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Comparative analysis of pregnancy outcomes between teenage and adult women at Anaka General Hospital, Northern Uganda

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Abstract

Background Teenage pregnancy is a global health concern associated with adverse maternal and neonatal outcomes. In Uganda, while teenage pregnancy rates are high, knowledge about their specific risks compared to those of adult pregnancy remains limited.

Objective We determined the proportion of pregnant teenagers and compared the maternal and neonatal outcomes between pregnant teenagers and pregnant adults at a general hospital in northern Uganda.

Methods We conducted a comparative, retrospective cohort study involving chart reviews of deliveries at the maternity ward of Anaka General Hospital, Nwoya, Uganda between July 2020 and June 2023. We performed systematic random sampling to include patient charts. All the data were analyzed using STATA software 17 SE. Binary logistic regression was performed to compare adverse pregnancy outcomes between teenage mothers and adult mothers.

Results Over the 3-year period, 27.6% ($n=1,842$) of the 6,662 deliveries were by teenage mothers. The outcomes of 457 teenage and 457 adult mothers were compared. Compared to adult mothers, teenage mothers had a significantly lower prevalence of HIV (2.2% *versus* 6.1%, $p=0.003$). Teenage mothers had higher odds of having an episiotomy performed (adjusted odds ratio [aOR] = 5.66, 95% confidence interval [CI]: 2.48–12.90, $p<0.001$), low birth weight (aOR = 4.66, 95% CI: 2.66–6.37, $p<0.001$) or perineal tear (aOR = 2.61, 95% CI: 1.69–4.02, $p<0.001$). However, adult mothers had greater odds of developing pre-eclampsia (aOR = 4.0, 95% CI: 1.59–11.1, $p=0.004$).

Conclusions In this study, approximately 1 in every 4 deliveries were by teenage mothers, with increased risks of maternal and neonatal complications, except for pre-eclampsia which was more common among adult mothers. Therefore, it is crucial to implement targeted interventions and comprehensive education programs aimed at reducing teenage pregnancies and providing adequate antenatal care and support for teenage mothers.

Keywords Teenage pregnancy, Maternal outcome, Neonatal outcomes

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Background

Teenage pregnancy, defined as conception between the ages of 13 and 19 years, is a global public health concern due to its significant medical risks for both mothers and newborns, impacting both developed and developing nations [1–3]. Although often used interchangeably, terms such as "adolescent" and "child pregnancy" have distinct meanings from "teenage pregnancy" [4].

Globally, approximately 16 million pregnancies occur in girls aged 15–19, with an additional 1 million pregnancies occurring in girls under 15 years [4]. Over 90% of teenage pregnancies occur in sub-Saharan Africa (SSA) [4, 5], where the prevalence of teenage pregnancy is 19.3%, with the highest prevalence of 21.5% in East Africa [5]. Hospital-based studies have revealed varying rates of teenage pregnancy across different settings and populations. In Nepal, a community hospital study revealed that 29.06% of total deliveries over a ten-year period were teenage deliveries [6]. Similarly, in Ethiopia's Assosa General Hospital, the prevalence was 26% [7], and in Egypt's Bassion General Hospital [8], it was 26.4%. In Uganda, Kiryandongo General Hospital reported a prevalence of 12% [9], while the Mbale Regional Referral Hospital had a prevalence of 20.6% [10].

Teenage pregnancy is linked to serious maternal health complications when compared to adult pregnancy due to biological and psychological unreadiness, limited access to care, and social/economic disadvantages [2, 11]. These complications include pregnancy-induced hypertension [8, 12], anaemia [8, 13], preterm delivery [14, 15], increased rates of caesarean Sects [12–14]., postpartum hemorrhage (PPH) [12, 15], perineal tears [16], and sexually transmitted infections, including HIV [17, 18]. Infants born to teenage mothers face risks such as preterm birth [15], low birth weight [12, 19, 20], birth asphyxia [14], neonatal intensive care unit (NICU) admission [8, 19], and long-term permanent physical and mental disabilities [3].

Teenage pregnancy is a significant public health concern in Uganda, where 52% of the population is under 18 years old; however, the prevalence of teenage pregnancy is 25% [21], particularly affecting areas such as the Nwoya district, where girls face vulnerabilities due to low secondary school attendance (16%), high dropout rates (94%), and early marriage (20% before age 20) [22]. Despite systematic challenges, there is limited information on the outcomes of teenage pregnancy; studies in Uganda provided prevalence estimates or descriptive characteristics without analytical comparison of delivery outcomes between teenage and adults [9, 10, 23]. Priority should be given to ensuring safe pregnancy outcomes for teenage mothers.

Our study therefore adds value by also providing a comparative cohort analysis of maternal and neonatal outcomes among teenage versus adult mothers in a general hospital setting in Northern Uganda.

Hypothesis

Teenage mothers delivering at Anaka General Hospital have a higher risk of adverse maternal and neonatal outcomes compared with adult mothers.

Methods

Study design

This study was hospital based retrospective cohort study that involved review of maternity records for deliveries at Anaka General Hospital, Nwoya District, Northern Uganda, from July 2020 to June 2023, using a structured data extraction tool developed for the study.

Study setting

Anaka General Hospital is the only government-owned hospital under governance of Nwoya district local government. It is located in Northern Uganda, approximately 320 km north-west of the capital city Kampala by road. The hospital has an average of 2000 deliveries annually. The unit provides care 24 h a day, 7 days a week, offering comprehensive emergency obstetric, maternal and newborn care.

Study population

The study population comprised all women who delivered at Anaka General Hospital between July 2020 and June 2023. For the comparative analyses we included charts that met the following eligibility criteria: [1] maternal age < 20 years (teenage arm) or ≥ 20 years (adult arm); [2] singleton pregnancy; [3] delivery occurred at Anaka General Hospital (in-facility deliveries); and [4] the maternal and neonatal records contained the core variables required for the primary outcome (delivery mode and birthweight). Exclusion criteria were: deliveries before arrival (BBA), multiple pregnancies (twins or higher order), and charts with irretrievable or missing core outcome data despite cross-checking theatre, maternity and NICU registers.

Sample size estimation

For the descriptive aim (proportion of deliveries by teenage mothers) we performed a facility census of all deliveries recorded in the maternity register during the study period. For the comparative aim (teenage vs. adult mothers) we calculated required sample size to detect a difference in primary outcome (caesarean section) using the two-sample proportion formula [24]. Using a two-sided $\alpha = 0.05$, 80% power, and expected proportion of caesarean Sect. 12.9% in teenage mothers and 18.8% in adult mothers, sourced from a study in Ethiopia [12], the

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minimum sample size required per group was 457. Thus, we included 457 teenage mothers and 457 adult mothers.

Sampling strategy

During the study period, there were a total of 6,662 obstetric admissions, which included 1,842 teenagers and 4,830 adults. Charts of 15 teenage mothers and charts of 151 adult mothers were excluded. Systematic random sampling from the integrated maternity register was used to select the charts. The sampling intervals were determined by calculating "K" values, using the formula K = N/n, where "N" is the total number of deliveries and "n" is the calculated sample size. For teenagers, K = 1,827/457 ≈ 4, while for adults, K = 4669/457 ≈ 10. The sampling intervals were 4 and 10 for teenage mothers and adults, respectively.

Data collection

The data were collected from the patients' files using a structured data extraction tool. Two midwives served as research assistants. They were briefed on the study's objectives, data collection procedures, and how to accurately complete the extraction tool. Sample charts identified from the integrated maternity register, including names and inpatient numbers, are listed. Subsequently, charts of sampled mothers and babies admitted to the NICU were retrieved from the records section.

Study variables

The primary maternal outcome variables were mode of delivery (categorized as vaginal delivery or caesarean section); the secondary maternal outcomes were preeclampsia, ante partum haemorrhage; episiotomy performed, and perineal tear, post-partum haemorrhage and maternal death.

The primary neonatal outcome was birth weight, while the secondary outcomes were delivery status (alive or dead), Apgar score at 1 and 5 min, presence of congenital anomalies, admission to the NICU and neonatal death.

The main independent variable was age. Other independent (baseline) variables were the sociodemographic characteristics, medical factors and obstetrics factors. The sociodemographic factors included area of residence and referral status. Medical factor captured was the HIV status. The obstetric factors included gravidity, parity, and gestation age at delivery, stage of labour at admission and induction of labor.

Outcomes operational definitions

Preeclampsia: new-onset hypertension (systolic BP ≥ 140 mmHg or diastolic BP ≥ mmHg on at least two occasions after 20 weeks' gestation) with proteinuria (dipstick proteinuria ≥ + 1).

Antepartum haemorrhage (APH): bleeding from the genital tract after 28 weeks gestation and prior to delivery, as recorded in the maternal chart.

Postpartum haemorrhage (PPH): blood loss ≥ 500 mL after vaginal birth or ≥ 1,000 mL after caesarean section, or as recorded and managed as PPH in the maternal.

Perineal tear: any perineal laceration that required suturing and was documented in the chart.

Birth asphyxia: Apgar score < 7 at 1 and 5 min or clinical diagnosis in the neonatal record.

Data management and analysis

The data were checked for accuracy and completeness before being coded and entered into an Excel spreadsheet. Analysis was conducted using STATA/SE v17, StataCorp LLC, Texas, USA. The study utilized two-tailed tests at a 95% confidence interval and a significance of $p < 0.05$. The baseline characteristics of the participants are summarized; with corresponding p values indicated distribution disparities between cohorts. Categorical variables are presented as frequencies and percentages, with Pearson's chi-square p-values. Numerical variables were assessed for normality using the Shapiro-Wilk test; normally distributed data were expressed as the mean and standard deviation with the Student's t-test p values, and non-normally distributed data were summarized using the median, range, and p-values from the Mann-Whitney U test.

We report the facility-level proportion of deliveries by teenage mothers (number of deliveries to mothers aged < 20 years divided by total facility deliveries during the study period). This proportion reflects the hospital caseload and is not a population prevalence estimate.

To compare the teenage pregnancy and adult pregnancy outcomes, maternal outcomes were categorized as dichotomous. Bivariate and multivariate logistic regression models were used to compare outcomes. Outcome variables that had significant ($p < 0.05$) or marginally ($0.05 \le p < 0.25$) significant different proportion between the age groups were adjusted for other independent variables using separate multivariate analysis models. We checked for multicollinearity, and in that respect excluded parity ($r = 0.72$) and gravidity ($r = 0.69$) from all models as they were highly correlated with age. Backward, stepwise elimination method and Akaike's information criteria (AIC) were used to select best models. The results are presented as adjusted odds ratios (aORs) with the corresponding 95% confidence intervals (CIs) and *p values*.

Results

Study enrollment

During the three-year-study period, there were a total of 6,662 were deliveries conducted, including 1, 842 (27.6%)

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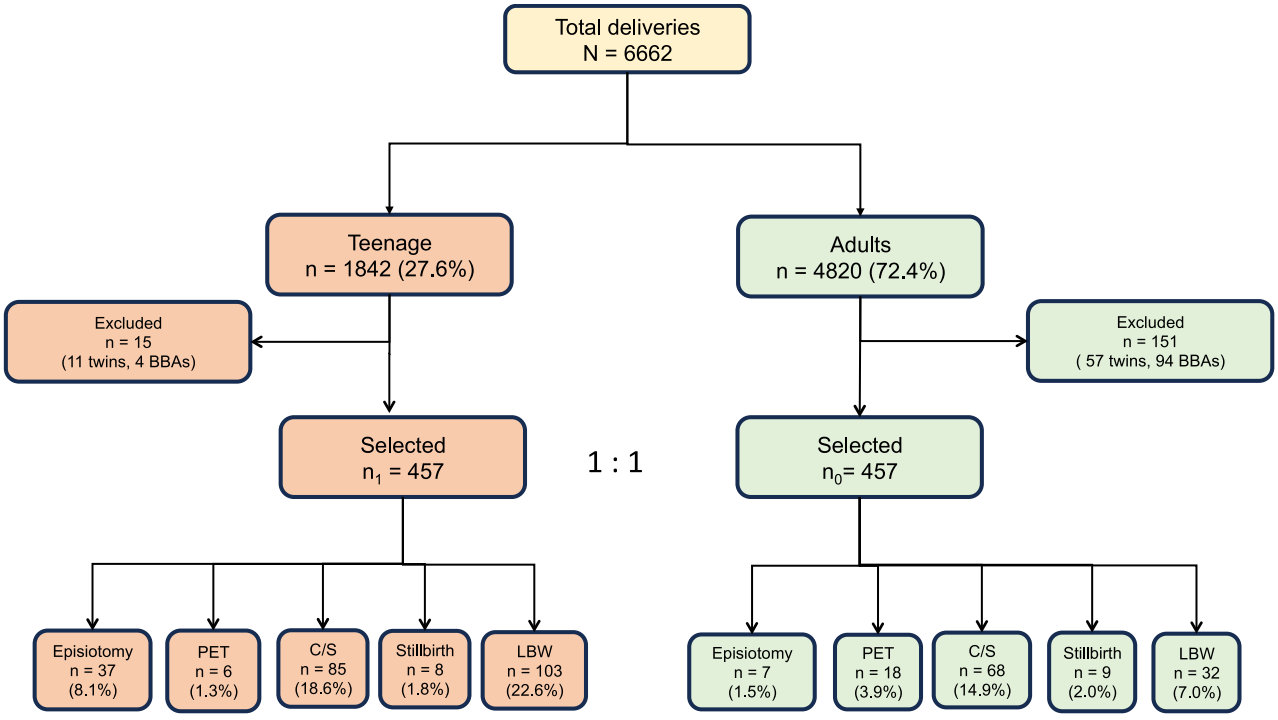


Fig. 1 Showing study enrollment

Table 1 Maternal characteristics of teenage and adult mothers

Characteristics	Total *N* (%)	Teenage *n* (%)	Adults *n* (%)	*P* value
Age Median (min, max)	19.5 (15, 46)	18 (15–19)	25 (20–46)	**< 0.001**
Gravidity median (min, max)	2 (1, 12)	1 (1, 3)	3 (1, 12)	**< 0.001**
Parity median (min, max)	0 (0, 10)	0 (0, 1)	2 (0, 10)	**< 0.001**
Gestation age				
(Mean, SD)	38.34 (28, 44)	38.42 (2.08)	38.25 (1.97)	0.208
Referral in				
Yes	109 (11.93)	75 (16.41)	34 (7.44)	**< 0.001**
No	805 (88.07)	382 (83.59)	423 (92.56)	
HIV status				
Positive	38 (4.16)	10 (2.19)	28 (6.13)	**0.003**
Negative	876 (95.84)	447 (97.81)	429 (93.87)	
Labor onset				
Induced	26 (2.9)	5 (1.10)	21 (4.74)	**< 0.001**
Spontaneous	370 (97.10)	448 (98.90)	422 (95.26)	
Stage of labor				
Not in labor	111 (12.14)	45 (9.85)	66 (14.44)	**< 0.001**
Latent phase	250 (27.35)	158 (34.57)	92 (20.13)	
Active phase	412 (45.08)	196 (42.89)	216 (47.26)	
Second stage	141 (15.43)	58 (12.69)	83 (18.16)	

Min Minimum value, *Max* Maximum value, *N* Number, *SD* Standard deviation

of which involved teenage mothers (exposed) while 4,820 (72.4%) adult mothers (non-exposed), Fig. 1.

Proportion of teenage pregnancy

Of the 6,662 facility deliveries recorded during the study period, 1,842 (27.6%) were to mothers aged < 20 years; this proportion is a hospital-based (facility) estimate.

Maternal characteristics of teenage and adult mothers

Compared to adult mothers, teenage mothers had a lower median gravidity (1 versus 3, $p < 0.001$) and parity (0 versus 2, $p < 0.001$). There was no statistically significant difference in the mean gestational age at delivery ($p = 0.208$). The proportion of referrals was greater for teenage mothers (16.4%) than for adult mothers (7.4%) ($p < 0.001$). Adult mothers had a greater prevalence of HIV (6.1% vs. 2.2%, $p = 0.003$). Induction of labor was more common among adult mothers (4.7%) than among teenage mothers (1.1%) ($p < 0.001$). Teenage mothers presented earlier in labor, while adult mothers presented later ($p < 0.001$), (Table 1).

Comparison of maternal outcomes between pregnant teenagers and pregnant adults

The proportion of caesarean deliveries was similar among teenagers (18.6%) and adult mothers (14.9%) ($p = 0.132$). A greater proportion of adult mothers had pre-eclampsia than did teenagers (3.9% vs. 1.3%, $p = 0.013$). There was no statistically significant difference in the incidence of

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Table 2 Obstetric outcomes of teenage and adult deliveries

Variable	Total *N* (%)	Teenage *n* (%)	Adult *n* (%)	*P* value
Mode of delivery				
Caesarean	153 (16.7)	85 (18.6)	68 (14.9)	0.132
Vaginal	761 (83.3)	372 (81.4)	389 (85.1)	
Indication of C/S				
Prolong/obstructed	38 (25.2)	26 (30.9)	12 (17.9)	**< 0.0001**
Fetal distress	19 (12.6)	11 (13.1)	8 (11.9)	
Previous C/S	45 (29.8)	12 (14.3)	33 (49.2)	
Contracted pelvis	25 (16.5)	23 (27.4)	2 (3.0)	
Pre-eclampsia	9 (6.0)	3 (3.6)	6 (9.0)	
Others	15 (9.9)	9 (10.7)	6 (9.0)	
Type of C/S				
Elective	10 (6.6)	1 (1.2)	9 (13.2)	**0.003**
Emergent	142 (93.4)	83 (98.8)	59 (86.8)	
Pre-eclampsia				
Yes	24 (2.6)	6 (1.3)	18 (3.9)	**0.013**
No	890 (97.4)	451 (98.7)	439 (96.1)	
APH				
Yes	11 (1.2)	4 (0.9)	7 (1.5)	0.363
No	903 (98.8)	453 (99.1)	450 (98.5)	
Obstructed/prolonged				
Yes	31 (3.4)	16 (3.5)	15 (3.3)	0.860
No	882 (96.6)	441 (96.5)	441 (96.7)	
Perineal tear				
Tear	119 (13.0)	85 (18.6)	34 (7.4)	**< 0.001**
No tear	795 (87.0)	372 (81.4)	423 (92.6)	
Episiotomy				
Performed	44 (4.8)	37 (8.1)	7 (1.5)	**< 0.001**
Not performed	870 (95.2)	420 (91.9)	450 (98.5)	
PPH				
Yes	12 (1.3)	6 (1.3)	6 (1.3)	1.00
No	902 (98.7)	451 (98.7)	451 (98.7)	
Puerperal sepsis				
Yes	1 (0.1)	1 (0.1)	0 (0.00)	0.317
No	456 (99.9)	456 (99.9)	457 (100.00)	
Hospitalization days	2 (1, 18)	2 (1, 18)	1 (1, 17)	0.577

antepartum hemorrhage ($p = 0.363$), postpartum hemorrhage ($p = 1.00$) or obstructed labor ($p = 0.860$). A greater proportion of teenage mothers had perineal tears (18.6% vs. 7.4%, $p < 0.001$) and underwent episiotomy (8.1% vs.1.5%, $p < 0.001$). Puerperal sepsis was rare in teenage mothers (0.1%) with no cases in adult mothers ($p = 0.317$). The median hospitalization duration was 2 days for teenagers and 1 day for adult mothers ($p = 0.557$), (Table 2).

After bivariate and multivariate analysis, the proportions of several maternal outcomes remained significantly different between the age groups. Adult mothers had a fourfold likelihood of pre-eclampsia compared to teenage mothers ($p = 0.004$). Teenage mothers were 2.61 times more likely to experience perineal tear ($p < 0.001$) and 5.66 times more likely to undergo episiotomy ($p < 0.001$) compared to adult mothers, (Table 3).

Table 3 Neonatal outcomes of teenage and adult pregnancies

Variable	Total *N* (%)	Teenage *n* (%)	Adult *n* (%)	*P* value
Status				
Stillbirth	17 (1.9)	8 (1.8)	9 (2.0)	0.795
Live birth	897 (98.1)	449 (98.2)	450 (98.0)	
Apgar 1 min				
< 7	77 (8.4)	44 (9.7)	33 (7.2)	0.187
7–10	836 (91.6)	412 (90.3)	424 (92.8)	
Apgar 5 min				
< 7	24 (2.6)	15 (3.3)	9 (2.0)	0.213
7–10	889 (97.4)	441 (96.7)	448 (98.0)	
Baby sex				
Male	456 (49.9)	237 (51.7)	219 (47.9)	0.234
Female	458 (50.1)	220 (48.1)	238 (52.1)	
Birth asphyxia				
Yes	92 (10.3)	52 (11.5)	40 (8.9)	0.190
No	805 (89.7)	397 (88.4)	408 (91.1)	
Low birth weight				
< 2.5	135 (14.8)	103 (22.6)	32 (7.0)	**< 0.001**
≥ 2.5	775 (85.2)	352 (77.4)	423 (93.0)	
Anomaly				
Yes	8 (0.9)	2 (0.4)	6 (1.3)	0.156
No	905 (99.1)	454 (99.6)	451 (98.7)	
NICU admission				
Yes	104 (11.6)	49 (10.9)	55 (12.3)	0.524
No	793 (88.4)	400 (89.1)	393 (87.7)	
Discharged alive				
No	44 (4.8)	19 (4.2)	25 (5.5)	0.354
Yes	870 (95.2)	438 (95.8)	432 (94.5)	

NICU Neonatal Intensive Care Unit

Comparison of neonatal outcomes of teenage pregnancy to adult pregnancy

The proportion of stillbirth was similar among teenage mothers (1.8%) and adult mothers (2.0%), ($p = 0.795$). Apgar scores below 7 at 1 min were observed in 9.7% for teenagers and 7.2% for adult ($p = 0.187$) and at 5 min, 3.3% for teenagers and 2.0% for adults ($p = 0.213$). Sex distribution did not significantly differ among teenagers (51.9% boys, 48.1% girls) and adult mothers (47.9% boys, 52.1% girls) ($p = 0.234$). The proportion of babies that had birth asphyxia was 11.6% for teenagers and 8.9% for adults ($p = 0.190$). Teenage mothers had significantly higher proportion of low birth weight compared to adult mothers (22.6% vs. 7.0%, $p < 0.001$). Proportion of congenital anomalies was similar ($p = 0.156$). The proportion of babies that had NICU admission was 10.9% among teenagers and 12.3% among adult mothers ($p = 0.524$). Among teenage mothers, 95.8% of babies were discharged alive, compared to 94.5% among adult mothers. However, this difference was not statistically significant ($p = 0.354$), (Table 4).

After multivariate analysis, independently teenage mothers had 4.12-fold higher odds of delivering a low-birth-weight baby compared to adult mothers ($p < 0.001$), (Table 5).

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Table 4 Logistic regression models of adverse maternal outcomes of teenage and adult mothers

	Obstetric outcome		Bivariate		Multivariable	
	Yes n (%)	**No n (%)**	**Crude OR (95% CI)**	***P* value**	**Adjusted OR (95% CI)**	***P* value**
Caesarean section (primary outcome variable)						
Age						
Teenage	85 (55.6)	372 (48.9)	1.31 (0.92 – 1.85)	0.133*	1.27 (0.86 – 1.87)	0.224
Adult	68 (44.4)	389 (51.1)				
Parity						
Multiparous	69 (45.1)	372 (48.9)	0.86 (0.61 – 1.22)	0.393	--------	-----
Nulliparous	84 (54.9)	38(51.1)				
Birth weight						
≥ 3.5	33 (21.6)	94 (12.4)	1.94 (1.25 – 3.02)	0.003**	2.09 (1.29 – 3.37)	0.003***
< 3.5	120 (78.4)	663 (87.6)				
Referral						
Yes	37 (24.2)	72 (9.5)	3.05 (1.96 – 4.75)	< 0.001**	3.20 (2.00 – 5.14)	< 0.001***
No	116 (75.8)	689 (90.5)				
Stage of labor						
Second stage	2 (1.3)	139 (13.3)	0.03 (0.01 – 0.12)	< 0.001**	0.03 (0.01 – 0.12)	< 0.001***
Active phase	64 (41.8)	348 (45.7)	0.38 (0.23 – 0.59)	< 0.001**	0.34 (0.20 – 0.55)	< 0.001***
Latent phase	50 (32.7)	200 (26.3)	0.50 (0.30 – 0.83)	0.007**	0.49 (0.29 – 0.82)	0.011***
Not in labor	37 (24.2)	74 (9.7)	1	---	1	---
Pre eclampsia/eclampsia						
Age						
Teenage	6 (25.0)	451 (50.7)	1	0.018**	4.0 (1.59 – 11.11)	0.004***
Adult	18 (75.0)	439 (49.3)	3.13 (1.20 – 7.69)			
Parity						
Multiparous	14 (58.3)	427 (48.0)	1.51 (0.66 – 3.45)	0.320	-------	
Nulliparous	10 (41.67)	463 (52.0)				
Referral						
Yes	8 (33.3)	101 (11.3)	3.91 (1.63 – 9.36)	0.002**	5.38 (2.17 – 13.37)	< 0.001***
No	16 (66.7)	789 (88.7)				
Perineal tear						
Age						
Teenage	85 (71.4)	372 (46.8)	2.84 (1.87 – 4.33)	< 0.001**	2.61 (1.69 – 4.02)	< 0.001***
Adult	34 (28.6)	423 (53.2)				
Birth weight						
≥ 3.5	23 (19.3)	104 (13.2)	1.58 (0.96 – 2.61)	0.072*	1.26 (0.75 – 2.10)	0.385)
< 3.5	96 (80.7)	687 (86.8)				
Stage labor						
Second stage	18 (15.1)	123 (15.5)	2. 17 (0.87 – 5.41)	0.095*	2.18 (0.86 – 5.48)	0.096
Active phase	50 (42.0)	362 (45.5)	2.05 (0.90 – 4.66)	0.086*	1.95 (0.85 – 4.46)	0.115
Latent phase	44 (37.0)	206 (25.9)	3.17 (1.38 – 7.29)	0.006**	2.66 (1.14 – 6.16)	0.023
Not in labor	7 (5.9)	104 (13.1)	1	---	1	----
Episiotomy						
Age						
Teenage	37 (84.1)	420 (48.3)	5.66 (2.50 – 12.84)	< 0.001**	5.66 (2.48 – 12.90)	< 0.001***
Adult	7 (15.9)	450 (51.7)				
Birth weight						
≥ 3.5	6 (13.6)	121 (14.0)	0.97 (0.40 – 2.35)	0.950	-------	----
< 3.5	38 (86.4)	745 (86.0)				
Stage labor						
Second stage	5 (11.4)	136 (15.6)	1.32 (0.31 – 5.66)	0.705	1.31 (0.30 – 5.71)	0.712
Active phase	23 (52.3)	389 (44.7)	2.13 (0.63 – 7.22)	0.226*	1.93 (0.56 – 6.65)	0.293

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Table 4 (continued)

	Obstetric outcome		Bivariate		Multivariable	
	Yes n (%)	**No n (%)**	**Crude OR (95% CI)**	***P* value**	**Adjusted OR (95% CI)**	***P* value**
Latent phase	13 (29.5)	237 (27.3)	1.97 (0.55 – 7.07)	0.296	1.45 (0.40 – 5.26)	0.575
Not in labor	3 (6.8)	108 (12.4)			1	---

CI Confidence interval, *OR* Odds ratio

* Marginally significant on bivariate (p ≤ 0.05 < 0.25)

** significant on bivariate (p < 0.05)

*** significant after multivariate

Table 5 Logistic models of adverse neonatal outcomes of teenage and adult mothers

Variable	Obstetric outcome		Bivariate		Multivariate	
	Yes n (%)	**No n (%)**	**Crude OR (95% CI)**	**P value**	**Adjusted OR (95% CI)**	**P value**
Birth asphyxia						
Age						
Teenage	52 (56.5)	397 (49.3)	1.34 (0.86 – 2.06)	**0.192***	1.31 (0.85 – 2.03)	0.219
Adult	40 (43.5)	408 (50.7)				
Birth weight						
< 2.5	14 (15.4)	112 (14.0)	1.12 (0.61 – 2.05)	0.713	--------	
≥ 2.5	77 (84.6)	690 (86.0)				
Baby's sex						
Male	53 (57.6)	396 (49.2)	1.40 (0.91 – 2.17)	**0.127***	1.41 (0.91 – 2.19)	0.121
Female	39 (42.4)	409 (50.8)				
Obstructed/prolonged labor						
Yes	1 (1.1)	30 (3.7)	0.28 (0.04 – 2.10)	**0.218***	0.27 (0.04 – 1.99)	0.198
No	91 (98.9)	774 (96.3)				
Low birth weight						
Age						
Teenage	103 (76.3)	352 (45.4)	3.87 (2.54 – 5.89)	**< 0.001****	4.12 (2.66 – 6.37)	**< 0.001*****
Adult	32 (23.7)	423 (54.6)				
ParityMultiparous	36 (26.7)	403 (52.0)	0.34 (0.22 – 0.50)	**< 0.001****	--------	
Nulliparous	99 (73.3)	372 (48.0)				
Gestation age						
Unknown	7 (5.2)	35 (4.5)	0.36 (0.15 – 0.89)	**0.026****	0.39 (0.15 – 1.00)	0.05
≥ 40	16 (11.9)	215 (27.8)	0.13 (0.07 – 0.25)	**< 0.001****	0.13 (0.07 – 0.25)	**< 0.001*****
37 – 39	70 (51.9)	449 (57.9)	0.28 (0.18 – 0.44)	**< 0.001****	0.27 (0.17 – 0.43)	**< 0.001*****
< 37	42 (31.1)	76 (9.8)	1		1	
Baby's sex						
Male	55 (40.7)	397 (51.2)	0.65 (0.45 – 0.95)	**0.025****	0.61 (0.41 – 0.90)	**0.013*****
Female	80 (59.3)	378 (48.8)				
Preterm birth						

CI Confidence interval, *OR* Odds ratio

* Marginally significant on bivariate (p ≤ 0.05 < 0.25)

** significant on bivariate (p < 0.05)

*** significant after multivariate

Discussion

In this study, we aimed to determine the proportion of teenage pregnancies and compare the outcomes of these pregnancies with those of adult pregnancies. The study revealed a high prevalence of teenage pregnancies, and that; compared with adults, teenage mothers had significantly greater proportion of episiotomy, perineal tears, and low birth weight babies compared to adults. However adults had a greater proportion of preeclampsia.

Our study identified that 27.6% of facility deliveries at Anaka General Hospital occurred among teenagers; this represents a hospital caseload proportion, not a community prevalence estimate. The factors contributing to the high rate may be related to the increased vulnerability of girls in Nwoya due to low secondary school attendance (16%), high dropout rates (94%), and early marriage (20% before age 20) [22]. This may also be attributed to inaccessibility of contraceptive services, poor attitudes of the

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community towards the use of contraceptives by teenagers, poor sexual and reproductive health knowledge among teenage girls, and early onset of sexual activity [5]. The proportion of teenage pregnancy found in this study is higher than that documented in Ugandan studies [9, 10, 23] and other African countries [25, 26], This variation could be due to the differences in culture, resources and education levels as was seen elsewhere [5]. Our study findings is however comparable to rates of teenage pregnancy of 26.4% in Egypt [8] and 29.06% in rural Nepal [6].

Our study further highlights the increased risk of adverse maternal outcomes; importantly; compared to adults, teenage mothers are approximately six times more likely to undergo episiotomies compared to adults. Similar findings were reported in studies from Ethiopia [12], Cameroon [16] and Malaysia [27]. Teenage mothers might need more episiotomies due to factors such as tight perineum and the perceived need for assistance by healthcare providers based on their age [11]. However our study differs from a Turkish study [28], possibly because of the narrow age range for adults and higher rates of episiotomy across groups, suggesting routine practice in both groups.

This study revealed that adult mothers had a greater proportion of preeclampsia compared to teenage mothers, with the adults four times more likely to develop preeclampsia. Advanced maternal age and differences in healthcare utilization may contribute to this disparity, as older mothers have more risk factors and may receive more intensive monitoring. The current finding is in agreement with those of a study in Turkey [28], and in Egypt [14]. However, it was inconsistent with a study in Ethiopia [12] and a study in Ethiopia [8]. This difference could be due to differences in demographic characteristics (socioeconomic status or healthcare access) and may also be because of age restrictions in the adult group (adults were restricted to the 20–34 year-old age group) unlike our study, were we did not restrict the age of the adults recruited.

Our study also revealed a greater proportion of teenage mothers compared to adult mothers sustained perineal tears that required suturing; teenage mothers were 2.61 times more likely to experience tears even after adjustment for birth weight and labor stage. The findings of the present study are consistent with those of 2 studies conducted in Cameroon [16, 29]. Teenage mothers' anatomical differences such as smaller pelvis and less tissue elasticity, coupled with limited antenatal care and awareness, may increase perineal tear risk. Our finding however is not in agreement with a study in Ethiopia that found no significant association between teenage pregnancy and perineal tear [12] and that in Mecadonia, perineal tear rates were statistically significantly lower among teenage mothers [30]. This could be due to differences in the demographic characteristics of our study population compared to those of the other populations. The comparison group (adults) in the study by Mecadoni was age group 20–24 unlike our study in which there was no age restriction.

According to this study, 22.6% of teenage mothers delivered low birth weight neonates while only 7.1% delivered low birth weight neonates. After adjustments for the influence of gestational age at delivery and the sex of the baby, low birth weight was still significantly greater among teenage mothers. Compared with adults mothers, the teenage mothers were four times more likely to deliver a low-birth-weight baby compared to adult mothers. This was similar to findings of studies from Ethiopia [12], Egypt [14], Nigeria [20], India [19] and Indonesia [13]. The reason for the high rates of low birth weight among teenage mothers is that they are still immature and still continuing to grow as well and therefore during pregnancy there is competition with the developing foetus for nutrients, and this competition is often detrimental to the foetus [11]. Additionally, teenage mothers are more disadvantaged socioeconomically than adult mothers; factors such as poverty, food insecurity and inadequate housing may contribute to increased stress levels and poor maternal nutrition during pregnancy, which can impact fetal growth and result in low birth weight.

Strengths and limitations

The main strength of this study lies in its comparison of maternal and neonatal outcomes between teenage and adult mothers, a novel approach in Uganda and East Africa. Controlling for confounding factors enhances the study's credibility. However, socioeconomic factors such as education and employment status, as well as behavioral risk factors such as maternal smoking and alcohol consumption, were not considered. Additionally, the study did not assess factors such as antenatal care attendance, weight gain during pregnancy, or maternal illness, which could influence maternal and neonatal outcomes in either group. We also found incomplete information in some charts reviewed, and to ensure accuracy, missing information in chart reviews was addressed by crosschecking essential registers such as the integrated maternity register, theatre register, and NICU register before considering it incomplete.

Implications of the study findings

The study highlights the urgent need for targeted interventions to reduce teenage pregnancy rates, addressing social factors like poverty and limited access to reproductive health services. It emphasizes the need for increased antenatal education and support for teenage mothers, along evidence-based obstetric practices such as promoting upright birth positions and non-pharmacological pain

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management techniques to reduce tears and episiotomies. Policy implications include prioritizing adolescent-friendly reproductive health services, comprehensive sex education to non pregnant teenage girls, and improved access to contraception, in addition to ensuring comprehensive antenatal care and support for socioeconomically disadvantaged teenage mothers. Reducing barriers to healthcare access can improve maternal and neonatal outcomes.

Future directions

Further research is needed to explore the roles of interventions such sex education, contraceptives use in reducing teenage pregnancy as well as factors facilitating the high teenage rates. Studies investigating the role of socioeconomic factors, healthcare access, and provider practices in shaping maternal and perinatal outcomes among the teenagers are warranted. Additionally longitudinal studies tracking maternal and perinatal outcomes over time among teenage and adult mothers can provide valuable insights into the long-term implications of age at childbirth on maternal and child development.

Conclusions

In this study, approximately one-quarter of the deliveries in Anaka General Hospital were by a teenage mother. Teenage mothers had increased risk of delivering a low-birth-weight baby, perineal tears and episiotomies compared to adult mothers. We recommend implementing; comprehensive sex education, and access to contraception to reduce teenage pregnancy rates and targeted antenatal education programs and evidence based obstetric practices to improve pregnancy outcomes among the teenagers.

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Author contributions

JJL, EO, FB, PA, and PFP contributed to the conception and design of the study. JJL performed the formal data analysis. JJL drafted the manuscript. EO, FB, PA, and PFP critically reviewed and revised the manuscript. JJL prepared the final manuscript. All the authors have read and approved the final manuscript.

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Data availability

The research data and materials used to support the research findings of this study are available upon request from the corresponding author.

Declarations

Ethics approval and consent to participate

This study was approved by the Gulu Research Ethics Committee (Ref GUREC-2023-586), including the approval of the request for a waiver of consent. Administrative clearance was obtained from the Chief Administrative Officer of the Nwoya District Local Government before conducting the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Abbreviations

AGH Anaka General Hospital.
AIC Akaike's Information Criterion.
aOR Adjusted odds ratio.
APH Antepartum haemorrhage.
C/S Caesarean section.
CI Confidence interval.
cOR Crude odds ratio.
GUREC Gulu University Research Ethics Committee.
LBW Low birth weight.
NICU Neonatal Intensive Care Unit.
PPH Postpartum haemorrage.
SVD Spontaneous vaginal delivery.
Not applicable.

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References

1. Sayegh MA, Castrucci BC, Lewis K, Hobbs-Lopez A. Teen pregnancy in Texas: 2005 to 2015. Matern Child Health J. 2010;14(1):94–101.
2. Paller L, Feldman F, Lauria W. Obstetric and perinatal outcomes in teenage pregnancy: a literature review. Int J Fam Commun Med. 2021;5(1):1–5.
3. Kiani MA, Ghazanfarpour M, Saeidi M. Adolescent pregnancy: a health challenge. Int J Pediatr. 2019;7(7):9749–52.
4. Cook SMC, Cameron ST. Social issues of teenage pregnancy. Obstet Gynaecol Reprod Med. 2015;25(9):243–8.
5. Kassa GM, Arowojolu AO, Odukogbe AA, Yalew AW. Prevalence and determinants of adolescent pregnancy in Africa: a systematic review and meta-analysis. Reprod Health. 2018;15(1):1–17.
6. Maharjan M, Thapa N, Maharjan N, Rai P, Pun P, Petrini MA, et al. Prevalence of teenage pregnancy in a community hospital of rural Nepal: a cross-sectional study. JNMA J Nepal Med Assoc. 2019;57(217):176.
7. Beyene A, Muhiye A, Getachew Y, Hiruye A, Mariam DH, Derbew M, et al. Assessment of the magnitude of teenage pregnancy and its associated factors among teenage females visiting Assosa General Hospital. EMJ. 2015;53(suppl 2):25–37.
8. Eldaboly SA, Allam NE, Ibrahim MM, Abo-Elhssan HA. Prevalence and outcome of teenage pregnancy among attendants of labour room in Bassion general hospital-Egypt (cross section study). J Recent Adv Med. 2021;2(2):166–72.
9. Zakari M. The prevalence of teenage pregnancies and their perinatal complications among teenage mothers in Kiryandongo General Hospital. Available from https//www.kiu.ac.ug. 2019.
10. Chemutai V, Musaba MW, Amongin D, Wandabwa JN. Prevalence and factors associated with teenage pregnancy among parturients in Mbale Regional Referral Hospital: a cross sectional study. Afr Health Sci. 2022;22(2):451–8.
11. Moraes AN, Likwa RN, Nzala SH. A retrospective analysis of adverse obstetric and perinatal outcomes in adolescent pregnancy: the case of Luapula Province, Zambia. Matern Heal Neonatol Perinatol. 2018;4(1):1–11.
12. Abebe AM, Fitie GW, Jember DA, Reda MM, Wake GE. Teenage pregnancy and its adverse obstetric and perinatal outcomes at Lemlem Karl Hospital, Tigray, Ethiopia, 2018. Biomed Res Int. 2020;2020.
13. Indarti J, Al Fattah AN, Dewi Z, Hasani RDK, Mahdi FAN, Surya R. Teenage pregnancy: Obstetric and perinatal outcome in a tertiary centre in Indonesia. Obstet Gynecol Int. 2020;2020.
14. Abbas AM, Ali SS, Ali MK, Fouly H, Altraigey A. The maternal and neonatal outcomes of teenage pregnancy in a tertiary university hospital in Egypt. Proc Obstet Gynecol. 2017;7(3):1.
15. Kirbas A, Gulerman HC, Daglar K. Pregnancy in adolescence: is it an obstetrical risk? J Pediatr Adolesc Gynecol. 2016;29(4):367–71.

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16. Fouelifack FY, Tameh TY, Mbong EN, Nana PN, Fouedjio JH, Fouogue JT, et al. Outcome of deliveries among adolescent girls at the Yaoundé central hospital. BMC Pregnancy Childbirth. 2014;14:1–10.
17. Elly AD, Musa S, Kafunjo BJ. Prevalence and Factors Associated with HIV Infection among Teenage Mothers Delivered at Mulago Hospital—A Cross-Sectional Study. Open J Obstet Gynecol. 2022;12(7):661–70.
18. Organization WH. Actions for improved clinical and prevention services and choices: preventing HIV and other sexually transmitted infections among women and girls using contraceptive services in contexts with high HIV incidence, June 2020: policy brief. World Health Organization; 2020.
19. Divya NV, Pillai SK, Srinivasan B. A study on the fetomaternal outcomes of teenage pregnancies in a tertiary care hospital. From ymerdigital com/uploads/YMER. 2022;210603.
20. Eugene I, Israel J, Atombosoba E. Teenage pregnancy and obstetric outcome: A comparative study in urban Nigeria. Nepal J Obstet Gynaecol. 2016;11(1):37–43.
21. UDHS. Uganda demographic and health survey. Available from https//www.ubos.org/wp-. 2016.
22. UBOS. Area Specific Profiles Nwoya District. Natl Popul Hous Census 2014Area Specif profiles [Internet]. 2017;(April):49. Available from: https://www.ubos.org/wp-content/uploads/publications/2014CensusProfiles/NWOYA.pdf
23. Tabula J. Prevalence of teenage deliveries, and the subsequent maternal and neonatal out comes among women delivering from Bwera Hospital, Kasese Uganda. 2017.
24. Kish L. Sampling organizations and groups of unequal sizes. Am Sociol Rev. 1965;30:564–72.
25. Onwubuariri MI, Kasso T. Teenage pregnancy: Prevalence, pattern and predisposing factors in a tertiary Hospital, Southern Nigeria. Asian J Med Heal. 2019;17(3):1–5.
26. Olofinbiyi BA, Oluleye JT, Simeon O, Olatunya BP, Olofinbiyi RO, Akintoye OO, et al. Teenage pregnancy at a tertiary health institution in south-western Nigeria: Socio demographic correlates and obstetric outcome. Int J Clin Obstet Gynaecol. 2019;3(4):97–101.
27. Nagandla K, Kumar K. Prevalence of teenage pregnancy in 2015–2016 and its obstetric outcomes compared to non-teenage pregnancy at Hospital Tuanku Ja'afar Seremban (HTJS), Negeri Sembilan, Malaysia: A retrospective case-control study based on the national obstetric registry. Malaysian Fam physician Off J Acad Fam Physicians Malaysia. 2020;15(2):2.
28. Ergen EB, Yayla CA, Sanverdi I, Ozkaya E, Kilicci C, Kocakusak CK. Maternal-fetal outcome associated with adolescent pregnancy in a tertiary referral center: a cross-sectional study. Ginekol Pol. 2017;88(12):674–8.
29. Agbor VN, Mbanga CM, Njim T. Adolescent deliveries in rural Cameroon: an 8-year trend, prevalence and adverse maternofoetal outcomes. Reprod Health. 2017;14:1–8.
30. Rexhepi M, Besimi F, Rufati N, Alili A, Bajrami S, Ismaili H. Hospital-based study of maternal, perinatal and neonatal outcomes in adolescent pregnancy compared to adult women pregnancy. Open access Maced J Med Sci. 2019;7(5):760.

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