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Sexual and reproductive health knowledge, attitudes and practices among adolescents in rural Thatta, Pakistan: a cross-sectional study

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ABSTRACT

Objectives Adolescent Sexual and Reproductive Health encompasses their physical and emotional well-being, including their ability to avoid unwanted pregnancies, unsafe abortions, sexually transmitted infections (STIs) and any type of sexual violence and coercion. However, these risks may be mitigated through improved knowledge, encouraging positive attitudes, and adopting better practices. This study aimed to identify the factors associated with knowledge, attitudes and practices (KAP) related to HIV, STI, family planning and pregnancy among adolescents residing in rural Thatta.

Design A cross-sectional study.

Setting 62 villages from Thatta, Gharo and Jungshahi registered under the Global Network Maternal and Newborn Health Registry in Thatta, Pakistan.

Participants 632 adolescents aged 14–19 years.

Outcome measures The association between sociodemographic factors and KAP was assessed using a modified version of the 'Asking Young People about Sexual and Reproductive Behaviors' tool. Statistical analysis was performed on Stata V.15.0 using multiple linear regression.

Results Among 632 adolescents, 82.7% were females. No significant differences were found in mean scores of knowledge and attitudes between males and females. However, a difference of 0.13 (95% CI 0.005, 0.24) in practice scores was observed. In design-based multivariable analysis, adolescents' marital status (β 5.13; 95% CI 1.34, 8.91) and father's occupation (β 3.41; 95% CI 0.90, 5.93) were associated with knowledge. Marital status (β 1.34; 95% CI 0.82, 1.86), household income (β −2.36; 95% CI −4.64, −0.07), father's occupation (β −1.42; 95% CI −2.52, −0.33) and mother's education (β −1.41; 95% CI −2.71, −0.11) were associated with attitudes. Moreover, marital status (β 0.24; 95% CI 0.06, 0.41) and mother's occupation (β 0.64; 95% CI 0.38, 0.90) were associated with practices.

Conclusion No differences in knowledge and attitudes between male and female adolescents were found. These findings suggest that community awareness programmes should be implemented to improve sexual and reproductive health KAP for both male and female adolescents in Thatta.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study's questionnaire underwent content validation to assess its appropriateness, relevance and clarity.
⇒ Face validation was performed to assess the clarity of the questionnaire.
⇒ The use of multistage cluster sampling enabled the study to capture a wide range of characteristics.
⇒ Reliance on self-reported data may have led to under-reporting, especially on sensitive topics like sexual and reproductive health.
⇒ The study had an imbalance, with a higher proportion of female participants due to the timing of data collection.

INTRODUCTION

The Sustainable Development Goals are directed towards uplifting the global health of the population and one of these goals focuses on enhancing Adolescent Sexual and Reproductive Health (ASRH).[1] ASRH refers to 'physical and emotional wellbeing of adolescents. This includes their ability to remain free from unwanted pregnancy, unsafe abortion, Sexually Transmitted Infections (STIs) including Human Immunodeficiency Virus (HIV), and all forms of sexual violence and coercion'.[2 3] Neglecting ASRH presents substantial public health concerns worldwide.[4] Adolescents face various challenges, including early pregnancies, unsafe abortions, sexually transmitted infections (STIs) and HIV.[3] Therefore, addressing these issues is important to safeguard the overall health and well-being of adolescents.

Pregnancy, which occurs in adolescent girls aged 10–19 years, is a widespread issue globally. Approximately 16 million girls in this age group give birth every year.[5] Despite advancements in maternal health on a global scale,[6] adolescent pregnancy remains a prevalent public health concern, especially in developing countries where approximately 19% of

women experience pregnancy before their 18th birthday.[7] In addition to the challenges of teenage pregnancy, the burden of HIV among adolescents remains significant. In 2022, approximately 1.65 million adolescents aged 10–19 were living with HIV. Moreover, gender disparities play a significant role in HIV prevalence with 71% of affected adolescents being girls.[8]

In Pakistan, like many low- and middle-income countries (LMICs), adolescents face difficulties due to cultural restrictions, limited information and restricted access to health services, especially in rural areas.[9] The lack of comprehensive sex education and cultural norms hinder discussions on ASRH between parents and adolescents, leading to misconceptions and limited access to reliable information.[10] Thus, addressing ASRH requires understanding sociodemographic factors influencing adolescent knowledge, attitudes and practices (KAP). Factors such as parental education, sex and limited reliable information sources significantly impact ASRH.[11] Cultural norms, religious beliefs and parents' lack of information about sexual and reproductive health (SRH) further hinder open discussions about ASRH, exacerbating these challenges.[12] Addressing these challenges necessitates a foundation of adequate and accurate knowledge, fostering a favourable attitude and promoting safe practices, which will contribute to significant improvements in ASRH and enhancing the overall well-being of adolescents.

It is very important to target adolescents between 14 and 19 years because they need extra care and vigilance in terms of SRH. Evidence suggested that adolescents aged 14–19 years have a high incidence of STIs, early pregnancies and abortions. Literature suggests that adolescents in Pakistan have a limited understanding of SRH.[13] In Pakistan, there is generally little to no teaching in schools regarding SRH-related issues. Young people primarily acquire information from media, peers and to some extent, parents, with girls, often receiving information from their mothers. However, parents are typically uncomfortable discussing topics related to sexuality and biological changes due to their own limited knowledge.[14] Approximately 44% of young women from middle-income families in Karachi reported a lack of information about reproductive organs and normal physiology.[15] Additionally, young people have also been found to be critical of the quality of information they receive[16] and reported health staff as 'unwelcoming' and 'not competent' when addressing their concerns related to SRH.[17] A study conducted in Pakistan on life skills-based education, indicated that one of the major challenges in providing SRH education in Pakistan includes strong cultural and religious resistance against discussing and teaching matters related to sexuality and bodily development. These factors play a significant role in shaping adolescents' knowledge and attitudes towards SRH.[14] In addition to this, adolescents residing in rural areas are more vulnerable to indulging in unsafe practices related to SRH, and neglecting their reproductive needs.[18] The disparity becomes more pronounced when considering differences between males and females.[19] These disparities directly affect the empowerment of adolescents in making effective decisions.[19] The foremost step to make the adolescent population of rural areas empowered, it is important to uplift their knowledge related to SRH which will subsequently affect their attitudes and practices towards ASRH. Thus, this study aimed to identify the mean score and factors associated with KAP related to HIV, STI, family planning and pregnancy among adolescents in rural areas of district Thatta, Sindh. This study serves the purpose of identifying the knowledge gaps related to ASRH. It provided valuable evidence for proposing educational interventions to enhance adolescents' knowledge and empower them to make informed decisions.

METHODOLOGY

Study design and setting

The study was an analytical cross-sectional study and a population-based representative sample was drawn from selected villages registered under the Global Network Maternal and Newborn Health Registry (MNHR) in Thatta, Pakistan. Thatta is a district located in the Sindh province of Pakistan and consists of several subdivisions or regions. For this study, we included only three subdivisions—Thatta, Gharo and Jungshahi—within the Thatta district. The term 'rural' is used because all three regions included in our study are classified as rural areas within the Thatta district. The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology.

Study participants and eligibility

Adolescents between 14 and 19 years residing in households of selected villages registered under MNHR were included in the study. However, adolescents with cognitive or intellectual impairments, those below 18 years whose parents were deaf, blind or had any psychiatric illness were excluded. Additionally, households that were locked or households where eligible adolescents were not present at the time of the initial visit were revisited on the same day before being excluded from the study.

Sampling strategy

A multistage cluster sampling method was employed. There were a total of 104 clusters (villages) within Thatta, Jungshahi and Gharo regions. Through systematic sampling, 62 clusters were selected based on a calculated kth value of 2 (104/62) and served as a primary sampling unit. Each cluster comprised a minimum of 58 households. Through systematic sampling, approximately 10 households from each cluster were selected based on the calculated kth value of 6 (58 households per cluster/10 households) and selected households served as a secondary unit. The survey began at the village centre, determining the first street's direction with a spun bottle. If the end of the street was reached, the

survey team turned right, adhering to the right-hand rule and continued into the next street or lane. Adolescents within households served as elements or tertiary sampling units in our study. If there was more than one adolescent between 14 and 19 years in one house, only one adolescent was chosen randomly through the lottery method. The data collection was carried out from May to June 2023.

Data collection

In this study, KAP were considered as outcome variables which were measured with the help of Asking Young People about Sexual and Reproductive Behavior tool,[20] with participant responses treated as continuous variables. The English questionnaire was carefully translated into Sindhi to maintain the accuracy of conceptual questions, and an expert reviewed the translation for accuracy. Additionally, back translation was conducted to ensure the original meaning and intent were preserved. Modified version of the tool (online supplemental file 1) comprised a total of 35 questions and had 4 sections as follows:

Section 1: sociodemographic information.

Section 2: knowledge related to HIV, STI, family planning and adolescent pregnancy.

This section consisted of twenty-seven questions. Among these, eight had 'yes' or 'no' choice, with one score for the correct answer. Six questions were in a 'true' or 'false' format; two of these required reverse coding, and a correct answer was scored as one. Additionally, two questions used a Likert scale with scores ranging from 0 to 3. Six more questions used a Likert scale, but with scores ranging from 0 to 2. The remaining five questions were in an 'agree' or 'disagree' format, with one score given for the correct response.

Section 3: attitude related to HIV, STI, family planning and adolescent pregnancy.

There were a total of seven questions in the attitude section. Two questions were in the form of Likert scale, where the score ranged from 0 to 5. Another two questions used a Likert scale with a score range from 0 to 2. For the remaining three questions, each correct answer was assigned a score of 1.

Section 4: practices related to HIV, STI, family planning and adolescent pregnancy.

In this section, there were a total of five questions. Four were in 'yes' or 'no' format, where a score of 1 was assigned for a correct response. The remaining question used a Likert scale with score range from 1 to 4.

The modified tool underwent content validation by a panel of eight experts including subject matter experts, epidemiologists and biostatisticians, and demonstrated high relevance (0.97) and clarity (0.96) based on Content Validity Index for Scale (S-CVI/Ave) method. The Universal Agreement (S-CVI/UA) method revealed a relevance of 0.90 and clarity of 0.82. Face validation using the S-CVI/Ave and S-CVI/UA method also confirmed the questionnaires' high clarity at a score of 1.

Operational definitions

Knowledge

Knowledge referred to adolescents' awareness and understanding of HIV, STIs, family planning and pregnancy. There were a total of 27 items, and scores ranged from 0 to 35. As adolescents' scores in knowledge increase, their understanding of HIV, STIs, family planning and adolescent pregnancy improves.

Attitudes

Attitude referred to the adolescents' feelings, and behavioural intentions regarding HIV, STIs, family planning and adolescent pregnancy. It consisted of seven items, and scores ranged from 0 to 17. As the adolescents' score in the attitudes increases, their attitudes improve.

Practices

Practices referred to actions and activities that adolescents engage in SRH well-being including STI screening, contraceptive use and parent-adolescent communication. It consisted of five questions, with scores ranging from 0 to 6 where a higher score indicates better practices related to ASRH.

Sample size

A total of 632 adolescents participated in the study. The sample size was calculated using OpenEpi to achieve 80% power for detecting a mean difference of 2, with an SD of 6.11 for females and 6.12 for males, significance level of 5% and a design effect of 1.25 were assumed. The final sample was adjusted to account for a 10% non-response rate.

Statistical analysis

A complex data analysis approach was employed after using sampling weights and clusters. The weights were computed using formula.

$$W=NM/nm$$

For age, mean and SD were computed and for the adolescent's level of education, mother's education level, father's education level, household income, mother's occupation and father's occupation, percentages were computed. A t-test for two independent samples was used to compute mean difference of knowledge, attitude and practice scores, along with 95% CI, stratified on sex. Design-based univariate analysis was conducted for all the independent variables, using simple linear regression to compute unadjusted β coefficients along with 95% CIs. The cut-off for the univariate analysis was 0.25.[21] All the independent variables that were eligible at univariate level were checked for multicollinearity. Adjusted β coefficients along with 95% CIs were reported using multivariable analysis. A p value of less than 0.05 was treated as statistically significant. Interaction between sex and education level of adolescents was checked at p value <0.10. All analysis was carried out in STATA V.15.0.

Patient and public involvement

None.

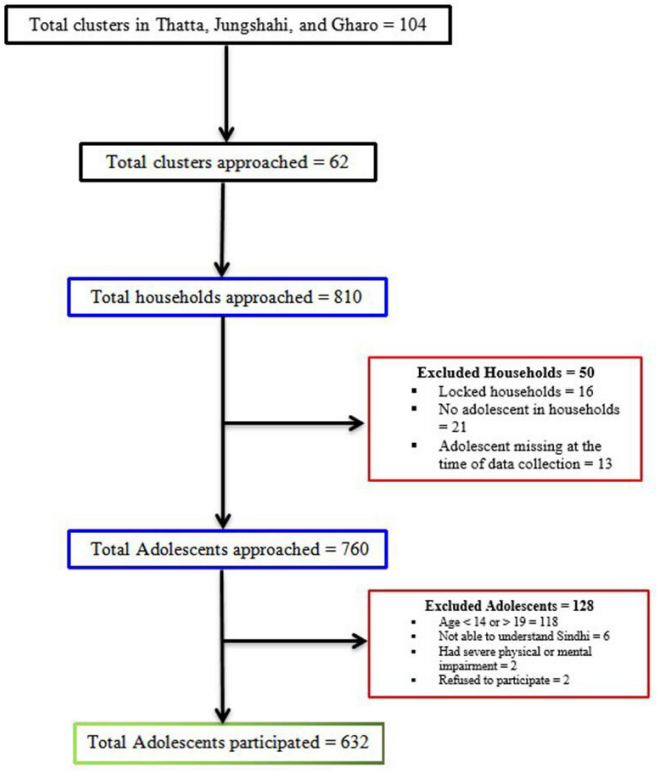

Figure 1 Participant's selection in the study conducted in rural Thatta from May 2023 to June 2023.

RESULTS

Out of the 760 adolescents approached to participate in the study, 632 completed the survey, resulting in a response rate of 83.15%. Within this sample, 82.7% were female, and 17.2% were male (see figure 1).

Table 1 summarises the percentage distribution of adolescents, parental and sociodemographic characteristics by sex. Among male adolescents, 96.3% were single, and among females, 87.4% were single. The mean age of adolescents enrolled in this study was 17.3±1.7. Among the total male adolescents surveyed, more than half, 54.1%, had attended school. In contrast, among total female participants, only 40.5% attended school, indicating a lower attendance rate than their male counterparts. A total of 92.4% of adolescents' mothers had no formal education, 4.3% had primary education, while 3.3% had secondary education and above. In the father's education level, a total of 66.3% of adolescents' fathers had no formal education, 11.4% had primary education, 4.8% had middle education, 10.4% of participants' fathers attained secondary education and 7.1% had higher education and above. There were 95.4% adolescents who spoke Sindhi, followed by 3.0% Urdu speaking, 1.4% Punjabi and 0.2% others.

Difference in mean scores of KAP

There was no significant difference in mean scores of knowledge (mean difference 0.51; 95% CI −1.06, 2.11) and attitudes (mean difference 0.29; 95% CI −0.19, 0.79) between males and females. Both males and females demonstrated similar levels of knowledge and attitudes. However, a mean difference of 0.13 (95% CI 0.005, 0.24) was observed in practice which showed that males had slightly higher mean practice scores (mean 1.35; 95% CI 1.22, 1.48) compared with females (mean 1.22; 95% CI 1.18, 1.27).

Factors associated with knowledge

Marital status and father's occupation were significant predictors of knowledge related to HIV, STI, family planning and adolescent pregnancy. Age and education level of adolescents were included in the model even though they were not statistically significant, because of their potential impact on knowledge (see table 2). A significant interaction was found between sex and education level of adolescents, which indicated that male adolescents who had secondary education, the estimated mean knowledge score related to HIV, STI, family planning and adolescent pregnancy was 6.89 units higher compared with female adolescents with no formal education.

Factors associated with attitudes

Household income, marital status, father's occupation and mother's education were significant factors for predicting adolescents' attitude. Despite the age and education level of adolescents not being statistically significant, they were kept in the model due to their potential impact on attitudes, as shown in table 3. A significant interaction was also found between sex and education level of adolescents, which indicated that among male adolescents who had primary education, the estimated mean attitude score related to HIV, STI, family planning and adolescent pregnancy was 1.60 units less compared with female adolescents with no formal education.

Factors associated with practices

Marital status and mother's occupation were significant factors associated with adolescents' practice. Although age and education level of the adolescents were not statistically significant, they were kept in the multivariable model due to their potential influence on practices, shown in table 4. A significant interaction was also identified between sex and education level of the adolescents, which indicated that, among male adolescents who had secondary education, the estimated mean practice score related to HIV, STI, family planning and adolescent pregnancy was 0.52 units higher compared with female adolescents with no formal education.

DISCUSSION

This study identified factors associated with KAP related to HIV, STI, family planning and pregnancy among adolescents aged 14–19 years in rural Thatta. The main finding of this study included no significant difference in the mean scores of knowledge and attitudes between males and females. This finding is consistent with a previous study conducted among adolescents attending

Table 1 Percentage distribution of adolescents, parental and sociodemographic characteristics stratified by sex in rural Thatta from May 2023 to June 2023

Characteristics	Overall %	Male %	Female %	P value
Age				
Mean (SD)	17.3 (1.7)	17.5 (1.6)	17.2 (1.7)	0.08
Educational level of adolescents				0.08
No education	57.1	45.9	59.5	
Primary	18.3	19.3	18.1	
Middle education	9.2	11.0	8.8	
Secondary education	11.5	19.3	9.9	
Higher secondary education and above	3.8	4.6	3.6	
Type of school				0.40
Government	96.3	94.9	96.7	
Private	3.7	5.1	3.3	
Working status of adolescents				<0.001
Yes	9.8	43.1	2.9	
No	90.2	56.8	97.1	
Adolescents' occupation				<0.001
Labour and fishery	40.3	48.9	13.3	
Protective services	3.2	4.3	0	
Skilled	24.2	4.3	86.7	
Business	32.3	42.6	0	
Mother's occupation				0.26
House maker	87.0	90.8	86.2	
Sanitation worker	2.5	0.9	2.9	
Skilled worker	5.9	2.8	6.5	
Others	4.6	5.5	4.4	
Father's occupation				0.28
Labour	54.9	62.4	53.4	
Agriculture and fishery	6.8	4.6	7.3	
Driver	6.0	4.6	6.3	
Skilled worker	5.9	1.8	6.7	
Service provider	5.4	4.6	5.5	
Business	6.5	4.6	6.9	
Professional	12.5	16.5	11.7	
Others	2.1	0.9	2.3	
Family system				0.20
Nuclear family	97.3	95.4	97.7	
Extended family	2.7	4.6	2.3	
Household income				0.32
5000–20 000	70.6	66.9	71.3	
21 000–40 000	28.2	33.0	27.2	
41 000 and above	1.3	0	1.5	

Categorical variables were tested using Pearson's χ^2, and continuous variables were tested using t-test for two independent samples. P value <0.05.

Table 2 Adjusted β coefficients with 95% CI for factors predicting knowledge related to HIV, sexually transmitted infection, family planning and pregnancy among adolescents (aged 14–19 years) in rural Thatta

Factors	Adjusted β coefficient (95% CI)
Marital status	
Single	Ref
Married	5.13 (1.34, 8.91)
Father's occupation	
Labour	Ref
Agriculture and fishery	0.34 (–2.28, 2.96)
Driver	0.84 (–2.93, 4.61)
Skilled worker	–2.98 (–5.54, 0.43)
Service provider	3.41 (0.90, 5.93)
Business	–1.02 (–2.97, 0.93)
Professional	–1.34 (–3.51, 0.82)
Other	0.12 (–2.66, 2.89)
Age	0.20 (–0.21, 0.61)
Sex and education level of adolescents	
Female with no formal education	Ref
Female with primary education	–1.04 (–2.90, 0.81)
Female with middle education	–1.13 (–3.08, 0.82)
Female with secondary education	–1.64 (–3.95, 0.67)
Female with higher secondary and above	2.40 (–0.55, 5.36)
Male with no formal education	–1.35 (–3.50, 0.81)
Male with primary education	1.98 (–2.08, 6.04)
Male with middle education	4.66 (0.12, 9.20)
Male with secondary education	6.89 (2.23, 11.54)
Male with higher secondary and above	3.48 (–2.67, 9.63)

P value <0.05 was used.

Table 3 Adjusted β coefficients with 95% CI for factors predicting attitude related to HIV, sexually transmitted infection, family planning and pregnancy among adolescents (aged 14–19 years) in rural Thatta

Factors	Adjusted β coefficient (95% CI)
Household income	
5000–20 000	Ref
21 000–40 000	–1.01 (–1.74, 0.29)
41 000 and above	–2.36 (–4.64, 0.07)
Marital status	
Single	Ref
Married	1.34 (0.82, 1.86)
Father's occupation	
Labour	Ref
Agriculture and fishery	–0.95 (–1.54, 0.35)
Driver	–0.004 (–1.22, 1.21)
Skilled worker	–1.42 (–2.52, 0.33)
Service provider	–1.24 (–2.64, 0.15)
Business	–0.07 (–0.76, 0.61)
Professional	0.77 (–0.07, 1.62)
Other	–0.44 (–1.77, 0.89)
Mother's education level	
No education	Ref
Primary education	0.02 (–0.71, 0.75)
Secondary education	–1.41 (–2.71, 0.11)
Age	0.03 (–0.11, 0.16)
Sex and education level of adolescents	
Female with no formal education	Ref
Female with primary education	0.63 (0.07, 1.18)
Female with middle education	0.36 (–0.46, 1.19)
Female with secondary education	0.49 (–0.35, 1.33)
Female with higher secondary and above	0.55 (–0.69, 1.79)
Male with no formal education	0.69 (0.04, 1.35)
Male with primary education	–1.60 (–3.08, 0.13)
Male with middle education	0.44 (–0.89, 1.77)
Male with secondary education	–0.71 (–2.19, 0.77)
Male with higher secondary and above	–1.66 (–4.63, 1.31)

P value <0.05 was used.

secondary schools in Asmara, Eritrea, where no significant disparity in knowledge was observed between males and females.[22] However, our results are contrary to a study conducted in Yemen, where males exhibited higher scores of knowledge than females.[23] Similarly, a study conducted in 20 villages of Lahore reported that males had relatively higher knowledge than females regarding pregnancy (M=55%, F=43%), family planning (M=62%, F=50%) and STIs (M=56%, F=44%).[24] In addition to this, a study conducted in eight Colombian schools found that females generally have more knowledge regarding contraceptive methods, while males believe that family planning is solely their partner's responsibility.[25] This variation in knowledge could be attributed to the distribution of male and female participants in this study. In our study, female participants were more compared with males. This imbalanced sex representation may have influenced the findings.

In this study, we observed a difference in practices between male and female participants. Males demonstrated slightly higher mean practice scores compared with females. This finding aligns with a cross-sectional survey of 11 651 unmarried adolescent boys and girls aged 15–19 years in two large states of India, which revealed a significant association between boys and seeking treatment compared with girls.[26] One possible explanation

Table 4 Adjusted β coefficients with 95% CI for factors predicting practices related to HIV, sexually transmitted infection, family planning and pregnancy among adolescents (aged 14–19 years) in rural Thatta

Factors	Adjusted β coefficient (95% CI)
Marital status	
Single	Ref
Married	0.24 (0.06, 0.41)
Mother's occupation	
Home maker	Ref
Sanitation worker	0.64 (0.38, 0.90)
Skilled worker	−0.06 (−0.22, 0.08)
Other	−0.09 (−0.34, 0.15)
Age	0.002 (−0.02, 0.03)
Sex and education level of adolescents	
Female with no formal education	Ref
Female with primary education	−0.12 (−0.25, 0.02)
Female with middle education	0.18 (−0.05, 0.42)
Female with secondary education female with	−0.19 (−0.33, 0.05)
Higher secondary and above	0.07 (−0.22, 0.37)
Male with no formal education	0.04 (−0.14, 0.22)
Male with primary education	0.22 (−0.29, 0.73)
Male with middle education	−0.34 (−0.68, 0.01)
Male with secondary education	0.52 (0.22, 0.82)
Male with higher secondary and above	0.52 (−0.48, 1.51)

P value <0.05 was used.

for this disparity in practices could be due to social stigma. Adolescent girls face social stigma when seeking healthcare services, especially related to reproductive health if they are unmarried. These stigmas discourage them from accessing services independently. Moreover, limited knowledge about healthcare services and their accessibility, barriers to obtaining information, minimal family support and significant economic barriers hinder the acquisition of family planning.[24] Economic factors and limited resources can further exacerbate gender disparities. In Pakistan, access to finances and independent decision-making differs between males and females, particularly in rural areas,[27] impacting the ability to seek timely and appropriate healthcare services, which creates a significant barrier for female adolescents in rural areas.

In our study, the marital status of adolescents was significantly associated with KAP. Our finding contrasts with a community-based study on knowledge and attitudes of reproductive health, conducted in Jimma town, Southwest Ethiopia, among adolescents aged 15–19 years. That study revealed an inverse association with marital status, where never-married adolescents had a higher mean score of knowledge and attitude than ever-married adolescents.[28] However, our findings were consistent with a study conducted in Yemen which reported that married adolescents had more knowledge about family planning methods than singles.[23] Additionally, another study conducted among college students in Northwest Ethiopia reported that married adolescents were 1.34 times more knowledgeable compared with singles.[29] The possible explanation of our findings could be that marital status influences the level of exposure and access to reproductive health information and services without social stigma and constraints. Married adolescents may have greater access to family planning services and educational resources related to sexual health, which could contribute to their improved knowledge, more positive attitudes and better practices. In contrast, unmarried adolescents face significant societal, religious, parental and cultural barriers that hinder open discussions about their SRH rights.[30] In many rural communities of Pakistan, discussions surrounding SRH are considered taboo, especially for unmarried individuals, reflecting deeply rooted cultural norms. Additionally, there are prevalent misconceptions among LMICs that unmarried adolescents are too young to seek or benefit from SRH-related information and services.[31] Such misconceptions, combined with cultural stigma, play a crucial role in shaping adolescents' SRH KAP in Pakistan.

In our study, household income was negatively associated with adolescents' attitudes. This contradicts the results reported in a study conducted in Dhaka South City, where male adolescents aged 13–19 years showed a significant positive association between monthly family income and attitudes related to SRH.[32] The contrasting association between household income and adolescent attitude could be due to differences in study setting and cultural contexts. In rural areas, higher household income might not necessarily lead to open discussions or progressive attitudes related to SRH. In addition to this, higher household incomes often have easier access to various forms of media, including internet and mobile phones. In today's digital era, adolescents from high-income families are more likely to have personal mobile phones and unrestricted internet access which not only provide valuable information but also expose them to a wide range of content which might portray SRH in an unfavourable manner thus affecting their attitudes.[32]

Interestingly, our study highlighted effect modification between sex and the education level of adolescents in KAP. It revealed that males with secondary education level had more knowledge and positive practice compared with females with no formal education. The possible reason for this finding could be sex disparity in education opportunities and resources. In rural areas, access to formal education and educational resources significantly differs between males and females. Families often constrained by limited resources, prioritise the education of male children due to perceived future economic contributions.[33] This increased educational

access enhances their knowledge, subsequently leading to more positive practices. However, in our study, males with primary education level exhibited lower mean scores of attitudes compared with females with no formal education. This unique finding could be attributed to the role of chance or to the nature of the questions in the attitude section where a significant portion of the items were on communication with parents, and the preferred group for discussing SRH matters. It is likely that male adolescents in the rural areas discuss less with their parents due to cultural and societal norms leading to their negative attitudes. Whereas females, despite lacking formal education, often feel more comfortable discussing SRH matters with their mothers.[34 35] Supporting this, a mixed-method study conducted in eight Colombian schools found that parent-child dialogue about sex education was associated with adequate knowledge or attitudes towards family planning.[25] Thus, our findings highlight the critical need to create a supportive and non-judgmental environment at home where adolescents both males and females feel secure to express their concerns and seek guidance, ultimately empowering them to make informed decisions regarding their SRH. Literature suggests that there is a taboo where the population largely believes that sex education should exclusively be provided by health professionals, as they are perceived to be more knowledgeable and qualified on these topics.[25] This belief often leads to delays in introducing sex education, resulting in adolescents beginning their sexual life with many uncertainties and misconceptions. Additionally, in the context of Pakistan, especially rural areas, the role of parents in providing sexual education is often minimal due to prevailing cultural and societal norms. There exists a significant taboo where sex education is viewed as a sensitive topic, and discussions about it are often avoided within families. Our findings highlight the urgent need for empowering parents to engage in open and comprehensive discussions with their adolescents about SRH. By addressing these cultural barriers and fostering dialogue, parents can help bridge critical gaps in knowledge, reduce stigma and create an environment where adolescents feel supported and better equipped to make informed decisions about their SRH.

Strengths and limitations

We strengthened our study by conducting content validation to identify the appropriateness, relevance and clarity of the study's questionnaire. Additionally, face validation was performed which was tailored to the 14–19 years age bracket to assess clarity of the questionnaire. Subsequently, pretesting of the study's questionnaire was conducted to identify and clarify any unclear questions. These steps were taken to ensure that the tool was culturally appropriate and could effectively capture the necessary insights. We also used multistage cluster sampling which allowed us to capture a wide range of characteristics in this study. This approach enables us to apply our findings to adolescents between 14 and 19 years in rural areas of Sindh. Additionally, our study's large sample size increases the reliability of our results and increases the study's statistical power. Besides these strengths, our study also had a few limitations. Most of our participants were female, which was attributed to the timing of data collection. Most male adolescents were at work during the data collection hours. To address this limitation in future studies, adjusting the data collection timings or implementing stratified techniques could ensure a more balanced sex representation. Relying on self-reported data was also a limitation as it might lead to underreporting, particularly regarding sensitive topics like SRH. To address this, we ensured participant anonymity and privacy to encourage open and honest responses. In terms of generalisability, the study findings are primarily limited to areas that share similar characteristics to the rural Thatta district.

Conclusion

Our study sheds light on KAP related to SRH among rural Thatta adolescents. We found no disparity in mean scores of knowledge and attitudes between males and females, and only a small difference in mean score of practice. Our study also identified the association of sociodemographic factors with adolescents' KAP. By understanding and addressing the identified factors, health professionals and policymakers can develop culturally sensitive and context-specific educational programmes for adolescents. Our findings underscore the importance of tailored SRH education for schools and communities to address gender norms, overcome social stigma, improve healthcare access and empower adolescents to make informed decisions.

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Ethics approval This study involves human participants and was approved by Ethical Review Committee (ERC) of Aga Khan University Hospital, Karachi (2023-8488-24511). All adolescents provided written assent and informed consent before participation. For participants below 18 years of age, written parental consent was also obtained.

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