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Experiences of drought, heavy rains, and flooding and linkages with refugee youth sexual and reproductive health in a humanitarian setting in Uganda: qualitative insights

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ABSTRACT

Climate-related extreme weather events (EWE) exacerbate resource insecurities that, in turn, shape sexual and reproductive health (SRH). Refugee settlements face increased EWE exposure yet are understudied in EWE research. We explored experiences of climate change and SRH among refugee youth aged 16–24 in Bidi Bidi Refugee Settlement, Uganda. This qualitative study involved walk-along individual youth interviews and key informant (KI) service provider interviews. We conducted thematic analysis informed by the resource scarcity framework, which explores socioeconomic and ecological risks for resource insecurity. Participants ($N=44$) included youth ($n=32$; mean age: 20.0, standard deviation [SD]: 2.4; 50% men, 50% women) and KI ($n=12$; mean age: 37.0, SD: 5.8; 75% men, 25% women). Findings illustrate how EWE shape SRH outcomes for refugee young women: (1) climate change contributes to water scarcity, extreme heat, and changing rain patterns; (2) drought contributes to resource scarcities (e.g. food, water) that increase sexual and gender-based violence (SGBV) risks, transactional sex, and menstruation insecurity and (3) heavy rains/flooding contribute to resource scarcities that increase SGBV risks, and sanitation insecurity exacerbates menstruation insecurity. Findings highlight how EWE-related resource insecurities are associated with poor SRH (STI/HIV acquisition risks, unplanned pregnancy, SGBV) and should be addressed in multi-level climate-informed humanitarian programmes.

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1. Background

A growing body of research is recognising the interconnectedness between climate change and extreme weather events, such as drought and flooding, with worse sexual and reproductive health

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(SRH) outcomes (Orievulu & Iwuji, 2022; van Daalen et al., 2021). Climate change and related extreme weather events (EWE) are associated with increased sexual and gender-based violence (SGBV) and poorer HIV prevention and care outcomes (Epstein et al., 2020; K. van Daalen et al., 2020) through multi-level impacts on health infrastructure, poverty, community displacement, relationship stressors and mental health (Logie, Toccalino, MacKenzie, et al., 2024; C. H. Logie & MacNeil, 2025). Other hypothesised pathways from climate-related EWE to worse HIV outcomes include migration and food insecurity (Lieber et al., 2021). These mechanistic pathways from EWE to SRH are complex and understudied, particularly in humanitarian settings – which often face high levels of exposure to EWE such as drought, extreme heat and heavy rain compared to national averages (Fransen et al., 2024). Refugee youth experiences of SRH in the context of climate change and EWE are understudied in climate-affected regions (Nsubuga & Rautenbach, 2018) such as Uganda, which is also Africa's largest refugee-hosting nation (UNHCR, 2024).

Youth in Uganda – particularly adolescent girls and young women – may experience challenges to realising optimal SRH. Adolescent girls and young women in Uganda experience SRH disparities, including more than double the HIV prevalence compared to adolescent boys and young men counterparts (2.2% vs. 0.9%) (UNAIDS, 2018), widespread sexual and gender-based violence (SGBV) (Goessmann et al., 2020; Merrill et al., 2023), and early, unplanned pregnancy whereby nearly one-quarter (25%) of Ugandan women have given birth by the time they are aged 18 (UNFPA, 2021). SGBV risks are also reported among refugee young women in humanitarian settings in Uganda, including in relation to needing to walk farther to collect water and firewood (Logie et al., 2021, 2022) and navigating gendered role expectations regarding food and water (e.g. cooking, cleaning) during times of resource scarcity (Logie et al., 2021). These and other SRH challenges experienced by young refugees in Uganda are understudied in relation to climate change and EWE.

This is a significant knowledge gap, as climate change and related EWE in Uganda are well documented and include increasing variability in rainfall, contributing to droughts and floods, and temperature changes that lead to drier conditions (Nsubuga & Rautenbach, 2018). Droughts contribute to water scarcity and low agricultural production, which, in turn, increase economic and food insecurity (Nuwagira & Yasin, 2022). Some parts of Uganda are also expected to have increased flooding and periods of extreme rainfall (Nsubuga & Rautenbach, 2018; Nuwagira & Yasin, 2022). Flooding can lead to destruction of infrastructure required for sanitation, agriculture, roads, and shelter (Nuwagira & Yasin, 2022). Both droughts and flooding are linked with poorer SRH outcomes, especially relating to higher SGBV and HIV vulnerabilities. For instance, drought was linked with increased physical and sexual violence in a 19-country study across sub-Saharan Africa, and these effects were worse for adolescent girls and unemployed women (Epstein et al., 2020). Droughts are also associated with increased HIV prevalence in women particularly through hypothesised pathways that include violence, migration and transactional sex (Austin et al., 2021; Berndt & Austin, 2021; Gwatarisa & Manderson, 2012; Low et al., 2019; Orievulu & Iwuji, 2022). Flooding has been linked to reduced HIV care access via health infrastructure destruction and closures (Anthonj et al., 2015; Khawcharoenporn et al., 2013; Logie, Toccalino, MacKenzie, et al., 2024) and may be followed by increased GBV, potentially influenced by displacement, incoming migrant men and mental health challenges (Bradley et al., 2023; Madhuri, 2016; Rashid & Michaud, 2000; Singh et al., 2018; Sohrabizadeh, 2016). The lived experiences of refugee youth in Uganda, climate-related EWE and a range of SRH issues remain understudied.

Climate change, however, may have detrimental effects on youth SRH in refugee settlements, which are particularly vulnerable to EWE. Fransen et al. (2024) reviewed the 20 largest refugee settlements worldwide and found them to experience higher exposure to extreme weather than the rest of the country. In Ugandan settlements, they found refugee settlements experienced greater exposure to high temperatures and higher rates of rainfall compared to the rest of Uganda (Fransen et al., 2024). EWE can be especially detrimental to refugee settlements due to pre-existing social and structural vulnerabilities, including economic, employment, food and water insecurity (Sabates-

Wheeler, 2019). Refugee settlements may also have fragile health infrastructure, which is more prone to damage from EWE, such as flooding (Ahmed et al., 2021; Fransen et al., 2024). Youth within refugee settlements may also be particularly vulnerable to climate change impacts that could result in leaving school early, malnutrition, poorer mental health (e.g. climate anxiety) and sexual exploitation (Burns & Mutunga, 2024; Parsons et al., 2024).

Given the exposure to, and impact of, climate change and EWE in refugee settlements, it is essential to understand the experiences of refugee youth focussed on EWE and SRH (Fransen et al., 2024). Existing literature suggests youth experience disproportionate harms of climate change and are more likely to be impacted by infrastructure damage, resource insecurity, and poor health (Mugeere et al., 2024). There are several gaps in existing literature, however, including limited attention to the impacts of EWE on refugee youth for a diversity of SRH outcomes (Burns & Mutunga, 2024; Fransen et al., 2024). Despite the particular vulnerability of refugee adolescent girls and young women to worse SRH due to gender and age-based marginalisation, they are understudied in climate change and SRH research (Burns & Mutunga, 2024; Mugeere et al., 2024). To address these critical knowledge gaps, we conducted a qualitative study to explore the impact of climate change and related EWE on SRH among refugee youth in Bidi Bidi Refugee Settlement, Uganda.

2. Methods

This article reports on the qualitative phase of the community-based Woli Na Kelan ('Planetary health') study that involved interviews with key informants and refugee youth in Bidi Bidi, Uganda, conducted between September 2022 and August 2023. The overall aim was to explore linkages between social, health and environmental wellbeing, while identifying protective factors, coping strategies and priorities. Specifically, this manuscript focuses on qualitative findings regarding SRH.

We obtained ethical approval for this study from the Research Ethics Board at the University of Toronto, the Mildmay Uganda Research Ethics Committee and the Uganda National Council for Science and Technology. All participants were given details about the study's purpose and activities prior to enrolment and provided written informed consent.

Our research was guided by the resource scarcity framework that conceptualises shared social, economic, and ecological vulnerabilities to water and food insecurity, coping strategies and impacts on wellbeing (Wutich & Brewis, 2014). Research materials (e.g. protocols, interview guides) were informed by the resource scarcity framework (Wutich & Brewis, 2014) and its adaptation for refugee youth in Uganda (Logie et al., 2021). Specifically, we were interested in examining experiences of structural drivers (ecological, socioeconomic and social), resource insecurities (e.g. water, food) and SRH (e.g. SGBV, stigma, mental health, violence).

2.1. Setting and participants

Our study was conducted in Bidi Bidi Refugee Settlement, located in northeast Uganda near the South Sudan border. As of August 2024, there were over 200,000 refugees living in Bidi Bidi – the second largest settlement in Uganda – and almost half were between the ages of 12 and 35 years (UNHCR, 2024). This study was a collaboration between an academic institute and the Uganda Refugee Disaster and Management Council (URDMC), a local community-based agency conducting livelihood programmes with refugees in Bidi Bidi.

One-on-one interviews were conducted with key informants ($n = 12$) from local non-governmental organisations (e.g. water security-focussed), international non-governmental organisations (e.g. refugee-focussed) and local government officials (e.g. refugee wellbeing-focussed). Key informants were purposively selected by the research team to provide diverse perspectives.

One-on-one interviews were conducted with refugee youth ($n = 32$; 16 women and 16 men). Eligibility criteria for youth participants included being aged 16–24 years, residing in Zone 3 or 4 in

Bidi Bidi (where URDMC works), being able to speak English, Bari or Juba Arabic, and having experienced either resource (food, water or sanitation) insecurity or an extreme weather event in the past 14 days before the interview. Refugee youth participants were recruited through word of mouth using purposive sampling by peer navigators, who were employed by URDMC and were themselves refugees aged 20–30 years, living in Bidi Bidi, and fluent in English, Bari and/or Juba Arabic.

2.2. Data collection

Interviews with key informants were conducted by two senior URDMC research staff, who received extensive qualitative methods training. The URDMC research staff facilitated the interviews using a semi-structured interview guide that was developed collaboratively by the team comprised of academics, local community agencies, the ministry of health and URDMC. The interview guide was pilot-tested locally, and feedback was incorporated to ensure clarity and contextual relevance. The interview guide included questions on how changes in weather and EWE impacted the health and wellbeing of refugee youth in Bidi Bidi, and how changes in access to food, water, sanitation and fuel/firewood impacted the health and wellbeing of refugee youth in Bidi Bidi, coping mechanisms and recommendations for future change. Demographics, including gender, highest level of education, role within the community and number of years worked with refugee youth and in Bidi Bidi, were also collected using a paper-based survey.

Interviews with refugee youth were conducted by two Research Assistants from URDMC (one man and one woman), who also received extensive training on qualitative interviews from research staff at the University of Toronto. A semi-structured interview guide was developed collaboratively between academic and community-based partners and was piloted locally. During each one-on-one interview, the refugee youth were asked to take the Research Assistant to one to three places where they access food, water and/or sanitation facilities. At each place, the participant was given a tablet to take photos of the place. After taking the photos, the Research Assistant and participant sat in a quiet, private space to conduct the interview. This type of interview reflects ‘walk-along’ interview and ‘go-along’ methodological approaches that aim to provide a rich understanding of lived experiences in a target environment, including micro-scale environmental and contextual factors (Carpiano, 2009; Kusenbach, 2003). The interview guide included questions on why they chose each place, how the season and weather influenced their experience of each place, how each place and the weather-related effects impacted their health and how each place could be made better. Demographics, including gender, age, highest level of education, and where they access water, food and a toilet, were also collected using a paper-based survey. All interviews lasted between 1 and 2 hours were recorded and transcribed verbatim by URDMC staff. The interviews were subsequently translated from Bari/Juba Arabic into English by trained and experienced translators for data analysis.

2.3. Data analysis

Demographics of key informants and refugee youth were summarised using proportions for categorical measures and medians with interquartile range (IQR) or means with standard deviation (SD) for continuous measures, depending on the distribution of the data.

We developed a codebook for the qualitative data using both deductive codes informed by the resource scarcity framework (Logie et al., 2021; Wutich & Brewis, 2014) as well as inductive codes we identified after reviewing the data (e.g. extreme heat). Some examples of the codes developed using the resource scarcity framework include: transactional sex as a coping strategy for food insecurity; insufficient infrastructure contributing to sanitation insecurity; and coping with water insecurity by travelling farther for water. Dedoose software (Dedoose, 2021) was used to code the interview transcripts by a minimum of two trained Research Assistants. Thematic analysis, a

theoretically flexible approach, was used to explore underlying meaning and patterns by the two analysts (coding discrepancies were managed by the first author) through a process of familiarisation with the data, identifying patterns, organising patterns into codes and then themes, and further refining codes and themes into a conceptual map (Attride-Stirling, 2001; Braun & Clarke, 2006). This project also used visual ethnography to document the places shown in the walk-along interviews (Pink 2020). Thematic analysis was used to code photos and their descriptions of EWE and SRH; visual data such as photos facilitate multi-sensory analysis that can evoke emotions and enrich understanding of lived experiences (Chalfen, 2014; Hedenus, 2016; Pink 2020). Participant quotations were presented to illustrate themes, and each quote is identified using a participant identification (ID), along with the youth's age and gender, or KI's gender and employment sector.

3. Results

Participant socio-demographic information for key informants ($n = 12$) is in Table 1 and for youth ($n = 32$) is in Table 2.

We identified the following themes from the participant interviews: (1) climate change contributes to water scarcity and extreme heat; (2) drought contributes to multiple resource scarcities that increase sexual and gender-based violence (SGBV) risks, transactional sex and menstruation management challenges and (3) heavy rains and flooding contribute to multiple resource scarcities that increase SGBV risks and menstruation management challenges. While this study interviewed both young men and young women and asked participants generally about experiences of SRH, the

Table 1. Socio-demographic characteristics of key informant interview participants in Bidi Bidi Refugee Settlement, Uganda ($n = 12$).

Characteristics	Total N (%), or mean (SD)
Total	12 (100)
Age, years	37 (5.8)
Gender	
Man	9 (75.0)
Woman	3 (25.0)
Location	
Yumbe	8 (66.7)
Koboko	1 (8.3)
Bidi Bidi	3 (25.0)
Education level	
Secondary	2 (16.7)
Post-secondary	10 (83.3)
Community role	
Social worker	3 (25.0)
Community leader	2 (16.7)
Healthcare provider	1 (8.3)
Climate education	1 (8.3)
Programme developer	1 (8.3)
Multiple roles*	4 (33.3)
Sector of employment	
Community development	3 (25.0)
Refugee services	5 (41.7)
Water insecurity	1 (8.3)
Food insecurity	3 (25.0)
Years worked with refugee youth	
1–5	8 (66.7)
6–10	3 (25.0)
>10	1 (8.3)
Years worked in Bidi Bidi	
1–5	9 (75.0)
>5	3 (25.0)

Table 2. Socio-demographic characteristics of refugee youth walk-along interview participants key in Bidi Bidi Refugee Settlement, Uganda ($n = 32$).

Characteristics	Total N (%) or mean (S.D)
Total	32 (100)
Age, years	20 (2.4)
Gender	
Cisgender men	16 (50.0)
Cisgender women	16 (50.0)
In school currently	
Yes	23 (71.9)
No	9 (28.1)
Educational attainment (highest level completed)	
Primary school	11 (34.4)
Secondary	21 (65.6)
Employment status	
Not employed: job searching	9 (28.1)
In school, work after school to support family	9 (28.1)
In school: job searching to work after school to support family	12 (37.5)
In school, not job searching	2 (6.3)
Phone accessibility	
Owns a phone	21 (67.7)
Has access to a shared phone	11 (34.4)
Type of toilet used	
Private latrine only	23 (71.9)
Private latrine and outside	5 (15.6)
Private latrine and public (outside, public or community) latrine/toilet	2 (6.3)
Outside only	1 (3.1)
Neighbour's private latrine	1 (3.1)
House type	
Grass thatched house	24 (75)
Temporary (iron sheet roof)	8 (25)
Source of water	
Community tap/tank only	10 (31.3)
Community tap/ tank, well/ bore holes, natural source/ stream	4 (12.5)
Community tap/tank, natural source/ stream	4 (12.5)
Community tap/ tank, well/ bore holes	3 (9.8)
Community tap/ tank, natural source/ stream, wells/ bore holes	3 (9.8)
Natural sources/ stream only	2 (6.3)
Well/ bore holes only	2 (6.3)
Well/ bore holes, natural source/ stream	1 (3.1)
Water pump, natural source/ stream	1 (3.1)
Water pump, wells/ bore holes, community tap/ tank	1 (3.1)
Public truck	1 (3.1)
Distance to water access	
< 2 km	25 (78.1)
≥ 2 km	7 (21.9)
Food source	
Food Distribution Point (FDP) only	11 (34.4)
Garden/private farm and open market/street stalls	6 (18.8)
Garden/private farm and open market/street stalls, FDPs	6 (18.8)
Garden/private farm and FDPs	5 (15.6)
Garden/private farm only	3 (9.4)
Open market/street stalls only	1 (3.1)
Distance to food source	
< 2 km	17 (53.1)
≥ 2 km	15 (46.9)
Number of meals per day	
1	25 (78.1)
2	7 (21.9)

results primarily focussed on the SRH outcomes experienced by young women. Based on these findings, we developed a conceptual framework of pathways from drought and flooding to SRH outcomes, which summarises our results (Figure 1).

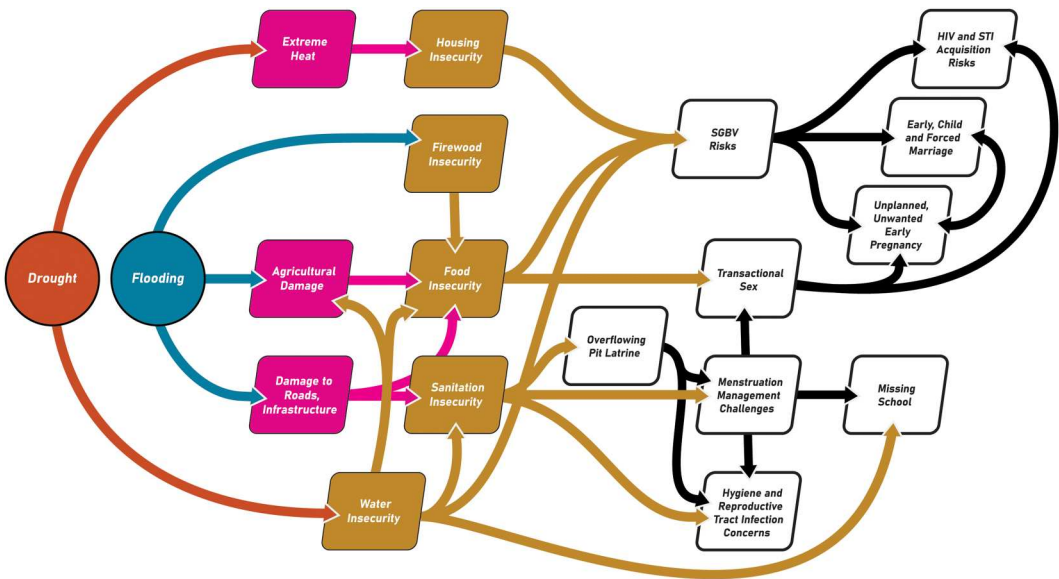


Figure 1. Pathways from drought and flooding to sexual and reproductive health outcomes among refugee youth in Bidi Bidi Refugee Settlement, Uganda.

3.1. Climate change contributes to water scarcity, extreme heat, and changing rain patterns

Both key informant and refugee youth participants noted the impacts of climate change on weather and temperature, particularly noting how climate change contributes to water scarcity, extreme heat and altered rain patterns. For instance, a key informant explained: ‘the global warming affects the water supply ... some of the wells with the refugee community are drying and the aqua levels are reducing’ (man, KI-4, water insecurity sector). A young woman described the impact of weather changes on their water supply: ‘during [the] dry season, you can see crops dry up because there is a shortage of water. People will have a shortage of water because ... these streams are seasonal, they are not permanent’ (young woman, age 19, ID 03-01-05). This was reiterated by another key informant who described how refugees would need to wait with jerricans during dry season for water: ‘When you are to go to the settlement during dry season and see the number of jerricans lining up at a water point, then that is when you will realise that the impact of this climate change is real’ (man, KI-10, food insecurity sector).

During periods of drought, participants also described increased temperatures. One young woman reported, ‘sometimes because the rain just comes ... once in a month, we just experience extreme heat caused by too much sunshine’ (young woman, age 19, ID 04-01-07). A key informant also described the impact of both extreme heat and water scarcity:

Dry season, sometimes the level of the water goes down – now you find water becomes a problem. Sometimes they will pump little water which cannot supply the whole population, so you find when it comes to dry season it is very hard for the refugees plus even the host community to get water. The climate was very hot: you find that you need to sit under a shade. (woman, KI-7, refugee sector)

Another key informant described changes in usual rain patterns: ‘we used to receive rains at the beginning of the season like around March but nowadays its very unpredictable, you can’t tell when the rains are coming’ (man, KI-2, refugee sector). A young man described the sudden, heavy rains and flash flooding:

At the food distribution point, when you go, sometimes the weather will change and after receiving your food, you find that it rains heavily and all your food that you have received will get wet or even be washed away by the heavy rainfall. (young man, age 18, ID 03-02-06)

These rainfall changes harm crops: ‘People were planting their crops; it was raining heavily. Floods occur, the crops were washed away by too much rainfall’ (young man, age 20, ID 03-02-02). A key informant described the seasonal changes in rainfall timing and quantity, which harmed agriculture:

June used to be the time there would be no rain completely, but this year there was rain in June especially in Yumbe. So most of the farmers were complaining cassava had already started rotting when the water was too much. (woman, KI-9, community development sector)

3.2. Drought contributes to multiple resource scarcities that increase sexual and gender-based violence risks, transactional sex, and menstruation management challenges

Participants identified that during drought, multiple forms of resource scarcity worsened, including food, water, sanitation and housing insecurities. These drought-related resource insecurities further exacerbated several SRH outcomes, including increased sexual and gender-based violence exposure (SGBV) and transactional sex engagement, which, in turn, increased risks for unplanned pregnancy, HIV, sexually transmitted infections and menstruation management challenges.

3.2.1. Drought-related food insecurity increases risks for sexual and gender-based violence

Drought was described as harming crops and agriculture, in turn exacerbating food insecurity. A key informant explained: ‘people here rely on agriculture, so prolonged drought means crops will not grow or will not have good harvest so they may be food insecure’ (man, KI-4, water insecurity sector). A young man shared a photo ([Figure 2](#)) of his crops during the rainy season, contrasting this with the dry season:

In this garden, normally during the rainy season, that’s when I do cultivation and at least get some food that could at least sustain my farming. But in dry season, it is a little bit hard to do farming here. So, when it’s dry season, I normally face difficulties in terms of food. (young man, age 21, ID 04-02-04)

The effects of drought and extreme heat were also discussed in relation to increased unemployment and subsequent reliance on food distribution programmes ([Figure 3](#)): ‘When it is too hot, getting food is hard, there is no *leja leja* [casual labour] for us to get some money to buy other things at home, so we end up waiting for food from the distribution point. The crops dry, the cassava dries’ (young woman, age 22, ID 04-01-03). Yet food rations were cut, leading to widespread food insecurity: ‘I must say that in Bidi Bidi we are food insecure whether adult, or a child or adolescent we are food insecure therefore most of the refugees survive on one meal a day; for example, just look at the food ration’ (man, KI-12, refugee sector). Food ration cuts also increased household conflicts and violence, as detailed by a young man:

In the dry season of course, we used to get a food ration, and it was cut. The food we are getting is not enough. When [my friend] came home, he finds there’s nothing at home. Now the wife starts to quarrel. You see if he is not eating, he will not be happy, he will find a lot of challenges. That is where violence occurs from. (young man, age 24, ID 03-02-04)

Early, forced and child marriage was another form of SGBV discussed in relation to food security. A young woman described the pressure from family to leave school and get married in order to ensure access to food and other resources:

Others are getting married to the natives [Ugandans], and some of the girls have dropped out of school ... I am in senior one and I feel like I should study and I don’t know. Like, I have three sisters. For them, they think marriage is better ... they are defending themselves in the food shortage. Like, if they ask my stepfather, he will say that ‘right now you are seeing us, we don’t have food at home’. And also if you want food, our stepfather



Figure 2. ‘In this garden, normally during the rainy season, that’s when I do cultivation’ (young man, age 21, ID 04-02-04).

will say to me ... ‘Where will I get money for buying you the basic needs?’ So that made my sisters get married. (young woman, age 19, ID 04-01-07)

A key informant suggested that these early marriages could contribute to the high rates of teenage pregnancy:

Parents who have many children and now the food ration is not enough, it forces these young ones to be pushed off in order to get something in return. Others can end up giving off their children who are not the age of marriage, with the aim that the parents of the other side can give them something ... When you sit down you realise that our teenage pregnancy rate is very high. Those are some of the things we anticipate could be causes of these young girls getting married when you don’t expect them to do so. (woman, KI-8, refugee sexual and reproductive health sector)

3.2.2. Drought-related food insecurity increases transactional sex engagement and unplanned pregnancy

Participants described how adolescent girls and young women may engage in transactional sex during times of food scarcity, which in turn could result in unplanned pregnancy. A young woman described how unplanned pregnancies resulting from transactional sex increased familial food needs among young mothers:

When all my crops have dried, I will feel very sad ... to get something to survive on, some girls end up marrying those people in the host community and also having sex with them so that you get money to buy food. Now you have children. What will they eat if you don’t plan? (young woman, age 24, ID 04-01-01)



Figure 3. 'This is the place where we get our food' (young woman, age 19, ID 03-01-06).

This linkage between food insecurity, transactional sex and teen pregnancy for young women refugees was reinforced by a key informant:

Some of them, because they don't have food in the house, especially the female youths ... end up selling their bodies for money such that they earn living ... after selling their body in order to get what they need, they may end up getting [a] pregnancy which they don't expect, they may even get [a sexually transmitted] disease in due course of the business, that makes it different for the female youth. (man, KI-3, refugee sector)

Transactional sex engagement was also described for meeting household food needs:

There is a girl who was impregnated, she said that they met with the boy at night and she was given two thousand Ugandan shillings and then the girl accepted. But now what can two thousand shillings do? That's only for one day and one meal ... when they interviewed her, she said that the food was not enough at home and sometimes they go hungry without eating so she had to give herself to the boy to get something for the family and that's how she ended up getting pregnant – and these cases are many in the community. (young man, age 18, ID 04-02-08)

At times, young women engaged in transactional sex to use land for growing food:

Some girls they go and ask land from the owners, but you know they are deceived easily. Like when the owner of the garden decides to say that 'maybe I will give you this land, maybe when you decide to sleep with me', so for them they accept and then the owner gives them the garden. In simple terms, the girl gives her body so that she can be given the garden, and some end up getting married since there is no food for them in the settlement. (young man, age 18, 04-02-07)

In addition to transactional sex, household food insecurity could lead to multiple sex partners: ‘you find the person having like three sexual partners because of the social pressures or the food insecurity within the home and the need to live a better life’ (man, KI-5, food insecurity sector). Transactional sex was also discussed as a strategy enacted by young women to meet school and menstruation management needs:

They are looking for favours from men who can give them some money ... to be able to go to school and afford some of the few basic items for themselves like sanitary pads, also maybe the books and pens to keep you at least in school. (woman, KI-9, community development sector)

3.2.3. Drought-related water insecurity increases risks for sexual and gender-based violence and education disruptions

During drought and the dry season, nearby water was limited and youth – primarily girls and young women – had to travel far to collect water. As a young woman described:

Sometimes we can go for almost two to three weeks without water coming, it will lead us to suffer much whereby we shall go and fetch water in Zone 4, which is very far for us ... if you are going to Zone 4 and you start moving from here at around two in the afternoon, you will be back at around eight to nine or even ten in the night. (young woman, age 18, ID 03-01-08)

This increased distance meant often having to travel at night to access water, which, in turn, increases SGBV risks. As a key informant described: ‘it’s bad because it’s very far ... sometimes people end up fetching water at night, like during dry season, so it’s very risky for a girl to go there’ (woman, KI-7, refugee sector). This was corroborated by a young man:

The cases of raping our girls increases more, especially in the dry season, because they move long distances. Imagine you come from school at 5pm, when you reach home, you pick jerricans to go and look for water, you walk for 6–7 kilometers, and you reach there. Then you have to wait for other people to fetch and then you also fetch, you come back at around 7pm, and this puts you at risk of being raped, so it is very hard. (young man, age 24, ID 04-02-01)

This was reflected in [Figure 4](#), taken by a young woman who described: ‘we come at around one bringing the jerricans to the line, so if you come at around eight in the evening these boys will start raping us the girls, they rape us’ (young woman, age 17, ID 03-01-08).

Rape in turn was discussed as a risk factor for adolescent pregnancy, and acquiring HIV and other sexually transmitted infections (STIs):

I have a friend of mine, she came to get water from here at around 8pm because there is no water at home and she was raped at this place ... she is pregnant and HIV positive also ... they (local leaders) were saying that this place has to be left, but we cannot leave this place because this is the place where we are getting water from. (young woman, age 22, ID 03-01-02)

Having to travel farther for water especially impacted young women attending school, putting them at increased risk for SGBV. One young woman described, ‘at nighttime, you find a lot of youth ... because they come from school in the late hours ... and some of them (boys) are always here waiting for girls. I think some of these youths are the ones raping our friends’ (young woman, age 23, ID 03-01-03). To avoid travelling at night to collect water, some young women and girls end up missing school or dropping out of school to collect water:

[Youth are] used by the families to go and fetch water which is sometimes not going well with their education, especially the girl child. When a girl child is prepared to go to class, before she goes she is supposed to go and fetch water, and the distance where the home is to the water source is again a problem. Coming back you are supposed to wash utensils, serve the family – then when will you reach class? (man, KI-1, community development sector)

Other key informants emphasised that the cultural expectation for young girls to collect water for the family meant their education came second:



Figure 4. ‘We come at around one bringing the jerricans to the line, so if you come at around eight in the evening these boys will start raping us the girls, they rape us.’ (young woman, age 17, ID 03-01-08).

Water scarcity affects the female child more than the male child in our African culture. Most of the chores like collecting water is an activity that is done by women or girls ... it means that in drought water is not easily available, if this persists and some of the sources are dry girls will be expected to move far places to get water for usage at home so that translates to even depriving them time for reporting early to school. Others even do drop out because they are going to look for water. (man, KI-4, water insecurity sector)

In addition to the increased distance to water during drought, there may be long lines at collection points. Participants described how being away from home for a prolonged period could exacerbate intimate partner violence (IPV), abusive or aggressive behaviours within a romantic relationship. A KI described mistrust and IPV resulting from extended time being spent collecting water: ‘when you go [collect water] you take a lot of time: that is where we have domestic violence outbreaks ... lines are too long, especially during dry season, and cases of fights easily breakout’ (man, KI-6, community development sector). IPV was also exacerbated during water scarcity; a young man reported:

Water is causing domestic violence in this way. You may find that the parent, the husband, the owner of the family, may go to the market, go and spend some time, leisure there, reaching back home. He may find that there is nothing like water at home. Then he will decide to quarrel with the wife ... this will cause violence, and this is happening in the settlement. (young man, age 21, ID 03-02-03)

3.2.4. Drought-related sanitation insecurity leads to hygiene and menstruation management challenges

In the drought and dry season, participants described insufficient water to meet hygiene requirements, including menstruation management. Such hygiene challenges were shared in a photo by a young man (Figure 5) who described: ‘In dry season, this water is not there, things are hard. For us, we can just stay for two days, one day without bathing’ (young man, age 18, ID 03-02-07).

Several of the young women described the challenges they faced due to being unable to bathe while menstruating during times of water scarcity:

We as girls, if you don’t bathe during your menstruation period – you want to bathe, but there is no water – you will not even feel good. Because if you want to go to public places, like you want to go to school and you didn’t bathe ... you walk for long distances to access water in case it is not flowing at this tap. (young woman, age 17, ID 03-01-08)

This young woman’s narrative highlights the frequency of skipping school when menstruating due to sanitation insecurity, and instead needing to travel in search of water. Another young woman reiterated this challenge:

We walk long distances and pick water from there ... if I am in my menstruation and water is not there and I want to go to school, because of lack of water, I will not go, because you can’t go to public places when you are even in your menstruation. At least I will postpone school, I will stay home and look for a way I can get two jerricans. (young woman, age 18, ID 04-01-05)



Figure 5. ‘In dry season, this water is not there, things are hard.’ (young man, age 18, ID 03-02-07).

Lack of water was raised as a specific concern for young women's menstruation management and risks for reproductive infections:

Menstrual hygiene management – it is challenge, because water is life. Without water you can't do anything. Somebody will say 'I rather have water in the house even though I don't have food' because we all know water is life. So when you take it to the side of menstrual hygiene, I really say it has a very big impact, why? The hygienic part you will feel like things are not okay, you need to clean, [it can] expose them to infection. (woman, KI-08, refugee sexual and reproductive health sector)

During periods of water scarcity, several women described using lower quality water to bathe and developing rashes:

You boil the water for some minutes, then you use it for bathing, because you cannot get this skin rash like scabies. Because when you use the water like this, it will affect you. Because you want to wash your body, you want to also squat down and wash your vagina, then you just get that water. You may not know that water is containing germs, it will cause for you some diseases in your body. (young woman, age 19, ID 03-01-05)

3.2.5. Drought-related extreme heat causes housing insecurity and subsequent violence and security concerns

During drought, participants noted extreme heat that can impact sleeping practices in ways that increase security and sexual violence concerns.

A participant described security and theft concerns due to keeping houses open to manage extreme heat:

Since it is very hot at night we don't close our houses, in the settlement here many people don't close their houses during dry season at night so these thieves take advantage- as you are sleeping, they will come and take your things. (young man, age 20, ID 03-02-02)

This practice could also increase sexual violence risks for girls and women:

Many leave their houses open at night ... it's not safe for girls because these boys who move around, maybe from the disco, can rape them and this happened many times in the settlement – girls being raped – you hear the following day that there was a girl who was raped. (young man, age 24, ID 03-02-04)

Others described risks of sleeping outdoors to manage heat, alongside the ways in which extreme heat presents challenges for fetching food and water.

When it is too hot, getting food is hard, getting water in the settlement is also very difficult, we move long distances looking for water, that is when the streams dry completely, and the water at the taps is not reliable ... At night you can't even stay in the house, because it is very hot, so end up sleeping outside like up to 3AM, that is when you go inside the house, and that is very risky – or you don't close the door and the windows. (young woman, age 22, ID 04-01-03)

3.3 . Heavy rains and flooding contribute to multiple resource scarcities that increase sexual and gender-based violence risks and menstruation management challenges

Heavy rains and floods contributed to food insecurity and firewood insecurity that were both linked to increased SGBV risks, and sanitation insecurity that presented hygiene and menstruation management challenges.

3.3.1. Heavy rain and flood-related food insecurity increases risks for sexual and gender-based violence

Participants identified two pathways from heavy rains and floods to food insecurity: agricultural damage and infrastructure damage. First, participants discussed how agriculture was impacted by heavy rains. A young woman shared a photo of her crops ([Figure 6](#)) and described:



Figure 6. ‘When there is too much flooding our crops get rotten’ (young woman, age 17, ID 03-01-07).

When there is too much flooding our crops, for example, cassava, gets rotten because of too much water ... it becomes very difficult to get food, there is too much hunger, feeding becomes very difficult at home. Sometimes you can sleep without eating. (young woman, age 17, 03-01-07)

A key informant suggested that low crop yields are linked to SGBV: ‘the cases of GBV, basically they come where there are crises, crises can come at time when there is excessive rainfall where you don’t receive yields’ (man, KI-11, food insecurity sector). Another reinforced how food insecurity could exacerbate IPV in male-dominated households: ‘if you don’t have food and you are head of a family ... your wife is asking for food, children are crying. As an adult you become aggressive, amounting to gender-based violence’ (man, KI-12, refugee sector).

The second pathway from heavy rains and flooding to food insecurity was infrastructure damage to roads and houses. Food distribution was disrupted by heavy rains, as was access to school:

These heavy rains have been affecting them [roads], mostly during food distribution. The roads have become very bad and then some areas where there are valleys we put bridges, so when it rains it becomes so hard for them to cross to access some of the services. The same for some of the youths who are in school; in the morning you wake up you find it has rained heavily and you need to cross to school which is the other side. (man, KI-02, refugee sector)

Others reiterated disruptions to food ration delivery due to heavy rains: ‘the rainfall, last month and this month it has rained really very heavily – even you see now the roads are not all that good. World Food Programme was trying to give some support ... vehicles got stuck because of too much rain’ (woman, KI-7, refugee sector). A young woman also described how heavy rains

contributed to difficulty collecting food rations or leading to rations spoiling: ‘if it is rainy season, at times here it rains heavily. It will drizzle with too much wind ... other people miss getting their food, other people take food home when it is wet, so that means your ration will get spoilt’ (young woman, age 23, ID 03-01-04).

3.3.2. Firewood insecurity increased risks for sexual and gender-based violence

Participant narratives described how accessing dry firewood during the rainy season was challenging, requiring young women to travel farther for firewood and exacerbating their risk of SGBV during resource collection. With the heavy rains come an overgrowth of bush and tall grass that must be crossed to obtain firewood, as a KI described:

During the rainy season, it’s very hard to get firewood, the place is bushy, sometimes you have to go very far ... women fear because it might be in a bushy area you cannot see who is coming there, who is there. (woman, KI-7, refugee sector)

Other participants described how the overgrowth put young girls at risk for sexual violence: ‘like in this place also our sisters are suffering, like when they go and get firewood in the bush there, these boys can rape them’ (young man, age 17, ID 04-02-06). Participants described instances of young women being raped while isolated and collecting firewood:

The security here is not well. Two weeks ago, they raped also a certain girl. The girl was 14 years old. They raped that girl and there was heavy rain that day. The aunt of that girl sent her to collect firewood, then, on her way, these cattle keepers here ... when they saw the girl, they raped her ... the parents tried to ask her what happened. Because of fear that girl kept quiet. (young woman, age 18, ID 04-01-05)

Participants noted that they may have to travel far out of the settlement into the host community to access firewood during the rainy season. One young woman described that young refugees are pressured to engage in transactional sex in exchange for firewood:

We as the girls, if you want to go and fetch firewood, you also pay money to fetch firewood to the host community people. If you cannot pay money, then they will ask for sex from you, so you have to choose. (young woman, age 17, ID 03-01-08)

This quotation highlights how economic insecurity and firewood insecurity intersect, leaving young women vulnerable to transactional sex in order to meet their resource needs. If young women are not able to pay for firewood, nor gain permission from the host community to take it, some may resort to stealing, which could lead to the host community members sexually assaulting them as a form of retribution:

You move long distances to get firewood and you are moving across the settlement. When you cross you know that you are going to a host community and this area is protected. Sometimes the landlord may say, ‘I don’t want refugees here, this is my land, this is my tree.’ So what will you do? You have to either seek for permission or you steal. [If you steal] sometimes you are caught and beaten ... they can rape them; they can abuse them sexually, they can try to harass them sexually. Yes, this is the host [Ugandan community] doing all this, maybe to payback. (man, KI-1, community development sector)

Several participants described firewood collection as a time when young women are vulnerable to sexual assault, which is exacerbated by having to travel farther for firewood during heavy rain and floods.

3.3.3. Flooding and heavy rain-related sanitation insecurity leads to hygiene and menstruation management challenges

Many participants described the destruction of latrines during times of heavy rain. Key informants discussed how most of the latrines in the settlement are not in good condition and are at risk of collapsing during heavy rains: ‘the issue of heavy rains: most of the latrines are collapsing, you find in the settlement here most of the latrines are not in good condition honestly’ (woman, KI-07, refugee sector). A young man took a photo of a latrine ([Figure 7](#)) and described challenges



Figure 7. ‘The bad thing is when it is rainy season, the latrine gets filled with water.’ (young man, age 21, 04-02-02).

in the rainy season: ‘the bad thing is when it is rainy season, the latrine gets filled with water’ (young man, age 21, 04-02-02).

Several young women described hygiene concerns in heavy rains. For instance, one participant described contaminated water exposure concerns due to flooded latrines: ‘during rainy season ... the latrine will flood, and when you do defecate in the latrine, the faeces will bounce back on your buttocks and sometimes your private parts’ (young woman, age 18, ID 04-01-06). Participants referred to general health risks (e.g. ‘diseases’, ‘sickness’) affecting girls due to unhygienic toilets: ‘as you can see the toilet is now full and it is spreading diseases commonly to the girls ... we need change otherwise all the girls will get the same sickness which will affect our private parts’ (young woman, age 17, ID 04-01-08).

Young women described feeling unsafe while trying to use existing sanitation and bathing facilities, which were more limited during the rainy season. While participants explained that it was common for young men to bathe in streams during the rainy season, several explained that young women would not feel safe doing so because of SGBV risks. One young woman described:

We don’t have a bathing shelter. If you decide to bathe from here, other people will see your nakedness, and this can attract those bad people to do something bad to you. A boy can see you and admire you, so they can come and rape you. Or if someone takes your photo on the smartphone and shares with the whole village, that’s why I can’t bathe from here. But boys come and bathe from here. For them, they don’t fear. (young woman, age 22, ID 04-01-03)

Young women also described being fearful using community pit latrines at night due to fear of rape: ‘in the night hours, I will fear to go there when there is no light because the latrine is a little far so, I fear if someone is to come and rape me’ (young woman, age 17, ID 03-01-07). Participants described bathing less or changing sanitary pads less frequently to cope with these challenges, which contributed to developing infections. One young woman explained:

I don’t feel comfortable ... because I did not take a shower, I changed the sanitary pads minus bathing ... Sometimes I feel my body itching, and if I find my body is itching sometimes, I will go to the health centres and get medications. (young woman, age 24, ID 04-01-01)

Challenges were also raised when trying to dry menstrual products during heavy rains:

When it rains continuously, without stopping, and I am in my period, if I wash my pads and put them to dry from inside, it will not dry, it will smell very badly so when I put on, I will get itches on my private parts. I can wash and iron it to dry very fast or use my towel to dry it. If I fail to do that, I will cut clothes and use them as pads. (young woman, age 17, ID 03-01-07)

4. Discussion

This qualitative study with refugee youth and key informants in Bidi Bidi Refugee Settlement revealed that climate change contributes to water scarcity, unpredictable rain patterns, and extreme heat, which, in turn, shape a range of SRH outcomes. Both drought and flooding exacerbated multiple resource scarcities that in turn increased SGBV risks and increased sanitation insecurity, which heightened menstruation management challenges. Drought also increased transactional sex for food and other resources. SGBV and transactional sex elevated risks for unplanned pregnancy, HIV and other sexually transmitted infections. Our findings can guide climate-informed programmes that consider the interplay of social-ecological factors (Bernhardt & Amiri, 2024; Crandon et al., 2022; Krieger, 2001; Mcleroy & Bibeau, 1988), such as hazardous environments at ecologic (e.g. EWE), socio-political (e.g. insufficient funding for food rations), community (e.g. SGBV) and interpersonal (e.g. transactional sex) levels that shape intrapersonal SRH outcomes (e.g. unplanned pregnancy) among refugee youth in Bidi Bidi. We developed Figure 8 to situate our findings within a social-ecological model.

At the ecological level, climate change-related drivers of food insecurity included both agricultural and infrastructural damage as reported in prior research (Mirzabaev et al., 2023). As rain-fed agriculture is an essential part of individuals' livelihoods in rural Uganda, both flooding and drought increase food insecurity (Wichern et al., 2019). Our findings corroborate research on the pathways from ecological factors such as drought to community-level food insecurity and, in



Figure 8. Social-ecological factors associated with refugee youth sexual and reproductive health in Bidi Bidi Refugee Settlement, Uganda.

turn, to interpersonal dynamics such as transactional sex. For instance, research on Malawi's 2015 drought noted increased likelihood of transactional sex for those reliant on agriculture for livelihoods (Treibich et al., 2022) and a qualitative study with adults in drought-affected regions in Zambia found women engaged in transactional sex for food (Rosen et al., 2021). Our findings build on associations between community-level resource insecurities (food, water) and transactional sex with urban refugee youth in Kampala (Logie, Okumu, Admassu, et al., 2024). Specifically, our findings reveal that transactional sex is gendered – most affecting adolescent girls and young women – and undertaken to meet personal and household needs in this large refugee settlement where participants also described experiencing widespread food insecurity due to the cutting of food rations. Aligned with past research with youth in African settings, transactional sex among youth participants was discussed as a cause of early, unplanned pregnancy (Kons et al., 2022) and HIV/STI acquisition risks (Kilburn et al., 2018), reflecting the interplay between interpersonal level strategies for poverty-coping and intrapersonal SRH outcomes. These are significant SRH concerns, as adolescent and youth pregnancy and parenting in Africa is associated with social exclusion that can lead to disrupted education, poverty, and poorer physical and mental health (Ajayi et al., 2023), and HIV infection similarly can lead to youths' disrupted schooling (Kimera, Vindevogel, Kintu, et al., 2020), stigma (Kalibbala et al., 2022; Kimera, Vindevogel, Reynaert, et al., 2020), poorer HIV outcomes (Hodes et al., 2018; Toska et al., 2017, 2020) and mental health challenges (Culbreth et al., 2020).

We found EWE and resource scarcities were associated with SGBV, aligning with the evidence base that pathways from EWE to SGBV include infrastructure damage and community-level increased economic insecurity and inequitable gender norms (Logie, Okumu, Tailor, et al., 2024; Thurston et al., 2021; K. R. van Daalen et al., 2022). This includes increased IPV, aligned with prior research across global contexts (Díaz & Saldarriaga, 2023; Epstein et al., 2020; Tallman et al., 2023). Resource scarcities also increased violence towards refugee youth – particularly girls and women – in refugee and host communities while collecting resources, corroborating past research that identified community-level stressors such as water, food and firewood insecurity as increasing refugee youth risks for SGBV in Uganda (Logie et al., 2021). We build on this literature by identifying extreme heat as an ecological driver of community-level SGBV, as it increases housing insecurity due to the need to sleep outdoors and/or in unsecured dwellings; while extreme heat and elevated SGBV have been reported in diverse contexts, this topic is understudied in humanitarian settings. SGBV victimisation is also linked with unplanned youth pregnancy among non-refugees in Uganda (Merrill et al., 2023), and our findings identify this as a concern for refugee youth in Bidi Bidi. Similar to other studies with non-refugees (Esho et al., 2021; Pope et al., 2023), we found resource scarcities contributed to early, child and forced marriage among refugee youth in Bidi Bidi as a household financial stress coping strategy.

Menstruation management challenges due to drought-related water insecurity and flooding were raised in participant narratives and align with the larger evidence base on community access to water, sanitation and hygiene resources as key to realising menstrual health (Barrington et al., 2021; Hennegan et al., 2019; Hennegan & Montgomery, 2016). Corroborating prior research in non-humanitarian settings, participants identified menstruation insecurity as a barrier to school attendance (McMahon et al., 2011), a driver of transactional sex (Onyango & Elliott, 2020; Phillips-Howard et al., 2015) and a risk factor for reproductive tract infections (Atashili et al., 2008; Caruso et al., 2017; Mehta et al., 2023; Wilson et al., 2021) – our findings underscore the urgent need to address menstruation insecurity in Bidi Bidi. This includes the need for research on age, culturally, and contextually tailored menstruation management options – future research can investigate options for fast drying reusable menstrual absorbents and/or menstrual cups to reduce reproductive tract infections (Torondel et al., 2018), including bacterial vaginosis (Mehta et al., 2023).

Our findings applied the resource scarcity framework (Wutich & Brewis, 2014) to identify the interplay between ecological (i.e. drought), social (i.e. gender inequity) and economic (i.e. poverty) factors that contribute to multiple resource insecurities (i.e. food, water, sanitation, firewood,

housing) that are understudied with refugee youth in Bidi Bidi (Maxfield, 2020; Whittle et al., 2020) yet threaten SRH (Figure 1). Our findings build on a scoping review (Logie, Toccalino, MacKenzie, et al., 2024) of social-ecological pathways from climate change to sexual health spanning interpersonal (e.g. transactional sex), community (e.g. SGBV risks) and structural (e.g. road infrastructure damage) levels, and a framework on pathways to climate and HIV risks via factors including infrastructure erosion, food insecurity, migration and infectious diseases (Lieber et al., 2021). Our findings expand on both social-ecological (Figure 7) and resource insecurity (Figure 1) frameworks to produce new insights into shared pathways from different ecological level factors (EWE such as drought and floods) – often looked at separately – to multiple resource insecurities and a range of SRH issues. The social-ecological framework also provides the opportunity to examine the interplay between climate-related EWE and socio-political contexts. For instance, as noted by many participants, the World Food Programme's reduction of refugee food rations due to funding constraints presents serious problems in Uganda and results in refugees 'now receiving less than 40% of their basic survival rations' (Nilsen et al., 2024). This larger socio-political context of constrained international refugee assistance converges with refugee camps' geographical locations that are at increased exposure to extreme weather events (Fransen et al., 2024) to produce a heightened space of vulnerability (Leatherman, 2005) for climate harms on SRH.

Our study has limitations, including non-random sampling that may have overrepresented youth connected with URDMC who work in specific zones, and thus perhaps less marginalised and resource insecure. Stigma towards adolescent SRH in Uganda (Logie, Okumu, et al., 2019) and sexual violence stigma in Bidi Bidi (Logie et al., 2023) may have limited explicit discussions of stigmatised SRH topics with adult interviewers. Additionally, participant discussions centred refugee adolescent girl and young women's SRH, leaving knowledge gaps regarding refugee adolescent boys and young men's SRH that require further attention. Walk-along interviews may have constrained discussion of SRH in public spaces, yet interviewers attempted to mitigate these limitations by conducting interviews in places where there was privacy. Our study also has strengths, including a focus on different EWE (drought, floods/heavy rains), inclusion of a range of youth perspectives across genders and key informant domains of expertise, and multiple qualitative methods whereby photos and their description add richness and insight into context (O'Reilly et al., 2021). Data collectors reported that the walk-along interview method was enjoyable for youth and interviewers, and the tablet-based photos are of high quality.

Climate change and its effects on increased drought, heavy rains, and flooding increase SRH vulnerabilities among refugee youth in Bidi Bidi via complex and multi-level pathways and require urgent focus. Community-level, youth-engaged strategies can develop culturally and contextually appropriate methods to reduce multiple resource insecurities (e.g. housing, water, food, sanitation, firewood). For instance, strategies can explore increased access to clean fuel options, such as solar options in Uganda (Gebu & Elofsson, 2023), to reduce firewood reliance. Community-based gender-transformative interventions (Abramsky et al., 2016; Gittings & Grimwood, 2021; Harvey et al., 2021) at community and interpersonal levels are critically needed to increase value, dignity, and access to power and resources among refugee adolescent girls and young women and to reduce SGBV perpetrated by communities, partners, and families, including early marriage. At socio-political levels, organisations can promote climate-informed SRH strategies that leverage community coping and resilience, adapt early climate warning systems to meet SRH priorities, and increase self-care access to SRH such as HIV self-testing, over-the-counter oral contraception, and self-injectable long-acting contraception (Logie, Khoshnood, et al., 2019; Narasimhan et al., 2019). Responses must address how refugee youth's SRH in Bidi Bidi is shaped by a polycrisis (Lawrence et al., 2024) comprised of social-ecological systems – where refugee settlements are overexposed to climate change, socio-political systems whereby refugee settlements have insufficient funding for resource requirements, and socio-cultural systems where girls and women are devalued with reduced access to power. The solutions for policy and environmental change must therefore also span social-ecological levels (Golden et al., 2015) to advance equitable resource distribution,

collective action to tackle poverty, climate-informed SRH programmes, community commitment to equity, and refugee youth sexual and reproductive rights and self-determination.

Author's contributions

CHL conceptualised the study, was the nominated principal investigator and acquired the funding, oversaw the study management, and led the writing. ML and FM coordinated data collection, management and analysis and substantially contributed to writing and analysis. MO helped to coordinate study, contributed to acquiring funding, study management, and writing and editing the manuscript. RL substantially contributed to the analysis and writing. FSA contributed to data analysis. SOL and NK coordinated data collection and management and contributed to study interpretation, writing and edits. PK, LO, MK and MN contributed to study interpretation, writing and edits. All authors approved the final version of the manuscript.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

We obtained ethical approval for this study from the Research Ethics Board at the University of Toronto (41103), Mildmay Uganda Research Ethics Committee (MUREC-2021-85), and the Uganda National Council for Science and Technology (SS1315ES).

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References

- Abramsky, T., Devries, K. M., Michau, L., Nakuti, J., Musuya, T., Kiss, L., Kyegombe, N., & Watts, C. (2016). Ecological pathways to prevention: How does the SASA! community mobilisation model work to prevent physical intimate partner violence against women? *BMC Public Health*, 16(1), 339–339. <https://doi.org/10.1186/s12889-016-3018-9>

- Ahmed, A., Mohamed, N. S., Siddig, E. E., Algaily, T., Sulaiman, S., & Ali, Y. (2021). The impacts of climate change on displaced populations: A call for action. *The Journal of Climate Change and Health*, 3, 100057. <https://doi.org/10.1016/j.joclim.2021.100057>
- Ajayi, A. I., Athero, S., Muga, W., & Kabiru, C. W. (2023). Lived experiences of pregnant and parenting adolescents in Africa: A scoping review. *Reproductive Health*, 20(1), Article 1. <https://doi.org/10.1186/s12978-023-01654-4>
- Anthonj, C., Nkongolo, O. T., Schmitz, P., Hango, J. N., & Kistemann, T. (2015). The impact of flooding on people living with HIV: A case study from the Ohangwena Region, Namibia. *Global Health Action*, 8(1), 26441. <https://doi.org/10.3402/gha.v8.26441>
- Atashili, J., Poole, C., Ndumbe, P. M., Adimora, A. A., & Smith, J. S. (2008). Bacterial vaginosis and HIV acquisition: A meta-analysis of published studies. *AIDS*, 22(12), 1493–1501. <https://doi.org/10.1097/QAD.0b013e3283021a37>
- Attride-Stirling, J. (2001). Thematic networks: An analytic tool for qualitative research. *Qualitative Research*, 1(3), 385–405. <https://doi.org/10.1177/1468794101001003007>
- Austin, K. F., Noble, M. D., & Berndt, V. K. (2021). Drying climates and gendered suffering: Links between drought, food insecurity, and women’s HIV in less-developed countries. *Social Indicators Research*, 154(1), 313–334. <https://doi.org/10.1007/s11205-020-02562-x>
- Barrington, D. J., Robinson, H. J., Wilson, E., & Hennegan, J. (2021). Experiences of menstruation in high income countries: A systematic review, qualitative evidence synthesis and comparison to low- and middle-income countries. *PLoS ONE*, 16(7), e0255001. <https://doi.org/10.1371/journal.pone.0255001>
- Berndt, V. K., & Austin, K. F. (2021). Drought and disproportionate disease: An investigation of gendered vulnerabilities to HIV/AIDS in less-developed nations. *Population and Environment*, 42(3), 379–405. <https://doi.org/10.1007/s11111-020-00367-1>
- Bernhardt, J. M., & Amiri, A. (2024). Application of the socioecological model to mitigate risks of heat illness. *Nursing Outlook*, 72(3), 102150. <https://doi.org/10.1016/j.outlook.2024.102150>
- Bradley, T., Martin, Z., Upreti, B. R., Subedu, B., & Shrestha, S. (2023). Gender and disaster: The impact of natural disasters on violence against women in Nepal. *Journal of Asian and African Studies*, 58(3), 354–371. <https://doi.org/10.1177/00219096211062474>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Burns, P. A., & Mutunga, C. (2024). Addressing the impact of climate change on sexual and reproductive health among adolescent girls and young women in low- and middle-income countries. *Global Health: Science and Practice*, 12(1), e2300374. <https://doi.org/10.9745/GHSP-D-23-00374>
- Carpiano, R. M. (2009). Come take a walk with me: The “go-along” interview as a novel method for studying the implications of place for health and well-being. *Health & Place*, 15(1), 263–272. <https://doi.org/10.1016/j.healthplace.2008.05.003>
- Caruso, B. A., Clasen, T. F., Hadley, C., Yount, K. M., Haardörfer, R., Rout, M., Dasmohapatra, M., & Cooper, H. L. (2017). Understanding and defining sanitation insecurity: Women’s gendered experiences of urination, defecation and menstruation in rural Odisha, India. *BMJ Global Health*, 2(4), e000414. <https://doi.org/10.1136/bmjgh-2017-000414>
- Chalfen, R. (2014). ‘Your panopticon or mine?’ Incorporating wearable technology’s glass and GoPro into visual social science. *Visual Studies*, 29(3), 299–310. <https://doi.org/10.1080/1472586X.2014.941547>
- Crandon, T. J., Scott, J. G., Charlson, F. J., & Thomas, H. J. (2022). A social-ecological perspective on climate anxiety in children and adolescents. *Nature Climate Change*, 12(2), 123–131. <https://doi.org/10.1038/s41558-021-01251-y>
- Culbreth, R., Swahn, M. H., Salazar, L. F., Ametewee, L. A., & Kasiry, R. (2020). Risk factors associated with HIV, Sexually Transmitted Infections (STI), and HIV/STI co-infection among Youth Living in the Slums of Kampala, Uganda. *AIDS and Behavior*, 24(4), 1023–1031. <https://doi.org/10.1007/s10461-019-02444-5>
- Dedoose (Version 9.0.17). (2021). [Computer software]. SocioCultural Research Consultants, LLC. www.dedoose.com.
- Díaz, J.-J., & Saldarriaga, V. (2023). A drop of love? Rainfall shocks and spousal abuse: Evidence from rural Peru. *Journal of Health Economics*, 89, 102739. <https://doi.org/10.1016/j.jhealeco.2023.102739>
- Epstein, A., Bendavid, E., Nash, D., Charlebois, E. D., & Weiser, S. D. (2020). Drought and intimate partner violence towards women in 19 countries in sub-Saharan Africa during 2011–2018: A population-based study. *PLoS Medicine*, 17(3), e1003064. <https://doi.org/10.1371/JOURNAL.PMED.1003064>
- Esho, T., Komba, E., Richard, F., & Shell-Duncan, B. (2021). Intersections between climate change and female genital mutilation among the Maasai of Kajiado County, Kenya. *Journal of Global Health*, 11, 1–10. <https://doi.org/10.7189/jogh.11.04033>
- Fransen, S., Werntges, A., Hunns, A., Sirenko, M., & Comes, T. (2024). Refugee settlements are highly exposed to extreme weather conditions. *Proceedings of the National Academy of Sciences*, 121(3), e2206189120. <https://doi.org/10.1073/pnas.2206189120>
- Gebru, B., & Elofsson, K. (2023). The role of forest status in households’ fuel choice in Uganda. *Energy Policy*, 173, 113390. <https://doi.org/10.1016/j.enpol.2022.113390>

- Gittings, L., & Grimwood, A. (2021). 'We need other men to stand up and start the journey' engaging men as HIV community health workers - A gender transformative approach? *Culture, Health & Sexuality*, 23(2), 192–206. <https://doi.org/10.1080/13691058.2019.1700306>
- Goessmann, K., Ssenyonga, J., Nkuba, M., Hermenau, K., & Hecker, T. (2020). Characterizing the prevalence and contributing factors of sexual violence: A representative cross-sectional study among school-going adolescents in two East African countries. *Child Abuse & Neglect*, 109, 104711. <https://doi.org/10.1016/j.chiabu.2020.104711>
- Golden, S. D., McLeroy, K. R., Green, L. W., Earp, J. A. L., & Lieberman, L. D. (2015). Upending the social ecological model to guide health promotion efforts toward policy and environmental change. *Health Education & Behavior*, 42(1_suppl), 8S–14S. <https://doi.org/10.1177/1090198115575098>
- Gwatarisa, P., & Manderson, L. (2012). "Living from day to day": Food insecurity, complexity, and coping in Mutare, Zimbabwe. *Ecology of Food and Nutrition*, 51(2), 97–113. <https://doi.org/10.1080/03670244.2012.661328>
- Harvey, S., Abramsky, T., Mshana, G., Hansen, C. H., Mtolela, G. J., Madaha, F., Hashim, R., Kapinga, I., Watts, C., Lees, S., & Kapiga, S. (2021). A cluster randomised controlled trial to evaluate the impact of a gender transformative intervention on intimate partner violence against women in newly formed neighbourhood groups in Tanzania. *BMJ Global Health*, 6(7), e004555. <https://doi.org/10.1136/bmjgh-2020-004555>
- Hedenus, A. (2016). Embodiment and materialization in "neutral" materials: Using audio-visual analysis to discern social representations. *Forum: Qualitative Social Research*, 17(1), 1–25.
- Hennegan, J., & Montgomery, P. (2016). Do Menstrual Hygiene Management Interventions improve education and psychosocial outcomes for women and girls in low and middle income countries? A systematic review *PLoS ONE*, 11(2), e0146985. <https://doi.org/10.1371/journal.pone.0146985>
- Hennegan, J., Shannon, A. K., Rubli, J., Schwab, K. J., & Melendez-Torres, G. J. (2019). Women's and girls' experiences of menstruation in low- and middle-income countries: A systematic review and qualitative metasynthesis. *PLoS Medicine*, 16(5), e1002803. <https://doi.org/10.1371/journal.pmed.1002803>
- Hodes, R., Vale, B., Toska, E., Cluver, L., Dowse, R., & Ashhorn, M. (2018). Yummy or crummy? The multisensory components of medicines-taking among HIV-positive youth. *Global Public Health*, 14(2), 284–299. <https://doi.org/10.1080/17441692.2018.1504103>
- Kalibbala, D., Mpungu, S. K., Ssuna, B., Muzeyi, W., Mberesero, H., Semitala, F. C., Katahoire, A., Armstrong-Hough, M., Kalyango, J. N., & Musiime, V. (2022). Determinants of testing for HIV among young people in Uganda. A nested, explanatory-sequential study. *PLoS Global Public Health*, 2(12), e0000870. <https://doi.org/10.1371/journal.pgph.0000870>
- Khawcharoenporn, T., Apisarnthanarak, A., Chunloy, K., & Mundy, L. M. (2013). Access to antiretroviral therapy during excess black-water flooding in central Thailand. *AIDS Care*, 25(11), 1446–1451. <https://doi.org/10.1080/09540121.2013.772284>
- Kilburn, K., Ranganathan, M., Stoner, M. C. D., Hughes, J. P., MacPhail, C., Agyei, Y., Gómez-Olivé, F. X., Kahn, K., & Pettifor, A. (2018). Transactional sex and incident HIV infection in a cohort of young women from rural South Africa. *AIDS*, 32(12), 1669–1677. <https://doi.org/10.1097/QAD.0000000000001866>
- Kimera, E., Vindevogel, S., Kintu, M. J., Rubaihayo, J., De Maeyer, J., Reynaert, D., Engelen, A.-M., Nuwaha, F., & Bilsen, J. (2020). Experiences and perceptions of youth living with HIV in Western Uganda on school attendance: Barriers and facilitators. *BMC Public Health*, 20(1), 79. <https://doi.org/10.1186/s12889-020-8198-7>
- Kimera, E., Vindevogel, S., Reynaert, D., Justice, K. M., Rubaihayo, J., de Maeyer, J., Engelen, A. M., Musanje, K., & Bilsen, J. (2020). Experiences and effects of HIV-related stigma among youth living with HIV/AIDS in Western Uganda: A photovoice study. *PLoS ONE*, 15(4), e0232359. <https://doi.org/10.1371/journal.pone.0232359>
- Kons, K., Biney, A. A. E., & Sznajder, K. (2022). Factors associated with adolescent pregnancy in Sub-Saharan Africa during the COVID-19 pandemic: A review of Socioeconomic Influences and Essential Interventions. *International Journal of Sexual Health*, 34(3), 386–396. <https://doi.org/10.1080/19317611.2022.2084199>
- Krieger, N. (2001). Theories for social epidemiology in the 21st century: An ecosocial perspective. *International Journal of Epidemiology*, 30(4), 668–677. <https://doi.org/10.1093/ije/30.4.668>
- Kusenbach, M. (2003). Street phenomenology: The go-along as ethnographic research tool. *Ethnography*, 4(3), 455–485. <https://doi.org/10.1177/146613810343007>
- Lawrence, M., Homer-Dixon, T., Janzwood, S., Rockstöm, J., Renn, O., & Donges, J. F. (2024). Global polycrisis: The causal mechanisms of crisis entanglement. *Global Sustainability*, 7, e6. <https://doi.org/10.1017/sus.2024.1>
- Leatherman, T. (2005). A space of vulnerability in poverty and health: Political-ecology and biocultural analysis. *Ethos*, 33(1), 46–70. <https://doi.org/10.1525/eth.2005.33.1.046>
- Lieber, M., Chin-Hong, P., Whittle, H. J., Hogg, R., & Weiser, S. D. (2021). The synergistic relationship between climate change and the HIV/AIDS epidemic: A conceptual framework. *AIDS and Behavior*, 25(7), 2266–2277. <https://doi.org/10.1007/s10461-020-03155-y>
- Logie, C. H., Khoshnood, K., Okumu, M., Rashid, S. F., Senova, F., Meghari, H., & Kipenda, C. U. (2019). Self care interventions could advance sexual and reproductive health in humanitarian settings. *BMJ*, 365, 11083. <https://doi.org/10.1136/bmj.11083>
- Logie, C. H., & MacNeil, A. (2025). Climate change and extreme weather events and linkages with HIV outcomes: Recent advances and ways forward. *Current Opinion in Infectious Diseases*, 38(1), 26–36. <https://doi.org/10.1097/QCO.0000000000001081>

- Logie, C. H., Okumu, M., Admassu, Z., Perez-Brumer, A., Ahmed, R., Luna, M. L., MacKenzie, F., Kortenaar, J.-L., Berry, I., Hakiza, R., Katisi, B., Musoke, D. K., Nakitende, A., Batte, S., Kyambadde, P., Taing, L., Giordana, G., & Mbuagbaw, L. (2024). HIV vulnerabilities associated with water insecurity, food insecurity, and other COVID-19 impacts among Urban Refugee Youth in Kampala, Uganda: Multi-method findings. *AIDS and Behavior*, 28(2), 507–523. <https://doi.org/10.1007/s10461-023-04240-8>
- Logie, C. H., Okumu, M., Coelho, M., Loutet, M. G., Berry, I., Lukone, S. O., Kisubi, N., Musoke, D. K., & Kyambadde, P. (2023). Sexual violence stigma experiences among refugee adolescents and youth in Bidi Bidi refugee settlement, Uganda: Qualitative insights informed by the stigma power process framework. *SSM - Mental Health*, 4, 100242. <https://doi.org/10.1016/j.ssmmh.2023.100242>
- Logie, C., Okumu, M., Coelho, M., Loutet, M., Narasimhan, M., Lukone, S. O., Kisubi, N., Musoke, D. K., Kyambadde, P., Dorea, C., & Taing, L. (2022). Water insecurity and sexual and gender-based violence among refugee youth: Qualitative insights from a humanitarian setting in Uganda. *Journal of Water, Sanitation and Hygiene for Development*, 12(12), 883–893. <https://doi.org/10.2166/washdev.2022.236>
- Logie, C. H., Okumu, M., Latif, M., Musoke, D. K., Odong Lukone, S., Mwima, S., & Kyambadde, P. (2021). Exploring resource scarcity and contextual influences on wellbeing among young refugees in Bidi Bidi refugee settlement, Uganda: Findings from a qualitative study. *Conflict and Health*, 15(1), 3. <https://doi.org/10.1186/s13031-020-00336-3>
- Logie, C. H., Okumu, M., Mwima, S. P., Kyambadde, P., Hakiza, R., Kibathi, I. P., Kironde, E., Musinguzi, J., & Kipenda, C. U. (2019). Exploring associations between adolescent sexual and reproductive health stigma and HIV testing awareness and uptake among urban refugee and displaced youth in Kampala, Uganda. *Sexual and Reproductive Health Matters*, 27(3), 86–106. <https://doi.org/10.1080/26410397.2019.1695380>
- Logie, C. H., Okumu, M., Taylor, L. S., Taing, L., Dorea, C., Mbuagbaw, L., Hakiza, R., Kibuuka-Musoke, D., Katisi, B., Nakitende, A., Kyambadde, P., MacKenzie, F., & Admassu, Z. (2024). Water and food insecurity and linkages with physical and sexual intimate partner violence among urban refugee youth in Kampala, Uganda: Cross-sectional survey findings. *Journal of Water, Sanitation and Hygiene for Development*, 14(3), 261–276. <https://doi.org/10.2166/washdev.2024.298>
- Logie, C. H., Toccalino, D., MacKenzie, F., Hasham, A., Narasimhan, M., Donkers, H., Lorimer, N., & Malama, K. (2024). Associations between climate change-related factors and sexual health: A scoping review. *Global Public Health*, 19(1), 2299718. <https://doi.org/10.1080/17441692.2023.2299718>
- Low, A. J., Frederix, K., McCracken, S., Manyau, S., Gummerson, E., Radin, E., Davia, S., Longwe, H., Ahmed, N., Parekh, B., Findley, S., & Schwitters, A. (2019). Association between severe drought and HIV prevention and care behaviors in Lesotho: A population-based survey 2016-2017. *PLoS Medicine*, 16(1), e1002727. <https://doi.org/10.1371/journal.pmed.1002727>
- Madhuri. (2016). The impact of flooding in Bihar, India on women: A qualitative study. *Asian Women*, 32(1), 31–52. <https://doi.org/10.14431/aw.2016.03.32.1.31>
- Maxfield, A. (2020). Testing the theoretical similarities between food and water insecurity: Buffering hypothesis and effects on mental wellbeing. *Social Science & Medicine*, 244, 112412. <https://doi.org/10.1016/j.socscimed.2019.112412>
- Mcleroy, K., & Bibeau, D. L. (1988). An ecology perspective on health promotion programs article in health education quarterly. *Health Education Quarterly*, 15(4), 351–377. <https://doi.org/10.1177/109019818801500401>
- McMahon, S. A., Winch, P. J., Caruso, B. A., Obure, A. F., Ogutu, E. A., Ochari, I. A., & Rheingans, R. D. (2011). “The girl with her period is the one to hang her head” Reflections on menstrual management among schoolgirls in rural Kenya. *BMC International Health and Human Rights*, 11(1), 7. <https://doi.org/10.1186/1472-698X-11-7>
- Mehta, S. D., Zulaika, G., Agingu, W., Nyothach, E., Bhaumik, R., Green, S. J., van Eijk, A. M., Kwaro, D., Otieno, F., & Phillips-Howard, P. (2023). Analysis of bacterial vaginosis, the vaginal microbiome, and sexually transmitted infections following the provision of menstrual cups in Kenyan schools: Results of a nested study within a cluster randomized controlled trial. *PLoS Medicine*, 20(7), e1004258. <https://doi.org/10.1371/journal.pmed.1004258>
- Merrill, K. G., Knight, L., Nakuti, J., Mirembe, A., Allen, E., Bhatia, A., Parkes, J., Naker, D., & Devries, K. M. (2023). The association between violence victimization and subsequent unplanned pregnancy among adolescent girls in Uganda: Do primary schools make a difference? *PLoS Global Public Health*, 3(7), e0001141. <https://doi.org/10.1371/journal.pgph.0001141>
- Mirzabaev, A., Bezner Kerr, R., Hasegawa, T., Pradhan, P., Wreford, A., Cristina Tirado von der Pahlen, M., & Gurney-Smith, H. (2023). Severe climate change risks to food security and nutrition. *Climate Risk Management*, 39, 100473. <https://doi.org/10.1016/j.crm.2022.100473>
- Mugeere, A., Barford, A., & Magimbi, P. (2024). Climate change and young people in Uganda: A literature review. *The Journal of Environment & Development*, 30(4), 344–368. <https://doi.org/10.1177/10704965211047159>
- Narasimhan, M., Allotey, P., & Hardon, A. (2019). Self care interventions to advance health and wellbeing: A conceptual framework to inform normative guidance. *BMJ*, 365, l688. <https://doi.org/10.1136/bmj.l688>
- Nilsen, M. S., Viga, E., Serwajja, E., & Refstie, H. (2024, March 18). Why refugee ration cuts in Uganda risk long-term social damage. *The New Humanitarian*.

- Nsubuga, F. W., & Rautenbach, H. (2018). Climate change and variability: A review of what is known and ought to be known for Uganda. *International Journal of Climate Change Strategies and Management*, 10(5), 752–771. <https://doi.org/10.1108/IJCCSM-04-2017-0090>
- Nuwagira, U., & Yasin, I. (2022). Review of the past, current, and the future trend of the climate change and its impact in Uganda. *East African Journal of Environment and Natural Resources*, 5(1), 115–126. <https://doi.org/10.37284/eajenr.5.1.605>
- Onyango, E. O., & Elliott, S. J. (2020). Bleeding bodies, untrustworthy bodies: A social constructionist approach to health and wellbeing of young people in Kenya. *International Journal of Environmental Research and Public Health*, 17(20), 7555–. <https://doi.org/10.3390/ijerph17207555>
- O'Reilly, M., Kiyimba, N., & Drewett, A. (2021). Mixing qualitative methods versus methodologies: A critical reflection on communication and power in inpatient care. *Counselling and Psychotherapy Research*, 21(1), 66–76. <https://doi.org/10.1002/capr.12365>
- Orievulu, K. S., & Iwuji, C. C. (2022). Institutional responses to drought in a high HIV prevalence setting in rural South Africa. *International Journal of Environmental Research and Public Health*, 19(1), 434. <https://doi.org/10.3390/ijerph19010434>
- Parsons, E. S., Jowell, A., Veidis, E., Barry, M., & Israni, S. T. (2024). Climate change and inequality. *Pediatric Research*. <https://doi.org/10.1038/s41390-024-03153-z>
- Phillips-Howard, P. A., Otieno, G., Burmen, B., Otieno, F., Odongo, F., Odour, C., Nyothach, E., Amek, N., Zielinski-Gutierrez, E., Odhiambo, F., Zeh, C., Kwaro, D., Mills, L. A., & Laserson, K. F. (2015). Menstrual needs and associations with sexual and reproductive risks in Rural Kenyan Females: A cross-sectional behavioral survey linked with HIV prevalence. *Journal of Women's Health*, 24(10), 801–811. <https://doi.org/10.1089/jwh.2014.5031>
- Pink, S. (2020). A multisensory approach to visual methods. In L. Pauwels, & D. Mannay (Eds.), *The SAGE handbook of visual research methods* (2nd ed., pp. 523–533). SAGE Publications, Inc. <https://doi.org/10.4135/9781529721485.n33>
- Pope, D. H., McMullen, H., Baschieri, A., Philipose, A., Udeh, C., Diallo, J., & McCoy, D. (2023). What is the current evidence for the relationship between the climate and environmental crises and child marriage? A scoping review. *Global Public Health*, 18(1), 2095655. <https://doi.org/10.1080/17441692.2022.2095655>
- Rashid, S. F., & Michaud, S. (2000). Female adolescents and their sexuality: Notions of honour, shame, purity and pollution during the floods. *Disasters*, 24(1), 54–70. <https://doi.org/10.1111/1467-7717.00131>
- Rosen, J. G., Mulenga, D., Phiri, L., Okpara, N., Brander, C., Chelwa, N., & Mbizvo, M. T. (2021). “Burnt by the scorching sun”: Climate-induced livelihood transformations, reproductive health, and fertility trajectories in drought-affected communities of Zambia. *BMC Public Health*, 21(1), 1501. <https://doi.org/10.1186/s12889-021-11560-8>
- Sabates-Wheeler, R. (2019). Mapping differential vulnerabilities and rights: ‘Opening’ access to social protection for forcibly displaced populations. *Comparative Migration Studies*, 7(1), 38. <https://doi.org/10.1186/s40878-019-0142-6>
- Singh, N. S., Aryasinghe, S., Smith, J., Khosla, R., Say, L., & Blanchet, K. (2018). A long way to go: A systematic review to assess the utilisation of sexual and reproductive health services during humanitarian crises. *BMJ Global Health*, 3(2), e000682. <https://doi.org/10.1136/bmjgh-2017-000682>
- Sohrabizadeh, S. (2016). A qualitative study of violence against women after the recent disasters of Iran. *Prehospital and Disaster Medicine*, 31(4), 407–412. <https://doi.org/10.1017/S1049023X16000431>
- Tallman, P. S., Collins, S., Salmon-Mulanovich, G., Rusyidi, B., Kothadia, A., & Cole, S. (2023). Water insecurity and gender-based violence: A global review of the evidence. *WIREs Water*, 10(1), Article 1. <https://doi.org/10.1002/wat2.1619>
- Thurston, A. M., Stöckl, H., & Ranganathan, M. (2021). Natural hazards, disasters and violence against women and girls: A global mixed-methods systematic review. *BMJ Global Health*, 6(4), e004377. <https://doi.org/10.1136/bmjgh-2020-004377>
- Torondel, B., Sinha, S., Mohanty, J. R., Swain, T., Sahoo, P., Panda, B., Nayak, A., Bara, M., Bilung, B., Cumming, O., Panigrahi, P., & Das, P. (2018). Association between unhygienic menstrual management practices and prevalence of lower reproductive tract infections: A hospital-based cross-sectional study in Odisha, India. *BMC Infectious Diseases*, 18(1), 473. <https://doi.org/10.1186/s12879-018-3384-2>
- Toska, E., Laurenzi, C. A., Roberts, K. J., Cluver, L., & Sherr, L. (2020). Adolescent mothers affected by HIV and their children: A scoping review of evidence and experiences from sub-Saharan Africa. *Global Public Health*, 15(11), 1655–1673. <https://doi.org/10.1080/17441692.2020.1775867>
- Toska, E., Pantelic, M., Meinck, F., Keck, K., Haghghat, R., & Cluver, L. (2017). Sex in the shadow of HIV: A systematic review of prevalence, risk factors, and interventions to reduce sexual risk-taking among HIV-positive adolescents and youth in sub-saharan Africa. *PLoS ONE*, 12(6), e0178106. <https://doi.org/10.1371/journal.pone.0178106>
- Treibich, C., Bell, E., Blanc, E., & Lépine, A. (2022). From a drought to HIV: An analysis of the effect of droughts on transactional sex and sexually transmitted infections in Malawi. *SSM - Population Health*, 19, 101221. <https://doi.org/10.1016/j.ssmph.2022.101221>

- Uganda. (2018). *UNAIDS*. <https://www.unaids.org/en/regionscountries/countries/uganda>
- UNFPA. (2021). *UNFPA Uganda: Fact Sheet on teenage pregnancy*, 2021. UNFPA. https://uganda.unfpa.org/sites/default/files/pub-pdf/teenpregnancy_factsheet_3.pdf
- UNHCR. (2024). *Uganda—Refugee Statistics August 2024—Active Population by Settlement*. <https://data.unhcr.org/en/documents/details/111041>
- van Daalen, K. R., Dada, S., Issa, R., Chowdhury, M., Jung, L., Singh, L., Stokes, D., Orcutt, M., & Singh, N. S. (2021). A scoping review to assess sexual and reproductive health outcomes, challenges and recommendations in the context of climate migration. *Frontiers in Global Women's Health*, 2, 757153. <https://doi.org/10.3389/fgwh.2021.757153>
- van Daalen, K., Jung, L., Dhatt, R., & Phelan, A. L. (2020). Climate change and gender-based health disparities. *The Lancet Planetary Health*, 4(2), e44–e45. [https://doi.org/10.1016/S2542-5196\(20\)30001-2](https://doi.org/10.1016/S2542-5196(20)30001-2)
- van Daalen, K. R., Kallesøe, S. S., Davey, F., Dada, S., Jung, L., Singh, L., Issa, R., Emilian, C. A., Kuhn, I., Keygnaert, I., & Nilsson, M. (2022). Extreme events and gender-based violence: A mixed-methods systematic review. *The Lancet Planetary Health*, 6(6), e504–e523. [https://doi.org/10.1016/S2542-5196\(22\)00088-2](https://doi.org/10.1016/S2542-5196(22)00088-2)
- Whittle, H. J., Leddy, A. M., Shieh, J., Tien, P. C., Ofotokun, I., Adimora, A. A., Turan, J. M., Frongillo, E. A., Turan, B., & Weiser, S. D. (2020). Precarity and health: Theorizing the intersection of multiple material-need insecurities, stigma, and illness among women in the United States. *Social Science & Medicine*, 245, 112683. <https://doi.org/10.1016/j.socscimed.2019.112683>
- Wichern, J., Descheemaeker, K., Giller, K. E., Ebanyat, P., Taulya, G., & van Wijk, M. T. (2019). Vulnerability and adaptation options to climate change for rural livelihoods – A country-wide analysis for Uganda. *Agricultural Systems*, 176, 102663. <https://doi.org/10.1016/j.agsy.2019.102663>
- Wilson, L. C., Rademacher, K. H., Rosenbaum, J., Callahan, R. L., Nanda, G., Fry, S., & Mackenzie, A. C. L. (2021). Seeking synergies: Understanding the evidence that links menstrual health and sexual and reproductive health and rights. *Sexual and Reproductive Health Matters*, 29(1), 44–56. <https://doi.org/10.1080/26410397.2021.1882791>
- Wutich, A., & Brewis, A. (2014). Food, water, and scarcity: Toward a broader anthropology of resource insecurity. *Current Anthropology*, 55(4), 444–468. <https://doi.org/10.1086/677311>