Determinants of Sexually Transmitted Infections among Adolescent Girls and Young Women in Artisanal and Small-Scale Mining Communities of Uganda and Ghana

Betty Kwagala[1]*, Hanna Chidwick[2], Deborah Mensah[3], John Bosco Asiimwe[1], Stephen Ojiambo Wandera[1], Patricia Ndugga[1], Miriam Mutabazi[4], Fred Ngabirano[5], Lydia Osei[6], and Lydia Kapiriri[7]

*Corresponding author
[1] Department of Population Studies, Makerere University, Kampala, Uganda
[2] Global Health, Faculty of Health Sciences, McMaster University, Hamilton, Canada
[3] Northern Empowerment Association/GRID, Tamale, Ghana
[4] Uganda Christian University, Mukono, Uganda
[5] Ministry of Gender, Labour and Social Development, Uganda
[6] Department of Geography, University of Ghana, Accra, Ghana
[7] Department of Health, Aging & Society, McMaster University, Hamilton, Canada

BK: kkwagala@gmail.com, Makerere University, Department of Population Studies, Kampala, Uganda, +256-772469097

Abstract

Background: The artisanal and small-scale mining (ASM) sector has become an important employer in mineral rich countries of sub Saharan Africa where women constitute up to half of the labour force. However, gender and socio-economic marginalization negatively impact the sexual and reproductive health (SRH) of the adolescent girls and young women (AGYW) who work in the ASM sector. Despite the growing literature on adolescents' SRH, there is a paucity of literature on the SRH of this last mile population. This paper fills this gap in the literature by examining the prevalence and determinants of sexually transmitted infection (STI) status among AGYW in the ASM gold mining sectors of Uganda and Ghana.

Methods: The paper is based on a survey of 1618 AGYW working in the mining sectors of Uganda and Ghana. Descriptive analysis involved frequency distributions and chi squared tests. Multivariable analysis involved fitting a binary logistic regression model to assess the determinants of STI status of the AGYW.

Results: Almost half (47%) of the respondents had an STI during the 12 months preceding the study. STI status was significantly associated with marital status, level of education, alcohol consumption, whether the respondent was fairly paid, experience of sexual violence and participation in transactional sex. The odds of reporting an STI were higher among AGYW that were cohabiting (AOR = 1.4; CI 1.1-2.0); with primary level of education (AOR = 1.4; CI 1.0-2.0), and those who were fairly paid (AOR 1.4; CI 1.1-1.8). The odds of reporting STIs were also higher among AGYW who drank alcohol (AOR 1.4; CI 1.1-1.9), experienced sexual violence (AOR 1.7; CI 1.1-2.6), and those who engaged in transactional sex (AOR 1.7; CI 1.2-2.3).

Conclusions: The high prevalence of STIs among AGYW in ASM requires attention. Unstable or uncommitted relationships, a low education level, risky behaviors such alcohol consumption by females, multiple sexual partnerships, transactional sex and sexual violence increased the risk of STIs among ASM AGYW. Health ministries in Ghana and Uganda need to design preventive interventions targeting male ASM workers and AGYW, adopting multi-sectoral participatory approaches that engage key stakeholders in mining communities.

Key words: Young female artisanal mine workers, sexually transmitted infections, sub Saharan Africa.

Background

Artisanal and small-scale mining (ASM) is an important source of minerals and metals globally [1, 2]. The sector is a significant employer in low and middle income countries in particular. In many sub-Saharan African countries, ASM has grown rapidly, providing employment to many including vulnerable groups such as women and adolescents [3, 4]. Uganda and Ghana are both endowed with a variety of minerals, including gold, which is mainly extracted through ASM. In the Ugandan ASM sector, women occupy 40,000 jobs (about 50% of the jobs). These women are mainly involved in processing of the ore and provision of related services while men dominate mineral extraction [2, 3, 5]. In Ghana, the sector employs over 500,000 women, also representing 50% of the workforce (about 50% of the workforce) [6, 7]. The involvement of poor adolescent girls and young women (AGYW) in a male dominated informal sector raises concerns over their economic well-being and sexual and reproductive health (SRH).

Sexually transmitted infections (STIs) are among the most important global reproductive health challenges. More than one million infections occur globally on a daily basis. Although many remain asymptomatic, STIs have significant (reproductive) health impacts including infertility, pregnancy complications, mother to child transmission, stillbirths, neonatal deaths, and congenital deformities. These infections also increase the risk for reproductive organ cancers and contracting HIV [8]. Uganda's STI prevalence among women of reproductive age is 24%, with the fishing areas (islands) having the highest prevalence (35%) [9]. Similar to fisherfolk, ASM workers tend to be migratory (which is one of the factors that predisposes populations to contracting STIs). Studies about SRH in sub-Saharan Africa report a high prevalence of STIs in general, and in mining communities in particular [10-16]. AGYW in the mining sector are definitely a last mile population, being among the poorest in the sector, and resident in underserved areas with respect to essential social infrastructure [17]

The ASM sector involves several intersectional and gendered aspects [1-3, 18-20]. Intersecting aspects such as age, gender, socioeconomic status, and access to resources impact the health and well-being of AGYW [21]. The marginalization of poor young women often includes sexual exploitation that could result in STIs. Indeed, studies report poor SRH among women and adolescents in mining communities [10, 16, 22].

Socio economic as well as physiological factors increase the risk of STIs among women [13, 23, 24]. Contextual gender norms and the hierarchical gender relations that accord women a subordinate role in relationships, with limited access to and control over economic and SRH resources, and decision making power are closely linked to proximate factors that are associated with STIs among women [8]. Sex and gender based violence that is often reported in mining settings [12, 23, 25] exposes women to STIs. Gender based violence disempowers women and often results in risky sexual behaviors such as multiple sexual partnerships, transactional sex and

early marriage that increase the odds of contracting STIs. The risk is higher when it occurs at a young age, with an early sex debut [26].

In mining communities specifically, some studies have associated STIs with age, migration, alcohol and substance use, limited access to entertainment and poverty. First, AGYW in mining communities are more vulnerable to sexual exploitation [2, 3, 5, 16]. STIs in mining communities in sub-Saharan Africa tend to be concentrated amongst the youth [11]. The high prevalence is partly attributed to challenges of accessing SRH services and information due to stigma and sociocultural barriers [12]. Second, studies show an association between migration status and STIs. Migrant workers have minimal social support [16]. The youth who work in the mines are internal and international migrants, and some come from unstable homes [11]. This results in prolonged stays away and isolation from families and consistent sexual partners which contributes to the spread of STIs [10, 12, 13, 15]. Third, alcohol and substance misuse in mining communities is an additional factor associated with risky sexual behaviour and thus STIs, since it often involves unprotected sex [10, 12]. Resistance to condom use predominantly amongst male sexual partners, limited information on SRH, and constrained negotiating power on the part of AGYW contribute to unsafe sex practices [10, 12, 27]. Fourth, studies highlight the lack of access to entertainment in mining communities as a factor contributing to risky sexual behaviour such as transactional sex and sex with multiple partners, resulting in STIs [11, 12, 14, 16, 27, 28]. It is common for women to engage in transactional sex, and men to engage in multiple sex partnerships [16]. Finally, poverty and economic dependence, limit women's safer sex negotiation power. Mines that operate in poor communities often have higher rates of transactional sex, a key risk factor for STIs [16].

The Sustainable Development Goal 3 places emphasis on the fact that no one should be left behind in the development process [29]. The quest to meet SDG 3 requires consideration of the health- and specifically the SRH of AGYW who work in the ASM. Unfortunately, the growing body of literature on SRH has not addressed the unique experiences of this population in Uganda and Ghana; this paper fills this gap in the literature. The situation concerning AGYW's SRH in mining communities is likely to have been exacerbated by the impact of the COVID-19 pandemic. The pandemic contributed to reduced income, loss of employment, limited access to food; disruption in education, escalation of sex and gender based violence, teenage pregnancies, early marriages, and limited access to health care services [30-32]. This paper examines the prevalence and factors associated with STI status among AGYW that work in the ASM.

Methods

Study design: The paper is based on findings of a cross sectional survey that was conducted among adolescent girls and young women in artisanal and small-scale mining sector conducted in Uganda and Ghana.

Study sites: The study was conducted in ASM communities of Ghana, specifically Bamboi (Savannah Region) and Chingakrom (Bono East Region). In Uganda, the study was conducted in ASM communities of Busia and Namayingo districts, Eastern region, and Kassanda and Mubende districts, central region. Specific sites in each country were selected based on the existence of ASM activities, and feasibility of implementing the study, including security.

Sample size and method of data collection: We surveyed adolescent girls and young women age 10-24 years, living in the selected artisanal mining communities. We interviewed 1618 respondents in the two countries. The sample sizes were determined using Yamane's [33] formula, taking into consideration the design effect of 2 and anticipated response rate of 98%.

Eligible respondents were AGYW age 10-24 years, who either directly worked or provided services to ASM workers. Service providers were included because they derived their livelihoods from the mines, are affected by their close interactions with ASM workers and often end up working in the mines. Adolescents as young as 10 years were considered because adolescents in the ASM sector are at a high risk of defilement. In Uganda, 12% of adolescents in the general population had their sexual debut below the age of 15years [9]. It is anticipated that the percentage is higher among adolescents that engage in ASM [25].

Data collection

Research teams were trained and the study tool was pretested prior to data collection (19-20). We used the KoBo Collect tool that functions even in remote communities with limited internet connectivity, to collect data. Questions addressing STIs and key background factors were adapted from the Uganda Demographic and Health Survey women's validated questionnaire [9].

Interviews were conducted at household level. Local guides helped to list households with AGYW. All households eligible with AGYW were taken into consideration. One AGYW was interviewed per household. If a household had more than one eligible AGYW, simple random selection was applied to select the respondent. Recruitment took place in all households with AGYW in the respective areas. Data were collected by young female research assistants to match the prospective respondents. In order to ensure privacy, interviews were conducted in a private but open place where any approaching persons could be observed. The interviews were conducted in the relevant local languages.

Variables and measurements

The dependent factor STI status was coded as a binary outcome. Respondents were asked whether during the year preceding the study they had a) a bad smelling/ abnormal genital discharge, b) a genital sore or ulcer or c) a disease acquired through sexual contact [9]. "Yes" responses to one or more of the questions were coded as 1 and "No" responses to all three questions were coded as 0.

Independent factors included: country of study, age, religion, marital status, migration status, education level, kind of work in the mine, employer, fairness of payment, whether the respondent had savings, membership of a saving/investment group, number of lifetime sexual partners, alcohol consumption, experience of physical violence, sexual violence in the past one year, and transactional sex.

Data Analysis

Data were analyzed using Stata statistical software version 15. Analyses involved frequency distributions to describe the characteristics of the respondents, bivariate (Chi-squared tests) to identify variables for inclusion in the multivariable analysis, followed by logistic regression analysis to isolate significant determinants of AGYW's STI status. The results are reported at 95% confidence intervals (the level of significance was set at $p<0.05$) (18).

Ethical considerations

The study was approved by the research ethics committees in Uganda (The AIDS Support Organization-2022-169 and registered by the Uganda National Council for Science and Technology- UNCST – SS149ES). In Ghana the study was cleared by the University of Ghana Ethics Committee for the Humanities (ECH109/22-23), and in Canada McMaster University Research Ethics Board (MREB#: 6257). Voluntary informed consent was obtained from the adult respondents and assent from minors, after seeking consent of their caregivers where applicable. Working minors that lived alone were treated as emancipated minors. Owing to the recent COVID 19 and Ebola epidemics, we used verbal consent. Participants were assured of confidentiality**.**

Results

Respondents Background Characteristics

We interviewed 1,338 respondents across the two countries. About 16% were less than 18 years old. The majority of respondents were Christians (74%), single never married (56%), migrants (66%), and had primary or no formal education (53%). Just over one in three (36%) worked directly in the mines and over half (62%) were employed by private individuals. Less than half (45%) felt that they are fairly paid, 59% had savings from their earnings, but only 19% belong to a savings group. About a third (31%) had more than one sexual partner during the two years preceding the survey, and 18% drunk alcohol. Almost half (47%) of the respondents had an STI and 17% participated in transactional sex during the 12 months preceding the study. However, a relatively low percentage had experienced either physical violence (13%) or sexual violence (9%) during the year preceding the survey

Table 1. Respondents Background Characteristics and Reporting an STI by Independent factors

Variables	%age of Respondents who had ever had sex	Frequency	%age had an STI	p-value
Country				0.868
Ghana	47.5	702	47.2	
Uganda	52.5	636	46.7	
Age Groups				**0.041**
Less than 18 years	16.4	219	40.6	
18+ years	83.6	1,119	48.2	
Religion				**0.047**
Catholic	25.4	340	47.9	
Anglican	9.4	126	44.4	
Muslim	22.1	296	53.7	
Christian	39.6	530	44.0	
Others	3.4	46	37.0	
Marital Status				**0.004**
Single never married	55.8	747	45.8	
Married	20.4	273	40.7	
Living with the man	15.4	206	55.3	
Ever married	8.4	112	54.5	
Migration status				**0.036**
Not migrated	33.8	452	42.9	
Migrated	66.2	886	49.0	
Highest education level				0.176
None	19.0	254	41.3	
Primary	43.6	583	49.4	
Secondary	35.8	479	47.2	
University/Tertiary	1.6	22	40.9	
Kind of work in the mine				0.814
Directly work in the mine	35.5	475	47.4	
Services & others	64.5	863	46.7	
Employer				0.100
Self employed	31.8	426	43.7	
A private individual	61.7	826	48.4	
An organization or company	1.9	25	56.0	
Parents	3.1	41	36.6	
Other (specify)	1.5	20	65.0	
Fairly paid				0.052
Yes	45.4	608	49.8	
No/Don’t know	54.6	730	44.5	
Have savings				0.122
No	41.3	552	49.5	
Yes	58.7	786	45.2	

Belong to saving/investment group				0.570
No	80.7	1,080	47.3	
Yes	19.3	258	45.4	
Number of sexual partners				**0.001**
None	36.0	482	45.0	
One	33.5	448	42.2	
More than one	30.5	408	54.4	
Drink alcohol				**0.000**
No	81.9	1,096	44.6	
Yes	18.1	242	57.4	
Physical violence [after Covid19]				**0.013**
Never experience violence	86.9	1,162	45.6	
Experience violence	13.2	176	55.7	
Sexual violence				**0.001**
Not experienced	90.6	1,212	45.5	
Experienced	9.4	126	61.1	
Transactional sex				**0.000**
No	81.5	1,091	44.4	
Yes	16.6	222	59.9	
Don't know/refused to answer	1.9	25	44.0	
Ever had sex				**0.000**
Yes	82.7	1,338	46.9	
Total	**100.0**	**1,338**		

Bivariate analysis results in Table 1 (columns 4 and 5) show that STI status was significantly associated with age, religion, marital status, migration status, number of lifetime sexual partners, alcohol consumption, experience of physical violence, sexual violence, and transactional sex (p value<0.05). Higher proportions of respondents with STIs were observed among young women age 18 years and above (48%), Muslims (54%), cohabiting (55%), migrants (49%), with more than one partner (54%), consumed alcohol (57%), experienced physical violence (56%), sexual violence (61%), and engaged in transactional sex (60%).

Determinants of STI status

Multivariable analysis involved fitting a logistic regression model to assess the determinants of STI status. All variables with a p-value less than 0.2 were included in the model. The country of study was included owing to its importance for the current study.

Table 2. Adjusted Odds Ratios for Reporting STI among AGYW in the ASM sector

Variables	ORs	95%CI
Country (RC=Uganda)		
Ghana	0.9	0.7 - 1.2
Age(RC=below 18 years)		
Age 18+ years	1.3	1.0 - 1.9
Religion (RC=Catholic)		
Anglican	0.8	0.5 - 1.2
Muslim	1.3	0.9 - 1.9
Christian	0.9	0.7 - 1.2
Others	0.6	0.3 - 1.3
Marital Status (RC=Never married)		
Married	0.8	0.6 - 1.1
Cohabiting or living with the man	1.4*	1.0 - 2.0
Ever married	1.2	0.8 - 1.8
Migration Status (RC=Not migrated)		
Migrated	1.2	1.0 - 1.6
Highest education Level (RC=None)		
Primary	1.4*	1.0 - 2.0
Secondary	1.3	0.9 - 1.8
University/Tertiary	1.1	0.4 - 2.8
Employer (RC=Self-employed)		
A private individual	1.2	0.9 - 1.6
An organization or company	1.8	0.8 - 4.2
Parents	0.9	0.4 - 1.8
Others	2.6	1.0 - 7.0
Number of sexual partners COVID 19 lock down 2019 to 2021 (RC=None)		
One	0.9	0.7 - 1.1
More than 1	1.2	0.9 - 1.6
Do you drink alcohol? (RC=No)		
Yes	1.4*	1.0 - 1.9
Fairly paid (RC=No)		
Yes	1.4**	1.1 - 1.8
Experienced sexual violence (RC=Not experienced)		
Experienced	1.7*	1.1 - 2.6
Experienced physical violence (RC=Not experienced)		
Experienced	1.1	0.7 - 1.6
Transactional sex during pandemic (RC=No)		
Yes	1.7**	1.2 - 2.3
Don't know/refused	1.2	0.5 - 2.7

CI Confidence Interval, RC Reference Category, *p < 0.05- **p < 0.01- ***p < 0.001

STI status was significantly associated with marital status, level of education, alcohol consumption, whether the respondent was fairly paid, experience of sexual violence and participation in transactional sex. The odds of reporting an STI were higher among cohabiting AGYW compared to AGYW who were single (never married) (AOR = 1.4; CI 1.1-2.0); AGYW with primary level of education compared to those with no formal education (AOR = 1.4; CI 1.0-2.0), and those who were fairly paid (AOR 1.4; CI 1.1-1.8). The odds of reporting STIs were also higher among AGYW who drank alcohol (AOR 1.4; CI 1.1-1.9), experienced sexual violence (AOR 1.7; CI 1.1-2.6) and those who engaged in transactional sex (AOR 1.7; CI 1.2-2.3).

Discussion

Nearly half of AGYW working in the ASM sector who had ever has sex (47%) had an STI. This is twice as high as the national prevalence for Uganda of (23 %) and is higher than Ghana's national prevalence (35%) [9, 34]. This high STI prevalence in this population requires urgent attention since the AGYW in mining communities exhibit high levels of poverty, limited rights awareness, limited knowledge on STIs, and access to the requisite health services [17]. This result is in consonance with findings of previous studies that observed a high prevalence of STIs among mining communities in sub Saharan Africa [10-13, 15].

The higher odds of reporting STIs among cohabitating AGYW is attributed to the limited commitment to the relationship by the parties involved. Cohabitation implies that either partner could relate with partners outside the relationship, thereby increasing the likelihood of multiple sexual partnerships and consequently STIs [35]. The higher odds of STIs among AGYW with primary education compared to those with no formal education highlights the need to enforce a minimum of secondary education among young people. Primary level school dropouts often rely on incomplete information and are vulnerable to misinformation. Anecdotal public health reports allude to the fact that persons with no formal education are more open to learning than those with some education.

While multiple sexual partnerships increase the risk of STIs, this risk is heightened in artisanal mining communities where the persons involved rarely practice safer sex [11]. Such relationships often involve transactional sex in contexts where sustained negotiation for safer sex is likely to be limited, especially when it involves poor or economically dependent AGYW [16]. The high prevalence of poverty among mining host communities compels AGYW to engage in transactional sex, which may not only result in STIs but unwanted pregnancies as well. The marginalization of AGYW on the basis of gender, age, poverty and the fact that they work in a context with limited protection and guidance exposes them to sexual exploitation and STIs [1-3, 10, 21]. Although low satisfaction with payment may have been an indicator of low incomes, and increased likelihood for sexual exploitation, it was surprising that the AGYW who were satisfied with their payment in our study, had higher odds of reporting STIs. It is possible that these AGYW exchange sexual favors for cash, being allowed to work, or in exchange for the ore; as has been established in the validation meetings.

Alcohol consumption by AGYW compromises their capacity for rational decision making and physical defense. Alcohol consumption has been associated with risky sexual behaviors. It's a precursor to sexual violence, unprotected sex and STIs [36-38]. Sexual violence was among the most important determinant of STI status. Being nonconsensual, safer sex through condom use is hardly practiced. Female ASM workers are among the most affected owing to proximity with male ASM workers [25, 39]. In the current study, male ASM workers are not only the majority among AGYW's partners but also the majority among the perpetrators of sexual violence against AGYW.

Limitations of the study

This study has two main limitations. First, STI status was self-reported and not verified since laboratory tests were beyond the scope of the study. Hence, there is a possibility of underreporting owing to social desirability and or poor understanding of the symptoms. This was mitigated by (i) first asking general questions that do not directly relate to STI; and (ii) describing the STI symptoms when asking the questions. Second, since this was a cross sectional study there were no provisions for determining causal relationships.

Conclusions

This study highlights the urgent need to respond to the high prevalence of STIs among AGYW in ASM. The risk factors for STIs identified in the study were unstable or uncommitted relationships in the form of cohabitation, having primary education, engaging in risky behavior such alcohol consumption, multiple sexual partnerships, transactional sex and sexual violence. These constitute multiple and intersecting vulnerabilities. Response to the situation requires both preventive and curative interventions targeting ASM AGYW in particular, ASM male workers and host communities in general. Awareness raising messages should emphasize behavioral change with respect to abstinence from alcohol misuse, abstinence from transactional sex by opting for viable alternative sources of income, promotion of committed relationships, the use of protection, and prevention of sexual violence. Health ministries and key development partners in Ghana and Uganda should partner with other relevant government and non-government stakeholders in designing the interventions which should not only target AGYW, but also ASM male workers. A multi sectoral approach that effectively engages key stakeholders, including mining host communities, is essential given the close interrelations between gender, health and economic aspects of the AGYW's lives.

Acknowledgements: This research was funded by IDRC Women Rise research programme (project no. 110012-001). We are grateful to the adolescent girls and young women in the mining sector who were our respondents, the key informants, data collectors and officers at sub national and national level who supported the research process, and reviewers of this manuscript. The generous support from the IDRC program office is highly appreciated.

References

1. Fritz W, McQuilken J, Collins N, Weldegiorgis F: Global trends in artisanal and small-scale mining (ASM): A review of key numbers and issues: Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF). In.; 2017.
2. Mpagi I, Ssamula NF, Ongode B, Henderson S, Robinah HG: Artisanal gold mining: both a woman's and a man's world. A Uganda case study. Gender & Development 2017, 25(3):471-487.
3. Buss D, Rutherford B, Stewart J, Côté GE, Sebina-Zziwa A, Kibombo R, Hinton J, Lebert J: Gender and artisanal and small-scale mining: implications for formalization. The Extractive Industries and Society 2019, 6(4):1101-1112.
4. Hilson G, Osei L: Tackling youth unemployment in sub-Saharan Africa: Is there a role for artisanal and small-scale mining? Futures 2014, 62:83-94.
5. Barreto M, Schein P, Hinton J, Hruschka F: Economic Contributions of Artisanal and Small-Scale Mining in Rwanda: Tin, Tantalum, and Tungsten. Pact, DFID and EARF 2018.
6. McQuilken J, Hilson G: Artisanal and small-scale gold mining in Ghana. Evidence to inform an 'action dialogue' IIED, London 2016.
7. Osei L, Yeboah T, Kumi E, Antoh EF: Government's ban on Artisanal and Small-Scale Mining, youth livelihoods and imagined futures in Ghana. Resources Policy 2021, 71:102008.
8. WHO: Sexually transmitted infections. In: WHO. Edited by WHO: WHO; 2023.
9. UBOS and ICF: Uganda Demographic and Health Survey 2016. In. Kampala, Uganda and Rockville, Maryland, USA: UBOS and ICF; 2018.
10. Murewanhema G, Musuka G, Gwinji PT, Dzobo M, Dzinamarira T: Sexually transmitted infections among artisanal miners in Zimbabwe: An urgent need for enhanced preventive measures. Public Health in Practice 2022, 4.
11. Lwelamira J, Sarwatt A, Masumbuko I: Knowledge and practices related to HIV/AIDS infection among youths in mining areas of Central Tanzania: A case of Londoni and Winza Mining Areas. Asian Journal of Medical Sciences 2012, 4(4):134-144.
12. Mattew N, Rumbidzai C, Dung J, Wendy N, Stephen EM: Exploring enablers of sexually transmitted infections among illegal gold miners in the midlands region of Zimbabwe. International Journal of Reproduction, Contraception, Obstetrics and Gynecology 2021, 10(4):1321-1327.
13. Wilches-Gutierrez J, Documet P: What is known about sexual and reproductive health in Latin American and Caribbean mining contexts? A systematic scoping review. Public health reviews 2018, 39:1-13.
14. Clift S, Anemona A, Watson-Jones D, Kanga Z, Ndeki L, Changalucha J, Gavyole A, Ross D: Variations of HIV and STI prevalences within communities neighbouring new

goldmines in Tanzania: importance for intervention design. Sexually transmitted infections 2003, 79(4):307-312.
15. Corno L, De Walque D: Mines, migration and HIV/AIDS in Southern Africa. Journal of African Economies 2012, 21(3):465-498.
16. Desmond N, Allen CF, Clift S, Justine B, Mzugu J, Plummer ML, Watson-Jones D, Ross DA: A typology of groups at risk of HIV/STI in a gold mining town in north-western Tanzania. Social Science & Medicine 2005, 60(8):1739-1749.
17. Pedrajas M, Choritz S: Getting to the last mile in least developed countries. New York: UNDP 2016.
18. Hinton J, Veiga MM, Beinhoff C: Women and artisanal mining: Gender roles and the road ahead. The socio-economic impacts of artisanal and small-scale mining in developing countries 2003:149-188.
19. Ibrahim AF, Rutherford B, Buss D: Gendered "choices" in Sierra Leone: women in artisanal mining in Tonkolili District. In: The (In) Visibility of Women and Mining. edn.: Routledge; 2022: 154-173.
20. Muheki S, Geenen S: Women in (and out of) artisanal mining: apposing policy and women's lived experiences in Lujinji B and Wakayiba mines, Mubende, Uganda. Discussion paper/University of Antwerp Institute of Development Policy and Management; Université d'Anvers Institut de politique et de gestion du développement-Antwerp, 2002, currens 2018.
21. Bearinger LH, Sieving RE, Ferguson J, Sharma V: Global perspectives on the sexual and reproductive health of adolescents: patterns, prevention, and potential. The lancet 2007, 369(9568):1220-1231.
22. Dawson AJ, Homer CS: How does the mining industry contribute to sexual and reproductive health in developing countries? A narrative synthesis of current evidence to inform practice. Journal of clinical nursing 2013, 22(23-24):3597-3609.
23. D'Souza MS, Karkada SN, Somayaji G, Venkatesaperumal R: Women's well-being and reproductive health in Indian mining community: need for empowerment. Reproductive health 2013, 10(1):1-12.
24. Jenkins K: Women, mining and development: An emerging research agenda. The Extractive Industries and Society 2014, 1(2):329-339.
25. Rustad SA, Østby G, Nordås R: Artisanal mining, conflict, and sexual violence in Eastern DRC. The Extractive Industries and Society 2016, 3(2):475-484.
26. Violence Against Women [http://www.who.int/news-room/fact-sheets/detail/violence-against-women]
27. Xu JJ, Wang N, Lu L, Pu Y, Zhang GL, Wong M, Wu ZL, Zheng XW: HIV and STIs in clients and female sex workers in mining regions of Gejiu City, China. Sexually transmitted diseases 2008:558-565.

28. Zhang G, Wang N, Wong M, Yi P, Xu J, Li B, Ding G, Ma Y, Wang H, Zheng X: HIV-1 and STIs prevalence and risk factors of miners in mining districts of Yunnan, China. Journal of acquired immune deficiency syndromes (1999) 2010, 53(Suppl 1):S54.
29. Leaving no one behind, UNCDP committee for development policy, accessed . [https://sustainabledevelopment.un.org/content/documents/2754713_July_PM_2._Leaving_no_one_behind_Summary_from_UN_Committee_for_Development_Policy.pdf]
30. Parkes J, Datzberger S, Howell C, Knight L, Kasidi J, Kiwanuka T, Nagawa R, Naker D, Devries K: Young people, inequality and violence during the COVID-19 lockdown in Uganda. 2020.
31. Nyakato VN, Kemigisha E, Tuhumwire M, Fisher E: Covid reveals flaws in the protection of girls in Uganda. 2021.
32. Nuwematsiko R, Nabiryo M, Bomboka JB, Nalinya S, Musoke D, Okello D, Wanyenze RK: Unintended socio-economic and health consequences of COVID-19 among slum dwellers in Kampala, Uganda. BMC Public Health 2022, 22:1-13.
33. Yamane T: Statistics: an introductory analysis-3. 1973.
34. Ghana Statistical Service (GSS) GHSG, and ICF International,: Ghana Demographic and Health Survey 2014 In. Rockville, Maryland, USA: GSS, GHS, and ICF International; 2015.
35. Teachman J: Premarital Sex, Premarital Cohabitation, and the Risk of Subsequent Marital Dissolution among Women. Journal of Marriage and Family 2003, 65(2):444-455.
36. Llamosas-Falcón L, Hasan OS, Shuper PA, Rehm J: A systematic review on the impact of alcohol use on sexually transmitted infections. International journal of alcohol and drug research 2023, 11(1):3.
37. Wandera SO, Kwagala B, Ndugga P, Kabagenyi A: Partners' controlling behaviors and intimate partner sexual violence among married women in Uganda. BMC Public Health 2015, 15(1):214.
38. Kwagala B, Wandera SO, Ndugga P, Kabagenyi A: Empowerment, partner's behaviours and intimate partner physical violence among married women in Uganda. BMC Public Health 2013, 13(1):1112.
39. Buss D: Conflict minerals and sexual violence in Central Africa: troubling research. Social Politics: International Studies in Gender, State & Society 2018, 25(4):545-567.