

ORIGINAL RESEARCH ARTICLE

Predictors of contraceptive use at first sexual intercourse among adolescent girls in Ratlou local municipality, South Africa

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Boitshwarelo KM. Ngake^{1,2*}, Mluleki Tsawe^{1,2}, Ishmael Kalule-Sabiti¹, Frank Ofosu-Asante³, Kolletsane Motshehare⁴, Stephina K. Mbele⁵, and Leonard Marevhula⁶

Department of Population Studies and Demography, North-West University, Mahikeng Campus, South Africa¹; Population and Health Research Focus Area, Faculty of Humanities, North-West University, Mahikeng Campus, South Africa²; National Population Council, Sekondi, Ghana³; Resurrection Hope Foundation, Mahikeng, South Africa⁴; Pim Trading Enterprise, Mmabatho, South Africa⁵; Department of Mathematical and Computational Science, University of Venda, Thohoyandou, South Africa⁶

***For Correspondence:** Email: Mirriam.Ngake@nwu.ac.za : Phone : 0183892611

Abstract

Adolescent girls are vulnerable to unintended pregnancies, unsafe abortions, and sexually transmitted infections when contraception is not used at sexual debut. Understanding the factors influencing contraceptive use at first sex is important for informing adolescent sexual and reproductive health and rights interventions, especially in rural settings where there is limited evidence. The study adopted a cross-sectional design. The sample of 290 adolescent girls was drawn from nine selected villages in the Ratlou local municipality of South Africa. Bivariate analysis, with a chi-square test, and binary logistic regression were conducted. Overall, 41.0% of adolescent girls reported contraceptive use at first sex. The regression model revealed that secondary education [AOR=0.40], a working household head [AOR=0.47], having first sex at 14-16 [AOR=0.16] and at 17-19 [AOR=0.39], ever use of dual methods of contraception [AOR=0.21], and living in Kraaipan village [AOR=0.18] were associated with lower odds of contraceptive use at first sex. Strengthening school-based sexual and reproductive health and rights education, improving parent-adolescent communication, and ensuring equitable access to youth-friendly services are important for improving contraceptive use at first sexual intercourse among adolescents in Ratlou local municipality. (*Afr J Reprod Health* 2026; 30 [17]: 20-30).

Keywords: adolescent girls, contraceptive use, first sexual intercourse, Ratlou local municipality, Sustainable Development Goals, sexual and reproductive health and rights

Résumé

Les adolescentes sont exposées aux risques de grossesses non désirées, d'avortements à risque et d'infections sexuellement transmissibles lorsqu'elles n'utilisent pas de contraception lors de leurs premiers rapports sexuels. Il est crucial de comprendre les facteurs influençant l'utilisation de la contraception à ce stade pour orienter les interventions en matière de santé et de droits sexuels et reproductifs des adolescents, en particulier dans les zones rurales où les données disponibles sont limitées. L'étude a reposé sur une méthodologie transversale. L'échantillon, composé de 290 adolescentes, a été constitué à partir de neuf villages sélectionnés dans la municipalité locale de Ratlou, en Afrique du Sud. Des analyses bivariées (incluant un test du chi carré) ainsi qu'une régression logistique binaire ont été réalisées. Au total, 41,0 % des adolescentes ont déclaré avoir utilisé une contraception lors de leur premier rapport sexuel. Le modèle de régression a révélé que le fait d'avoir suivi un enseignement secondaire [AOR=0,40], d'avoir un chef de ménage actif [AOR=0,47], d'avoir eu son premier rapport sexuel entre 14 et 16 ans [AOR=0,16] ou entre 17 et 19 ans [AOR=0,39], d'avoir déjà utilisé une double méthode de contraception [AOR=0,21] et de résider dans le village de Kraaipan [AOR=0,18] était associé à une probabilité plus faible d'utilisation de la contraception lors du premier rapport sexuel. Le renforcement de l'éducation à la santé et aux droits sexuels et reproductifs en milieu scolaire, l'amélioration de la communication entre parents et adolescents ainsi que la garantie d'un accès équitable à des services adaptés aux jeunes sont essentiels pour accroître l'utilisation de la contraception lors des premiers rapports sexuels chez les adolescents de la municipalité locale de Ratlou. (*Afr J Reprod Health* 2026; 30 [17]:20-30).

Mots-clés: adolescentes, utilisation de contraceptifs, premier rapport sexuel, municipalité locale de Ratlou, Objectifs de développement durable, santé et droits sexuels et reproductifs

Introduction

Contraceptive use at first sex not only prevents unintended pregnancies and induced abortions, it also plays an important role in lowering the chances of maternal morbidity and mortality.¹ It is predicted that universal access to contraceptive use among adolescents could result in an annual reduction of more than 2,000,000 unplanned births, 31,000,000 and 5,000 maternal deaths every year.² Moreover, the use of contraceptives empowers adolescent girls and young women (AGYW) to make informed choices about the timing of their pregnancies. Adolescent pregnancy remains a global social phenomenon that impacts the sexual and reproductive health and rights (SRHR) and the social and economic well-being of adolescents. According to the World Health Organization³, about 21 million girls aged 15-19 years become pregnant yearly, and half of these pregnancies are unintended. In 2021, it was estimated that sub-Saharan Africa recorded approximately 6.1 million births among adolescents aged 15-19 years and roughly 332,000 births among those aged 10-14 years.³ In South Africa, a study conducted by the United Nations Population Fund (UNFPA) revealed that 3,000 girls, including some as young as 11 years old, were either pregnant or had given birth to one or more children in 2016 in Ratlou local municipality, North-West province.⁴

Despite the growing literature on adolescent contraceptive behaviours, most studies in South Africa and the broader sub-Saharan African region tend to focus on current or ever use and are generally analysed at national or provincial levels.⁵⁻⁹ On the other hand, research on contraceptive use which specifically focuses on first sexual intercourse in rural or village contexts remains limited, yet this early decision point has future consequences for unintended pregnancy and other SRHR outcomes.^{3,5}

This study addresses this gap by analysing the predictors of contraceptive use at first sex among adolescent girls in a predominantly rural municipality and generating context-specific insights to inform youth-friendly SRHR programming in a setting previously flagged for high adolescent births.^{4,10} Studies related to the predictors of contraceptive use at first sex among adolescents highlighted that the age at first sex

plays a significant role in their likelihood of using contraception.^{5,11} Available evidence indicates that adolescents who have their first sexual experience before 15 years of age are less likely to use contraception.^{12,13} Similarly, Lara & Abdo¹⁴ in their review supported this finding, indicating that girls who begin sexual activity at age 14 years or younger are less likely to use contraceptives during their first sexual encounter and may delay starting sexual activity. The experience of early motherhood can also affect the likelihood of using contraception at subsequent sexual encounters due to factors such as fear of stigma, limited autonomy, and economic instability. Hence, age at first birth was also found to be a significant predictor of contraceptive use at first sex.⁵

Other studies explored the interrelationships between socio-economic factors, such as education and work status of the head of the household and contraceptive use at first sex among adolescents. The results of such studies highlighted the positive relationship; thus, adolescents who were educated were more likely to use a contraceptive at their first sex.⁶⁻⁸ Formal education offers opportunities to access information about SRHR, including the importance of using modern contraceptives, helping to dismiss misconceptions about their use.^{8,15} Contraceptive use at first sex was found to be prevalent among adolescents whose head of the household was employed, as they have better access to health resources.^{5,16,17} Moreover, studies by Umoren¹⁸ and Ahinkorah¹⁹ found that higher household income levels led to increased contraceptive awareness and use among adolescents in sub-Saharan Africa. Understanding the factors that influence contraceptive use at first amongst adolescents in Ratlou local municipality may provide the affected departments with a factual basis to develop interventions that aim to promote SRHR among this significant cohort of the population. Moreover, the study aims to contribute to the body of knowledge by filling in the literature gap within the rural setting to attain Sustainable Development Goals (SDGs).²⁰ The SDGs particularly targeted are SDG 3: good health and well-being, related to reducing maternal mortality and ensuring universal access to SRHR-care services and SDG 5: gender equality, aiming to empower AGYW to make informed choices about their reproductive health.²⁰

Methods

Study setting

The study was conducted in Ratlou local municipality, North West province, South Africa. The municipality is one of the five local municipalities in Ngaka Modiri Molema District and is predominantly rural. According to Statistics South Africa²¹, the population of Ratlou local municipality in 2022 was 128,766, the second lowest in Ngaka Modiri Molema district. The majority (57.4%) of the population falls within the economically active age category (15-64 years), followed by children aged 0-14 years, with 35.2% and 7.4% elderly population.²² The mean age in the Ratlou local municipality is 22 years, and female adolescents account for 10% of the population.²¹

Study design

A cross-sectional design was used for the study, with data collected in 2021. The calculated sample size of the study was 530 adolescent girls aged 13-19 years. Participants were identified through multistage sampling; random sampling was used to select seven Wards. Stratified sampling was then used to select 10 villages out of 21 within the selected Wards. The village of Setlagole was sampled twice due to their residents being the largest representation of the local municipal population. Hence, in the presentation of data, there are only nine villages. Lastly, the systematic sampling technique was used to select households with adolescent girls in the selected villages. The structured questionnaire consisted of sections on socio-demographic information, households and family characteristics, behavioural information, SRHR, and pregnancy and childbirth, was administered by the principal and research assistants. The sample size was determined using Yamane's formula for finite populations:

$$n = \frac{N}{1 + N(e)^2}$$

Where, n is the required sample size. N is the population size (8,231 adolescent girls in Ratlou Local Municipality from the last census before this study's survey). e is the level of precision (0.05). When the formula was applied, we got to a sample

size of 381 adolescents. To account for non-response and unreachable participants, we added 40% to the sample, giving us a target sample of 530. A total of 462 questionnaires were completed during the survey. The anticipated sample of 530 participants was not realised due to COVID-19 regulations, fear of COVID-19 infection, and unreachable households. For this study, questionnaires were excluded when adolescents indicated that they were not sexually active, and the sample size was thereby reduced to 290. Although data were collected in 2021, anecdotal evidence shows that the structural characteristics of the study setting (rurality and schooling environments) and some of the socio-behavioural determinants of contraceptive decision-making at first sex are relatively stable.

Outcome variable

The outcome variable for the study is contraceptive use at first sex. The variable is based on a question that asked the respondents if they used contraception when they had their first sexual intercourse. The responses were categorised into 0=No and 1=Yes.

Explanatory variables

Seven explanatory variables were used in this study. These included the age of the respondent, categorised into 13-14 years, 15-16 years, and 17-19 years. Highest level of education had two categories: primary or none, and secondary. The working status of the household head was coded as working and not working. Age at first sex was categorised into 11-13 years, 14-16 years, and 17-19 years. Ever used dual method has two categories: no and yes. Age at first birth has five categories: never been pregnant, never had a live birth, 12-14 years, 15-16 years, and 17-19 years. Village of residence was Disaneng, Kraaipan, Mabule, Madibogo Pan, Mareetsane, Matloding, Moshawane, Ramabesa, and Setlagole.

Statistical analysis

The data were analysed at all three levels using Stata, version 14.²³ Frequency and percentage distribution of the outcome variable and the socio-demographic characteristics were used in univariate analysis. Cross-tabulation and chi-square were used

to examine the association between outcome and explanatory variables at the bivariate analysis level. Lastly, the study employed binary logistic regression to determine the socio-demographic variables influencing contraceptive use at first sex.

Ethical approval

This paper used data collected for the doctoral study of the first author. All necessary ethical procedures were completed, and ethical clearance for the study was granted by the Human and Social Sciences Research Ethics Committee of North-West University, South Africa (Ethics Number: NWU-00664-21-A7). This manuscript does not contain any identifying personal information about the participants.

Results

Demographic and socio-economic characteristics

Table 1 presents the characteristics of the study population. The results revealed that most of the respondents (71%) were aged 17-19 years, and the lowest representation (10%) were aged 13-14 years. Most of the respondents (69%) had secondary education. Over sixty per cent (64%) of the respondents were from households where the household head was not working. Five in ten respondents (50%) reported that they had their first sex at age 14-16 years; only 24% of the respondents reported that they had their first sex at age 11-13 years. Over seventy per cent of the respondents (78%) reported that they have never used the dual method of contraception. About 57% of the respondents reported that they have never been pregnant. Most of the respondents resided in Setlagole (19%), followed by Madibogo Pan (12%), Ramabesa (12%), Disaneng (11%), and Matloding (11%); only a few respondents resided in Mareetsane (7%).

Prevalence of contraceptive use at first sex

Table 2 presents the prevalence of contraceptive use at first sex among adolescents (13-19 years) in Ratlou local municipality. The results of the study revealed that there was a significant association between contraceptive use at first sex and most of

the explanatory variables (age of the respondent, highest level of education, work status of the household head, ever used dual method, age at first sex, and age at first birth). The findings further showed that the majority (72%) of adolescents who were aged 13-14 years reported that they had used a contraceptive during their first sexual intercourse. The prevalence of contraceptive use at first decreases as age increases. Interestingly, the majority (63%) of the respondents who reported using a contraceptive at first sex had primary or no education. Concerning the work status of the household head, the findings of the study revealed that contraceptive use at first sex was high among adolescents whose household head was not working (46%) compared to their counterparts. Similarly to the age of the respondent, the results of the age at first sex variable showed that contraceptive use at first sex prevalence was higher (73%) among adolescents who had first sex when they were very young (11-13 years), and the prevalence decreased across the other age categories.

Moreover, Table 2 revealed that most (47%) of the adolescents who used a contraceptive at first sex, had never used dual method contraception. In terms of age at first birth, most (64%) adolescents who indicated that they used a contraceptive at sex, gave birth to their first child when they were aged 15-16 years, and the prevalence was lower (30%) among those who first gave birth between 17 and 19 years. Even though the village of residence was contraceptive use at first sex, there was area variation observed. The use of contraceptives at first sex was very low (19%) among adolescents who resided in Kraaipan, followed by those in Ramabesa (37%) of the total respondents in these respective areas.

Predictors of contraceptive use at first sex

Table 3 presents the predictors of contraceptive use at first sex among adolescents (13-19 years) in Ratlou local municipality using the logistic regression analysis. The results of the logistic regression indicated that there is a strong relationship between contraceptive use at first sex and most of the explanatory variables (highest level of education, work status of household head, age at first sex, ever used dual method, age at first birth, village of residence). A multicollinearity was run for the explanatory variables, and no collinearity

Table 1: Demographic and socio-economic characteristics of the respondents

Characteristics	Frequency	Percentage
<i>Age group</i>		
13-14 years	29	10.0
15-16 years	54	19.0
17-19 years	207	71.0
<i>Highest level of education</i>		
Primary or none	89	31.0
Secondary	201	69.0
<i>Work status of the household head</i>		
Working	103	36.0
Not working	187	64.0
<i>Age at first sex</i>		
11-13 years	70	24.0
14-16 years	145	50.0
17-19 years	75	26.0
<i>Ever used the dual method of contraception</i>		
No	227	78.0
Yes	63	22.0
<i>Age at first birth</i>		
Never been pregnant	166	57.0
Never had a live birth	23	8.0
12-14 years	9	3.0
15-16 years	45	16.0
17-19 years	47	16.0
<i>Village of residence</i>		
Disaneng	31	11.0
Kraaipan	27	9.0
Mabule	25	9.0
Madibogo Pan	36	12.0
Mareetsane	21	7.0
Matloding	32	11.0
Moshawane	29	10.0
Ramabesa	35	12.0
Setlagole	54	19.0
Total	290	100.0

was detected (mean VIF: 1.24). The results further revealed that adolescents whose highest level of education was secondary were [AOR: 0.40, 95% CI: 0.20-0.79] times less likely to use contraceptives at first sex compared to those who had primary or no education. In addition, adolescents whose household head was working were [AOR: 0.47, 95% CI: 0.25-0.88] times less likely to use contraceptives at first sex compared to those whose household head was not working. In terms of age at first sex, adolescents aged 14-16 years were [AOR: 0.16, 95% CI: 0.07-0.36] times less likely to use contraceptive at first sex as compared to those aged 11-13 years and those who were aged 17-19 years were [AOR: 0.11 95% CI: 0.04-0.33] times less

likely to use contraceptive at first sex compared to those aged 11-13 years. Furthermore, Table 3 revealed that adolescents who had ever used dual method were [AOR: 0.21, 95% CI: 0.09-0.50] times less likely to use a contraceptive at first sex compared to those who never used dual method. Adolescents who had never been pregnant were [AOR: 0.18, 95% CI: 0.07-0.47] times less likely to use contraception at first sex compared to those aged 15-16 years.

In addition, adolescents who were residing at Kraaipan were [AOR: 0.18, 95% CI: 0.04-0.76] times less likely to use a contraceptive at first sex compared to those residing at Madibogo Pan.

Table 2: Prevalence of contraceptive use at first sex among adolescent girls

Characteristics	Contraceptive use at first sex			χ^2 , p-value
	No	Yes	Total	
	%	%	%	
<i>Age group</i>				14.45***
13-14 years	27.6	72.4	100.0	
15-16 years	55.6	44.4	100.0	
17-19 years	64.3	35.7	100.0	
<i>Highest level of education</i>				25.42***
Primary or none	37.1	62.9	100.0	
Secondary	68.7	31.3	100.0	
<i>Work status of the household head</i>				4.25*
Working	67.0	33.0	100.0	
Not working	54.5	45.5	100.0	
<i>Age at first sex</i>				44.22***
11-13 years	27.1	72.9	100.0	
14-16 years	63.4	36.6	100.0	
17-19 years	80.0	20.0	100.0	
<i>Ever used the dual method of contraception</i>				18.49***
No	52.4	47.6	100.0	
Yes	82.5	17.5	100.0	
<i>Age at first birth</i>				15.31**
Never been pregnant	63.3	36.7	100.0	
Never had a live birth	47.8	52.2	100.0	
12-14 years	66.7	33.3	100.0	
15-16 years	35.6	64.4	100.0	
17-19 years	70.2	29.8	100.0	
<i>Village of residence</i>				8.67
Disaneng	58.1	41.9	100.0	
Kraaipan	81.5	18.5	100.0	
Mabule	56.0	44.0	100.0	
Madibogo Pan	50.0	50.0	100.0	
Mareetsane	61.9	38.1	100.0	
Matloding	59.4	40.6	100.0	
Moshawane	48.3	51.7	100.0	
Ramabesa	62.9	37.1	100.0	
Setlagole	57.4	42.6	100.0	
Total	59.0	41.0	100.0	

Note: * = 0.05; ** = 0.01; *** = 0.000

Table 3: Predictors of contraceptive use at first sex among adolescent girls

Characteristics	Contraceptive use at first sex	
	Odds ratio	Confidence interval
<i>Age group</i>		
13-14 [®] years	1	
15-16 years	0.92	0.26-3.18
17-19 years	0.85	0.25-2.88
<i>Highest level of education</i>		
Primary or none [®]	1	
Secondary	0.40**	0.20-0.79
<i>Work status of the household head</i>		
Working	0.47*	0.25-0.88
Not working [®]	1	
<i>Age at first sex</i>		
11-13 years [®]	1	
14-16 years	0.16***	0.07-0.36
17-19 years	0.11***	0.04-0.33
<i>Ever used the dual method of contraception</i>		
No [®]	1	
Yes	0.21***	0.09-0.50
<i>Age at first birth</i>		
Never been pregnant	0.18***	0.07-0.47
Never had a live birth	0.48	0.14-1.63
12-14 years	0.24	0.03-1.79
15-16 years [®]	1	
17-19 years	0.35	0.12-1.01
<i>Village of residence</i>		
Disaneng	0.45	0.14-1.50
Kraaipan	0.18*	0.04-0.76
Mabule	0.95	0.26-3.49
Madibogo Pan [®]	1	
Mareetsane	0.57	0.16-2.08
Matloding	0.38	0.12-1.26
Moshawane	1.01	0.30-3.42
Ramabesa	0.77	0.25-2.39
Setlagole	0.65	0.23-1.88

Note: [®] = reference category; * = 0.05; ** = 0.01; *** = 0.000

Discussion

This study examined the factors predicting contraceptive use at first sex among adolescent girls in Ratlou local municipality, South Africa. About four in ten young women reported using contraception at sexual debut. The results revealed significant association between the age of adolescents, the highest level of education, work status of the household head, age at first sex, ever use of the dual method of contraception, age at first birth, and contraceptive use at first sex. One notable finding was that adolescents with secondary education had lower odds of using contraception at

first sex than those who had primary education or none. This finding is contrasts previous studies which found that adolescents with higher levels of education tend to have higher odds of using contraception, which also tends to increase with level of education.^{6,9} An explanation for our findings is that adolescents with lower levels of education in the study area may experience stronger peer influence or misinformation discouraging contraceptive use, whereas those with lower education may perceive early pregnancy as a bigger threat to their education, making them use contraceptive.²⁴ This finding calls for further research into the role of school environments and

peer networks in shaping contraceptive behaviour among adolescents in Ratlou local municipality and similar rural settings.

Adolescents from households where the household head was working had lower odds of using contraception at first sex than those from households whose household head was not working. No known study has been found that measured the work status of the head of household to compare our findings to. Nonetheless, previous research has shown that socioeconomic status tends to be associated with better resources and better use of contraceptive services.^{25,26} Those from a lower socioeconomic status tend to use contraceptive services less compared to those from a higher socioeconomic status.²⁷ This finding may also reflect limited parental involvement and communication among households where the head of household is working, which may limit opportunities for guidance on safe sex practices. Previous studies have emphasised the role of parent-adolescent communication in shaping contraceptive behaviours, which suggests that economic resources alone do not guarantee protective practices.²⁸⁻³⁰

Age at first sex was another strong predictor of adolescent contraceptive use, where adolescents whose age at first sex was 14-16 years or 17-19 years had lower odds of using contraception at first sex than those whose age at first sex was 11-13 years. This counterintuitive finding suggests that younger girls may be more cautious due to fear of the consequences of non-contraceptive use, while older adolescents may be influenced by social norms and romantic relationships, which discourage contraceptive use. This is contrary to a study by Seutlwadi and colleagues, who found that early sexual debut is associated with lower odds of contraceptive use.³¹ Another possible explanation for our finding is that as age increases, adolescents may rely more on the trust of their partners rather than negotiate for contraceptive use.

The study also found that adolescents who have ever used the dual method of contraception had lower odds of using contraception at first sex than those who have never used the dual method of contraception. No known study has explored the association between dual contraceptive use and contraceptive use at first sex. Nonetheless, this finding suggests that dual contraceptive method use may be adopted later, possibly due to experiencing an unintended pregnancy or other related health

risk. This may also reflect gaps in SRHR education and the need to promote more comprehensive strategies before sexual debut. Similarly, the study found that adolescents who had never been pregnant had lower odds of using contraception at first sex than those whose age at first birth was 15-16 years. This finding may indicate that prior pregnancy experience increases young women's awareness and motivation to use contraception. Furthermore, adolescents from Kraaipan village had lower odds of using contraception at first sex than those from Madibogo Pan village. Previous studies have also found geographic differences in the use of contraception, in general, among AGYW.^{32,33} This suggests that local contexts, such as access to services and community norms, play an important role in adolescent contraceptive use. These geographic differences highlight the importance of not treating rural areas as homogeneous and call for community-specific programmes in dealing with adolescent contraceptive use at first sex.

Strengths and limitations

This study has several strengths. The study focuses on contraceptive use at first sex among adolescents in a rural setting, a topic that has not been widely explored. The use of primary, village-level data, collected from a rural setting, is one of the strengths of this study. Moreover, the sampling methods used improved the representativeness of the sample. Nonetheless, the study has some limitations. The cross-sectional design used in the study limited causal inference between the variables. The self-reported nature of the data may also introduce some biases (social desirability bias and reporting bias). The 2021 fieldwork date may limit temporal generalisability if rapid programmatic and contextual shifts occurred after this date; however, anecdotal evidence suggests that the observed patterns persist over time and remain actionable for local SRHR planning. The study offers valuable evidence that can be used to improve the situation of young women in the study area.

Implications for policy and practice

The findings of this study provide several important insights for policy and practice in the country. The finding that adolescents with secondary education had lower odds of contraceptive use at first sex than

those with primary or no schooling is counterintuitive and suggests a need for stronger school-based SRHR education. This calls for the Department of Basic Education, together with the Department of Health, to strengthen Comprehensive Sexuality Education programmes, to ensure that adolescents receive accurate, age-appropriate, and practical information about SRHR before they engage in sexual activities. Moreover, the lower odds of contraceptive use among adolescents from households where the head was employed show the importance of family and household engagement in adolescent SRHR. This calls for community-based interventions that include parents and caregivers and encourage open communication to guide adolescents on safe sex practices. Furthermore, the geographic differences in contraceptive use at first sex across the villages call for localised and context-specific interventions. Policymakers and non-government organisations should ensure equitable distribution of youth-friendly services, especially in areas such as Kraaipan.

Conclusion

This study examined the factors predicting contraceptive use at first sex among adolescent girls in Ratlou local municipality, South Africa. The results revealed that socio-demographic factors such as level of education, employment status of the household head, age at first sex, ever use of dual contraception, age at first birth, and village were significantly associated with contraceptive use at first sex. Unexpectedly, adolescents with secondary education, those from households with an employed head of household, and those who initiated sex at older ages were less likely to use contraception at first sex, while younger adolescents and those with lower levels of education reported higher use. These findings highlight the complex and context-specific nature of contraceptive decision-making in rural settings in the country. There is a need for interventions that prioritise the strengthening of school-based SRHR education, foster parent-adolescent communication, and expand youth-friendly SRHR services across rural communities. Moreover, future research should use the mixed-methods approach to explore the social, cultural, and structural factors underlying these unexpected patterns.

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Conflict of interest

The author(s) declared no conflict of interest.

Contribution of authors

BKMN developed the concept for this study, wrote the background, methodology (all subsections excluding study setting), and tabulated analysis; MT performed data analysis and conclusion. KM wrote the interpretation text for the manuscript. FO-A wrote the discussion text for the manuscript, and SKM and LM wrote the abstract and the methodology (study setting). BKMN and IK-S performed an overall review and editing of the manuscript for intellectual content. All authors read and approved the final version of the manuscript

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