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Factors Affecting Knowledge, Attitudes, and Practices Related to Reproductive Health Issues among University Youth in Yemen: A Cross-sectional Analytical Study

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ABSTRACT

Background & aim: Reproductive health reflects the health of young people throughout adolescence and adulthood; thus, it is critical to address their reproductive health needs and concerns. This study aimed to assess knowledge, attitudes, and practices towards reproductive health and associated factors among university youth in Yemen.

Methods: A cross-sectional study including 576 male and female students was undertaken. Participants were selected using a simple random sampling, and data were collected using a self-structured and self-administered questionnaire. Chi-square test, and logistic regression model were used to identify factors associated with university students' knowledge, attitudes, and practices about reproductive health.

Results: The average age of participants was 21.7 years, and 54.9% were male. The study reported that 55.9%, 46.2%, and 73.3% of youth had poor knowledge, negative attitudes, and unsatisfactory practices towards reproductive health services, respectively. Females had a higher odd of having knowledge, positive attitudes, and practices [(AOR= 2.379; 95% CI: 1.591 - 3.558; P =0.001), (AOR= 2.399; 95% CI: 1.613 - 3.569; P =0.001), and (AOR= 1.501; 95% CI: 1.033 - 2.181; P =0.033, respectively)]. Marriage, urban residence, and independence were associated with increased knowledge, positive attitudes, and satisfactory practices.

Conclusion: The majority of participants demonstrated poor knowledge, negative attitudes, and unsatisfactory practices regarding reproductive health services, highlighting a significant gap in this population. Gender, marriage, urban residence, and independence emerged as key positive determinants. These findings underscore the urgent need for targeted educational interventions, particularly for male, unmarried, and rural-dwelling students, to improve reproductive health outcomes among university youth.

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Introduction

Reproductive health (RH) greatly influences overall quality of life and constitutes a massive part of public health concerns (1). RH is a vital indicator of well-being during childhood. It plays a pivotal role during adolescence and adulthood, establishing a foundation for both genders' health beyond the reproductive years. This aspect of health not only impacts individuals throughout their lives but also has significant implications for the health of future generations (2). Young people, embarking on their sexual and reproductive lives, represent the next generation of parents. The way they prepare for this journey significantly impacts

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their own lives and has profound implications for national reproductive health outcomes (3).

Adolescents and young adults globally encounter significant obstacles in accessing their sexual and reproductive health (SRH) needs and rights. This age group, comprising individuals aged 15-25, constitutes a substantial portion of the world's population, particularly concentrated in developing countries. This demographic reality poses a significant burden on health systems, especially in low- and middle-income nations (4-5).

According to the World Bank Group, Key youth issues are early marriage, low use of family planning and contraceptives, early childbearing, gender-based violence, unsafe multiple sexual intercourses, sexually transmitted diseases (STIs) and HIV, and unsafe abortion. Female adolescents are more susceptible to RH-related problems in comparison to male adolescents (6).

According to a systematic review conducted by Farih et al. (2015) in the Middle East, including nine studies, a lack of knowledge and practice related to sexual and reproductive health in the Middle East and North African countries was reported. It has been emphasized in this systematic review that studies are needed to evaluate how to provide culturally sensitive sexual and reproductive health information (7). An experimental (method) study in Hadramaut, Yemen (2019), suggested the need to use all available educational approaches to increase young university women's knowledge and change their attitudes toward reproductive health (8).

In Yemen, almost one-quarter of the population consists of youths aged 15 to 24. This group has very little knowledge about RH issues, and there are no dedicated services for their age group. Generally, youths in Yemeni society lack a significant voice, and their outlook is bleak (9). A (method) study on young adults' knowledge and attitude about reproductive health and family planning conducted in Yemen (2017) concluded that the knowledge level regarding reproductive health services and family planning was low to moderate. In this study it was reported that introducing contraceptives in Yemen is problematic due to inadequate reproductive health education in Yemeni education curriculum (10). Research confirms that insufficient or inaccurate SRH knowledge can result in serious health adverse outcomes (11). Primarily, adolescents and young individuals acquire information and render decisions within the cultural milieu of their surroundings (12).

Thus, conducting this study was necessary for several reasons, including the scarcity of research that focuses specifically on university youth in Yemen, which leaves a gap in understanding their unique challenges. University youth also constitute an important segment of the population and play an important role in shaping the future of the country. As a result of the health risks that threaten youth, especially HIV/AIDS and other sexually transmitted diseases, we believe that there is an urgent need to focus on the youth's knowledge and practice regarding reproductive health issues.

Identifying the factors that influence the knowledge, attitudes, and practices (KAP) related to the reproductive health of university students is important because they have a striking influence on sexual and reproductive decision-making (13). Therefore, this study was conducted to measure the level of knowledge and assess the attitudes and practices of university youth towards RH issues, identifying and analyzing the most important factors influencing these KAP among youth.

Materials and Methods

A cross-sectional analytical study was conducted between January and April 2022. The study was done at the University of Saba Region, Marib governorate, Yemen, which includes students from many governorates, such as Marib, Al-Jawf, and Al-Bayda, and students from other Yemeni governorates displaced due to the war. Marib Governorate is located to the northeast of the capital, Sana'a, about 173 kilometers away from it.

The study population was all Yemeni male and female students registered at the University of Saba Region, who are on campus during conducting the study. The total number of students enrolled in the university is about 17,000.

Students between 18–24 years of age, who were mentally and physically capable of being

interviewed, and expressed a willingness to take part were included in the study. Students over the age of 24 years, and those who did not consent or had reservations about participating, were excluded from the study.

The sample size was estimated based on just one sample percentage, using the following guidelines: a confidence level of 95% (corresponding to a Zα/2 value of 1.96), a margin of error of 5% (e = 0.05), and an assumed prevalence rate of knowledge, attitudes, and practices regarding reproductive health issues among university youth in the region of 50% (P = 0.5) by using the following equation: $n = (z_{a/2})^2 * p (1-p) / (e)^2$

$n= (1.96)^2 (0.5) (1- 0.5) / (0.05)^2 = 384.16 \approx 384$

The initial sample size was 384 students. The sample size was modified by 1.5 times to become the final sample size for the study (576), in order to better represent the population. The sample was selected from students at the University of Saba Region.

In this study, the dependent variables encompassed the levels of knowledge, attitudes, and practices of youth regarding RH issues, whereas the independent variables included sociodemographic and economic factors.

The data was gathered utilizing a pre-designed and independently administered survey. After reviewing previous research, the questions and statements were grouped, arranged, and written in a simple Arabic language, comprised of two sections. The first section consisted of personal data, including the socio-demographics and economic characteristics as follows: a) Socio-demographic characteristics: age, gender, residence, marital status, Faculty, academic year, living with parents, father's education, mother's education, and employment. b) Variables of economic status: income per month, level of living, and housing level.

The second section included an instrument to evaluate the respondents' knowledge, attitudes, and practices regarding some RH issues as follows: a) Assessment of knowledge: The assessment comprised 38 items focusing on youth knowledge regarding RH issues, covering concepts, services, manifestations of puberty, family planning, contraceptives, and sexually transmitted diseases (STDs), among others. Each item was scored as 1 for a correct response and 0 for an incorrect one. The overall rating varied from 0 and 38. Participants who scored above the mean on knowledge questions were defined as having strong knowledge, whilst those who scored at or below the mean were labeled as having weak knowledge. b) Determining the main source of information about RH through a multiple-choice question. c) Assessment of attitudes: The assessment of the youth's attitudes towards some RH issues using 14 items rated on a three-point Likert scale, consisted of six negatively and eight positively stated statements to maintain the balance of responses respectively: 1 disagree; 2 neutral; 3 agree. After reversing items that were negatively stated, we aggregated the results calculated from the mean. The outcomes were transformed into a dichotomous format, wherein respondents scoring above the mean value of the total cumulative score were categorized as having a positive attitude towards RH issues. Conversely, those scoring at or below the mean were classified as having a negative attitude towards RH issues. d) Assessment of practices: The assessment of youth practices concerning RH issues involved 12 items, with each item scored as 1 for a correct response and 0 for an incorrect one. The total score ranged from 0 to 12. Individuals who answered practice questions with scores above the mean were labeled as having good practice, while those who scored at or below the mean were labeled as having poor practice.

To ensure the validity and reliability of the research instruments, a two-phase process of preparation and implementation was conducted. In the preparatory phase, a review of the national and international literature on the study variables was undertaken to develop research instruments. These instruments were subsequently reviewed and corrected by the supervisors. Additionally, the validity of all instruments was verified by three faculty members with expertise in public health and biostatistics from Hodeidah University and the University of Saba Region in Yemen, representing different academic ranks (professor and associate professor) to ensure their accuracy and suitability. The internal

consistency of the knowledge, attitude, and practice (KAP) questions was determined using Cronbach's alpha, yielding values of 0.75, 0.77, and 0.74, respectively. A pilot study conducted on 10% of the sample size confirmed the clarity, consistency, and applicability of the instruments, with an estimated completion time of 15-17 minutes per questionnaire. No modifications were required for the instruments as they were clear and understandable to the participants. Therefore, the pilot data were included in the study.

In the implementation phase, data collection was carried out from January to April 2022. Four days per week, during morning hours only, were allocated to accommodate their work schedule and students' study schedules. An interview with each participating student was conducted, explaining the objectives and nature of the study in clear and simple terms. Information was obtained for participants before their involvement in the study. To further ensure data validity, the researcher meticulously entered the data.

Following data collection, it underwent revision, coding, entry, and analysis utilizing the statistical software SPSS version 25. Graphical representations were generated using Microsoft Excel Software. The Kolmogorov-Smirnov and the Shapiro-Wilk tests were used to test the assumption that the data are normally distributed or not. Descriptive statistics, encompassing frequency, proportions, mean, and standard deviation, were computed to depict the study variables concerning the population and were visually presented via tables and graphs. The chi-square test was employed to evaluate the connections between socioeconomic and demographic factors and knowledge, attitudes, and practices regarding RH. Bivariate logistic regression was utilized to calculate the crude odds ratio (COR). Variables exhibiting statistically significant associations were subsequently included in the multiple logistic regression model to account for or adjust the impacts of potential confounding variables and to gauge their influence on knowledge, attitudes, and practices regarding reproductive health. The adjusted odds ratio (AOR) with a 95% confidence interval served to quantify the strength of the association, with a p-value of <0.05 indicating the statistical significance of the multivariable analysis.

Results

The study involved 576 students, the majority of whom were males (54.9%). The age group with the highest participation was 22 to 24 years. The average age was 21.7±1.7 years. More than half of the students (58.3%) were single, 69.8% were urban residents, and 53.1% were not working. Most students (75.7%) were in the literary colleges. The first academic year had the highest percentage of participating students. 84.5% had a television, and 37.0% had a radio at home. Regarding parental education, 38.5% of fathers had university qualifications or higher, while 42.2% of mothers were illiterate. For monthly family income, 44.6% found it sufficient but could not save money, and 53.0% of the families had a low housing level. Table 1 displays the socio-demographic and economic characteristics of the university students at the University of Saba Region in 2022, Yemen, who took part in the study.

Table 1. Frequency distribution of demographic characteristics of the University youth participating in the study. University of Saba Region, 2022, Yemen

Characteristics	No (%)	Characteristics	No (%)
Sex		**Father education**	
Male	316 (54.9)	Illiterate	68 (11.8)
Female	260 (45.1)	Primary	71 (12.3)
Age (group)		Preparatory	50 (8.7)
18-20	178 (30.9)	Secondary	90 (15.6)
20-22	186 (32.3)	Diploma	75 (13)
22-24	212 (36.8)	University or above	222 (38.5)
Mean ± SD		**Mother education**	
21.7 ± 1.7			
Marital status		Illiterate	243 (42.2)
Single	336 (58.3)	Primary	110 (19.1)

Characteristics	No (%)	Characteristics	No (%)
Married	214 (37.2)	Preparatory	52 (9)
Widower	16 (2.8)	Secondary	97 (16.8)
Divorced	10 (1.7)	Diploma	26 (4.5)
Residence		University or above	48 (8.3)
Urban	402 (69.8)	**Having TV in the house**	
Rural	174 (30.2)	Yes	487 (84.5)
Faculty		No	89 (15.5)
Scientific faculties	140 (24.3)	**Having radio in the house**	
literary faculties	436 (75.7)	Yes	213 (37)
The academic year		No	363 (63)
First	218 (37.8)	**Monthly income level of the family**	
Second	133 (23.1)	Enough and can save money	150 (26.1)
Third	88 (15.3)	Enough and can not save money	257 (44.6)
Fourth or above	137 (23.8)	Not enough	169 (29.3)
Employment		**The living level of the family**	
Employed	270 (46.9)	High	22 (3.8)
Unemployed	306 (53.1)	Average	504 (87.5)
Living with parents		Low	50 (8.7)
Live with both parents	309 (53.6)	**Housing level**	
Live with one parent	87 (15.1)	High	271 (47)
Live with anyone	180 (31.3)	Low	305 (53)

Figure 1 shows levels of University youth KAP toward reproductive health issues. It was found that 55.9% of the students had a poor level of knowledge, while 44.1% had a good level of knowledge. Regarding attitudes, it was found that 53.8% of youths had a positive level of attitude, and 46.2% of them had a negative level of attitude.

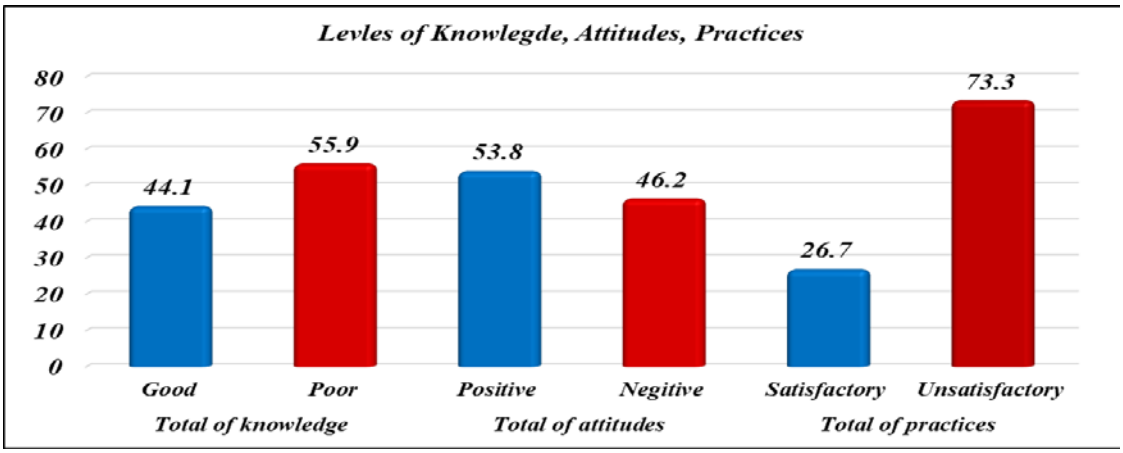

Figure 1. Distribution of levels of University youth knowledge, attitudes, and practices toward reproductive health issues, University of Saba Region, Marib, Yemen

Regarding practices, it was found that 73.3% of the youth had an unsatisfactory level of practice, and 26.7% of them had a satisfactory level of practice.

Figure 2 shows the main sources of information related to RH issues among the university youth participating in the study. It was found that the main source of information (46.9%) was the family, followed by friends (33.9%), and school (31.5%), while health institutions and universities had a low role (10.8% and 8.6% respectively).

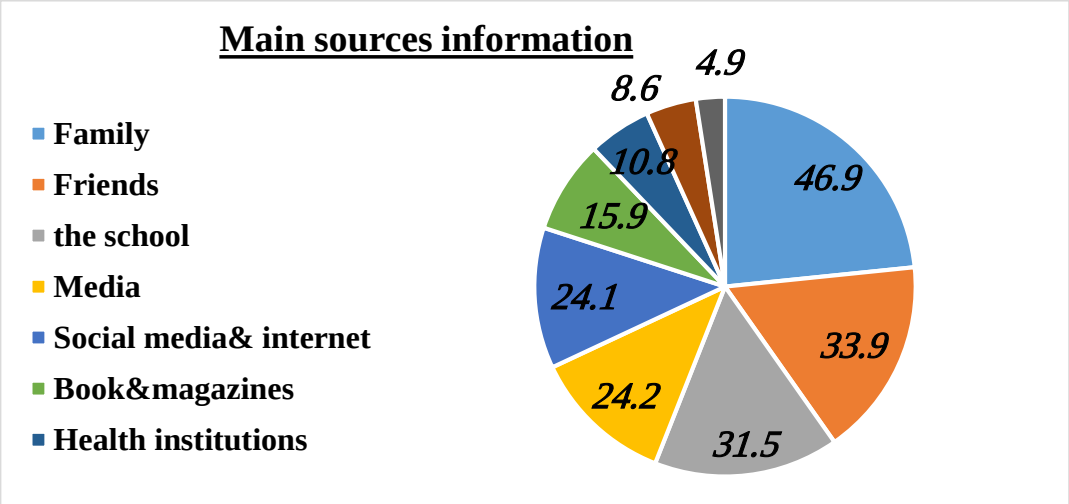

Figure 2. Main Sources of information related to RH issues, as reported by the participants of university youth, University of Saba Region, Marib, Yemen

The factors associated with the level of knowledge, attitudes, and practices of RH issues among university youth are presented in Table 2.

Table 2. Factors associated with knowledge, attitudes, and practices of RH issues among University Youth, University of Saba Region, Marib, Yemen

Variables	Knowledge		Attitudes		Practices	
	χ2	P-Value	χ2	P-Value	χ2	P-Value
Sex	27.95	0.001*	38.76	0.001*	5.58	0.018*
Age (group)	1.098	0.577	9.55	0.008*	8.15	0.017*
Marital status	26.8	0.001*	6.27	0.099	132.34	0.001*
Residence	7.247	0.007*	16.99	0.000*	6.59	0.010*
Faculty	0.115	0.734	0.016	0.899	5.24	0.022*
The academic year	4.49	0.212	9.67	0.022*	6.34	0.096
Employment	8.23	0.004*	22.49	0.000*	0.824	0.364
live with parents	13.94	0.001*	5.46	0.065	36.85	0.001*
Fathers' education	10.07	0.073	10.29	0.067	1.58	0.903
Mothers' education	5.63	0.344	18.39	0.002*	4.94	0.426
Having a TV in the house	1.22	0.27	1.86	0.173	1.2	0.273
Having a radio in the house	2.41	0.121	2.23	0.135	6.34	0.096
Monthly income level	7.73	0.021*	1.51	0.47	15.92	0.001*
Living level	7.73	0.227	1.54	0.463	1.53	0.464
Housing level	2.04	0.153	0.48	0.487	0 .706	0.401

χ2 is chi-square value, ∗P value ≤ 0.05 = significant

It was found that gender, marital status, residence, work, living with parents, and monthly income level are factors that had a statistically significant association with youth knowledge (P < 0.05).

Regarding attitudes, the table indicates that gender, age, residence, academic year, work, and mother's education are factors that had a statistically significant association (P < 0.05).

Regarding the practices, the table indicates that gender, age, marital status, residence, faculty, living with parents, and monthly income level are factors that had a statistically significant association (P < 0.05).

After knowing the independent variables by chi-square test which proved their significance and relationship with the knowledge, attitudes, and practices of young people related to RH a stepwise logistic regression model was used to determine which of these variables were significant, to quantify their effects, and to assess how these effects vary across the categories of the independent variables. The best-fitting Logistic regression model for detecting factors affecting knowledge, attitudes, and practices related to RH issues among the University youth is presented in Tables 3, 4, and 5.

In terms of knowledge, Table 3 revealed that females exhibited a 2.379-fold higher likelihood of possessing good knowledge regarding RH issues compared to males (AOR = 2.379; 95% CI: 1.591 - 3.558; P = 0.001). Furthermore, married young individuals were 1.816 times more inclined to have good knowledge about RH issues in contrast to their single counterparts (AOR = 1.816; 95% CI: 1.243 - 2.654; P = 0.002). Moreover, students residing in urban areas demonstrated a 1.587-fold increased probability of possessing good knowledge compared to those residing in rural areas (AOR = 1.587; 95% CI: 1.071 - 2.353; P = 0.021).

Table 3. Logistic regression model for factors affecting knowledge related to RH among the University youth, University of Saba Region, Marib, Yemen

Variables	Good knowledge			P-Value
	COR (95% CI)	P- Value	AOR (95% CI)	
Sex				
Male	Ref		Ref	
Female	2.467 (1.760 - 3.457)	0.001*	2.379 (1.591 - 3.558)	0.001*
Marital status				
Single	Ref		Ref	
Married	2.282 (1.608 - 3.239)	0.001*	1.816 (1.243 - 2.654)	0.002*
Widower	0.585 (0.185 - 1.853)	0.362	0.345 (0.103 - 1.151)	0.083
Divorced	4.093 (1.039 - 16.118)	0.044*	2.557 (0.620 -10.549)	0.194
Residence				
Rural	Ref		Ref	
Urban	1.652 (1.144 - 2.384)	0.007*	1.587 (1.071 - 2.353)	0.021*
Employment				
Employed	Ref		Ref	
Unemployed	1.626 (1.165 - 2.268)	0.004*	1.146 (0.765 - 1.718)	0.508
Living with parents				
live with both parents	Ref		Ref	
live with one parent	1.010 (0.620 - 1.645)	0.967	1.184 (0.704 – 1.993)	0.525
live lonely	1.969 (1.356 - 2.857)	0.000*	1.772 (1.168 - 2.691)	0.007*
Monthly income level				
Enough and can save money	Ref		Ref	
Enough but can't save money	1.395 (0.922 - 2.112)	0.115	1.400 (0.899 - 2.180)	0.137
Not enough	1.886 (1.203 - 2.957)	0.006*	1.587 (0.963 - 2.616)	0.07

Ref.= reference categories, ∗P value ≤ 0.05 = significant, COR = crude odds ratio, AOR = adjusted odds ratio

Additionally, youths not residing with their parents, or with only one parent, exhibited a 1.772-fold higher likelihood of possessing good knowledge than those living with both parents (AOR = 1.772; 95% CI: 1.168 - 2.691; P = 0.025).

Concerning attitudes, as depicted in Table 4, females exhibited a 2.399-fold higher likelihood of harboring positive attitudes towards RH issues compared to male youth (AOR = 2.399; 95% CI: 1.613 - 3.569; P = 0.001). Moreover, students residing in urban areas were 1.862 times more inclined to possess positive attitudes than their rural counterparts (AOR = 1.862; 95% CI: 1.260 - 2.752; P = 0.002). Additionally, young individuals not engaged in employment displayed a 1.614-fold higher likelihood of having positive attitudes compared to those employed (AOR = 1.614; 95% CI: 1.085 - 2.402;

P = 0.018). Furthermore, youths whose mothers had attained a university education or higher exhibited a 2.901-fold increased probability of harboring positive attitudes towards RH issues in comparison to those with uneducated mothers (AOR = 2.901; 95% CI: 1.320 - 6.373; P = 0.008). Notably, young individuals possessing good knowledge were 1.505 times more likely to have positive attitudes than those with poor knowledge (AOR = 1.505; 95% CI: 1.076 - 2.106; P = 0.017).

Table 4. Logistic regression model for factors affecting attitudes related to RH among the University youth, University of Saba Region, Marib, Yemen

Variables	Positive attitudes			P-Value
	COR (95% CI)	P- Value	AOR (95%CI)	
Sex				
Male	Ref		Ref	
Female	2.934 (2.082 - 4.136)	0.001*	2.399 (1.613 - 3.569)	0.001*
Age (group)				
18-20	Ref		Ref	
21-22	0.751 (0.494 - 1.140)	0.179	0.966 (0.599 - 1.558)	0.887
23-24	0.531 (0.354 - 0.797)	.002*	0.943 (0.537 - 1.656)	0.839
Residence				
Rural	Ref		Ref	
Urban	2.127 (1.481 - 3.055)	0.001*	1.862 (1.260 - 2.752)	0.002*
The academic year				
First	Ref		Ref	
Second	1.242 (0.800 - 1.929)	0.335	1.160 (0.715 - 1.881)	0.549
Third	0.808 (0.492 - 1.328)	0.401	0.712 (0.394 - 1.285)	0.259
Fourth or above	0.602 (0.391 - .926)	0.021*	0.679 (0.383 - 1.204)	0.186
Employment				
Employed	Ref		Ref	
Unemployed	2.233 (1.599 - 3.120)	0.001*	1.614 (1.085 - 2.402)	0.018*
Mother education				
Illiterate	Ref		Ref	
Primary	1.530 (.970 - 2.414)	0.067	1.517 (0.931 - 2.472)	0.094
Preparatory	1.059 (.582 - 1.928)	0.85	0.810 (0.426 - 1.541)	0.521
Secondary	0.996 (.622 - 1.595)	0.986	0.753 (0.454 - 1.248)	0.271
Diploma	1.695 (.740 - 3.884)	0.212	1.732 (0.699 - 4.291)	0.236
University or above	4.025 (1.919 - 8.442)	0.001*	2.901 (1.320 - 6.373)	0.008*
Knowledge				
Poor knowledge	Ref		Ref	
Good knowledge	1.460 (1.048 - 2.035)	0.025*	1.505 (1.076 - 2.106)	0.017*

Ref.= reference categories. ∗P value ≤ 0.05 = significant, COR = crude odds ratio., AOR = adjusted odds ratio

Regarding practices, as shown in Table 5, females were 1.501 times more inclined to exhibit satisfactory practices towards RH issues compared to males (AOR = 1.501; 95% CI: 1.033 - 2.181; P = 0.033). Furthermore, youths who were married, divorced, or widowed were respectively 10.03, 8.411, and 5.652 times more likely to demonstrate satisfactory practices regarding RH issues compared to single youths (AOR = 10.03; 95% CI: 6.006 - 16.661; P = 0.001), (AOR = 8.411; 95% CI: 2.148 - 32.936; P = 0.002), and (AOR = 5.652; 95% CI: 1.704 - 18.748; P = 0.005). Additionally, youths residing in urban areas displayed a 1.843-fold increase in the likelihood of exhibiting satisfactory practices compared to those in rural areas (AOR = 1.843; 95% CI: 1.094 - 3.104; P = 0.022). Moreover, young individuals not residing with both parents were 1.956 times more likely to demonstrate satisfactory practices compared to those living with parents (AOR= 1.956; 95% CI: 1.209 - 3.163; P = 0.006). Concurrently, youths with good knowledge exhibited a 4.619-fold higher probability of demonstrating satisfactory practices compared to those with poor knowledge (AOR = 4.619; 95% CI: 3.054 - 6.987;

P = 0.001). Conversely, youths from families with inadequate monthly income were 0.517 times less likely to exhibit satisfactory practices compared to those from families with sufficient income and savings potential (AOR = 0.517; 95% CI: 0.308 - 0.868; P = 0.013).

Table 5. Logistic regression model for factors affecting practices related to RH among the University youth, University of Saba Region, Marib, Yemen

Variables	Satisfactory practices			
	COR (95%CI)	P-Value	AOR (95%CI)	P-Value
Sex				
Male	Ref		Ref	
Female	1.561 (1.077 - 2.262)	0.019*	1.501 (1.033 - 2.181)	0.033*
Age (group)				
18-20	Ref		Ref	
21-22	1.688 (1.033 - 2.758)	0.037*	1.142 (0.632 - 2.063)	0.659
23-24	1.957 (1.220 - 3.140)	0.005*	0.956 (.525 - 1.741)	0.883
Marital status				
Single	Ref		Ref	
Married	11.41 (7.196 - 18.098)	0.001*	10.03 (6.006 - 16.661)	0.001*
Widower	6.120 (2.080 - 18.010)	0.001*	5.652 (1.704 - 18.748)	0.005*
Divorced	10.20 (2.794 - 37.242)	0.001*	8.411 (2.148 - 32.936)	0.002*
Residence				
Rural	Ref		Ref	
Urban	1.752 (1.138 - 2.697)	0.011*	1.843 (1.094 - 3.104)	.022*
Faculty				
Scientific faculties	Ref		Ref	
Literary faculties	1.720 (1.077 - 2.746)	0.023*	1.590 (0.909 - 2.782)	0.104
Living with parents				
live with both parents	Ref		Ref	
live with one parent	0.935 (0.508 - 1.723)	0.83	0.958 (0.472 - 1.946)	0.906
I don't live with anyone	3.174 (2.111 - 4.772)	0.001*	1.956 (1.209 - 3.163)	0.006*
Monthly income level				
Enough and can save money	Ref		Ref	
Enough but can't save money	0.537 (0.331 - 0.872)	0.012*	0.927 (0.508 - 1.690)	0.804
Not enough	0.426 (0.276 - 0.658)	0.001*	0.517 (0.308 - 0.868)	0.013*
Knowledge				
Poor knowledge	Ref		Ref	
Good knowledge	4.826 (3.224 - 7.225)	0.001*	4.619 (3.054 - 6.987)	0.001*

Ref.= reference categories. ∗P value ≤ 0.05 = significant, COR = crude odds ratio, AOR = adjusted odds ratio

Discussion

This study found that 55.9% of the participants had poor knowledge about the RH issues that were studied. This aligns with previous studies in Ethiopia, which reported inadequate RH knowledge among university students (14-15). While this finding contrasts with studies conducted by Adinew et al. (2013) and Ayalew et al. (2019), who observed good knowledge levels in youth (16-17). This discrepancy might indicate variations in educational programs and cultural contexts around RH information.

In our study, most young people obtained their RH information primarily from relatives (46.9%) and friends (33.9%), relying on informal sources; this finding is consistent with studies in Ghana and Malaysia (18, 19). Despite the knowledge gap, over half of the young individuals (53.8%) exhibited positive attitudes towards RH issues, a result similar to a study conducted by Ayalew et al. (2019), which found 53.4% of young people had positive attitudes

(17). In addition, the study demonstrated that a significant proportion of young individuals (73.3%) exhibited unsatisfactory practices regarding RH issues. This observation resonates with findings from other studies conducted in Ethiopia, there is a lack of appropriate practices had the youth regarding RH issues (14, 20).

The study revealed several significant factors associated with young people's knowledge, attitudes, and practices regarding reproductive health, including gender, age, marital status, residence, academic year, work, living with parents, mother's education, and monthly income level. This was consistent with prior studies by Getachew et al. (2022), Ayalew et al. (2019), Ashebir et al. (2020) and Kerbo et al. (2018), who found that most of these factors are significantly related to young people's KAP towards RH issues (14, 17, 21-22).

The study demonstrated significant gender disparities in knowledge of RH issues. Females were 2.4 times more likely than males to have good knowledge, consistent with prior research by Kassa et al. (2016) and Mesele et al. (2023) (20, 23). This may be attributed to females having greater exposure to sex education or RH information through their social networks. Married youth were 1.8 times more knowledgeable than single youth, possibly because marriage facilitates RH issue discussions. This contrasts with an Iranian study that found similar knowledge levels between married and unmarried individuals (24). Urban youth possessed 1.6 times better knowledge than rural youth, likely reflecting superior healthcare, education, and awareness in cities. These findings are consistent with studies by Adinew et al. (2013), Beletew et al. (2020), and Gebresilassie et al. (2019) that found that young people living in urban areas had higher knowledge than those living in the countryside (16, 25-26). Additionally, youth not living with parents were 1.8 times more knowledgeable, suggesting independence may allow for greater information seeking, also supported by earlier studies by Kassa et al. (2016) and Abajobir (2014) (20, 27).

Regarding attitudes, the survey found that female university students were 2.4 times more likely to have positive attitudes about RH issues than male students. Adolescents with highly educated moms were 2.9 times more likely to have favorable perspectives on reproductive health than youth with illiterate mothers. This finding coincides with the study conducted by Getachew et al. (2022) (14). Also, youth residing in urban areas and young people who were not working were more likely to have positive attitudes towards RH issues. Furthermore, the young people with good knowledge were 1.5 times more likely to be positive about RH issues than those with low knowledge. This result confirms the results of a study conducted in Northwest Ethiopia, which demonstrated a positive association between knowledge and attitudes toward RH issues (17).

In terms of RH practices, female students exhibited a 1.5 times higher likelihood of satisfactory practices than their male student counterparts. Also, married youth, divorced and widowed individuals showed higher odds of acceptable practices (10.03, 8.4, and 5.6 times, respectively) compared to single youth. Furthermore, young people with good RH knowledge had a 4.6 times higher probability of exhibiting satisfactory practices than those with poor knowledge. These findings align with studies conducted by Wakjira (2022) and Tessema (2015), which found females and married individuals to have more satisfactory practices, although at different rates (28-29). Urban youth were 1.8 times more likely to have satisfactory RH practices compared to their rural counterparts. Additionally, young individuals not residing with their parents or one parent were 1.9 times more likely to demonstrate satisfactory practices, which was anticipated in a conservative society like Yemen, where independence from parental oversight might foster greater personal responsibility for RH. This contrasts with a study by Ayehu et al. (2016), which reported that young people living with their mothers were more likely to practice positive RH behaviors (30). Finally, the present study indicated that young people from families with inadequate monthly income were 0.517 times less likely to have satisfactory RH practices than those from families with sufficient income. This finding is consistent with studies in Ethiopia and Canada (30-31), which found that young individuals from higher-income households were more likely to utilize

sexual and reproductive health services, suggesting that a low economic level negatively impacts RH practices among university youth in Yemen.

One of the strengths of this study is the selection of the topic of reproductive health among university youth in Yemen. Focusing on a specific group, which is the university youth, as this age group represents future leaders and plays a crucial role in societal change. The study of factors affecting knowledge, attitudes, and practices suggests a broad scope of study, providing more comprehensive picture of the issue. Conducting the study in the local Yemeni context adds great value to the results due to the scarcity of such studies, and the social, cultural, and economic conditions in Yemen have a significant impact on reproductive health. A key limitation of this study is its cross-sectional design, which precludes the establishment of definitive causal relationships. Also, an important weakness is that the study was confined to a specific community and region, explain that the findings might not apply to populations with different socio-cultural or environmental contexts. Social desirability bias may have influenced participants' responses regarding sensitive practices. Recall bias was another issue, as participants might not accurately recall their knowledge and possibly the study did not explore the depth of participants' knowledge, focusing instead on the recall of specific facts.

This study opens the door to many research questions that can contribute to a deeper understanding of the factors affecting the reproductive health of youth in Yemen, research into the most effective interventions, research into the challenges facing youth in accessing reproductive health services, conducting comparative studies between different regions in Yemen, and develop more effective strategies to improve the health and well-being of university youth. This study also has clinical implications such as the prevention of sexually transmitted diseases through contributing to the development of preventive programs in order to encourage youth to practice safe sexual practices. At the political level, the study can contribute to the development of health policies, support youth rights, and build partnerships to promote reproductive health.

Conclusion

This study investigated the knowledge, attitudes, and practices regarding reproductive health among university youth in the University of Saba Region of Yemen. The findings revealed significant disparities in KAP across various socio-demographic and economic characteristics. Youth knowledge and practice toward reproductive health were low, and while the youth attitude were positive, it was not enough and must be strengthened among young people. Various factors were found to significantly influence the knowledge, attitudes, and practices of young people towards RH. Gender, marital status, residence, work, living with parents, mother's education, and monthly income level were identified as influential factors. Females exhibited better knowledge and more positive attitudes compared to males. In Yemen, the role of the media, colleges, schools, and public health workers in providing knowledge about the importance of reproductive health is still limited, and according to the study, the main source of information about reproductive health for youth is their family and friends while universities and health institutions were at the bottom of the list.

These findings highlight the need for targeted interventions to improve knowledge and practices related to RH among university youth in Yemen. The study recommends focusing on addressing gender disparities, providing comprehensive sex education, increasing access to RH information and services, and addressing the unique challenges faced by individuals from low-income families. By addressing these factors, it is possible to enhance the overall reproductive health outcomes and well-being of young people in Yemen.

Declerations

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Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

The researcher was complying with the International Guidelines for Research Ethics. The students' consent was taken to participate in the study after explaining the purpose and process of the research. Voluntary participation was emphasized. Anonymity and confidentiality were assured and maintained throughout the stages of the study.

Code of Ethics

The researchers got the approval of the Ethics Committee of the Molecular Biology Research & Studies Institute for conducting the study.

Use of Artificial Intelligence (AI)

We have not used any AI tools or technologies to prepare this manuscript.

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Authors' contribution

MSA, MIH, and MAS suggested the research and designed the study. MSA collected and analyzed the data and prepared the draft of manuscript. MIH and MAS participated in reviewing the data of the study and drafting the manuscript and making required amendments. All authors read and approved the final manuscript.

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