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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.

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3 Sexual health-seeking behavior and associated factors in men with diabetes
4 mellitus attending at the three hospitals of northwest Amhara region, Ethiopia.
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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

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

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

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

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3 **Comorbid illness:** The presence of additional chronic illness/s among patient with DM, which
4 include hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer,
5 asthma, multiple sclerosis, and so forth.
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8 **Diabetic complication:** The co-existence of one or more diabetic related complications such as
9 retinopathy, neuropathy, nephropathy, and diabetic foot ulcer.
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11 **Poor glycemc control:** current fasting blood glucose level greater than 130mg/dl(17).
12

13 **Alcoholic:** The daily alcohol consumption of respondents was calculated as the product of the
14 average alcoholic percentage (%/ml) of each drink and the volume (ml) of the drink and
15 volumetric mass density (which is 0.8g/ml). The, participants were labeled to be alcoholic
16 provided they consume more than 12g ethanol daily for the past six months of the survey (18).
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19 **Smoker:** a respondent was deemed to be smoker if ≥ 12 cigarettes smokes per day for the past six
20 month of the survey (19).
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23 Data collection tool, procedure and quality control 24

25 A face-to-face interviewer administered pretested questioner was used. The tool was prepared in
26 English and translated to local (Amharic) language and retranslated into English to see its
27 consistency. The questionnaire had comprised of five sections: socio-demographic
28 characteristics; medical and behavioral related factors; psychosocial factor; change in sexual
29 function; and sexual health seeking behavior. The data collection was facilitated by two trained
30 nurses and a supervisor in each health institution.
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33 Data quality was assured through careful designing of the questionnaire. Data collectors and
34 supervisors had received a two days training on the purpose of the study, the question items, the
35 data collection procedure, participant selection and, the rights of study participants. Pre-test was
36 done prior to the actual data collection. The collected data were checked for its completeness and
37 consistency in daily basis over the course of the data collection period.
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40 Data processing and analysis 41

42 The data were entered into Epi Data version 3.1 and then exported to SPSS version 21.0 for
43 analysis after checking for consistency, coding errors, missing value, and completeness. All
44 continuous independent variables were categorized.
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47 The wealth status of the participants was analyzed using factor analysis, employing the principal
48 component analysis (PCA) method. All categorical and continuous variables were categorized to
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3 be between '0' and '1'. All statistical assumptions of factor analysis were checked. Descriptive
4 statistics were used, to describe the study population in relation to relevant variables.
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6 The outcome variable, sexual health-seeking behavior of diabetic men, was dichotomized ('1',
7 '0'), to inform those who have sought sexual-health service and who didn't. Further, for
8 continuous variables, like age and duration of diagnosis with diabetes, the Shapiro-Wilk test was
9 used, to determine the appropriate measure of central tendency. Frequency, percentage, and
10 measures of central tendency with its corresponding measure of dispersion were used for
11 describing demographic and other variables. Tables, graph, and texts were used to present the
12 findings.
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14 The binary logistic regression analysis was run to examine the presence of association between
15 each independent variable and sexual health-seeking behavior. The bivariable and multi-
16 variable analysis were applied to ascertain the associations among the dependent and
17 independent variables, taking into account the 95% level of confidence. Independent variables
18 having a p-value of 0.2 and less in the bi-variable analysis were included in a multivariable
19 logistic regression model to control the potential impact of confounding variables and to declare
20 the presence of association. The Hosmer and Lemeshow model fitness of test was applied to
21 examine the model adequacy. Moreover, variance inflation factor (VIF) was used to check for
22 multicollinearity problem between independent variables, and none of the variables exhibited the
23 problem.
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37 Patient and public involvement

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

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3 *indicates significant at p-value <0.05 and ** (<0.01), and *** (<0.001), COR= crude odds ratio
4 and AOR=adjusted odds ratio
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6 Hosmer and Lemshow goodness of fit (p-value=0.89)
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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,

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3 and psychological health problems(27). In light of this, improving the literacy level of
4 respondents is recommended to enhance their sexual health-seeking behavior, and thereby to
5 tackle the associated stubborn consequences.
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8 Similarly, participants who have lived with diabetes for longer period have higher odds of sexual
9 health seeking. The perceived risk of major diabetic complications, including sexual problem is
10 higher among patients who have lived with diabetes for longer period of time, rather than short
11 time (28, 29). In addition, patients lived longer time are at higher risk of having diabetic
12 complications and other comorbid illnesses, which might exacerbate their existing health
13 problem and increase the risk of different sexual problems, including sexual dysfunction that
14 might urge them to seek professional help (8, 21, 29).
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17 SD has a positive effect on an individual's sexual health-seeking behavior. Consistent with
18 various literature, patients who have SD were more likely to seek sexual health service (21, 30).
19 This could be due the perception of individuals to seek sexual health service, in which seeking
20 professional help for screening and counseling service prior to experiencing a problem is unusual
21 particularly in developing country like Ethiopia, related to cultural taboos and fear of judgments.
22 Beside this, as this study also evidenced, respondents with SD have different social (marital
23 instability and divorce) and health problems (infertility) that might be a pushing factor to seek
24 sexual health service. Although seeking help once experiencing a sexual health problem is
25 appreciated, the better is working to improve sexual health seeking behavior of all vulnerable
26 individual regardless of the clinical presentation of sexual disorder so as to limit the reproductive
27 and associated health impacts.
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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 curative service is recommended for diabetic patients to prevent and get them over from different sexual and reproductive health problems.

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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.

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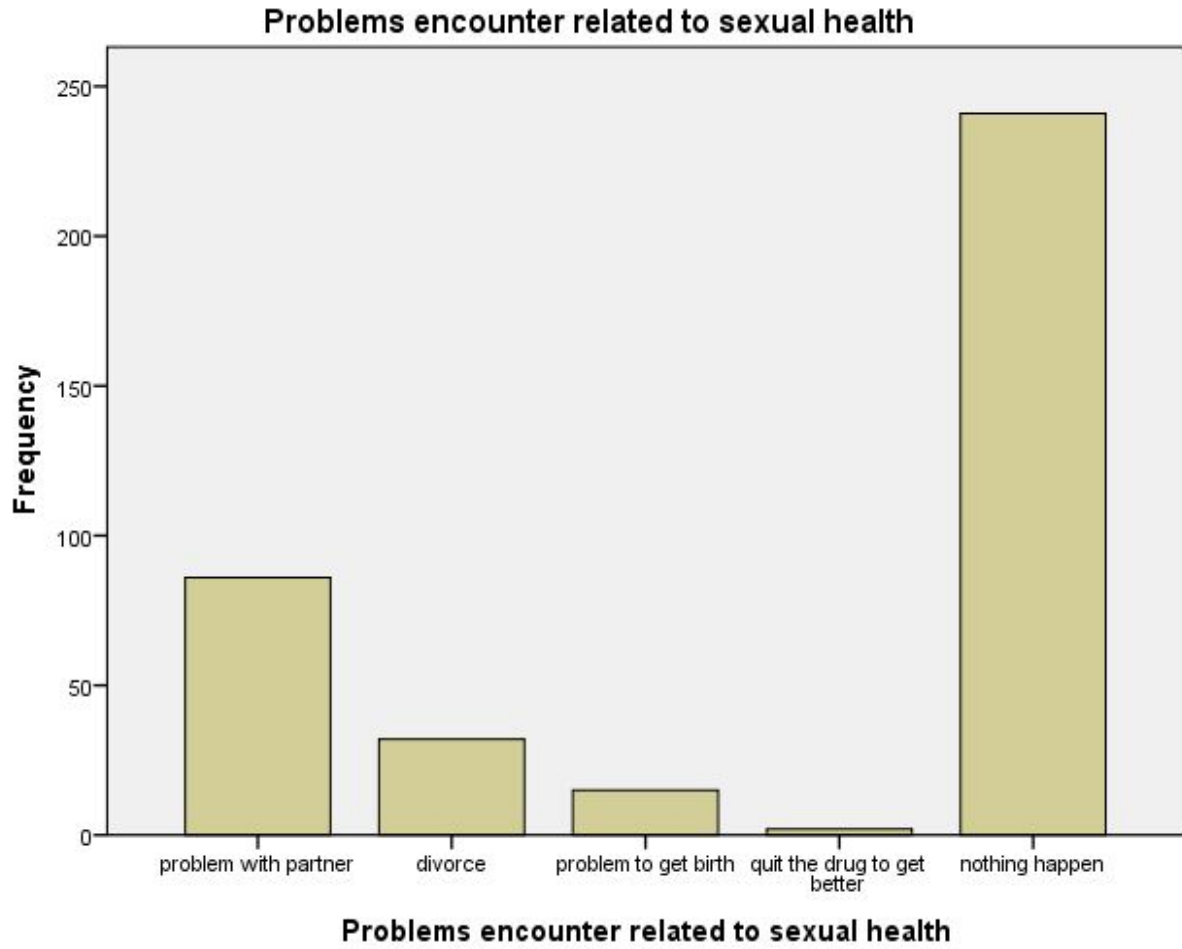


Figure 1: problems encountered related to sexual health in men with diabetes mellitus attending at the three hospitals of northwest Amhara region, Ethiopia 2020

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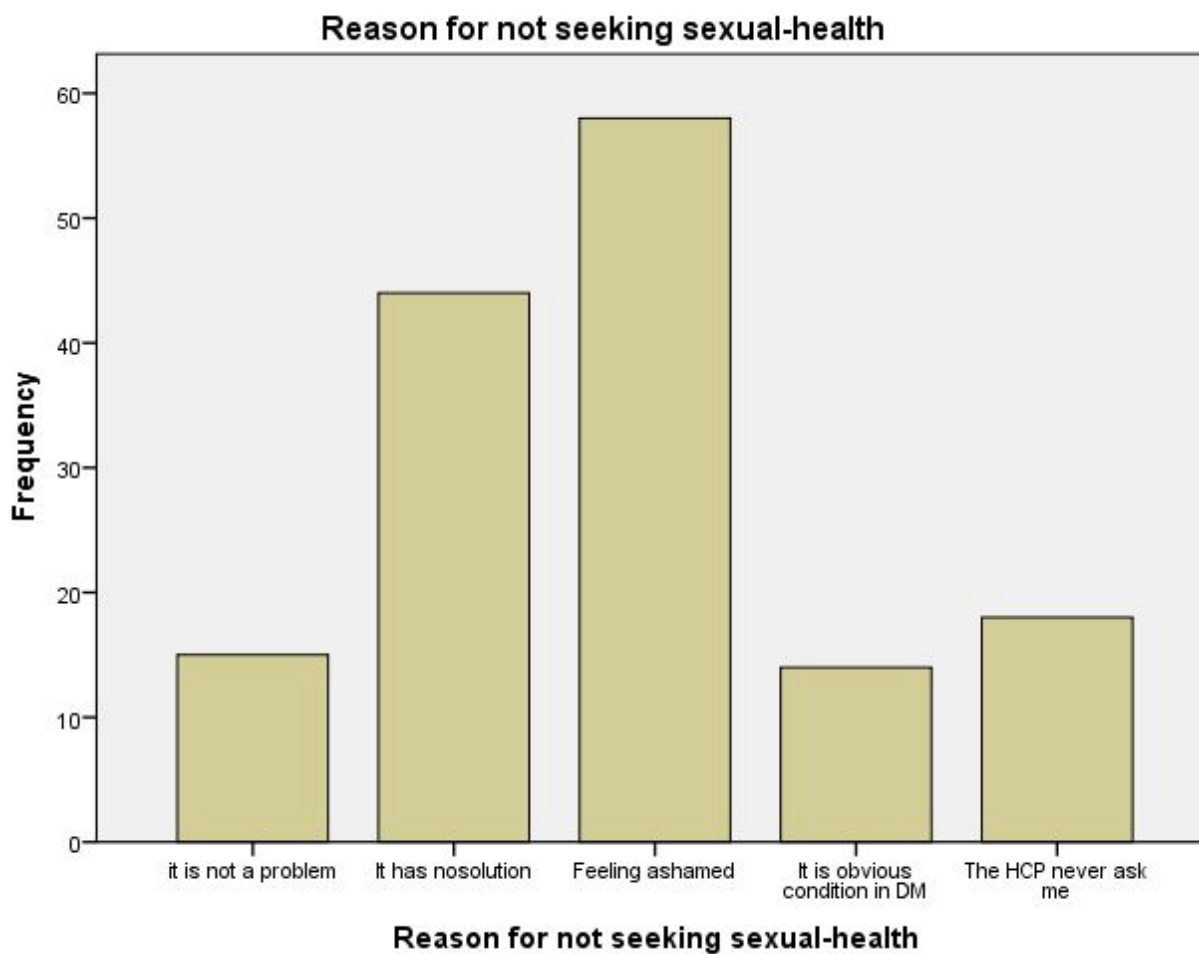


Figure 2: Reason for not seeking sexual health among men diabetic patients at the three hospitals of northwest Amhara region, Ethiopia 2020

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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants | Page 5 |
| | | (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed | N/A |

| | | | |
|--------------------------|-----|--|---------------|
| | | <i>Cross-sectional study</i> —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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | <i>Cohort study</i> —Report numbers of outcome events or summary measures over time | |
| | | <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure | |
| | | <i>Cross-sectional study</i> —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

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

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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.

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4 49 **Strength and limitation of the study**

- 5 50 • The study highlighted the sexual health-seeking behavior of men with diabetes who are the
6
7 51 most under-recognized and liable group of the population for different SRH problems.
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9 52 • The study might notably introduce social desirability bias due to the nature of the data
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11 53 collection method (face-to-face interview) and the sensitivity of some variables (sexual
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13 54 history).
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15 55 • Further, it would have been better if the knowledge and perceptions towards sexual health
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17 56 had been explored through a qualitative study.
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57 Introduction

58 Diabetes mellitus (DM), a growing public health concern in the world is jeopardizing the lives of
59 dozen individuals. The number of people with diabetes would rise to 642 million by the year
60 2040, according to the International Diabetic Association's (IDA) estimate (1). In Ethiopia, the
61 World's Health Organization (WHO) report indicated, more than 2.5 million individuals live with
62 diabetes in the year 2015 alone (1). Besides the growing burden of DM, patients particularly men
63 are at higher risk of developing different sexual problems like sexual dysfunction (SD)
64 associated with the psychogenic, hemodynamic, neurogenic, and hormonal impacts of diabetes in
65 men's sexuality (2-4).

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

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

81 Help-seeking behavior can provide a means to improve access to treatment and reduce human
82 suffering. On the other hand, the lack of professional consensus regarding the standard sexual
83 health care is an important hitch for diabetic men receiving adequate levels of SRH service
84 (10),(13). Neither the patient themselves nor their providers receive a clear message about the
85 types of services that men need to receive, how often they should get and which group of
86 individuals need special emphasis(13). Indeed, less than 10% of chronic patients had been asked
87 about their sexual health in their routine follow-up visits (10).

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3 88 Although progress is being made towards universal health coverage, the unmet need of men
4 89 diabetic patients for SRH service is substantial that requires urgent attention and innovative
5 90 solutions. To strengthen and facilitate the intended care to be delivered, evidence showing the
6 91 burden and related factors is imperative. In general, men regardless of their health status are a
7 92 segment of the population with less access to SRH care. Specifically, men with DM are the most
8 93 vulnerable group of individuals to different SRH challenges associated with their health status
9 94 and psychosocial matters. The demand for SRH service for this group of population is clearly
10 95 appreciable; however, there is a small body of evidence regarding their health-seeking behavior
11 96 and contributing factors. Therefore, this study was aimed to investigate the sexual health-seeking
12 97 behavior as well as contributing factors among men with diabetes. In doing so, decision-makers
13 98 working on improving SRH service to attain the universal health coverage of the country and
14 99 promoting the health of this vulnerable population will uptake the evidence produced from this
15 100 study.
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102 **Methods and materials**

103 **Patient and public involvement**

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

107 **Study design, period and setting**

108 A hospital-based cross-sectional study was conducted between February 20th and April 30th,
109 2020 among men with DM attending the northwest hospitals of the Amhara region. Participants
110 were recruited from chronic the outpatient department (OPD) of Felege Hiwote comprehensive
111 and specialized hospital (FHCSH), Debre Markos referral hospital, and Debre Tabor general
112 hospital. Chronic OPD is the one among others structured in each health institution, where
113 diabetic patients account for the largest proportion (40%) of all chronic outpatient visitors. The
114 study was prepared using the Strengthening the Reporting of Observational studies in
115 Epidemiology (STROBE).

116 **Sample size estimation, procedure, and technique**

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

124 The estimated sample size was proportionally allocated to each hospital considering their
125 monthly patient flow, and then participants were selected using systematic random sampling
126 technique using the kth interval calculated as $k = \frac{N}{n}$ (where N was the total number of men diabetic
127 patients per month in each hospital. 401, 305, and 340 patients have visited the FHCSH, Debre
128 Markos referral hospital, and Debre Tabor general hospital, respectively. Accordingly, 149, 114,
129 126 participants were chosen from FHCSH, Debre Markos referral hospital, and Debre Tabor
130 general hospital, respectively. The estimated interval was approximately 3 in each hospital and
131 participants were approached in every three units.

132

133 **Study population**

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

138 **Variables of the study**

139 **Outcome variable**

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

142 **Independent variables**

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

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

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

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

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

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

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

160 **Data collection tool, procedure, and quality control**

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

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

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

173 **Data processing and analysis**

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

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

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

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3 194 The binary logistic regression was applied to model the outcome variable and to investigate
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5 195 factors associated with the odds of seeking SRH services. Adjusted odds ratio with the
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7 196 corresponding 95% confidence interval (CI) was used as a measure of the strength of
8
9 197 associations. Variables having a p-value of at most 0.2 in the bi-variable analysis were included
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11 198 in a multivariable logistic regression model and a p-value of less than 0.05 was used as an
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13 199 indicator of statistical significance. The overall fitness of the final multivariable logistic
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15 200 regression model was assessed using Hosmer and Lemeshow test. The Variance inflation factor
16
17 201 (VIF) and rank correlation were used to check for multicollinearity.

18
19 202 **Ethics approval and consent to participate:** This study was approved by the ethical review
20
21 203 board of the University of Gondar, College of Medicine and Health Sciences, and each
22
23 204 respective hospital was approached with a support letter written from the university. Oral
24
25 205 informed consent was obtained from each study participant since the study didn't apply invasive
26
27 206 procedures like body fluid samples. All study participants were informed that participation was
28
29 207 on a voluntary basis and have full right to withdraw at the time of need during the interview
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31 208 process. Moreover, they were informed that all information taken from them kept confidential
32
33 209 and the entire data collected is going to be used for the purpose of the current study only. The
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35 210 reference/ ID number of the ethical clearance was V/P/RCS/04/620/2020.

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223 Results

224 Socio-demographic characteristics of participants

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

230 Table 1: Socio-demographic characteristics of men with DM attending in the Northwest Amhara
 231 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 |

232 **Health and psychosocial factors**

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

237 Table 2: Health and psychosocial factors of men with diabetic recruited from the northwest
 238 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 |

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240 **Sexual health-seeking behavior**

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

247 Sixty percent of respondents had never sought sexual health service because they assume that
248 SRH service is tailored only for individuals who exhibited sexual problem(s). Feeling ashamed
249 (15.4%) and believing sexual problems have no solution/remedy (11.7) are the two predominant
250 reasons that stopped participants from seeking sexual health (Fig 2).

251 **Factors associated with sexual health seeking behavior**

252 The summary result that describes the association of seeking sexual health service and
253 predefined background characteristics of men having diabetes are summarized in table 3. After
254 adjusting for potential confounding variables, the odds of seeking SRH service among men with
255 diabetes was 57% lower in participants who can't read and write (AOR=0.43; 95% CI: 0.22 -
256 0.82) and 66% lower amongst participants who attended either primary or secondary education
257 (AOR=0.34; 95% CI: 0.17 - 0.7) as compared to those whose educational status is at least
258 diploma level. Men having diabetes for a longer duration (>5 years) of time have increased odds
259 of seeking SRH services (AOR=2.7; 95%CI: 1.2 -6.04) as compared to those whose duration of
260 diagnosis is shorter. Moreover, the odds of sexual health-seeking was significantly higher (AOR
261 = 5.6; 95%CI: 1.52 - 20.8) among participants who have SD compared to those who do not have.

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268 Table 3: Factors associated with sexual help-seeking behavior among men with DM attending in
 269 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) |

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270 COR= crude odds ratio and AOR=adjusted odds ratio; Hosmer and Lemshow goodness of fit (p-
271 value=0.89)
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For peer review only

273 Discussion

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

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

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

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3 304 problems (27). In light of this, providing comprehensive health education and improving the
4 305 literacy level is the way forward for the betterment of sexual health-seeking behavior of men
5 306 with diabetes and thereby to tackle the associated negative health impacts.

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8 307 Longer duration from the time of diagnosis of diabetes is significantly associated with increased
9 308 odds of sexual health-seeking behavior. The perceived risk of major diabetic complications,
10 309 including sexual problem is higher among patients who have lived with diabetes for longer
11 310 period of time (28, 29). Existing evidence highlights that, patients lived longer duration with the
12 311 illness are at high risk of experiencing diabetic complications and other comorbid illnesses,
13 312 which might exacerbate their existing health problem and elevate the risk of different sexual
14 313 problems including SD that might drove them to sought professional help (10, 21, 29).

15 314 Consistent with previous literature, patients who have SD were more likely to seek sexual health
16 315 services (21, 30). A number of individuals have a miss perception about sexual health service
17 316 and when to seek help. Seeking professional help for screening and counseling service prior to
18 317 experiencing a problem is unusual particularly in developing country like Ethiopia related to
19 318 cultural taboos and fear of judgments. In the current study, respondents with SD have different
20 319 social (marital instability and divorce) and health (infertility) problems that might improve their
21 320 intention to seek sexual health services. Although seeking help once experiencing the problem is
22 321 still appreciated, the better is working to improve the sexual health-seeking behavior of
23 322 vulnerable individuals like men with DM to prevent them from reproductive and associated
24 323 health impacts. Therefore, a well-designed SRH education is recommended.

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325 **Conclusions**

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

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3 **336 Abbreviations**
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5 AOR Adjusted Odd Ratio
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7 COR Crude Odd Ratio
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9 CSFQ Change in Sexual Function Questionnaire
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11 CSI Couple Satisfaction Index
12
13 DM Diabetes Mellitus
14
15 FBS Fasting Blood Sugar
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17 HTN Hypertension
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19 OPD Outpatient Department
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21 SD Sexual Dysfunction
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23 SRH Sexual and reproductive health
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25 WHO World Health Organization

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338 **Declarations**

339 **Author's Contribution:**

- 340 • Conceptualization: EGM and WWT
- 341 • Formal analysis: WWT, EGM, and ATG
- 342 • Investigation: ATG, EGM, and WWT
- 343 • Methodology: WWT, EGM, and ATG
- 344 • Project administration: ATG, EGM, and WWT
- 345 • Validation: WWT, EGM, and ATG
- 346 • Writing-original draft: EGM, and WWT
- 347 • Writing-review and editing: ATG, EGM, and WWT

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

356 **Consent for publication:** Not applicable.

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

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32 440 Figure 1: problems encountered related to sexual health in men with diabetes mellitus attending
33 441 in hospitals of northwest Amhara region, Ethiopia 2020

34 442 Figure 2: Reason for not seeking sexual health among men diabetic patients attending in
35 443 hospitals of northwest Amhara region, Ethiopia 2020

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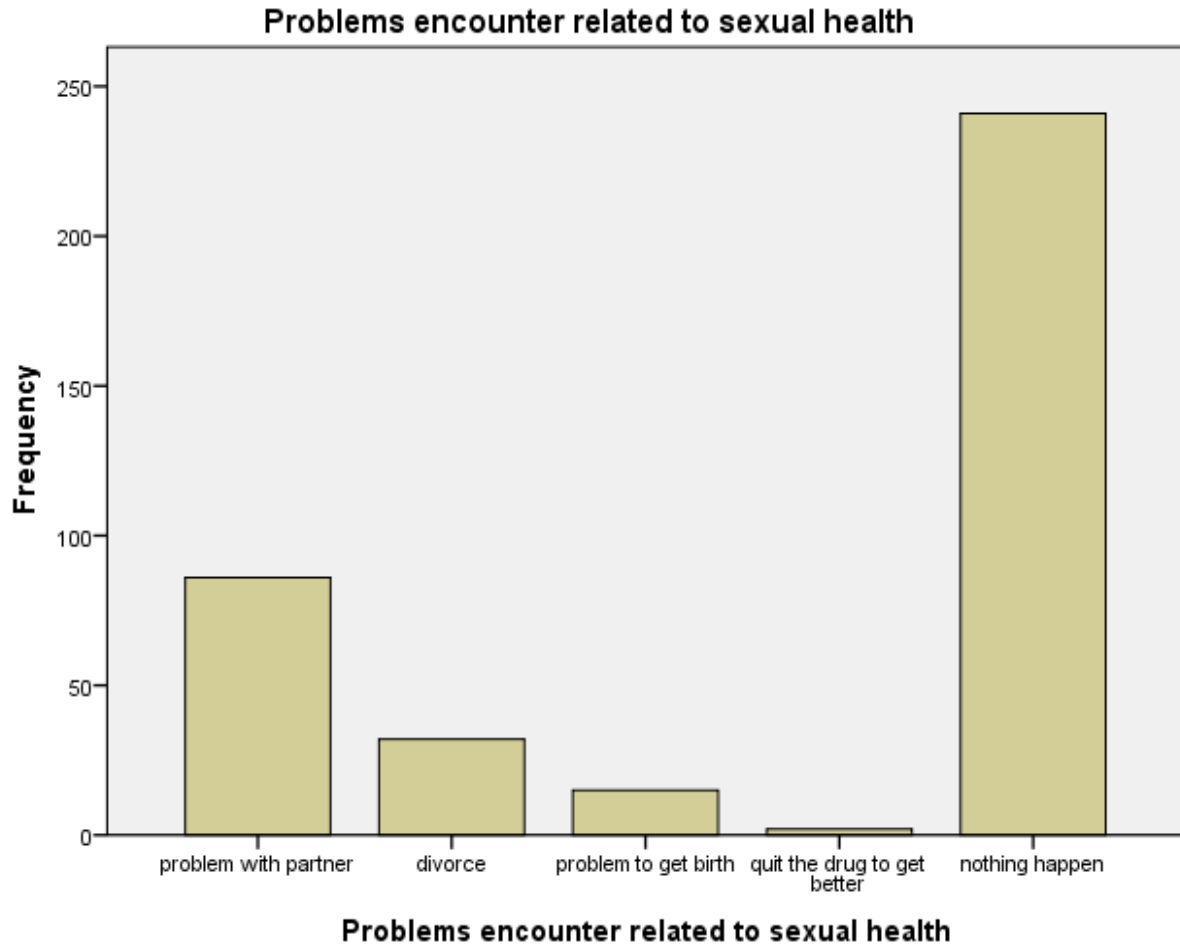


Figure 1: problems encountered related to sexual health in men with diabetes mellitus attending in hospitals of northwest Amhara region, Ethiopia 2020

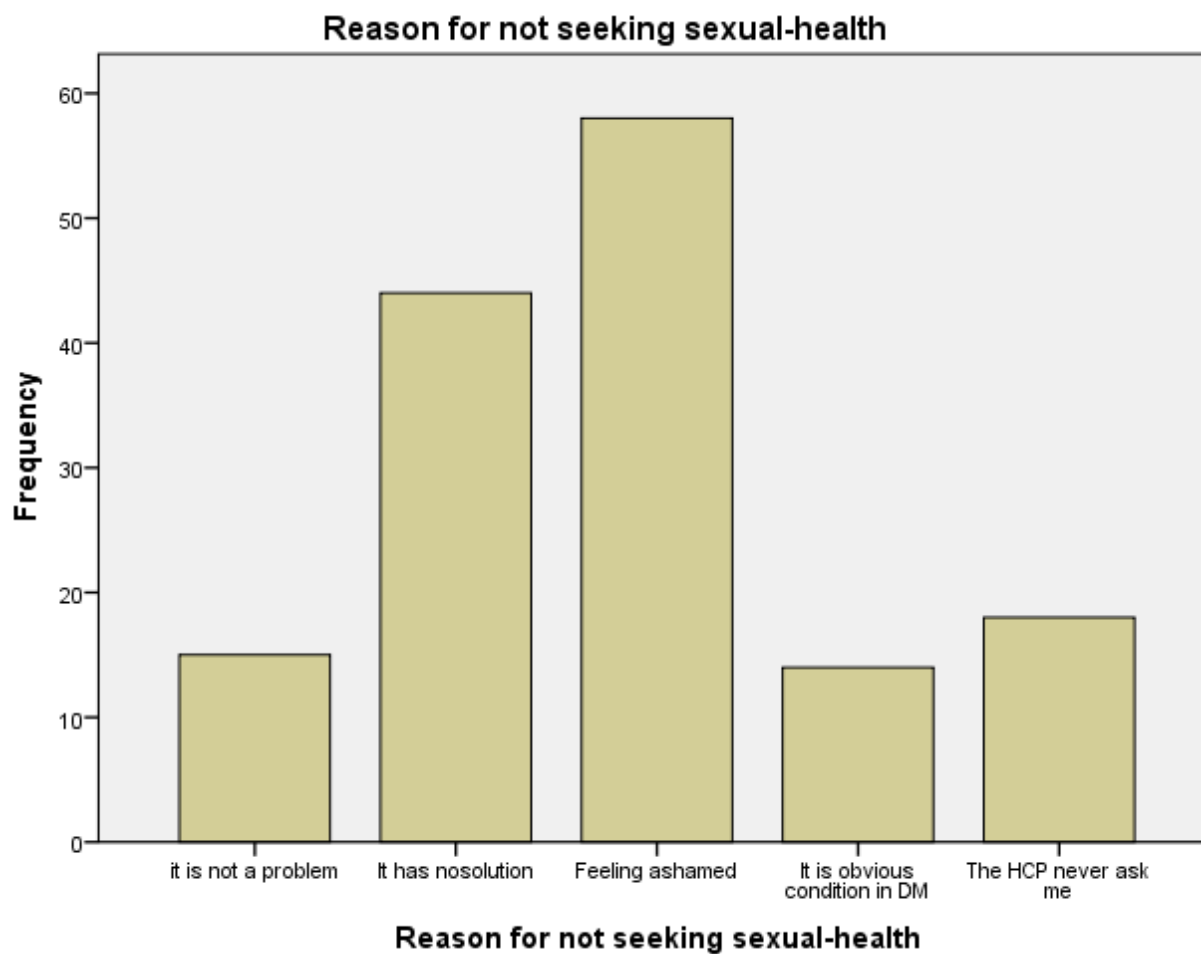


Figure 2: Reason for not seeking sexual health among men diabetic patients in hospitals of northwest Amhara region, Ethiopia 2020

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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants | Page 6&7 |
| | | (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed | N/A |

| | | | |
|--------------------------|-----|--|-----------------|
| | | <i>Cross-sectional study</i> —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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | <i>Cohort study</i> —Report numbers of outcome events or summary measures over time | |
| | | <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure | |
| | | <i>Cross-sectional study</i> —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.

BMJ Open

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

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

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19 Abstract

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

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

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

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

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

46 **Strength and limitation of the study**

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

55 Introduction

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

64 Sexual problems, in particular, SD, are a growing problem among diabetic patients. The risk of
65 SD is three-fold higher among this population than healthy individuals, and it occurs at an earlier
66 age with its severest form (4, 5). The prevalence of SD among this population ranges from 53-
67 69.5% in Ethiopia (6, 7). Likewise, diabetic patients are also at a greater risk of sexual
68 transmitted infections (STIs) related to immunosuppression and high blood glucose level (8, 9).

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

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

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

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3 86 (13). Indeed, less than 10% of chronic patients had been asked about their sexual health in their
4 87 routine follow-up visits (10).

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6 88 Although progress is being made towards universal health coverage, the unmet need of men
7 89 diabetic patients for SRH service is substantial that requires urgent attention and innovative
8 90 solutions. Evidence showing the burden and related factors are imperative to strengthen and
9 91 facilitate the intended care delivered. In general, regardless of their health status, men are a
10 92 segment of the population with less access to SRH care. Specifically, men with DM are most
11 93 vulnerable to different SRH challenges associated with their health status and psychosocial
12 94 matters. The demand for SRH service for this group of population is clearly appreciable;
13 95 however, there is a small body of evidence regarding their health-seeking behaviour and
14 96 contributing factors. Therefore, this study aimed to investigate the sexual health-seeking
15 97 behaviour and contributing factors among men with diabetes. In doing so, decision-makers
16 98 working on promoting the health of this vulnerable population, including sexual and
17 99 reproductive health will uptake the evidence produced from this study.
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101 **Methods and materials**

102 **Patient and public involvement**

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

106 **Study design, period and setting**

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

115 **Sample size estimation, procedure, and technique**

116 The sample size was estimated using Epi info version 7 software. A pilot study was conducted at
117 Gondar Comprehensive Specialized Referral Hospital by recruiting 50 diabetic patients to
118 estimate the prevalence of sexual health-seeking behaviour, and it was 18%. Then, the sample
119 size was calculated using the following additional assumptions: (a) margin of error (d): 4%; (b) a
120 standard Z-score of 1.96 corresponding to 95% confidence interval; proportion: 18%; and (c)
121 10% none response and a total of 389 were recruited.

122 A stratified sampling technique followed by systematic sampling was employed. Firstly, the
123 estimated sample size was proportionally allocated to the three hospitals considering their
124 monthly patient flow. Then, participants were selected using a systematic random sampling
125 technique using the k^{th} interval calculated as $k = \frac{N}{n}$ (where N was the total number of men diabetic
126 patients per month in each hospital. About 401, 305, and 340 patients have visited the FHCSH,
127 Debre Markos referral hospital, and Debre Tabor general hospital, respectively. Accordingly,
128 149, 114, and 126 participants were chosen from FHCSH, Debre Markos referral hospital, and
129 Debre Tabor referral hospital. The estimated interval was approximately 3 in each hospital, and
130 participants were approached in every three individuals.

131

132 **Study population**

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

137 **Variables of the study**

138 **Outcome variable**

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

141 **Independent variables**

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

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

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

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

153 **Poor glycemic control:** fasting blood glucose level greater than 130mg/dl or most recent HgA1c
154 >9.0% (19).

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

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

160 **Data collection tool, procedure, and quality control**

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

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

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

173 **Data processing and analysis**

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

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

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

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3 194 The binary logistic regression was applied to model the outcome variable and to investigate
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5 195 factors associated with the odds of seeking SRH services. Adjusted odds ratio with the
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7 196 corresponding 95% confidence interval (CI) was used to measure the strength of associations.
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9 197 Variables with a p-value of at most 0.2 in the bi-variable analysis were included in a
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11 198 multivariable logistic regression model, and a p-value of less than 0.05 was used as an indicator
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13 199 of statistical significance. The overall fitness of the final multivariable logistic regression model
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15 200 was assessed using Hosmer and Lemeshow test. The Variance inflation factor (VIF) and rank
16
17 201 correlation were used to check for multicollinearity.

202 **Ethics approval and consent to participate**

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19 203 The ethical review board of the University of Gondar, College of Medicine and Health Sciences
20
21 204 approved this study (ref V/P/RCS/04/620/2020). Each respective hospital was approached with a
22
23 205 support letter written by the University. Oral informed consent was obtained from each study
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25 206 participant since the study didn't apply invasive procedures like body fluid samples. All study
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27 207 participants were informed that participation was on a voluntary basis and had the full right to
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29 208 withdraw at the time of need during the interview process. Moreover, they were informed that all
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31 209 information taken from them is kept confidential, and the entire data collected was used for the
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33 210 current study only.

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223 Results

224 Socio-demographic characteristics of participants

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

230 Table 1: Socio-demographic characteristics of men with DM attending the Northwest Amhara
 231 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 |

232 **Health and psychosocial factors**

233 The median duration of the participants who lived with diabetes was 8.22 years, ranging from 1-
 234 30 years. The proportion of type I diabetic patients was 50%. Neuropathy (16.5%) was the most
 235 frequently observed diabetic complication. Further, hyperlipidemia (16%) was the highest
 236 comorbid illness behind hypertension (37.2%) (Table 2).

237 Table 2: Health and psychosocial factors of men with diabetes recruited from the northwest
 238 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 |

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240 **Perceived reasons for not seeking sexual health**

241 Relationship instability, divorce, and fertility problem are the prominent problems that the
242 participant encountered. Of all participants that have sought professional help, just over one-third
243 (34.04%) of them reported having a relationship problem/instability associated with sexual
244 difficulty. Even though most of the participants witnessed different social and health problems
245 (like divorce and infertility) following the disruption of sexual health, about 50.4% of them
246 failed to seek professional help.

247 Sixty percent of respondents had never sought sexual health service because they assume that
248 SRH service is tailored only for individuals who exhibited sexual problem(s). Feeling ashamed
249 (15.4%) and believing sexual problems have no solution/remedy (11.7%) are the two principal
250 perceived reasons that stopped participants from seeking sexual health.

251 **Sexual health-seeking behaviour**

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

254 **Factors associated with sexual health-seeking behaviour**

255 The summary result that describes the association of seeking sexual health service and
256 predefined background characteristics of men having diabetes are summarised in table 3. After
257 adjusting for potential confounding variables, the likelihood of seeking sexual health service
258 among men with diabetes was 67% lower in participants who can't read and write (AOR=0.33;
259 95% CI: 0.1 - 0.87) than those whose educational status is at least diploma level. Similarly, the
260 odds of seeking sexual health service in participants who have attended either primary or
261 secondary education was reduced by 71% (AOR=0.29; 95% CI: 0.1 - 0.67) as compared to those
262 whose educational status is at least diploma level. The odds of sexual health-seeking behavior
263 was significantly higher (among participants who exhibited SD disorder compared to those who
264 do not have AOR = 7.1; 95% CI: 2.1 - 23).

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271 Table 3: Factors associated with sexual help-seeking behaviour among men with DM attending
 272 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) |

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

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276 Discussion

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

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

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

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

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3 307 are also less likely to be influenced by harmful cultural and social beliefs that are the biggest
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5 308 bottlenecks of sexual health service utilization (28). With the low educational coverage in
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7 309 Ethiopia, a significant number of diabetic men could likely be affected by the adverse
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9 310 consequences of low sexual health-seeking behaviour, including infertility, relationship
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11 311 instability, and psychological health problems (29). In light of this, providing comprehensive
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13 312 health education and improving literacy is recommended to enhance the sexual health-seeking
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15 313 behaviour of men with diabetes. Therefore, the associated adverse health impacts of sexual
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17 314 problems could be tackled.

17 315 Consistent with the previous literature, diabetic men with SD were more likely to seek sexual
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19 316 health services (23, 32). Several individuals have a miss perception about sexual health services
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21 317 and when to seek help. Seeking professional help for screening and counselling services before
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23 318 experiencing a problem is unusual, particularly in developing countries like Ethiopia, due to high
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25 319 cultural taboos, fear of judgments, and low awareness (33). In the current study, respondents
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27 320 with SD have different social (marital instability and divorce) and health (infertility) problems
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29 321 that might increase their intention to seek sexual health services. Although seeking help once
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31 322 experiencing the problem is still appreciated, the better would be improving the sexual health-
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33 323 seeking behaviour of vulnerable individuals like diabetic men to prevent reproductive and
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35 324 associated health impacts. Therefore, a well-designed SRH education is recommended.

36 325 The study is not free from some limitations. Due to the nature of the data collection technique
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38 326 and the sensitivity of some variables (e.g. sexual dysfunction), the study might have introduced a
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40 327 bias; notably, social desirability bias though some measures such as interviewing privately have
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42 328 been used to minimize it. In addition, the perceived risk and susceptibility of the participants
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44 329 about the sexual problems are the areas that need to be explored qualitatively to understand the
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46 330 participant's view, which is not considered in this study.

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332 **Conclusions**

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

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3 344 **Abbreviations**
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5 AOR Adjusted Odd Ratio
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7 COR Crude Odd Ratio
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9 CSFQ Change in Sexual Function Questionnaire
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11 CSI Couple Satisfaction Index
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13 DM Diabetes Mellitus
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15 FBS Fasting Blood Sugar
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17 HTN Hypertension
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19 OPD Outpatient Department
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21 SD Sexual Dysfunction
22
23 SRH Sexual and reproductive health
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25 WHO World Health Organization

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3 346 **Declarations**

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5 347 **Author's Contribution:**

- 6
7 348 • Conceptualization: EGM and WWT
8
9 349 • Formal analysis: WWT, EGM, and ATG
10
11 350 • Investigation: ATG, EGM, and WWT
12
13 351 • Methodology: WWT, EGM, and ATG
14
15 352 • Project administration: ATG, EGM, and WWT
16
17 353 • Validation: WWT, EGM, and ATG
18
19 354 • Writing-original draft: EGM, and WWT
20
21 355 • Writing-review and editing: ATG, EGM, and WWT

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36
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38
39 366 manuscript; however, the corresponding author will provide the dataset upon request.

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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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants | Page 6&7 |
| | | (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed | N/A |

| | | | |
|--------------------------|-----|--|-----------------|
| | | <i>Cross-sectional study</i> —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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | <i>Cohort study</i> —Report numbers of outcome events or summary measures over time | |
| | | <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure | |
| | | <i>Cross-sectional study</i> —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.

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

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19 Abstract

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

22 **Design:** a cross-sectional study was conducted.

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

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

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

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

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

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

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451 **Strength and limitation of the study**

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

60 Introduction

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

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

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

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

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3 90 particular emphasis (13). Indeed, less than 10% of chronic patients had been interviewed about
4
5 91 their sexual health in their routine follow-up visits (10).

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7 92 Although positive progress is observed in the universal health coverage, the unmet need for SRH
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9 93 service among men with diabetes is substantial that requires urgent attention and innovative
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11 94 solutions. In general, regardless of their health status, men are a segment of the population with
12
13 95 less access to SRH care. Specifically, men with DM are most vulnerable to different SRH
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15 96 challenges associated with their illness. Evidence exhibiting the burden and related factors are
16
17 97 imperative to strengthen and facilitate the intended care delivered to this group of the population.
18
19 98 However, there is a small body of evidence regarding their health-seeking behaviour and
20
21 99 contributing factors. Therefore, this study was designed to determine the sexual health-seeking
22
23 100 behaviour and contributing factors among men with diabetes. In doing so, decision-makers
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25 101 working on sexual and reproductive health services will uptake the evidence to improve service
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27 102 utilization. It will also help to realize universal health coverage in the country.
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104 **Methods and materials**

105 **Patient and public involvement**

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

109 **Study design, period and setting**

110 A hospital-based cross-sectional study was conducted between the 20th of February and April
111 30th/2020 among men with DM attending in the northwest Amhara region hospitals, Ethiopia.
112 Participants were accessed and recruited while visiting the chronic out-patient departments
113 (OPD) of the Felege Hiwote comprehensive and specialized hospital (FHCSH), Debre Markos
114 referral hospital, and Debre Tabor referral hospital. The chronic OPD is one of the other
115 structured departments in each health institution, where diabetic patients account for the most
116 significant proportion (40%) of all chronic out-patient visitors. The study was prepared and
117 reported using the Strengthening the Reporting of Observational Studies in Epidemiology
118 (STROBE) (16).

119 **Sample size estimation, sampling procedures, and sampling techniques**

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

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

1
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3 135 (k) was approximately 3 in each hospital; therefore, participants were approached in every three
4 136 individuals.

6 137 **Study population**

8 138 Men patients diagnosed with diabetes who were visiting the chronic OPDs for monthly follow-
9 139 up during the data collection period in the included hospitals were invited and enrolled. Before
11 140 the enrollment, the patient's general insight and sexual activity were checked; patients who were
13 141 disoriented and unable to communicate were excluded.

15 142 **Variables of the study**

17 143 **Outcome variable**

19 144 **Good sexual health-seeking behaviour:** if a respondent has ever sought SRH services after
20 145 being diagnosed with DM.

22 146 **Independent variables**

24 147 **SD:** The 14-items scale of the Change in the Sexual Functioning (CSFQ) was used, where each
25 148 item was scored between 0-5 scale (17). The total score of this instrument varies from 0-70.
27 149 Accordingly, participants who scored below 47 were categorized as having SD.

29 150 **Couples satisfaction in their relationship:** a score of above 20 from the relationship assessment
30 151 scale was considered satisfied (18).

32 152 **Comorbid illness:** participants who have one or more additional confirmed chronic diseases
33 153 (hypertension, cardiac disease, dyslipidemia, psychosis, renal disease, HIV, cancer, asthma, and
34 154 multiple sclerosis) were deemed to have comorbid illnesses.

36 155 **Diabetic complication:** the existence of one or more diabetic-related complications, such as
37 156 retinopathy, neuropathy, nephropathy, and diabetic foot ulcer, was considered as having DM
38 157 complications.

40 158 **Poor glycemic control:** fasting blood glucose level of greater than 130mg/dl, or most recent
41 159 HgA1c of >9.0% (19).

43 160 **Alcoholic:** the daily alcohol consumption of respondents was calculated by taking the average
44 161 alcohol percentage (%/ml) of each drink multiplied by the volume (ml) of the drink and
45 162 volumetric mass density (which is 0.8g/ml). Participants were categorized as 'alcoholic',
46 163 provided they consumed more than 12g ethanol daily for the past six months (20).

48 164 **Smoker:** a respondent who smoke \geq 12 cigarettes per day for the last six months (21).
49 165

166 **Data collection tool, procedure, and quality control**

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

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

178 **Data processing and analysis**

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

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

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

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3 196 The binary logistic regression was applied to model the outcome variable and to investigate
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5 197 factors associated with the odds of seeking SRH services. Adjusted odds ratio with the
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7 198 corresponding 95% confidence interval (CI) was used to measure the strength and direction of
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9 199 the association. Variables with a p-value of less than 0.2 in the bi-variable analysis were included
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11 200 in the multivariable logistic regression model, and a p-value of less than 0.05 was used as an
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13 201 indicator of statistical significance. The overall fitness of the final model was assessed using
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15 202 Hosmer and Lemeshow test. The Variance inflation factor (VIF) and rank correlation were used
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17 203 to diagnose the problem of multicollinearity.

204 **Ethics approval and consent to participate**

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19 205 The ethical review board of the University of Gondar, College of Medicine and Health Sciences
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21 206 approved the study (ref V/P/RCS/04/620/2020). Each respective hospital was approached with a
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23 207 support letter written by the University, and a permission letter was obtained from them. Oral
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25 208 informed consent was taken from each study participant, as the study didn't apply any invasive
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27 209 procedures like body fluid samples. All study participants were informed that participation was
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29 210 on a voluntary basis and oriented about their full right to withdraw at any time of need during the
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31 211 interview process. Moreover, they were informed that all information taken from them will be
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33 212 kept confidential, and the entire data collected will only be used for the current study.

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224 Results

225 Socio-demographic characteristics of participants

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

231 **Table 1: Socio-demographic characteristics of men with DM attending the Northwest**
 232 **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 |

233 **Health and psychosocial factors**

234 The median duration of the participants who lived with diabetes was 8.22 years, ranging from 1-
 235 30 years. The proportion of type I diabetic patients was 50%. Neuropathy was the most
 236 frequently observed diabetic complication at 16.5%. Further, hyperlipidemia (16%) was the
 237 highest comorbid illness behind hypertension (37.2%) (Table 2).

238 **Table 2: Health and psychosocial factors of men with diabetes recruited from the**
 239 **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 |

240

241 **Perceived reasons for not seeking sexual health**

242 Relationship instability, divorce, and fertility problems were the major problems that the
243 participant encountered. Of all participants seeking professional help, just over one-third
244 (34.04%) reported having a relationship problem/instability associated with sexual difficulty.
245 Even though most of the participants witnessed, different social and health problems like divorce
246 and infertility linked with the disruption of sexual health, about half (50.4%) of them failed to
247 seek professional help.

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

252 **Sexual health-seeking behaviour**

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

255 **Factors associated with sexual health-seeking behaviour**

256 The summary result that describes the association of seeking sexual health service and
257 predefined background characteristics of men having diabetes are summarised in table 3. After
258 adjusting for the potential confounding variables, the likelihood of seeking sexual health service
259 among men with diabetes was 67% lower in participants who can't read and write (AOR=0.33;
260 95% CI: 0.1 - 0.87) than those whose educational status was at least diploma level. Similarly,
261 the odds of seeking sexual health service in participants who have attended either primary or
262 secondary education was reduced by 71% (AOR=0.29; 95% CI: 0.1 - 0.67) compared to those
263 whose educational status was at least diploma level. The likelihood of sexual health-seeking
264 behaviour was 7.1times higher among participants who have exhibited SD disorder compared to
265 those who do not (AOR = 7.1; 95% CI: 2.1 - 23).

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272 **Table 3: Factors associated with sexual help-seeking behaviour among men with DM**
 273 **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) |

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

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277 Discussion

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

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

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

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

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3 308 educated individuals are also less likely to be influenced by harmful cultural and social
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5 309 misbeliefs that are the most significant bottlenecks of SRH service utilization in developing
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7 310 countries like Ethiopia, where the vast majority of things are tied with cultural beliefs (28). The
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9 311 study implies that with the low educational coverage in Ethiopia, a high number of diabetic men
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11 312 could likely be affected by the adverse consequences of low sexual health-seeking behaviour,
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13 313 including infertility, relationship instability, and psychological health problems (29). In light of
14
15 314 this, providing comprehensive health education to improve patient's health literacy is
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17 315 recommended to enhance their sexual health-seeking behaviour. Therefore, the associated
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19 316 adverse health impacts of sexual problems could be tackled.

20
21 317 Consistent with the previous evidence, diabetic men with SD were more likely to seek sexual
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23 318 health services (23, 30). Several individuals have a miss perception about sexual health services
24
25 319 and when to seek help. Seeking professional help for screening and counselling services before
26
27 320 experiencing a problem is unusual, particularly in developing countries like Ethiopia, due to high
28
29 321 cultural taboos, fear of judgments, and low awareness (31). In the current study, respondents
30
31 322 with SD have different social (marital instability and divorce) and health (infertility) problems
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33 323 that might increase their drive to seek sexual health services. Although seeking help once
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35 324 experiencing a problem is still appreciated, the better would be improving the sexual health-
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37 325 seeking behaviour of vulnerable individuals like diabetic men to prevent reproductive and
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39 326 associated health sequelae. Therefore, a well-designed SRH education is again recommended.

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41 327 The study is not believed to be free from some limitations. Due to the nature of the data
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43 328 collection technique and the sensitivity of some variables (e.g. sexual dysfunction), the study
44
45 329 might have introduced a bias; notably, social desirability bias though some measures such as
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47 330 interviewing participants privately have been used to minimize it. In addition, the perceived risk
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49 331 and susceptibility of the participants about the sexual problems were the areas that need to be
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51 332 explored qualitatively to understand the participant's view, which is not considered in this study.

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3 334 **Conclusions**
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5 335 The study demonstrated that just one-fourth of men with diabetes had sought sexual health
6 336 services. Participants with lower educational status have failed to seek sexual health services. On
7 337 the flip side, diabetic men who have experienced SD sought the service better than their
8 338 counterparts. Providing special emphasis for men with low educational level would improve
9 339 sexual health-seeking behaviour. Patients should be advised to seek sexual health services
10 340 though they didn't experience SD, explaining their susceptibility. Future researchers are
11 341 recommended to explore the individual's perception through a qualitative research approach to
12 342 understand the contributing factors that affect sexual health-seeking behaviour.
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3 346 **Abbreviations**
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5 AOR Adjusted Odd Ratio
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7 COR Crude Odd Ratio
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9 CSFQ Change in Sexual Function Questionnaire
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11 CSI Couple Satisfaction Index
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13 DM Diabetes Mellitus
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15 FBS Fasting Blood Sugar
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17 HTN Hypertension
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19 OPD Outpatient Department
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21 SD Sexual Dysfunction
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23 SRH Sexual and reproductive health
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25 WHO World Health Organization

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3 348 **Declarations**

4
5 349 **Author's Contribution:**

- 6
7 350 • Conceptualization: EGM and WWT
8
9 351 • Formal analysis: WWT, EGM, and ATG
10
11 352 • Investigation: ATG, EGM, and WWT
12
13 353 • Methodology: WWT, EGM, and ATG
14
15 354 • Project administration: ATG, EGM, and WWT
16
17 355 • Validation: WWT, EGM, and ATG
18
19 356 • Writing-original draft: EGM and WWT
20
21 357 • Writing-review and editing: ATG, EGM, and WWT

22
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28
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32 366 **Consent for publication:** Not applicable.

33 367 **Availability of data and materials:** All data generated during this study are included in this
34 368 manuscript; however, the corresponding author will provide the dataset upon request.

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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) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —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 <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants | Page 6&7 |
| | | (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —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) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed | N/A |

| | | | |
|--------------------------|-----|--|-----------------|
| | | <i>Cross-sectional study</i> —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) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount) | |
| Outcome data | 15* | <i>Cohort study</i> —Report numbers of outcome events or summary measures over time | |
| | | <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure | |
| | | <i>Cross-sectional study</i> —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.