

# Knowledge and Attitudes of Secondary Schools students Towards Premarital Screening and Counseling in Taiz, Yemen

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**Background:** Premarital screening and counseling (PMCS) is a preventive measure for genetic, infectious, and blood-transmitted diseases. This study aimed to assess secondary school students' knowledge of and attitudes towards PMCS in Taiz City, Yemen.

**Methods:** This study included 306 secondary school students selected through stratified random sampling from six secondary schools representing three directorates in Taiz city, Yemen. Researchers used two validated tools, students' knowledge and attitudes about the PMCS which were adopted from previous studies, to collect the necessary data. The data were analyzed using the SPSS software. Descriptive analysis was conducted for frequencies and percentages while chi square test was used to identify the relationships between the demographics and knowledge level.

**Results:** Most of the students had a weak knowledge of 58.82%, while 40.52% showed fair understanding. The majority of students (79.09%) displayed a positive attitude towards PMCS, among the students with a positive attitude, 36.93% had fair knowledge, whereas 41.5% of the students had weak knowledge.

**Conclusion:** The study concluded that secondary school students in Taiz lack knowledge and have positive attitudes towards various aspects of premarital screening and counseling. Knowledge deficits were linked to male students, younger academic years, non-engagement, and family history of disease.

**Keywords:** knowledge, attitude, premarital counseling, Yemen, school students

## Introduction

Genetic disorders (GD) are common in Arab countries<sup>1</sup> and hemoglobinopathies are considered the most common type, not only in Arab countries, but also in the world.<sup>2</sup> Thalassemia and sickle cell anemia are the most common inherited hemoglobinopathies, with the highest impact on morbidity and mortality among affected individuals.<sup>3,4</sup> Studies report that sickle cell anemia affects approximately 2% of the population in Sanaa, Yemen.<sup>5</sup> The prevalence of thalassemia in Sana'a, the capital city of Yemen, is estimated at approximately 13%.<sup>6</sup>

Previous studies have shown that early detection of genetic disorders has the potential to contribute positively to the reduction in the prevalence of associated diseases and could help in developing better strategies for prevention.<sup>7–9</sup> Unfortunately, studies have revealed limited knowledge regarding the fundamental characteristics of genetic diseases among Arab populations.<sup>10</sup> Considering the high occurrence of consanguineous marriages in Arab communities,<sup>11–13</sup> inherited genetic diseases have become a real threat to public health and are a major concern for policymakers and public health activists. Approximately half of all marriages in Arab communities, including Yemen, are consanguineous, and this phenomenon is not receding.<sup>14</sup> This phenomenon is commonly perceived by families as a means of maintaining family ties, sustaining wealth within the family network, and maintaining the social structure over generations.<sup>15</sup> Additionally, Islamic religion and socioeconomic factors may contribute to the prevalence of consanguineous marriages in Yemen and other Arab communities.<sup>14–16</sup> In Yemen, 40% of marriages are consanguineous, with 58% of those marriages being between first cousins (Jurdi and Saxena 2003). In Saudi Arabia, it was varied between 42% and 67%.<sup>17,18</sup>

To reduce the burden of genetic diseases associated with consanguineous marriages, individuals must make decisions concerning premarital testing. Historically, Rome established the first premarital screening program in 1976 in Rome<sup>19</sup> that was established then in many countries. Several countries have adopted preventive screening programs to reduce the prevalence of genetic diseases.<sup>9,20–22</sup> In Saudi Arabia, it was started and involves mandatory screening for any couples planning to get married.<sup>23</sup> In Jordan instituted a mandatory marriage certificate with test result was decided by National Premarital Screening Program.<sup>23,24</sup>

The PMCS in the current study includes the knowledge and attitudes of schoolteachers regarding genetic risks, health implications, psychological factors and family planning. The application of PMCS services in Yemen could reduce the number of affected births, as well as their social, emotional, and economic burdens on the family and health system. Although the Yemeni Ministry of Health recently established premarital clinics, they are not activated due to couples' lack of knowledge and interest, as well as a lack of encouragement by families and the community. Students in school represent a period of self-discovery, independence, and frequently, marriage preparation. In order to create educational programs for those students, it is crucial to assess their attitudes and knowledge regarding PMCS. When combined with the significance of premarital exams, this information can enable them to make well-informed decisions regarding the health of their family.

The high prevalence of genetic disorders, together with the common practice of consanguineous marriages among the general population in Arab countries, including Yemen, makes this study necessary.<sup>6,25–27</sup> This is because the literature has shown that curbing the burden of genetic disorders on the health system is significantly associated with public knowledge of and attitudes towards genetic testing.<sup>28–30</sup> Therefore, this study aimed to fill this information gap by assessing Yemeni secondary school students' knowledge of and attitudes towards premarital screening and counseling.

## Methods

### Study Design

A cross-sectional design was used.

### Setting

This study was conducted in Taiz, Yemen, in six secondary schools: three boys and three girls. Taiz Governorate is one of the main cities in Yemen, where there are more education and facilities. These schools include the Asmaa School for Girls and Al-Farouk School for Boys from the Sala Directorate, Arwa School for Girls and Khalid Ebn EL-Waleed School for Boys from the El Kahera Directorate, and September School for Girls and Nasr School for Boys from the El-Muzaffar Directorate.

### Sampling and Sample Size

Sample size was calculated using the Epi-Info program 7.2 (Epi Info, CDC, Atlanta, GA, USA, 2020. <https://www.cdc.gov/epiinfo/pc.html>)<sup>31</sup> where 306 from 1500 people in the population was determined based on the following criteria: 5% absolute precision, and a 95% confidence level. This study included 306 secondary school students who were selected

using stratified random sampling. The population was divided into three strata according to the level of study (first, second, and third academic levels) as to identify any differences between the three groups. Seventeen students were randomly selected from each strata totaling fifty-one from each of the six schools.

## Data Collection

The questionnaire was composed of three parts. Part I involved socio-demographic characteristics such as students' age, sex, academic year, marital status, engagement status, degree of relative engagement, marriage's consanguinity, degree of marriage's consanguinity, father's level of education, father's occupation, mother's level of education, mother's occupation, and family income per month. Part II included students' knowledge about the PMCS, such as definition, target population, importance, and components (four questions), as well as places and personnel providing the service (two questions). It encompasses their knowledge of the health consequences of consanguineous marriage and genetic and sexually transmitted diseases (three questions). This section was developed after thoroughly reviewing previous literature on knowledge of premarital counselling.<sup>8,32</sup> Each knowledge item (9) was assigned a score as follows: correct and complete answer (2), correct and incomplete answer (1), and incorrect answer or do not know (0). A scoring system was used to assess participants' responses: (1) knowledge items: correct and complete answer = 2, correct and incomplete answer = 1, incorrect answer or do not know = 0. The total knowledge score ranges from 0 to 18 and is classified as good (18–12), fair (12–6), or weak (<6–0). Content validity was tested by a panel of five experts in the field. Part III covered attitudes towards the PMCS, which was originally developed and validated by Mohamed et al, 2015.<sup>33</sup> It consists of 14 items that assess students' attitudes towards the PMCS. Positive attitude items were scored as "Agree = 3, not sure = 2, and disagree = 1" while negative attitudes items were scored reversely as "Agree = 1, not sure = 2, and disagree = 3". The total scores for attitudes ranged from 42 to 14, and were classified as positive = 32–42, neutral = <32–23, and negative = <23–14.

The reliability of the tool was assessed through a pilot study with 30 students to identify the consistency of the questions. Tools of knowledge and attitudes were checked for reliability using Cronbach's alpha, and the results were good (0.724 and 0.730, respectively). The researchers have translated the questionnaire and then it was assessed by three researchers after translation into Arabic. It was validated and tested to ensure accuracy, consistency and the validity; its Cronbach alpha was above acceptable level. Questionnaire sheets were distributed by the researcher and filled out by the students during the break time in the presence of the researcher for further explanation and clarification of the items, if needed.

## Ethical Consideration

This study was approved by the Ethical Committee of Research, Faculty of Medicine and Health Sciences, Taiz University, Yemen (approval no. 116–07-2020). All participants were informed that their participation in the study was voluntary and that they had the right to withdraw at any time, without any explanation. Written informed consent was obtained from all participants. Privacy and confidentiality were ensured before the completion of the questionnaire. We confirm that this study complies with the Declaration of Helsinki.

## Statistical Analysis

The collected data were categorized, coded, computerized, tabulated, and analyzed using the Statistical Package for Social Sciences (SPSS) version 20. Statistical measures, such as simple frequency tables, were used to describe and summarize categorical variables. Descriptive and analytical statistics, such as percentages, were used. The association between demographic variables and the total score of knowledge was assessed by cross-tabulation test indicated by Chi square test and the level of confidence was determined as 95%.

## Results

### Sociodemographic Characteristics of the Participants

The majority of the participants were middle-aged adolescents (64.7%), while adults were (4.6%). Approximately one quarter of the fathers of the participants were illiterate or just read and write, and more than half of the mothers had a low

level of education. In addition, more than half of the participating students' families had sufficient monthly income. Details of these findings are presented in Table 1.

## Knowledge About Premarital Counseling and Screening

The majority of the participants (98%) either did not know or did not fully know the importance of the PMCS. More than three-quarters of the participants did not know the components of the PMCS or where this service was provided (83.0% and 87.6%, respectively). Detailed results of the respondents' knowledge of premarital counseling and screening are presented in Table 2.

Only two respondents managed to have a good total score for knowledge about PMCS, while the other respondents obtained either fair or weak total scores for knowledge about PMCS, as presented in Figure 1.

Most students who participated in the study reported that they did not know about the presence of law regarding the PMCS in Yemen as shown in Figure 2.

**Table 1** Sociodemographic Characteristics of the Participating Students

Students' Socio-Demographic Characteristics	n = 306 (%)
<b>Age (years):</b>	
Middle adolescence (15–17)	198 (64.7)
Late adolescence (18–19)	94 (30.7)
Adult (20–22)	14 (4.6)
<b>Sex:</b>	
Female	153 (50.0)
Male	153 (50.0)
<b>Academic year:</b>	
First	102 (33.3)
Second	102 (33.3)
Third	102 (33.3)
<b>Marital status:</b>	
Single	294 (96.1)
Married	10 (3.3)
Divorced	2 (0.7)
<b>Engagement status:</b>	
Engaged	n = 294(%) 38 (12.9)
Not engaged	256 (87.1)
<b>Relative engagement:</b>	
Present	n = 38 (%) 25 (65.8)
Absent	13 (34.2)
<b>Degree of Relative engagement:</b>	
1st (cousin)	n = 25 (%) 12 (48.0)
2nd (Father's/mother's relatives)	12 (48.0)
3rd (Grandfather's/Grandmother's relatives)	1 (4.0)
<b>Marriage's consanguinity:</b>	
Present	n = 10 (%) 8 (80.0)
Absent	2 (20.0)
<b>Degree of marriage's consanguinity:</b>	
1st (Cousin)	n = 8 (%) 1 (12.5)
2nd (Father's/Mother's relatives)	5 (62.5)
3rd (Grandfather's/Grandmother's relatives)	2 (25.0)

(Continued)

**Table 1** (Continued).

Students' Socio-Demographic Characteristics	n = 306 (%)
<b>Father's level of education:</b>	
Illiterate/read and write	76 (24.9)
Primary and preparatory	74 (24.2)
Secondary or its equivalent	53 (17.3)
University and more	103 (33.7)
<b>Father's occupation:</b>	
Worker	266 (86.9)
Retired, not working	40 (13.1)
<b>Mother's level of education:</b>	
Illiterate/read and write	178 (58.2)
Primary and preparatory	70 (22.9)
Secondary or its equivalent	30 (9.8)
University and more	28 (9.2)
<b>Mother's occupation:</b>	
Not working (housewife)	353 (82.7)
Working	53 (17.3)
<b>Mother's type of work:</b>	n = 53 (%)
Professional	23 (43.4)
Employee	15 (28.3)
Worker	13 (24.5)
Merchant	2 (3.8)
<b>Family income/month:</b>	
More than enough	89 (29.1)
Just enough	170 (55.6)
Not enough	47 (15.4)

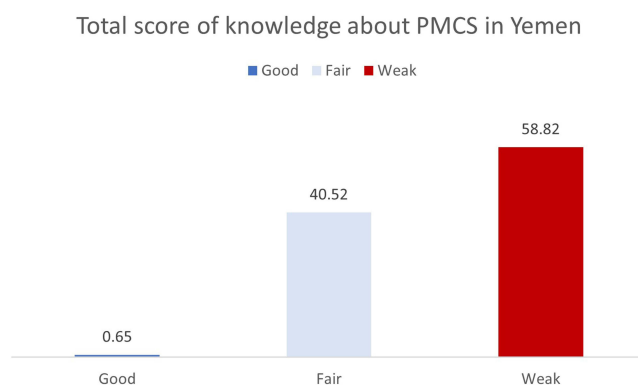
**Abbreviation:** n, number.

**Table 2** Respondents Knowledge About Premarital Counseling and Screening

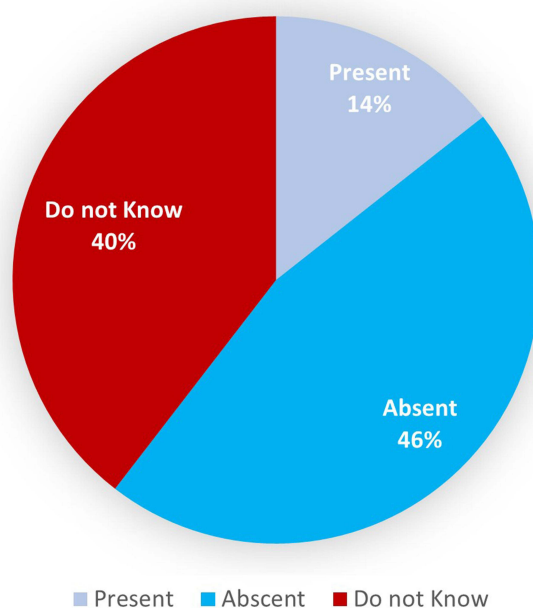
Knowledge About PMCS	Correct	Incomplete	Incorrect
	n (%)	n (%)	n (%)
Definition	159 (52.0)	0 (0)	147 (48.0)
Target population	8 (2.6)	256 (83.7)	42 (13.7)
Community reasons for establishing PMCS	7 (2.3)	245 (80.1)	54 (17.7)
Importance	6 (2.0)	164 (53.6)	136 (44.4)
Health consequences of consanguineous marriage	2 (0.7)	168 (54.9)	136 (44.4)
Components	4 (1.3)	48 (15.7)	254 (83.0)
Laboratory investigations	0 (0)	99 (32.4)	207 (67.7)
Place providing PMCS	38 (12.4)	0 (0)	268 (87.6)
Service providers	5 (1.6)	185 (60.5)	116 (37.9)
Genetic diseases	11 (3.6)	170 (55.6)	125 (40.9)
Sexually transmitted diseases	3 (1.0)	177 (57.9)	126 (41.2)

## Attitudes Towards Premarital Counseling and Screening

Table 3 shows that the majority of the respondents had a positive attitude towards the necessity of going for treatment if they had a family history of diseases and that every couple should go for PMCS (85.62% and 81.37%, respectively). Details of the findings regarding attitudes towards premarital counseling and screening are presented below.



**Figure 1** Percent distribution of students according to their total score of knowledge about PMCS in Yemen.



**Figure 2** Percent distribution of students according to their knowledge about presence of PMCS law in Yemen.

## Relationship Between Total Score of Knowledge About PMCS and Socio-Demographic Characteristics

The study findings revealed that only gender, academic year, and engagement status had a significant relationship with knowledge of the PMCS, the randomization used to select the participants confirm the elimination of the confounding

**Table 3** Students Attitudes Towards Premarital Counseling and Screening

Attitudes Towards Premarital Counseling and Screening	Agree	Not Sure	Disagree
	n (%)	n (%)	n (%)
I am ready to attend lectures about PMCS	202 (66.0)	69 (22.6)	35 (11.4)
PMCS should be integrated into university curriculum	231 (75.5)	52 (17.0)	23 (7.5)
I am ready to go for PMCS	208 (68.0)	62 (20.3)	36 (11.8)
It is necessary to go for treatment if I have family history of diseases	262 (85.6)	30 (10.0)	14 (4.6)

(Continued)

**Table 3** (Continued).

Attitudes Towards Premarital Counseling and Screening	Agree	Not Sure	Disagree
	n (%)	n (%)	n (%)
Every couple should go for PMCS	249 (81.4)	39 (12.8)	18 (5.9)
I prefer that PMCS should be obligatory	164 (53.6)	64 (21.0)	78 (25.5)
I prefer marriage after doing PMCS	240 (78.4)	45 (14.7)	21 (6.9)
PMCS should not be integrated into secondary school curriculum	48 (15.7)	72 (23.5)	186 (60.8)
Couple should not be frank with each other if one of them has family history of diseases	65 (21.2)	40 (13.1)	201 (65.7)
Couple's separation is preferred if one of them has family history of diseases	149 (48.7)	98 (32.0)	59 (19.3)
PMCS is wasting of time	28 (9.2)	51 (16.7)	227 (74.2)
PMCS affects family reputation	32 (10.5)	69 (22.6)	205 (67.0)
I prefer marriage without doing PMCS	34 (11.1)	62 (20.3)	210 (68.6)
Family usually refuses PMCS	68 (22.2)	144 (47.1)	94 (30.7)

factors affecting these relationships. Details of the results are presented in Table 4. The total score of knowledge was significantly correlated with female ( $p<0.001$ ), third academic level ( $p<0.010$ ), and those who are not engaged ( $p<0.001$ ).

Figure 3 shows the sources of information among students who participated in the study mentioned that their sources of information about the PMCS were family and relatives (40.85%) followed by mass media (33.99%) and doctors (24.18%) while schoolteachers were mentioned by only (0.33%) of students.

## Discussion

This study investigated the knowledge and attitudes of Yemeni secondary school students regarding PMCS in Taiz, Yemen. The findings showed that the students have weak awareness and positive attitudes about the PMCS. However, in contrast to several studies in the literature,<sup>29</sup> this study revealed weak knowledge about the importance of the PMCS.

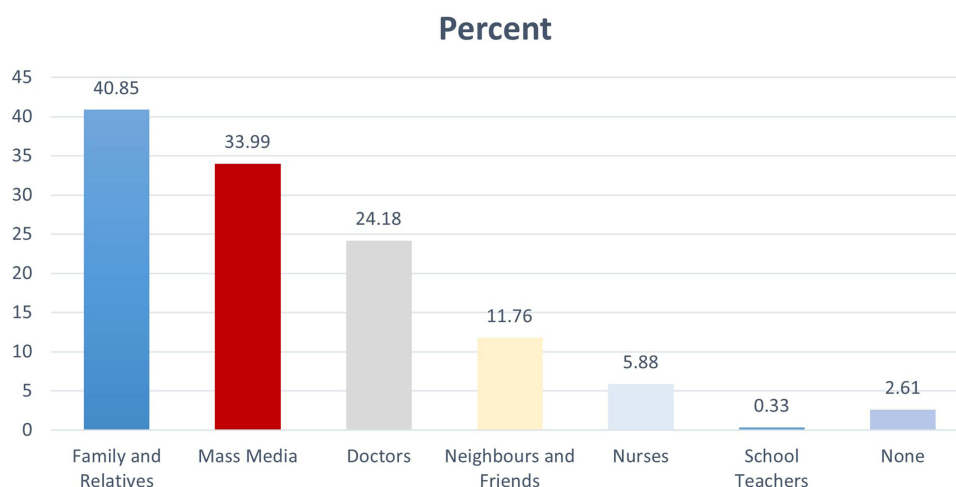
**Table 4** Relationship Between Total Score of Knowledge About PMCS and Socio-Demographic Characteristics

Students' Socio-Demographic Characteristics	Total Score of Knowledge About PMCS			Total n (%)	F/ $\chi^2$ (P)
	Good n (%)	Fair n (%)	Weak n (%)		
Age (years):					
Middle adolescence (15–17)	2 (1.0)	73 (36.9)	123 (62.1)	198 (100)	4.104
Late adolescence(18–19)	0 (0)	45 (47.9)	49 (52.1)	94 (100)	–0.392
Adult (20–22)	0 (0)	6 (42.9)	8 (57.1)	14 (100)	
Sex:					
Female	2 (1.3)	79 (51.6)	72 (47.1)	153 (100)	18.523
Male	0 (0)	45 (29.4)	108 (70.6)	153 (100)	(<0.001)*
Academic year:					13.23
First	0 (0)	30 (29.4)	72 (70.6)	102 (100)	(0.010)*
Second	0 (0)	44 (43.1)	58 (56.9)	102 (100)	
Third	2 (2.0)	50 (49.0)	50 (49.0)	102 (100)	
Marital status:					6.8
Single	2 (0.7)	115 (39.1)	177 (60.2)	294 (100)	(–0.147)
Married	0 (0)	7 (70.0)	3 (30.0)	10 (100)	
Divorced	0 (0)	2 (100)	0 (0)	2 (100)	
Engagement status:	(n=2)	(n=115)	(n=177)	(n=294)	
Engaged	2 (5.3)	19 (50.0)	17 (44.8)	38 (100)	16.53
Not engaged	0 (0)	96 (37.5)	160 (62.5)	256 (100)	(0.001)*

Note: \*Significant.

Abbreviations: n, number; %, Percent.





**Figure 3** Percent distribution of students according to their source of information about PMCS in Yemen.

Additionally, more than three-quarters of the respondents did not know where the service was provided. Another study conducted in Yemen reported similar findings.<sup>34</sup> Knowledge of the components of the PMCS was weak. Furthermore, the findings reported in other Arab countries<sup>8,32,35</sup> have shown more awareness, for instance, in Saudi Arabia, where more knowledge was identified, where higher educational levels and a strong health system were established in comparison to Yemen. In addition, while more than three-quarters of the participants in a study conducted in Saudi Arabia showed reasonable knowledge of the health consequences of consanguineous marriage,<sup>36</sup> less than half of the respondents in the current study showed the same. The weakness of knowledge and low awareness of Yemeni students regarding the PMCS may be explained by the structural barriers, lack of public health initiatives, or even cultural taboos in Yemen. Furthermore, a systematic review conducted by Dilli et al, on premarital screening for sickle cell traits in Africa showed that the uptake of the screening was good, and it is significantly linked with participants awareness about the disease.<sup>37</sup>

The results of this study revealed that participants' attitudes towards the PMCS were generally positive. This finding is consistent with results reported in several studies conducted in other Arab countries.<sup>35,38–40</sup> However, the respondents showed negative attitude towards “couple's separation if one of them has family history of diseases. This attitude, which does not favor couples” separation if one of them has a family history of disease, is common in Arab communities.<sup>8,41</sup> Several factors could be potential causes of this negative attitude. Although religion appears to be a major factor, as mentioned in several studies, there may also be other financial and cultural barriers.<sup>22,38,42</sup>

Participants in the current study revealed that their major sources of information about the PMCS were family and relatives, while schoolteachers were the least. Interestingly, another study conducted in Yemen reported contradictory findings, with schools and universities representing sources of information for more than two-thirds of study participants.<sup>34</sup> However, other studies have reported similar findings to the current study.<sup>43,44</sup> The absence of schoolteachers as a source of information about the topic could be justified by cultural or religious factors within the Yemeni culture. This is because the discussion of topics related to sexual or reproductive health could be sensitive, so schoolteachers avoid discussing such topics.

Ethical considerations may also contribute to schoolteachers' reluctance to provide information about the PMCS. Teachers may feel unequipped or morally conflicted about discussing sensitive health matters with students, particularly if they perceive such discussions as encroaching on parental or cultural responsibility. This could be noticed in culture such in Yemen where discussing such topic is very sensitive. However, the challenges associated with the implementation of PMCS in Arab countries, the imposition of PMCS laws in countries like Bahrain, Palestine, UAE, Saudi Arabia lead to achieve positive outcomes.<sup>45</sup>

This study revealed that females had significantly higher knowledge of PMCS than males. Another study conducted in Yemen reported similar finding.<sup>46</sup> This finding is supported by other studies conducted in the Gulf region and elsewhere.<sup>24,47–49</sup> Differences in knowledge between males and females could be attributed to cultural factors, as females



in several communities tend to be more knowledgeable about marriage-related matters.<sup>39</sup> In addition, this can be explained that women worry more about the existence of life-lasting diseases in children, as this negatively impacts their quality of life.<sup>47</sup> However, contradictory findings have also been reported, with males more knowledgeable about PMCS than females.<sup>50</sup>

Although several studies in the literature failed to report a statistical association between respondents' characteristics and their level of knowledge about PMCS,<sup>8,34</sup> this was observed in this study. Final-year students were reported to have more knowledge about the PMCS than those in their first or second years. This finding is supported by a study conducted in Qatar, which documented similar results.<sup>49</sup> In addition, there was a significant difference between engaged and non-engaged students who were more knowledgeable about the PMCS than those who were not. A study conducted in Saudi Arabia reported similar finding.<sup>51</sup> This may be because those engaged or married are assumed to have better experience with this matter.

However, this study reported significant findings that reflected the situation such as conducting the study in very sensitive community among large number of students. It has several limitations. The social desirability bias, where individuals responded in a way to show their adherence to the ideal situation, may be a concern. This study investigated the sensitivity of a PMCS using a quantitative approach. It would be valuable if qualitative methods were used to identify the related beliefs and perceptions of communities. This study had a cross-sectional design, which limits the opportunity for longitudinal monitoring of such sensitive behavior. Further research using a longitudinal design and a larger sample size all over the country and to assess the effectiveness of educational interventions are recommended to identify the hidden factors related to PMCS in Yemen. It is also recommended that interventional studies to investigate how public health campaigns could help to improve knowledge about PMCS.

## Conclusion

Overall, poor knowledge of the PMCS was identified, especially among junior students. It also showed that the students in Taiz, Yemen have positive attitudes towards various aspects of premarital screening and counseling. Knowledge deficits were linked to male students, younger academic years, non-engagement, and family history of disease.

The observed low contribution of schoolteachers as a source of information could be considered as guiding information to encourage policymakers to improve their knowledge about PMCS. The introduction of PMCS in schools' curricula could be an effective strategy to improve the knowledge of PMCS and the consequences of consanguineous marriage at the initial stages of life. Improving youth knowledge and skills regarding the risks associated with consanguineous marriage and the importance of PMCS are essential to empower individuals' health and to have a healthy productive life.

## Informed Consent Statement

This study was approved by the Ethics Committee of Research, Faculty of Medicine and Health Sciences, Taiz University. The study was conducted in accordance with the local legislation and institutional requirements. Written informed consent was obtained from the participants' legal guardians and their next of kin.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

The authors declared that there was no potential conflicts of interest.

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