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# Fertility awareness, perceived factors and approaches to improve contraceptive uptake among sexually active adolescent girls in Phalombe, Malawi: a mixed-methods study

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## Abstract

**Background** Healthcare practitioners and policymakers in Sub-Saharan Africa face a significant health challenge due to the insufficient fertility awareness and other perceived health outcomes in contraceptive use among adolescent girls. This has resulted in a rise in unplanned pregnancies and other adverse fertility-related health consequences for adolescent girls in Malawi. Consequently, this research examines fertility awareness, perceived factors, and strategies in contraceptive adoption among adolescent girls in Malawi's Phalombe district.

**Methods** The study utilized a mixed-methods approach, with the quantitative component employing structured questionnaires administered in person to collect data from school-going adolescent girls in three traditional authorities in Phalombe district, Malawi. The research employed multivariate logistic regression analysis, and its findings were corroborated with qualitative data obtained through focus group discussions involving adolescent girls in the same environment.

**Results** The majority of adolescent females were unaware that their fertile period occurs in the middle of their menstrual cycle, indicating a lack of knowledge regarding their reproductive health. The study examined data from 102 sexually active adolescent females in the quantitative component and 72 adolescent girls in the qualitative component. For the quantitative strand, participants' ages ranged from 13 to 19 years, with a mean age of 16.5 and a standard deviation of 1.5. In the qualitative portion, the study conducted interviews with adolescent females aged between 10 and 19 years, with a median age of 15 years. Services that were not tailored to youth needs served as barriers to contraceptive use. Factors that facilitated contraceptive use included a preference for receiving contraceptives from peers, which was associated with a higher probability of usage (AOR: 4.80, 95% CI 1.31–17.32). Moreover, adolescent females who were identified as Catholic (AOR: 14.01, 95% CI 2.50–78.47) or belonged to other Christian denominations (AOR: 5.85, 95% CI 1.20–28.25) exhibited a greater likelihood of using contraceptives compared to their Muslim counterparts. The focus group discussions suggested making contraceptives available in educational institutions, analogous to the distribution of iron supplements.

**Conclusion** Adolescent girls in the Phalombe district seemingly have low awareness and knowledge of their fertility, which may lead to unintended pregnancies. Adolescent girls are unable to access modern contraceptives, and there

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is a need for youth-friendly structures when delivering contraceptive services. Additionally, participants indicated that community midwives and health surveillance assistants should provide contraceptives within the communities to reduce distance.

### Plain language summary

This study assessed fertility awareness and perceived factors and approaches to improve contraceptive uptake among sexually active adolescents in Phalombe, Malawi. This mixed-methods study was conducted among adolescent girls in three traditional authorities in the Phalombe District. Most adolescent girls demonstrated limited knowledge of female fertility. Inadequate comprehension of female reproductive physiology is associated with decreased contraceptive utilization and increased risks of unplanned pregnancies, and other adverse reproductive health outcomes. Furthermore, girls with Catholic and other Christian faiths are more likely to use contraceptives than Muslim girls. Most adolescent girls suggested that contraceptives should be delivered via peers, community midwives, and health surveillance assistants to improve the use of contraceptives among adolescents.

**Keywords** Adolescents, Contraceptive agents, Unplanned pregnancy, Health knowledge

## Background

Unintended pregnancies among adolescent girls pose great health and economic concerns globally. As of 2019, the World Health Organization reported an estimated 21 million pregnancies among adolescents in low- and middle-income countries, approximately 50% of which were unintended pregnancies [1]. Multiple factors have been associated with unintended pregnancies, including early sexual debut [2–5]. Early sexual debut (ESD) is commonly defined as having sexual intercourse for the first time at or before 14 years of age [2]. Evidence-based interventions and consequences associated with ESD must continuously be reviewed and updated to improve adolescent girls' health outcomes through contraceptive use. The use of modern contraceptives among adolescent girls is lower in sub-Saharan Africa (25.4%) than in the rest of the world [3, 4].

In Malawi, contraceptive use among adolescent girls aged 15–19 years remains a challenge, with uptake at 37.5% [5]. This has resulted in unintended pregnancies, high school dropouts, and increased early marriages [6, 7]. Additionally, these pregnancies are associated with poor delivery outcomes and high health risks [7, 8].

Unintended pregnancies can be prevented through many methods, including natural and modern contraceptives. There are five types of natural family planning methods. Natural methods rely on the awareness of fertility within the menstrual cycle [6, 9]. Awareness of the fertile period is critical to effective natural family planning to avoid unintended pregnancies. A woman should be able to correctly identify the days within her menstrual cycle when she is fertile. She can become pregnant if she engages in unprotected sexual intercourse during this window [10]. According to the Malawi Demographics and Health Survey, one's awareness of the fertile period is correct if one states that the fertile period is

halfway between two menstrual periods [6]. Adolescent girls and young women's knowledge of the fertility period is associated with many factors, including age, educational status, proximity to a health facility, knowledge of family planning methods, community poverty, and place of residence [11]. Additionally, knowledge of the fertile period is also associated with the partner's level of education, wealth index, history of family planning, listening to the radio, frequency of watching TV, and internet use [6, 12].

Moreover, understanding the fertility window requires an adequate understanding of the menstrual cycle and hormonal changes before reaching menarche, which usually starts between 12 and 13 years old [13]. Poor knowledge and management of menstrual health are affected by inadequate or nonexistent education about puberty and knowledge of the menstrual cycle [14]. Adolescent girls struggle to properly self-monitor their menstrual cycles to identify the correct period of fertility [15]. Promoting puberty and menstruation education will increase correct self-monitoring of the menstrual cycle and detection of menstrual disorders that influence the fertility period [14, 15].

Therefore, this study investigated awareness, perceived factors and approaches to improve contraceptive uptake among sexually active adolescent girls in Phalombe, Malawi. Using a qualitative design, we further investigated the perceived factors and approaches to improving contraceptive uptake among sexually active adolescent girls in the Phalombe district of Malawi.

## Materials and methods

### Data source

#### Study design and setting

This was a mixed methods study employing both quantitative and qualitative approaches. The qualitative

approach aimed to explain and interpret the findings from the quantitative design. This mixed-method design gave an in-depth understanding of the problem [16].

The study was conducted in the Phalombe district of Malawi. The district lies in the southeastern part of Malawi and shares boundaries with Mulanje to the south and west, Zomba to the north, and Mozambique to the east. Most inhabitants belong to the Lomwe tribe and depend on domestic or subsistence farming. According to the 2018 census, the Phalombe district has a total adolescent population of 117,054, of which 58,874 are girls. The investigation was conducted in three purposively selected traditional authorities within the district: Jenala, Nkhumba and Nkhulambe. These specific areas were chosen from the total of six traditional authorities in the district, as they corresponded to the locations from which the quantitative study participants originated. In Malawi, traditional authority forms an established system of local governance and are legally recognized by the government under local administration. They influence and safeguard local customs and beliefs among their followers in areas of jurisdiction.

#### **Inclusion and exclusion criteria**

The research employed both quantitative and qualitative methodologies, focusing on sexually active school going female adolescents aged 10 to 19 years within educational settings. The girls who had experienced at least one menstrual period, stayed in the district for over 5 months.

However, the study excluded adolescents who were not sexually active during the research period, as well as those who stayed in the area for less than 5 months, those with new born babies.

#### **Quantitative strand**

##### **Data collection**

These data were collected through surveys among school-going girls in the Phalombe district of Malawi. More details of the data collection have been reported elsewhere [17]. The three traditional authorities were sampled purposively because they registered more adolescent pregnancies.

##### **sample size and population**

The initial cohort of data collection comprised 388 adolescent girls; however, this analysis focused only on 102 participants who reported sexual activity. The research targeted female adolescents aged between 10 and 19 years. The study population was drawn from both primary and secondary schools.

#### **Quantitative data analysis**

This study utilized multivariate logistic regression to elucidate the factors influencing contraceptive use among adolescent females in the Phalombe district. The dependent variable was a dichotomous question (yes/no) ascertaining whether sexually active adolescent females had previously employed any form of contraception, including long-acting reversible contraceptives such as injectables and Norplant, or short-term methods such as condoms, oral contraceptive pills, and emergency contraceptives. The predictor variables were as follows: whether adolescent girls preferred peers to offer family planning methods; whether adolescent girls preferred youth clubs to offer family planning methods; whether adolescent girls had a level of knowledge about contraceptive methods; whether adolescent girls had sexual boyfriends; whether adolescent girls had started their menstrual period; and whether adolescent girls were satisfied with the way emergency contraceptives were found. These variables were chosen because they had p values of at least 0.2 or less in the univariable analysis. Before conducting the regression, we checked the multicollinearity, and any interactions, fortunately we did not find any. We used multivariable logistic regression to determine the predictive factors. We used stepwise backward removal of the statistically non-significant variables to reach the final model. We determined the final model by using the minimization of the information criteria or Bayesian information criteria. We used a p value < 0.05 to indicate significance for the multivariable analysis.

#### **Qualitative strand**

##### **Sample size and population**

We purposively selected sexually active female students from standard five, six, seven, and eight classes from primary schools and from forms one, two, three, and four from secondary schools to participate in focus group discussions (FGDs). At each school, 12 students were included to form one FGD. To ensure that all students and classes had an equal opportunity to participate in the study, the students were grouped according to their classes or forms. The list of names of each class or form was obtained from the class teacher. Each student was given a unique number on a paper mixed according to the class or form. Three unknown people were asked to draw one paper each from each class. The number was checked against the list of names to trace the possible participants. The girls were asked privately if they had ever had sex before and whether they were willing to participate in the study. If the selected adolescent refused to participate or was not sexually active, the process was repeated. Informed consent was obtained from the guardians of

girls younger than 18 years, and informed consent was obtained from older girls the same day before participating in the study. Each school had twelve participants, and we planned to conduct eight FGDs; however, we reached a saturation point after conducting the sixth FGD.

#### Data collection

The data were collected using an FGD guide. We used two voice recorders to record the interviews. There were three interviewers at each FGD. The first interviewer was responsible for asking questions and notetaking, the second interviewer was responsible for managing the voice recorders, and the third person was responsible for arranging and assisting adolescents if they needed help. Each session lasted approximately 40–60 min.

#### Qualitative data analysis

The FGD data were reviewed several times to check for missing words. This was done by comparing the recordings of the two voice recorders and written notes. The data were transferred to a computer with a password known only to the investigators before being transcribed. The recordings were listened to several times before they were transcribed verbatim. The data were collected in the Chichewa language, translated into English, and back-translated to Chichewa to ensure that meanings were not lost in the translation process. After transcription, the data were kept in a lockable cabinet, and the investigators only accessed the keys. The data were analyzed manually by reading the transcriptions several times to become familiar with the data and to explore the themes that emerged from the transcriptions and memos. The emerging themes were given appropriate codes. The codes were assigned under the central theme they supported. The main ideas from each participant concerning fertility awareness, barriers to accessing contraceptives and desirable approaches for providing contraceptive methods were isolated and assigned under the theme that they supported. The ideas from the qualitative strand were analyzed and triangulated with the findings from quantitative analysis to determine the conclusions of the study.

#### Ethical considerations

The study protocol was reviewed and approved by the National Health Sciences Research Committee, Lilongwe, Malawi (#2 1/0312668). Permission to conduct the study was obtained from the District Health Office (DHO), the District Commissioner (DC) for Phalombe, and the three traditional authorities. We obtained written informed consent from girls who were 18 years and above. For the adolescent girls who were less than 18 years of age, we first obtained written informed consent from their legal guardians before collecting assent from the participating

girls. The study participants were assured of their anonymity, privacy and confidentiality. Again, the participating girls were assured that their participation was purely voluntary, and they were free to withdraw at any time if they feel to do so, and there will be no negative consequences to them by doing that.

## Results

### Quantitative strand

According to Table 1, among the 388 adolescent girls who were interviewed, 90.39% had reached menarche, and approximately 74 (19%) reported the use of modern contraceptives. Only 43.24% girls using contraceptives reported satisfaction with family planning delivery services. Interestingly, out of the girls with high level of knowledge for modern contraceptive, 62.5% girls who had never used contraceptives reported compared to girls who used modern contraceptives. Approximately 28.46% girls reported being in a dating relationship. The study revealed that 26.49% adolescent girls out of the total sample were already engaged in sexual activity, and 65.69% of those who were sexually active were in the group that previously used contraceptives. About 39.22% of the girls preferred accessing contraceptives through youth clubs, and only 26.75% preferred using peers to access family planning.

The following two barriers preventing adolescents from accessing contraceptives were reported. About 59.69% of girls reported fear and being shy as social barriers preventing adolescent girls from accessing contraceptives. The second barrier were fearing of barrenness due to early contraceptive use before gravidity which was reported by 47.86% of girls while some 23.53% of girls indicated that contraceptives were for married women. Both of these issues were recorded as cultural barriers hindering adolescent girls from using contraceptives.

Approximately 76.01% adolescent girls were reported to have general knowledge of the female fertility period within a menstrual cycle. Of these, only 22.53% girls indicated ever using modern contraceptives.

For the logistical regression, we filtered those girls who were sexually active at the time of the survey ( $n=102$  girls). The participants' ages ranged from 13 to 19 years, with a mean age of 16.5 and a standard deviation of 1.5.

We assessed the predictors of modern contraceptive use among sexually active adolescent girls, and below are findings from the final model for multivariate logistic regression. In Table 2, being Catholic increased the odds (AOR: 14.01 95% CI 2.50–78.47  $P=0.003$ ) of using contraceptives compared with girls who were of the Muslim faith. Similarly, girls who were affiliated with other Christian faiths had greater odds (AOR: 5.85, 95% CI 1.20–28.25,  $P=0.029$ ) than Muslim adolescent girls.

**Table 1** Characteristics of the adolescent girls who used modern contraceptives in the Phalombe district in Malawi

NO	Variable		Did not use contraceptives (%)	Used contraceptive (%)	Total n = 388 (%)	P value
1	Religious beliefs I	Muslim	8 (2.57)	3 (4.05)	11 (2.86)	0.168
		Catholic	47 (15.11)	20 (27.03)	67 (17.40)	
		CCAP	35 (11.25)	11 (14.86)	46 (11.95)	
		Anglican	4 (1.29)	1 (1.35)	5 (1.30)	
		Seventh-day Adventist	40 (12.86)	8 (10.81)	48 (12.47)	
		Other christians	126 (40.51)	24 (32.43)	150 (38.96)	
		Other religions	51 (16.40)	7 (9.46)	58 (15.06)	
		Total			<b>385</b>	
2	Social barriers	Never heard	24 (7.79)	0 (0.00)	24 (6.28)	0.058
		Long distance	25 (8.12)	7 (9.46)	32 (8.38)	
		Poverty	14 (4.55)	8 (10.81)	22 (5.76)	
		Need to have children	41 (13.31)	11 (14.86)	52 (13.61)	
		Fear and being shy	186 (60.39)	42 (56.76)	228 (59.69)	
		Parental refusal and church beliefs	18 (5.84)	6 (8.11)	24 (6.28)	
		Total			<b>382</b>	
3	Cultural barriers	Never heard any	50 (16.67)	1 (1.35)	51 (13.64)	0.027
		Use of herbs	6 (2.00)	1 (1.35)	7 (1.87)	
		Contraceptive is for married	68 (22.67)	20 (27.03)	88 (23.53)	
		Barren due to early contraceptive use before gravidity	137 (45.67)	42 (56.76)	179 (47.86)	
		Contraceptive causes long days of menstruation	14 (4.67)	2 (2.70)	16 (4.28)	
		People consider you a prostitute	7 (2.33)	2 (2.70)	9 (2.41)	
		Told during initiation never to use contraceptive	5 (1.67)	0 (0.00)	5 (1.34)	
		Other reasons	13 (4.33)	6 (8.11)	19 (5.08)	
		Total			374	
4	Preferred to use peers to access family planning	Yes	77 (24.76)	26 (35.14)	103 (26.75)	0.070
		No	234 (75.24)	48 (64.86)	282 (73.25)	
		Total			385	
5	Preferred to use youth club to access family planning	Yes	117 (37.62)	34 (45.95)	151 (39.22)	0.187
		No	194 (62.38)	40 (54.05)	234 (60.78)	
		Total			385	
6	Level of knowledge about different modern contraceptive methods	High	20 (6.43)	12 (16.22)	32 (8.31)	0.017
		Medium	106 (34.08)	26 (35.14)	132 (34.29)	
		Low	185 (59.49)	36 (48.65)	221 (57.40)	
		Total			385	
7	Has a sexual partner	Yes	55 (17.80)	54 (72.97)	109 (28.46)	0.001
		No	254 (82.20)	20 (27.03)	274 (71.54)	
		Total			383	
8	Ever started a menstrual period	Never	35 (11.25)	2 (2.70)	37 (9.61)	0.025
		Yes	276 (88.75)	72 (97.30)	348 (90.39)	
		Total			385	
9	If satisfied with the family planning services	Yes	78 (26.44)	32 (43.24)	110 (29.81)	0.001
		No	49 (16.61)	25 (33.78)	74 (20.05)	
		No idea	168 (56.95)	17 (22.97)	185 (50.14)	
		Total			369	



**Table 1** (continued)

NO	Variable		Did not use contraceptives (%)	Used contraceptive (%)	Total n = 388 (%)	P value
10	Ever had sex before	Yes	35 (11.25)	67 (90.54)	102 (26.49)	0.001
		No	276 (88.75)	7 (9.46)	283 (73.51)	
		Total			385	
11	General knowledge about female fertility	Yes	227 (72.99)	66 (89.19)	293 (76.10)	0.003
		No	84 (27.01)	8 (10.81)	92 (23.90)	
		Total			385	

Girls who desired contraceptives to be provided by their peers were more likely to use contraceptives (AOR: 4.80, 95% CI 1.31–17.32 P=0.008).

The analysis did not show strong test results; therefore, we complemented the findings with qualitative findings.

#### Qualitative strand

We conducted six FGDs, and 72 adolescents participated in three primary and three secondary schools. The median age of the participants was 15 years. The lowest class was standard five, and the highest class was form four. In terms of tribe, 68 were Lomwe, and 4 were Mang'anja. Regarding religion, most (n=47) were Roman Catholics, 22 were Pentecostals, and 3 were Muslims. We grouped the results into the following themes: knowledge about the fertile period, barriers preventing adolescents from accessing modern contraceptives, and ways to improve the use and delivery of modern contraceptives to adolescent girls.

#### Knowledge about the fertile period

Most of the adolescent girls had limited and sometimes incorrect knowledge about the fertile period. Almost all adolescents did not know that the fertile window was halfway between periods. One participant reported, "I know the fertile period is a period when you are about to have a menstrual period and you also have the desire for sexual intercourse (*chilakolako chofuna kugonana ndi mwamuna*) called *lustful*" (FGD 1, Participant No 9). Another participant reported that "when a girl is in the fertile period, she develops vaginal sores and feels abdominal pains" (FGD 3, participant No 5). Another participant reported that the "fertile period is a time when a girl feels itching on her private part" (FGD 1, Participant No 2).

Despite low knowledge of the fertile period, most girls understood the importance of knowing about the fertile period. Most girls understood the benefits of learning about the fertile period, such as when to abstain from sexual intercourse, when to use preventive measures

such as condoms, and the use of emergency contraceptives after having unprotected sexual intercourse. One participant reported that "it is good to know your fertile period, as you can avoid unprotected sexual intercourse" (FGD 4, Participant No 10). Another participant said, "It is beneficial to know the fertile period as you are aware that if I engage in unprotected sexual intercourse, I will be pregnant and so you try that during that period you do not sleep with any man" (FGD 3, participant No 2). One participant said, "Once you know that you are in a fertile period and you have the desire to have sex, you make sure that you use a condom" (FGD 1, Participant 4).

Most girls suggested modalities to increase knowledge of the fertile period, such as through youth clubs, introducing special lessons on the fertile period in schools, and using peer education. In contrast, others indicated that mothers should be open and have discussions with their daughters at home. One participant said, "There should be special lessons on the fertile period to be delivered in schools only for girls" (FGD 2, Participant No. 7). Another participant said, "Parents, especially mothers, should be free to share this information with their daughters (*asamakhale omangika*) because she is their child, and they should guide her because if they cannot guide her, she might end up having an unwanted pregnancy" (FGD 1, Participant 12).

#### Barriers preventing adolescents from accessing modern contraceptives

Several barriers prevented adolescents from accessing modern contraceptives. Knowledge and awareness barriers are significant for Long-acting reversible contraceptives (LARCs). Many women lack accurate information about LARC methods, their mechanisms of action, and potential side effects [18, 19]. This knowledge deficit extends to healthcare providers as well, limiting their ability to counsel clients effectively [20]. In contrast, barrier methods like condoms are generally more familiar to both users and providers. The barriers ranged from

**Table 2** Multivariable model assessing the impact of the predictor variables (Religion, social barrier, cultural barrier, preference of accessing contraceptive, level of knowledge about contraceptive, level of satisfaction of family planning delivery and general knowledge of female fertility) on the response (use of modern contraceptives methods among sexually active adolescents)

Variables	Univariate analysis		Initial multivariable analysis n		Final multivariable model		
	OR	P-value	AOR	P-value	AOR	95% CI	P-value
The religion that the adolescent girl belongs							
Muslim	1.0	–	1.0		1.0	–	–
Catholic	6.97	0.007 <sup>a</sup>	12.99	0.004 <sup>a</sup>	14.01	2.50–78.47	0.003 <sup>a</sup>
CCAP	2.62	0.174	1.94	0.435	1.90	0.36–9.99	0.448
Anglican	Empty		Empty		Empty		
Seventh day Adventist	4.89	0.061	5.46	0.077	5.89	0.92–37.67	0.061
Other Christians	4.28	0.024 <sup>a</sup>	5.55	0.035 <sup>a</sup>	5.82	1.20–28.25	0.029 <sup>a</sup>
Other religions	Empty		Empty		Empty		
Cultural barriers hindering adolescents' girls from getting access to contraceptives							
Never heard any	1.0	–	1.0		1.0	–	–
Use of Herbs	1.50	0.810	0.67	0.823	0.68	0.02–23.68	0.830
Contraceptive are for married	4.50	0.143	5.89	0.108	5.68	0.66–48.85	0.113
If contraceptives are used before giving birth to first child will be barren	2.66	0.304	6.68	0.070	6.69	0.86–51.79	0.069
Contra causes long days of menstruation	Empty		Empty		Empty		
People consider you as prostitute	Empty		Empty		Empty		
Told during initiation never to use contraceptive	omitted		Omitted		Omitted		
Other reasons	Empty		Empty		Empty		
If the girl preferred to use peer to access family planning							
No	1.0	–	1.0		1.0	–	–
Yes	2.88	0.040 <sup>a</sup>	4.63	0.022*	4.80	1.31–17.62	0.018 <sup>a</sup>
If adolescent girl has a sexual boyfriend							
No	1.0	–	1.0				
Yes	1.90	0.178	1.33	0.619			
Social Barrier hindering adolescent girls getting access to contraceptive							
Never heard	1.0	–					
Long Distance	0.69	0.554					
Poverty	2.08	0.386					
Need to have children	1.64	0.444					
Fear and being ashamed	Empty						
Parental refusal and church beliefs	Empty						
If the girl preferred to use youth club to access family planning							
No	1.0	–					
Yes	1.55	0.307					
Level of knowledge about different modern contraceptive methods							
High	1.0	–					
Medium	0.47	0.300					
Low	0.48	0.311					
If the adolescent girl ever started menstrual period							
Never	1.0	–					
Yes	Omitted						
If the girl is satisfied with the Family Planning delivery services							
Yes	1.0	–					
No	2.94	0.96					
No Idea	0.67	0.429					
General knowledge about female fertility							
No	1.0	–					
Yes	1.77	0.340					

**Table 2** (continued)

Non-significant terms were step-wise deleted and significant terms were retained in the final model

AIC 4 BIC 6

<sup>a</sup> This should mean that the results are statistically significant, indicating p-value of less than 0.05

social-economic beliefs to attitudes of health workers. Regarding social-economic barriers, most girls mentioned long distances to the health facility and the shyness of being labeled prostitutes.

One participant reported that *“esiii the health facility is far away from my home, and I cannot manage to get transport money for me to get contraceptives”* (FGD 3, Participant No 1). Another participant said, *“Many girls do not go to the health facility to get contraceptives, as they are afraid of being labeled prostitutes”* (FGD 2 Participant No. 9).

On beliefs, most girls indicated the need to have children in the future. They believed that using contraceptives before giving birth could disrupt a girl's womb and render her barren. Additionally, some girls were afraid of side effects based on hearsay. One participant said, *“I cannot start using contraceptives before giving birth, as that might disrupt my womb and be barren and never give birth to children in the future”* (FGD 4, Participant No 6). Another participant said, *“I heard that pills cause someone to have a prolonged menstrual period, and this instills fear in me”* (FGD 2, Participant No. 4).

Regarding the attitudes of health workers, most participants reported that the health workers were judgmental and did not keep secrets. The participants reported that some health workers reported them to either their parents or schoolteachers once they visited the health facility to access contraceptives. One participant reported that *“Some health workers, especially nurses, report us to either our parents or schoolteachers once we go and get contraceptives from health centers, as they consider us to be young children who have not yet started sexual intercourse”* (FGD 1, Participant No 11). Another participant said, *“Health workers start laughing at you when you go there to get contraceptives considering you a child who does not know anything about sexual intercourse”* (FGD 3, Participant 6).

#### Methods for improving the use of modern contraceptives among adolescents

Participants suggested ways of improving modern contraceptive uptake among adolescent girls. Most girls indicated that schools should provide contraceptives in the same way that iron tablets are provided. Additionally, the participants indicated that community midwives and health surveillance assistants should have contraceptives within the communities to reduce

distance. Other participants mentioned strengthening contraceptive literacy in schools and public gatherings.

One participant said, *“Aaaaaah I think I can easily access contraceptives if found at school the same way we get iron tablets”* (FGD 3, Participant No 8). Another participant said, *“Let health personnel train female teachers so that we can get contraceptives at school”* (FGD 1, Participant No 6). Another participant said, *“To me, I will be comfortable if contraceptives are found with (Obereketsa amidzi) community midwives and (Azilanginzi) Health Surveillance Assistants within their catchment areas”* (FGD 2, Participant No 5). Another participant said, *“Health workers should provide contraceptive health talks (literacy) in schools and public gatherings the same way they do with vaccine talk”* (FGD 1, Participant 2).

#### Means of providing modern contraceptives to adolescents

During the FGDs, we assessed how teachers and health surveillance assistants should provide modern contraceptives to adolescents. Girls were also asked about preferred modern contraceptives and how they would inform their friends about accessing modern contraceptives. Most girls mentioned that female teachers should have special lessons with adolescent girls during a fertile period where they can also provide contraceptives. They also indicated that female teachers should have contraceptives wherever they are at school so that once they are approached, they might provide contraceptives.

One participant said, *“Female teachers should have special time during the week when they give us special health talks on contraceptives and at the same time provide them to those who may need them”* (FGD 4, Participant No 7). Another participant said, *“Health surveillance assistants should always have contraceptives, especially emergency ones, in the community for us to access at their home, but they should not sell”* (FGD 3, Participant No 1).

Most girls preferred male condoms for modern contraceptives, while few indicated the use of emergency contraceptives. One participant said, *“As for me, I prefer male condoms, although boys do not like that”* (FGD 4, Participant No 10). Another participant said, *“Mmmm it is very difficult, but I will go for emergency contraceptives (mapilitsi aja amamwa mukagonana ndi mwamuna mosazitetedza pasanathe 72 h)”* (FGD 2, Participant No 3).



## Discussion

This study was done in Phalombe district in Malawi with the aim of examining the fertility awareness, perceived factors, and strategies in contraceptive adoption among adolescent girls. The key findings showed that the majority of the participants lacked knowledge on the fertile period within the menstrual cycle, however, they expressed the importance of having such an awareness and the use of contraceptives during that period. Some of the barriers hindering adolescent girls from using contraceptives include fear and shyness, and myths including that, contraceptives causes barrenness. Further, the participants highlighted barriers like lack of transport money, poor attitude of health workers and their lack of confidentiality. To improve the services delivery, the study found that participants preferred the dispensing of contraceptives in schools through female teachers and in the community using community health workers.

In this study, it is revealed that some adolescent girls who had access to modern contraceptive services did not use these services due to shyness, fear and unfriendly health workers who are judgmental and lack confidentiality. In 2021, Lesley Ninsiima et al. [21] in their systematic review on studies done in sub-Saharan Africa reported that structural barriers preventing adolescents from accessing modern contraceptives in sub-Saharan Africa included negative attitudes, unskilled healthcare providers, and a lack of knowledge of youth-friendly family planning services for individual adolescents. Likewise Muula et al [22] in their report on increasing adolescents' access to SRH information and services in Malawi found that unfriendly health workers with poor attitudes toward adolescent girls accessing contraceptives was a barrier in contraceptive use. Our findings align with those of Lesley Ninsiima et al. [21] and APHRC [22], and we report similar structural barriers to contraceptive use by girls in the Phalombe district. Strengthening the provision of adolescent friendly health services would mitigate this barrier hence improve service use among adolescent girls.

We observed that girls who preferred contraceptive delivery via their peers had greater odds of using contraceptives than those who did not desire contraceptive delivery via their peers. Many adolescents may be shy to access contraceptives from adults since it is believed that contraceptives are for married people. Hoopes et al. [23] reported that girls in Washington State were more likely to use long-acting reversible contraceptives if they had received previous information from their peers. Therefore, using peers for family planning delivery may improve usage.

In our study, religious affiliations were associated with acceptance of contraceptives. Being Catholic or

of other Christian faith was associated with increased odds of using contraceptives. This finding aligns with those of other studies that reported the association between religion and the use of contraceptives in adolescent girls [24, 25]. There is little evidence that religion prevents adolescents from receiving contraceptives. Specifically, in Nigeria, Okonofua et al. [26] reported that more Muslim adolescents were pregnant than Catholic adolescent girls, who were more likely to use contraceptives. In principle, the Catholic faith is reported to restrain its members from using modern contraceptives [27], but this was not observed in our study. This finding suggests that contraceptive providers should encourage adolescents to use contraceptives regardless of their religious affiliation. Further attention should be given to Muslim adolescents who are less likely to use contraceptives. However, in this analysis we found that the confidence intervals were wide which could be due to small sample size of 102 study participants, or the involvement of only 11 Muslim girls as a reference group which is underrepresented, hence this finding is plausible and should be used with caution.

In the quantitative strand of this study, majority of the participants indicated that they know the fertile period. However, the qualitative findings were contrary as most of the participants could not specifically describe the fertile period in reference to the menstrual cycle. Thus, the girls in our study may be at risk of early pregnancy, which is worrisome. Studies done in Malawi and other sub-Saharan Africa (SSA) countries have also found that adolescent girls have low knowledge on fertile period and this trend has been low since the 1990's with little improvement over the years [22, 28] Some of the factors that were found to be associated with this low knowledge level were; residing in rural areas, lack of formal education, advancing in age (with young women having more knowledge than adolescent girls), knowledge of family planning, self-stigma, lack of autonomy and misinformation on contraceptives [28]. Similarly, in a study on fertility awareness among adolescents in SSA, only 18.4% (n=8,306) of participants correctly identified the fertile window [29]. Furthermore, in Ghana, 70% of male adolescents claimed to have good knowledge about their partner's fertility period; however, when asked to mention the exact time, only 14.7% correctly mentioned the period [30]. We believe that a lack of knowledge concerning the fertile period may be a contributing factor to the high number of unintended pregnancies leading to school dropout in the Phalombe district of Malawi. This belief is supported by a study conducted in Cameroon that reported a significant association between fertility awareness knowledge and the period of abstinence [31]. Comprehensive sexuality education in schools should

also emphasize fertility awareness to improve knowledge among adolescent girls.

Breaking barriers and improving attitudes toward accessing modern contraceptives can reduce health risks and promote good health practices among adolescent girls. In this study, girls reported barriers ranging from social-economic beliefs to attitudes of health workers. Most of the girls in our study did not use contraceptives because they lived far from health services, believed that contraceptives were for married women, and felt that health workers had poor attitudes. Other studies have also reported these barriers. In Ntcheu, long distances to health facilities hindered pregnant women from starting antenatal clinics early [32]. Elsewhere, health workers' beliefs and poor attitudes were also reported as barriers to accessing health services by adolescents [33, 34]. Adolescent girls might be attracted to using contraceptives if health services are brought closer through outreach clinics, through health education on the side effects of contraceptives, and friendly health workers. Adolescents should be given safe spaces so that they feel free to share their reproductive health needs with health workers.

Girls in our study indicated that they would prefer if modern contraceptives were available in schools in the same way as iron tablets. Additionally, girls suggested that community midwives and health surveillance assistants should have contraceptives within the communities. However, these community health workers should be trusted to maintain confidentiality and protect adolescents. A lack of confidentiality among some health workers and the need for modern contraceptives available in schools have been reported in other studies [35, 36]. Moreover, girls would prefer female teachers to be trained to provide modern contraceptives in schools. Adolescent girls trust their female teachers more than they do healthcare workers. Girls are confident that female teachers can better keep secrets than health workers who are judgmental. Currently, the existing education policy in Malawi does not allow contraceptives to be delivered on school premises [37]. We suggest that policies should be changed to accommodate the recommendations of adolescents. Health and education authorities must work together to respond to the current needs of adolescent girls in the Phalombe district of Malawi.

Public health agencies should explore strategies to reduce ESD and subsequent unintended pregnancies. These strategies depend on knowledge of barriers to successful implementation, resource availability, and monitoring of prevention programs. Strategies aimed at reducing unintended adolescent pregnancies include accurate knowledge of fertile periods and contraceptives, abstinence from sexual intercourse, the use of modern contraceptives, and adolescent-friendly

sexual reproductive facilities [28]. Modern contraceptive methods include birth control pills, patches, injectables, intrauterine devices (IUDs), implants, female and male sterilization, female and male condoms, and other barrier methods. Barriers to the use of modern contraceptives include fear of side effects, fear of being judged by family and friends, rumors surrounding contraceptives, pressure from family members, social-cultural norms, religious beliefs, and health workers' behaviors [38, 39]. Adolescents reportedly believe various myths and misconceptions, experience prohibitive social norms and negative attitudes toward health professionals, and experience overconfidence in the ability of traditional and folk methods to prevent pregnancies [40].

Adolescents should be provided with accurate information on fertility and contraceptives and be encouraged and motivated to improve their use [41]. Adolescent girls can be motivated through supportive social networks, friendly providers who offer for privacy and confidentiality, readily availability, affordability, and accessibility of contraceptives close to their homes [42, 43]. These motivators should be accompanied by clear and well-defined approaches that should attract adolescent girls to seek and obtain modern contraceptives voluntarily. Contraceptive uptake among adolescents can be improved through community-based outreach, youth-friendly contraceptive services, social marketing, and the use of peers as contraceptive distributors [44, 45]. Adolescents have further suggested that contraceptives be provided by local drug stores, pharmacies, and hospitals; improved counseling at the health system level; and youth centers, clubs, and corners at the community level [46, 47]. Improving the knowledge of the fertile period, breaking barriers, and establishing convenient ways of providing contraceptives among adolescent girls may reduce unintended pregnancies and improve the health status of this age group.

#### **Study limitations**

The quantitative component used a small sample size as a reference group on religious beliefs, which may not reflect the beliefs of Muslim girls ( $n=11$ ). Unfortunately, in the qualitative study, we could not produce the religious belief themes that could have qualified the claim in the quantitative strand. Again, since the survey used face to face interview which is subject to social desirability bias, however the study used a number of strategies to reduce the bias, including proper training to the data collectors, using validated questions, using a private place for administering the questionnaire, established good rapport prior to data collection.

## Conclusion

Adolescent girls in the Phalombe district have little knowledge of the fertility window, which may lead to unintended pregnancies. Adolescent girls are unable to access contraceptives due to various structural barriers, including non-youth-friendly health services. Adolescent friendly health services are needed to improve knowledge on sexuality including on fertile period, improve access to modern contraceptives and limit unintended pregnancies among adolescent girls in the Phalombe district. Such structures might include comprehensive sexuality education, contraceptive services provision in schools and in the community through community midwives and health surveillance assistants. This study, therefore, advocates for policy change to allow contraceptives to be delivered in schools.

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## Author contributions

PLH conceptualized the study, designed the study, supervised the data collection, conducted the quantitative data analysis, interpreted the results, and prepared the draft manuscript. FM designed the study, supervised the data collection, interpreted the results, and reviewed and edited the manuscript. LP interpreted the results and reviewed and edited the manuscript. LT conducted the data analysis. CSC conceptualized the study, designed the study, supervised the data collection, conducted the qualitative data analysis, prepared the draft manuscript, interpreted the results, and reviewed and edited the manuscript.

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## Availability of data and materials

The datasets used during the current study are available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent to participate

The National Health Sciences Research Committee (NHSRC) approved the study protocol under registration number # 2 I/0312668. Written informed consent was sought from adolescent girls who were 18 years and older; however, we also sought permission from the legal guardians of girls younger than 18 years before collecting data.

### Competing interests

The authors declare no competing interests.

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## References

- WHO. Adolescent pregnancy. World Health Organisation <https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy>. Accessed 25 Apr 2024
- Amoateng AY, Baruwa O. Changes in the timing of sexual intercourse in Ghana: evidence from the demographic and health survey data. *Afr Popul Stud*. 2019. <https://doi.org/10.1156/32-3-1350>.
- Michael TO, Ojo TF, Ijabadeniyi OA, Ibikunle MA, Olukayode OJ, Agboola AA. Prevalence and factors associated with contraceptive use among sexually active adolescent girls in 25 sub-Saharan African countries. *PLOS ONE*. 2024. <https://doi.org/10.1371/journal.pone.0297411>.
- Kantorová V, Wheldon MC, Ueffing P, Dasgupta ANZ. Estimating progress towards meeting women's contraceptive needs in 185 countries: a Bayesian hierarchical modelling study. *PLOS Med*. 2020. <https://doi.org/10.1371/journal.pmed.1003026>.
- Government calls for improved access to family planning services. UNFPA <https://malawi.unfpa.org/en/news/government-calls-improved-access-family-planning-services#:~:text=%E2%80%9CIn%20Malawi%2C%20contraceptive%20prevalence%20rate,%2F1000%2C%E2%80%9D%20she%20said>. Accessed 23 Mar 2024
- Malawi Demographics and Health Survey. Malawi Government. National Statistics Office [http://www.nsomalawi.mw/index.php?option=com\\_content&view=article&id=222&Itemid=108](http://www.nsomalawi.mw/index.php?option=com_content&view=article&id=222&Itemid=108)
- Chaura T, Mategula D, Gadama LA. Adolescent pregnancy outcomes at Queen Elizabeth Central Hospital, Malawi: a cross-sectional study. *Malawi Med J*. 2021;33(4):261–8.
- Nash K, O'Malley G, Geoffroy E, Schell E, Bvumbwe A, Denno DM. Our girls need to see a path to the future" – perspectives on sexual and reproductive health information among adolescent girls, guardians, and initiation counselors in Mulanje district, Malawi. *Reprod Health*. 2019. <https://doi.org/10.1186/s12978-018-0661-x>.
- Natural Family Planning as a Means of Preventing Pregnancy. Women's Health Policy <https://files.kff.org/attachment/Fact-Sheet-Natural-Family-Planning-as-a-Means-of-Preventing-Pregnancy>. Accessed 23 Mar 2024
- Simmons RG, Jennings V. Fertility awareness-based methods of family planning. *Best Pr Res Clin Obstet Gynaecol*. 2020. <https://doi.org/10.1016/j.bpobgyn.2019.12.003>.
- Zegeye AF, Tamir TT, Mekonen EG, Workneh BS, Negash WD, Mekonnen CK. Individual and community-level determinants of knowledge about fertile periods among adolescent girls and young women (10–24 years) in Sub-Saharan Africa: a multilevel mixed effect analysis of a recent demographic and health survey. *Heliyon*. 2024. <https://doi.org/10.1016/j.heliyon.2024.e26756>.
- Wolde M, Kassie A, Shitu K, Azene ZN. Knowledge of fertile period and its determinants among women of childbearing age in Ethiopia: a multilevel analysis based on 2016 Ethiopian demographic and health survey. *Front Public Health*. 2022. <https://doi.org/10.3389/fpubh.2022.828967>.
- Rees M. The age of menarche. *ORGYN*. 1995;4:2–4.
- Mohammedl S, Larsen-Reindorf RE. Menstrual knowledge, sociocultural restrictions, and barriers to menstrual hygiene management in Ghana: evidence from a multi-method survey among adolescent schoolgirls and schoolboys. *PLoS ONE*. 2020;5(10): e0241106.
- Shah SF, Punjani NS, Rizvi SN, Sheikh SS, Jan R. Knowledge, attitudes, and practices regarding menstrual hygiene among girls in Ghizer Gilgit Pakistan. *Int J Env Res Public Health*. 2023. <https://doi.org/10.3390/ijerph20146424>.
- Doyle L, McCabe C, Keogh B, Brady A, McCann M. An overview of the qualitative descriptive design within nursing research. *J Res Nurs*. 2020;25(5):443–55.
- Skenard CC, Mpachika-Mfipa F, Tshotetsi L, Hajison PL. School-going adolescent girls' preferences and views of family planning services in Phalombe district Malawi: a descriptive, cross-sectional study. *Public Libr Sci San Franc CA USA*. 2022. <https://doi.org/10.1371/journal.pone.0267603>.

18. Dasari M, Borrero S, Akers AY, Sucato G, Dick R, Hicks A, et al. Barriers to long-acting reversible contraceptive uptake among homeless young women. *J Pediatr Adolesc Gynecol*. 2016. <https://doi.org/10.1016/j.jpaa.2015.07.003>.
19. Nowak A, Nowak A, Kielbowicz M. Foreign bodies inside us - Trends and knowledge regarding long-acting reversible contraceptives (LARCs) use, factors influencing of contraceptives choice-making process, and the dual-method use among Polish college-aged women. *J Educ Health Sports*. 2023;15:90–105.
20. Pritt N, Norris A, Berlan E. Barriers and facilitators to adolescents' use of long-acting reversible contraceptives. *J Pediatr Adolesc Gynecol*. 2017;30(1):18–22.
21. Ninsiima LR, Chiumia IK, Ndejjo R. Factors influencing access to and utilisation of youth-friendly sexual and reproductive health services in sub-Saharan Africa: a systematic review. *Reprod Health*. 2021;18:1–17.
22. Muula AS, Chipeta E, Mussa R, Mhango P, Ajay AI, Karibu CW, et al. Increasing Adolescents' Access to Sexual and Reproductive Health Information and Services in Malawi: A Problem Driven Political Economy Analysis. KnowHub Software <https://aphrc.org/publication/increasing-adolescents-access-to-sexual-and-reproductive-health-information-and-services-in-malawi-a-problem-driven-political-economy-analysis/>
23. Hoopes AJ, Gilmore K, Cady J, Akers AY, Ahrens KR. A qualitative study of factors that influence contraceptive choice among adolescent school-based health center patients. *J Pediatr Adolesc Gynecol*. 2016;29(3):259–64.
24. Gold MA, Sheftel AV, Chiappetta L, Young AJ, Zuckoff A, DiClemente CC, et al. Associations between religiosity and sexual and contraceptive behaviors. *J Pediatr Adolesc Gynecol*. 2010;23(5):290–7.
25. Brewster KL, Cooksey EC, Guilkey DK, Rindfuss RR. The changing impact of religion on the sexual and contraceptive behavior of adolescent women in the United States. *J Marriage Fam*. 1998. <https://doi.org/10.2307/353864>.
26. Okonofua FE. Factors associated with adolescent pregnancy in rural Nigeria. *J Youth Adolesc*. 1995;24(4):419–38.
27. Ignaciuk A, Kelly L. Contraception and catholicism in the twentieth century: transnational perspectives on expert, activist and intimate practices. *Med Hist*. 2020;64(2):163–72.
28. Zegeye A, Tamir T, Mekonen E, Workneh B, Negash W, Mekonnen C. Individual and community-level determinants of knowledge about fertile periods among adolescent girls and young women (10–24 years) in Sub-Saharan Africa: a multilevel mixed effect analysis of a recent demographic and health survey. *Heliyon*. 2024;10(5):1.
29. McCurdy Rebekah Jo, MD; Schnatz, Peter Frederick DO. Fertility awareness in adolescents in Sub-Saharan Africa. *Obstet Gynecol*. 2015. <https://doi.org/10.1097/01.AOG.0000463240.48074.9f>.
30. Baku PM, Nyarko SH. Ghanaian male adolescents' knowledge about female fertile perio. *Ghana J Geogr*. 2018;10(2):23–35.
31. Akoku DA, Achombwom VT, Tihnje MA, Nzubepie IB. Childbearing intentions, fertility awareness knowledge and contraceptive use among female university students in Cameroon. *PLoS ONE*. 2018. <https://doi.org/10.1371/journal.pone.0276270>.
32. Chimatiro CS, Hajison P, Chipeta E, Muula A. Understanding barriers preventing pregnant women from starting antenatal clinic in the first trimester of pregnancy in Ntcheu District-Malawi. *Reprod Health*. 2018. <https://doi.org/10.1186/s12978-018-0605-5>.
33. Garney W, Wilson K, Ajayi KV, Panjwani S, Love SM, Flores S, et al. Social-ecological barriers to access to healthcare for adolescents: a scoping review. *Int J Env Res Public Health*. 2021. <https://doi.org/10.3390/ijerph18084138>.
34. Wakjira DB, Habedi D. Barriers to access and utilisation of sexual and reproductive health services among adolescents in Ethiopia: a sequential mixed-methods study. *BMJ Open*. 2022. <https://doi.org/10.1136/bmjopen-2022-063294>.
35. Ghafari M, Shamsuddin K, Amiri M. Barriers to Utilization of Health Services: Perception of Postsecondary School Malaysian Urban Youth. *Int J Prev Med*: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4124555/pdf/IJPVM-5-805.pdf>. Accessed 24 Mar 2024
36. Sullivan EE, Love HL, Fisher RL, Schlitt JJ, Cook EL, Soleimanpour S. Access to contraceptives in school-based health centers: progress and opportunities. *Am J Prev Med*. 2022. <https://doi.org/10.1016/j.amepre.2021.08.030>.
37. Dombola G, Manda W, Chipeta E. Factors influencing contraceptive decision making and use among young adolescents in urban Lilongwe, Malawi: a qualitative study. *Reprod Health*. 2021. <https://doi.org/10.1186/s12978-021-01259-9>.
38. Wondimagegne YA, Debelew GT, Koricha ZB. Barriers to contraceptive use among secondary school adolescents in Gedeo zone South Ethiopia: a formative qualitative study. *BMJ Open*. 2023. <https://doi.org/10.1136/bmjopen-2021-060582>.
39. Dioubaté N, Manet H, Bangoura C, Sidibé S, Kouyaté M, Kolie D, et al. Barriers to contraceptive use among urban adolescents and youth in Conakry in Guinea. *Front Glob Womens Health*. 2019. <https://doi.org/10.3389/fgwh.2021.655929>.
40. Cohen N, Mendy FT, Wesson J, Plotti A, Cissé C, Gueye EB, et al. Behavioral barriers to the use of modern methods of contraception among unmarried youth and adolescents in eastern Senegal: a qualitative study. *BMC Public Health*. 2020. <https://doi.org/10.1186/s12889-020-09131-4>.
41. Self A, Chipokosa S, Misomali A, Aung T, Harvey SA, Chimchere M, et al. Youth accessing reproductive health services in Malawi: drivers, barriers, and suggestions from the perspectives of youth and parents. *Reprod Health*. 2018. <https://doi.org/10.1186/s12978-018-0549-9>.
42. Bain LE, Amu H, Tarkang EE. Barriers and motivators of contraceptive use among young people in Sub-Saharan Africa: a systematic review of qualitative studies. *Plos One*. 2021. <https://doi.org/10.1371/journal.pone.0252745>.
43. Bankole A, Malarcher S. Removing barriers to adolescents' access to contraceptive information and services. *Stud Fam Plann*. 2010;41(2):117–24.
44. Youth Contraceptive Use: Effective Interventions [Internet]. Population Reference Bureau; <https://www.prb.org/wp-content/uploads/2020/12/PRB20Youth20Policies20Reference20Guide.pdf#:~:text=Social%20marketing%3A%20Combine%20mass%20m>. Accessed 23 Mar 2024
45. Evaluation of Youth-Friendly Health Services in Malawi. Lilongwe. [Internet]. Malawi Goivernment, Ministry of Health <https://www.e2aproject.org/wp-content/uploads/evaluation-summary-yfhs-malawi.pdf>. Accessed 24 Mar 2024
46. Makwinja AK, Maida ZM, Nyondo-Mipando AL. Delivery strategies for optimizing uptake of contraceptives among adolescents aged 15–19 years in Nsanje District, Malawi. *Reprod Health*. 2021. <https://doi.org/10.1186/s12978-020-01065-9>.
47. Muula A, Lusinja AC, Phiri C, Majawa P. Youth clubs' contributions towards pro- motion of sexual and reproductive health services in Machinga District. Malawi. *Tanzan J Health Res*. 2015. <https://doi.org/10.4314/thrb.v17i3.6>.

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