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Original Research Article

Pregnancy and marriage among teenage schoolgirls in rural western Kenya; a secondary analysis of a menstrual solution feasibility cohort study

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ABSTRACT

Background: Adolescent pregnancy increases the risk of adverse health outcomes, social stigma, loss of education and employment, and early marriage. Research characterising at risk girls will inform targeting of effective interventions.
Methods: Risk characteristics for adolescent pregnancy were evaluated in schoolgirls aged 14-16 years as a secondary analysis in a longitudinal study evaluating menstrual products in 30 primary schools in rural western Kenya. Characteristics of participants were collected at baseline and follow-up. Descriptive and multivariate analysis were conducted.
Results: Of 766 girls enrolled into the study, aged 14-16 years and followed over a school year, 53 (7%) were or became pregnant, with three (6%) neonatal deaths reported. Girls with the lowest compared with the highest socio-economic status had 2.5-fold higher risk of pregnancy (13.1% vs 5.0%: adjusted risk ratio (aRR) 2.48, confidence limits 1.32-4.64). Girls reporting early menarche (<13 years) had a 2.5-fold higher risk of pregnancy (aRR 2.61, 1.38-4.92), while those happy in school had a reduced risk (aRR 0.60, 0.34-1.04). Age, presence of parents, and being harassed by boys or men were not associated with pregnancy risk. Twenty-two girls (2.9%) married by the study end. Marriage was significantly associated with pregnancy (aRR 13.44, 5.50-32.83) and a history of sex at baseline (3.15, 1.55-6.38). All but two girls dropped out of school when pregnant with only five girls returning after delivery.
Conclusions: Pregnancy leading to school dropout and child marriage remains an urgent public health concern among teenage girls in rural Kenya. Interventions are needed to enable schoolgirls to reach their educational potential.

Keywords: Pregnancy, Schoolgirls, Adolescence, Sexual and reproductive health, Child marriage, Education

INTRODUCTION

Adolescent pregnancy is a global problem driving and exacerbating poverty. It is estimated that approximately 10 million unintended pregnancies, and 12 million births occur among girls 15-19 years in low-middle income countries (LMIC) annually.[1] In a review of adolescent pregnancies in sub-Saharan Africa between 2003 and 2018, the highest rate of pregnancies were documented in east Africa (21.5%) and lowest in Northern Africa (9.2%).[2] Globally and nationally, adolescent pregnancies occur more frequently in marginalised groups, driven by poverty, lower levels of education and employment opportunities, and a lack of reproductive freedom.[3] Sub-Saharan African (SSA) schoolgirl pregnancies make a significant contribution to the gender gap in educational

attainment.[4] The poorest regions of the world have a 4-fold higher birth rate for 15-19y-olds compared to that in high-income regions.[5] As well as a higher frequency of pregnancy among poorer populations, pregnancy further amplifies pre-existing poverty. Research in South Africa, for example found children of teenage mothers had lower levels of school achievement.[6]

Pregnancy-related dropout in east Africa is well documented in Tanzania, Uganda, and Kenya, with teachers reporting a third of dropouts were due to pregnancy.[7-9] In Uganda, a survey in 20 districts noted ~20% of girls compared to 2% of boys aged 15-19 years were married or living with a partner.[8] Throughout Kenya, 11.8% of girls and 8.4% of boys aged between 10-24 years had received no education in 2014,[10] while 37% and 43% of young adult females and males 20-24 years, respectively had completed secondary school.[10] World bank studies indicate that girls who complete secondary education can earn up to 5 times more than those without education, with a one-third reduction in their total fertility which would reduce population growth and generate a large demographic dividend.[11] Adolescent pregnancy is associated with maternal and newborn complications and is the primary cause of death for girls in this age group in LMIC.[1,12] Adolescent mothers <20 years face higher risks of eclampsia, puerperal endometritis and systemic infections than those aged 20-24 years, and babies of adolescent mothers are at greater risk of low birth weight, preterm delivery and severe neonatal conditions.[13] Infants are also more likely to be of low birth weight impacting their health and development.[1] Prevention of pregnancy in adolescent schoolgirls is thus vital to achieving several of the sustainable development goals, including quality education, gender equality, good health and well-being, feeding into cessation of poverty.[14]

In Kenya, a quarter of women aged 25-49 years reported they first gave birth by age 18 years and a half by age 20 years, with ~18% of girls aged 15-19 years having experienced pregnancy.[10,15] Kenya started policy development for adolescent sexual and reproductive health in 2003; however, dissemination of the policy has been limited and not applied equitably missing the most vulnerable and difficult to reach.[16] In the 2014 demographic and health survey, the proportion of teenagers becoming pregnant had not changed, suggesting that interventions thus far have had little effect.[10]

Among 1,952 girls aged 13-19 years in a home-based cross-sectional survey in rural western Kenya, 23.3% reported they had ever been pregnant, three-quarters of whom had not wanted to become pregnant, with lower rates of school completion occurring among those pregnant.[17] We sought to evaluate if a similar rate of pregnancy is occurring while girls are still in school, which girls are at greatest risk, and whether they can continue their schooling, utilizing data from a primary school-based study evaluating menstrual solutions among girls aged 14-16 years.[18]

METHODS

Study type

Secondary analysis of a longitudinal cohort study was done.

Study place

The study was conducted in 30 schools in Gem Sub-County in Siaya County, western Kenya. This rural area, located a few miles north of Lake Victoria, has a population of ~82,000 of whom ~10,000 (12%) comprise girls aged 10-19 years.[19] The population is predominantly rural, existing on subsistence farming and local trading, and of Luo ethnicity.[19] The area is served by a health and demographic surveillance system (HDSS) by the Kenya Medical Research Institute (KEMRI).

Study period

This study took place from August 2012 to November 2013.

Selection criteria

Selection criteria for the Menstrual Solutions study (MS study), which examined the acceptability, use and safety of menstrual items, among girls in 30 primary schools in western Kenya was as follows: (i) school selection was based on an agreement by the head teacher to participate, if minimum water, sanitation and hygiene (WASH) criteria were achieved, the school was not enrolled in another study, or had ineligible class years, discussed in detail elsewhere; and (ii) schoolgirls were selected and enrolled if they were 14-16 years (y) of age, had no precluding disability (assessed by the enrolling nurse as severely disabled), had experienced at least three menses, were resident for a minimum of 4 months in the study area, and provided written assent (schoolgirl) and consent (parents/caregivers).[18,20]

Procedures

For the main study, the 30 selected schools were randomized into the three study groups [(menstrual cups, sanitary pads, or usual practice (e.g. used the same materials as prior to the study)] through randomization ceremonies in the community with school head teachers and district education officials.[18] Pre-intervention, girls received puberty and hygiene education and specific training on their allocated menstrual item. At baseline, participants were taught how to use netbooks (2go™ Convertible Classmate PC) to enable them to self-complete the survey privately through the netbook. Study nurses provided girls with the assigned menstrual items after baseline screening. Girls were followed on average twice per term. Rolling enrolment was used so that girls who did not meet these criteria at the start of the study were included if their circumstances changed to fit the criteria

(Figure 1). Girls who aged beyond the enrolment criteria of 14-16 years were retained in the study. This resulted in length of study participation varying amongst participants, with a median duration of 10.9 months. At enrolment, baseline characteristics of each participant were gathered through an interview with a study nurse, and a self-completed behavioural survey.

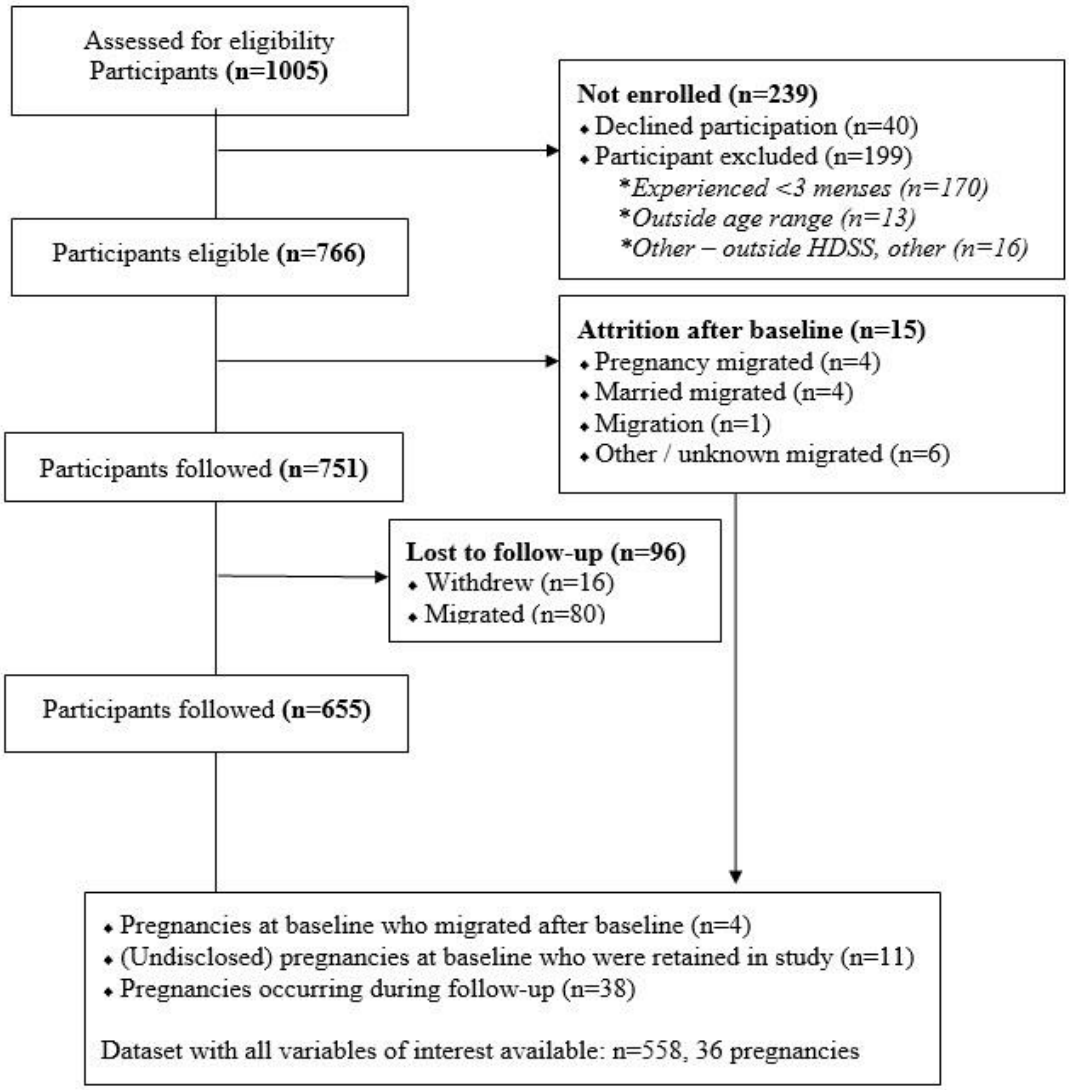

Figure 1: Participants flow diagram.

Nurse interview questions recorded girls' school class, their ages, start of menstruation, age at menarche, menstrual flow (light, normal, heavy), usual menstrual product used, and if there was a disability precluding inclusion. The behavioural survey included questions on who they live with in their household, their marital status, if they were happy at school, and if happy at home, if they were 'harassed for sex' in-school and/or out-of-school, if they had ever had sex or been tricked or coerced to have sex, if they had ever been pregnant. Socio-economic characteristics were obtained for 639 girls who could be linked with KEMRI's HDSS SES census survey on households. Pregnancy was identified through questioning girls on whether they were or had ever been pregnant, their date of their last menstrual period, and study nurses observing physical evidence in their school visits, followed by confidential questioning if she had missed her menses. Additionally, some girls also disclosed their pregnancy status to the study nurse. Girls who dropped out of school were detected as pregnant by our routine home follow-up to document reason for absence. The field worker would establish an estimated delivery date (e.g. from date of last menstrual period or conception) and record birth outcomes if possible, and guide girls on antenatal care services. Study nurses then re-visited all girls at the end of the study and recorded all birth outcomes.

Ethical approval

Ethical approval for the study was granted by the Ethics Committee of the Liverpool School of Tropical Medicine

(12.11) and the Scientific and Ethical Review Boards of the Kenya Medical Research Institute (SSC No 2198). Written assent was provided by the schoolgirls, and written consent by the parents. Nurses were available throughout the study to support safeguarding and counselling to deal with any questions or concerns the girls had.

Data analysis

Descriptive statistics were generated to characterise the sample of girls at baseline. Socio-economic status (SES) quintiles for the girls' household at time of enrolment was generated using multiple component analysis,[19] which was collapsed into the 'lowest' which included the lowest 2 quintiles, and 'highest' which composed the upper three quintiles. Other variables collapsed included age (14, 15-16 years), school class (5-6, 7-8), early menarche was defined as a threshold of self-reported menarche <13 years, and ever had sex (combining willing sexual intercourse, and those tricked or coerced into having sex). Participants responses to 'happy' at home, and at school, were analysed as a dichotomous (yes/no) variable. Marriage was classified as reported marriage or cohabiting with their partner. Child marriage is defined as marriage <18 years. Characteristics associated with pregnancy-related outcomes were evaluated in bi-variate analyses using chi squared tests with significance level set at 5%, and risk ratios, with 95% confidence intervals (CI). Multivariate analysis was conducted using generalized linear regression models with a log link and binomial distribution, controlling for school cluster, among 558 girls with complete data on all variables, to explore associations with pregnancy, and with marriage.[21] Variables included in the multivariate model of pregnancy or marriage if they had a p-value of <0.1 in univariate analysis; age was included in all models because age was an important risk factor in the literature.[22] The variable 'ever had sex' was included in the analysis for marriage but not for pregnancy. Absence of SES was examined to determine if this missing data caused bias against outcomes (pregnancy, marriage, dropout) and risk characteristics through bivariate and multivariate analyses. Data were analysed using SPSS for Windows (Release v25.0; IBM, Endicott, NY, USA) and Stata (Stata/IC version 14.2, StataCorp LP, College Station, USA).

RESULTS

Baseline characteristics

Of the 766 primary schoolgirls enrolled for study, over half (53.8%) were aged 14 years (Table 1), with a median age of 14 years. Three-quarters of girls had at least one parent present in their household. Among 639 (83%) girls whose home data could be linked, 18.5% were in the lowest SES two quintiles, with 31.5% in the highest SES quintile. Three quarters of girls reported being happy at home, and over four in five reported being happy at school. Most (80.3%) girls reported menarche started between the age of 13-14 years (Table 1), with a mean and median age of menarche of 13.6 years (sd 0. 9) and 14 years (IQR 13-15 years), respectively. One in ten girls reported early menarche (<13 years) (Table 1). Just under one quarter considered their periods were heavy, and over four in five reported they had ever used branded sanitary pads. Being harassed for sex by boys and men was common with around half of girls reporting this occurred within and outside of school. Just over one quarter (27.1%) of girls reported they had had sex, among these, 18.8% had sex with a partner (e.g. willing), 46.6% were tricked or coerced to have sex, and 9.5% reported both being willing and being coerced.

Characteristics associated with pregnancy

Throughout the duration of the study, 53 (6.9%) of the girls enrolled were or became pregnant, of whom 11 were pregnant at baseline. In unadjusted analyses, age and presence of mother or father were not associated with pregnancy risk among primary schoolgirls (Table 2). SES was significantly associated, with the highest rates in the SES lowest quintile, e.g. 12.5% among the lowest SES, and 3.5% among the highest SES quintile (X^2 linear trend 11.8, p=0.008). Enrolment class was significantly associated with higher pregnancy rates among girls in the earlier (5, 6) compared with later (7, 8) classes (X^2 linear trend 5.76, p=0.016). While being unhappy at home was not associated with pregnancy, being unhappy at school was significantly associated (p=0.043). Despite evidence of being harassed for sex by boys and men, it had no association with pregnancy.

Girls who had reported early menarche (<13 years) had twice the rate of pregnancy compared with those starting menarche at 13 years or older, although this did not reach statistical significance (p=0.062). Marriage by the end of the study was highly correlated with pregnancy, with 40.9% of pregnant girls becoming married, compared with 5.9% of non-pregnant girls (p<0.001).

Characteristics associated with pregnancy: multivariate analyses

Among 558 girls with full data on all risk characteristics of interest (including 36 pregnancies), SES remained strongly associated with girls in the lowest quintiles at a 2.5-fold higher risk of pregnancy compared with those in the highest quintiles [adjusted risk ratio (aRR) 2.66, 1.35-5.26; Table 3].

Girls who reported they were happy at school were less likely to become pregnant (aRR 0.50, 0.26-0.95) compared with those reporting they were not happy. Early menarche was also a significant risk factor with girls reaching menarche before age 13 years having a close to three-fold higher risk (aRR 2.96, 1.18-4.32) compared with girls beginning their menses at an older age. Class was not associated with pregnancy (class 5-6 vs 7-8: RR 1.12, 95% CI 0.58-2.16, p=0.73) and neither was age (aRR 1.10, 95%

CI 0.61-2.00). No interaction was noted between SES and being happy at school, or SES and early menarche. Inclusion of child marriage into the model found that the risk of pregnancy was highly associated with marriage with an 8-fold higher risk (aRR 8.18, 3.74-17.91, Table 4). Early menarche and SES remained associated with pregnancy in this model.

Characteristics associated with child marriage

Of the 766 girls enrolled, 22 (2.9%) were married by the end of the study. Among the 558 girls for whom complete data on all variables were obtained, 11 (2.0%) were married by the end of the study. Being pregnant was the strongest risk factor for marriage, with girls at a 13-fold (aRR 13.44, 5.50-32.83) higher risk of marrying by the end of the study if they became pregnant (Table 5). Reporting 'ever had sex' at baseline was an additional significant risk factor for child marriage (aRR 3.15, 1.55-6.38); when controlling for pregnancy, no other variables were significant. There was no interaction noted between 'ever had sex' and pregnancy for the risk on marriage. There were no marriages among girls with early menarche, and this factor could not be further evaluated.

Pregnancy outcomes

Birth outcomes were known for 36 of 53 pregnancies. Of the 36, all were live births, with 33 (91.7%) surviving up to follow-up and 3 deaths within one week of delivery. No participants reported or were identified to have spontaneous or induced abortion. Five (14%) of the 36 girls resumed school, two of whom claimed they had never been pregnant, one transferred to another school and two resumed their current school. No socio-behavioural or economic characteristics were associated with infant survival, however all five resuming school had mothers present in their household. Notes on circumstances and outcomes related to the girls who became pregnant during the study confirmed they stopped attending school after pregnancy disclosure, in contrast to dropping out first and then becoming pregnant.

Table 1: Characteristics of Kenyan schoolgirls at baseline.

Characteristics	Frequency	Percentage (%)
Age at enrolment (years)		
14	412/766	53.8
15	268/766	35.0
16	86/766	11.2
Parent present in household		
Mother and father	240/693	34.6
Mother only	237/693	34.2
Father only	62/693	8.9
No parent	154/693	22.2
Class of participants at time of enrolment		
5	55/766	7.2
6	186/766	24.3
7	434/766	56.7
8	91/766	11.9
SES of participants		
1 (lowest MCA)	40/639	6.3
2	78/639	12.2
3	133/639	20.8
4	187/639	29.3
5 (highest MCA)	201/639	31.5
SES of participants (collapsed)		
Lowest (quintile 1 and 2)	118/639	18.5
Highest (quintile 3-5)	521/639	81.5
Reported to be happy at home	525/693	75.8
Reported to be happy at school	567/693	81.8
Reported age at start of menstruation (years)		
10-12	74/736	10.1
13-14	591/736	80.3
15-16	71/736	10.4
Early menarche (below 13 years)	74/736	10.1
Reported heavy periods	174/766	22.7
Reported ever using pads	638/766	83.3
Boys/men harass for sex at school	324/693	46.8
Boys/men harass for sex out of school	345/693	49.8

Continued.

Characteristics	Frequency	Percentage (%)
Ever had sex (exposure to sex, baseline)	191/693	27.1
Among ever exposure to sex (baseline)		
Willing (sexual partner)	36/191	18.8
Tricked/coerced	89/191	46.6
Willing and tricked/coerced)	66/191	34.6
Menstrual product group		
A	243/766	31.7
B	294/766	38.4
C	229/766	29.9

Note: MCA- multiple component analysis.

Table 2: Factors associated with pregnancy in Kenyan schoolgirls.

Characteristics	Category	Pregnant (%)	Chi square value	P value
Age at time of enrolment	14	30/412 (7.3)	0.22	0.90
	15	17/268 (6.3)		
	16	6/86 (7.0)		
Mother in household	Mother present	29/477 (6.1)	0.72	0.40
	Not present	15/216 (6.9)		
Father in household	Father present	22/302 (7.3)	0.79	0.37
	Not present	22/391 (5.6)		
SES	1 (lowest)	5/40 (12.5)	14.22	0.007
	2	9/78 (11.5)		
	3	15/133 (11.3)		
	4	8/187 (4.3)	Linear trend 11.8	0.008
	5 (highest)	7/201 (3.5)		
SES (collapsed)	Lowest (1-2)	14/118 (11.9)	5.60	0.018
	Highest (3-5)	30/521 (5.8)		
Class of participants at time of enrolment	5	5/55 (9.1)	8.63	0.035
	6	17/186 (9.1)		
	7	31/434 (7.1)	Linear trend 5.76	0.016
	8	0/91 (0)		
Class	5 or 6	22/241 (9.1)	2.67	0.10
	7 or 8	31/525 (5.9)		
Happy at home	Yes	31/525 (5.9)	0.72	0.40
	No	13/168 (7.7)		
Happy at school	Yes	31/567 (5.5)	4.08	0.043
	No	13/126 (10.3)		
Boys/men harass for sex at school	Yes	19/324 (5.9)	0.24	0.62
	No	25/369 (6.8)		
Boys/men harass for sex out of school	Yes	25/345 (7.2)	0.93	0.34
	No	19/348 (5.5)		
Early menarche (below 13 years)	Yes	9/74 (12.2)	3.49	0.062
	No	42/662 (6.3)		
Heavy periods	Yes	11/174 (6.3)	0.13	0.72
	No	42/592 (7.1)		
Pad use (baseline)	Ever used pads	46/638 (7.2)	0.50	0.48
	Never used pads	7/128 (5.5)		
Intervention group	A	15/243 (6.2)	1.67	0.43
	B	18/294 (6.1)		
	C	20/229 (8.7)		
Married (by end of study)	Yes	9/22 (40.9)	40.63	<0.001
	Not reported	44/744 (5.9)		

Table 3: Associations between pregnancy and baseline characteristics in schoolgirls (n=558).

Characteristics	Category	Pregnant by endline (%)	RR (95% CI)	P value	aRR (95%CI)	P value
Age group (years)	Younger (14)	21/311 (6.8)	1.11 (0.60,2.05)	0.73	1.10 (0.61, 2.00)	0.75
	Older (15-16)	15/247 (6.1)	1		1	
SES	Lowest	13/99 (13.1)	2.62 (1.33, 5.18)	0.006	2.66 (1.35, 5.26)	0.005
	Highest	23/459 (5.0)	1		1	
Happy at school	Yes	25/454 (5.5)	0.52 (0.27, 1.01)	0.052	0.50 (0.26, 0.95)	0.036
	No	11/104 (10.6)	1		1	
Early menarche (below 13 years)	Yes	7/50 (14.0)	2.45 (1.28, 4.69)	0.007	2.96 (1.18, 4.32)	0.014
	No	29/508 (5.7)	1		1	

Table 4: Associations between pregnancy and marriage and baseline risk characteristics in schoolgirls (n=558).

Characteristics	Category	Pregnant by endline (%)	RR (95% CI)	P value	aRR (95%CI)	P value
Age group (years)	Younger (14)	21/311 (6.8)	1.11 (0.60,2.05)	0.73	1.05 (0.58, 1.91)	0.86
	Older (15-16)	15/247 (6.1)	1		1	
SES	Lowest	13/99 (13.1)	2.62 (1.33, 5.18)	0.006	2.48 (1.32, 4.64)	0.005
	Highest	23/459 (5.0)	1		1	
Happy at school	Yes	25/454 (5.5)	0.52 (0.27, 1.01)	0.052	0.60 (0.34, 1.04)	0.067
	No	11/104 (10.6)	1		1	
Early menarche (below 13 years)	Yes	7/50 (14.0)	2.45 (1.28, 4.69)	0.007	2.61 (1.38, 4.92)	0.003
	No	29/508 (5.7)	1		1	
Married by endline	Yes	5/11 (45.5)	8.02 (3.75, 17.15)	<0.001	8.18 (3.74, 17.91)	<0.001
	No	31/547 (5.7)	1			

Table 5: Associations between marriage, pregnancy and baseline risk characteristics in schoolgirls (n=558).

Characteristics	Category	Married by endline (%)	RR (95% CI)	P value	aRR (95%CI)	P value
Age group (years)	Younger (14)	6/311 (1.9)	0.95 (0.31, 2.91)	0.93	1.39 (0.58, 3.30)	0.46
	Older (15-16)	5/247 (2.0)	1			
SES	Lowest	2/99 (2.0)	1.03 (0.20, 5.32)	0.97		
	Highest	9/459 (2.0)	1			
Happy at school	Yes	7/454 (1.5)	0.40 (0.19, 0.85)	0.016	0.67, 0.29-1.54	0.35
	No	4/104 (3.9)	1		1	
Early menarche (below 13 years)	Yes	0/50 (0.0)	-		-	
	No	11/508 (2.2)	-		-	
Ever had sex (at baseline)	Yes	7/158 (4.4)	4.43 (2.03, 9.65)	<0.001	3.15 (1.55, 6.38)	0.001
	No	4/400 (1.0)	1		1	
Pregnant by endline	Yes	5/36 (13.9)	12.08 (3.96, 36.85)	<0.001	13.44 (5.50, 32.83)	<0.001
	Not reported	6/522 (1.2)	1			

DISCUSSION

In our cohort among Kenyan schoolgirls aged 14-16 years, 7% became or were pregnant. Risk factors included lower SES, early menarche, and being unhappy at school. Girls who were pregnant had a high chance of marrying, despite their young age, and most dropped out of school (91%). A systematic review of 52 studies on prevalence and determinants of adolescent pregnancies among girls in the age group 10-19 years was conducted in 24 countries in Africa, covering the project follow-up period.[2] This detected a pooled prevalence of 18.8% of adolescent pregnancies, with a higher prevalence of 21.5% in East Africa. In the Demographic and Health Survey in Kenya of 2014, the percentage of girls 15-19y who had begun childbearing in Nyanza province was 22.2%, which was down from 27.0% in the survey in 2008-2009.[10,23] Among 16 years-old Kenyan girls, 8% had begun childbearing in 2014, and 80% of these pregnancies were unintended.[10,24] Data from a similar study in the same area reported nearly

a quarter (23.3%) of teenage girls (13-19 years) to have had a history of pregnancy in a study of 1952 girls.[17] One review reported a percentage of first births of 7.7% among girls <16 years in Kenya.[15]

We noted a prevalence of 6.9% among schoolgirls aged 14-16 years; given the young age of this group, it is likely that the percentage will increase by the age of 19 years. Our estimate is likely to be an underestimate of total fertility, given that some pregnancies may have resulted in abortions and may not have been documented. Additionally, the lowest socio-economic strata may not have been well represented, because they may not have attended school, or may not have attended these schools where certain quality criteria for sanitation of schools were part of the inclusion criteria in this study. Age at the time of enrolment was not associated with pregnancy in either the bivariate or multivariate analyses, with a similar percentage of girls in each age group becoming pregnant over the period the study ran. This is inconsistent with a meta-analyses which identified increasing age as a risk factor for adolescent pregnancy.[24] We note, however, that the age range we examined (14-16 years) was limited compared to other studies (15-19 years).[22]

Early menarche was associated with pregnancy; several African countries have reported a decreasing age of menarche in younger generations.[25] It is possible that young girls may be unaware of pregnancy risk after menarche because comprehensive sexual and reproductive education is provided at a later age.[26] Alternatively, girls who experience menarche may be viewed as sexually mature and face increased pressures and opportunities for sex and/or marriage.[27] A systematic review of the effects of early menarche on sexual and reproductive health in LMIC noted that early menarche was associated with early sexual initiation, early pregnancy, and sexually transmitted infections, similar to observations in high-income countries.[28] The review also identified an association between early menarche and child marriage.

In our study, girls in the lowest two SES categories were demonstrated to have an almost 2.5-fold higher risk of becoming pregnant compared with girls in the 3 highest SES categories. Similar patterns were reported before in Kenya, with 14.6% first births among girls less than 16 years in the lowest SES quintile and 3.6% in the highest quintile in 2014, and women aged 15-19 in the highest quintile having their first birth an average of 3.5 years later than women in the lowest quintile.[10] The association between poverty and teenage pregnancy is globally well known.[3] Girls from poor families may be vulnerable to exchanges of sexual favours for money; in addition, knowledge of and access to contraceptives may be reduced.[29] A recent qualitative study discussed reports of drivers (taxi cars, motor cycles, or bicycles) in connection to teen pregnancies, citing a chief in western Kenya as saying poor schoolgirls in their mid-late teens may be persuaded to have sex with drivers who transport them to and from school in in exchange for pocket money.[30]

The association between unhappiness at school and increased pregnancy risk was of borderline significance. A previous study found girls with lower attendance rates were more likely to become pregnant than those with higher attendance.[31] Another study from South Africa noted that instances of non-pregnancy-related grade repetition or temporary withdrawals from school were associated with a higher risk of pregnancy when in school.[32] Unhappiness at school may also contribute to reduced re-entry in the school system after delivery (only 5 participants or 9% in our study), although practical concerns about childcare and income may also contribute to this. In 1994, the Ministry of Education in Kenya allowed girls to continue with education after dropping out of school due to pregnancy, however, girls still report being expelled from schools due to pregnancy.[33,34]

Prevention of adolescent pregnancies and improving the conditions for the mothers and their children from adolescent pregnancies are a complex issue, and a multi-faceted approach is needed.[1] Currently, this has not been adequately addressed. Kenya's parliament record of a senate debate documents speakers calling to attention the need for the government to fully enact its policy on adolescent sexual and reproductive health.[35] It highlights that the current emphasis of the government is on integration back to school after childbirth, but few systems have been established to achieve this. The speaker encouraged the government to develop systems so that school age mothers have access to carers, either hired or family members, who can reliably look after their child while they are in school so that they can truly focus on their education.

A recent policy dialogue reported that there are more than 10 policies on youth and adolescent sexual reproductive health, but that these lack implementation due to insufficient funding.[36] The report discusses why progress on preventing adolescent pregnancy has been slow and outlines the next steps that can be taken to implement significant change. Several recommendations were made; the final point calls for evidence-based interventions which would include identifying how to target and implement interventions. A systematic review identified 3 methods that were effective in studies at reducing pregnancy rates in Sub-Saharan Africa: Economic incentives, life-skills education and using facility-based provision of contraception.[37] Using evidence-based interventions will be a key factor for reducing adolescent pregnancy in sub-Saharan Africa; however, up to now, progress has not been optimal. In a review of five sub-Saharan countries over the last 10 years, three were at the same level for percentage of women who had been pregnant by age 19 years (Kenya, Uganda, Zambia) and two showed an increase (Tanzania and Malawi).[22]

Limitations

This was a secondary analysis of data collected for a pilot intervention study on menstrual product interventions.

Information on condom use, other forms of family planning, and care seeking, were not gathered. However, adolescent girls separately have informed in qualitative studies that they do not attend family planning, as they are stigmatised for not abstaining while unmarried; further, chemical contraceptives are considered dangerous with taboos asserting they will cause birth defects.[34,38]

We noted that data from this prior study may have some limitations due to any recent public health or economic changes, however, more recent studies in this impoverished area demonstrate no significant health, social, economic, or environmental changes in the study area.[39] Some variables were incomplete, and this reduced the effective sample size, e.g. SES information was not available among all girls due to lack of linking with household data. While explained by logistical field activities and migration, we evaluated if missing data could have created biases. The prevalence of pregnancy, marriage and dropout were not different among participants with SES, compared against those without SES data for their household. Similarly, characteristics of risk, e.g. reported sex, being harassed for sex, and happiness at home and school were similar.

Age at time of established pregnancy was not recorded; the analyses instead used age at time of enrolment. However, given pregnancy outcomes occurred within 9 months, and all girls enrolled were between 14-16 years, misclassification related to age would have had minimal effect on the analyses. Age of menarche were less prone to this as girls made this estimate based on how many years they had been menstruating at the time of the study. We did not do pregnancy tests to identify pregnancy as it could have resulted in early disclosure of pregnancy and subsequent expulsion or dropout of the girls from school, thus, some pregnancies may have been missed among girls having a spontaneous or medically induced abortion.

Marriage dates were not recorded in the dataset, which limited the ability to determine if pregnancy occurred before or after marriage among girls identified as pregnant early in the cohort follow-up.

CONCLUSION

Adolescent pregnancy and child marriage are important public health issues; these girls are at risk of adverse reproductive health challenges and school dropout. Interventions which will help to protect teenage girls against unwanted pregnancy and enable them to reach their full potential in education and beyond are urgently needed.

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