Critical Public Health

ISSN: 0958-1596 (Print) 1469-3682 (Online) Journal homepage: www.tandfonline.com/journals/ccph20

Drivers of risky sexual behaviours among adolescents in Nebbi Municipality, Uganda: analytical cross-sectional study

Kizito Omona, George Wycliffe Bwire, Godfrey Mugisa & Jane Tolit Akullu

To cite this article: Kizito Omona, George Wycliffe Bwire, Godfrey Mugisa & Jane Tolit Akullu (2026) Drivers of risky sexual behaviours among adolescents in Nebbi Municipality, Uganda: analytical cross-sectional study, Critical Public Health, 36:1, 2604882, DOI: 10.1080/09581596.2025.2604882

To link to this article: https://doi.org/10.1080/09581596.2025.2604882

Elevate Series

CRITICAL PUBLIC HEALTH
2026, VOL. 36, NO. 1, 2604882
https://doi.org/10.1080/09581596.2025.2604882

RESEARCH ARTICLE

OPEN ACCESS Check for updates

Drivers of risky sexual behaviours among adolescents in Nebbi Municipality, Uganda: analytical cross-sectional study

Kizito Omona[a], George Wycliffe Bwire[b], Godfrey Mugisa[a] and Jane Tolit Akullu[c,d]

[a]Faculty of Health Sciences, Uganda Martyrs University, Kampala, Uganda; [b]Department of Programme Monitoring & Evaluation, Plan International, Nebbi, Uganda; [c]Faculty of Public Health, Nursing and Midwifery, Uganda Christian University, Mukono, Uganda; [d]Outpatient Department, Gulu Regional Referral Hospital, Gulu, Uganda

ABSTRACT

Risky sexual behaviour among adolescents remains a major public health challenge in Uganda. In Nebbi Municipality, high rates of teenage pregnancy, early sexual debut, and HIV infections have compounded the problem. This study sought to determine individual, environmental, and family-level drivers associated with adolescents' risky sexual behaviours. Analytical cross-sectional study was conducted from January 2022 to March 2022 using a mixed-methods approach. Multi-stage sampling was used to select 300 adolescents aged 10–19 years, who were interviewed using an interviewer-administered questionnaire. Quantitative data were analyzed using SPSS, while qualitative data were thematically coded and analyzed. We found that risky sexual behaviours were associated with multiple drivers, including school dropout (aPR = 2.27, 95% CI: 0.54–6.65), awareness of partner's HIV status (aPR = 8.22, 95% CI: 3.11–33.19), and traditional beliefs (aPR = 5.48, 95% CI: 1.73–17.39). Qualitative findings revealed that many adolescents lacked the power to negotiate safe sex, were influenced by peers, social media, and financial hardship. Adolescents in Nebbi Municipality remain vulnerable to risky sexual behaviours due to a combination of factors. Our study highlighted the need for targeted preventive interventions that strengthen parental support, promote safe sexual negotiation skills, and engage schools and community structures.

ARTICLE HISTORY
Received 12 April 2024
Accepted 10 December 2025

KEYWORDS
Sexual behaviour; adolescents; risky behaviour; HIV; Uganda

Introduction

Background of the study

Adolescent risky sexual behaviour (RSB)—defined as engagement in unsafe sex (Petersen et al., 2017). remains a critical public health concern, particularly in sub-Saharan Africa where early sexual debut, teenage pregnancy, and HIV vulnerability are widespread. Worldwide, sexual risk behaviour among young people has contributed to rising HIV infections, unwanted pregnancies, and sexually transmitted infections (UNAIDS, 2016). Every week, an estimated 6,000 adolescent girls and young women acquire HIV, underscoring the scale of the problem. In the United States, for example, the 2021 Youth Risk Behaviour Survey found that 30% of high school students had ever had sexual intercourse, 48% had not used a condom during their most recent sexual encounter, and 8% reported forced sex (Centre for Disease Control and Prevention [CDC], 2023). These figures highlight that risky sexual behaviour is not unique to low-income settings, though the burden is disproportionately higher in sub-Saharan Africa.

In Africa, structural and socio-cultural drivers intersect with individual vulnerabilities to create a heightened risk profile. An estimated 21 million girls aged 15–19 years become pregnant annually in developing countries, with about 12 million giving birth (WHO, 2020). Poor parenting, negative coping with biological changes, and materialism have all been identified as risk factors (Githuka et al., 2014; Idele et al., 2014; Mcharo et al., 2021). Studies from Tanzania, Kenya, and Uganda show that adolescents

CONTACT Kizito Omona kizitoomona@gmail.com
Supplemental data for this article can be accessed online at https://doi.org/10.1080/09581596.2025.2604882.

exposed to poor family environments or unable to negotiate safe sex are significantly more likely to engage in high-risk practices (Omona & Ssuka, 2023). Uganda faces one of the fastest-growing populations globally, driven by a total fertility rate of 5.8 children per woman (UBOS, 2017). The 2016 Uganda Demographic and Health Survey (UDHS) reported that 25% of women aged 15–19 had begun childbearing, and 14% of adolescents had initiated sex by age 15. Early marriage remains a concern, with 10% of adolescent girls married before age 19 (UBOS, 2017). The Uganda National Household Survey (UNHS 2016/17) further highlights socio-economic inequalities that leave adolescents vulnerable to transactional sex, early pregnancy, and HIV (Kato & Omona, 2021; Mukasa & Omona, 2021; Uganda Bureau of Statistics (UBOS), 2018). Emerging social dynamics, including peer influence and social media, have compounded these risks. Labbé et al. (2016) found that girls exposed to social media at an early age had significantly higher odds of engaging in risky behaviours compared to their peers. Similarly, materialistic tendencies and exposure to negative peer groups increase the likelihood of adolescent pregnancy and unprotected sex (Idele et al., 2014; Seth et al., 2012).

In conflict and post-conflict regions, the risks are even more pronounced. Evidence from Karamoja, Uganda, showed that adolescent girls were disproportionately affected, with higher prevalence of transactional sex and earlier sexual debut compared to boys (Ssebunya et al., 2019). Crises and displacement increase vulnerability, with adolescents often lacking the power to negotiate safe sex or avoid exploitation (Aturinde et al., 2019; WHO, 2021a, 2021b). On average, 14% of women and men aged 15–19 years have sexual intercourse by age 15. In the same age group, 10% of women and no men (zero men) are already married (Omona et al., 2020; UBOS, 2017). In another study, it was found that girls who are exposed to social media at an early age had higher odds of engaging in risky sexual behaviours when compared to those who were not exposed to social media [COR, 6.3; 95% CI, 1.8–22.7] (Labbé et al., 2016). Further, in a community-based study, it was found that materialistic girls demonstrated a higher likelihood to engage in risky sexual behaviours when compared to those who were not materialistic [COR, 4.8; 95% CI, 1.2–11.6] (Idele et al., 2014).

Despite an increased vulnerability to a risky sexual behaviours disease, evidence indicates that a large proportion of young people aged 15–24 years remain exposed to the same (Petersen et al., 2017) and continue to engage in risky sexual behaviours (Amin et al., 2013). Additionally, inadequate HIV knowledge, lack of access to treatment and poor adherence to medication among adolescents (Kennedy et al., 2012), among other drivers, further taint this blurred picture in the struggle to end engagement in risky sexual behaviours among adolescents. Evidence alludes to even worse indicators in conflict communities (Aturinde et al., 2019). Crises due to conflicts have been documented to increase people's vulnerability to risky sexual behaviours, especially among girls and women (WHO, 2021a, 2021b). With 80% of the global adolescents living with HIV/AIDS residing in sub-Saharan Africa, adolescents in post-conflict and pastoralist communities present a double-barreled challenge in the fight against risky sexual behaviours. The attainment of global HIV targets requires a holistic understanding of context-specific adolescent sexual and behavioural characteristics. Several reports have highlighted the need to refocus efforts on the most at-risk populations including adolescents, if the 2020 targets are to be achieved (UNAIDS & UNFPA, 2020; UNICEF, 2013; WHO, 2016). In North Eastern Uganda, out of those who had ever had sex, 11.4% of them reported prior engagement in high-risk sexual behaviours. Prior engagement in high-risk sexual behaviours was lower among men than women (adjusted prevalence ratio (adj. PR) = 0.46; 95% Confidence Interval (95% CI): 0.33, 0.62) (Ssebunya et al., 2019). The 2014 WHO report on adolescent health elucidated various forces behind adolescent health behaviours including individual drivers such as age, sex, knowledge, family and community drivers as well as cultural practices and norms (Couture et al., 2011). Against this backdrop, this study, thus, sought to investigate the drivers of risky sexual behaviours among adolescents in Nebbi Municipality, Uganda. Despite multiple interventions, adolescent sexual and reproductive health indicators in Uganda remain poor. Programmes often address single determinants, such as school retention or HIV testing, but fail to capture the multi-level drivers (individual, socio-environmental, and family) that shape adolescent behaviours. Moreover, while several studies have focused on rural or conflict-affected populations, urban municipalities like Nebbi, where traditional norms intersect with new risk factors such as social media and rapid urbanization, remain understudied. Addressing this gap is essential to design more tailored interventions.

Theoretical underpinning: the observational learning theory

The study was guided by the observation learning theory (Mukhalalati et al., 2022). Observational learning is a process of learning through watching and imitating others people's behaviors, which can be a positive or negative behavior. This is typical in adolescents, as they transition to adulthood. Albert Bandura's social learning theory, also known as social cognitive theory, proposes that people learn from one another through observation, imitation, and modeling (Bandura, 1965; Bandura et al., 1966). This type of learning involves several steps, such as paying attention to the model, retaining the information, and then motorically reproducing the behavior.

i. Attention to the model: The observer (adolescent) must be in the right mindset to do so. This means having the energy to learn and remain focused on what the model is engaging in, and being able to observe the model for enough time to grasp what models are doing. The models are fellow adolescents, with influence, in the community.
ii. Retention: In this step, the observer is able to focus on the model's behavior and then remembers what was viewed. Where the observer is not able to recall the model's behavior, they may need to go back to the first stage again.
iii. Reproduction: In this step, the observer (adolescent) replicates the behavior observed. It is important to note that every individual has his or her own unique capacity when it comes to imitating certain behaviors.
iv. Motivation: For the observer to engage in the new behavior, he or she will need some sort of motivation. People tend to be more motivated when they see the model receive a reward for engaging in a particular behavior, such as receiving money for risky sexual behaviour. This is even more appealing if the observer believes they will also receive similar rewards if they imitate the new behavior.

In this context, the negative behavior - risky sexual Behaviour, gets learned. However, several factors increase the likelihood that a behavior will be imitated. These are; seeing people receive rewards for their behavior, staying with people who are in an authoritative position in our lives, staying with people of a higher social status or who are similar to us in age, sex, and interests. History having of having been rewarded for imitating the behavior in the past also motivates adolescents to adopt certain behaviours.

Specific objectives

The study had the following specific objectives;

i. To establish the level of involvement in sexual risk behaviours among adolescents aged 10–19years in Nebbi Municipality, Uganda.
ii. To determine the individual drivers associated with adolescents' sexual risky behaviours among adolescents aged 10–19 years in Nebbi Municipality, Uganda.
iii. To determine the socio-environmental drivers associated with adolescents' sexual risky behaviours among adolescents aged 10–19 years in Nebbi Municipality, Uganda.
iv. To examine the family drivers associated with adolescents' sexual risky behaviours among adolescents aged 10–19 years in Nebbi Municipality, Uganda.

Materials and methods

Study design

This study adopted a community-based analytical cross-sectional design, using a mixed-method approach that combined both quantitative and qualitative components. The cross-sectional design was appropriate for describing exposures and outcomes at a single point in time, as well as establishing exposure–outcome relationships (Wang & Cheng, 2020). For the qualitative component, a phenomenological approach was employed to capture and interpret the lived experiences of adolescents and health workers in

relation to risky sexual behaviours. Rather than applying phenomenology in a purely theoretical sense, it was used to guide data collection and analysis by focusing on how participants described and made sense of their experiences. Interview transcripts were thematically coded, allowing patterns, meanings, and shared narratives to emerge from the participants' perspectives (Im et al., 2023; Sofaer, 1999).

Study area

The study was conducted in Nebbi Municipality, Uganda and particularly health facilities within the Municipality while using entry points which included; the out-patient department (OPD), antenatal care, post-natal care and youth corners. This is because these areas were entry points where youths receiving reproductive health services could be accessed. The health records indicated 877 adolescents consuming Adolescent Sexual Health services in the outpatient department (OPD), antenatal care, post-natal care and youth corners. Nebbi Municipality is located in Nebbi District in the Northern Part of Uganda (UNICEF, 2019). Specifically, this municipality is located in the West Nile Sub-region along the Karuma–Olwiyo–Pakwach–Nebbi–Arua Road, approximately 80 kilometres (50 miles), south-east of Arua, the largest city in the West Nile sub-region (UNICEF, 2013; West Nile Web, 2018).

Study population and eligibility

The study population comprised adolescents aged 10–19 years residing in Nebbi Municipality, as well as health workers providing reproductive health services in selected health facilities within the municipality. Eligible adolescents were those accessing services at major entry points including outpatient departments (OPD), antenatal care, postnatal care, and youth corners during the two-month data collection period. Adolescents who were severely ill or presenting with emergency conditions such as accidents were excluded from the study.

Sample size determination

The sample size was determined based on the Kish Leslie (1965) formula for cross-sectional studies in which the outcome was prevalence (Wiegand, 1968).

$$n = \frac{Z\alpha^2 PQ}{\delta^2}$$

where

n- Sample size

Z- The standard normal deviate at 95% confidence (1.96)

P- Estimated prevalence of sexual risk behaviours among 10–19 years which is 23% (UNFPA, 2019)

Q-100%–P (or 1–P)

δ- Maximum error estimated (5%)

Substituting into this formula translates to a minimum sample of 272 participants

Considering an estimated non-response rate of 10%, brings the final sample size to 300 participants. The qualitative component comprised of 7 key informants health care providers from the different health facilities.

Sampling techniques

Nebbi Trading Center and Akworo in Nebbi Municipality were purposively selected because existing records indicated that they host the majority of health facilities offering adolescent sexual and reproductive health (ASRH) services (Labbé et al., 2016).

Within these parishes, five villages each were randomly selected with the assistance of Local Council I chairpersons. From the centre of each village, a random direction (north, east, south, or west) was drawn and households were visited sequentially until the required sample size was obtained. Only

households with at least one adolescent aged 10–19 years were eligible, and if more than one adolescent was present, one was randomly selected for participation. This approach minimized selection bias among adolescents, hereafter referred to as study participants.

For the qualitative component, health workers defined as providers of reproductive health services in adolescent-focused entry points (OPD, ANC, PNC, and youth corners) were purposively selected based on their direct experience with adolescent clients. These individuals are referred to as key informants in this study. Purposive sampling ensured inclusion of those with in-depth knowledge, while triangulation with adolescent survey data reduced information bias.

Operational definitions

The following definitions have been used and defined as follows;

1. Risky Sexual Behaviour (RSB)—This was defined as the engagement of adolescents in unsafe sex (Petersen et al., 2017).
2. Sexual Risky Behaviours—This was defined as early sexual initiation, unprotected intercourse or sex with multiple partners (Kincaid et al., 2012)
3. Adolescence - This is the phase of life between childhood and adulthood, from ages 10 to 19 years (WHO, 2021a).
4. Adolescent—An adolescent was defined as any person between ages 10 and 19 years (WHO, 2021a, 2021b).
5. Adolescent Sexual Reproductive Health (ASRH)—This means providing access to comprehensive sexuality education such as services to prevent, diagnose and treat sexually transmitted infections (STIs) and counselling on family planning, as well as empowering young people to know and exercise their rights to delay marriage and to refuse unwanted sexual advances (UNFPA, 2014).
6. Early sexual debut—This was defined as having had first sexual intercourse at or before age 14 years of age (Omona & Ssuka, 2023; Richter et al., 2015).
7. Self-control—This is defined as one having active regulation of behaviour by internal forces (Hu & Wang, 2022).
8. Parental control—This was defined as the supervision and guidance of behaviours by external forces (Hu & Wang, 2022).

Data collection methods and tools

Quantitative data were collected using an interviewer-administered structured questionnaire. The tool consisted of five sections covering socio-demographic characteristics, involvement in risky sexual behaviours, individual drivers, socio-environmental drivers, and family drivers. To enhance comprehension among adolescents, the questionnaire was translated into Alur/Luo, the predominant local languages in Nebbi Municipality, and was administered by trained interviewers. Technical terms were simplified into age-appropriate language to ensure that participants clearly understood each question. Key informant interviews were conducted with health workers using a semi-structured guide to explore perceptions of risky sexual behaviours among adolescents, as well as individual, socio-environmental, and family drivers.

Data entry and analysis

Quantitative data were single-entered in EpiData version 3.1, with built-in quality controls such as skips, ranges, and legal values. The dataset was exported to SPSS version 22 for univariate, bivariate, and multivariate analysis.

For the qualitative component, interviews were transcribed verbatim and coded line by line by two independent researchers. Codes were compared for consistency, and discrepancies were resolved through discussion until consensus was reached. Themes were then derived inductively, allowing patterns to emerge directly from participants' narratives rather than being imposed a priori. Verbatim quotes were used illustratively to capture the lived experiences and perspectives of key informants.

Ethical considerations

Our study was performed in accordance with the principles stated in the Declaration of Helsinki. Ethical approval consideration was followed and approval granted by Uganda Martyrs University (Document Number: UMU/FHS/11/08/2021; Date: August 11th, 2021). Administrative clearance was secured from the Division Health Office in Nebbi Municipality. Written informed consent was obtained from all participants aged 18 years and above. For participants below 18 years, parental or guardian consent was obtained alongside informed assent from the adolescents themselves. Participation was voluntary and confidentiality was assured throughout the study.

Results

Socio-demographic characteristics of participants

The socio-demographic characteristics of the participants are shown in Table 1. Most of the participants were females (65%) and this is attributed to the number of girls which overwhelms boys as far as adolescents' sexual risk behaviours is concerned. On education level of participants, majority (50.0%) had not studied or lacked formal education. 68.7% of the participants had both parents and 40.3% of them were students. 80% of them were currently single compared to 15% who were cohabiting. Further, 73.3% of them had at least lived in households of less than five members.

The qualitative interviews were transcribed verbatim and analyzed independently by two coders. Each coder conducted a line-by-line review, generating initial codes that were then compared and reconciled through consensus. Themes were derived inductively to reflect the lived experiences of adolescents as described by health workers. Representative verbatim quotes are presented to illustrate each theme and provide context to the quantitative findings (Table 2).

Table 1. Distribution of sociodemographic characteristics of adolescents.

Variable	Frequency ($N = 300$)	Percentage (%)
Age of Adolescents (years)		
Median (interquartile range)	50 (25, 75)	
• 10–14years	120	40.0%
• 15–19years	180	60.0%
Sex of adolescent		
• Male	105	35.0%
• Female	195	65.0%
Education level		
• No formal education	150	50.0%
• Primary education	75	25.0%
• Post-primary	75	25.0%
Caretaker		
• Both parents	206	68.7%
• Single parent	47	15.7%
• Self	30	10.0%
• Guardian/sponsors	17	5.7%
Occupation		
• Student/school children	121	40.3%
• Cattle keeping	59	19.7%
• Farmer	30	10.0%
• Trading	15	5.0%
• Domestic worker	75	25.0%
Marital status of an adolescent		
• Currently single	240	80.0%
• Currently cohabiting	45	15.0%
• Currently married	15	5.0%
Number of household members		
• Less than 6	220	73.3%
• 6–9	60	20.0%
• 10 and above	20	6.7%

Table 2. Major Themes from qualitative interviews.

S. No	Themes	Sub-themes
01	Individual drivers associated with risky sexual behaviours	Coping with biological changes Difficulty in negotiating safe sex Materialistic tendencies
02	Socio-environmental drivers associated with adolescent's sexual risky behaviours	Peer influences Social media
03	Family drivers associated with adolescent's sexual risky behaviours	Unstable financial background Parental carelessness

Table 3. Involvement in adolescent's sexual risky behaviours.

Involvement in risky sexual behaviours	Frequency ($N=300$)	Percentage (%)
Ever had sex		
• Yes	130	43.3%
• No	170	56.7%
Use condom during sex ($N=133$)		
• Yes	56	18.7%
• No	77	25.7%
Number of children ever had ($N=133$)		
• None	73	24.3%
• 1–3	60	20.0%
Has had multiple sexual partners (N = 133)		
• Yes	60	20.0%
• No	73	24.3%
Aware of partner's HIV status ($N=132$)		
• Yes	43	14.3%
• No	89	29.7%
Ever had transactional sex ($N=130$)		
• Yes	6	2.0%
• No	124	41.3%

Level of involvement in adolescent sexual risky behaviours

Results indicated that the majority of adolescents on a large extent were not engaged in risky sexual behaviours as presented (Table 3). For instance, at least, 56.7% of participants had never had sex whilst 43.3% who had ever had sex. Of the 43.3% who had had sex, only 18.7% had used a condom, 24.3% had no children, whereas 20% had 1–3 children. In addition, 24.3% of them had no multiple sexual partners. Regarding awareness of partner's HIV status, 29.7% were not aware while 14.3% were aware. Lastly, 41.3% of the participants were not engaged in transactional sex whilst 2% were engaged. Therefore, it was concluded that 56.7% were not engaged in adolescent sexual risky behaviours while 43.3% were engaged.

Individual drivers associated with risky sexual behaviours among adolescents

Individual drivers associated with adolescent's sexual risky behaviours are presented in Table 4. It is indicated that the majority of participants 195 (65%) had a lower level of awareness, and 189 (63%) of them could cope well with biological changes. In addition, 215(71.7%) admitted having difficulty in negotiating safe sex from their partners. It was also found that 195 (65%) were not motivated by material benefits to engage in sexual behaviours. Lastly, 180 (60%) admitted that they were school dropouts.

Three individual drivers were significantly associated with the adolescent's sexual risky behaviours (Table 4) and these included: coping with biological changes (PR: 0.549, CI: 0.338–0.891); difficult negotiating safe sex (PR: 1.673, CI: 0.401–3.128); and school dropout (PR: 1.326, CI: .832–2.113). The adolescent's sexual risky behaviour was 0.6 times less likely among adolescents who would cope with biological changes when compared to those who would not. Secondly, the adolescent's sexual risky behaviour was 1.7 times more likely among adolescents who would find it difficult to negotiate safe sex when compared to those who would negotiate. Lastly, adolescents' sexual risky behaviour among school dropouts was 1.3 times more likely compared to those who were not dropouts. Similarly, age ($p=0.001$), education ($p=0.000$) and occupation ($p=0.022$) were also associated with individual risky behaviours among adolescents, as shown in Table 4.

Table 4. Individual drivers associated with risky sexual behaviours among adolescents.

	Adolescent's sexual risky behaviours				
Individual related drivers	Involved	Not involved	Total $N=300$	Unadjusted PR (95% CI)	*p*-value
Age (in years)					0.001**
• 10–14	65 (21.7%)	55 (18.3%)	120 (40.0%)	0.525 (0.002–0.910)	
• 15–19	65 (21.7%)	115 (38.3%)	180 (60.0%)	Reference	
Sex					0.072
• Male	49 (16.3%)	56 (18.7%)	105 (35.0%)	0.393 (0.252–0.729)	
• Female	81 (27.0%)	114 (38.0%)	195 (65.0%)	Reference	
Education					0.000**
• No formal education	55 (18.3%)	95 (31.7%)	150 (50.0%)	–	
• Primary	55 (18.3%)	20 (6.7%)	75 (25.0%)	0.253 (0.240–0.726)	
• Post-primary	20 (6.7%)	55 (18.3%)	75 (25.0%)	Reference	
Caretaker					0.500
• Both parents	88 (29.3%)	118 (39.3%)	206 (68.7%)	0.510 (0.324–0.973)	
• Single parent	18 (6.0%)	29 (9.7%)	47 (15.7%)	–	
• Self	14 (4.7%)	16 (5.3%)	30(10.0%)	–	
• Other	10 (3.3%)	7 (2.3%)	17 (5.7%)	Reference	
Occupation					0.022**
• Student/school children	57 (19.0%)	64 (21.3%)	121 (40.3%)		
• Cattle keeping	26 (8.7%)	33 (11.0%)	59 (19.2%)	0.419 (0.065–0.517)	
• Farmer	6 (2.0%)	24 (8.0%)	30 (10.0%)	–	
• Trading	10 (3.3%)	5 (1.7%)	15 (5.0%)	–	
• Domestic worker	31 (10.3%)	44 (14.7%)	75 (25.0%)	Reference	
Low-risk awareness					0.148
• Yes	95 (31.7%)	100 (33.3%)	195 (65.0%)	0.526 (0.321–0.862)	
• No	35(11.7%)	70 (23.3%)	105 (35.0%)	Reference	
Able to cope with biological changes					.041**
• Yes	92 (30.7%)	97 (32.3%)	189 (63.0%)	0.549 (0.338–0.891)	
• No	38 (12.7%)	73 (24.3%)	111 (37.0%)	Reference	
Had difficulty negotiating safe sex					0.047**
• Yes	99 (33%)	116 (387%)	215 (71.7%)	1.673 (0.401–3.128)	
• No	31 (10.3%)	54 (18%)	85 (28.3%)	Reference	
Motivated by materialism					0.148
• Yes	35 (11.7%)	70 (23.4%)	105 (35.0%)	1.900 (1.160–3.112)	
• No	95 (31.7%)	100 (33.3%)	195 (65.0%)	Reference	
School dropout					0.050**
• Yes	73 (24.3%)	107 (35.7%)	180 (60.0%)	1.326 (0.832–2.113)	
• No	57 (19.0%)	63 (21.0%)	120 (40.0%)	Reference	

PR = Prevalence Rate, * Denotes statistical significance, ** Denotes high level of statistical significance.

Results from key informant interviews with health workers running health centres related ASRH services did not indicate variations from the results from quantitative interviews related to individual drivers associated with the adolescents' sexual risky behaviours. Participants in the key informant interviews were mostly females with a few of them being males. The majority of them were ASRH health workers. Only a few of the key informants were other cadres like doctors and youth representatives. Overall, three themes were developed (coping with biological changes, difficulty in negotiating safe sex and materialism or materialistic tendencies).

i. Coping with biological changes

It was indicated by majority key informants that the majority of adolescents find hard time trying to cope with changes on their body. These changes tend to appear at the same time and cause uncontrollable excitement among adolescents. This widens the need to explore.

> *"[…] The need to explore is too huge and it affects almost all our children…as an adolescent health worker, I have witnessed a number of cases where a girl openly tells me that after her friends explored, they seduced her to also explore. The new body parts cause uncontrollable excitement and this renders them victims of risky sexual behaviours"*—Key Informant 3.

It was reported that this challenge affects adolescents differently.

> *"[…] We have all at one time been affected by changes in our body parts, it is worse in some people more than others. The end result has been increasing the number of adolescents engaged in risky sexual behaviours"*—Key Informant 1 added.

ii. Difficulty in negotiating safe sex

Most of the key informants informed the study that the majority of adolescents have no power to determine the kind of sex to have. This is because they are usually engaged in cross-generational sex whereby the payer determines the kind of sex he wishes to get from either a girl or boy.

> *"[…] to many of these adolescents, we interact with them, you realize that they never plan or predict when they have to do sex. They just find themselves in intercourse. You can't imagine many of the daughters losing their virginities to old men, teachers, and boda-boda people! These kinds of people cannot allow safe sex and many girls who have been victims have always told me […]"*—Key Informant 4.

It was further reported that because of the excitement many adolescents tend to have, they find no time to negotiate safe sex. This renders them to become victims of HIV and other STDs.

> *"[…] discovery is what explains adolescent sex…they want to do what they have been reading about on the internet, what they have heard their parents doing, what they see in films, what they read in papers and what they hear others saying. This makes them candidates for HIV and STDs"*—Key Informant 2.

iii. Materialistic tendencies

Lack of resources related to human and financial is among the primary motivators of increased adolescent sexual risky behaviours. The majority of boys go for sugar mummies and daddies to get some upkeep. The majority of the key informants indicated that Nebbi Municipality is fundamentally a municipality with a great majority of people with poor financial backgrounds. This renders them needy.

> *"[…] as you approach adolescence, the biological changes not only affect the body, but they also call for tuning the body and usually the majority of these girls and boys tend to lack resources. One day I asked one boy why he was allowed to be married to a sugar mummy for over five years. His answer was amazing, that she used to cater for all his needs. This also applies to girls"*—Key Informant 5.

> *"[…] Our areas were highly hit by wars and insurgencies which makes several adolescents vulnerable…a person who is lacking a sanitary pad of UGX 500 cannot fail to submit sex for such benefits. This is why I believe that most of the risky sexual behaviours are largely from this source"*—Key Informant 5 added.

Socio-environmental drivers associated with adolescent's sexual risky behaviours

Socio-environmental drivers associated with adolescents' sexual risky behaviours in Nebbi Municipality are presented below in Table 5. It was indicated that the majority of participants 270 (90%) described and lived in a poor state of ASRH services, 268 (89.3%) admitted that they attend social events while 112 (37.3%) obtained their income from their boyfriends. Lastly, 223 (74.3%) were not on social media and 228 (76%) lived with negative peer influence.

Table 5. Socio-environmental drivers associated with the adolescent's sexual risky behaviours.

	Adolescent's sexual risky behaviour				
Socio-environmental variables	Involved	Not involved	Total $N=300$	Unadjusted PR (95% CI)	*p*-value
State of ASRH services					0.067
• Good	10 (3.3%)	20 (6.7%)	30	1.600 (0.722–2.084)	
• Poor	120 (40.0%)	150 (50.0%)	270	Reference	
Attends social event					0.041**
• Yes	118 (39.3%)	150 (50.0%)	268	1.763 (0.358–3.623)	
• No	12 (4.0%)	20 (6.7%)	32	Reference	
Unsafe economic activities					0.108
• Parents	33 (11.0%)	66 (22.0%)	99	1.200 (0.475–3.029)	
• Boyfriend	52 (17.3%)	60 (20.0%)	112	0.280 (0.223–1.713)	
• Other economic activities	36 (12.0%)	29 (9.7%)	65	0.483 (0.185–1.263)	
• Guardian/Sponsors	9 (3.0%)	15 (5.0%)	24	Reference	
Use social media					0.021**
• Yes	32 (10.7%)	45 (15.0%)	77	1.102 (0.652–1.863)	
• No	98 (32.7%)	125 (41.7%)	223	Reference	
Negative peer influences					0.035**
• Yes	101 (33.7%)	127 (42.3%)	228	1.848 (0.495–3.453)	
• No	29 (9.7%)	43 (14.3%)	72	Reference	

PR = Prevalence Rate, * Denotes statistical significance, ** Denotes high level of statistical significance.

Three socio-environmental drivers were significantly associated with the adolescents' sexual risky behaviours (Table 5) and these included: social event (PR: 1.763, CI: 0.358–3.623); social media (PR: 1.102, CI: 0.652–1.863); and negative peer influence (PR: 1.848, CI: 0.495–3.453). The adolescent's sexual risky behaviour among adolescents who attended social events was 1.7 times more likely when compared to those who did not attend social events. Further, the adolescent's sexual risky behaviour among adolescents who were on social media was 1.1 times more likely when compared to those who were not. Lastly, the adolescent's sexual risky behaviour among adolescents who had negative peer influence was 1.9 times high likely when compared to those who did not have negative peers.

Results from key informant interviews with health workers giving ASRH services did not indicate variations from the results from quantitative interviews related to socio-environmental drivers associated with the adolescent's sexual risky behaviours. Participants in the key informant interviews were mostly females with a few of them being males. The majority of them were ASRH health workers. Only a few of the key informants were other cadres like doctors and youth representatives. Overall, two themes were also developed from this objective, which included; peer influence and social media.

iv. Peer influence

When participants (key informants) were asked whether peers contributed to adolescents' risky sexual behaviours, the majority admitted to this view. They reported that most of the things or behaviours engaged in by these children are largely a contribution of their peers. When his or her best friend has a girl or boyfriend, they also get one. When they tell them how sex is enjoyable, they also want to try. This renders the majority victims.

> *"[…] last year I meant a group of girls and we chatted organically on peer life. They opened to me that minus peers, adolescent's involvement in risky sexual behaviours can be put to an end. They meant the negative peers who always tell them how much they get from their boyfriend. The love they display to them. In reaction, everyone ends up into them"*—Key Informant 4.

It was further found out that the majority of adolescents largely relied on emotions to make decisions and these are ignited by peers.

> *"[…] out of the 10 adolescents that end up into risky sexual actions, nine of them are due or connected by their peers. Peers form an essential part of our lives and mostly among adolescents where much of the decisions are largely emotional"*—Key Informant 3.

v. Social media

The coming of social media was also pointed out by the majority of key informants as widening the problem of engaging in risky sexual behaviours. They reported that social media has exposed significant adolescents to several things more than before.

> *"[…] these days it is easy to find a partner to use and drop because they are all over social media…a lot of lies are spread on social media and these lies have costed a significant number of adolescents. It is hard to hide these youths what goes on, on social media. They can easily access pornography without much control"*—Key Informant 2,

It was reported that social media does more harm than good on the side of adolescents because no adolescent usually goes on social media to learn or do business. Majority of them use social media to satisfy their sexual urge.

> *"[…] I always refer to social media as sex media…why? Because it is a platform for accomplishing sex talks, meetings and having sex. Haven't you heard about phone sex? What do you think comes out of phone sex? Why do you think masturbation is on the rise among girls and boys?"*—Key Informant 5.

Family drivers associated with adolescent sexual risky behaviours

Some family factors, such as parenting/parental control, among others, influenced adolescents' sexual risky behaviours (Table 6). It was found that the majority of participants 272(90.7%) had a poor family background. 283 (94.3%) admitted that their parents protect them from unsafe sexual behaviours.

Table 6. Family drivers associated with adolescent's sexual risky behaviours.

Variable	Adolescent's sexual risky behaviours		Total $N=300$	Unadjusted PR (95% CI)	*p*-value
	Involved	Not involved			
Family financial status					0.072
• Yes	9 (3.0%)	19 (6.3%)	28 (9.3%)	1.692 (0.732–3.873)	
• No	121 (40.0%)	151 (50.3%)	272 (90.7%)	Reference	
Parenting /parental control					0.050**
• Yes	125 (41.7%)	158 (52.7%)	283 (94.3%)	0.527 (0.181–1.534)	
• No	5 (1.6%)	12 (4.0%)	17 (5.7%)	Reference	
Traditional beliefs had an effect					0.044**
• Yes	11 (3.7%)	21 (7.0%)	32 (10.7%)	1.525 (0.707–3.287)	
• No	119 (39.7%)	149 (49.7%)	268 (89.3%)	Reference	
Negative traditional customs affected					0.041**
• Yes	118 (39.3%)	150 (50.0%)	268 (89.3%)	0.763 (0.358–1.623)	
• No	12 (4.0%)	20 (6.7%)	32 (10.7%)	Reference	

PR= Prevalence Rate, * Denotes statistical significance, ** Denotes high level of statistical significance.

On whether unsafe sexual behaviours were an approved practice, 268 (89.3%) refused. Lastly, on whether their cultures had problems with unsafe sexual behaviours, 268 (89.3%) agreed.

Three family drivers were significantly associated with the adolescent's sexual risky behaviours (Table 6) and these included: parenting or parental control (PR: 0.527, CI: 0.181–1.534); traditional beliefs (PR: 1.525, CI: 0.707–3.287) and negative traditional customs (PR: 0.763, CI: 0.358–1.623). The adolescent's sexual risky behaviour among adolescents who were highly protected by their parents was 0.5 times less likely compared to those who were not being protected. In addition, the adolescents' sexual risky behaviour among those who felt that unsafe sexual behaviours is an approved practice was 1.5 times more likely compared to those who did not. Lastly, the adolescent's sexual risky behaviour among those who thought that their cultures had problems with unsafe sexual behaviours was 0.8 times less likely than those who thought otherwise.

Results from key informant interviews with health workers giving ASRH services did not indicate variations from the results from quantitative interviews related to family drivers. Participants in the key informant interviews were mostly females with a few of them being males. The majority of them were ASRH health workers. Only a few of the key informants were other cadres like doctors and youth representatives. Two themes emerged; unstable financial background and parental carelessness.

vi. Unstable financial background

It is clear that our regions have been the most hit when it comes to wellbeing. This has a long-term effect on these children and their consequent engagement in risky sexual behaviours.

> *"[…] it is in our villages where a child grows up without shoes, eats poorly and sleeps poorly and also a head of a family. You can't imagine how a child becomes a breadwinner at home at 14 years and you expect her or him to avoid teenage pregnancy?"*—Key Informant 2.

It was reported that most of the families are headed by children who rely on free education. This means that when they realize that they cannot sustain school. They have to drop out, get married and support themselves in all ways possible.

> *"[…] It is not about materialism; a number of our adolescents are not engaged in risky sexual behaviours because they like but because they were exposed to such life early enough and by a number of unavoidable circumstances"*—Key Informant 5.

vii. Parental carelessness

It was reported by several key informants that parents have not done their roles too, that is, they have weak control over their children. This is because they do not make efforts to ensure that their children are kept safe whereby they send or allow them to engage in a number of economic activities to obtain a living.

> *"[…] it is not agreeable because no parent would love to have his or her child get spoilt but it's unfortunate that the majority of these parents play a part. When you visit most markets and trading points. These places are full of adolescents who are sent by parents to find money or sell their items for a living or for school fees. What comes*

next are pregnancies and diseases. And when it comes to this period of Covid-19 when children are home. It is becoming worse"—Key Informant 1.

"[…] I have always found adolescents working past 7 in the evening and I ask them whether they were allowed by their parents or whether their parents know where they are and they fully admit that they know. You find a child more than thrice with boys playing prematurely and you wonder why risky sexual behaviours can ever stop in Nebbi. These are clearly supported by our cultures and parents currently"—Key Informant 3.

Multivariate association of drivers influencing adolescents' sexual risky behaviours

At logistic multivariate analysis (Table 7), variables that were significant at bivariate analysis and those which were not significant but were thought to be important in influencing the adolescent's sexual risky behaviour were included in the model. After backward stepwise generalised linear modelling based on p-values and model fitness, drivers that remained associated with adolescents' sexual risky behaviour include sex of the adolescent (aPR: 0.311, CI: 0.160–.605); educational level of adolescent (aPR: 0.447, CI: 0.209–0.958); condom use (aPR: 0.777, CI: 0.284–2.800); awareness of partner's HIV status (aPR: 8.221, CI: 3.1120–33.185); difficulty in negotiating safe sex (aPR: 1.772, CI: 0.256–4.036); school dropout (aPR: 2.268, CI: 0.540–6.654); social event (aPR: 1.271, CI: .158–10.251); social media (aPR: 1.940, CI: .459–1.924); negative peer influence (aPR: 1.700, CI: 0.527–5.032); and traditional beliefs (aPR: 5.478, CI: 1.726–17.386).

Summary of results

Adolescents' sexual risky behaviours (SRB) were largely dependent on several socio-demographic drivers which included; the sex of the adolescent, educational level of the adolescent, occupation status, history of condom use, number of children ever had and awareness of partner's HIV status. Additionally, SRB was also dependent on three individual drivers; coping with biological changes, difficulty negotiating safe sex and school dropout. Further, adolescent's sexual risky behaviours in Nebbi Municipality were also associated with some socio-environmental drivers such as attending social events, using social media and negative peer influences. Lastly, adolescents' sexual risky behaviours were associated with poor parenting (weak parental control), traditional beliefs and negative traditional customs in the community.

Discussion

Involvement in adolescent's sexual risky behaviours

This study examined the prevalence and drivers of risky sexual behaviours among adolescents aged 10–19 in Nebbi Municipality. Specifically, it addressed four questions: the level of adolescent involvement in risky sexual behaviours; individual-level factors; socio-environmental influences; and family-related drivers. Understanding these determinants is significant for shaping interventions in Uganda, where adolescent sexual and reproductive health indicators remain poor despite national and global efforts (Omona & Mugumya, 2020). In this study, nearly half of the adolescents reported engagement in risky sexual behaviours. This aligns with findings from South Africa, Kenya, and Zimbabwe, where between 45 and 60% of adolescents reported similar behaviours (Buckler et al., 2022; Heeren et al., 2014; Seth et al., 2012). The consistency across diverse contexts suggests that adolescent vulnerability to risky sexual behaviours is widespread and not unique to Uganda.

Individual drivers associated with adolescent's sexual risky behaviours

The study revealed that individual drivers are significantly associated with adolescent's sexual risky behaviours in. This was reflected in three drivers. The study revealed that adolescents' sexual risky behaviour was 0.6 times less likely among adolescents who would cope with biological changes when compared to those who would not. This study was synonymous with a descriptive community cross-sectional study done in South Africa among adolescents between 10 and 19 years old with an odd ratio of 2.2 representing 95% likelihood. It was established that adolescents who could cope with biological changes were less likely to engage in sexual risk behaviours. However, the rate of engagement in sexual behaviours increases with less coping with changes in biology. For instance, a similar

Table 7. Adjusted prevalence ratios for drivers associated with adolescent sexual risky behaviours.

Variables	cPR (95% CI)	*p*-value	aPR (95% CI)	*p*-value
Sex of adolescent				
• Male	0.812 (0.504–1.309)	0.049	0.311 (0.160–0.605)	0.001
• Female	Reference		Reference	
Education Level				
• No formal education	0.628 (0.341–1.156)	0.020	0.447 (0.209–0.958)	0.038
• Primary education	0.132 (0.064–0.273)		0.029 (0.010–0.086)	0.000
• Post-primary	Reference		Reference	
Occupation				
• Student/School children	0.791(0.442–1.416)	0.037	0.664 (0.200–1.110)	0.100
• Cattle keeping	0.894 (0.449–1.782)		0.775 (0.658–1.784)	0.429
• Farmer	0.818 (0.031–1.705)		0.621 (0.500–1.370)	0.008
• Trading	0.352 (0.110–1.132)		0.155 (0.039–0.620)	0.008
• Domestic worker	Reference		Reference	
Condom Use				
• Yes	0.815 (0.249–1.835)	0.016	0.777 (0.284–2.800)	0.009
• No	Reference		Reference	
Number of children ever had				
• None	1.662 (0.147–18.878)	0.036	1.464 (0.173–1.243)	0.057
• 1–3	Reference		Reference	
Awareness of partner's HIV status				
• Yes	0.595 (0.128–1.320)	0.046	8.221 (3.1120–33.185)	0.007
• No	Reference		Reference	
Coping with biological changes				
• Yes	0.549 (0.338–0.891)	0.041	0.464 (0.173–1.243)	0.127
• No	Reference		Reference	
Difficult negotiating safe sex				
• Yes	1.673 (0.401–3.128)	0.047	1.772 (0.256–4.036)	0.043
• No	Reference		Reference	
School dropout				
• Yes	1.326 (0.832–2.113)	0.050	2.268 (0.540–6.654)	0.032
• No	Reference		Reference	
Attend social event				
• Yes	1.763 (0.358–3.623)	0.041	1.271 (0.158–10.251)	0.022
• No	Reference		Reference	
Use social media				
• Yes	1.102 (0.652–1.863)	0.021	1.940 (0.459–1.924)	0.006
• No	Reference		Reference	
Negative peer influence				
• Yes	1.848 (0.495–3.453)	0.035	1.700 (0.527–5.032)	0.004
• No	Reference		Reference	
Parenting/parental control				
• Yes	0.527 (0.181–1.534)	0.050	0.950 (0.183–4.943)	0.925
• No	Reference		Reference	
Traditional beliefs had an effect				
• Yes	1.525 (0.707–3.287)	0.044	5.478 (1.726–17.386)	0.004
• No	Reference		Reference	
Negative traditional customs				
• Yes	0.763 (0.358–1.623)	0.041	1.185 (0.213–6.583)	0.843
• No	Reference		Reference	

PR = Prevalence Rate, cPR = Crude Prevalence Rate, aPR = Adjusted Prevalence Rate.

study in Uganda showed that having multiple sexual partners, frequent sex and irregular contraceptive use increased the likelihood of teenage pregnancy, which is a risky behaviour (Ochen et al., 2019). In further support of the findings, Githuka et al. (2014) in a study conducted in Kenya regarding coping with biological changes and the likelihood to engage in risky sexual behaviours. It was established that poor or negative coping of biological changes on adolescent bodies increased their odds of engaging in risky sexual behaviours when compared to those who copied positively [COR, 7.3; 95% CI, 1.4–20.4 ($p < 0.05$)].

Furthermore, the study revealed that adolescents' sexual risky behaviour was 1.7 times high likely among adolescents who would find it difficult to negotiate safe sex when compared to those who would negotiate. This is supported by a community cross-sectional study done in Ghana by Patton et al. (2009) who showed that difficulty in negotiating safe sex was significantly associated with increased prior engagement in sexual risk behaviours among the study participants [COR, 0.8; 95% CI, 0.1–7.6 ($p < 0.05$)]. The adolescents who had exhibited the ability to negotiate safe sex were less likely to engage in sexual risk behaviours than those adolescents who had difficulty in negotiating safe sex. The study found that more than 65% of male counterparts could negotiate for safe sex more than females who were reportedly on 28%(Patton et al., 2009).

The study further revealed that the adolescent's sexual risky behaviour among those who were aware of partner's HIV status was 0.6 times less likely when compared to those who were not aware. This finding was in line with Lewis et al. (2022) who showed a higher probability of prior engagement in high-risk sexual behaviours among adolescents who were unaware of their most recent sexual partners' HIV status. This finding has implications for HIV transmission among adolescents especially if one of the partners was already infected with HIV and calls for a need to promote mutual HIV status disclosure between sexual partners. Besides, it is likely that adolescents who engage in high-risk sexual behaviours in this setting are not empowered to bargain and demand HIV status disclosure from their peers before they engage in sex with them.

Lastly, the study revealed that adolescents' sexual risky behaviour among school dropout 1.3 times high likely compared to those who were not dropouts. This was congruent with what Nnko et al. (2019) did in a community cross-sectional study done in Uganda among 295 participants in selected secondary schools which showed that about 50.1% prior engagement in sexual behaviours was associated with school dropouts. A $p=0.001$ confirmed a significant association between school dropout and engagement in sexual risk behaviours. Nnko et al. (2019) ascertained that the majority of school dropouts end up in sexual risk behaviours because they have nothing to lose. In Zimbabwe, the other significant drivers for both sexes were increasing education level, higher wealth status and currently/formerly being in a union (Takarinda et al., 2016).

Socio-environmental drivers associated with adolescent's sexual risky behaviours

The study revealed that socio-environmental drivers were found to have a significant contribution to adolescents' sexual risky behaviours. This was reflected in three major drivers. In the first place, the study established that adolescents' sexual risky behaviour among adolescents who attended social events was 1.7 times high likely when compared to those who did not attend social events. This was supported by Ssewanyana et al. (2021), in a study of drivers associated with adolescents' sexual risk behaviours among 10–19 years old in Kenya, where they found that the likelihood of adolescents' sexual risk behaviours among 10–19 years old was 3.9 times higher among areas where social events were observed [COR, 3.9; 95% CI, 0.22–9.7 ($p<0.05$)]. The current study findings were further supported by other studies which showed that having multiple sexual partners, frequent sex and irregular contraceptive use increased the likelihood of teenage pregnancy. Among familial drivers, being married was found to increase the likelihood of teenage pregnancy. Peer pressure, sexual abuse and lack of control over sex was observed to increase the likelihood of teenage pregnancy (Ochen et al., 2019).

Further, study revealed that adolescents' sexual risky behaviour among Social media emerged as an important influence on adolescent behaviour. Beyond exposure to sexual content, platforms such as Facebook and WhatsApp may normalize risk-taking through peer networks. This suggests a need to integrate digital literacy and safe online practices into adolescent health programs—an area rarely addressed in Ugandan interventions.Labbé et al. (2016) in a cross-sectional study found that girls who are exposed to social media at an early age had higher odds or likelihood to engage in risky sexual behaviours when compared to those who were not exposed to social media [COR, 6.3; 95% CI, 1.8–22.7 ($p<0.05$)]. In further support of the current study, a study conducted, examined the association between social media and adolescents' sexual risk behaviours among 10–19 years old in Gyane et al. (2025) and Ghana. It was evident that social media plays a significant role in introducing a good number of adolescents to sexual risk behaviours and later engagement. It was ascertained that 20% of teenage pregnancies occurred among young couples who had social media accounts. The pooled result of this meta-analysis indicated that adolescents who had social media accounts were 2.9 times more likely to engage in adolescent sexual risk behaviours as compared to their counterparts who had no accounts (OR: 1.9, 95%CI: 1.2, 5.8). Lastly, the study found that the adolescent's sexual risky behaviour among adolescents who had negative peer influence was 1.9 times high likely when compared to those who did not have negative peers. This concurred with Govender et al. (2019) while studying in South Africa regarding the influence of peers on teenage pregnancies among secondary school girls. They found that the likelihood of girls getting pregnant in their teenage is higher when they are exposed to negative peers when compared to when they are exposed to positively grown peers at school [COR, 8.4; 95% CI, 1.9–19.6 ($p<0.05$)]. Further, one peer,

Kennedy et al. (2012) studied the contribution of peers on engagement in risky sexual behaviours among adolescents aged 10–19 years in Senegal. The study found that negative peer influence highly contributed to adolescent sexual risky behaviours. It contributed 7.3 times higher compared to children who were not exposed to negative peers. Other studies found similar results (Potard et al., 2008).

Family drivers associated with adolescents' sexual risky behaviours

The study revealed that family drivers had a significant contribution to adolescents' sexual risky behaviours in Nebbi Municipality. For instance, it was established that the adolescent's sexual risky behaviour among adolescents who were highly protected by their parents 0.5 times less likely compared to those who were not being protected. This was supported by other studies (Takarinda et al., 2016). In further support, in a community-based study by Petersen et al. (2017), it was found that the number of girls engaged in risky sexual behaviours was synonymous with poor family background. Girls from poor families had increased odds of engaging in risky sexual behaviours when compared to those who were coming from richer families [COR, 4.9; 95% CI, 1.4–17.5 ($p < 0.05$)].

In addition, the study findings indicated that adolescents' sexual risky behaviour among those who felt that unsafe sexual behaviours were an approved practice was 1.5 times high likely compared to those who did not. This was congruent with Idele et al. (2014) in a community-based study where they found that materialistic girls demonstrated a higher likelihood to engage in risky sexual behaviours when compared to those who were not materialistic [COR, 4.8; 95% CI, 1.2–11.6 ($p < 0.05$)]. In a comprehensive investigation done in Tanzania by Whitworth et al. (2023), they found that poor parenting (parental control) had a higher likelihood to contribute to the engagement of adolescents in risky behaviours when compared to those children who were exposed to good parenting.

Lastly, the study findings indicated that adolescents' sexual risky behaviour among those who thought that their cultures had problems with unsafe sexual behaviours was 0.8 times less likely than those who thought otherwise. This was in support of Couture et al. (2011) who did a study to find out the drivers contributing young women to engage in sex work in Phnom Penh, Cambodia. They discovered that the majority of these younger women were engrossed in several traditional beliefs regarding avoidance of pregnancies which in the end affected their ability to give birth. It was determined that traditional beliefs among younger women engaged in unsafe sex had a higher likelihood when compared to those young girls who never used any traditional methods to avoid pregnancies [COR, 1.1; 95% CI, 0.22–5.9($p < 0.05$)].

Strengths and limitations

This study had several strengths. It employed a mixed-methods design that combined quantitative and qualitative data, enabling a richer and more nuanced understanding of adolescent risky sexual behaviours. The relatively large sample size of 300 adolescents strengthened the reliability of the quantitative findings, while multivariate analysis allowed for the identification of independent associations between variables. The inclusion of health workers as key informants added contextual depth by providing perspectives from those directly involved in adolescent reproductive health services.

However, some limitations should be acknowledged. The cross-sectional design precludes conclusions about causality and restricts the findings to associations only. Data were self-reported, which raises the possibility of recall and social desirability bias. Although steps were taken to minimize bias through random household sampling and interviewer training, complete elimination was not possible. Additionally, the findings are based on adolescents from Nebbi Municipality, which may limit generalizability to other regions of Uganda, although similarities with findings from other East African contexts suggest reasonable transferability.

Transferability and bias

While the results provide valuable insights specific to Nebbi Municipality, they may also be transferable to similar urban municipalities in Uganda that face rapid urbanization, high fertility rates, and limited

adolescent health services. Selection bias was minimized through randomization at the household level and inclusion of diverse health facility entry points. Reporting bias was mitigated by assuring confidentiality, using local languages, and simplifying questions to ensure comprehension. Despite these measures, some degree of bias cannot be fully excluded.

Conclusions

This study examined the prevalence and drivers of risky sexual behaviours among adolescents in Nebbi Municipality, Uganda, using a mixed-methods analytical cross-sectional design. The findings showed that individual, socio-environmental, and family-level factors all play a role in shaping adolescent vulnerability to risky sexual behaviours. Key associations included coping with biological changes, school dropout, difficulty negotiating safe sex, peer influence, exposure to social media, parental protection, and cultural beliefs.

Because the study was cross-sectional, it cannot establish causality, and the findings must be interpreted as associations only. The reliance on self-reported data may also have introduced bias. Nevertheless, the consistency of the results with prior research across Uganda and sub-Saharan Africa suggests that these findings are robust and relevant. The implications for public health are clear. Locally, the results call for integrated adolescent sexual and reproductive health interventions that combine school-based education, parental support, peer-led approaches, and digital health messaging. Nationally and globally, the study adds evidence that adolescent risky sexual behaviour is a multi-level problem requiring coordinated action by families, schools, communities, health systems, and policymakers. Addressing these drivers in a holistic way is essential for reducing teenage pregnancies, early marriages, and HIV infections among young people.

Recommendations

The following recommendations can be adopted by the different stakeholders as they fit in their different interventions targeting adolescent's sexual risky behaviours;

1. Nebbi Municipal Health Department needs to adopt specific programmes for particular genders. This is because the study found out that females engage in sexual risky behaviours more than males. This means that targeted programmes to sensitize females to consume ASRH services need to be introduced. These can include promoting the use of female condoms and other contraceptives. They can freely be given to domestic workers.
2. The Ministry of Health, through the Public Health Department and District Health Teams, should strengthen adolescent-focused education programs on sexual and reproductive health. These should include school clubs, radio programs, and community dialogues that emphasize condom use, HIV testing, and safe sexual practices.
3. Government of Uganda and Nebbi district need to increase awareness about the risks associated with HIV/AIDs. This can be done by ensuring that radio programmes, community programmes and school clubs are used to sensitize adolescents regarding the challenges associated with HIV/AIDs.
4. Government of Uganda need to sternly deal with the issue of school dropouts. There is a need for the Ministry of Education and District Education Offices to come up with more sustainable and favourable strategies to ensure that the dropout of students is minimized. This can be dealt with by ascertaining student, family and school-based drivers contributing to this surge and putting in place strategies along those lines.
5. Government of Uganda and Nebbi district authorities need to consider massive stakeholders' involvement in matters of adolescent sexuality. It is important that the participation of stakeholders in planning is maintained and continually improved. This can be achieved while ensuring that all key stakeholders are engaged in needs identification and resource allocation for child protection services. Further, stakeholder participation in the implementation and strengthening of child protection systems is very significant. This can be done by ensuring that all stakeholders are represented on the implementation committee. This is because the representation of all concerned

stakeholders can improve accountability and transparency as far as the implementation of a project is concerned.

6. Monitoring and evaluation of adolescent sexual and reproductive health programs should involve the Ministry of Health, District Health Teams, schools, parents' associations, and civil society organizations. Joint participation in feedback, reporting, and accountability processes will strengthen program implementation and sustainability.
7. Schools, youth groups, and health facilities should integrate peer-led education and mentorship. Adolescents are more likely to accept and retain messages delivered by their peers, making peer teaching a powerful strategy to promote safe sexual behaviours and negotiation skills.
8. Given the strong influence of social media, health authorities and partners should develop targeted campaigns on platforms such as Facebook, WhatsApp, and TikTok to disseminate accurate, youth-friendly information and counter harmful content

Implications for practice and policy

This study explored the drivers associated with risky sexual behaviours among adolescents in Nebbi municipality, Uganda. The following were found associated with sexual risky behaviours; sex of the adolescent, educational level, occupation, condom use, number of children ever had and awareness of partner's HIV status. All these have policy connotations which can be used to improve new or existing adolescent policies within Nebbi district or even globally.

Acknowledgement

We sincerely appreciate the support of the follow master students undertaking master of science in clinical epidemiology and biostatics at Uganda Martyrs University; Nakigozi Jacent, Ssemugenyi Hamidu, Kainza Janet, Kusaasira Anitah and Hood Kagoda Serumaga. We also appreciate all the support of Nebbi Municipal council administrative staff, not forgetting all our respondents.

Authors' contributions

KO was involved in the conception and design, data curation, formal data analysis, investigation, methodology, supervision validation, the drafting of the paper, revising it critically for intellectual content; and the final approval of the version to be published. He Agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. BGW was involved in the conception and design, data curation, formal data analysis, funding acquisition, investigation, methodology, project administration; the drafting of the paper, revising it critically for intellectual content; and the final approval of the version to be published. He Agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. GM was involved in the conception and design, data curation, formal data analysis, methodology, resources, software, validation, visualization, the drafting of the paper, revising it critically for intellectual content and the final approval of the version to be published. He Agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. JTA was involved in data curation, formal data analysis, funding acquisition, methodology, resources, software, validation, the drafting of the paper, revising it critically for intellectual content and the final approval of the version to be published. She Agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Disclosure statement

The authors have declared that no competing interests exist.

Funding

The authors received no specific funding for this work.

ORCID

Kizito Omona http://orcid.org/0000-0003-2962-0919

Data availability statement

The dataset related to this study has been published in Harvard Dataverse (Omona & Bwire, 2023), available at https://doi.org/10.7910/DVN/ZM01EO.

References

Amin, S., Austrian, K., Chau, M., Glazer, K., Green, E., Stewart, D., Stoner, M. (2013). *The Adolescent Girls Vulnerability Index: Guiding Strategic Investment in Uganda*. New York: Population Council. http://library.health.go.ug/sites/default/files/resources/The%20Adolescent%20girls%20vulnerability%20index%20guiding%20strategic%20Investment%20in%20Uganda%202013.pdf

Aturinde, A., Farnaghi, M., Pilesjö, P., & Mansourian, A. (2019). Spatial analysis of HIV-TB co-clustering in Uganda. *BMC Infectious Diseases*, *19*(1). https://doi.org/10.1186/s12879-019-4246-2

Bandura, A. (1965). Influence of models' reinforcement contingencies on the acquisition of imitative responses. *Journal of Personality and Social Psychology*, *1*(6), 589–595. https://doi.org/10.1037/h0022070

Bandura, A., Grusec, J. E., & Menlove, F. L. (1966). Observational learning as a function of symbolization and incentive set. *Child Development*, *37*(3), 499–506.

Buckler, A., Chamberlain, L., Mkwananzi, F., Dean, C., & Chigodora, O. (2022). Out-of-school girls' lives in Zimbabwe: What can we learn from a storytelling research approach? *Cambridge Journal of Education*, *52*(2), 195–215. https://doi.org/10.1080/0305764X.2021.1970718

Centre for Disease Control and Prevention [CDC]. (2023). *Sexual risk behaviours*. https://www.cdc.gov/healthyyouth/sexualbehaviourss/index.htm

Couture, M.-C., Sansothy, N., Sapphon, V., Phal, S., Sichan, K., Stein, E., Evans, J., Maher, L., Kaldor, J., Vun, M. C., & Page, K. (2011). Young women engaged in sex work in Phnom Penh, Cambodia, have high incidence of HIV and sexually transmitted infections, and amphetamine-type stimulant use: New challenges to HIV prevention and risk. *Sexually Transmitted Diseases*, *38*(1), 33–39. https://doi.org/10.1097/OLQ.0b013e3182000e47

Githuka, G., Hladik, W., Mwalili, S., Cherutich, P., Muthui, M., Gitonga, J., Maina, W. K., & Kim, A. A., KAIS Study Group. (2014). Populations at increased risk for HIV infection in Kenya: Results from a national population-based household survey, 2012. *Journal of Acquired Immune Deficiency Syndromes (1999)*, *66 Suppl 1*(Suppl 1), S46–S56. https://doi.org/10.1097/QAI.0000000000000137

Govender, D., Naidoo, S., & Taylor, M. (2019). Knowledge, attitudes and peer influences related to pregnancy, sexual and reproductive health among adolescents using maternal health services in Ugu, KwaZulu-Natal, South Africa. *BMC Public Health*, *19*(928). https://doi.org/10.1186/s12889-019-7242-y

Gyane, C. O., Gmayinaan, V. U., & Osei, E. (2025). Association between social media use and adolescents' sexual behaviours: a cross-sectional study among high school students in Drobo, Ghana. *BMC Public Health*, *25*(1), 537. https://doi.org/10.1186/s12889-025-21585-y

Heeren, G. A., Mandeya, A., Jemmott, J. B., Chiruka, R. T., Marange, C. S., Batidzirai, J. M., Gwaze, A. R., Tyler, J. C., & Hsu, J. (2014). Multiple partners and condom use among students at a South African University. *Journal of Evidence-Based Social Work*, *11*(5), 437–444. https://doi.org/10.1080/15433714.2012.759468

Hu, Y., & Wang, Q. (2022). Self-control, parental monitoring, and adolescent problematic mobile phone use: Testing the interactive effect and its gender differences. *Frontiers of Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.846618

Idele, P., Gillespie, A., Porth, T., Suzuki, C., Mahy, M., Kasedde, S., & Luo, C. (2014). Epidemiology of HIV and AIDS among adolescents: Current status, inequities, and data gaps. *Journal of Acquired Immune Deficiency Syndromes (1999)*, *66 Suppl 2*(Supplement 2), S144–S153. https://doi.org/10.1097/QAI.0000000000000176

Im, D., Pyo, J., Lee, H., Jung, H., & Ock, M. (2023). Qualitative research in healthcare: Data analysis. *Journal of Preventive Medicine and Public Health*, *56*(2), 100–110. https://doi.org/10.3961/jpmph.22.471

Kato, E. I., & Omona, K. (2021). Peer influences to risky sexual behaviours among out-of-school adolescents in Kamuli municipality. *Health Policy and Development*, *19*(1), 40–59.

Kennedy, S. B., Atwood, K. A., Harris, A. O., Taylor, C. H., Gobeh, M. E., Quaqua, M., Woods, D. V., Bee, E. M., & Warlonfa, M. (2012). HIV/STD risk behaviours among in-school adolescents in post-conflict liberia. *The Journal of the Association of Nurses in AIDS Care: JANAC*, *23*(4), 350–360. https://doi.org/10.1016/j.jana.2011.05.005

Kincaid, C., Jones, D. J., Sterrett, E., & McKee, L. (2012). A review of parenting and adolescent sexual behaviours: The moderating role of gender. *Clinical Psychology Review*, *32*(3), 177–188. https://doi.org/10.1016/j.cpr.2012.01.002

Labbé, J., Ford, J. D., Berrang-Ford, L., Donnelly, B., Lwasa, S., Namanya, D. B., Twesigomwe, S., & Harper, S. L. (2016). Vulnerability to the health effects of climate variability in rural southwestern Uganda. *Mitigation and Adaptation Strategies for Global Change*, *21*(6), 931–953. https://doi.org/10.1007/s11027-015-9635-2

Lewis, L., Kharsany, A. B. M., Humphries, H., Maughan-Brown, B., Beckett, S., Govender, K., Cawood, C., Khanyile, D., & George, G. (2022). HIV incidence and associated risk factors in adolescent girls and young women in South Africa: A population-based cohort study. *PLOS ONE*, *17*(12), e0279289. https://doi.org/10.1371/journal.pone.0279289

Mcharo, R. D., Olomi, W., Mayaud, P., & Msuya, S. E. (2021). Risky sexual behaviours among young adults attending Higher Learning Institutions in Mbeya, Tanzania: Implications for STIs and HIV preventive programs. *Open Research Africa*, *3*, 41. https://doi.org/10.12688/aasopenres.13123.2

Mukasa, S., & Omona, K. (2021). Perceived needs and barriers to accessing sexual reproductive health (SRH) services among the Ik community, Kaabong District, Uganda. *International Journal of Studies in Nursing*, *6*(4), 62. https://doi.org/10.20849/ijsn.v6i4.944

Mukhalalati, B., Elshami, S., Eljaam, M., Hussain, F. N., & Bishawi, A. H. (2022). Applications of social theories of learning in health professions education programs: A scoping review. *Frontiers in Medicine*, *9*(, 912751. https://doi.org/10.3389/fmed.2022.912751

Nnko, S., Kuringe, E., Nyato, D., Drake, M., Casalini, C., Shao, A., Komba, A., Baral, S., Wambura, M., & Changalucha, J. (2019). Determinants of access to HIV testing and counselling services among female sex workers in sub-Saharan Africa: A systematic. *BMC Public Health*, *19*(1), 15. https://doi.org/10.1186/s12889-018-6362-0

Ochen, A. M., Chi, P. C., & Lawoko, S. (2019). Predictors of teenage pregnancy among girls aged 13–19 years in Uganda: A community-based case-control study. *BMC Pregnancy and Childbirth*, *19*(1), 211. https://doi.org/10.1186/s12884-019-2347-y

Omona, K., & Bwire, W. G. (2023). Replication data for drivers of risky sexual behaviours among adolescents in Nebbi Municipality, Uganda: A cross-sectional study. https://doi.org/10.7910/DVN/ZM01EO, Harvard Dataverse, V1, UNF:6:ZSUPAmHuh/hEX6gkZMszuQ== [fileUNF]

Omona, K., & Mugumya, I. (2020). Involvement of parents in sexuality and reproductive health education of adolescents and associated drivers in Hoima Municipality, Uganda. *Texila International Journal of Public Health*, *8*(1). https://doi.org/10.21522/TIJPH.2013.08.01.Art036

Omona, K., & Ssuka, J. K. (2023). Early sexual debut and associated factors among adolescents in Kasawo Sub-county, Mukono district, Uganda. *Cogent Public Health*, *10*(1), 1–27. https://doi.org/10.1080/27707571.2023.2183561

Omona, K., Ssuka, J. K., & Mbabazi, S. G. (2020). Influence of parent-teacher interactions on initiation of sexual practices among teenagers: A qualitative study of Kawuku S. S_ Mukono District, Uganda: Parent-teacher interactions. *Journal of Applied Learning and Teaching*, *3*(2), 127–135. https://doi.org/10.37074/jalt.2020.3.2.21

Patton, G. C., Coffey, C., Sawyer, S. M., Viner, R. M., Haller, D. M., Bose, K., Vos, T., Ferguson, J., & Mathers, C. D. (2009). Global patterns of mortality in young people: A systematic analysis of population health data. *Lancet (London, England)*, *374*(9693), 881–892. https://doi.org/10.1016/S0140-6736(09)60741-8

Petersen, M., Balzer, L., Kwarsiima, D., Sang, N., Chamie, G., Ayieko, J., Kabami, J., Owaraganise, A., Liegler, T., Mwangwa, F., Kadede, K., Jain, V., Plenty, A., Brown, L., Lavoy, G., Schwab, J., Black, D., van der Laan, M., Bukusi, E. A., … Havlir, D. (2017). Association of implementation of a universal testing and treatment intervention with HIV diagnosis, receipt of antiretroviral therapy, and viral suppression in East Africa. *JAMA*, *317*(21), 2196–2206. https://doi.org/10.1001/jama.2017.5705

Potard, C., Courtois, R., & Rusch, E. (2008). The influence of peers on risky sexual behaviour during adolescence. *The European Journal of Contraception & Reproductive Health Care*, *13*(3), 264–270. https://doi.org/10.1080/13625180802273530

Richter, L., Mabaso, M., Ramjith, J., & Norris, A. (2015). Early sexual debut: Voluntary or coerced? Evidence from longitudinal data in South Africa—The birth to twenty plus study. *The South African Medical Journal = Suid-Afrikaanse Tydskrif Vir Geneeskunde*, *105*(4), 304–307. https://doi.org/10.7196/SAMJ.8925

Seth, P., Lang, D. L., DiClemente, R. J., Braxton, N. D., Crosby, R. A., Brown, L. K., Hadley, W., & Donenberg, G. R. (2012). Gender differences in sexual risk behaviours and sexually transmissible infections among adolescents in mental health treatment. *Sexual Health*, *9*(3), 240–246. https://doi.org/10.1071/SH10098

Sofaer, S. (1999). Qualitative methods: what are they and why use them? *Health Services Research*, *34*(5 Pt 2), 1101–1118.

Ssebunya, R. N., Matovu, J. K. B., Makumbi, F. E., Kisitu, G. P., Maganda, A., & Kekitiinwa, A. (2019). Drivers associated with prior engagement in high-risk sexual behaviours among adolescents (10–19 years) in a pastoralist post-conflict community, Karamoja sub-region, Northeastern Uganda. *BMC Public Health*, *19*(1), 1027. https://doi.org/10.1186/s12889-019-7352-6

Ssewanyana, D., Abubakar, A., Mabrouk, A., Kagonya, V. A., Nasambu, C., Dzombo, J. T., Angwenyi, V., Kabue, M., Scerif, G., & Newton, C. R. (2021). The occurrence of sexual risk behaviors and its association with psychological well-being among Kenyan adolescents. *Frontiers in Reproductive Health*, *3,* 659665. https://doi.org/10.3389/frph.2021.659665

Takarinda, K. C., Madyira, L. K., Mhangara, M., Makaza, V., Maphosa-Mutsaka, M., Rusakaniko, S., Kilmarx, P. H., Mutasa-Apollo, T., Ncube, G., & Harries, A. D. (2016). Drivers associated with ever being HIV-tested in Zimbabwe: An extended analysis of the zimbabwe demographic and health survey (2010–2011). *PloS One*, *11*(1), e0147828. https://doi.org/10.1371/journal.pone.0147828

UBOS. (2017). *Uganda Demographic and Health Survey 2016 Key Indicators Report*. Uganda Bureau of Statistics. https://www.ubos.org/wp-content/uploads/publications/03_2018Uganda_DHS_2016_KIR.pdf

Uganda Bureau of Statistics (UBOS). (2018). *Uganda National Household Survey 2016/2017*. Kampala; UBOS

UNAIDS, & UNFPA. (2020). *HIV Prevention, 2020 Road Map*. UNAIDS. https://www.unfpa.org/sites/default/files/pub-pdf/hiv-prevention-2020-road-map_en.pdf

UNAIDS. (2016). *HIV prevention among adolescent girls and young women*. WHO. https://www.unaids.org/sites/default/files/media_asset/UNAIDS_HIV_prevention_among_adolescent_girls_and_young_women.pdf

UNFPA. (2014). Adolescent sexual and reproductive health. https://www.unfpa.org/resources/adolescent-sexual-and-reproductive-health

UNFPA. (2019). *Over 22 per cent of young Ugandans are involved in risky sexual behaviour*. BMC Report. https://uganda.unfpa.org/en/news/over-22-percent-young-ugandans-are-involved-risky-sexual-behaviour-%E2%80%93-bmc-report#:~

UNICEF. (2013). *Towards an AIDS-free generation–children and AIDS: sixth stocktaking report, 2013*. UNICEF. file:///Users/dr.omonakizito/Downloads/str6_full_report_29-11-2013_78.pdf

UNICEF. (2019). *Nebbi_Advocacy Briefs*. UNICEF. https://www.unicef.org/uganda/media/8481/file/8%20NEBBI_ADVOCACY%20BRIEFS.pdf

Wang, X., & Cheng, Z. (2020). *Cross-sectional studies: strengths, weaknesses, and recommendations. Chest*, *158*(1S), S65–S71. https://doi.org/10.1016/j.chest.2020.03.012

West Nile Web. (2018). *Nebbi District*. West Nile Web. https://www.westnileweb.com/districts/nebbi-district

Whitworth, H. S., Baisley, K. J., Nnko, S., Irani, J., Aguirre-Beltran, A., Changalucha, J., Crucitti, T., Francis, S., Hashim, R., Hansen, C. H., Hayes, R. J., Buvé, A., & Watson-Jones, D. (2023). Associations between age of menarche, early sexual debut and high-risk sexual behaviour among urban Tanzanian schoolgirls: A cross-sectional study. *Tropical Medicine & International Health: TM & IH*, *28*(3), 237–246. https://doi.org/10.1111/tmi.13858

WHO. (2016). *Global health sector strategy on HIV: 2016-2021*. World Health Organization. https://www.who.int/publications-detail-redirect/WHO-HIV-2016.05

WHO. (2020). *Adolescent pregnancy*. World Health Organization. https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy

WHO. (2021a). *Adolescent health*. https://www.who.int/health-topics/adolescent-health#tab=tab_1

WHO. (2021b). *Global status report on violence against children 2020*. World Health Organization. https://www.who.int/teams/social-determinants-of-health/violence-prevention/global-status-report-on-violence-against-children-2020

Wiegand, H. (1968). Kish, L.: Survey sampling. John Wiley & Sons, Inc., New York, London 1965, IX + 643 S., 31 Abb., 56 Tab., Preis 83 s. *Biometrische Zeitschrift*, *10*(1), 88–89. https://doi.org/10.1002/bimj.19680100122