Incidence and safety of abortion in two humanitarian settings in Uganda and Kenya: a respondent-driven sampling study



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Summary

Background Access to abortion is a fundamental human right. The need for abortion services is amplified in complex humanitarian emergencies. However, most humanitarian agencies do not provide abortion services. There is a lack of data on the direct experiences of abortion of those living in displacement. This study aimed to describe abortion practices, safety, and incidence in two refugee settings.

Methods Between March and October 2022, we surveyed 1201 women and girls with recent abortion experiences (past 5 years) from Bidibidi Refugee Settlement, Uganda, and Kakuma Refugee Camp, Kenya, using respondentdriven sampling (RDS). Participants completed an interviewer-administered survey. Population-based estimates of abortion experiences were weighted using the RDS-II estimator to account for the sampling design. We used the sequential sampling population size estimation method to estimate annual abortion incidence. We also conducted a health facility assessment of 27 facilities (16 in Bidibidi, 11 in Kakuma) to describe the availability of facilitybased abortion services in these communities.

Findings Among those with an abortion in the past 5 years, the most common methods of abortion were traditional herbs (81% in Bidibidi, 45% in Kakuma) and non-medication abortion pharmaceuticals such as painkillers and antimalarials. Few participants reported using WHO-recommended methods of abortion (mifepristone in combination with misoprostol, misoprostol alone, or manual vacuum aspiration). Self-reported morbidity was high. Nearly a quarter reported avoiding seeking post-abortion care. The estimated annual abortion rate was 52 per 1000 in Bidibidi (95% simulation interval 20–106) and 55 per 1000 in Kakuma (95% simulation interval 19–119). Only 5 of 27 health facilities (1 of 16 in Bidibidi, 4 of 11 in Kakuma) reported providing safe abortion services. 15 of 16 in Bidibidi and 9 of 11 in Kakuma reported providing post-abortion care.

Interpretation Refugees in these two contexts have little access to WHO-recommended methods of abortion, and the need for safe abortion services is high.

Funding This study was funded by Elrha's Research for Health in Humanitarian Crises (R2HC) Programme. Elrha aims to improve health outcomes by strengthening the evidence base for public health interventions in humanitarian crises. R2HC is funded by the Foreign, Commonwealth & Development Office of the United Kingdom, Wellcome Trust, and the UK National Institute for Health Research.

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Keywords: Abortion; Abortion incidence; Humanitarian settings; Refugee; Respondent-driven sampling

Introduction

The need for safe abortion services likely increases in humanitarian crises, due to the collapse and/or underresourcing of health systems, disruptions in contraceptive use and access, and increased exposure to sexual violence and transactional sex.¹ However, safe abortion services are routinely excluded from reproductive services in humanitarian settings for a variety of https://doi.org/10. 1016/j.eclinm.2025. 103200

eClinicalMedicine 2025;83: 103200 Published Online 5 May 2025

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Research in context

Evidence before this study

Access to abortion information, support, and services is critical to ensuring the reproductive autonomy of individuals in humanitarian settings. However, safe abortion services are routinely excluded from reproductive health service provision in these settings despite the inclusion of safe abortion care as an essential service in globally recognized guidance on lifesaving sexual and reproductive health care for humanitarian crises. Qualitative research has found that without access to safe abortion care, women living in humanitarian settings often resort to unsafe and/or ineffective methods of abortion. Complications from unsafe abortion are responsible for up to 60% of maternal deaths in fragile and conflict-afflicted settings and are responsible for a large proportion of maternal morbidity. However, there is a lack of research on direct abortion experiences in humanitarian settings, and there is no published quantitative epidemiologic data on abortion methods, safety, or incidence in any humanitarian setting. We used the following search terms in PubMed for articles in English: "abortion," "humanitarian," "conflict," "refugee," and "displaced."

Added value of this study

This study provides critical information about the methods, safety, and incidence of abortion in two humanitarian

reasons, such as limited trained providers, political concerns of healthcare implementers, and concerns around abortion legality in the host country.^{1,2} This exclusion has continued despite the 2018 inclusion of comprehensive abortion care as an essential service in globally recognized guidance on life-saving sexual and reproductive health care in emergency settings, and recognition that integrating abortion services is a critical component of responding to the needs of sexual assault survivors.³

Evidence from qualitative studies has suggested women in humanitarian or conflict-affected settings often resort to using unsafe methods to terminate their pregnancies,⁴⁻⁷ and that a substantial proportion of maternal morbidity and mortality in refugee camps may be due to abortion complications.⁸ Even in contexts where health implementing organizations are providing comprehensive abortion services, lack of knowledge, fear of reprisal or legal repercussions, and abortion stigma may prevent women from accessing care from these providers.⁹

However, there is a dearth of research on abortion experiences of refugees and internally displaced persons.¹⁰ To date, there has been no descriptive epidemiologic study that has characterized the abortion experiences of women in humanitarian contexts, or to estimate incidence and safety of abortion in these settings. Thus, the need for abortion care and services is unknown and easily overlooked.¹¹ Traditional approaches of measuring abortion incidence and settings, and is one of the first and largest studies to characterize abortion experiences in humanitarian settings where barriers to this service are high. The study reported low usage of WHO-recommended methods of abortions and high abortion incidence, which reflects the urgent demand and need for safe abortion services in these contexts.

Implications of all the available evidence

The findings of this study indicate the urgent need for safe abortion services in humanitarian settings. The study provides information for humanitarian agencies, policy makers, and researchers to design, implement, and evaluate interventions to increase access to WHO-recommended methods of abortion. The results of our study shed much needed light on the abortion experiences of women living in refugee settings, as well as yield important findings on the applicability of respondent- driven sampling as a methodologic tool and sampling approach in this context. Ultimately, findings from our research can aid in the development of effective interventions to improve access to self-managed abortion in humanitarian settings, as well as identify the need and demand for safe abortion services.

experiences are fraught with several challenges, which are likely amplified in humanitarian settings. For example, studies that rely on recruitment from health facilities suffer from selection bias, particularly in contexts where abortion commonly occurs outside of facility settings; community-based or household surveys similarly suffer from under-reporting of abortion experiences due to abortion stigma.¹² Innovative networkbased approaches for estimating abortion incidence and outcomes have been suggested as potential alternatives for gathering more representative data on abortion experiences, particularly in legally restricted settings.^{13,14}

Understanding the current methods of abortion that women in humanitarian settings are using, their decisions around care-seeking, and abortion incidence at a population-level are key to developing interventions that adequately meet the needs of women living in humanitarian contexts. Data on the scope of methods currently used in these contexts to terminate their pregnancies can identify optimal targets for intervention, and shift provision of abortion in these contexts along the continuum of safety from least safe to safer methods. Estimates of the overall number of women having abortions can help demonstrate the need for abortion services in these settings. To address these critical research gaps, we conducted a respondent-driven sampling (RDS) study to describe abortion practices, safety, and incidence in Kakuma Refugee Camp, Kenya, and Bidibidi Refugee Settlement, Uganda.

Methods

Study location

Bidibidi Refugee Settlement, established in 2016 in northern Uganda, is one of the largest refugee settlements in the world. It hosts over a quarter million refugees, primarily from South Sudan.15 Kakuma Refugee Camp in north-western Kenya was established in 1992 with the arrival of thousands of Sudanese children fleeing civil war, and currently hosts over 200,000 refugees, primarily from South Sudan and Somalia.¹⁶ Abortion is highly restricted in Uganda and generally not legally permitted except under narrow circumstances; in Kenya, while the constitution and High Court recognizes abortion as a fundamental right, abortion remains criminalized in the penal code. As a result of these inconsistencies in the application of the law and lack of clear guidelines, access to abortion care within the formal health care sector is limited, and most abortions in both countries occur outside of the health system.

Study design and participants

We conducted a mixed-methods community-engaged research study employing an exploratory and explanatory sequential approach. Full study protocol details, study profile, full demographic characteristics of the sample, and a methodological assessment of RDS in this study context are described elsewhere.¹⁷ This paper reports on findings from a cross-sectional survey of women with recent abortion experiences living in Bidibidi Refugee Settlement, Uganda and Kakuma Refugee Camp, Kenya who were recruited via RDS. RDS is a peer referral-based nonprobability sampling methodology used to recruit individuals from hidden or stigmatized populations where no valid sampling frame exists.18,19 We also completed a health facility assessment to assess availability of facility-based abortion services in each setting, and qualitative in-depth interviews with 20 participants in each country which is to be reported elsewhere.12

Participants were eligible to participate if they were of reproductive age (15–49), had attempted to terminate a pregnancy in the past 5 years, had a valid recruitment coupon, and spoke one of the study languages (English, Swahili, or Arabic in Kakuma; English, Luganda, Kakwa, or Aringa in Bidibidi). Participants were excluded if they had already participated in the study or were not residents of Kakuma Refugee Camp or Bidibidi Refugee Settlement.

Procedures

Seeds (starting participants), were identified from participants who completed in-depth interviews during the formative qualitative phase or with support from the study community advisory board. Seeds completed an in-person interviewer-administered questionnaire on socio-demographic characteristics, social network composition, conditions of displacement, and abortion experiences. Seeds were given recruitment coupons to distribute to up to three potentially eligible individuals in their social network. Recruits presented at the study site where eligibility was confirmed by study interviewers. Eligible participants provided verbal consent, completed the study questionnaire, and were provided up to three recruitment coupons. Recruitment coupons linked participants to their recruiter, and enabled tracking of referral chains. Approximately one month after completing the questionnaire, participants completed follow-up survey about their recruiting experiences. Participants were provided an incentive of \sim \$5 USD for completing the survey and \sim \$2 USD for each successful recruit. Recruitment continued until the desired sample size was reached and convergence on key variables was achieved.

Health care facilities were mapped with assistance from humanitarian partners at each study site. To be eligible for inclusion, the facility had to offer emergency treatment of abortion complications, post-abortion care, or provide induced abortions; be in the refugee camp, accompanying town center, or settlement, and have a provider or health professional knowledgeable about abortion care provision. These capacities were assessed through key informant interviews with health providers during in-person facility visits capturing the signal functions for each type of care and treatment of interest (management of abortion complications, i.e., post-abortion care, safe (induced) abortion care and clinical management of rape) at all health facilities in the catchment areas.

Primary outcomes from the RDS study were abortion method, warning signs of potential complications, post-abortion care seeking, and estimates of total population size of women with recent abortion experiences and the abortion rate (annual number of abortions per 1000 women of reproductive age). The primary outcome from the health facility assessment reported in this paper are whether or not the facility reported providing any facility-based safe abortion care for the first or second trimester.

Community engagement and public involvement

We convened a community advisory board (CAB) at each study site. CAB members identified as women and were refugees with a direct personal experience with abortion or knew someone who had experience with abortion. The CAB provided input on the following: study aims, study questionnaire, recruitment coupons and procedures, interpretation of findings, and dissemination strategies. The CAB assisted with recruitment of seeds, and provided regular feedback to study coordinators on issues arising during data collection, strategies for addressing implementation challenges, and ideas for dissemination and research uptake in programming and policy recommendations.

Statistics

The estimated sample size for each study site was 600 participants, which would enable us to estimate the proportion of abortion seekers who used any given method of abortion with a standard error of 0.03 and a design effect of 2.20 We calculated weighted proportions of sociodemographic characteristics and key outcomes related to participants' most recent abortion experiences, by site, using the RDS package in R.²¹ Estimates of population proportions were calculated using the RDS-II estimator, with imputed visibility used for participant network size. To estimate the underlying source population size (those with an abortion experiences in the past five years in each setting), we used the sequential sampling population size estimation method (SS-PSE) using the sspse package in R.22 SS-PSE uses a Bayesian approach with Markov chain Monte Carlo simulations to estimate the size of the underlying target population from which RDS participants are recruited.23 To estimate the annual abortion incidence (number of abortions per 1000 women of reproductive age), we calculated the estimated number of abortions over a fiveyear period by weighting the estimated source population by number of abortions reported in the sample, and divided the total number of abortions over a five-year period by five and by the estimated number of women of reproductive age residing in each site.

Ethics

All participants provided verbal informed consent. This study was approved by Amref Health Africa Ethics & Scientific Review Committee (Kenya, P981/2021) and Mildmay Uganda Research Ethics Committee (Uganda, 2021-45).

Role of the funding source

The study funders had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Between March and October 2022, 1201 participants with a recent abortion experience (2017–2022) were recruited (600 in Kakuma, 601 in Bidibidi). Sample proportions and RDS-II weighted population proportions of selected sociodemographic characteristics can be found in Table 1. Most participants in Bidibidi were from South Sudan (94%); participants from Kakuma were from the Democratic Republic of the Congo (41%), Burundi (23%), and South Sudan (22%). Most were between the ages of 19–35.

Table 2 presents population (RDS-II weighted) abortion characteristics of the most recent abortion experience by site. Commonly cited reasons for wanting to terminate a pregnancy were: economic concerns (54% in Bidibidi, 61% in Kakuma), having an unsupportive partner (59% in Bidibidi, 45% in Kakuma), or fear of desertion from their partner (15% in Bidibidi, 35% in Kakuma). We did not directly ask whether the pregnancy was a result of sexual violence or rape; however, 1% cited this as a reason for wanting to terminate their pregnancy, and approximately 20% reported experiencing sexual violence in the past 12 months (Supplementary Materials).

Participants confirmed their pregnancy based on pregnancy symptoms (76% in Bidibidi, 61% in Kakuma), missed menstrual period (86% in Bidibidi, 67% in Kakuma), or a positive pregnancy test (32% in Bidibidi, 61% in Kakuma). Most relied on information from a friend (66% in Bidibidi, 52% in Kakuma) for what to do or where to go to terminate their pregnancy.

In Bidibidi, the most reported method of abortion was traditional herbs (81%). In Kakuma, participants used a variety of methods, including traditional herbs (45%), non-medication abortion pharmaceutical products, such as antimalarials, antibiotics, or pain medication (27%), and other unsafe methods (36%) such as ingesting cleaning detergent and other solutions. A minority of abortions occurred in a clinic or health facility (9% in Bidibidi, 5% in Kakuma). Use of WHOrecommended methods for abortion was low; 0.2% in Bidibidi and 1% in Kakuma reported having a manual vacuum aspiration. While 24% in Kakuma and 6% in Bidibidi reported using medication abortion, almost no participants were aware of the brand name of the medication they used and most reported pill dosages that do not align with WHO-recommended regimens for medication abortion (either mifepristone and misoprostol combined, misoprostol alone) or (Supplementary Material). While 18% in Bidibidi and 34% in Kakuma reported knowing about the existence of medication abortion, when asked which medications they were aware of by name, only 5 respondents in Kakuma and none in Bidibidi stated misoprostol.

Table 3 presents population (RDS-II weighted) abortion outcomes; 95% in Bidibidi and 90% in Kakuma successfully terminated their pregnancy. Reporting warning signs of potential complications was high: 88% in Bidibidi and 98% in Kakuma reported experiencing at least one warning sign (foul smelling vaginal discharge, high fever that lasted more than one day, heavy bleeding that soaked more than two pads per hour for more than two hours, or felt faint, dizzy, or lightheaded). Many (32% in Bidibidi, 57% in Kakuma) reported seeking follow-up care. Despite high experiences of morbidity, a substantial minority reported avoidance of care seeking (27% in Bidibidi, 23% in Kakuma), primarily due to fear of stigma, mistreatment, or arrest (Supplementary Material). Most (58% in Bidibidi, 53% in Kakuma) reported not feeling supported during their abortion process, and reported not having all the information they needed (52% in Bidibidi, 63% in Kakuma).

	Bidibidi (n = 601)		Kakuma (n = 600)	
	n	RDS-II % (95% SI) ^a	n	RDS-II % (95% SI) ^a
Age (years)				
15-18	88	14.7 (10.7, 18.6)	83	13.8 (10.4, 17.1)
19–24	212	35.2 (30.5, 39.9)	233	39.5 (34.9, 44.1)
25-34	213	35.6 (30.9, 40.4)	200	32.8 (28.4, 37.1)
35-44	84	14.0 (10.8, 17.1)	75	12.4 (9.3, 15.5)
45-49	4	0.6 (0.1, 1.1)	9	1.5 (0.2, 2.8)
Home country				
Burundi	0	-	142	23.4 (19.4, 27.5)
Democratic Republic of the Congo	1	0.2 (0.0, 0.4)	247	41.0 (36.3, 45.6)
Ethiopia	0	-	1	0.2 (0.0, 0.4)
Ethiopia and Kenya	0	-	1	0.2(0.0, 0.3)
Somalia	0	_	7	1.0 (0.3, 1.8)
South Sudan	566	-	122	1.2 (0.0, 2.0) 22 2 (18 8 25 7)
Sudan	1	01 (00 03)	48	82 (50 114)
Uganda	33	6.0 (3.9, 8.1)	16	2.6 (1.5, 3.7)
Educational attainment	55	(33,)		
In school (unknown level)	0	-	1	0.1 (0.1, 0.1)
No schooling	59	10.1 (6.8, 13.5)	72	11.8 (8.8, 14.9)
Some/completed primary	423	70.5 (65.9, 75.1)	217	36.2 (31.7, 40.6)
Some/completed secondary school	114	18.5 (14.7, 22.2)	261	43.8 (39.2, 48.5)
Some college	1	0.1 (0.0, 0.2)	10	1.6 (0.3, 2.9)
Technical/Vocational training	4	0.8 (0.0, 1.6)	39	6.4 (3.8, 9)
Marital status				
Married	203	34.1 (29.3, 38.8)	82	13.7 (10.2, 17.3)
In a relationship, living together as partners	53	9.1 (6.1, 12.0)	22	3.6 (2.1, 5.1)
In a relationship, not living together	38	5.8 (3.7, 8.0)	65	11.0 (8.0, 14.0)
Single	196	32.8 (28.0, 37.7)	240	40.0 (35.4, 44.6)
Divorced	3	0.5 (0.0, 1.4)	14	2.3 (0.8, 3.8)
Separated	91	14.9 (11.9, 18)	126	21.1 (17.4, 24.7)
Widowed	15	2.4 (1.1, 3.7)	50	8.1 (5.5, 10.7)
No response	2	0.4 (0.0, 0.9)	1	0.2 (0.0, 0.4)
Employment	526	977 (946 007)	457	76 4 (77 6 90 7)
Where do you twoically go for health care?	520	07.7 (04.0, 90.7)	457	70.4 (72.0, 80.2)
(multiple responses allowed)				
Non-governmental organization facility	588	97.9 (97.0, 98.7)	597	99.5 (98.8, 100.0)
Pharmacy	5	0.8 (0.3, 1.4)	15	2.5 (0.9, 4.2)
Private facility	28	4.2 (3.0, 5.5)	9	1.4 (0.7, 2.2)
Government facility	47	7.9 (5.6, 10.1)	1	0.2 (0.0, 0.7)
Village Health Team	3	0.5 (0.0, 1.3)	0	-
Traditional healer	6	1.1 (0.0, 2.3)	0	-
Herbs (self-treated)	5	0.8 (0.2, 1.5)	1	0.2 (0.0, 0.7)
Years living in camp/settlement				
Less than 1 year	1	0.2 (0.0, 0.5)	54	9.1 (6.3, 11.9)
1–4 years	39	6.6 (4.3, 8.8)	179	29.7 (25.4, 34.1)
5-9 years	541	89.8 (8/.1, 92.4)	202	33.9 (29.4, 38.5)
10-14 years	4	0.6 (0.2, 1.0)	115	18.9 (15.3, 22.4)
15-19 years	3	0.5(0.3, 0.6)	22	3.7 (2.0, 5.5)
20+ years	13	2.4 (1.0, 3.0)	20	4.7 (3.3, 0.0)
No births	170	21 5 (17 2 25 9)	155	258 (217 200)
1 birth	119	19.6 (15.7 23.6)	در <u>۰</u> 11۹	20.1 (16 3 24 0)
2–3 births	170	28.3 (23.9. 32.6)	159	26.7 (22.5. 30.9)
4-6 births	169	28.3 (23.9, 32.6)	129	21.0 (17.3, 24.8)
7 or more births	14	2.3 (0.7, 3.9)	38	6.3 (4.1, 8.6)
			(Table 1	continues on next page)

	Bidibidi (n = 601)		Kakuma (n = 600)	
	n	RDS-II % (95% SI) ^a	n	RDS-II % (95% SI) ^a
(Continued from previous page)				
Number of children				
No children	110	18.5 (14.2, 22.7)	106	17.8 (14.0, 21.7)
1 child	86	14.3 (10.5, 18.0)	80	13.3 (10.0, 16.5)
2-3 children	130	21.7 (17.7, 25.8)	181	30.3 (26.0, 34.6)
4–6 children	186	30.7 (26.4, 35.0)	163	27.0 (23.0, 31.0)
7 or more children	88	14.6 (11.2, 18.0)	70	11.6 (8.6, 14.5)
Number of abortions in past 5 years				
1 abortion	467	77.9 (73.8, 82.0)	484	81.1 (77.5, 84.7)
2 abortions	121	20.0 (16.1, 23.9)	95	15.6 (12.2, 18.9)
3 abortions	13	2.1 (0.5, 3.7)	11	1.8 (0.6, 2.9)
4 abortions	0	-	8	1.3 (0.2, 2.3)
5 or more abortions	0	-	2	0.3 (0.0, 0.8)
^a All proportions are weighted to account for respondent-driven sample	ing (RDS) using the	RDS-II estimator; intervals are si	imulation interval	s (SI).

Table 1: Selected sociodemographic characteristics (N = 1201).

Characteristic	ristic Bidibidi (n = 601)		Kakuma (n = 600)	
	n	RDS-II % (95% SI) ^a	n	RDS-II % (95% SI) ^a
Year of most recent abortion				
2017	18	3.1 (1.6, 4.6)	16	2.7 (1.3, 4.1)
2018	75	12.7 (9.1, 16.3)	48	7.9 (5.9, 9.8)
2019	67	11.0 (8.2, 13.9)	57	9.7 (7.3, 12.1)
2020	101	17.0 (13.3, 20.8)	91	15.1 (11.6, 18.6)
2021	162	27.2 (22.7, 31.7)	164	27.5 (23.4, 31.5)
2022	178	28.9 (24.5, 33.4)	224	37.2 (32.4, 42.0)
Estimated gestational age				
6 weeks or earlier	213	35.5 (31.0, 40.1)	253	42.1 (37.4, 46.8)
7–13 weeks	347	58.0 (53.2, 62.8)	275	46.1 (41.4, 50.8)
14–20 weeks	12	1.7 (0.4, 2.9)	22	3.6 (1.9, 5.3)
Not sure	29	4.8 (2.2, 7.4)	50	8.1 (7.2, 9.1)
How did you confirm your pregnancy? ^b				
Late/missed period	518	86.3 (83.6, 89.0)	398	66.5 (62.3, 70.7)
Pregnancy symptoms	456	75.7 (71.6, 79.7)	367	61.1 (56.8, 65.5)
Pregnancy test (any)	195	32.1 (27.4, 36.7)	364	60.6 (56.1, 65.1)
Pregnancy test (urine, in facility)	190	31.2 (26.6, 35.9)	245	41.1 (36.4, 45.8)
Pregnancy test (blood, in facility)	2	0.3 (0.0, 0.8)	20	3.2 (1.7, 4.7)
Pregnancy test (urine, at home)	3	0.6 (0.0, 1.4)	109	18 (14.2, 21.7)
Ultrasound	2	0.4 (0.0, 1.1)	0	-
What was the primary reason for your abortion? ^b				
Unsupportive partner	351	59.2 (54.3, 64.1)	270	44.9 (40.2, 49.6)
Economic reasons	324	53.9 (48.9, 58.9)	368	61.3 (56.9, 65.7)
To continue education	142	24.0 (19.4, 28.7)	119	20.1 (16.3, 23.9)
Not ready for a child	104	17.4 (13.2, 21.6)	51	8.5 (5.9, 11.0)
Fear of partner desertion	90	15.2 (11.7, 18.7)	208	34.6 (30.1, 39.1)
Who else was involved in your abortion decision?				
Only myself	451	75.3 (71.1, 79.4)	331	54.9 (50.2, 59.6)
My friend	103	17.4 (13.6, 21.1)	179	30.0 (25.8, 34.2)
My partner	33	5.3 (3.3, 7.2)	62	10.4 (7.3, 13.6)
My relative(s)	14	2.3 (1.5, 3.1)	24	3.9 (2.3, 5.5)
How did you know where to go/what to do to end your pregnancy?				
Health care worker/organization told me	8	1.3 (0.5, 2.1)	6	1.0 (0.2, 1.9)
Heard from community	33	5.3 (3.5, 7.1)	49	8.1 (5.5, 10.7)
Know from home country	21	3.7 (2.1, 5.3)	19	3.1 (1.2, 5.0)
			(Table 2 c	ontinues on next page)

	Bidibidi (n = 601)		Kakuma (n = 600)	
	n	RDS-II % (95% SI) ^a	n	RDS-II % (95% SI) ^a
(Continued from previous page)				
My friend told me	399	66.1 (61.8, 70.5)	312	52.4 (47.7, 57.1)
My neighbor told me	13	2.2 (0.8, 3.5)	24	3.9 (2.1, 5.6)
My partner told me	7	1.2 (0.2, 2.1)	26	4.4 (2.3, 6.5)
My relative told me	44	7.5 (5.1, 9.8)	26	4.3 (2.7, 5.9)
Nowhere/no one	61	10.1 (7.8, 12.4)	110	18.2 (14.8, 21.6)
Pharmacist/chemist/herbalist	15	2.6 (1.2, 4.1)	20	3.2 (1.6, 4.9)
Other	0	-	8	1.4 (0.5, 2.2)
Who performed the abortion?				
Self	495	82.4 (78.7, 86.0)	412	68.4 (64.1, 72.7)
Friend/relative/partner	68	11.6 (8.4, 14.7)	86	14.6 (11.3, 17.9)
Pharmacist/chemist	10	1.6 (0.4, 2.9)	64	10.8 (7.9, 13.7)
Midwife	8	1.3 (0.6, 1.9)	0	-
Nurse	8	1.4 (0.1, 2.6)	0	-
Doctor	3	0.5 (0.4, 0.7)	14	2.2 (1.1, 3.4)
Health officer	2	0.3 (0.1, 0.5)	1	0.2 (0.1, 0.3)
Community health worker	0	-	3	0.5 (0.0, 1.3)
Other health worker	5	0.7 (0.1, 1.4)	11	1.8 (0.6, 3.0)
Traditional healer	1	0.1 (0.1, 0.2)	6	0.9 (0.4, 1.5)
Other	1	0.1 (0.1, 0.2)	3	0.5 (0.0, 1.0)
Where did the abortion take place?				
Didn't go anywhere (own home)	299	49.7 (44.7, 54.7)	295	49.1 (44.4, 53.8)
Someone's home	209	34.7 (29.5, 39.9)	126	21.0 (17.2, 24.9)
Clinic or health facility	53	8.7 (6.4, 10.9)	28	4.6 (2.7, 6.4)
Pharmacy/chemist	36	6.2 (3.9, 8.5)	114	19.0 (15.4, 22.6)
Shop/market	0	-	27	4.6 (2.3, 6.8)
Other	4	0.6 (0.2, 1.1)	10	1.7 (0.5, 2.8)
What method did you use? ^b				
Traditional herbs	486	81.1 (77.6, 84.5)	269	44.7 (39.9, 49.4)
Pharmaceuticals (antibiotics, antimalarials, painkillers)	73	11.9 (9.0, 14.9)	163	27.3 (23.5, 31.0)
Medication abortion	34	5.8 (3.8, 7.9)	145	23.9 (20.1, 27.8)
Manual vacuum aspiration (procedural abortion)	1	0.1 (0.1, 0.2)	6	1.0 (0.2, 1.9)
Other unsafe methods (detergents, boiled coins, alcohol, etc)	37	5.7 (4.0, 7.4)	218	36.3 (31.8, 40.7)
^a All proportions are weighted to account for respondent-driven sampling (RDS) usin possible.	g the RDS-II es	timator; intervals are simulati	on intervals (!	SI). ^b Multiple answers were

Table 4 presents population (RDS-II weighted) healthcare seeking experiences among those who sought follow-up care (n = 194 in Bidibidi, n = 339 in Kakuma). Most sought care at a clinic or health facility (85% in Bidibidi, 54% Kakuma). Reasons for seeking care were primarily for concerns around bleeding (45% in Bidibidi, 53% in Kakuma) or pain (69% in Bidibidi, 66% in Kakuma). Common treatments received were pain medications (60% in Bidibidi, 56% in Kakuma) and antibiotics (24% in Bidibidi, 44% in Kakuma). Sixty-six participants in Kakuma (19%) and three (2%) participants in Bidibidi reported receiving a manual vacuum aspiration as post-abortion care.

Using the sequential-sampling population size estimate approach, we estimate that the underlying population size of women who have had an abortion in the past five years is 8734 women in Bidibidi, or approximately 21% of all women of reproductive age in Bidibidi. In Kakuma, the estimated population size of women who have had an abortion in the past five years is 8537, or approximately 23% of all women of reproductive age in Kakuma. Assuming that the underlying population proportion of number of abortions an individual has over a five-year period is the RDS-II weighted proportions from this sample, this corresponds to an annual abortion rate of 52 per 1000 women of reproductive age in Bidibidi (95% simulation interval 20–106) and 55 per 1000 women of reproductive age in Kakuma (95% simulation interval 19–119) (Fig. 1).

The health facility assessment included 27 health facilities across the 2 settings; 11 in Kakuma and 16 in Bidibidi. The key informants reported that only 5 were providing safe abortion services (1 in Bidibidi, 4 in Kakuma) while 15 out of 16 in Bidibidi and 9 out of 11 in Kakuma reported providing post-abortion care.

Characteristic	Bidibidi (n = 601)			Kakuma (n = 600)			
	n	RDS-II % (95% SI) ^a	n	RDS-II % (95% SI) ^a			
Did you have a complete abortion?							
Yes	572	94.8 (92.8, 96.8)	541	90.2 (87.5, 92.9)			
No	28	4.9 (3.0, 6.9)	54	8.9 (6.3, 11.6)			
Not sure	1	0.2 (0.0, 0.7)	5	0.9 (0.1, 1.6)			
How did you know your abortion was complete? ^b							
Bleeding stopped	254	44.5 (39.4, 49.6)	230	42.5 (37.7, 47.3)			
Saw products of conception	381	66.6 (62.0, 71.1)	360	66.5 (62.1, 70.9)			
Period returned	244	42.7 (37.6, 47.9)	186	34.4 (29.5, 39.3)			
Pregnancy symptoms went away	242	42.5 (37.4, 47.5)	154	28.3 (23.6, 33.1)			
Negative pregnancy test	63	11.2 (8.0, 14.3)	148	27.5 (23.1, 31.9)			
Signs of potential complications ^b							
Experienced at least one sign of potential complications	532	88.3 (84.4, 92.2)	588	98.0 (97.1, 99.0)			
Discharge	223	36.5 (31.9, 41.2)	372	61.9 (57.5, 66.3)			
Fever	400	66.6 (61.7, 71.5)	378	62.8 (58.4, 67.2)			
Heavy bleeding	417	69.9 (65.4, 74.4)	507	84.4 (81.1, 87.7)			
Felt faint	419	69.4 (64.6, 74.2)	494	82.2 (78.9, 85.5)			
Extreme pain	424	70.8 (66.3, 75.3)	446	74.3 (70.2, 78.3)			
Did you seek follow-up care?							
Didn't want to seek care	248	41.7 (36.6, 46.7)	125	20.7 (16.7, 24.7)			
Sought care	194	31.6 (27.3, 35.8)	339	56.5 (51.7, 61.2)			
Wanted to seek care but didn't	159	26.8 (22.3, 31.3)	136	22.9 (18.7, 27.1)			
Did you have all the support you needed?							
Yes	255	42.1 (37.3, 46.9)	283	47.3 (42.6, 52.0)			
No	346	57.9 (53.1, 62.7)	317	52.7 (48.0, 57.4)			
Did you have all the information that you needed?							
Yes	254	41.8 (37.0, 46.6)	197	32.8 (28.3, 37.2)			
No	311	52.2 (47.3, 57.1)	376	62.8 (58.1, 67.4)			
Not sure	36	6.0 (3.7, 8.2)	27	4.5 (2.4, 6.5)			
Have you ever heard of medication abortion?							
Yes	109	18.1 (14.6, 21.6)	205	34 (29.7, 38.2)			
No	465	77.3 (73.3, 81.2)	385	64.4 (60.1, 68.7)			
Not sure	27	4.6 (2.5, 6.8)	10	1.6 (0.7, 2.6)			
^a All proportions are weighted to account for respondintervals are simulation intervals (SI). ^b Multiple answ	^a All proportions are weighted to account for respondent-driven sampling (RDS) using the RDS-II estimator; intervals are simulation intervals (SI). ^b Multiple answers were possible.						

Table 3: Abortion outcome and care seeking (N = 1201).

Discussion

This study found that most women and girls in Kakuma Refugee Camp, Kenya and Bidibidi Refugee Settlement, Uganda did not use or have access to abortion methods recommended by the World Health Organization. Instead, traditional herbs, non-medication abortion pharmaceutical drugs, or other unsafe methods or toxins were used. Reporting of abortion-related morbidity was high. Very few obtained an abortion in a healthcare facility, and overall knowledge of safe abortion methods was low. Estimates of the underlying population size of women terminating their abortion in the past five years indicate that nearly one quarter of the camp population of women of reproductive age may have a need for abortion services; this need is not currently being met by existing health-providing organizations within the camp.

Our estimates of abortion incidence in these camps are similar to estimates of abortion incidence in the East Africa region.²⁴ There is a lack of directly measured population-level data on the abortion methods used in either country. However, existing research suggests that despite the restrictive abortion legal environment in Kenya and Uganda, facility-based procedural abortion and medication abortion (self-managed or facilitymanaged) are available to some with navigation.25-27 Modeled estimates of abortion safety find that nearly a quarter of abortions in the region are performed under safe conditions.28 Findings from this study suggest that while abortion incidence may be similar between the refugee camps and the host country, those in the host country may have better access to safer methods of abortion (though access is still a substantial challenge for most).

Findings from this quantitative study align with qualitative research in other humanitarian settings, which have found that women living in these settings often resort to unsafe abortion practices,¹⁰ and provide additional key population-level data on abortion practices and possible avenues for intervention. For example, participants in this study largely relied on informal networks of friends for information on how to terminate their pregnancies, yet there was very low awareness of misoprostol as a WHO-recommended medication for abortion. Strategies that focus on peer-to-peer information sharing and community-level interventions on safe abortion methods could potentially increase information and access, if referrals to qualified abortion providers or access to safe abortion methods exist. Furthermore, as many sought assistance for their abortion from pharmacists, improving access to medication abortion via pharmacies and information about effectiveness and safety of selfmanaged abortion (when an individual using WHOrecommended medications without clinical supervision) may be a successful approach.

Self-care interventions have been proposed as a strategy to improve sexual and reproductive health in humanitarian settings.²⁹ Self-managed medication abortion is as safe and effective as clinician-managed medication abortion,³⁰ and is recommended by the WHO as a model of abortion care.³¹ Evidence from other settings have demonstrated the safety, acceptability, and effectiveness of various models of providing information and support to individuals self-managing, such as access to medications via pharmacists or drug sellers,³² abortion accompaniment networks,³⁰ and community-distribution programs.³³ One study on the Thai-Myanmar border with migrant and refugee women found that community-based distribution of misoprostol for pregnancy termination was a safe and effective

	Bidibidi (n	Bidibidi (n = 194)		n = 339)
	n	RDS-II % (95% SI) ^a	n	RDS-II % (95% SI) ^a
Reason for seeking care ^b				
Bleeding	86	44.5 (35.5, 53.5)	179	52.8 (46.5, 59.0)
Pain	133	68.9 (60.7, 77.2)	223	65.8 (59.9, 71.7)
Fever	41	21.4 (14.3, 28.5)	82	23.9 (18.5, 29.3)
Manual vacuum aspiration (procedural abortion)	1	0.5 (0.4, 0.5)	14	4.0 (2.4, 5.7)
To know if abortion was complete	44	23.3 (15.2, 31.4)	29	8.6 (4.5, 12.8)
Where did you seek care?				
Original provider	0	-	9	2.7 (0.4, 5.1)
Clinic or health facility	166	84.8 (78.0, 91.7)	183	53.5 (47.3, 59.8)
Friend	5	2.5 (0.2, 4.8)	28	8.5 (4.9, 12.0)
Pharmacist/chemist	20	11.0 (5.1, 16.9)	90	26.9 (21.3, 32.5)
Traditional healer	2	1.1 (0.0, 4.3)	4	1.2 (0.0, 3.0)
Other	1	0.6 (0.0, 1.9)	25	7.1 (3.6, 10.6)
What medical treatment did you receive? ^b				
Antibiotics	48	23.6 (16.5, 30.8)	148	43.5 (37.3, 49.8)
Manual vacuum aspiration (procedural abortion)	3	1.7 (0.0, 5.0)	66	19.0 (14.7, 23.3)
Pain medication	117	59.6 (50.9, 68.4)	190	56.1 (50.0, 62.3)
Intravenous fluids	33	16.6 (10.5, 22.7)	63	18.7 (14.1, 23.4)
Blood products	6	3.1 (0.0, 6.1)	20	6.0 (3.6, 8.3)
Other surgical procedure (unknown)	2	0.9 (0.5, 1.3)	7	2.1 (0.8, 3.4)
Misoprostol	6	3.1 (0.8, 5.3)	4	1.2 (0.0, 2.6)

Table 4: Healthcare seeking experiences (N = 533).



Fig. 1: Legend: * Kenya and Uganda country estimates of abortion incidence are from Bearak and colleagues.²⁴ Error bars for country estimates correspond to 95% uncertainty intervals (UI). Kenya estimated abortion incidence is 43 abortions per 1000 women of reproductive age (95% UI 29–61). Uganda estimated abortion incidence is 43 abortions per 1000 women of reproductive age (95% UI 29–60). +Kakuma and Bidibidi estimates of abortion incidence were computed using the successive sampling population size estimation approach using data from the present study. Error bars for Kakuma and Bidibidi estimates correspond to 95% simulation intervals (SI) over 1000 Markov chain Monte Carlo simulations. Kakuma estimated abortion incidence is 55 abortions per 1000 women of reproductive age (95% SI 19–119). Bidibidi estimated abortion incidence is 52 abortions per 1000 women of reproductive age (95% SI 20–106).

strategy for expanding access to safe abortion care in conflict-affected settings.³³ However, additional research on successful interventions in these settings are sorely needed.^{34,35}

In addition to strategies to improve access to selfmanaged abortion information and support, overcoming barriers to provision of facility-based care is of vital importance. Similar to other humanitarian settings,³⁶ access to facility-based abortion care was extremely limited and few providers reported providing abortion care. In our study, few participants sought safe abortion care or information from the formal healthcare sector; findings from other studies have highlighted mistrust or denial of services37 and fear of legal consequences, mistreatment, and stigma as barriers to seeking facility-based abortion care. In addition, around one-fifth of respondents reported 2 or more abortions in the past five years, highlighting the continued need for safe abortion care. In data from this sample reported elsewhere, 72% of respondents were not using a method of contraception at the time of the survey,17 possibly indicating a broader lack of access to sexual and reproductive health services. Similar to prior qualitative findings,4 findings from our study also highlight the impact of lack of abortion provision at facilities on access to post-abortion care, as participants report not seeking care despite wanting or needing care. Humanitarian agencies should renew and strengthen their efforts to provide safe abortion and post-abortion care for refugees. Indeed, the Minimum Initial Service Package (MISP) for Sexual and Reproductive Health, which sets global standards for life-saving SRH in acute or early humanitarian emergencies, has included abortion care as a critical component of responding to the needs of survivors of sexual violence since 2018.3 Experiences from Bangladesh, where coordination between UNFPA, government, humanitarian, and non-governmental organizations established safe abortion services for Rohingya refugees, demonstrated that introducing and implementing safe abortion even in acute emergencies is not only possible, but desired and practical.³⁸ Additional studies have highlighted the success of clinical trainings in improving health provider attitudes and capacity for safe abortion and post-abortion care as a necessary investment.39 Health provider capacitybuilding and facility strengthening for abortion care in humanitarian settings are crucial steps to improve access and trust in facility-based services.

This study is not without limitations. Although RDSweighting approaches are intended to account for selection bias, without gold-standard population data, it is impossible to know whether the study sample generated by RDS is representative of the underlying population of women with recent abortion experiences in these two humanitarian settings. For example, in Kakuma, the RDSweighted proportion of Somali participants in the study is much lower than the overall proportion of camp residents from Somalia, and the RDS-weighted proportion of participants from Burundi and the Democratic Republic of Congo is higher than the proportion of camp residents from these countries. However, it is unknown whether this is due to unresolved selection bias in our sampling and weighting approach, which may have inadvertently excluded participants from these countries due to cultural or linguistic barriers or differences in willingness to share abortion experiences, or whether there are true differences in abortion incidence by country of origin. We are also unable to comment on the effectiveness of any reported abortion method-while we sought to recruit individuals with unsuccessful and successful abortion attempts, it is possible that participants interpreted the eligibility to only include successful abortions, or that individuals with unsuccessful abortions that were carried to term may be less likely to participate in a study about abortion. While we attempted to collect detailed information on medication abortion use, including brand name, color and shape and number of tablets, and route of administration, we were still unable to confidently ascertain whether medication abortion usage reported by participants in this study were WHO-recommended medications for abortion, or just perceived by participants to be medication abortion. It is possible that these findings may not be applicable to other refugee contexts, particularly in places where abortion is less restricted-however, prior studies have found abortion services to be largely unavailable in refugee contexts regardless of the legal status of the host country.^{1,2} Finally, our estimates of abortion incidence rely on untestable assumptions about the underlying population, and have low precision; however, they are largely aligned with other estimates of abortion incidence in the East Africa region (43 per 1000).24

These limitations are balanced by several strengths. Our study of 1201 participants across two study sites represents, to our knowledge, the largest study sample of women who have had abortions while living in a humanitarian context and largest study sample of women with abortion experiences recruited via RDS. Additionally, given that a substantial proportion of participants in our sample reported not ever seeking post-abortion care, we are confident that we were able to reach a broader sample of participants than studies that rely exclusively on recruitment from health facilities. This study sheds much needed light on the abortion experiences of women living in refugee settings and the underlying need for abortion services, and yields important findings on the applicability of RDS as a methodologic tool and sampling approach in this context.

Findings from our study clearly indicate that additional resources should be dedicated to improving infrastructure for safe abortion in humanitarian settings. Our research also reveals that despite a demonstrated need for abortion services among refugee women and girls, there is a severe lack of access to WHO-recommended methods of abortion in humanitarian settings. Practitioners and policymakers should dedicate resources to training providers on provision of safe abortion, and building trust and awareness of the availability of these services for those living in refugee contexts. Increased access to and availability of WHO-recommended medication abortion methods, and programs to increase medication abortion knowledge and support, can expand the cadres of providers who can offer safe abortion care, and expand opportunities for self-managed medication abortion use. Initiatives to increase information and support for self-managed medication abortion should occur in tandem with efforts to strengthen facility-based abortion care. Humanitarian agencies and advocates should renew and strengthen their efforts to make facility-based abortion care accessible, as individuals not only deserve the right to have an abortion, but to decide where, how, and with what support their abortion takes place.

Contributors

All authors contributed to the quantitative study conceptualization and design. RJ, WB, JN, LO, CO, and TF managed data collection and quality. RJ and CZ conducted the RDS quantitative analyses. RJ led the writing of the manuscript, with contributions, review, and approval from all authors. TF and BP conceptualized and conducted analysis on the facility assessment. All authors read and approved the final manuscript. All authors had access to all the data in the study, and two authors (RJ and CZ) have accessed and verified the data. All authors were responsible for the decision to submit for publication.

Data sharing statement

Due to the sensitive nature of the data collected, individual-level data from this study will not be made publicly available.

Declaration of interests

The authors have no conflicts of interest to declare.

Acknowledgements

We would like to thank the following individuals for their contributions to the study: Abby Ow, Margot Cohen, Chiara Bercu, the data collection teams in Bidibidi and Kakuma, and the Community Advisory Board members in Bidibidi and Kakuma.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.eclinm.2025.103200.

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