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Determinants of early pregnancy among adolescent girls in the rural commune of Musienene (North Kivu, Democratic Republic of the Congo).

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ABSTRACT

Introduction: Early pregnancy is a public health problem in sub-Saharan Africa. This study aimed to identify factors associated with pregnancy among adolescent girls in the rural commune of Musienene (North Kivu, DRC).

Methods: An analytical cross-sectional study was conducted among 215 girls aged 10 to 19 years, recruited using convenience sampling in the Katolo and Ivatama health areas. Data were collected using a structured questionnaire, and associations were tested using the chi-square test (5% significance level).

Results: Overall, 95 girls (44.2%) were pregnant at the time of the survey. Viewing marriage before age 18 as normal (69.5% of pregnant girls vs. 19.2% of others; $p < 0.001$) and not having consulted a health center about sexual and reproductive health (5.3% of pregnant girls . had consulted vs. 21.7% of others; $p < 0.001$) were associated with pregnancy. Only 20.9% of the girls knew of a contraceptive method, and 7.9% had used one during their first sexual intercourse. School-based sexuality education, personal income, and age at first sexual intercourse were not associated with pregnancy.

Conclusion: Social norms favoring early marriage and low use of sexual and reproductive health services are priority targets for preventing adolescent pregnancy in Musienene.

Keywords: early pregnancy, adolescent girls, determinants, contraception, child marriage, Democratic Republic of Congo.

1. INTRODUCTION

Early pregnancy refers to a pregnancy occurring in an adolescent girl, that is, a girl aged 10 to 19 years. In low- and middle-income countries, approximately 21 million pregnancies occur each year among adolescent girls aged 15 to 19; nearly half are unintended and result in approximately 12 million births (World Health Organization, 2024).

The adolescent birth rate has declined globally, falling from 64.5 births per 1,000 girls aged 15 to 19 in 2000 to 41.3 in 2023, but it remains highest in sub-Saharan Africa, at 97.9 births per 1,000 (World Health Organization, 2024) .

Early pregnancies expose adolescent mothers to an increased risk of eclampsia, puerperal endometritis, and systemic infections, and their newborns to an increased risk of low birth weight, preterm birth, and serious neonatal conditions (World Health Organization, 2024). They also jeopardize girls' education. In Mali, approximately 24% of adolescent girls aged 15 to 19 had experienced an early pregnancy, with a higher proportion in rural areas (29%) than in urban areas (17%) (Maiga & Kone, 2022).

Recognized risk factors include child marriage, low levels of education and income, limited access to contraception due to cost, lack of knowledge, stigma, and restrictions based on age or marital status as well as sexual violence (World Health Organization, 2024).

In the Democratic Republic of Congo, 27% of adolescent girls aged 15 to 19 had already become sexually active by 2013–2014: 32% in rural areas compared to 20% in urban areas, and 18% in North Kivu Province (MPSMRM et al., 2014).

Congolese adolescents' knowledge of contraception remains limited. A qualitative study conducted in Kinshasa and Kongo Central showed that only periodic abstinence, male condoms, and the pill were mentioned, and that peers, siblings, and the internet were the main sources of information (Mukendi et al., 2021) . In the Oicha health zone, also located in North Kivu, taboos, stigma, restrictive social and religious norms, and the lack of adolescent-friendly services were reported as the main barriers to reproductive health education (Kavugho et al., 2025) .

To the best of our knowledge, no study in the rural commune of Musienene has documented the factors associated with teenage pregnancies.

The objective of this study was to identify the family, educational, sexual and reproductive, socioeconomic, and sociocultural factors associated with teenage pregnancy in the rural commune of Musienene.

2. METHODS

2.1 Study Setting

The study was conducted in the rural commune of Musienene, located in the Baswagha chiefdom, Lubero territory, North Kivu province, in the Democratic Republic of the Congo. It is a predominantly agricultural area. The commune is served by two health zones, Katolo (17,735 residents, including 350 registered adolescent girls) and Ivatama (19,875 residents, including 550 registered adolescent girls), as well as by the Musienene General Referral Hospital (HGR).

2.2 Study Design

This is a quantitative, cross-sectional, descriptive, and analytical study conducted from February to June 2025.

2.3 Population and Sample

2.3.1 Study Population

The target population consisted of the 900 adolescent girls identified in the Katolo and Ivatama health zones.

2.3.2 Sample Size

The minimum sample size was calculated using Slovin's formula, $n = N / (1 + N \times e^2)$, where $N = 900$ and the margin of error $e = 0.05$, yielding $n = 900 / (1 + 900 \times 0.0025) = 276.9$, rounded to 277 adolescent girls. A total of 215 adolescent girls were interviewed, representing 77.6% of the target population.

2.3.4 Sampling Method

Participants were recruited using convenience sampling from among the adolescent girls available during visits to the neighborhoods and at the health center.

2.4 Selection Criteria

Included were adolescent girls aged 10 to 19 years who had been residing in the municipality for at least six months, had either been pregnant or were sexually active, and had given

their consent (with the consent of a parent or guardian for those under 18). Adolescents with a serious mental or physical health condition preventing their participation, as well as those who had recently moved to the municipality, were excluded.

2.5 Data Collection

Data was collected using a structured questionnaire with closed-ended questions, administered by interviewers who had been trained following a pre-test. The questionnaire covered sociodemographic characteristics, family environment, education and awareness, sexual and reproductive health, economic and social factors, and social and cultural norms. The dependent variable was whether the respondent was pregnant at the time of the survey (yes or no).

2.6 Data Analysis

Qualitative variables were described using frequencies and percentages. The association between each factor and pregnancy was tested using Pearson's chi-square test, with a significance level of 5%. The data were analyzed using SPSS version 20.

2.7 Ethical Considerations

The study was authorized by the central office of the Musienene Health Zone. Participants were informed of the study's purpose and provided informed consent; for adolescents under 18 years of age, consent from a parent or guardian was obtained. Participation was voluntary; no names were recorded on the questionnaires, and the results are presented in aggregated form.

3. RESULTS

3.1 Sociodemographic Characteristics

Among the 215 adolescent girls surveyed, 86.0% were aged 15 to 19 and 14.0% were aged 10 to 14 (Table1). Only 2.8% had completed upper secondary education, 18.1% had no formal education , and 40.0% had not completed secondary school. The vast majority were unmarried (87.9%), and 10.7% were married. Catholics accounted for 54.4% of the respondents. Most mothers were farmers (55.3%), as were most fathers (56.3%). More than half of the adolescent girls (56.7%) lived with both parents, 17.7% with a guardian, 10.7% with a spouse, and 3.3% alone. The household's economic situation was rated as average by 48.4% of the respondents, low by 30.7%, and very low by 10.2%. In total, 95 adolescent girls (44.2%) were pregnant at the time of the survey.

Table1: Sociodemographic characteristics of adolescent girls (n = 215)

Sociodemographic variables	Frequency	Percentage (%)
Age of respondents		
10 to 14 years	30	14.0
15 to 19 years	185	86.0
Level of education		
No formal education	39	18.1
Incomplete elementary education	41	19.1
Completed elementary school	19	8.8
Incomplete high school education	86	40.0
High school graduate	24	11.2
Higher education/college	6	2.8
Marital status		
Single	189	87.9
Married	23	10.7
Widowed	3	1.4
Religion		
Catholic	117	54.4
Protestant	48	22.3
Muslim	5	2.3
Adventist	22	10.2
Revival Church	11	5.1
Other	12	5.6
Mother's occupation		
Homemaker	27	12.6

Farmer	119	55.3
Employee	22	10.2
Entrepreneur	9	4.2
Teacher	11	5.1
Other	27	12.6
Father's occupation		
Unemployed	10	4.7
Farmer	121	56.3
Employee	37	17.2
Self-employed	18	8.4
Other	29	13.5
Person with whom the teenager lives		
Both parents	122	56.7
One parent	12	5.6
Guardian	38	17.7
Alone	7	3.3
Spouse	23	10.7
Brother or sister	13	6.0
Economic situation		
Good	23	10.7
Average	104	48.4
Low	66	30.7
Very low	22	10.2
Total	**215**	**100.0**

3.2 Family Environment and Pregnancy

Pregnant adolescents discussed sexuality with their parents less often than others (33.7% vs. 46.7%), but this difference was not statistically significant ($\chi^2 = 3.70$; $p = 0.055$) (Table2). Closeness to parents ($p = 0.222$) and a history of violence or abuse in the family ($p = 0.969$) were not associated with pregnancy. In contrast, having a family member who had experienced a teenage pregnancy was significantly associated with pregnancy, but in the opposite direction than expected: it applied to 28.4% of pregnant adolescents compared with 46.7% of the others ($\chi^2 = 7.45$; $p = 0.006$).

Table2: Family Environment and Pregnancy

Variable / response	**N**	**Early pregnancy**				**Chi-square**	**P**
		Pregnant		**Not pregnant**			
		n	**%**	**n**	**%**		
Do your parents talk to you about sex or romantic relationships?							
YES	88	32	33.7	56	46.7		
NO	127	63	66.3	64	53.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**3.70**	**0.055**
Are you close to your parents?							
YES	161	75	79	86	71.7		
NO	54	20	21	34	28.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**1.49**	**0.222**
Have there been any instances of violence or abuse in your family?							
YES	45	20	21	25	20.8		
NO	170	75	79	95	79.2		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**0.00**	**0.969**
Have one or more family members experienced a teenage pregnancy?							
YES	83	27	28.4	56	46.7		
NO	132	68	71.6	64	53.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**7.45**	**0.006**

3.3 Education, Awareness, and Pregnancy

Sex education received in school was not associated with pregnancy (22.1% vs. 27.5%; $\chi^2 = 0.82$; $p = 0.365$) (Table3). Pregnant adolescents were less likely to be familiar with contraceptive methods than others (15.8% vs. 25.0%), but this difference was not statistically significant ($\chi^2 = 2.72$; $p = 0.099$).

Table 3: Education, Awareness, and Pregnancy

Variable / response	**N**	**Are you experiencing an early pregnancy?**				**Chi-square**	**P**
		Pregnant		**Not pregnant**			
		Sample size	**%**	**Sample size**	**%**		
Did you receive sex education in school?							
YES	54	21	22.1	33	27.5		
NO	161	74	77.9	87	72.5		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**0.82**	**0.365**
Are you familiar with methods of contraception?							
YES	45	15	15.8	30	25		
NO	170	80	84.2	90	75		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**2.72**	**0.099**

Contraceptive Methods Known to Adolescent Girls (n = 45)

Among the 45 adolescent girls who were familiar with at least one contraceptive method, 62.2% cited male condoms, 13.3% cited natural methods, 8.9% cited injectables, 6.7% cited the pill, 6.7% cited the implant, and 2.2% cited emergency contraception (Table 4).

Table4: Contraceptive methods known to adolescent girls (n = 45)

Contraceptive method	**Number of respondents**	**Percentage**
Male condoms	28	62.2
Oral contraceptives	3	6.7
Injectables (Depo-Provera)	4	8.9
Implants	3	6.7
Natural methods	6	13.3
Emergency contraception	1	2.2
Total	**45**	**100.0**

3.4 Sexual Behavior and Pregnancy

Among the 147 adolescents who had already had sexual intercourse, age at first intercourse was not associated with pregnancy: 37.9% of pregnant adolescents had had their first sexual intercourse before age 15, compared with 44.2% of the others ($\chi^2 = 0.56$; $p = 0.454$) (Table5). The number of sexual partners ($p = 0.267$) and the use of contraception during first sexual intercourse (6.3% vs. 9.2%; $p = 0.442$) were also not associated with pregnancy. Only 17 adolescents (7.9%) had used contraception during their first sexual intercourse.

Table 5: Sexual Behaviors and Pregnancy

Variable / response	**N**	**Are you experiencing an early pregnancy?**				**Chi-square**	**P**
		Pregnant		**Not pregnant**			
		Sample size	**%**	**Sample size**	**%**		
At what age did you have sex for the first time?							
Before age 15	59	36	37.9	23	44.2		
After 15 years	88	59	62.1	29	55.8		
Total	**147**	**95**	**64.6**	**52**	**35.4**	**0.56**	**0.454**
How many partners do you have?							
One partner	83	31	32.6	52	43.3		
Two partners	49	23	24.2	26	21.7		
Three partners	83	41	43.6	42	35		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**2.638**	**0.119**
Do you use contraception during your first sexual encounter?							
YES	17	6	6.3	11	9.2		
NO	198	89	93.7	109	90.8		

Total	**215**	**95**	**44.2**	**120**	**55.8**	**0.59**	**0.442**
Have you ever been pregnant?							
YES	130	95	100	35	29.2		
NO	85	0	0.0	85	70.8		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**111.29**	**< 0.001**

3.5 Sexual and Reproductive Health and Pregnancy

Pregnant adolescents were less likely to have visited a health center for a sexual and reproductive health issue than others (5.3% vs. 21.7%; $\chi^2 = 11.56$; $p < 0.001$) (Table 6). Conversely, they reported having easy access to reproductive health services much more frequently (95.8% vs. 16.7%; $\chi^2 = 132.92$; $p < 0.001$). Being in a relationship at the time of pregnancy was not associated with the current pregnancy ($p = 0.179$). The associations with having previously had sexual intercourse or a pregnancy stem directly from the definition of the variable under study and are not interpreted; the number of pregnancies was not tested due to expected sample sizes being too small.

Table 6: Sexual and Reproductive Health and Pregnancy

ariable / response	**N**	**Are you currently pregnant?**				**Chi-square**	**P**
		Pregnant		**Not pregnant**			
		Sample size	**%**	**Sample size**	**%**		
Have you ever sought medical advice for a reproductive health issue?							
YES	31	5	5.3	26	21.7		
NO	184	90	94.7	94	78.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**11.56**	**< 0.001**
Do you have easy access to reproductive health services?							
YES	111	91	95.8	20	16.7		
NO	104	4	4.2	100	83.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**132.92**	**< 0.001**
Have you had sex?							
YES	147	95	100	52	43.3		
NO	68	0	0	68	56.7		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**78.74**	**< 0.001**
How many times have you become pregnant?							
Once	135	92	96.8	43	82.7		
Twice	11	3	3.2	8	15.4		
Three times or more	1	0	0.0	1	1.9		
Total	**147**	**95**	**64.6**	**52**	**35.4**	–	–
Were you in a relationship during the pregnancy?							
YES	41	23	24.2	18	34.6		
NO	106	72	75.8	34	65.4		
Total	**147**	**95**	**64.6**	**52**	**35.4**	**1.81**	**0.179**

3.6 Economic and Social Factors and Pregnancy

Personal income ($p = 0.908$), working to support oneself ($p = 0.406$), sexual relations in exchange for money, gifts, or services ($p = 0.964$), and regular internet access ($p = 0.084$) were not associated with pregnancy (Table7). Nearly half of the respondents (50.7%) reported having had sexual relations in exchange for money, gifts, or services. Frequent exposure to sexual content on social media was significantly associated with pregnancy, but it was less common among pregnant adolescents (74.7% versus 91.7%; $\chi^2 = 11.42$; $p < 0.001$).

Table 7: Economic and Social Factors and Pregnancy

Variable / response	**N**	**Are you experiencing an early pregnancy?**				**Chi-square**	**P**
		Pregnant		**Not pregnant**			
		Sample size	**%**	**Sample size**	**%**		
Do you have a personal income?							
YES	58	26	27.4	32	26.7		
NO	157	69	72.6	88	73.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**0.01**	**0.908**

Do you work to support yourself?							
YES	44	17	17.9	27	22.5		
NO	171	78	82.1	93	77.5		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**0.69**	**0.406**
Have you ever had sexual relations in exchange for money, gifts, or services?							
YES	109	48	50.5	61	50.8		
NO	106	47	49.5	59	49.2		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**0.00**	**0.964**
Do you have regular access to the internet and other social media platforms?							
YES	53	18	18.9	35	29.2		
NO	162	77	81.1	85	70.8		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**2.98**	**0.084**
Do you often see sexual content on social media?							
YES	181	71	74.7	110	91.7		
NO	34	24	25.3	10	8.3		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**11.42**	**< 0.001**

3.7 Social and Cultural Norms and Pregnancy

The belief that it is normal to marry before age 18 was strongly associated with pregnancy: 69.5% of pregnant adolescents shared this view, compared with 19.2% of the others (χ^2 = 55.31; p < 0.001) (Table8). Social or family pressure to marry was reported less frequently by pregnant adolescents (32.6% versus 45.8%; χ^2 = 3.85; p = 0.0497). Stigmatization of pregnant adolescents in the community, reported by 94.0% of respondents, was not associated with pregnancy (p = 0.315), and the taboo nature of discussions about sexuality within the family was not significantly associated with it (91.6% versus 82.5%; χ^2 = 3.75; p = 0.053).

Table 8: Social and Cultural Norms and Pregnancy

Variable / response	**N**	**Are you experiencing an early pregnancy?**				**Chi-square**	**P**
		Pregnant		**Not pregnant**			
		Sample size	**%**	**Sample size**	**%**		
Are pregnant teenage girls stigmatized in your community?							
YES	202	91	95.8	111	92.5		
NO	13	4	4.2	9	7.5		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**1.01**	**0.315**
Do you think it's normal to get married before the age of 18?							
YES	89	66	69.5	23	19.2		
NO	126	29	30.5	97	80.8		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**55.31**	**< 0.001**
Is there social or family pressure to get married?							
YES	86	31	32.6	55	45.8		
NO	129	64	67.4	65	54.2		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**3.85**	**0.0497**
Are discussions about sexuality considered taboo in your family?							
YES	186	87	91.6	99	82.5		
NO	29	8	8.4	21	17.5		
Total	**215**	**95**	**44.2**	**120**	**55.8**	**3.75**	**0.053**

4. DISCUSSION

4.1 Extent of Pregnancies

Nearly half of the adolescent girls surveyed (44.2%) were pregnant at the time of the survey. This proportion cannot be interpreted as a prevalence in the population, since the inclusion criteria targeted adolescent girls who had already experienced a pregnancy or were sexually active, and the sampling was convenience-based. However, it remains high compared to national data, according to which 27% of adolescents aged 15 to 19 had already begun their

reproductive lives in 2013–2014, including 32% in rural areas (MPSMRM et al., 2014).

4.2 Family and Sociocultural Factors

The most strongly associated with pregnancy was the belief that marriage before age 18 is normal (69.5% of pregnant adolescents versus 19.2% of others). This finding aligns with the recognized role of child marriage among the determinants of adolescent pregnancy (World Health Organization, 2024) . In a cross-sectional survey, however, this opinion may be a consequence of pregnancy as much as a risk factor.

Discussions about sexuality were considered taboo within the family by the vast majority of respondents (86.5%), and pregnant adolescents discussed sexuality with their parents less frequently, although these differences did not reach statistical significance. These results are consistent with the barriers described in the Oicha health zone, where taboos, stigma, and restrictive social norms limited adolescents' education on reproductive health (Kavugho et al., 2025) . The inverse association observed with a family history of teenage pregnancy and with pressure to marry is difficult to interpret and may reflect a reporting bias.

4.3 Education, Sexual and Reproductive Health

Knowledge of contraceptive methods was low: only 45 adolescent girls (20.9%) were familiar with at least one method primarily the male condom and only 7.9% had used one during their first sexual encounter. These findings are consistent with those of a qualitative study conducted in the DRC, where adolescents cited only periodic abstinence, male condoms , and the pill, and were wary of modern methods (Mukendi et al., 2021) . Sex education received at school, reported by only 25.1% of respondents, was not associated with pregnancy, which may reflect insufficient content, as also described in this study (Mukendi et al., 2021) .

Pregnant adolescents were less likely to have visited a health center for a sexual and reproductive health issue, which points to the need for adolescent-friendly services. Conversely, they reported having easy access to these services much more frequently; this finding is likely due to the prenatal care they receive as a result of their pregnancy and illustrates the difficulty of determining the direction of associations in a cross-sectional study.

The WHO also emphasizes that adolescents' access to contraception is limited by cost, lack of knowledge, stigma, and restrictions related to age or marital status (World Health Organization, 2024).

4.4 Economic Factors and Media Exposure

The economic factors studied (personal income, employment) were not associated with pregnancy. However, half of the respondents (50.7%) reported having had sex in exchange for money, gifts, or services, indicating significant economic vulnerability regardless of their pregnancy status.

Frequent exposure to sexual content on social media was more common among non-pregnant adolescents (91.7% versus 74.7%). This high proportion, even though only 24.7% of respondents reported regular internet access suggests that the question may have been interpreted broadly, for example, as exposure through third parties.

4.5 Limitations of the study

This study has several limitations. The convenience sampling and inclusion criteria—which selected adolescents who had already been pregnant or were sexually active—do not allow for an estimate of the prevalence of early pregnancies in the general population; moreover, the sample included 68 adolescents who had never had sexual intercourse. The actual sample size (215) was smaller than the calculated sample size (277). The cross-sectional design does not allow for determining the direction of associations, and the bivariate analyses were not adjusted for confounding factors. Finally, the data are based on the adolescents' self-reports, which introduce reporting bias on sensitive topics.

CONCLUSION

Nearly half of the adolescent girls surveyed in the rural commune of Musienene were pregnant. The perception that marriage before age 18 is normal and the lack of consultation regarding sexual and reproductive health issues were the factors most strongly associated with pregnancy. Knowledge of and use of contraception were low, and sex education received in school was not associated with a lower incidence of pregnancy. These findings call for strengthening sex education, adolescent-friendly health services, and efforts to combat child marriage.

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