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Risk Factors of Rapid Repeat Pregnancy amongst Adolescents in the Greater Accra Region, Ghana: A Case-Control Study

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ABSTRACT

Rapid repeat pregnancy (RRP) is the pregnancy onset within 24 months of the previous pregnancy outcome. RRP is known to result from different situations and as such might create different risks to the individual. Several studies have shown different risks factors; there is a pint-size consensus as to which risk factors are the very key predictors of RRP among adolescents in this region.

A mixed method approach (quantitative and qualitative) was used for this study which was conducted in 12 public health facilities in the Greater Accra Region. An unmatched case-control study design was used for the study. The cases were adolescent girls aged between 15 and 19 years who have had more than one pregnancy within two years. Controls were adolescent girls aged between 15 and 19 years who have had one pregnancy which either ended an abortion or delivery with more than twenty-four months spacing. The sample size for the quantitative method was n=

417 with 209 controls and 208 cases. Both the qualitative and quantitative components were hospital-based. Six FGDs were conducted among the control group in six of the selected hospitals and involved a total of forty-six adolescents. Eleven In-depth Interviews (IDI) were also held with every eligible adolescent who had experienced RRP (case) in six of the twelve health facilities selected for the research. STATA 15 MP (StataCorp, College Station, TX, USA) was used to analyze the quantitative aspect of the work. Univariate, bivariate and multivariate logistic regression analyses were conducted with p-value of <0.05 considered as significant.

The median ages at menarche between cases and controls were 12 and 13 years respectively and it was observed that most of the girls who experienced menarche at age 12 years and below were involved in early sexual activity (age at first sexual intercourse) than those who did not. The peers of the adolescents were the main source of information on issues of sex among the cases as compared with the control group. In a univariate analysis, variables that showed significance as risk factors for RRP were planning of last pregnancy, history of miscarriage, married or living with partner, parental care, and at least 4 ANC visits. All these variables were significantly associated with odds of RRP. There was evidence that the odds of RRP for the adolescents who have ever had a miscarriage was about eight times more than that among those who have never had a miscarriage (aOR=7.92; 95%CL: 3.18-19.71; $p<0.0001$).

This research has identified the main risk factors of RRP to be, age at menarche, marital status, parental care and support, number of times of ANC visits, sex education and transactional sex. The results from this study could provide an insight into designing targeted interventions by policy makers and other stakeholders.

Keywords: Rapid Repeat Pregnancy, unmatched case-control, mixed method, Antenatal visits, transactional sex, menarche, cases, controls.

Introduction

Rapid repeat pregnancy (RRP) in adolescents is a global health concern. In 2017, 22.5 million adolescents aged 15–19 years in 60 countries gave birth and, of these, approximately 4.1million gave birth to a second or higher-order child [1], [2]. In Ghana there is a high teenage pregnancy rate (17.8%), with one in five girls married before age 18 and one in twenty before age 15 [3], and adolescents account for nearly 30% of all recorded births [4]. While many adolescent births occur within 'socially sanctioned' marriage, it is likely that many of the closely spaced pregnancies are unintended. Ross and Colleagues analyzed 27 Demographic and Health Surveys among women aged 15–49, who were within 1 year of their last delivery, for unmet need for contraception and found that only a small proportion want another birth within two years [5].

Adolescent pregnancy exposes young mothers and their children to health and socio-economic risks. In a World Health Organization multi-country survey on maternal newborn health among >124,000 mothers in 29 countries, Ganchimeg and Colleagues found that the risk of eclampsia, puerperal endometritis, systemic infections, low birthweight, preterm delivery, and severe neonatal conditions among adolescent mothers aged 10–19 years was higher than that among mothers aged 20–24 years [6]. Several other studies also showed that adolescent mothers are less likely to complete school or participate in the labour force and earn less in their jobs when they do work [7] , [8]. Rapid repeat pregnancies, also pose their own set of risks including increased risks of preterm birth, low birthweight, small for gestational age, and infant and early childhood mortality [9], [10].

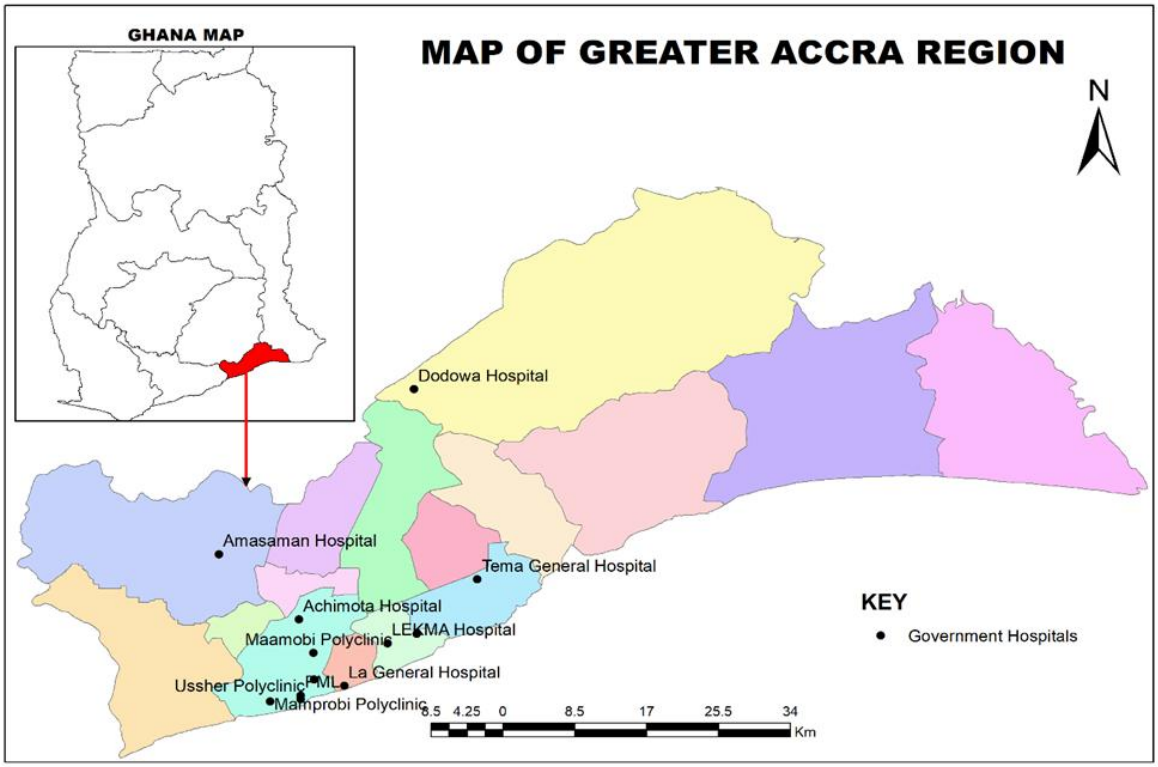
RRP is associated with several factors [11],[12]and current interventions address specific aspects of these factors [13]. But a single component intervention cannot address the problem adequately. It is apparent that, to address the adolescent repeat pregnancy problem, interventions should be designed to incorporate a multifaceted and interdisciplinary management not only limited to the risk factors and risk-behavior, but also social and cultural factors that influence young people's decision making [14] . In this study, we sought to identify factors independently associated with rapid repeat pregnancy among adolescents aged 15–19 years. The findings from this study could help in redesigning interventions for improved adolescent health.

Methods

Study area

This study was in the Greater Accra Region (GAR) of Ghana. Information about the study area including geography, demography, health facilities and healthcare provision were extracted from the 2014 Demographic and Health Survey and the Greater Accra Regional Health Directorate's annual report for 2016 [15]. There were ten hospitals (regional, metropolitan, municipal, and district) within the GAR; nine of which were included in the study plus three polyclinics: Greater Accra Regional Hospital, Achimota Hospital, Ga South Hospital, Maamobi Government Hospital, Shai Osudoku Hospital, Tema General Hospital, La General Hospital, Amasaman Hospital, LEKMA Hospital, LEKMA Polyclinic, Ussher Polyclinic, and Mamprobi Polyclinic. The geolocation of the study sites is shown in the Map (Figure 1).

Figure 1: Map of the Greater Accra Region showing study sites



Study design and participants

This was a mixed method design in which the quantitative component was an unmatched hospital-based case-control study design. The cases were adolescent girls between the ages of 15 and 19 years who had experienced more than one pregnancy within twenty-four months. Controls were adolescent girls between the ages of 15 and 19 years who had experienced one pregnancy which either ended in an abortion or delivery with more than twenty-four months spacing. These groups of adolescents (cases and controls) were identified and assessed for eligibility to participate in the study. Data on risk factors for each case and control participant were collected retrospectively.

Research assistants included nurses in the health facilities who were trained for this study. The nurses screened each girl presenting at MVA, family planning, Antenatal, child welfare clinics, and adolescent health corners for eligibility. An adolescent was eligible for a case if she had more than one pregnancy and became pregnant again within 12 months of previous pregnancy outcome. Girls who have never been pregnant and below age 15 years and above 19 years were excluded. All participants signed informed consent form.

Study procedures

Using semi-structured questionnaires, the research assistants collected socio-demographic, knowledge and use of contraceptives, sex education, media influence, support system, mental health, and self-efficacy data on eligible participants. For self-efficacy, each participant was asked to score six items on the scale of 1 “very unsure” to 5 “very sure”. The main data collection started in October 2017 and ended in January 2018. The questionnaire was administered to each participant after she had signed, or thumb printed the informed consent form. Generally, the questionnaire was self-administered by study participants who could read and write English. In instances where an adolescent did not have formal education, this was interviewer-administered. Each week, the administered questionnaires were checked for completeness and consistency after which it was entered into a database designed for this study using SPSS version 21 platform (SPSS Inc., Chicago, IL).

Six health facilities were selected for the qualitative component. These facilities were chosen based on patient volume. Eleven in-depth interviews (IDI) were held (Table 1) for every fourth eligible adolescents who have had RRP (case). We opted the in-depth interview to allow adolescents who might not want to open to answer questions in the focus group to do so freely in a one-on-one

session with the interviewing nurse. The main purpose of the in-depth interviews was to gather detailed information on their experiences, feelings, and attitudes towards the use of contraception and birth spacing.

Table 1: In-Depth Interviews for Adolescents with RRP and FGDs for Adolescent without RRP

IDIs		**FGDs**	
Health Facility	**Number of In-depth interviews**	**Health Facility**	**Number of participants in FGDs**
Ga South	1	Dodowa	8
Dodowa	2	Mamprobi	8
Usherr Polyclinic	3	La General	9
Mamobi	2	Tema General	7
La General Hospital	1	Amasaman	6
Tema General Hospital	2	LEKMA	8
Total	**11**		**46**

Six focus group discussions (FGDs) were conducted with a total of 46 participants (Table 1). None of the participants who took part in the IDI was eligible for the FGD. This was done only among the control group to find out how adolescents who have had one pregnancy do to prevent a second pregnancy. They discussed issues concerning knowledge and use of contraceptives, sex education, antenatal, perinatal, and postnatal counselling and suggestions that will help in delaying childbirth. Demographic information such as age, area of residence, religion, ethnicity, and occupation were taken from all the participants before the commencement of both the IDIs and the FGDs. Codes were also given to the FGD participants. The codes were used to address or call them during the period of discussion to enhance anonymity. Their consents were sought before the interviews took place.

Data Analysis

Categorical variables were summarized using proportions whereas continuous variables were summarized using median and interquartile range. Each categorical variable was compared between cases and controls using the Pearson's Chi-square test of association, whereas continuous variables were compared using the Wilcoxon rank sum test. Multivariate logistic regression was used to identify factors independently associated with the odds of RRP. Variables that had a likelihood ratio of $p<0.2$ with RRP were candidates for inclusion in the multivariate analysis. All analyses were performed using Stata 15 MP (StataCorp, College Station, TX, USA).

All interviews and discussions were audio recorded. Two of the IDIs were conducted in English language while the rest were done mainly in Twi and Ga languages. Those done in Twi and Ga languages were transcribed word for word into English language. Absolute content of all the transcribed interviews was put in Microsoft word and reviewed by independent persons. Thematic content analysis was adopted for the analysis of the qualitative data. Thematic content analysis involved four interrelated steps consisting of reading through textual data, identifying themes in the data, coding those themes, and then interpreting the structure and content of the themes [16].

Ethical statement

The Ghana Health Service Ethics Review Committee approved the study (GHS-ERC 05/05/17). Further approvals were sought from all participating health facilities. All methods were performed in accordance with the relevant guidelines and regulations, including the Declaration of Helsinki. Written informed consent was obtained before performing all the interviews. As the study involved adolescents who were minors(aged 15-17 years), written informed consent was also obtained from a parent and/or legal guardian prior to their participation, and written assent was

obtained from the minor participants themselves. The study materials were handled confidentially and so no names were mentioned in the reports of the studies. Only the research team had access to the answered questionnaire.

Results

Table 2: Characteristics of participants by case control status

Characteristics	Control Number of adolescents (% of total) (n=231)	Case Number of adolescents (% of total) (n=186)	Pearson chi2 P-value
Age (Years)			
Median (IQR)	18 (17, 19)	19 (18, 19)	<0.001***
14-15	37 (16.0)	12 (6.0)	
16-17	94 (42.0)	49 (27.0)	<0.001
18-19	96 (42.0)	123 (67.0)	
Religion			
Orthodox*	75 (33.0)	52 (29.0)	
Pentecostal	115 (50.0)	87 (48.0)	
Other Christians**	14 (6.0)	10 (5.0)	0.325
Islam	20 (9.0)	25 (14.0)	
Traditionalist/none	5 (2.0)	8 (4.0)	
Marital status			
Single/divorced/separated/widowed	147 (64.0)	70 (38.0)	<0.001
Married and or living together	84 (36.0)	116 (62.0)	
Highest level of education			
None	17 (7.0)	18 (10.0)	
Primary	51 (22.0)	37 (20.0)	0.790
Junior high school	111 (48.0)	92 (49.0)	
Secondary+	52 (23.0)	39 (21.0)	
Sch. drop-out [1]	175 (76.0)	156 (84.0)	0.042
Currently working			
No	128 (62.0)	87 (55.0)	0.189
Yes	80 (38.0)	72 (45.0)	

Number of siblings			
None	5 (2.0)	7 (4.0)	
1	13 (6.0)	8 (4.0)	
2	46 (20.0)	33 (18.0)	0.806
3	64 (28.0)	54 (29.0)	
4+	101 (44.0)	83 (45.0)	

Includes Catholic, Anglican, Methodist, Presbyterian,

**include SDA, Jehovah's witness etc.

*** P-value was estimated using Wilcoxin ranksum test

1 stopped schooling with reasons other than pregnancy

A total number of four hundred and seventeen (n=417) adolescents, comprising two hundred and thirty-one (n=231) controls and one hundred and eighty-six (n=186) cases were selected (Table 1). The age distribution among the adolescent girls who were interviewed ranged from 15 to 19 years. About 64% of the controls reported to be single whereas 38% of the cases reported to be single. The percentage of cases who were married and or cohabiting were seen to be (62%) (Table 1). This shows that respondents who had experienced RRP (cases) were more likely to be either married or cohabiting. This was also shown as significant between both cases and controls ($p<0.001$).

Table 3: Sex education, media influence and initiation of sex by case-control status

	Control	**Case**	
Characteristics	**Number of mothers (% of total) (n=231)**	**Number of mothers (% of total) (n=186)**	**Pearson chi^2 P-value**
Received any form of sex education			
No	47 (20.0)	42 (23.0)	0.499
Yes	183 (79.0)	139 (77.0)	
Main source of information on sex education			
Peer	44 (24.0)	43 (30.0)	
Parent	34 (18.0)	37 (26.0)	0.168
Mass media	18 (10.0)	10 (7.0)	
Social media	10 (5.0)	9 (6.0)	

Health professional	61 (33.0)	31 (21.0)	
Other	18 (10.0)	15 (10.0)	
Who initiated you into sex			
Friend	160 (75.0)	120 (70.0)	0.491
Sibling	8 (4.0)	8 (5.0)	
Relative	9 (4.0)	13 (8.0)	
Other	35 (17.0)	29 (17.0)	
How were you initiated into sex			
Alcohol influence	11 (5.0)	17 (9.0)	0.279
Financial gain	63 (29.0)	43 (24.0)	
Rape	19 (9.0)	11 (6.0)	
Consensual	118 (54.0)	105 (58.0)	
Belong to any social media group			
No	122 (55.0)	95 (56.0)	0.945
Yes	99 (45.0)	76 (44.0)	
If yes, does it have any influence on your sexual behavior?			
No	75 (78.0)	53 (77.0)	0.842
Yes	21 (22.0)	16 (23.0)	

Risk factors of Rapid Repeat Pregnancy

In a univariate analysis, the results showed that the odds of RRP was more likely to be increased by about 41% for a one year increase in the age of the adolescent (odds ratio (OR)=1.41; 95% confidence interval (CI)= [1.22-1.63]; p<0.0001), whereas the odds of RRP among those who planned their last pregnancy was about three times that among those who did not plan the last pregnancy (OR=3.33; 95%CI= [1.36-8.17]; p=0.009) (Table 2). The odds of RRP among those who had history of miscarriage was about seven times that among those who did not have history of miscarriage (OR=6.62; 95%CI= [3.59-12.22]; p<0.0001). For those who were married or living with a partner, the odds of RRP was about three times that found among those who were single or divorced or separated (OR=2.90; 95%CI= [1.94-4.33]; p<0.0001) (Table 2). Those who felt they

had adequate parental care had a 35% reduction in odds of RRP (OR=0.65; 95%CI= [0.43-0.96]; p=0.031) (Table 2). Similarly, there was about 33% reduction in odds of RRP among those who had counselling after their last pregnancy (OR=0.67; 95%CI= [0.44-1.03]; p=0.066). For those who had at least four ANC visits, the reduction in odds of RRP was about 53% (OR=0.47; 95%CI= [0.31-0.69]; p<0.0001) (Table 2).

In a multivariable analysis, the odds of experiencing RRP among the adolescent girls increase by 51% for each year advancement in age (adjusted OR (aOR): 1.51, 95% CI: 1.20 – 1.89, p<0.0001) (Table 3), suggesting that the older an adolescent the more likely that she will register repeat pregnancy. There was also overwhelming evidence that the odds of RRP for the girls who have ever had a miscarriage was about eight times that among those who have never had a miscarriage (aOR=7.92; 95%CI: 3.18 - 19.71; p<0.0001) (Table 3). Those who were married or living with partner were two times more likely to have RRP compared to those who were single or not living together (aOR=2.19; 95%CI: 1.22 - 3.94; p=0.009) (Table 3). There was borderline evidence for planned last pregnancy (aOR=3.42; 95%CI: 0.96, 12.21; p=0.058), partner support after first pregnancy (aOR=1.90; 95%CI: 0.97, 3.70; p=0.059), and having counselling after first pregnancy (aOR=0.53; 95%CI: 0.28, 1.01; p=0.052) (Table 3).

Table 4: Factors independently associated with odds of rapid repeat pregnancy among adolescent girls aged 15-19 years (n=274)

Factors	Crude OR [95%CI]	p-value	Adjusted OR [95%CI]	Wald p-value
Age (years) at menarche [1]	1.07 [0.94, 1.21]	0.301	0.86 [0.72, 1.02]	0.086
Age of the adolescent [1]	1.41 [1.22, 1.63]	**<0.0001**	1.51 [1.20, 1.89]	**<0.0001**
Age of the father at first pregnancy [1]	1.03 [0.98, 1.08]	0.206		
Stopped schooling with reasons other than pregnancy (sch. drop-out)	1.66 [1.02, 2.72]	0.043		

Planned last pregnancy	3.33 [1.36, 8.17]	**0.009**	3.42 [0.96, 12.21]	0.058
Had history of miscarriage	6.62 [3.59, 12.22]	**<0.0001**	7.92 [3.18, 19.71]	**<0.0001**
Self-efficacy (>= median score)	0.73 [0.50, 1.08]	0.115		
Partner support after first pregnancy	1.47 [0.96, 2.27]	0.078	1.90 [0.97, 3.70]	0.059
Married or living with partner	2.90 [1.94, 4.33]	**<0.0001**	2.19 [1.22, 3.94]	**0.009**
Had support from parents/guardian after first pregnancy	0.65 [0.42, 0.99]	0.046		
Felt I had adequate parental care	0.65 [0.43, 0.96]	**0.031**	0.66 [0.37, 1.17]	0.157
Had counseling after first pregnancy	0.67 [0.44, 1.03]	0.066	0.53 [0.28, 1.01]	0.052
Had at least 4 ANC visits during first pregnancy	0.47 [0.31, 0.69]	**<0.0001**	0.64 [0.35, 1.17]	0.144
Used LARC postpartum first child	0.39 [0.14, 1.09]	0.074		

1These variables were modelled on a continuous scale so that the effect corresponds to a unit increase. All other variables were modelled on a binary scale, the reference category was omitted in the presentation

The social support available to adolescents according to this study were seen to also contribute to RRP. The findings showed that most of the adolescents (both cases and controls) did receive some form of support from parents/guardians.

> *"...hm... I don't care about anything; I mind my own business. I'm not interested in anybody. My boyfriend treated me like a 'rag', he does not give me any money or any kind of support. I have really suffered and it's only by the grace of God that I'm here talking to you. This is my third termination and I don't think I can go into any relationship again." (IDI, case, 16years, Ussher)*

Most adolescents who were married reported that their partners supported them financially but they received insufficient support which forced them to start work as soon as they delivered their babies. This situation sometimes drives them to go for support from other sources and other men.

"I started selling chewing stick when I asked my partner for money and he said NO. I cannot go and beg for money or do prostitution while I am pregnant. I had to force myself so I wake up at dawn and go to the bus stations every day to sell though I was not feeling too well. That caused me the miscarriage…." (IDI, case, 16 years, La General).

"My partner was sending me money every three months when I was pregnant. He stopped when I delivered but sent me money occasionally. My parents felt very disappointed with him because he was really delaying in sending money sometimes. I got another man four months after I gave birth who behaved as if he was caring and always providing for me so I started "dating" him. That was how I got pregnant the second time." (IDI, case, 17 years, Mamobi Hospital).

Discussion

There were several factors that were measured statistically to find out the risk factors of RRP. The main factors that could influence the risk of RRP included;

- The age of the adolescent.
- Married or living with partner
- Parental care and Support
- ANC visits
- Transactional sex

The age distribution among the adolescent girls was from 15 to 19 years. Majority (67%) of the cases were between the 18-19years age group which constitute the late adolescent period compared with (42%) controls. The differences in ages between cases and controls were seen to be statistically significant ($p<0.0001$) with median ages of 19 years for cases and 18years for controls.

This shows that the older the adolescent the more likely she will experience RRP. This has been confirmed by Vieira et al. [17] who stated that when adolescents conceive at a younger age, the probability that the adolescent will experience RRP is high. Another study by [18], reported that RRP is highly prevalent among adolescents within the ages of 18 to 19.

In the earlier days societal and cultural restrictions governed premarital sex and early onset of sex to reduce the risks of pregnancy and unwanted childbirth [19] . In most cases sexual intercourse was prohibited before initiation rites have been performed [20]. Risk taking behaviors are considered by most adolescents to be normal. Experimentation such as joining friends for parties, alcohol intake and involving into sexual activities out of curiosity represents an adolescent [21]. Among these risks is the early onset of sexual intercourse. According to this study, more than 50% of the adolescent girls for both cases and controls stated that they did not go through any coercion that is there was consensual agreement between their partners and themselves during their first sexual intercourse. Some of the reasons for the consensual sex were for financial gains and these were mainly transactional.

In Ghana many parents, societies and cultures frown on discussing sexual matters with their adolescents. Sexual intercourse in Ghana is seen as a preserved of only married adults due to religious, cultural, and social reasons [22]. In this study more than 70% of both cases and controls had received some form of sex education. Out of these percentage about forty percent of both groups had their source of education from peers. Most of them indicated that, their parents did not feel too comfortable discussing issues on sexual health with them. The qualitative study again showed a higher number of adolescent girls who indulged in exchanging love/sex for money with most at times the partners being far older than them. The control which an older person has over their younger partner can lead to manipulation, emotional harm and physical violence [16]. Though

transactional sex did not show any statistical association with RRP in the quantitative study, it was very substantial in the qualitative study. The qualitative results showed that in both groups transactional sex preceded the pregnancy. It can also lead to serious health issues.

Conclusion

Significant predictors of rapid repeat pregnancy included younger age, low socioeconomic status, low education of adolescents, early marriage, intended or desired first pregnancy, and support systems. There is a slight consensus as to which risk factors are the most important predictors of tendency. Since many adolescent mothers conceive again within two years, there is a need for the development of intervention strategies for all these young women. Findings from the study indicated that among the ages 15 to 19 years, most pregnancies occurred at age 16 years. The factors responsible for teenage pregnancy include; early menarche, early marriage, early sex initiation, transactional sex and lack of parental care and support.

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Availability of data and materials

For confidentiality reasons, the authors cannot share this data publicly but corresponding authors could be contacted for further information.

Ethical approval and consent to participate

Ethical approval was sought and obtained from the GHS Ethical Committee before the commencement of the study with approval number GHS-ERC 05/05/17. Further approvals were also sought from all the selected health facilities. These were obtained from the regional, metropolitan, municipal and the district health directorates in the Greater Accra Region. To assure privacy, all interviews were conducted in an enclosed and undisrupted area within the hospital. The study materials were handled confidentially and so no names are mentioned in the reports of the studies. The participants were assured of strict anonymity and confidentiality on any information given.

Consent for publication

Not applicable

Competing Interests

The authors declare that they have no competing interests.

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Authors’ contributions

SAA conceived the idea of the whole study and discussed with AA and he provided technical advice and support throughout the manuscript preparation. Data collection and management was done by SAA. SB supported in statistical analysis, revision of manuscript and contributed to data management. AM, ETM, SB, AA contributed to data interpretation, revision of the manuscript drafts and supported the data validation. All the authors were involved in the drafting of the manuscript. All authors have access to the data, read and approved the final manuscript.

Figure Legends

Figure 1. Map of the Greater Accra Region showing study sites

(A) Geographic location of the Greater Accra Region within Ghana. (B) Distribution of the 12 selected public health facilities across the region, including regional, municipal, district hospitals and polyclinics. Study sites are marked to illustrate spatial coverage of facilities that contributed to participant recruitment for both quantitative and qualitative components.