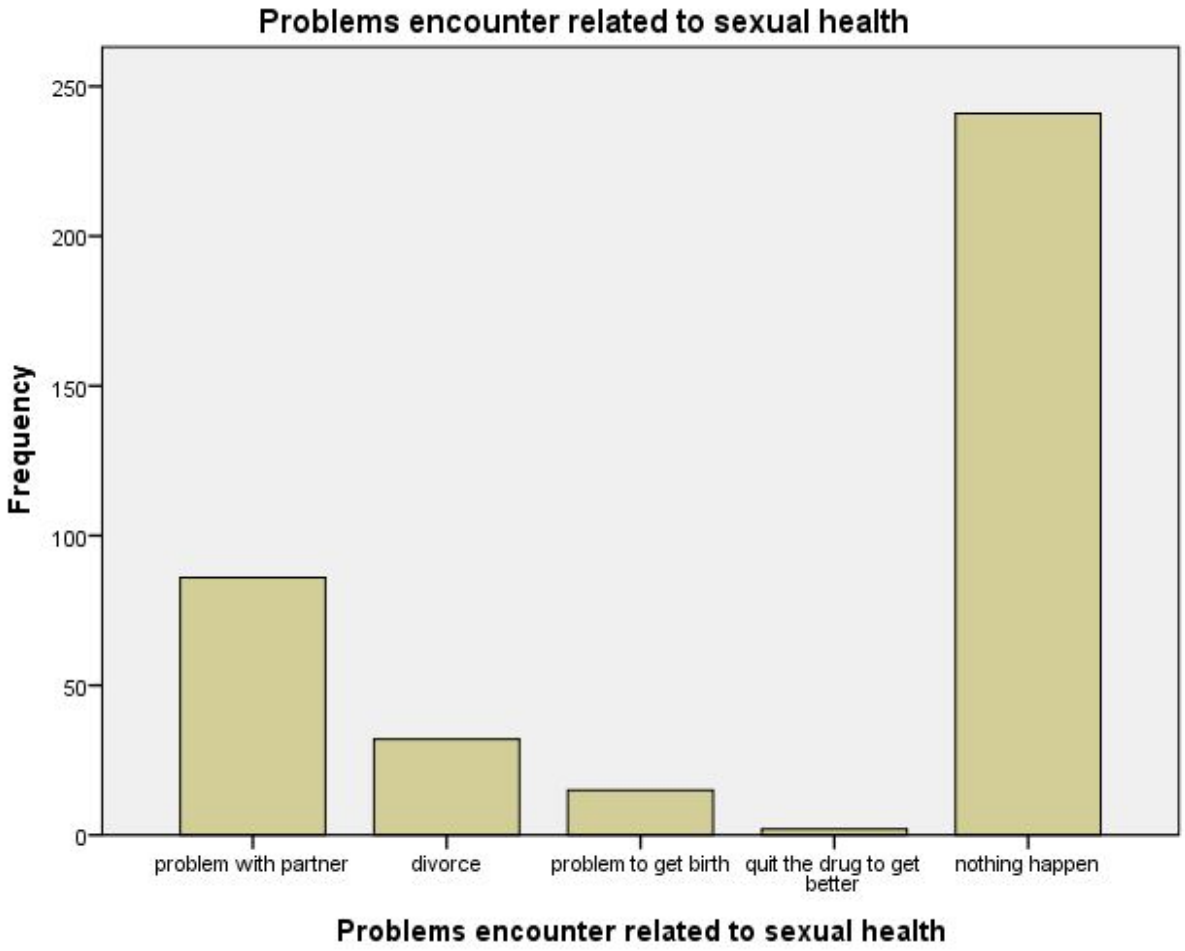

Figure 1: problems encountered related to sexual health in men with diabetes mellitus attending at the three hospitals of northwest Amhara region, Ethiopia 2020

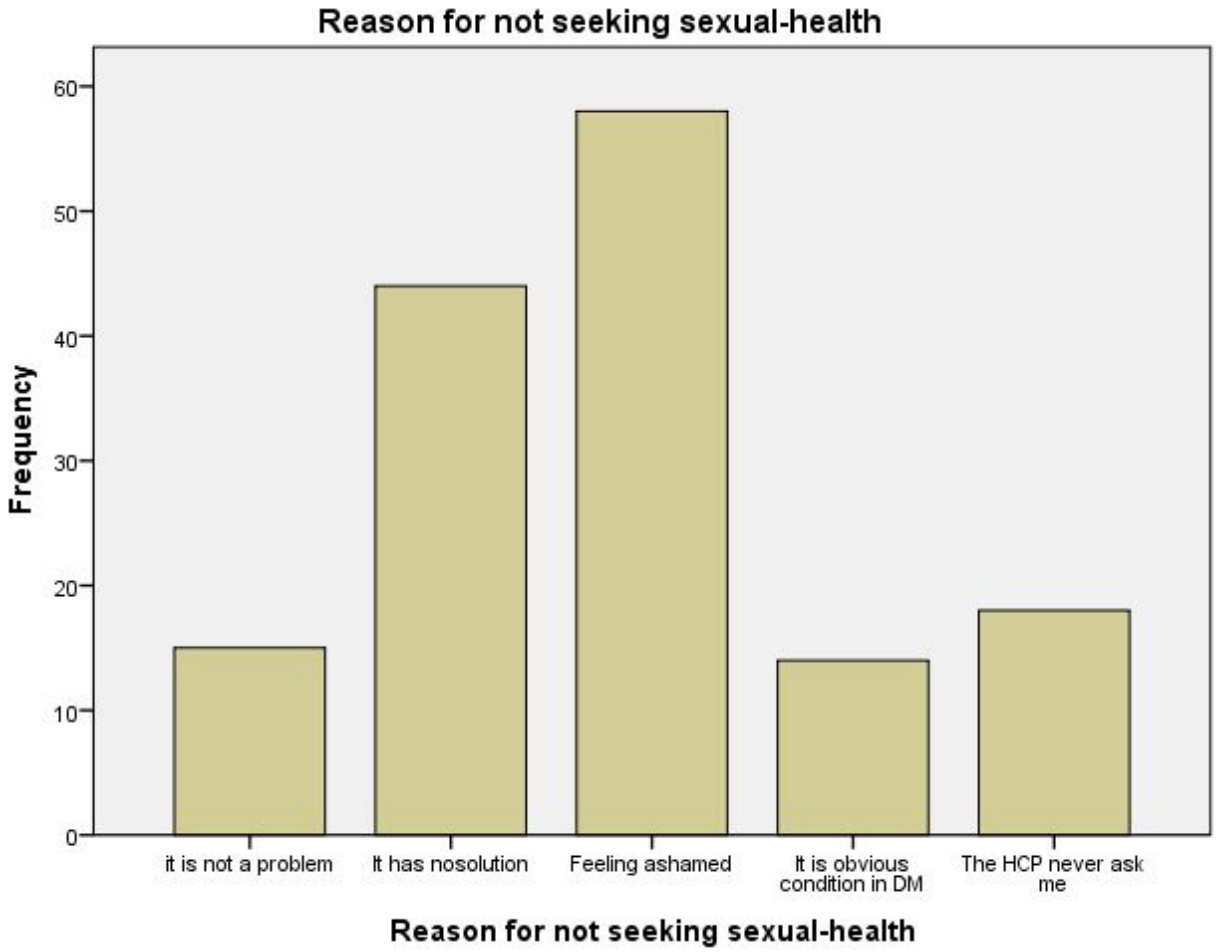

Figure 2: Reason for not seeking sexual health among men diabetic patients at the three hospitals of northwest Amhara region, Ethiopia 2020

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	3	State specific objectives, including any pre-specified hypotheses	Page 4
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 5 & 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 6 & 7
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6 & 7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 6 & 7
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Page 6 & 7
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	N/A

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	N/A
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8,9 &10
		(b) Indicate number of participants with missing data for each variable of interest	Page 8,9 & 10
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Page 10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 10 & 11
		(*b*) Report category boundaries when continuous variables were categorized	Page 8 &9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 13 & 14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 13 & 14
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 13 & 14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Sexual health-seeking behavior and associated factors in men with diabetes mellitus attending in the northwest Amhara region hospitals, Ethiopia; Cross-sectional study

Eskedar Getie Mekonnen[1], Almaz Tefera Gonete [2], Wubet Worku Takele[3]

Corresponding Author: Eskedar Getie Mekonnen

Email: eskedargetie18@gmail.com

[1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

Email: EGM: eskedargetie18@gmail.com

ATG: almazteferag3@gmail.com

WWT: wubetakele380@gmail.com

Abstract

Objective: This study aimed to assess the sexual health-seeking behavior and to identify the associated factors in men with diabetes mellitus attending in the northwest Amhara region hospitals, Ethiopia.

Methods: Hospital-based cross-sectional study was conducted during the 20th of February and 30th of April, 2020 in the three hospitals of the northwest Amhara region. We approached a total of 389 participants' selected using the systematic random sampling technique. A face-to-face interviewer-administered questionnaire was used to collect the data. The Binary logistic regression was employed to model the odds of having sexual health-seeking behavior and to investigate factors contributing to the behavior. We used the odds ratio with a corresponding 95% confidence interval as a measure of association and a p-value below 5% as an indicator of statistical significance.

Results: A quarter of diabetic men (25%:23.4%-27.6%) has sought sexual health service since the diagnosis of diabetes. The odds of seeking sexual health service were low in participants who were not able to read and write (Adjusted Odds Ratio (AOR) = 0.34; 0.22-0.82) or participants who attended primary/secondary education (AOR=0.34; 0.17–0.70). Living longer time with diabetes mellitus (AOR=2.7; 1.2-6.03) and experiencing sexual dysfunction (AOR=5.6; 1.5-20.8) were also significantly associated with an increased odds of seeking sexual health service.

Conclusions: The study remarks that just one-fourth of men with diabetes had sought sexual health services. Participants who don't read and write are failed to seek sexual health service. Those who have experienced sexual dysfunction and lived longer duration with diabetes mellitus (>5 years) sought the service well. Therefore, providing especial emphasis for men with low educational status, who lived shorter duration (>5 years) with diabetes mellitus, and those who don't experience sexual dysfunction might be an ideal way of improving their health-seeking behavior.

Keywords: Diabetes; Ethiopia; Factors; Sexual health seeking.

Strength and limitation of the study

- The study highlighted the sexual health-seeking behavior of men with diabetes who are the most under-recognized and liable group of the population for different SRH problems.
- The study might notably introduce social desirability bias due to the nature of the data collection method (face-to-face interview) and the sensitivity of some variables (sexual history).
- Further, it would have been better if the knowledge and perceptions towards sexual health had been explored through a qualitative study.

Introduction

Diabetes mellitus (DM), a growing public health concern in the world is jeopardizing the lives of dozen individuals. The number of people with diabetes would rise to 642 million by the year 2040, according to the International Diabetic Association's (IDA) estimate (1). In Ethiopia, the Worlds Health Organization (WHO) report indicated, more than 2.5 million individuals live with diabetes in the year 2015 alone (1). Besides the growing burden of DM, patients particularly men are at higher risk of developing different sexual problems like sexual dysfunction (SD) associated with the psychogenic, hemodynamic, neurogenic, and hormonal impacts of diabetes in men's sexuality (2-4).

Sexual problems, in particular, SD in diabetic patients are a growing problem. It's three fold higher than healthy individuals and it occurs at an earlier age with its severest form (4, 5). The prevalence of SD among this population ranges from 53-69.5% in Ethiopia (6, 7). Likewise, diabetic patients are also at a greater risk of sexually transmitted infections related to immunosuppression and high blood glucose level (8, 9). Although more than half of all sexually active diabetic men patients had experienced at least one sexual problem, less than a fifth of them had an attempt to seek medical help (10). The sexual and reproductive health (SRH) services are absent or of poor quality and underused in many countries among men with chronic disease because the issue is culturally sensitive to disclose and underway a discussion (11, 12).

SRH problems account for 18% of the total global burden of disease (11-13). The goal of SRH service was intended to deliver care for both women and men, nevertheless, it remains invisible and it fails to meet the SRH care needs of men (12, 13). The progress to scale up the SRH care has been undermined by the increasing influence of conservative political, religious, and cultural forces around the world (11). Particularly, in countries like Ethiopia, the service provision is highly threatened by the strong bond of cultural and religious beliefs (14).

Help-seeking behavior can provide a means to improve access to treatment and reduce human suffering. On the other hand, the lack of professional consensus regarding the standard sexual health care is an important hitch for diabetic men receiving adequate levels of SRH service (10),(13). Neither the patient themselves nor their providers receive a clear message about the types of services that men need to receive, how often they should get and which group of individuals need special emphasis(13). Indeed, less than 10% of chronic patients had been asked about their sexual health in their routine follow-up visits (10).

Although progress is being made towards universal health coverage, the unmet need of men diabetic patients for SRH service is substantial that requires urgent attention and innovative solutions. To strengthen and facilitate the intended care to be delivered, evidence showing the burden and related factors is imperative. In general, men regardless of their health status are a segment of the population with less access to SRH care. Specifically, men with DM are the most vulnerable group of individuals to different SRH challenges associated with their health status and psychosocial matters. The demand for SRH service for this group of population is clearly appreciable; however, there is a small body of evidence regarding their health-seeking behavior and contributing factors. Therefore, this study was aimed to investigate the sexual health-seeking behavior as well as contributing factors among men with diabetes. In doing so, decision-makers working on improving SRH service to attain the universal health coverage of the country and promoting the health of this vulnerable population will uptake the evidence produced from this study.

Methods and materials

Patient and public involvement

Men with DM were included in this study by providing their valuable information. Nevertheless, they have never been participated in conducting the study, designing the protocol and data collection tools, reporting the results, and disseminating the study findings.

Study design, period and setting

A hospital-based cross-sectional study was conducted between February 20th and April 30th, 2020 among men with DM attending the northwest hospitals of the Amhara region. Participants were recruited from chronic the outpatient department (OPD) of Felege Hiwote comprehensive and specialized hospital (FHCSH), Debre Markos referral hospital, and Debre Tabor general hospital. Chronic OPD is the one among others structured in each health institution, where diabetic patients account for the largest proportion (40%) of all chronic outpatient visitors. The study was prepared using the Strengthening the Reporting of Observational studies in Epidemiology (STROBE).

Sample size estimation, procedure, and technique

The sample size was estimated using Epi info version 7 software. A pilot study was conducted at Gondar Comprehensive Specialized Referral Hospital by recruiting 50 diabetic patients to estimate the prevalence of sexual health-seeking behavior and it was 18%. Using this as the best available evidence for the prevalence, we calculated the minimum required sample size using Epi info version 7 software with the following additional assumptions: (a) margin of error (d) 4%; (b) a standard Z-score of 1.96 corresponding to 95% confidence interval; and (c) 10% none response. The total sample size after adding none response was 389.

The estimated sample size was proportionally allocated to each hospital considering their monthly patient flow, and then participants were selected using systematic random sampling technique using the k^{th} interval calculated as $k=\frac{N}{n}$ (where N was the total number of men diabetic patients per month in each hospital. 401, 305, and 340 patients have visited the FHCSH, Debre Markos referral hospital, and Debre Tabor general hospital, respectively. Accordingly, 149, 114, 126 participants were chosen from FHCSH, Debre Markos referral hospital, and Debre Tabor general hospital, respectively. The estimated interval was approximately 3 in each hospital and participants were approached in every three units.

Study population

Men patients diagnosed with diabetics and had been visiting the chronic OPDs for monthly follow-up during the data collection period in the selected hospitals were invited and enrolled. Before the enrollment, the patient's general insight and sexual activity were checked; patients who were disoriented and unable to communicate were excluded.

Variables of the study

Outcome variable

Good sexual health-seeking behavior: if the respondents have ever sought sexual and reproductive health services after experiencing DM.

Independent variables

SD: was explained by total scores below the cutoff points of 47 using the 14-items scale of the Change in the Sexual Functioning (CSFQ) where each item is scored between 0-5 scale (15). The total score of this instrument varies from 0-70.

Couple relationship satisfaction: a score of above 20 from the summation of the relationship assessment scale was considered as satisfied (16).

Comorbid illness: participants having one or more additional confirmed chronic illnesses (hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer, asthma, and multiple sclerosis) among patients with DM.

Diabetic complication: the existence of one or more diabetic-related complications such as retinopathy, neuropathy, nephropathy, and diabetic foot ulcer.

Poor glycemic control: current fasting blood glucose level greater than 130mg/dl or most recent HgA1c >9.0% (17).

Alcoholic: the daily alcohol consumption of respondents was calculated by taking the average alcohol percent (%/ml) of each drink multiplied by the volume (ml) of the drink and volumetric mass density (which is 0.8g/ml). Accordingly, participants were deemed to be alcoholic provided they consume more than 12g ethanol daily for the past six months (18).

Smoker: a respondent who smoke ≥ 12 cigarettes per day for the past six month (19).

Data collection tool, procedure, and quality control

A face-to-face interviewer-administered pretested questionnaire was used. The tool was prepared in English and translated to the local (Amharic) language and retranslated back into English to ensure its consistency. The questionnaire was comprised of five sections: socio-demographic

characteristics; medical and behavioral related factors; psychosocial factors; CSF, and sexual health seeking behavior. Two trained nurses as a data collector and one supervisor were deployed to each hospital.

Data quality was assured through a careful designing of the questionnaire. Data collectors and supervisors were also trained for two days covering the purpose of the study, the detailed content of the questionnaire, the data collection procedure, participant selection, and the rights of study participants within the umbrella of the research ethics. We did pre-testing of the questionnaire prior to the actual data collection. Supervisors checked the data collected from the study participants for completeness and consistency daily over the course of data collection period.

Data processing and analysis

The data were entered into Epi Data version 3.1 and then exported to SPSS version 21.0 for analysis after checking for inconsistency, coding errors, missing value, and completeness. All continuous independent variables were categorized during data analysis and reporting of findings.

The wealth status of the participants was analyzed through principal component analysis (PCA). All categorical and continuous variables were categorized to be between '0' and '1' for the factor analysis. All statistical assumptions of factor analysis were checked. Then, all eligible factor scores were computed using the regression-based method to generate one variable, wealth status. Following this, the final scores were ranked to five quantiles as first, second, third, fourth, and fifth. Finally, ranks were coded as richest, rich, middle, poorer, and poorest, respectively.

The outcome variable of interest was the sexual health-seeking behavior of diabetic men and it was measured as a dichotomous response (1 if a study participant has sought sexual health service since the time he was diagnosed with DM and '0' if the response was "I have never sought"). Before deciding on the appropriate measures of central tendency to be used for some variables (e.g. age and duration of diagnosis with diabetes) we evaluated the distributional assumption of normality using the Shapiro-Wilk statistic and Kolmogorov-Smirnov. Frequency, percentage, mean and standard deviation were used to descriptively summarize the background characteristics of study participants. We reported the summary measures in tables', graph, and texts.

The binary logistic regression was applied to model the outcome variable and to investigate factors associated with the odds of seeking SRH services. Adjusted odds ratio with the corresponding 95% confidence interval (CI) was used as a measure of the strength of associations. Variables having a p-value of at most 0.2 in the bi-variable analysis were included in a multivariable logistic regression model and a p-value of less than 0.05 was used as an indicator of statistical significance. The overall fitness of the final multivariable logistic regression model was assessed using Hosmer and Lemeshow test. The Variance inflation factor (VIF) and rank correlation were used to check for multicollinearity.

Ethics approval and consent to participate: This study was approved by the ethical review board of the University of Gondar, College of Medicine and Health Sciences, and each respective hospital was approached with a support letter written from the university. Oral informed consent was obtained from each study participant since the study didn't apply invasive procedures like body fluid samples. All study participants were informed that participation was on a voluntary basis and have full right to withdraw at the time of need during the interview process. Moreover, they were informed that all information taken from them kept confidential and the entire data collected is going to be used for the purpose of the current study only. The reference/ ID number of the ethical clearance was V/P/RCS/04/620/2020.

Results

Socio-demographic characteristics of participants

A total of 389 participants were enrolled in the study, making a response of 96.7%. The mean (±SD) age of participants was 47.93(±15.01) years. The majority (88.9%) of the respondents were Orthodox Christian followers. About two-thirds (63.3%) of respondents lived in urban areas. Moreover, slightly more than a quarter (25.8%) and a third (36.7%) of participants have attended secondary education and had private work, respectively (Table 1).

Table 1: Socio-demographic characteristics of men with DM attending in the Northwest Amhara regional hospitals, 2020(n=376).

Characteristics	Number	Percent
Age in years		
<40	127	33.8
40-50	77	20.5
>50	172	45.7
Religion		
Orthodox	334	88.9
Muslim	36	9.7
Protestant	6	1.4
Current marital status		
Single	35	9.3
Married	323	85.9
Divorced	8	2.1
Widowed	10	2.7
Educational status		
Can't read and write	78	20.7
Grade 1-8	88	23.4
Grade 8-12	97	25.8
Diploma	20	5.4
Degree & above	93	24.7
Occupation		
Government employee	80	21.3
Private work	138	36.7
Farmer	102	27.1
Student	14	3.7
Job seeker	7	1.9
Retired	35	9.3
Wealth quantile		
Poorest	79	21
Poor	102	27
Middle	97	26
Rich	61	16.2
Richest	37	9.8

Health and psychosocial factors

The median duration the participants lived with diabetes was 8.22 years, ranging from 1-30 years. The proportion of type I diabetic patients was 50%. Neuropathy (16.5%) was the most frequently observed diabetic complication. Hyperlipidemia (16%) was the highest comorbid illness behind hypertension (37.2%) (Table 2).

Table 2: Health and psychosocial factors of men with diabetic recruited from the northwest Amhara regional hospitals, Ethiopia 2020 (n=376).

Characteristics	Frequency (n)	Percent (%)
Duration of diagnosis in years		
Short (<5)	147	39.1
Long (≥5)	229	60.9
Metabolic control		
Controlled	84	22.3
Un-controlled	292	77.7
Having comorbid illnesses		
Yes	191	50.8
No	185	49.2
Diabetic complications		
Yes	123	32.7
No	253	67.3
Physical activity		
Yes	282	75
No	94	25
Alcohol		
Yes	220	58.5
No	156	41.5
Couples satisfaction		
Satisfied	345	91.8
Un-satisfied	31	8.2

Sexual health-seeking behavior

A quarter (25%, 95CI (23.4%, 27.6%)) of men with DM had ever sought sexual health service, of whom the vast majority (97.9%) have claimed to have SD. Of all participants that have sought professional help, just over one-third (34.04%) of them reported having a relationship problem/instability associated with sexual difficulty. Despite most of the participants witnessed to have different social and health problems (like divorce and infertility) following the disruption of sexual health, about half 50.4% of them failed to seek professional help (Fig 1).

Sixty percent of respondents had never sought sexual health service because they assume that SRH service is tailored only for individuals who exhibited sexual problem(s). Feeling ashamed (15.4%) and believing sexual problems have no solution/remedy (11.7) are the two predominant reasons that stopped participants from seeking sexual health (Fig 2).

Factors associated with sexual health seeking behavior

The summary result that describes the association of seeking sexual health service and predefined background characteristics of men having diabetes are summarized in table 3. After adjusting for potential confounding variables, the odds of seeking SRH service among men with diabetes was 57% lower in participants who can't read and write (AOR=0.43; 95% CI: 0.22 - 0.82) and 66% lower amongst participants who attended either primary or secondary education (AOR=0.34; 95% CI: 0.17 - 0.7) as compared to those whose educational status is at least diploma level. Men having diabetes for a longer duration (>5 years) of time have increased odds of seeking SRH services (AOR=2.7: 95%CI: 1.2 -6.04) as compared to those whose duration of diagnosis is shorter. Moreover, the odds of sexual health-seeking was significantly higher (AOR = 5.6; 95%CI: 1.52 - 20.8) among participants who have SD compared to those who do not have.

Table 3: Factors associated with sexual help-seeking behavior among men with DM attending in the Northwest Amhara regional hospitals, 2020 (n=376).

Characteristics	Ever sought sexual healthcare		Odds ratio (95% CI)	
	Yes	No	Crude(OR)	Adjusted(OR)
Age in year				
<40	54	73	1	1
40-50	27	50	1.45(0.54-7.74)	1.92(0.7-5.14)
>50	121	51	3.25(2.13-12.47)	1.41(0.53-3.73)
Resident				
Urban	147	91	1	1
Rural	43	95	0.28(0.22-0.65)	0.76(0.33-1.75)
Education				
Can't read & write	24	54	0.22(0.11-0.83)	0.43(0.22-0.82)
Primary & secondary	88	97	0.21(0.17-0.76)	0.34(0.17-0.7)
Diploma and above	93	20	1	1
Comorbid illnesses				
No	20	172	0.16(0.09-0.28)	0.53(0.24-1.18)
Yes	75	109	1	1
Duration of diagnosis				
<5 years	59	88	1	1
≥5 years	154	75	3.08(1.18-12.76)	2.7(1.2-6.04)
Metabolic control				
<130 mg/dl	10	79	0.28(0.07-0.42)	0.68(0.24-2.01)
≥130 mg/dl	88	199	1	1
SD				
No	5	110	1	1
Yes	92	169	12.1(6.68-34.78)	5.6 (1.52-20.8)
Existence of complications				
No	45	213	1	1
Yes	51	67	3.45(2.13-5.56)	1.13(0.57-2.25)

COR= crude odds ratio and AOR=adjusted odds ratio; Hosmer and Lemshow goodness of fit (p-value=0.89)

Discussion

SRH service is a crucial element of healthcare in which its wide range of access is an individual's human right (11). People with different chronic diseases primarily, diabetes have several sexual and reproductive health challenges (sexually transmitted infections, sexual dysfunction (sexual arousal, satisfaction, desire, and etc.)). These problems could be early prevented through several interventions, including conducting studies and show the magnitude of the problem to the most responsible bodies(20). This segment of the population deserves sexual health counseling, health education, partner communication, and developing safe-sexual behaviors in order to have volitional and pleasurable sexual life (21). This study was, therefore, aimed to show their level of health-seeking behavior and contributing factors.

The study indicates a quarter (25%) of men with diabetes has sought sexual health service, and the pattern is higher among participants from urban residents than rural. Better access to existing evidence and ease healthcare access in urban areas than rural areas might be the reason to the observed heterogeneity (22). Ethiopia is a country where rural population makes up about 78.8% of the total population, and the higher burden of the problem among this population would impact the SRH performance of the country at large (23). The finding implies the need for expanding wide range of health service access to improve geographical accessibility and awareness creation strategies with special focus in rural areas for further improving the health-seeking behavior of men with diabetes.

Participants with lower educational status (secondary and lower) were less likely to seek sexual health services than their counterpart, which is supported by another study that shows being uneducated and having poor knowledge about SRH services are the commonest barrier to the SRH services utilization (22). It's utterly known that education is crucial to boost knowledge and help anticipate and analyze the risk and benefits that would improve the decision-making power of an individual (24). Studies also cemented that the sexual health knowledge and awareness of a person increases with educational level and poor utilization of different health services is the result of low level of literacy (22, 25). Moreover, educated individuals are also less likely to be influenced by harmful cultural and social beliefs that are the biggest bottlenecks of sexual health service utilization (26). In the presence of low educational coverage in Ethiopia, it is likely that significant number of people could be affected by the adverse consequences of low sexual health-seeking behavior, including infertility, relationship instability, and psychological health

problems (27). In light of this, providing comprehensive health education and improving the literacy level is the way forward for the betterment of sexual health-seeking behavior of men with diabetes and thereby to tackle the associated negative health impacts.

Longer duration from the time of diagnosis of diabetes is significantly associated with increased odds of sexual health-seeking behavior. The perceived risk of major diabetic complications, including sexual problem is higher among patients who have lived with diabetes for longer period of time (28, 29). Existing evidence highlights that, patients lived longer duration with the illness are at high risk of experiencing diabetic complications and other comorbid illnesses, which might exacerbate their existing health problem and elevate the risk of different sexual problems including SD that might drove them to sought professional help (10, 21, 29).

Consistent with previous literature, patients who have SD were more likely to seek sexual health services (21, 30). A number of individuals have a miss perception about sexual health service and when to seek help. Seeking professional help for screening and counseling service prior to experiencing a problem is unusual particularly in developing country like Ethiopia related to cultural taboos and fear of judgments. In the current study, respondents with SD have different social (marital instability and divorce) and health (infertility) problems that might improve their intention to seek sexual health services. Although seeking help once experiencing the problem is still appreciated, the better is working to improve the sexual health-seeking behavior of vulnerable individuals like men with DM to prevent them from reproductive and associated health impacts. Therefore, a well-designed SRH education is recommended.

Conclusions

The study remarks that just one-fourth of men with diabetes had sought sexual health services. Participants who don't read and write are failed to seek sexual health service. Those who have experienced SD and lived longer duration with DM (>5 years) sought the service well. Therefore, given the higher proportion of men with diabetes who failed to seek sexual health service, providing especial emphasis for men with low educational status, who lived shorter duration (>5 years) with DM, and who don't experience SD might be an ideal way of improving their health-seeking behavior.

Abbreviations

AOR	Adjusted Odd Ratio
COR	Crude Odd Ratio
CSFQ	Change in Sexual Function Questionnaire
CSI	Couple Satisfaction Index
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
HTN	Hypertension
OPD	Outpatient Department
SD	Sexual Dysfunction
SRH	Sexual and reproductive health
WHO	World Health Organization

Declarations

Author's Contribution:

- Conceptualization: EGM and WWT
- Formal analysis: WWT, EGM, and ATG
- Investigation: ATG, EGM, and WWT
- Methodology: WWT, EGM, and ATG
- Project administration: ATG, EGM, and WWT
- Validation: WWT, EGM, and ATG
- Writing-original draft: EGM , and WWT
- Writing-review and editing: ATG, EGM, and WWT

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Consent for publication: Not applicable.

Availability of data and materials: All data generated during this study are included in this manuscript; however, the corresponding author will provide the dataset upon request.

Author information: [1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

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Figure 1: problems encountered related to sexual health in men with diabetes mellitus attending in hospitals of northwest Amhara region, Ethiopia 2020

Figure 2: Reason for not seeking sexual health among men diabetic patients attending in hospitals of northwest Amhara region, Ethiopia 2020

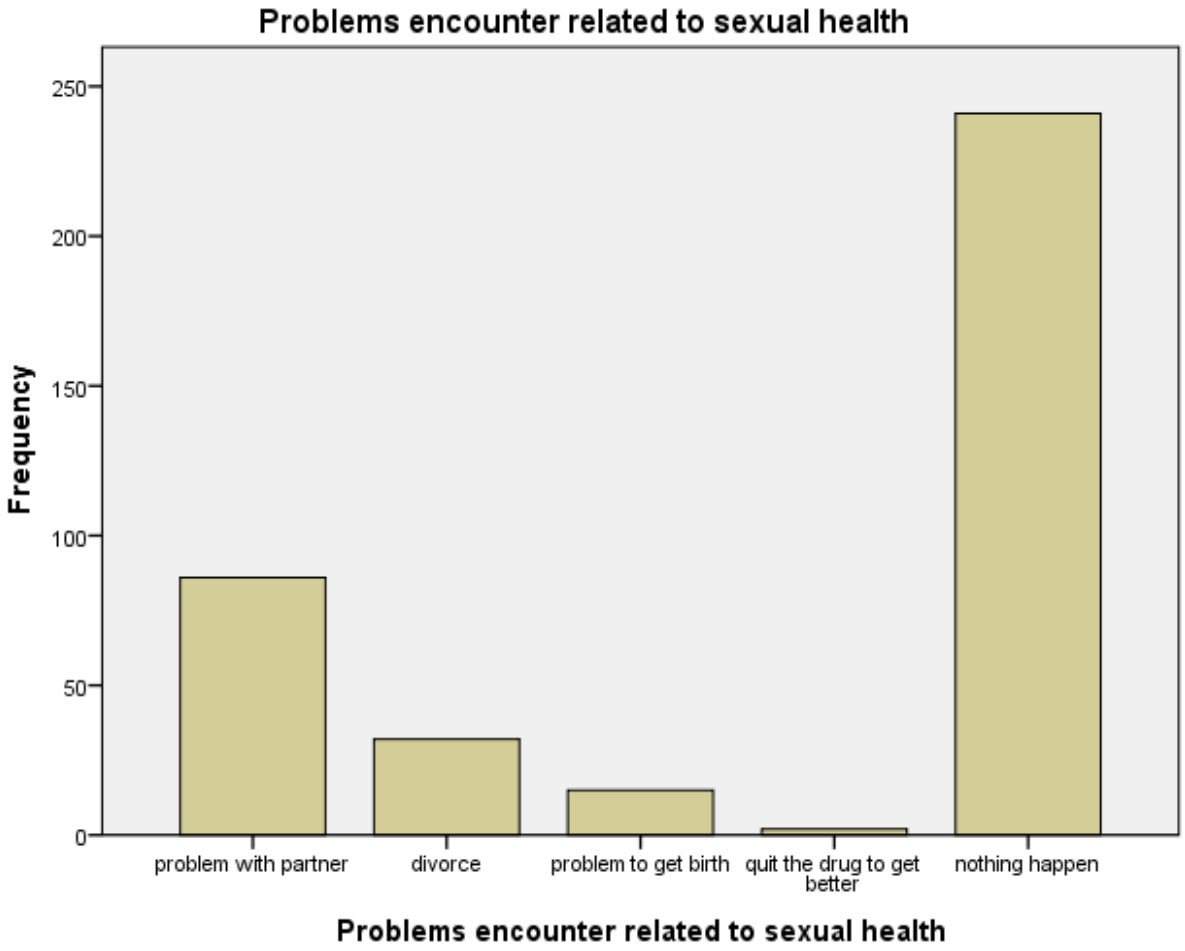

Figure 1: problems encountered related to sexual health in men with diabetes mellitus attending in hospitals of northwest Amhara region, Ethiopia 2020

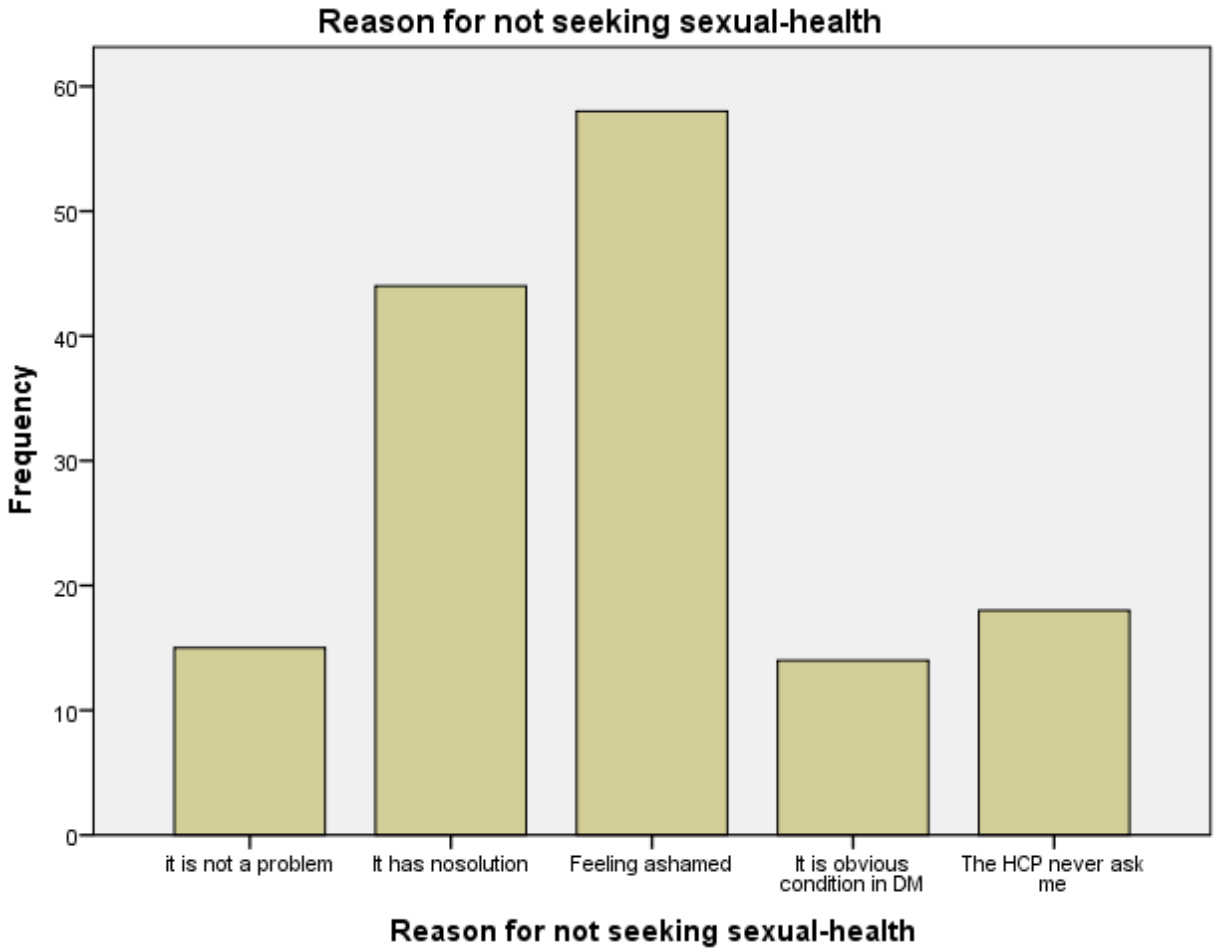

Figure 2: Reason for not seeking sexual health among men diabetic patients in hospitals of northwest Amhara region, Ethiopia 2020

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*
Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1&2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	3	State specific objectives, including any pre-specified hypotheses	Page 4
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Page 6&7
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 7
Bias	9	Describe any efforts to address potential sources of bias	Page 7,8, and 9
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 8 & 9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 8 & 9
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Page 8 & 9
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	N/A

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	N/A
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 10 & 11
		(b) Indicate number of participants with missing data for each variable of interest	Page 10,11 & 12
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Page 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 13
		(*b*) Report category boundaries when continuous variables were categorized	Page 10 & 11
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 15 & 16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 15 & 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 15 & 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Sexual health-seeking behavior and associated factors in men with diabetes mellitus attending in the northwest Amhara region hospitals, Ethiopia: a cross-sectional study.

Eskedar Getie Mekonnen[1], Almaz Tefera Gonete [2], Wubet Worku Takele[3]

Corresponding Author: Eskedar Getie Mekonnen

Email: eskedargetie18@gmail.com

[1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

Email: EGM: eskedargetie18@gmail.com

ATG: almazteferag3@gmail.com

WWT: wubetakele380@gmail.com

Abstract

Objective: to assess the sexual health-seeking behaviour and identify the associated factors in men with diabetes mellitus attending the northwest Amhara region hospitals, Ethiopia.

Methods: Hospital-based cross-sectional study was conducted in the northwest Amhara region hospitals between February 20 and April 30/2020. We approached a total of 389 participants' using a systematic random sampling technique. A face-to-face interviewer-administered questionnaire was used to collect the data. The Binary logistic regression was employed to model the odds of sexual health-seeking behaviour and investigate factors contributing to the behaviour. We used the odds ratio with a corresponding 95% confidence interval as a measure of association and a p-value below 5% as an indicator of statistical significance.

Results: A quarter of diabetic men (25%:23.4%-27.6%) has sought sexual health service since the diagnosis of diabetes. The odds of seeking sexual health service was low in participants who were not able to read and write (Adjusted Odds Ratio (AOR) = 0.33; 0.1-0.87) and participants who have attended primary/secondary education (AOR=0.29; 0.1-0.67) than those who have a diploma and above. Experiencing sexual dysfunction was also significantly associated with an increased odds of seeking sexual health service (AOR=7.1; 2.1-23).

Conclusions: The study remarks that just one-fourth of men with diabetes had sought sexual health services. Participants with lower educational status have failed to seek sexual health services. Patients who have experienced sexual dysfunction sought the service well. Therefore, providing special emphasis for men with lower educational status and those who don't experience sexual dysfunction might be an ideal way of improving their health-seeking behavior.

Keywords: Diabetes; Ethiopia; Factors; Sexual health-seeking.

Strength and limitation of the study

- The study highlighted the sexual health-seeking behaviour of men with diabetes, the most under-recognized and liable group for different Sexual and Reproductive Health (SRH) problems.
- The study might notably introduce social desirability bias due to the nature of the data collection method (face-to-face interview) and the sensitivity of some variables (sexual history).
- Further, it would have been better if the knowledge and perceptions towards sexual health had been explored through a qualitative study.

Introduction

Diabetes mellitus (DM), a growing public health concern globally, is jeopardizing the lives of numerous individuals. The number of people with diabetes expected to rise to 642 million by the year 2040, according to the International Diabetic Association's (IDA) estimate (1). In Ethiopia, the World Health Organization (WHO) report indicated, more than 2.5 million individuals lived with diabetes in the year 2015 alone (1). Besides of the growing burden of DM, patients, particularly men, are at higher risk of developing different sexual problems like sexual dysfunction (SD) associated with the psychogenic, hemodynamic, neurogenic, and hormonal impacts of diabetes in men's sexuality (2-4).

Sexual problems, in particular, SD, are a growing problem among diabetic patients. The risk of SD is three-fold higher among this population than healthy individuals, and it occurs at an earlier age with its severest form (4, 5). The prevalence of SD among this population ranges from 53-69.5% in Ethiopia (6, 7). Likewise, diabetic patients are also at a greater risk of sexual transmitted infections (STIs) related to immunosuppression and high blood glucose level (8, 9).

Although more than half of all sexually active diabetic men patients had experienced at least one sexual problem, less than a fifth of them had an attempt to seek Sexual and Reproductive Health (SRH) care (10). The SRH services are inaccessible or of poor quality and underused in many countries among men with chronic disease as the issue is culturally sensitive to disclose and underway a discussion (11, 12).

SRH problems account for 18% of the total global burden of disease (11-13). The goal of SRH service was intended to deliver care for both women and men; nevertheless, it remains invisible, and it fails to meet the SRH care needs of men (12, 13). The poor service utilization is even more worse in chronic disease patients (14). The progress in scaling up the SRH care has been undermined by the increasing influence of conservative political, religious, and cultural forces worldwide (11). Notably, in countries like Ethiopia, the service provision is highly threatened by the strong bond of cultural, social, and religious beliefs (15).

Help-seeking behaviour can provide a means to improve access to treatment and reduce human suffering. However, lack of professional consensus regarding the standard sexual health care is an essential hitch for diabetic men receiving adequate levels of SRH service (10, 13). Neither the patient nor their providers receive a clear message about the types of services that men need to receive, how often they should get, and which group of individuals need particular emphasis

(13). Indeed, less than 10% of chronic patients had been asked about their sexual health in their routine follow-up visits (10).

Although progress is being made towards universal health coverage, the unmet need of men diabetic patients for SRH service is substantial that requires urgent attention and innovative solutions. Evidence showing the burden and related factors are imperative to strengthen and facilitate the intended care delivered. In general, regardless of their health status, men are a segment of the population with less access to SRH care. Specifically, men with DM are most vulnerable to different SRH challenges associated with their health status and psychosocial matters. The demand for SRH service for this group of population is clearly appreciable; however, there is a small body of evidence regarding their health-seeking behaviour and contributing factors. Therefore, this study aimed to investigate the sexual health-seeking behaviour and contributing factors among men with diabetes. In doing so, decision-makers working on promoting the health of this vulnerable population, including sexual and reproductive health will uptake the evidence produced from this study.

Methods and materials

Patient and public involvement

Men with DM were included in this study by providing their valuable information. Nevertheless, they have never been participated in conducting the study, designing the protocol and data collection tools, reporting the results, and disseminating the study findings.

Study design, period and setting

A hospital-based cross-sectional study was conducted between February 20 and April 30th/2020, among men with DM attending the northwest hospitals of the Amhara region. Participants were recruited from the chronic out-patient department (OPD) of Felege Hiwote comprehensive and specialized hospital (FHCSH), Debre Markos referral hospital, and Debre Tabor referral hospital. Chronic OPD is one of the other structured departments in each health institution, where diabetic patients account for the most significant proportion (40%) of all chronic out-patient visitors. The study was prepared using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (16).

Sample size estimation, procedure, and technique

The sample size was estimated using Epi info version 7 software. A pilot study was conducted at Gondar Comprehensive Specialized Referral Hospital by recruiting 50 diabetic patients to estimate the prevalence of sexual health-seeking behaviour, and it was 18%. Then, the sample size was calculated using the following additional assumptions: (a) margin of error (d): 4%; (b) a standard Z-score of 1.96 corresponding to 95% confidence interval; proportion: 18%; and (c) 10% none response and a total of 389 were recruited.

A stratified sampling technique followed by systematic sampling was employed. Firstly, the estimated sample size was proportionally allocated to the three hospitals considering their monthly patient flow. Then, participants were selected using a systematic random sampling technique using the k^{th} interval calculated as $k=\frac{N}{n}$ (where N was the total number of men diabetic patients per month in each hospital. About 401, 305, and 340 patients have visited the FHCSH, Debre Markos referral hospital, and Debre Tabor general hospital, respectively. Accordingly, 149, 114, and 126 participants were chosen from FHCSH, Debre Markos referral hospital, and Debre Tabor referral hospital. The estimated interval was approximately 3 in each hospital, and participants were approached in every three individuals.

Study population

Men patients diagnosed with diabetes and visiting the chronic OPDs of the included hospitals for monthly follow-up during the data collection period were invited and enrolled. Before the enrollment, the patient's general insight and sexual activity were checked; patients who were disoriented and unable to communicate were excluded.

Variables of the study

Outcome variable

Good sexual health-seeking behaviour: if a respondent has ever sought SRH services after experiencing DM.

Independent variables

SD: was explained by total scores below the cutoff points of 47 using the 14-items scale of the Change in the Sexual Functioning (CSFQ), where each item is scored between 0-5 scale (17). The total score of this instrument varies from 0-70.

Couple relationship satisfaction: a score of above 20 from the relationship assessment scale's summation was considered as satisfied (18).

Comorbid illness: participants having one or more additional confirmed chronic diseases (hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer, asthma, and multiple sclerosis) among patients with DM.

Diabetic complication: the existence of one or more diabetic-related complications such as retinopathy, neuropathy, nephropathy, and diabetic foot ulcer was counted as having DM complications.

Poor glycemic control: fasting blood glucose level greater than 130mg/dl or most recent HgA1c >9.0% (19).

Alcoholic: the daily alcohol consumption of respondents was calculated by taking the average alcohol percent (%/ml) of each drink multiplied by the volume (ml) of the drink and volumetric mass density (which is 0.8g/ml). Accordingly, participants were deemed alcoholic, provided they consumed more than 12g ethanol daily for the past six months (20).

Smoker: a respondent who smoke ≥ 12 cigarettes per day for the past six months (21).

Data collection tool, procedure, and quality control

A face-to-face interviewer-administered pre-tested questionnaire was used. The tool was prepared in English, translated to the local language (Amharic), and translated back into English

to ensure consistency. The questionnaire comprised five sections: socio-demographic characteristics, medical and behavioural related factors, psychosocial factors, CSFQ, and sexual health-seeking behaviour. Two trained nurses as data collectors and one supervisor were deployed to each hospital.

The quality of data was assured through a careful design of the questionnaire. Data collectors and supervisors were also trained for two days covering the purpose of the study, the detailed content of the questionnaire, the data collection procedure, participant selection, and the rights of study participants within the umbrella of the research ethics. We did pre-testing of the questionnaire prior to the actual data collection. Supervisors checked the data collected for completeness and consistency daily over the course of the data collection period.

Data processing and analysis

The data were entered into Epi Data version 3.1 and then exported to SPSS version 21.0 for analysis after checking for inconsistency, coding errors, missing value, and completeness. All continuous independent variables were categorized during data analysis and reporting of findings.

The wealth status of the participants was analyzed through the principal component analysis (PCA). All categorical and continuous variables were categorized to be between '0' and '1' for the factor analysis. All statistical assumptions of factor analysis were checked. Then, all eligible factor scores were computed using the regression-based method to generate one variable, wealth status. Following this, the final scores were ranked to five quantiles as first, second, third, fourth, and fifth. Finally, ranks were coded as richest, rich, middle, poorer, and poorest, respectively.

The outcome variable of interest was the sexual health-seeking behaviour of diabetic men. Sexual health-seeking was measured as a dichotomous response (1 if a study participant has sought SRH service since he was diagnosed with DM and '0' if the answer was "I have never sought SRH service"). Before deciding on the appropriate measures of central tendency for variables like age and duration of diagnosis with diabetes, the distributional assumption of normality was evaluated using the Shapiro-Wilk statistic and Kolmogorov-Smirnov. Frequency, percentage, mean, and standard deviation were used to descriptively summarise the background characteristics of study participants. We reported the summary measures in tables', graphs, and texts.

The binary logistic regression was applied to model the outcome variable and to investigate factors associated with the odds of seeking SRH services. Adjusted odds ratio with the corresponding 95% confidence interval (CI) was used to measure the strength of associations. Variables with a p-value of at most 0.2 in the bi-variable analysis were included in a multivariable logistic regression model, and a p-value of less than 0.05 was used as an indicator of statistical significance. The overall fitness of the final multivariable logistic regression model was assessed using Hosmer and Lemeshow test. The Variance inflation factor (VIF) and rank correlation were used to check for multicollinearity.

Ethics approval and consent to participate

The ethical review board of the University of Gondar, College of Medicine and Health Sciences approved this study (ref V/P/RCS/04/620/2020). Each respective hospital was approached with a support letter written by the University. Oral informed consent was obtained from each study participant since the study didn't apply invasive procedures like body fluid samples. All study participants were informed that participation was on a voluntary basis and had the full right to withdraw at the time of need during the interview process. Moreover, they were informed that all information taken from them is kept confidential, and the entire data collected was used for the current study only.

Results

Socio-demographic characteristics of participants

A total of 389 participants were enrolled in the study, making a response of 96.7%. The mean (±SD) age of participants was 47.93(±15.01) years. The vast majority (88.9%) of participants were orthodox christian followers. About two-thirds (63.3%) of respondents were lived in urban areas. Moreover, slightly more than a quarter (25.8%) and a third (36.7%) of participants have attended secondary education and had private work, respectively (Table 1).

Table 1: Socio-demographic characteristics of men with DM attending the Northwest Amhara region hospitals, 2020(n=376).

Characteristics	Number	Percentage
Age in years		
<40	127	33.8
40-50	77	20.5
>50	172	45.7
Religion		
Orthodox	334	88.9
Muslim	36	9.7
Protestant	6	1.4
Current marital status		
Single	35	9.3
Married	323	85.9
Divorced	8	2.1
Widowed	10	2.7
Educational status		
Can't read and write	78	20.7
Grade 1-8	88	23.4
Grade 8-12	97	25.8
Diploma	20	5.4
Degree & above	93	24.7
Occupation		
Government employee	80	21.3
Private work	138	36.7
Farmer	102	27.1
Student	14	3.7
Job seeker	7	1.9
Retired	35	9.3
Wealth quantile		
Poorest	79	21
Poor	102	27
Middle	97	26
Rich	61	16.2
Richest	37	9.8

Health and psychosocial factors

The median duration of the participants who lived with diabetes was 8.22 years, ranging from 1-30 years. The proportion of type I diabetic patients was 50%. Neuropathy (16.5%) was the most frequently observed diabetic complication. Further, hyperlipidemia (16%) was the highest comorbid illness behind hypertension (37.2%) (Table 2).

Table 2: Health and psychosocial factors of men with diabetes recruited from the northwest Amhara regional hospitals, Ethiopia 2020 (n=376).

Characteristics	Frequency (n)	Percent (%)
Duration of diagnosis in years		
Short (<5)	147	39.1
Long (≥5)	229	60.9
Metabolic control		
Controlled	84	22.3
Un-controlled	292	77.7
Having comorbid illnesses		
Yes	191	50.8
No	185	49.2
Diabetic complications		
Yes	123	32.7
No	253	67.3
Physical activity		
Yes	282	75
No	94	25
Alcohol		
Yes	220	58.5
No	156	41.5
Couples satisfaction		
Satisfied	345	91.8
Un-satisfied	31	8.2

Perceived reasons for not seeking sexual health

Relationship unstability, divorce, and fertility problem are the prominent problems that the participant encountered. Of all participants that have sought professional help, just over one-third (34.04%) of them reported having a relationship problem/instability associated with sexual difficulty. Even though most of the participants witnessed different social and health problems (like divorce and infertility) following the disruption of sexual health, about 50.4% of them failed to seek professional help.

Sixty percent of respondents had never sought sexual health service because they assume that SRH service is tailored only for individuals who exhibited sexual problem(s). Feeling ashamed (15.4%) and believing sexual problems have no solution/remedy (11.7%) are the two principal perceived reasons that stopped participants from seeking sexual health.

Sexual health-seeking behaviour

A quarter (25%, 95CI (23.4%, 27.6%)) of men with DM had ever sought sexual health service, of whom the vast majority (97.9%) have claimed to have SD.

Factors associated with sexual health-seeking behaviour

The summary result that describes the association of seeking sexual health service and predefined background characteristics of men having diabetes are summarised in table 3. After adjusting for potential confounding variables, the likelihood of seeking sexual health service among men with diabetes was 67% lower in participants who can't read and write (AOR=0.33; 95% CI: 0.1 - 0.87) than those whose educational status is at least diploma level. Similarly, the odds of seeking sexual health service in participants who have attended either primary or secondary education was reduced by 71% (AOR=0.29; 95% CI: 0.1 - 0.67) as compared to those whose educational status is at least diploma level. The odds of sexual health-seeking behavior was significantly higher (among participants who exhibited SD disorder compared to those who do not have AOR = 7.1; 95% CI: 2.1 - 23).

Table 3: Factors associated with sexual help-seeking behaviour among men with DM attending in the Northwest Amhara regional hospitals, 2020 (n=376).

Characteristics	Ever sought sexual healthcare		Odds ratio (95% CI)	
	Yes	No	Crude(OR)	Adjusted(OR)
Age in year	N/A	N/A	-	1(0.98-1.03)
Resident				
Rural	43	95	1	1
Urban	143	91	3.75(2.1-6.32)	2.07(0.7-6.1)
Education				
Can't read & write	24	54	0.22(0.11-0.83)	0.33(0.1-0.87)
Primary & secondary	88	97	0.2(0.17-0.76)	0.29(0.1-0.67)
Diploma and above	93	20	1	1
Comorbid illnesses				
No	20	172	0.16(0.09-0.28)	0.53(0.25-1.11)
Yes	75	109	1	1
Duration of diagnosis	N/A	N/A	-	1.01(0.95-1.06)
Metabolic control				
<130 mg/dl	10	79	0.28(0.07-0.42)	0.54(0.22-1.31)
≥130 mg/dl	88	199	1	1
SD				
No	5	110	1	1
Yes	92	169	12.1(6.68-34.78)	7.1(2.1-23.0)
Existence of complications				
No	45	213	1	1
Yes	51	67	3.45(2.13-5.56)	1.45(0.28-2.19)

N/A=Not Applicable; COR= Crude Odds Ratio and AOR=Adjusted Odds Ratio; Hosmer and Lemshow goodness of fit (p-value=0.49). '1'=refrencecategory.

Discussion

SRH service is the crucial element of healthcare in which its wide range of access is an individual's human right (11). Sexual problems often accompany different chronic diseases; patients with diabetes, in particular, have several SRH challenges like STIs and SD (sexual arousal, satisfaction, desire, etc.). Conducting studies to show the magnitude of the problem for the most responsible bodies will help to design an intervention that prevents sexual problems before damaging the mental and psychological health of the individuals (22). Regardless of having sexual problems, men with DM deserves sexual health counselling, health education, and partner communication to develop safe and pleasurable sexual life (23). This study was, therefore, aimed to look at the health-seeking behaviour and contributing factors among men with DM.

The study indicates that a quarter (25%) of men with diabetes have sought sexual health service, depicting the significant number of men with DM are not seeking sexual health service despite the high vulnerability.

The pattern of health-seeking behaviour is higher among urban residents than rural participants. The better and easy access to existing healthcare services in urban areas than rural areas might be the reason for the observed heterogeneity (24). Ethiopia is a country where the rural population makes up about 78.8% of the total population, and thus, the current evidence help to emphasize this segment of the population in the healthcare system. The higher burden of the problem in the rural population would significantly contribute to the poor SRH service of the population in the country at large (25). In general, the finding implies the need for expanding a wide range of health service access to improve geographical accessibility and awareness creation strategies with a special focus in rural areas to improve the health-seeking behaviour of men with diabetes.

Participants with lower educational status (secondary and lower) were less likely to seek sexual health services than their counterparts. The finding is supported by another study that shows being uneducated and having poor knowledge about SRH services are the commonest barriers to utilizing SRH services (24). It's utterly known that education is crucial to boost knowledge and helps to anticipate and analyze the risks of not utilizing healthcare that ultimately enhances the individual's decision-making power (26). Similarly, studies also cemented that the person's sexual health knowledge and awareness increases with educational level, and poor utilization of different health services results from low literacy levels (24, 27). Moreover, educated individuals

are also less likely to be influenced by harmful cultural and social beliefs that are the biggest bottlenecks of sexual health service utilization (28). With the low educational coverage in Ethiopia, a significant number of diabetic men could likely be affected by the adverse consequences of low sexual health-seeking behaviour, including infertility, relationship instability, and psychological health problems (29). In light of this, providing comprehensive health education and improving literacy is recommended to enhance the sexual health-seeking behaviour of men with diabetes. Therefore, the associated adverse health impacts of sexual problems could be tackled.

Consistent with the previous literature, diabetic men with SD were more likely to seek sexual health services (23, 32). Several individuals have a miss perception about sexual health services and when to seek help. Seeking professional help for screening and counselling services before experiencing a problem is unusual, particularly in developing countries like Ethiopia, due to high cultural taboos, fear of judgments, and low awareness (33). In the current study, respondents with SD have different social (marital instability and divorce) and health (infertility) problems that might increase their intention to seek sexual health services. Although seeking help once experiencing the problem is still appreciated, the better would be improving the sexual health-seeking behaviour of vulnerable individuals like diabetic men to prevent reproductive and associated health impacts. Therefore, a well-designed SRH education is recommended.

The study is not free from some limitations. Due to the nature of the data collection technique and the sensitivity of some variables (e.g. sexual dysfunction), the study might have introduced a bias; notably, social desirability bias though some measures such as interviewing privately have been used to minimize it. In addition, the perceived risk and susceptibility of the participants about the sexual problems are the areas that need to be explored qualitatively to understand the participant's view, which is not considered in this study.

Conclusions

The study remarks that just one-fourth of men with diabetes had sought sexual health services. Participants with lower educational status have failed to seek sexual health services. Those who have experienced SD sought the service higher than their counterpart. Given the higher proportion of diabetic men who have failed to seek sexual health service, providing special emphasis for men with low educational status and don't experience SD might be ideal for improving their health-seeking behaviour. Future researchers in the field are recommended to explore the individual's perception through a qualitative research approach to better understand the contributing factors that affect sexual health-seeking behavior.

Abbreviations

AOR	Adjusted Odd Ratio
COR	Crude Odd Ratio
CSFQ	Change in Sexual Function Questionnaire
CSI	Couple Satisfaction Index
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
HTN	Hypertension
OPD	Outpatient Department
SD	Sexual Dysfunction
SRH	Sexual and reproductive health
WHO	World Health Organization

Declarations

Author's Contribution:

- Conceptualization: EGM and WWT
- Formal analysis: WWT, EGM, and ATG
- Investigation: ATG, EGM, and WWT
- Methodology: WWT, EGM, and ATG
- Project administration: ATG, EGM, and WWT
- Validation: WWT, EGM, and ATG
- Writing-original draft: EGM , and WWT
- Writing-review and editing: ATG, EGM, and WWT

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Consent for publication: Not applicable.

Availability of data and materials: All data generated during this study are included in this manuscript; however, the corresponding author will provide the dataset upon request.

Author information: [1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

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STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1&2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	3	State specific objectives, including any pre-specified hypotheses	Page 4
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Page 6&7
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 7
Bias	9	Describe any efforts to address potential sources of bias	Page 7,8, and 9
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 8 & 9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 8 & 9
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Page 8 & 9
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	N/A

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	N/A
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 10 & 11
		(b) Indicate number of participants with missing data for each variable of interest	Page 10,11 & 12
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Page 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 13
		(*b*) Report category boundaries when continuous variables were categorized	Page 10 & 11
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 15 & 16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 15 & 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 15 & 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Sexual health-seeking behaviour and associated factors in men with diabetes mellitus attending the northwest Amhara region hospitals, Ethiopia: a cross-sectional study.

Eskedar Getie Mekonnen[1], Almaz Tefera Gonete [2], Wubet Worku Takele[3]

Corresponding Author: Eskedar Getie Mekonnen

Email: eskedargetie18@gmail.com

[1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

Email: EGM: eskedargetie18@gmail.com

ATG: almazteferag3@gmail.com

WWT: wubetakele380@gmail.com

Abstract

Objective: to assess the sexual health-seeking behaviour and identify the associated factors in men with diabetes mellitus attending in the northwest Amhara region hospitals, Ethiopia.

Design: a cross-sectional study was conducted.

Setting: the study was conducted in the northwest Amhara region hospitals between February 20 and April 30/2020.

Participants: a total of 389 diabetic men were approached using a systematic random sampling technique. A face-to-face interviewer-administered questionnaire was used. The Binary logistic regression was employed to identify factors contributing to sexual health-seeking behaviour. The odds ratio with its corresponding 95% confidence interval was used to measure association. Factors with a p-value less than 0.05 in multivariable logistic regression were deemed as significant factors.

Outcome measures: participants were interviewed to respond whether they had sought sexual health service since they were notified to have diabetes mellitus.

Results: A quarter of diabetic men (25%:23.4%-27.6%) has sought sexual health service since they were diagnosed with diabetes mellitus. The odds of seeking sexual health service was reduced by 67% in participants who were not able to read and write (Adjusted Odds Ratio (AOR) = 0.33; 0.1-0.87) and 71% in participants who have attended primary/secondary education (AOR=0.29; 0.1-0.67) than those who have a diploma and above. Experiencing sexual dysfunction was also significantly associated with an increased odds of seeking sexual health service (AOR=7.1; 2.1-23).

Conclusions: the study remarks that just one-fourth of men with diabetes had sought sexual health services. Participants with lower educational status are less likely to seek sexual health services. Patients who have experienced sexual dysfunction sought the service well compared to their counterparts. Therefore, special emphasis should be given to men with lower educational status. Similarly, counseling patients to seek sexual health service before experiencing sexual dysfunction would help to improve sexual health-seeking behaviour.

Keywords: Diabetes; Ethiopia; Factors; Sexual health-seeking.

Strength and limitation of the study

- The study highlighted the sexual health-seeking behaviour of men with diabetes, the most under-recognized and susceptible population for different Sexual and Reproductive Health (SRH) problems.
- The study might introduce social desirability bias associated with the nature of the data collection technique (face-to-face interview) and the sensitivity of some variables like sexual history.
- It would have been better if the participant's knowledge and perceptions towards sexual health had been qualitatively explored.

Introduction

Diabetes mellitus (DM), a growing public health concern globally, is jeopardizing the lives of several individuals. The number of people with diabetes is expected to escalate to 642 million by the year 2040, according to the International Diabetic Association's (IDA) estimate (1). The World Health Organization (WHO) report indicated that more than 2.5 million individuals had diabetes in the year 2015 alone in Ethiopia (1). Besides the growing burden of DM, patients, particularly men, are at higher risk of developing different sexual problems like sexual dysfunction (SD) associated with psychogenic, hemodynamic, neurogenic, and hormonal complications (2-4). Likewise, diabetic patients are also more liable to sexually transmitted infections (STIs) related to immunosuppression and high blood glucose level (5, 6). SD is a growing problem among diabetic patients; where the risk is three-fold higher among people with DM than healthy individuals and occur at an earlier age with its severest form (4, 7). The prevalence of SD among this group population ranges from 53-69.5% in Ethiopia (8, 9).

Although more than half of all sexually active diabetic men patients had experienced at least one sexual problem, less than a fifth of them had an attempt to seek Sexual and Reproductive Health (SRH) care (10). The SRH services are inaccessible or of poor quality and underused in many countries among men with chronic disease as the issue is culturally sensitive to disclose and underway discussions (11, 12).

SRH problems account for 18% of the total global burden of disease (11-13). The goal of SRH service was intended to deliver care for both women and men in need; nevertheless, it remains low and fails to meet the SRH service demand of men (12, 13). The poor service utilization is even more worse in patients with chronic diseases (14). The progress towards scaling up the SRH care has been compromised by the increasing influence of conservative political, religious, and cultural forces worldwide (11). In particular, in countries like Ethiopia, the service demand is highly threatened by the strong cultural, social, and religious bond (15).

Help-seeking behaviour would provide a means to improve access to treatment and reduce human suffering. However, low levels of health-seeking and lack of professional consensus regarding the standard sexual health care are barriers for diabetic men receiving adequate SRH service (10, 13). Health care providers are not clear with messages about the types of services that men need to receive, how often they should get, and which group of individuals need

particular emphasis (13). Indeed, less than 10% of chronic patients had been interviewed about their sexual health in their routine follow-up visits (10).

Although positive progress is observed in the universal health coverage, the unmet need for SRH service among men with diabetes is substantial that requires urgent attention and innovative solutions. In general, regardless of their health status, men are a segment of the population with less access to SRH care. Specifically, men with DM are most vulnerable to different SRH challenges associated with their illness. Evidence exhibiting the burden and related factors are imperative to strengthen and facilitate the intended care delivered to this group of the population. However, there is a small body of evidence regarding their health-seeking behaviour and contributing factors. Therefore, this study was designed to determine the sexual health-seeking behaviour and contributing factors among men with diabetes. In doing so, decision-makers working on sexual and reproductive health services will uptake the evidence to improve service utilization. It will also help to realize universal health coverage in the country.

Methods and materials

Patient and public involvement

Men with DM were included in this study by providing their valuable information. Nevertheless, they have never been participated in conducting the study, designing the protocol and data collection tools, reporting the results, and disseminating the study's findings.

Study design, period and setting

A hospital-based cross-sectional study was conducted between the 20th of February and April 30th/2020 among men with DM attending in the northwest Amhara region hospitals, Ethiopia. Participants were accessed and recruited while visiting the chronic out-patient departments (OPD) of the Felege Hiwote comprehensive and specialized hospital (FHCSH), Debre Markos referral hospital, and Debre Tabor referral hospital. The chronic OPD is one of the other structured departments in each health institution, where diabetic patients account for the most significant proportion (40%) of all chronic out-patient visitors. The study was prepared and reported using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (16).

Sample size estimation, sampling procedures, and sampling techniques

The sample size was estimated using Epi info version 7 software considering various statistical assumptions. A pilot study was conducted at the University of Gondar Comprehensive Specialized Referral Hospital by recruiting 50 diabetic patients to estimate the prevalence of sexual health-seeking behaviour. The level of health-seeking was found to be 18%, and thus, 'P' was 0.18. Additional assumptions: (a) margin of error (d): 4%; (b) a standard Z-score of 1.96 corresponding to 95% confidence interval; and (c) 10% none response were considered. Thus, the final sample size was 389 diabetic men.

A stratified sampling followed by a systematic sampling technique was employed. First, the estimated sample size was proportionally allocated to the three hospitals, considering their monthly patient flow. Then, participants were selected using a systematic random sampling technique using the k^{th} interval calculated as $k=\frac{N}{n}$ (where 'N' was the total number of men diabetic patients visiting per month in each hospital). About 401, 305, and 340 patients have visited the FHCSH, Debre Markos referral hospital, and Debre Tabor general hospital, respectively; accordingly, 149, 114, and 126 participants were drawn from FHCSH, Debre Markos referral hospital, and Debre Tabor referral hospital, respectively. The estimated interval

(k) was approximately 3 in each hospital; therefore, participants were approached in every three individuals.

Study population

Men patients diagnosed with diabetes who were visiting the chronic OPDs for monthly follow-up during the data collection period in the included hospitals were invited and enrolled. Before the enrollment, the patient's general insight and sexual activity were checked; patients who were disoriented and unable to communicate were excluded.

Variables of the study

Outcome variable

Good sexual health-seeking behaviour: if a respondent has ever sought SRH services after being diagnosed with DM.

Independent variables

SD: The 14-items scale of the Change in the Sexual Functioning (CSFQ) was used, where each item was scored between 0-5 scale (17). The total score of this instrument varies from 0-70. Accordingly, participants who scored below 47 were categorized as having SD.

Couples satisfaction in their relationship: a score of above 20 from the relationship assessment scale was considered satisfied (18).

Comorbid illness: participants who have one or more additional confirmed chronic diseases (hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer, asthma, and multiple sclerosis) were deemed to have comorbid illnesses.

Diabetic complication: the existence of one or more diabetic-related complications, such as retinopathy, neuropathy, nephropathy, and diabetic foot ulcer, was considered as having DM complications.

Poor glycemic control: fasting blood glucose level of greater than 130mg/dl, or most recent HgA1c of >9.0% (19).

Alcoholic: the daily alcohol consumption of respondents was calculated by taking the average alcohol percentage (%/ml) of each drink multiplied by the volume (ml) of the drink and volumetric mass density (which is 0.8g/ml). Participants were categorized as 'alcoholic', provided they consumed more than 12g ethanol daily for the past six months (20).

Smoker: a respondent who smoke ≥ 12 cigarettes per day for the last six months (21).

Data collection tool, procedure, and quality control

A face-to-face interviewer-administered pre-tested questionnaire was used. The tool was prepared in English, translated to the Amharic (the local language), and translated back into English to ensure consistency. The questionnaire comprised five sections: socio-demographic characteristics; medical and behavioural related factors; psychosocial factors; CSFQ; and sexual health-seeking behaviour. Two data collectors (nurses) and one supervisor (public health) were recruited and assigned to each hospital.

The quality of data was assured through a careful design of the questionnaire. Data collectors and supervisors were also trained for two days on the purpose of the study, the detailed content of the questionnaire, the data collection procedure, participant selection, and the rights of study participants within the umbrella of research ethics. Supervisors checked the collected data for completeness and consistency throughout the data collection period.

Data processing and analysis

The data were entered into Epi Data version 3.1 and then exported to SPSS version 21.0 for analysis after checking any consistency, coding errors, missing value, and incompleteness.

The wealth status of the participants was analyzed through the principal component analysis (PCA). All categorical and continuous variables were categorized to be between '0' and '1' for the factor analysis. All statistical assumptions of factor analysis were checked. Then, all eligible factor scores were computed using the regression-based method to generate one variable, wealth status. Following this, the final scores were ranked to five quantiles as first, second, third, fourth, and fifth. Finally, ranks were coded as richest, rich, middle, poorer, and poorest.

The outcome variable of interest was the sexual health-seeking behaviour of diabetic men. The behaviour was measured as a dichotomous response ('1' if a study participant has sought SRH service since he was diagnosed with DM and '0' if the answer was "I have never sought SRH service"). Before deciding on the appropriate measures of central tendency for variables like age and number of years that patient had lived with DM, the distributional assumption of normality was evaluated using the Shapiro-Wilk statistic and Kolmogorov-Smirnov. Frequency, percentage, mean, and standard deviation (SD) were used to descriptively summarise study participants' background characteristics. The summary measures were reported in tables' and texts.

The binary logistic regression was applied to model the outcome variable and to investigate factors associated with the odds of seeking SRH services. Adjusted odds ratio with the corresponding 95% confidence interval (CI) was used to measure the strength and direction of the association. Variables with a p-value of less than 0.2 in the bi-variable analysis were included in the multivariable logistic regression model, and a p-value of less than 0.05 was used as an indicator of statistical significance. The overall fitness of the final model was assessed using Hosmer and Lemeshow test. The Variance inflation factor (VIF) and rank correlation were used to diagnose the problem of multicollinearity.

Ethics approval and consent to participate

The ethical review board of the University of Gondar, College of Medicine and Health Sciences approved the study (ref V/P/RCS/04/620/2020). Each respective hospital was approached with a support letter written by the University, and a permission letter was obtained from them. Oral informed consent was taken from each study participant, as the study didn't apply any invasive procedures like body fluid samples. All study participants were informed that participation was on a voluntary basis and oriented about their full right to withdraw at any time of need during the interview process. Moreover, they were informed that all information taken from them will be kept confidential, and the entire data collected will only be used for the current study.

Results

Socio-demographic characteristics of participants

A total of 389 participants were enrolled in the study, making a response of 96.7%. Participant's mean (±SD) age was 47.93(±15.01) years. The majority (88.9%) of participants were orthodox Christian followers. Close to two-thirds (63.3%) of respondents were lived in urban areas. Moreover, slightly more than a quarter (25.8%) and a third (36.7%) of participants have attended secondary education and had private work, respectively (Table 1).

Table 1: Socio-demographic characteristics of men with DM attending the Northwest Amhara region hospitals, 2020(n=376).

Characteristics	Number	Percentage
Age in years		
<40	127	33.8
40-50	77	20.5
>50	172	45.7
Religion		
Orthodox	334	88.9
Muslim	36	9.7
Protestant	6	1.4
Current marital status		
Single	35	9.3
Married	323	85.9
Divorced	8	2.1
Widowed	10	2.7
Educational status		
Can't read and write	78	20.7
Grade 1-8	88	23.4
Grade 8-12	97	25.8
Diploma	20	5.4
Degree & above	93	24.7
Occupation		
Government employee	80	21.3
Private work	138	36.7
Farmer	102	27.1
Student	14	3.7
Job seeker	7	1.9
Retired	35	9.3
Wealth quantile		
Poorest	79	21
Poor	102	27
Middle	97	26
Rich	61	16.2
Richest	37	9.8

Health and psychosocial factors

The median duration of the participants who lived with diabetes was 8.22 years, ranging from 1-30 years. The proportion of type I diabetic patients was 50%. Neuropathy was the most frequently observed diabetic complication at 16.5%. Further, hyperlipidemia (16%) was the highest comorbid illness behind hypertension (37.2%) (**Table 2**).

Table 2: Health and psychosocial factors of men with diabetes recruited from the northwest Amhara regional hospitals, Ethiopia 2020 (n=376).

Characteristics	Frequency (n)	Percent (%)
Duration of diagnosis in years		
Short (<5)	147	39.1
Long (≥5)	229	60.9
Metabolic control		
Controlled	84	22.3
Un-controlled	292	77.7
Having comorbid illnesses		
Yes	191	50.8
No	185	49.2
Diabetic complications		
Yes	123	32.7
No	253	67.3
Physical activity		
Yes	282	75
No	94	25
Alcohol		
Yes	220	58.5
No	156	41.5
Couples satisfaction		
Satisfied	345	91.8
Un-satisfied	31	8.2

Perceived reasons for not seeking sexual health

Relationship instability, divorce, and fertility problems were the major problems that the participant encountered. Of all participants seeking professional help, just over one-third (34.04%) reported having a relationship problem/instability associated with sexual difficulty. Even though most of the participants witnessed, different social and health problems like divorce and infertility linked with the disruption of sexual health, about half (50.4%) of them failed to seek professional help.

Sixty percent of respondents had never sought sexual health service as they assume SRH service is tailored only for individuals who exhibited sexual problem(s). Feeling ashamed and believing sexual problems have no solution/remedy were the two principal perceived reasons that stopped participants from seeking sexual health.

Sexual health-seeking behaviour

A quarter (25%, 95CI (23.4%, 27.6%)) of men with DM had ever sought sexual health service, of whom the vast majority (97.9%) have claimed to have SD.

Factors associated with sexual health-seeking behaviour

The summary result that describes the association of seeking sexual health service and predefined background characteristics of men having diabetes are summarised in table 3. After adjusting for the potential confounding variables, the likelihood of seeking sexual health service among men with diabetes was 67% lower in participants who can't read and write (AOR=0.33; 95% CI: 0.1 - 0.87) than those whose educational status was at least diploma level. Similarly, the odds of seeking sexual health service in participants who have attended either primary or secondary education was reduced by 71% (AOR=0.29; 95% CI: 0.1 - 0.67) compared to those whose educational status was at least diploma level. The likelihood of sexual health-seeking behaviour was 7.1times higher among participants who have exhibited SD disorder compared to those who do not (AOR = 7.1; 95% CI: 2.1 - 23).

Table 3: Factors associated with sexual help-seeking behaviour among men with DM attending in the Northwest Amhara regional hospitals, 2020 (n=376).

Characteristics	Ever sought sexual healthcare		Odds ratio (95% CI)	
	Yes	No	Crude(OR)	Adjusted(OR)
Age in year	N/A	N/A	-	1(0.98-1.03)
Resident				
Rural	43	95	1	1
Urban	143	91	3.75(2.1-6.32)	2.07(0.7-6.1)
Education				
Can't read & write	24	54	0.22(0.11-0.83)	0.33(0.1-0.87)
Primary & secondary	88	97	0.2(0.17-0.76)	0.29(0.1-0.67)
Diploma and above	93	20	1	1
Comorbid illnesses				
No	20	172	0.16(0.09-0.28)	0.53(0.25-1.11)
Yes	75	109	1	1
Duration of diagnosis	N/A	N/A	-	1.01(0.95-1.06)
Metabolic control				
<130 mg/dl	10	79	0.28(0.07-0.42)	0.54(0.22-1.31)
≥130 mg/dl	88	199	1	1
SD				
No	5	110	1	1
Yes	92	169	12.1(6.68-34.78)	7.1(2.1-23.0)
Existence of complications				
No	45	213	1	1
Yes	51	67	3.45(2.13-5.56)	1.45(0.28-2.19)

N/A=Not Applicable; COR= Crude Odds Ratio and AOR=Adjusted Odds Ratio; Hosmer and Lemshow goodness of fit (p-value=0.49). '1'=refrence category.

Discussion

SRH service is the crucial element of healthcare in which its wide range of access is an individual's human right (11). Sexual problems are often associated with different chronic diseases; patients with diabetes, in particular, have several SRH challenges like STIs and SD (sexual arousal, satisfaction, desire, etc.). Conducting studies to show the magnitude of the problem for the most responsible bodies will help in designing interventions to prevent sexual problems before damaging the mental and psychological health of vulnerable individuals (22). Regardless of having sexual problems, men with DM deserves sexual health counselling, health education, and partner communication to develop safe and pleasurable sexual life (23). This study was, therefore, aimed to look at the health-seeking behaviour and contributing factors among men with DM.

The study indicates that a quarter (25%) of men with diabetes have sought sexual health service, depicting a significant number of men with DM are not seeking sexual health service despite the high vulnerability.

The health-seeking behaviour of men is higher among urban residents than rural participants. The better and easy access to existing healthcare services in urban areas than rural areas might be the reason for the observed heterogeneity (24). Ethiopia is a country where the rural population makes up about 78.8% of the total population; thus, the current evidence helps to emphasize this segment population in the healthcare system. The low level of health-seeking in the rural population would significantly contribute to the poor SRH service utilization of the people in the country at large (25). In general, the finding implies the need to expand a wide range of health service accessibility and improve awareness creation strategies with a special focus in rural areas to improve the health-seeking behaviour of men with diabetes.

Participants with lower educational status (secondary and lower) were less likely to seek sexual health services than those who attained a diploma and above. The finding is supported by another study that shows being uneducated and having poor knowledge about SRH services are the commonest barriers to utilizing SRH services (24). It's utterly understood that education is crucial to boost knowledge and analyze the risks of not utilizing healthcare that ultimately enhances the individual's decision-making power (26). Similarly, previous studies revealed that the person's sexual health knowledge and awareness increases with educational level, and poor utilization of different health services results from low literacy levels (24, 27). Moreover,

educated individuals are also less likely to be influenced by harmful cultural and social misbeliefs that are the most significant bottlenecks of SRH service utilization in developing countries like Ethiopia, where the vast majority of things are tied with cultural beliefs (28). The study implies that with the low educational coverage in Ethiopia, a high number of diabetic men could likely be affected by the adverse consequences of low sexual health-seeking behaviour, including infertility, relationship instability, and psychological health problems (29). In light of this, providing comprehensive health education to improve patient's health literacy is recommended to enhance their sexual health-seeking behaviour. Therefore, the associated adverse health impacts of sexual problems could be tackled.

Consistent with the previous evidence, diabetic men with SD were more likely to seek sexual health services (23, 30). Several individuals have a miss perception about sexual health services and when to seek help. Seeking professional help for screening and counselling services before experiencing a problem is unusual, particularly in developing countries like Ethiopia, due to high cultural taboos, fear of judgments, and low awareness (31). In the current study, respondents with SD have different social (marital instability and divorce) and health (infertility) problems that might increase their drive to seek sexual health services. Although seeking help once experiencing a problem is still appreciated, the better would be improving the sexual health-seeking behaviour of vulnerable individuals like diabetic men to prevent reproductive and associated health sequelae. Therefore, a well-designed SRH education is againrecommended.

The study is not believed to be free from some limitations. Due to the nature of the data collection technique and the sensitivity of some variables (e.g. sexual dysfunction), the study might have introduced a bias; notably, social desirability bias though some measures such as interviewing participants privately have been used to minimize it. In addition, the perceived risk and susceptibility of the participants about the sexual problems were the areas that need to be explored qualitatively to understand the participant's view, which is not considered in this study.

Conclusions

The study demonstrated that just one-fourth of men with diabetes had sought sexual health services. Participants with lower educational status have failed to seek sexual health services. On the flip side, diabetic men who have experienced SD sought the service better than their counterparts. Providing special emphasis for men with low educational level would improve sexual health-seeking behaviour. Patients should be advised to seek sexual health services though they did't experience SD, explaining their susceptibility. Future researchers are recommended to explore the individual's perception through a qualitative research approach to understand the contributing factors that affect sexual health-seeking behaviour.

Abbreviations

AOR	Adjusted Odd Ratio
COR	Crude Odd Ratio
CSFQ	Change in Sexual Function Questionnaire
CSI	Couple Satisfaction Index
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
HTN	Hypertension
OPD	Outpatient Department
SD	Sexual Dysfunction
SRH	Sexual and reproductive health
WHO	World Health Organization

Declarations

Author's Contribution:

- Conceptualization: EGM and WWT
- Formal analysis: WWT, EGM, and ATG
- Investigation: ATG, EGM, and WWT
- Methodology: WWT, EGM, and ATG
- Project administration: ATG, EGM, and WWT
- Validation: WWT, EGM, and ATG
- Writing-original draft: EGM and WWT
- Writing-review and editing: ATG, EGM, and WWT

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Competing interest: The authors declare that they do not have any competing interests.

Consent for publication: Not applicable.

Availability of data and materials: All data generated during this study are included in this manuscript; however, the corresponding author will provide the dataset upon request.

Author information: [1]Department of Reproductive Health, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

[2]Department of Pediatrics and Child Health Nursing, School of Nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

[3]Department of Community Health Nursing, School of Nursing College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

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STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1&2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	3	State specific objectives, including any pre-specified hypotheses	Page 4
Methods			
Study design	4	Present key elements of study design early in the paper	Page 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	Page 6&7
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 7
Bias	9	Describe any efforts to address potential sources of bias	Page 7,8, and 9
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 8 & 9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 8 & 9
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Page 8 & 9
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	N/A

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	N/A
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 10 & 11
		(b) Indicate number of participants with missing data for each variable of interest	Page 10,11 & 12
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	Page 12
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 13
		(*b*) Report category boundaries when continuous variables were categorized	Page 10 & 11
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 15 & 16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 15 & 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 15 & 16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.