ORIGINAL RESEARCH ARTICLE

Prevalence and Risk Factors of Repeat Pregnancy among South African Adolescent Females

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Abstract

In the era of HIV/AIDS, repeat pregnancies among adolescents indicate the growing problem of high-risk sexual behavior and the status of reproductive health services. A cross sectional survey was conducted to establish the prevalence and risk factors of repeat pregnancies among South African adolescents. A total of 326 adolescents participated in this study at a district hospital in, KwaZulu-Natal, South Africa from June 2017 to November 2017. Data was analysed using R Software. Out of the 326 adolescents, 19.9% had experienced a repeat pregnancy. The risk factors associated with adolescent repeat pregnancy included a history of spontaneous abortion ($p<0.001$) and previous contraceptive use ($p<0.001$). A higher level of education ($p<0.001$) and emotional support from family ($p=0.007$) were found to be significant protective factors against adolescent repeat pregnancy. These findings have implications for future interventions aimed at reducing repeat pregnancy among adolescents. *(Afr J Reprod Health 2019; 23[1]: 73-87).*

Keywords: Adolescents, repeat pregnancy, HIV, contraception, spontaneous abortion

Résumé

À l'ère du VIH/sida, les grossesses répétées chez les adolescentes indiquent le problème croissant des comportements sexuels à haut risque et de l'état des services de santé de la reproduction. Une enquête transversale a été menée pour déterminer la prévalence et les facteurs de risque de grossesses répétées chez les adolescentes sud-africaines. 326 adolescents au total ont participé à cette étude dans un hôpital régional à KwaZulu-Natal, en Afrique du Sud, de juin 2017 à novembre 2017. Les données ont été analysées à l'aide de R Software. Sur les 326 adolescentes, 19,9% avaient eu une nouvelle grossesse. Les facteurs de risque associés aux grossesses répétées chez les adolescentes comprenaient des antécédents d'avortement spontané ($p <0,001$) et une utilisation antérieure de contraceptifs ($p <0,001$). Un niveau d'éducation plus élevé ($p <0,001$) et un soutien affectif de la famille ($p = 0,007$) se sont révélés être des facteurs de protection importants contre les grossesses répétées chez les adolescentes. Ces résultats ont des implications pour les futures interventions visant à réduire le nombre de grossesses répétées chez les adolescentes. *(Afr J Reprod Health 2019; 23[1]: 73-87).*

Mots-clés: Adolescentes, grossesse répétée, VIH, contraception, avortement spontané

Introduction

Adolescent pregnancy is a complex public health problem worldwide. Around 16 million adolescent females aged 15-19 years give birth annually[1]. The World Health Organisation estimates that 3 million adolescent females in the 15 to 19-year age category undertake unsafe abortions annually[1]. In South Africa, of the 1 084511 births registered in 2015, 13.4% occurred to mothers in the 15 to 19-year age category[2]. In general, the average rate of adolescent pregnancy in South Africa in 2014 was 47 births per 1 000 South African women aged 15 to 19 years[3]. Adolescent childbearing is associated with adverse medical, socio-economic, psychological and parenting outcomes[4]. The risk factors for adolescent repeat pregnancy include contraception use, lack of social support, poor partner support, school dropout and depression.[4]

Richter *et al*[5]. found that the median age of sexual debut for females and males was 16 years and 15 years respectively, in South Africa. The

median age for first time marriages were 34 years for males and 29 years for females, in South Africa[6]. Sexual debut amongst females in most developing countries mostly takes place within marriage, however, in South Africa this sexual initiation pattern differs in that South African females predominantly have their first sexual intercourse experience outside marriage[7]. In this regard, adolescent pregnancy in South Africa is related to early sexual initiation[8]. Furthermore, adolescent pregnancy is a result of unprotected sexual intercourse and hence is a risk factor for sexually transmitted infections (STIs) and HIV/AIDS[9]. According to the 2013 South African National Antenatal Sentinel HIV and Syphilis Prevalence Survey, the HIV prevalence among pregnant women in the age categories 15 to 19 years and 15 to 24 years was 12.7% and 19.9% respectively[10].

Existing literature states that children born to adolescent mothers face a higher risk of premature birth, blindness, cerebral palsy, chronic respiratory problems, deafness, dyslexia, hyperactivity, cognitive impairments and death at infancy[11-12]. Children born to adolescent mothers are also likely to have poor academic performance at school and live under poor socio-economic circumstances[12]. In this context, the problem of social inequality worsens. Available data suggest that boys born to adolescent mothers are 13% more likely to engage in unlawful activities and face incarceration, while girls born to adolescent mothers have a higher risk of becoming adolescent mothers themselves[13].

There is also the likelihood that adolescent mothers will have more than one pregnancy during the adolescent period and that this will further compound the adverse child health outcomes[12]. A second pregnancy or additional pregnancies for an adolescent girl before the age of 20 years is known as an adolescent repeat pregnancy[14]. Maravilla *et al*[14] argues that adolescent repeat pregnancy reflects the reproductive health status of adolescents and the health systems capacity in addressing the needs of adolescent females after the first pregnancy. Adolescent repeat pregnancy is likely to occur in South Africa considering the high adolescent pregnancy rates[15].

Previous studies on adolescent repeat pregnancy in Australia and Thailand have indicated prevalence rates of 33% and 20% respectively[16-17]. To date, there has been only one study in South Africa that has investigated the prevalence of adolescent repeat pregnancy in an urban setting[15]. Mphatswe *et al*[15] found that the prevalence of repeat pregnancy amongst a sample of 341 adolescent females attending a regional hospital in an urban township in KwaZulu-Natal was 17.6%. However, there is still a dearth of information on adolescent repeat pregnancy and its associated factors in South Africa. This study set out to establish the prevalence and risk factors of repeat pregnancies among South African adolescent females.

Methods

Study design and setting

A cross sectional study was conducted at a 300-bed district hospital in Ugu, KwaZulu-Natal, South Africa. The hospital serves three local municipalities, namely Umdoni, Vulamehlo, and Umzumbe North. Umdoni municipality is a mixture of urban and rural settlements while Vulamehlo and Umzumbe are surrounded primarily by rural settlements. Within these three municipalities, there are communities of low socio-economic status with poor access to basic services. The hospital is a referral centre for ten Primary Health Care (PHC) clinics and four mobile clinics[18].

Study population

The population of interest was adolescent females aged 13 to 19 years who attended the prenatal clinics, postnatal wards and gynaecology outpatient departments, at the district hospital, between June and November 2017. The study population was limited to adolescents who satisfied the following inclusion criteria: 1) pregnant/parenting adolescents aged 13 to 19 years; 2) pregnant and parenting adolescents under 18 years of age (but above 13 years) who obtained permission from their parent/s or legal guardian/s to participate in the study and 3) pregnant/parenting adolescents who understood

the aim and objectives of the study. Pregnant adolescents with cognitive impairments were excluded from the study. We did not approach adolescents attending the Termination of Pregnancy clinic as our questionnaire had questions that were related to current pregnancy health practices and social support after delivery of the current pregnancy. These questions were sensitive and would have possibly contributed to psychological distress and discordance. Adolescents attending the prenatal clinics, the postnatal and gynaecology wards were informed by the nursing operational managers about the study. If the adolescents indicated an interest in the study, they were referred to the researcher and research assistants.

Sample size

The researcher consulted local literature to determine the prevalence of adolescent repeat pregnancy in KwaZulu-Natal. According to Mphatswe *et al*[15] adolescent repeat pregnancy in a sample of 341 adolescents was 17.6%. Therefore, the anticipated population proportion was 17.6%. The level of precision was set at 0.05 and the confidence level was set at 95%. The sample size was calculated using the following assumptions: 1) precision =5%; 2) prevalence =17.6%; 3) population size =infinite; and 4) 95% confidence interval specified limits (12.6%-22.6%). The minimum sample size required for the survey study was 223 adolescent females.

Data collection tool

An adolescent pregnancy, sexual and reproductive health questionnaire was developed in consultation with maternal health clinicians, a school health manager and clinical psychologists. The formulation of questions on socio-demographic characteristics was guided by an ecological perspective on adolescent pregnancy. The following categories of information were requested on socio-demographic factors: 1) adolescent's characteristics and clinical history; 2) adolescent's living arrangements; 3) family characteristics; 4) socio-economic status; 5) schooling and employment; 6) social and financial support; and 7) the baby's father. Knowledge and practice of sexual and reproductive health care included questions on 1) contraception use, knowledge and access; 2) knowledge about HIV/AIDS/STIs transmission and prevention; 3) sexual risk behaviour and prevention; 4) personal attitudes towards sexuality and reproduction; 5) peer influences; 6) depression screening (EPDS); and 7) prenatal care and current pregnancy health knowledge and practices. A pilot study was conducted to ensure face validity and to improve the contents of the questionnaire. The average time that it took to administer the questionnaire was approximately 20 minutes.

Recruitment and training of the fieldworkers

A total of two fieldworkers were recruited from the local communities to assist in the collection of the survey data. The recruitment criteria for the fieldworkers included an ability to converse in both English and isiZulu and the ability to use a mobile phone. The fieldworkers were trained by the researchers on the contents of the questionnaire, the inclusion and exclusion criteria of adolescent females, the completion of the consent form, and the ethical issues involved in obtaining informed consent. Furthermore, they received training on the use of the Mobenzi. Researcher® interface. Training included skills on the use and care of a cellular phone, the Mobenzi. Researcher® software, and accessing the survey returns by cellphone.

Data collection

The questionnaire was administered by two trained female fieldworkers using the cellular telephone Mobenzi Researcher® interface provided by Mobenzi. Interviews were conducted in the private counselling areas of the antenatal clinic, postnatal and gynaecology wards. The completed surveys were uploaded using general packet radio service (GPRS) to a web-based database. The data sets from the web-based database was cleaned and exported into R software (R version 3.5.0. Vienna: R Foundation for Statistical Computing) for statistical analysis.

Data analysis

Descriptive statistics were used to summarise the baseline categorical data in frequency distribution tables. Continuous data were reported in median and interquartile ranges (IQR). Bivariate analysis was performed to identify independent variables that were associated with adolescent repeat pregnancy. The statistical significance for categorical variables were ascertained with a Fisher's exact test. The Fisher's exact test was used because it is conservative and works in all instances even when some of the categories of a variable have a few observations in them (when sample sizes are small). Comparisons between continuous variables were performed using the Wilcoxon signed-ranked test because as a non-parametric test it is suitable even when continuous variables are not normally distributed. Independent variables found to be significant on bivariate analysis were included in the multivariable logistic regression analysis. A univariate logistic regression analysis was done to analyse the association between the potential confounders and adolescent repeat pregnancy. The reason for the univariate logistic regression analysis was to demonstrate that the confounding variables on their own share a relationship with adolescent repeat pregnancy. The multivariable model adjusted for possible confounder variables that could confound the relationship between the outcome (adolescent repeat pregnancy) and exposure of interest. The variables that seemed to be candidates for confounding variables, which were adjusted for in the multivariable model, included: age, highest education level, and mother's marital status. The accepted level of significance was 0.05 (α=0.05).

Results

Socio-demographic profile of adolescent females

A total of 326 adolescent females completed the questionnaire. The average age of the adolescent females was 18 (IQR = 17-19) with 13.5% between the ages of 14 to 16 years. Many of the characteristics of the adolescent females were homogenous within the study sample (e.g. in terms of ethnicity and being single); the adolescent females were predominantly of African ethnicity (n=320; 98%). Of the 326 adolescents interviewed, only 5 (1.5%) were married (Table 1). The majority (n= 305; 93.6%) had indicated that their highest level of education was senior secondary school but only 2.5% (n=8) were employed full time. Overall, 155 (47.5%) adolescent females were currently not attending school.

Family characteristics and living arrangements

A total of 73 (22.4%) reported that their biological mother was deceased, while 132 (40.5%) reported that their biological father was deceased (Table 1). The educational status of the adolescent's biological mothers was low, as only 116 (35.6%) had secondary school education. Seventy-one (21.7%) indicated that their mothers had their first child before the age of 20 (median age was 18; IQR= 17-21 years). Of the 326 adolescents, 69 (21.2%) knew of siblings that had children before the age of 20. In total, 34 (10.4%) of adolescents admitted to experiencing verbal abuse, 20 (6.1%) to experiencing physical abuse, and 12 (3.7%) to experiencing sexual abuse (Table 2). Most of the adolescent females (n=151, 47%) lived with their siblings only (Figure 1).

Prevalence of repeat pregnancy, obstetric histories of adolescent females

Sixty-five (19.9%) of the adolescent females experienced an adolescent repeat pregnancy while the majority were primigravida (80.1%) (Table 3). The HIV and STI prevalence amongst the adolescent females were 17.8% (58) and 4% (13) respectively. Only 49.7% of the participants could identify 5 contraceptive methods out of ten. Seventy -one (21.8%) of the adolescents had used contraception in the last 12 months prior to the current pregnancy.

Obstetric information of the adolescent females

Partner relationship characteristics

Most adolescents (93.8%) were in stable relationships. The average age of the partner was

Table 1: Socio-demographic characteristics of adolescent females in Kwa Zulu Natal, South Africa

Characteristics	All participants (n=326)
Age	18 (IQR 17 – 19)
Ethnic group	
African	320 (98%)
Indian	3 (0.9%)
Coloured	3 (0.9%)
Religious practices	
Christianity	291 (89.3%)
Islam	3 (0.9%)
Atheist	31 (9.5%)
Jehovah witness	1 (0.3%)
Spoken home language	
Zulu	299 (91.7%)
Xhosa	19 (5.8%)
English	7 (2.1%)
Seswati	1(0.3%)
Marital status	
Single	321 (98.5%)
Married	5 (1.5%)
Highest educational status	
Primary school	9 (2.8%)
Junior secondary	12 (3.7%)
Senior Secondary	305 (93.6%)
Employment	
Employed full time	8 (2.5%)
Unemployed	318 (97.5%)
Family characteristics	
Biological mother alive	
Yes	253(77.6)
No	73 (22.4%)
Marital status of biological mother	
Single	147 (45.1%)
Married	102 (31.0%)
Other	78 (23.9%)
Education completed by biological mother	
None	28 (8.6%)
Primary school	46 (14,1%)
Secondary school	116 (35.6%)
Post-secondary	6 (1.8)
Do not know	130 (39.9%)
Age biological mother had her first child	
Median	18 (IQR 16 – 21).
13-19 years	71 (21.7%)
29-39 years	43 (13.7%)
Do not know	212 (65%)
Siblings who became parents before the age of 20	69 (21.2%)
Biological father alive	
Yes	194 (59.5%)
No	132 (40.5%)
Marital status of biological father	
Single	85 (26.1%)
Married	91 (27.9%)
Other	150 (46.0%)
Education completed by biological father	
None	42 (12.9%)
Primary school	26 (7.9%)
Secondary school	68 (20.8%)
Post-secondary	6 (1.8%)
Do not know	184 (56.4%)

found to be 22.69 years (SD=3.85) (Table 4) Adolescents with a partner who was at least 5 years older had significantly higher incidences of repeat pregnancies (p =0.051). Of the 65 adolescents with repeat pregnancies, only 41 (63%) were still in a relationship with the partner responsible for the previous pregnancy. Adolescents with repeat pregnancies were more likely to have a partner that had some form of employment than those without repeat pregnancies. Adolescents who thought their partners would provide them and their children with emotional support had significantly higher rates of repeat pregnancies (p=0.050).

Partner relationship characteristics

Bivariate analysis

Among the 65 repeat pregnancies, 23 (35.4%) had experienced previous spontaneous abortions (Table 5). Repeat pregnancies were associated with poor obstetrical outcomes such as history of previous spontaneous abortions (p<0.0001). The age of adolescent females was significantly associated with adolescent repeat pregnancies Older adolescents had higher repeat pregnancies than their younger counterparts (p<0.0001). Adolescents who were using contraceptives before pregnancy had significantly higher rates of repeat pregnancies (p<0.0001). There was a significant association between the engagement of unprotected sex in the last 12 months with more than one partner, and adolescent repeat pregnancies (p=0.033). Adolescents who reported having STIs were more likely to have experienced adolescent repeat pregnancies (p=0.009). Similarly, adolescent repeat pregnancies were significantly associated with a higher prevalence of HIV (36.9% vs 13%, p<0.0001). Adolescents who reported the absence of emotional support from their immediate family had significantly higher repeat pregnancies (p=0.026) (Table 5)

Bivariate analysis also identified protective factors. Adolescent females who thought that their mothers would provide emotional support were significantly less likely to report a repeat pregnancy (p=0.025) (Table 5) Similarly, factors for adolescent repeat pregnancy adolescent females who thought that their aunts

Table 2: Adolescents responses to physical, sexual and verbal abuse experiences

Category of Abuse	All participants (n=326)
Physical	
Yes	**20 (6.1%)**
No	**306 (93.9%)**
Do not want to answer	**0 (0%)**
Sexual Abuse	
Yes	**12 (3.7%)**
No	**312 (95.7%)**
Do not want to answer	**2 (0.6%)**
Verbal abuse	
Yes	**34 (10.4%)**
No	**289 (88.7%)**
Do not want to answer	**3 (0.9%)**

would provide support were significantly less likely to report a repeat pregnancy (p=0.023). Having a secondary school level of education was a protective factor for adolescent repeat pregnancy (p<0.0001). Thus, better educated adolescent females were significantly less likely to report a repeat pregnancy.

Factors associated with adolescent repeat pregnancy

The potential confounding variables that were identified included age, highest education level and mother's marital status. The association between the potential confounding variables and adolescent repeat pregnancy is presented in Table 6. The univariate analysis demonstrates that age, highest educational status and mother's marital status, on their own share a relationship with repeat pregnancies and thus warranted being included in the analysis. For each year increase in the age of the participant, the odds of having repeated pregnancies increased by a factor of 2.69. Adolescent females who had at least secondary school education had a 0.94% reduction in the odds of having a repeat pregnancy when compared to girls who had only a primary school education. Adolescent females who had a mother who was married were 2 times more likely to have repeat pregnancies, compared to adolescent females whose mothers were single.

The multivariable logistic regression analysis indicated that the following factors that were significantly associated with repeat pregnancies. These included history of poor obstetric outcome (spontaneous abortion) (adjusted odds ratio (OR) 29.48, 95% CI 10.05-105.47, p<0.001) and previous contraceptive use (adjusted odds ratio (OR) 6.11, 95% CI 3.08-12.37, p<0.001) (Table 7). Adolescent females who perceived emotional support from an aunt had a lower risk of a repeat pregnancies (adjusted odds ratio (OR) 0.15, 95% CI 0.03-0.52, p=0.007).

Discussion

This cross-sectional study shows the prevalence of adolescent repeat pregnancy to be 19.9%. The demonstrated prevalence of repeat pregnancies in this current study is consistent with the findings in countries like Thailand, Germany and USA, with adolescent repeat pregnancies of 20%, 17.3%, 18.3% respectively[17,19,20]. The literature establishes a comprehensive socio-ecological model for the predictors of adolescent repeat pregnancy[14,21]. The socio-ecological model is used to categorise the predictors of adolescent repeat childbearing according to individual factors, partner relationship, family, peer, school and community factors[22-23]. The findings of the bivariate analysis supported the existing literature on the risk factors of adolescent repeat pregnancy. However, after adjusting for potential confounders in the multivariable logistic regression, only a few variables maintained a statistically significant association with adolescent repeat pregnancy. (Figure 2)

In bivariate analysis, fourteen variables (see figure 2) were significantly associated with having a repeat pregnancy. However, in the multivariable analysis, age, higher education, marital status of mother, previous poor obstetric outcome (spontaneous abortion), previous contraceptive use in the last 12 months and perceived support from an aunt, were retained.

The systematic review by Maravilla *et al*[14] found that poor obstetric outcomes such as spontaneous abortions or pregnancy losses increased the risk of an adolescent repeat pregnancy by 66%. Several other studies have also supported the theory that history of spontaneous abortions increases the occurrence of repeat pregnancies among adolescents girls[16,21]. Similarly,

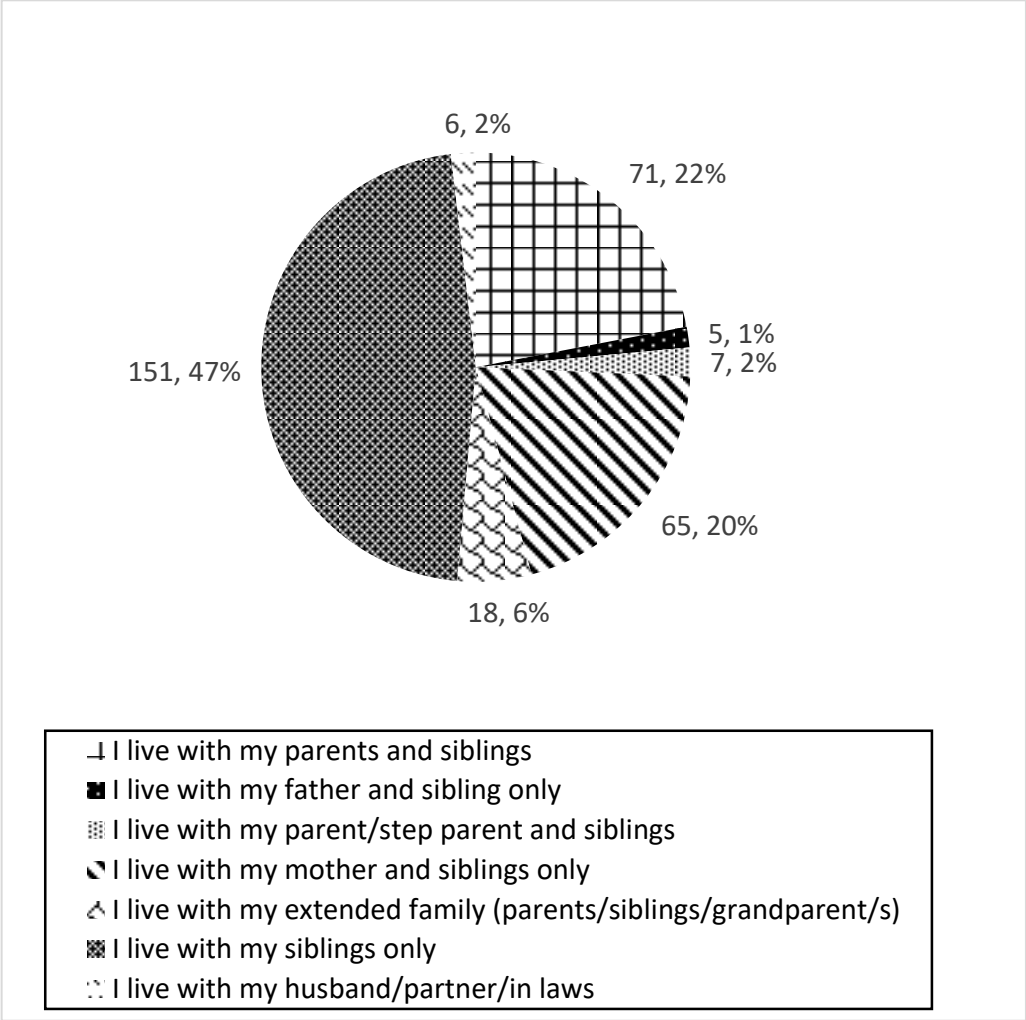

Figure 1: Living arrangements of adolescent females in KwaZulu Natal, South Africa

the findings of our study found that 35.4% of adolescents with a repeat pregnancy had experienced a spontaneous abortion ($p<0.001$). A spontaneous abortion may result in depression which is also a known risk factor for adolescent repeat pregnancy[14]. Studies suggest that after a spontaneous abortion, the individual may want to conceive again as a way of coping with the loss of the first pregnancy[14,22]. The adolescents with repeat pregnancies in our study were older, in comparison to the adolescents with first pregnancies ($p<0.001$). In this regard, childbearing at a young age also influences adolescent repeat pregnancy.

Some researchers have reported that low maternal educational status is associated with adolescent repeat pregnancy[22-23]. South Africa is regarded as a patriarchal country with large disparities in gender equality and education[23]. Therefore, it is not surprising that the bivariate analysis showed that low maternal educational status was associated with adolescent repeat pregnancy in our study ($p=0.097$). It is known that adolescent females with low educational levels have a higher risk of repeat pregnancies[21-22]. Raneri and Weimann[24] revealed that adolescents who dropped out of school prior to the previous pregnancy had a high risk of repeat pregnancy (OR 1.75, CI: 1.20-2.55, $p<0.01$) Consequently, our study found that adolescents with higher education levels had lower repeat pregnancies on both the bivariate and the multivariable logistic regression analyses.

Table 3: Obstetric information of adolescents' females in Kwa Zulu Natal, South Africa

Clinical information	All participants (n=326)
Obstetric history	
Number of pregnancies	
1	261 (80.1%)
2	60 (18.4%)
3	5 (1.5%)
Number of deliveries	
1	97(29.8%)
2	203 (62.3%)
3	26 (8%)
Number of live births	
0	101 (31.0%)
1	199 (61.0%)
2	26 (8%)
Number of still births	
0	324 (99.4%)
1	2 (0.6%
Number of spontaneous abortions	
0	298 (91.4%)
1	27 (8.3%)
2	1 (0.3%)
Medical conditions	
High blood pressure	23 (7.1%)
Diabetes	2 (0.6%)
Varicose veins	19 (5.8%)
Anaemia	25 (7.7%)
Epilepsy	3 (0.9%)
Asthma	12 (3.7%)
Sexually transmitted infections	13 (4.0%)
HIV positive	58 (17.8%)
Contraceptive Characteristics	
Had unprotected sex in the last 12 months with more than one sexual partner	16 (4.9%)
Used contraception prior to current pregnancy	71 (21.8%)
Contraceptive methods used prior to pregnancy (n=71)	
Male condom	28 (39%)
Female condom	1(1.4%)
OCP	3 (4.2%)
Injectable	35(49.3%)
Implanon	8 (11.3%)
Withdrawal	1 (1.4%)

Studies by Rigsby[21] and Rowland[22] identified dysfunctional families and poor mother-daughter relationships as predictors of adolescent repeat pregnancy. Adolescents in our study who reported no emotional support from their immediate family members had higher repeat pregnancies (p=0.026). The implication of maternal support was established on bivariate analysis as lower repeat pregnancies were noted in adolescents who received support from their mothers (p=0.025). On multivariable analysis, the perceived absence of emotional support from the immediate family and perceived support from the participant's mother did not show a statistically significant relationship with adolescent repeat pregnancy.

Intergenerational relations (biological mother having her first child before the age of 20 and siblings who became parents before the age of 20) have a profound effect on adolescent child bearing. Wall-Wieler *et al*[25] found that adolescent girls who had at least one older sister who experienced a pregnancy before the age of 20, had a higher risk of becoming pregnant between the ages of 14 to 19 years (OR 3.38, 99% CI 2.77-4.13). An adolescent girl whose biological mother had her first child before the age of 20 years also had a higher risk of early child bearing (OR 1.57, 99% CI 1.30-1.89). In our study, however there were no significant associations with intergenerational relations and adolescent repeat pregnancy.

Debates have emerged about the role of the extended family in adolescents' sexual health[26]. Our study found that adolescents who perceived support from their aunts had lower incidences of repeat pregnancies (p=0.026). The protective relationship between perceived support from an aunt and adolescent pregnancy was retained in the multivariable logistic regression analysis. Leech *et al*[27] explored the networks of support and potential gate keepers to care for adolescent mothers. In this study by Leech *et a*l[27] adolescent mothers reported that they felt more comfortable to confide in aunts and sought emotional support from aunts. Taking this further, Leech *et al*[27]. suggests that networks of women (aunts and godmothers) can provide information and emotional support to adolescent parents thereby building a source of community capacity. Aunts are either related biologically or are persons that are family but not related biologically or by law. In the South African context, African families are generally characterised by close bonds between the nuclear family and extended family members which include grandparents, aunts, uncles, cousins and close friends[28]. Extended families can provide

Table 4: Partner characteristics of adolescent females in Kwa Zulu Natal, South Africa

Partner characteristics	All participants (n=326)
Age	22.69 years (16-23)
Number with partner ≥ 5 years older	265 (81.2%)
Employment status:	
Employed full time	135 (41.4%)
Employed part time	48 (41.7%)
Unemployed	143 (43.8%)
Intimate partner violence	12 (3.7%)
Partner provides financial support	122 (37.4%)
Perceived emotional support from partner	196 (60.1%)

Table 5: Bivariate analysis of the association between adolescent repeat pregnancies and selected factors within the socio-ecological model

Variables	Repeat Pregnancy (n=65)	First pregnancy (n=261)	P value
Individual factors			
Age	19.0 (18.0-19.0)	18.0 (17.-19.0)	< 0.0001
History of spontaneous abortion	23 (35.4%)	5 (1.9%)	< 0.0001
Had unprotected sex with more than one partner in last 12 months	7 (10.8%)	9 (3.4%)	0.033
Living with HIV	24 (36.9%)	34 (13.0%)	< 0.0001
Ever had a sexually transmitted infections (STIs)	7 (10.87%)	6 (2.3%)	0.009
Used contraceptives prior to current pregnancy	32 (49.2%)	39 (14.9%)	<0.0001
Family factors			
Age mother had her first biological child	18.0 (16.0-21.0)	18 (16.0-21.0)	0.83
Sibling became a parent before the age of 20	14 (21.5%)	55 (21.1%)	0.61
Mother's marital status			0.064
Single	21 (32.3%)	126 (48.3%)	
Married	25 (38.5%)	76 (29.1%)	
Other	19 (29.2%)	59 (22.6%)	
Educational status of mother			0.097
Secondary	16 (24.6%)	100 (38.3%)	
Less than primary	60 (23.0%)	29 (44,6%)	
Don't know	101 (38.7%)	20 (30.8%)	
Perceived Support			
Perceived absence of emotional support from immediate family	3 (4.6%)	1(0.4%)	0.026
Perceived emotional support from mother	28 (43.1%)	154 (59.0%)	0.025
Perceived emotional support from aunt	3 (4,6%)	39 (14.9%)	0.023
Partner relationship factors			
Intimate partner violence	3(4.6%)	9 (3.4%)	0.35
Partner currently provides financial support	31 (47.7%)	91 (34.9%)	0.065
Age Disparate Relationships (Partner ≥ 5 years)	37 (56.9%)	112 (42.9%)	0.051
Perceived emotional support from partner	46 (70.8%)	150 (57.5%)	0.050
School factors			
High education level			<0.0001
Primary	7 (10.8%)	2 (0.8%)	
Junior	6 (9.2%)	6 (2.3%)	
Secondary	52 (80.0%)	253 (96.9%)	

*All continuous values are reported with median and inter-quartile range, Med (IQR), while categories are reported in percentages, n (%).

Table 6: Association between potential confounding variables and adolescent repeat pregnancies

	Adolescent Repeat Pregnancies OR (95% CI)		
Variables	**Model 1**	**Model 2**	**Model 3**
Age	2.69 (1.85 — 4.17)	—	—
Highest Education			
Primary	—	Ref	—
Junior	—	0.29 (0.03 — 1.8)	—
Secondary	—	0.06 (0.01 — 0.25)	—
Mother's Marital Status			
Single	—	—	Ref
Married	—	—	1.97 (1.04 — 3.8)
Other	—	—	1.93 (0.96 — 3.87)

OR, Odds Ratio
CI, Confidence Interval

Table 7: Multivariate logistic regression analysis investigating the influence of selected variables on adolescent repeat pregnancy when adjusting for confounders

Variable	Adjusted Odds Ratio (AOR)	95% CI of the AOR
Spontaneous abortion	29.48**	10.05-105.47
HIV	3.4	1.65-6.99
STIs	4.38	1.14-16.9
Used contraceptives in last 12 months	6.11**	3.08-12.37
Had unprotected sex with more than one partner in last 12 months	3.01	0.98-8.87
Partner currently provides financial support	1.18	0.63-2.2
Perceived emotional support from partner	1.93	0.98-4.0
Age Disparate Relationships (Partner ≥ 5 years)	1.35	0.73-2.5
Perceived emotional support from mother	0.54	0.25-1.16
Perceived emotional support from aunt	0.15**	0.03-0.52
Perceived absence of emotional family support	9.8	0.57-326.38

**** Indicates an odds ratio significantly different from 1.00 at a 5% significance level.**
CI confidence interval

strength and support during times of crises[28]. Solomon and Liefeld[29] revealed the importance of family support in the reduction of repeat pregnancies though the Family Growth Centre (FGC) intervention (p=0.002).

Partner relationship factors are an important component in the socio-ecological framework[22]. Increased partner support has been linked to adolescent repeat pregnancy[14]. Surprisingly, this study also found that adolescents who perceived that their partners would provide emotional support had higher rates of repeat pregnancies (p=0.050). Repeat pregnancies were more common among adolescents who reported current financial support from their partners (p=0.065). There are many assumptions regarding the link of increased partner support and adolescent repeat pregnancy. These could be attributed to gender relations, intimate partner violence, sex negotiation and a partner wanting a baby[14, 23]. For instance, studies by Raneri and Weimann[24] and Jacoby *et al*[30] have documented that the experience of intimate partner violence is associated with repeat pregnancies among adolescents (p<0.01 and p<0.01 respectively). This finding was not observed in our study. However, South African studies have emphasized the influence of gender relations, oppression of women and sexual relations that affect the reporting of intimate partner violence[23, 31]. Furthermore, younger people tend to tolerate abusive relationships[32]. The variables indicating increased partner support (current financial support and perceived emotional support) were not retained in the multivariable logistic regression model.

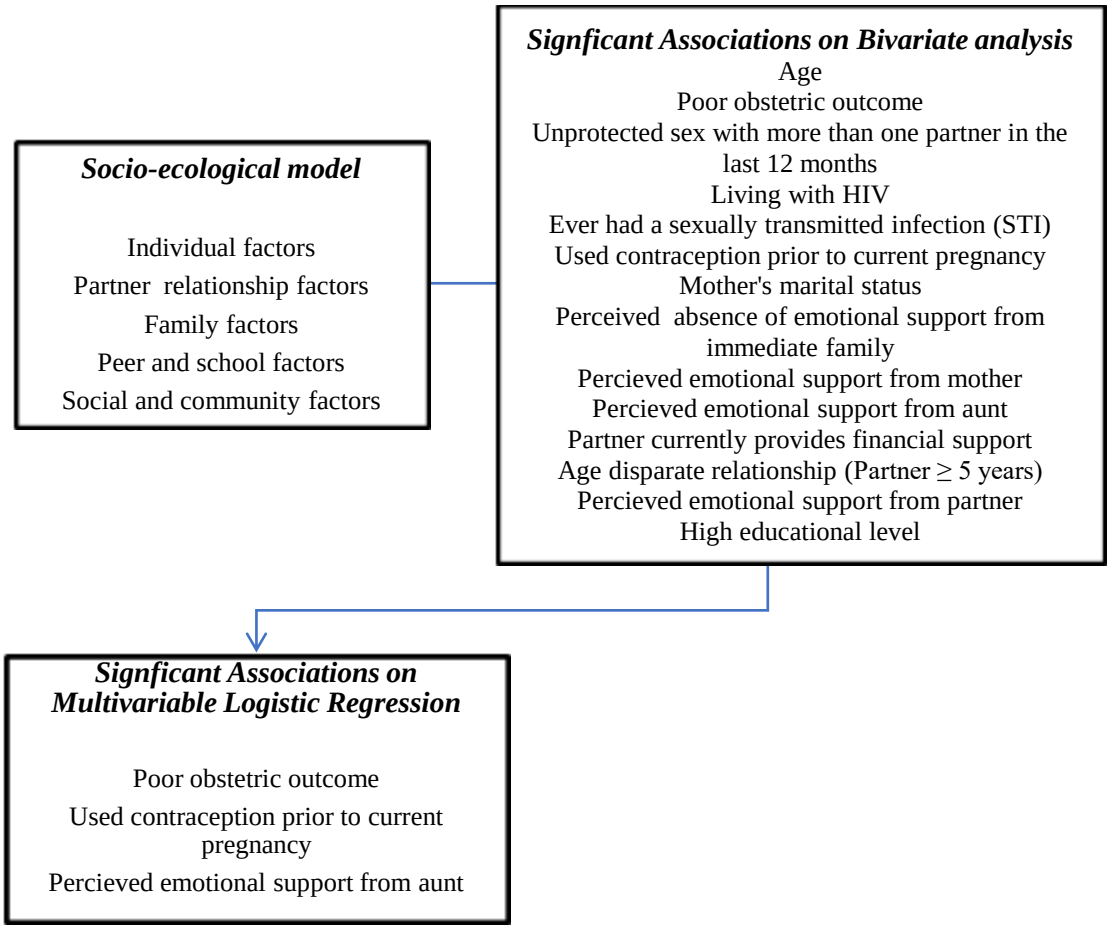

Figure 2: Adolescent repeat pregnancy and associated factors within the socio- ecological model

Adolescent females who had a mother who was married were twice as likely to have repeat pregnancies as compared to adolescent females whose mothers were single. In this study, repeat adolescent pregnancy was higher in adolescent females whose mothers were married. Conversely, numerous studies have highlighted that being raised by a single mother increases an adolescent's risk of early pregnancy and childbearing[33-34]. Although our findings regarding the mother's marital status and adolescent repeat pregnancy are unusual, they are not unique because marital instability is also a risk factor for adolescent pregnancy[25]. As previously noted, the median age in first time marriages for South African women is 29 years[5]. Our study examined the current marital status of the participant's mother and not transitions in marital status.

Studies in South Africa and Australia have documented that adolescent females involved with older men (five years and older) have a higher risk of repeat pregnancies ($p<0.001$ and $p<0.05$ respectively)[15-16]. The finding of the bivariate analysis also corroborated that adolescent females in relationships with older men (five years and older) had a higher incidence of repeat pregnancies ($p<0.051$) but this exposure variable was not statistically significant in multivariate logistic regression analysis. However, in the era of HIV/AIDS, the initial finding of the association between adolescent repeat pregnancy and the age disparate relationships (young women partnering

with older men) is compelling. Sexual relationships between adolescent females and older men are characterised by transactional sex[23]. Often in such relationships, there is an unequal power dynamic which places adolescent females at risk of unwanted pregnancies. The sexual relationships between young women and older men are considered a public health threat to South Africa because it is driving the rate of HIV transmission[33]. The HIV prevalence with adolescents with repeat pregnancies was 36.9% in comparison to 13% in first time mothers ($p<0.01$). Research has shown a significant association between intimate partner violence and being HIV positive[33]. HIV and STIs were not retained in the multivariable logistic regression model.

An unexpected finding in our study was that adolescents who reported contraceptive use in the last 12 months had a higher risk of repeat pregnancies ($p<0.001$). Lewis *et al*[16] had also noted this finding amongst Australian adolescents. The authors alluded that adolescents use contraceptives inconsistently. In our study, only 71 (21.8%) reported using contraception prior to the pregnancy. The most commonly used contraceptive methods were the injection (35/71=49%), the male condom (28/71= 39%) and Implanon (8/71=11%). The reported proportion of contraceptive use in our study (21.8%) is much lower in comparison to a South African study by Ehlers[36] which found that only 48% of 250 adolescent mothers had used contraception. In another South African study, it was found that adolescent learners in Limpopo knew about the various forms of contraception but lacked knowledge about the use of the oral contraceptive[37]. Most of the female learners in the Limpopo study (63%) had negative attitudes towards contraceptives due to various myths, fear of parental authority, and rejection by their male partners for using contraception. More than half (56.9%) of the adolescents with repeat pregnancies in our study believed that contraceptives caused sterility in women.

The reported levels of contraception uptake and use are low amongst both married and unmarried adolescents[38-39]. Although most married adolescents do not want a pregnancy, their contraceptive use is lower than that of sexually active unmarried adolescents[40]. There is therefore an unmet need for contraception amongst adolescents in general. Numerous studies have focused on the use of long acting reversible contraceptives (LARC) as an intervention to reduce adolescent repeat pregnancy[14,41-43]. A study by Tocce *et al*[41] revealed that only 2.6% of adolescent mothers (n=4/153; Relative Risk=5.5; CI: 1.9 -12.7) with immediate postpartum Etonogestrel implant insertion experienced a repeat pregnancy at 12 months versus 18.6% (38/204) of the control group adolescent females. While research has shown that long acting reversible contraceptives is an important intervention in the reduction of adolescent repeat pregnancy but on the contrast, research also indicates that depression in adolescents leads to risky sexual behaviour and poor use of contraception[14]. In this regard, mental health has a significant influence on contraception use. While there are existing programmes to assist pregnant and parenting adolescents, mental health care is not integrated into these programmes. An important consideration to note is that pregnant and parenting adolescents may also find accessing mental health services more challenging than their adult counterparts[44].

Strengths and Limitations of the Study

To address the weaknesses of other studies, we conducted our study in a rural setting. Although the study was conducted in one health district in KwaZulu-Natal, the findings are consistent with that of comparable studies in other countries. The limitation of our study was that we did not establish if the pregnancies were planned and the time intervals between the first and repeat pregnancies. We used a cross sectional study design as part of a larger doctorate study to establish the prevalence of adolescent repeat pregnancy, whereas a cohort study would be able to better establish the true incidence of adolescent repeat pregnancy.

Conclusion

In this study, we have established the prevalence of adolescent repeat pregnancy and its risk factors among South African adolescent females. Moreover, these findings may have implications for future interventions that are aimed at reducing adolescent repeat pregnancy. Adolescent reproductive health research traditionally focuses on primary pregnancy prevention, but secondary pregnancy prevention should be put forward as essential research. Additional research is required to determine the influence on partner support and the risk of repeat pregnancies among adolescents. Our study found that a history of poor obstetrical outcome such as a spontaneous abortion is a significant risk factor for adolescent repeat pregnancy. In this regard, we suggest that psycho-social interventions are required for adolescents who have experienced poor obstetrical outcomes Under-recognised resources such as informal networks of women (aunts, grandmothers and godmothers) who can serve as sources of information and support for adolescent parents, should also be explored. Therefore, we emphasise the need for holistic research regarding secondary pregnancy prevention in adolescents.

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Competing Interest

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' Contributions

D.G. contributed towards data collection, data analysis and writing of the manuscript. S.N. and M.T. revised the manuscript.

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