Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Knowledge, Perceptions, Utilization, and Determinants of Modern Contraceptive Use Among Internally Displaced Women in Conflict-Affected Sudan—A Cross-Sectional Study

Sohaib Mohammed
University of Gadarif
Tagwa kalool Fadlalla Ahmed
tagwa.kalool@gmail.com

Ahfad university for women
Fatima Ibrahim
University of Khartoum
Sarhad Mohmoud Mohammed Elamin
National Ribat university
Habiba Lawal
Baze University teaching hospital
Sara Abdellateef mohammed
University of Khartoum
Sara Mirghani
Ahfad University for Women school of Medicine
Roua Musadag Ali Elhassan
Sudan International University
Ameera Abdulwasa Mutahar Al-Humidi
University of Science and Technology
Jowaireia Gaber Al basheer Al Hassan
University of Kordofan
Sahar Abdalla Mohamed Abdalla
University Hospital Kerry
Sara Elsadig
Midland Metroploitan University Hospital
Shaza Zakaria Ibrahim Mohammed
Al-Neelain University

Research Article

Keywords:

Posted Date: November 11th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11138067/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Knowledge, Perceptions, Utilization, and Determinants of Modern Contraceptive Use Among Internally Displaced Women in Conflict-Affected Sudan—A Cross-Sectional Study

Authors

1- Sohaib Mohammed Mokhtar Ahmed

Faculty of Medicine and Health, University of Gadarif, Gadarif, Sudan

Sohaib.mohammed617@gmail.com

2- Tagwa kalool fadlalla Ahmed

Department of medicine, Ahfad university for women ,Omdurman, Sudan

tagwa.kalool@gmail.com

3- Fatima Ibrahim

Department of Medicine, University of Khartoum, Khartoum, Sudan fatmamusa31@yahoo.com

4- Sarhad Mohmoud Mohammed Elamin

Department of Medicine and Health,

University of Ribat ,Khartoum , Sudan

sarhadelamin@gmail.com

5- Habiba Lawal

Department of medicine, Baze University teaching hospital, Abuja, Nigeria

habibalawal7@gmail.com

6- Sara Abdellateef mohammed

Faculty of medicine university of khartoum, Khartoum, Sudan

Sara.lateef1999@gmail.com

7- Sara Mirghani

Department of medicine , Ahfad University for Women school of Medicine, Omdurman Sudan

sa.mirghani.99@gmail.com

8- Roua Musadag Ali Elhassan

Faculty of medicine and surgery , Sudan International University, Khartoum, Sudan

roaamosadag96@gmail.com

9- Ameera Abdulwasa Mutahar Al-Humidi

Department of Medicine and Health Sciences, University of Science and Technology, Aden, Yemen

ameeraalhumidi@gmail.com

10- Jowaireia Gaber Al basheer Al Hassan

Department of Hematology

University of Kordofan

El-Obeid - Sudan

Jowaireia@gmail.com

11- Sahar Abdalla Mohamed Abdalla.

Department Emergency,University Hospital Kerry,Tralee,Co.Kerry,Ireland.

soooshi131@gmail.com.

+353872373139

12- Sara Elsadig Babiker Ismail

Department of medicine, Midland Metroploitan University Hospital.Birmingham.UK

sara.ismail2@nhs.net

13- Shaza Zakaria Ibrahim Mohammed

Faculty of Medicine and health sciences, Al-Neelain University, Khartoum, Sudan.

shazazakaria90@gmail.com

Authors contributions:

Shaza, Tagwa, and Sara Elsadig did the methodology part, Sahar abdalla, Sohaib and Jowaireia wrote the first draft, Ameera, Roua and Sara Mirghani, wrote the final draft and did the conceptualization, Sara Abdellateef, habiba, Sarhad Mohmoud, Fatima did the data analysis and results presentations, Sohaib and tagwa did the supervision

Corresponding author:

Tagwa kalool fadlalla Ahmed

Department of medicine, Ahfad university for women ,Omdurman, Sudan

tagwa.kalool@gmail.com

Abstract

Background: Since April 2023, armed conflict in Sudan has displaced nearly 10 million people and devastated the health system, leaving millions of women without access to reproductive health services. Despite this crisis, empirical data on family planning among internally displaced women in Sudan remain scarce.

Objective: This study assessed knowledge, perceptions, utilization, and barriers to modern contraceptive use among internally displaced women in Eastern Sudan, and identified factors associated with current contraceptive use.

Methods: A community-based cross-sectional study was conducted from January to March 2026 among 257 internally displaced women aged 18–55 years in host communities across Eastern Sudan. Data were collected through structured interviewer-administered questionnaires. Multivariable binary logistic regression was used to identify factors independently associated with current contraceptive use.

Results: Current modern contraceptive use was 30.0% (77/257). Knowledge gaps were substantial: while 83.7% had heard of family planning, awareness of specific methods beyond oral pills was low (44.4% injectables, 37.0% implants). Over half (53.3%) believed pills cause infertility. Access barriers were pervasive: only 20.6% had nearby services; 70.9% reported violence affected healthcare-seeking. Independent predictors of use included university education (AOR=2.31, 95%CI:1.18–4.52), family planning counseling (AOR=3.84, 95%CI:2.01–7.34), nearby facility (AOR=2.67, 95%CI:1.33–5.36), partner approval (AOR=4.52, 95%CI:2.19–9.31), and adequate information (AOR=3.11, 95%CI:1.02–9.48). Violence affecting healthcare access reduced odds (AOR=0.48, 95%CI:0.25–0.91).

Conclusion: Internally displaced women in Sudan face a confluence of barriers to family planning—misperceptions, service collapse, partner opposition, and violence. Urgent investments in counseling, community engagement, and accessible service delivery are essential to address this reproductive health crisis.

Introduction

Armed conflict and forced displacement constitute some of the most profound disruptions to health systems and human well-being worldwide. Internally displaced persons (IDPs)—individuals who have fled their homes but remain within their country's borders—are

particularly vulnerable to health inequities, as displacement frequently severs access to essential services, social support networks, and economic stability [1]. Among IDPs, women and girls face compounded vulnerabilities, including heightened risks of gender-based violence, unintended pregnancy, and maternal morbidity and mortality, while simultaneously experiencing diminished access to reproductive healthcare [2]. The disruption of sexual and reproductive health (SRH) services in conflict settings has been well documented across diverse humanitarian contexts, from sub-Saharan Africa to the Middle East [3].

Family planning is a critical component of SRH, enabling individuals and couples to determine the number and spacing of their children, thereby contributing to reductions in maternal mortality, unsafe abortions, and high-risk pregnancies [4]. However, in humanitarian settings, access to modern contraceptive methods remains severely constrained. Studies among displaced populations have consistently identified multiple barriers to family planning utilization, including limited knowledge of contraceptive methods, fears of side effects and infertility, lack of partner and community support, financial constraints, transportation difficulties, and the physical unavailability of services [5]. In Ethiopia, for instance, over 40% of internally displaced married women were found to have an unmet need for modern contraception, with lack of access to methods and inadequate discussion with healthcare providers emerging as significant risk factors [6]. Similarly, research among displaced women in Nigeria revealed that fear of contraceptive side effects (60.3%), financial constraints (22.9%), and non-availability of services in camps (11.5%) were key barriers to use [7]. These findings underscore the urgent need for targeted interventions to address the reproductive health needs of displaced populations.

Sudan is currently experiencing one of the most severe humanitarian crises of the decade. Since the outbreak of armed conflict in April 2023, the country has witnessed massive internal displacement, with an estimated 9.8 million people displaced as of late 2025 [8]. The conflict has devastated the health infrastructure: across conflict-affected states, over 80% of health facilities are non-functional, leaving women and girls without access to safe deliveries, emergency obstetric care, or protection services [9]. An estimated 2.5 million displaced women and girls have no access to basic reproductive health services [10]. Health facilities have been destroyed, looted, or are struggling with critical shortages of staff, medicines, and supplies; those that remain operational are overwhelmed by the influx of displaced populations [11]. For displaced women and adolescent girls, the consequences have been immediate and devastating:

access to family planning, antenatal and postnatal care, and support for survivors of gender-based violence disappeared at the very moment when these services were most needed [12].

Despite the scale of Sudan's displacement crisis and the profound disruption of reproductive health services, empirical data on family planning knowledge, practices, and barriers among internally displaced women in Sudan remain scarce. Understanding the specific factors that influence contraceptive use in this population is essential for informing humanitarian response strategies and guiding resource allocation. This study, therefore, aimed to assess the knowledge, perceptions, and utilization of modern contraceptive methods among internally displaced women in Sudan, and to identify the socio-demographic, access-related, and social factors associated with current contraceptive use. The findings are intended to provide evidence-based recommendations for improving family planning service delivery in one of the world's most pressing humanitarian emergencies.

Methodology

Study Design

This study employed a community-based cross-sectional analytical design to assess the knowledge, perceptions, utilization, and barriers related to modern family planning methods among internally displaced women residing in host communities in Eastern Sudan. The study was designed to identify factors associated with current utilization of modern contraceptive methods in the context of ongoing conflict-induced displacement and disruption of reproductive health services.

Study Setting

The study was conducted in host communities located in Eastern Sudan between January and March 2026. Since the outbreak of armed conflict in Sudan in April 2023, Eastern Sudan has become a major destination for internally displaced persons (IDPs) fleeing violence from Khartoum, Al Jazirah, Darfur, Kordofan, and other conflict-affected regions. Large numbers of displaced families have settled within host communities across Gedaref, Kassala, and Red Sea States, where they reside with relatives, friends, or local residents rather than in formal displacement camps.

Study Population

The study population consisted of internally displaced women of reproductive age residing in host communities in Eastern Sudan during the study period.

Inclusion Criteria

Women were eligible to participate if they:

- Were aged 18 years or older.
- Had been displaced due to the ongoing armed conflict in Sudan.
- Were currently residing in a host community within the study area.
- Provided informed consent to participate.

Exclusion Criteria

Women were excluded if they:

- Were severely ill at the time of data collection.
- Were unable to communicate effectively during the interview.
- Declined participation or withdrew consent.

Sample Size Determination

The sample size was calculated using the single population proportion formula for cross-sectional studies:

$$n = Z^2 \frac{P(1 - P)}{d^2}$$

Where:

- n = required sample size
- Z = standard normal value corresponding to a 95% confidence level (1.96)
- P = assumed prevalence of 50% due to the absence of prior studies among internally displaced women in Sudan
- d = margin of error of 5%

Using these assumptions, the minimum required sample size was calculated as 384 participants. To account for possible non-response, the target sample size was increased to approximately 400 participants.

However, because of logistical constraints, security concerns, mobility of displaced populations, and difficulties in accessing eligible participants during the study period, the target sample size could not be achieved. Consequently, a total of 257 internally displaced women were successfully recruited and included in the final analysis.

Sampling Technique

A convenience sampling technique was employed. Internally displaced women who met the inclusion criteria and were accessible within the selected host communities during the study period were approached and invited to participate in the study.

Given the humanitarian context, ongoing population movements, and security-related limitations, probability-based sampling was not feasible. Recruitment was therefore conducted consecutively until the maximum attainable sample size was reached.

Data Collection Instrument

Data were collected using a structured interviewer-administered questionnaire developed specifically for the purposes of this study following an extensive review of published literature on family planning utilization, reproductive health, displacement-related barriers, and humanitarian health interventions.

The questionnaire comprised five major sections.

- The first section collected socio-demographic and displacement-related information, including age, marital status, educational level, number of living children, state of origin, duration of displacement, current place of residence, and history of repeated displacement.
- The second section assessed participants' knowledge and perceptions regarding modern family planning methods. This section explored awareness of modern contraceptive methods, recognition of specific contraceptive options, and beliefs regarding the safety and potential adverse effects of oral contraceptive pills.
- The third section focused on family planning practices and reproductive intentions, including current contraceptive use, previous contraceptive experience, preferred contraceptive methods, and fertility intentions.
- The fourth section assessed access-related barriers to family planning services, including availability of nearby healthcare facilities, transportation difficulties, perceived safety while seeking healthcare, availability of trained healthcare providers, contraceptive supply shortages, and access to family planning counseling.
- The fifth section examined social and security-related factors influencing contraceptive utilization, including partner approval, community attitudes toward contraception, experiences of violence, and the impact of insecurity on healthcare-seeking behavior.

The questionnaire was originally developed in English and subsequently translated into Arabic. The translated version was reviewed by specialists in obstetrics and gynecology, reproductive health, and public health to ensure clarity, cultural appropriateness, and content validity.

Pilot Testing and Reliability Assessment

Prior to the main study, a pilot test was conducted among 20 internally displaced women residing in host communities outside the selected study sites. Feedback obtained during pilot testing was used to revise the wording, sequencing, and structure of several questions to improve clarity and participant understanding.

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient to determine internal consistency. The instrument demonstrated acceptable reliability, with a Cronbach's alpha value of 0.71. Participants included in the pilot study were excluded from the final analysis.

Data Collection Procedure

Data were collected through face-to-face interviews conducted by trained female data collectors with backgrounds in medicine, nursing, or public health. Prior to data collection, all data collectors received training on the objectives of the study, interview techniques, ethical principles, confidentiality, informed consent procedures, and the management of sensitive reproductive health issues.

Interviews were conducted in private locations within the participants' communities to ensure confidentiality and encourage honest responses. Each interview required approximately 20–30 minutes to complete. Completed questionnaires were checked daily by the principal investigator to ensure completeness, consistency, and data quality.

Study Variables

Dependent Variable

The primary outcome variable was current utilization of a modern contraceptive method, categorized as:

- Yes
- No

Independent Variables

Independent variables included:

Socio-demographic characteristics

- Age
- Marital status
- Educational level
- Number of living children

Displacement-related characteristics

- State of origin
- Duration of displacement
- Current residence type
- History of multiple displacements
- Pregnancy since displacement

Knowledge and perception variables

- Awareness of modern family planning methods
- Recognition of contraceptive methods
- Perceived safety of oral contraceptive pills
- Beliefs regarding infertility, cancer, and other adverse effects

Access-related factors

- Availability of nearby family planning services
- Transportation barriers
- Distance barriers
- Availability of trained healthcare providers
- Family planning counseling
- Availability of contraceptive supplies

Social and security-related factors

- Partner approval
- Community support
- Experience of violence
- Impact of insecurity on healthcare access

Data Management and Statistical Analysis

Data were entered, cleaned, coded, and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics were used to summarize study variables. Continuous variables were presented as means and standard deviations, whereas categorical variables were summarized using frequencies and percentages. Bivariate analyses were performed to examine associations between independent variables and current contraceptive utilization. The Chi-square test was used to assess statistical significance between categorical variables. Variables with statistically significant associations during bivariate analysis, together with variables considered epidemiologically relevant based on previous literature,

were entered into a multivariable binary logistic regression model to identify factors independently associated with current contraceptive use. Adjusted odds ratios (AORs) with corresponding 95% confidence intervals (95% CI) were calculated. Statistical significance was considered at a p-value less than 0.05.

Ethical Considerations

Ethical approval for the study was obtained from the Ethical Committee of the Faculty of Medicine and Health Sciences, Gedaref University, Sudan, prior to commencement of the study. Permission to conduct the study was obtained from relevant local authorities and community leaders within the selected host communities. Participation was entirely voluntary, and written informed consent was obtained from all participants before enrollment.Participants were informed about the purpose of the study, the procedures involved, potential benefits and risks, their right to refuse participation, and their right to withdraw from the study at any stage without any consequences. To maintain confidentiality, no personal identifiers were collected, and all questionnaires were assigned unique identification codes. Data were stored securely and accessed only by members of the research team. Particular care was taken when discussing sensitive topics related to reproductive health, contraceptive use, violence, and displacement experiences. Participants requiring reproductive health services or psychosocial support were referred to appropriate healthcare facilities whenever necessary.

Results

The study included 257 displaced women with a mean age of 28.7 years (SD = 7.5, range: 18–55 years). As detailed in Table 1, all participants were currently displaced due to

conflict, with the majority being married (75.9%), while 15.2% were single, 5.8% widowed, and 3.1% divorced. Over half had attained university-level education or higher (51.0%), followed by secondary (29.6%), primary (13.6%), and no formal education (5.8%). Most participants had 1–2 living children (53.3%) or none (34.6%), and the primary regions of origin were Al Jazirah (35.8%) and Khartoum (35.4%). The majority had been displaced for 6–12 months (47.1%) or 1–2 years (40.5%), with 51.4% residing in informal settlements, and over one-third (35.8%) reported multiple displacements; moreover, 27.6% had become pregnant since displacement.

Regarding knowledge and perceptions (Table 2), 83.7% had heard of modern family planning methods. When prompted to recognize specific methods (Figure 1), the highest recognition was for oral contraceptive pills (79.0%), followed by injectable contraceptives (44.4%), implants (37.0%), IUDs (32.7%), male condoms (21.8%), and emergency contraceptive pills (13.2%), with 7.8% not knowing any method. Perceptions of oral contraceptive pills revealed considerable concerns: only 32.7% believed they are safe for most women, while 53.3% believed they may cause infertility, 12.1% believed they may cause cancer, and 5.1% believed they may cause permanent bodily harm.

As shown in Table 3, current modern contraceptive use was reported by 30.0% of participants, whereas 70.0% were not using any method. Among current users, oral contraceptive pills were the most common method (68.1%), followed by injectables (19.5%), implants (8.0%), and IUDs (3.5%). Overall, 42.4% had ever used oral contraceptive pills. Among non-current users, 29.4% expressed a desire to delay or stop pregnancy, while 56.2% did not and 14.4% were unsure.

Table 1. Socio-demographic Characteristics of the Participants (N = 257)

Variable	n (%)
Age (years)	

Variable	n (%)
Mean ± SD	28.7 ± 7.5
Range	18–55
Currently displaced due to conflict	
Yes	257 (100.0)
Pregnancy since displacement	
Yes	71 (27.6)
No	186 (72.4)
Marital status	
Married	195 (75.9)
Single	39 (15.2)
Widowed	15 (5.8)
Divorced	8 (3.1)
Highest educational level	
University or higher	131 (51.0)
Secondary	76 (29.6)
Primary	35 (13.6)
No formal education	15 (5.8)
Number of living children	
None	89 (34.6)
1–2	137 (53.3)
3–4	31 (12.1)
State/region of origin before displacement	
Al Jazirah	92 (35.8)
Khartoum	91 (35.4)
Kordofan	61 (23.7)
Darfur	13 (5.1)
Duration of displacement	
< 6 months	19 (7.4)
6–12 months	121 (47.1)
1–2 years	104 (40.5)
> 2 years	13 (5.1)
Current residence	
Informal settlement	132 (51.4)
Host community	81 (31.5)
Formal IDP camp	36 (14.0)
Other	8 (3.1)
Multiple displacements due to conflict	
Yes	92 (35.8)
No	165 (64.2)

Table 2. Knowledge and Perceptions Regarding Family Planning and Oral Contraceptive Pills among Displaced Women (N = 257)

Variable	Yes n (%)	No n (%)	Don't Know n (%)
Heard of modern family planning methods	215 (83.7)	42 (16.3)	0 (0.0)
Believes oral contraceptive pills are safe for most women	84 (32.7)	163 (63.4)	10 (3.9)
Believes oral contraceptive pills may cause infertility	137 (53.3)	115 (44.7)	5 (1.9)

Variable	Yes n (%)	No n (%)	Don't Know n (%)
Believes oral contraceptive pills may cause cancer	31 (12.1)	206 (80.2)	20 (7.8)
Believes oral contraceptive pills may cause permanent bodily harm	13 (5.1)	194 (75.5)	50 (19.5)

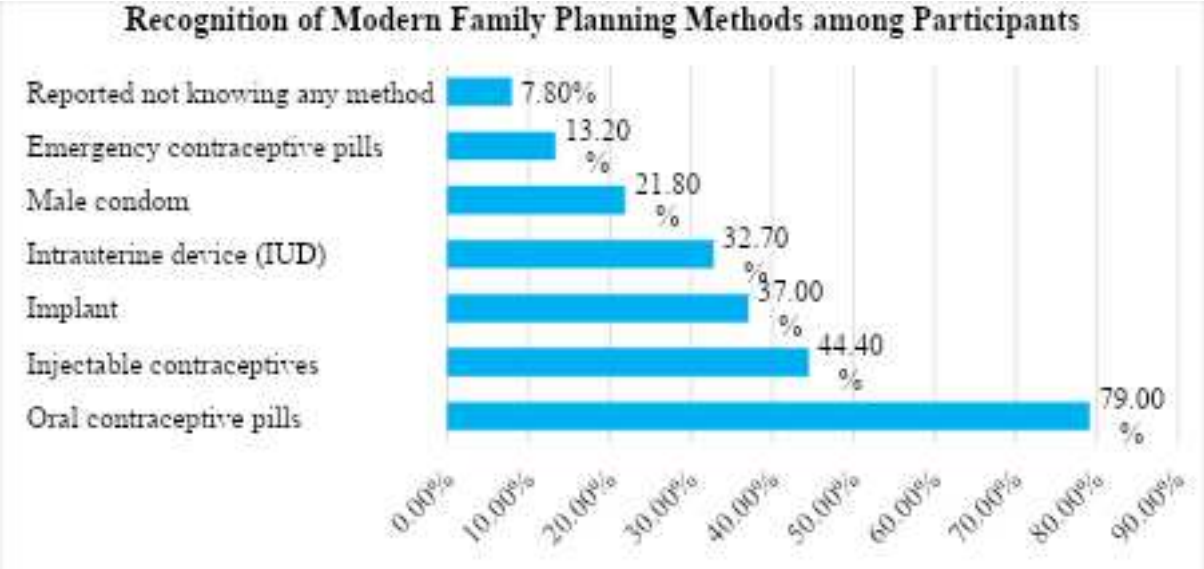


Figure 1. Recognition of Modern Family Planning Methods among Participants (Multiple Responses Allowed; N = 257)

Access barriers to family planning services are presented in Table 4. Only 20.6% reported having a nearby facility providing family planning services, while 70.4% reported none. Distance was a minor problem for 74.7% and a major problem for 15.2%, and transportation was a minor or major problem for 58.0% and 28.4%, respectively. Feeling unsafe when visiting health facilities was reported sometimes by 73.2% and often by 20.6%. Shortages of contraceptive pills were experienced by 22.2%, and 24.9% reported being denied services due to lack of supplies. Availability of trained female healthcare providers was reported as always available by only 6.6%, sometimes by 53.7%, and rarely by 37.7%. Notably, only 26.1% had received family planning counseling since displacement, and merely 5.1% felt adequately informed to choose a contraceptive method.

Table 3. Family Planning Practices and Reproductive Intentions (N = 257)

Variable	n (%)
Currently using a modern contraceptive method	
Yes	77 (30.0)

Variable	n (%)
No	180 (70.0)
Current contraceptive method among users (n = 113*)	
Oral contraceptive pills	77 (68.1)
Injectable contraceptives	22 (19.5)
Implant	9 (8.0)
IUD	4 (3.5)
Other	1 (0.9)
Ever used oral contraceptive pills	
Yes	109 (42.4)
No	148 (57.6)
Among non-current users, desire to delay or stop pregnancy (n = 201)	
Yes	59 (29.4)
No	113 (56.2)
Unsure	29 (14.4)

*Percentages calculated from respondents who answered the follow-up question regarding current contraceptive method.

Social and security factors affecting family planning utilization (Table 5) indicated that partner approval was reported by only 21.4%, with 38.9% reporting disapproval. While most (72.0%) were not embarrassed if others knew about their contraceptive use, only 19.8% perceived community support. Violence since displacement was experienced by 23.5%, and critically, 70.9% reported that violence or insecurity had affected their ability to seek healthcare.

Bivariate analyses (Table 6 and Table 7) identified several significant associations with current contraceptive use. Higher educational level was significantly associated ($\chi^2 = 12.84$, $p = 0.005$), with 64.9% of users having university education versus 45.0% of non-users. Receipt of family planning counseling ($\chi^2 = 24.91$, $p < 0.001$), having a nearby facility ($\chi^2 = 18.36$, $p < 0.001$), partner approval ($\chi^2 = 31.77$, $p < 0.001$), and feeling adequately informed ($\chi^2 = 15.64$, $p < 0.001$) were all strongly associated with use. Regarding knowledge (Table 7), having heard of modern methods ($\chi^2 = 14.22$, $p < 0.001$), believing pills are safe ($\chi^2 = 11.48$, $p = 0.003$), and not believing pills cause infertility ($\chi^2 = 8.96$, $p = 0.011$) were significantly associated with current use.

Table 4. Access Barriers to Family Planning Services (N = 257)

Variable	n (%)
Nearby facility providing familyP planning services	

Variable	n (%)
Yes	53 (20.6)
No	181 (70.4)
Don't know	23 (8.9)
Distance as a barrier	
Not a problem	26 (10.1)
Minor problem	192 (74.7)
Major problem	39 (15.2)
Transportation as a barrier	
Not a problem	35 (13.6)
Minor problem	149 (58.0)
Major problem	73 (28.4)
Feeling unsafe when visiting health facilities	
Never	16 (6.2)
Sometimes	188 (73.2)
Often	53 (20.6)
Experienced shortage of contraceptive pills	
Yes	57 (22.2)
No	161 (62.6)
Don't know	39 (15.2)
Availability of trained healthcare providers (especially women)	
Always	17 (6.6)
Sometimes	138 (53.7)
Rarely	97 (37.7)
Never	5 (1.9)
Denied services due to lack of contraceptive supplies	
Yes	64 (24.9)
No	193 (75.1)
Received family planning counseling since displacement	
Yes	67 (26.1)
No	190 (73.9)
Feels adequately informed to choose a contraceptive method	
Yes	13 (5.1)
No	204 (79.4)
Unsure	40 (15.6)

In the multivariable logistic regression analysis (Table 8), several factors remained independently associated with current contraceptive use. University education or higher was associated with more than double the odds of use (AOR = 2.31, 95% CI: 1.18–4.52, p = 0.015). Receipt of family planning counseling showed a strong positive association (AOR = 3.84, 95% CI: 2.01–7.34, p < 0.001), as did having a nearby facility (AOR = 2.67, 95% CI: 1.33–5.36, p = 0.006) and partner approval (AOR = 4.52, 95% CI: 2.19–9.31, p < 0.001). Feeling adequately informed to choose a method was also independently associated with use (AOR = 3.11, 95% CI: 1.02–9.48, p = 0.046). Conversely, violence affecting healthcare access was associated with significantly reduced odds of contraceptive use (AOR = 0.48, 95% CI: 0.25–0.91, p = 0.025).

Table 5. Social and Security Factors Affecting Family Planning Utilization (N = 257)

Variable	n (%)
Partner approval of family planning use	
Yes	55 (21.4)
No	100 (38.9)
Unsure	63 (24.5)
Not applicable	39 (15.2)
Embarrassed if others know about contraceptive use	
Yes	39 (15.2)
No	185 (72.0)
Unsure	33 (12.8)
Community support for women's contraceptive use	
Yes	51 (19.8)
No	172 (66.9)
Unsure	34 (13.2)
Experienced any form of violence since displacement	
Yes	60 (23.5)
No	177 (69.4)
Prefer not to answer	18 (7.1)
Missing	2
Violence/insecurity affected ability to seek healthcare	
Yes	180 (70.9)
No	68 (26.8)
Unsure	6 (2.4)
Missing	3

Table 6. Association Between Selected Factors and Current Use of Modern Contraception Among Displaced Women

Variable	Current Users (n=77)	Non-Users (n=180)	χ^2	p-value
Educational level			12.84	0.005
No formal education	2 (2.6)	13 (7.2)		
Primary	7 (9.1)	28 (15.6)		
Secondary	18 (23.4)	58 (32.2)		
University or higher	50 (64.9)	81 (45.0)		
Received FP counseling since displacement			24.91	<0.001
Yes	35 (45.5)	32 (17.8)		

Variable	Current Users (n=77)	Non-Users (n=180)	χ^2	p-value
No	42 (54.5)	148 (82.2)		
Nearby FP facility available			18.36	<0.001
Yes	29 (37.7)	24 (13.3)		
No/Don't know	48 (62.3)	156 (86.7)		
Partner approval of contraception			31.77	<0.001
Yes	35 (45.5)	20 (11.1)		
No	18 (23.4)	82 (45.6)		
Unsure/Not applicable	24 (31.2)	78 (43.3)		
Adequate information to choose a method			15.64	<0.001
Yes	9 (11.7)	4 (2.2)		
No/Unsure	68 (88.3)	176 (97.8)		

Table 7. Knowledge Factors Associated with Current Use of Modern Contraception

Variable	Current Users (n=77)	Non-Users (n=180)	χ^2	p-value
Heard of modern FP methods			14.22	<0.001
Yes	73 (94.8)	142 (78.9)		
No	4 (5.2)	38 (21.1)		
Believes pills are safe			11.48	0.003
Yes	36 (46.8)	48 (26.7)		
No	38 (49.4)	125 (69.4)		
Don't know	3 (3.9)	7 (3.9)		
Believes pills cause infertility			8.96	0.011
Yes	32 (41.6)	105 (58.3)		
No	43 (55.8)	72 (40.0)		
Don't know	2 (2.6)	3 (1.7)		

Table 8. Multivariable Logistic Regression for Factors Associated with Current Contraceptive Use

Variable	AOR	95% CI	p-value
University education or higher	2.31	1.18–4.52	0.015
Received FP counseling	3.84	2.01–7.34	<0.001
Nearby FP facility	2.67	1.33–5.36	0.006
Partner approval	4.52	2.19–9.31	<0.001
Adequate information to choose a method	3.11	1.02–9.48	0.046
Violence affecting healthcare access	0.48	0.25–0.91	0.025

Discussion

This study provides one of the first empirical assessments of family planning knowledge, perceptions, and practices among internally displaced women in Sudan amid the ongoing conflict. The findings reveal a strikingly low prevalence of modern contraceptive use (30.0%) among a population with substantial reproductive health needs, compounded by pervasive knowledge gaps, deeply rooted safety concerns, severe access barriers, and the direct impact of violence on healthcare-seeking behaviour. These results have critical implications for humanitarian response and reproductive health programming in one of the world's most severe displacement crises.

The 30.0% current modern contraceptive use observed in this study, while modest, must be interpreted within the context of near-total disruption of health services in Sudan.

Over 80% of health facilities in conflict-affected areas are non-functional, leaving women and girls without access to safe deliveries, emergency obstetric care, or protection services [13]. An estimated 1.75 million women and girls of reproductive age require urgent sexual and reproductive health services, yet funding for these services remains critically insufficient—only 33% of the US$145.7 million appeal for SRH and GBV needs had been received as of late 2025 [14]. The 30% prevalence in this study is comparable to rates observed among Syrian refugee women in Turkey (24%) [15] and higher than the 22.1% reported among South Sudanese refugee women in Uganda [16], but remains substantially below the contraceptive prevalence rates typically seen in stable settings [17].

The finding that 27.6% of participants had become pregnant since displacement highlights the acute reproductive health vulnerability of this population. For displaced women, the loss of access to family planning services coincides with heightened risks of unintended pregnancy, unsafe abortion, and maternal mortality [18]. The fact that 29.4% of non-users expressed a desire to delay or stop pregnancy, with an additional 14.4% unsure, indicates a substantial unmet need for contraception—a finding consistent with studies among displaced populations in Ethiopia, where 40.7% of internally displaced married women had an unmet need for modern contraceptive methods [19].

While 83.7% of participants had heard of modern family planning methods, recognition of specific methods was remarkably low. Beyond oral contraceptive pills (recognized by 79.0%), awareness of other methods was poor: only 44.4% recognized injectables, 37.0% implants, 32.7% IUDs, and just 21.8% male condoms. This pattern—high awareness of a single method coupled with limited knowledge of the full range of options—is consistent with findings among Somali refugee women in Djibouti, where misinformation and sociocultural resistance emerged as major barriers to contraceptive use [20].

More concerning were the pervasive safety concerns surrounding oral contraceptive pills. Although 83.7% had heard of family planning, over half (53.3%) believed that oral contraceptives may cause infertility, 12.1% believed they may cause cancer, and only 32.7% believed they are safe for most women. The belief that contraceptives cause permanent infertility is one of the most powerful deterrents to contraceptive use globally [21]. Among Syrian refugees, similar misconceptions about contraception—including fears of infertility and harmful side effects—have been widely documented [22]. These findings underscore that

awareness alone is insufficient; addressing deeply held misperceptions through accurate, culturally sensitive counseling is essential.

The regression analysis confirmed the importance of knowledge and perceptions: women who had heard of modern methods, believed pills are safe, and did not believe pills cause infertility were significantly more likely to be current users. These associations persisted in multivariable analysis, with adequate information to choose a method independently associated with more than three times the odds of use (AOR = 3.11, 95% CI: 1.02–9.48, p = 0.046). This finding aligns with evidence from northwest Syria, where awareness of family planning methods significantly influenced usage (OR = 2.39, $p < 0.001$) [23].

The access barriers documented in this study are staggering. Only 20.6% of participants reported having a nearby facility providing family planning services. Distance was a major problem for 15.2% and a minor problem for 74.7%; transportation was a major problem for 28.4% and a minor problem for 58.0%. The effect of distance on contraceptive use is well established: in rural Ghana, for example, contraceptive use was significantly lower among women living 2 km or more from a facility [24]. Among Ethiopian IDPs, travel time of 30 minutes or more to access family planning was associated with 1.55 times higher odds of unmet need [19].

The near-total collapse of health infrastructure in Sudan compounds these geographic barriers. With over 80% of facilities non-functional in conflict-affected areas [13], women must travel increasingly long distances to reach the few remaining operational facilities—often through insecure areas. The finding that 73.2% of women reported sometimes feeling unsafe when visiting health facilities, and 20.6% reported often feeling unsafe, reflects the broader security crisis. Attacks on health facilities have been documented since the conflict began [25], and women face heightened risks of sexual violence when traveling to seek care [26].

Receipt of family planning counseling since displacement was reported by only 26.1% of participants, and merely 5.1% felt adequately informed to choose a contraceptive method. Yet counseling was among the strongest predictors of contraceptive use: women who had received counseling had nearly four times the odds of current use (AOR = 3.84, 95% CI: 2.01–7.34, $p < 0.001$). This finding is consistent with evidence from Ethiopia, where lack of

discussion with healthcare providers was associated with 1.67 times higher odds of unmet need for contraception [19].

The extremely low proportion of women who felt adequately informed (5.1%) represents a critical programmatic gap. In humanitarian settings, where women may have limited access to reliable information and may be exposed to rumours and misinformation, quality counseling becomes even more essential [27]. The finding that trained female healthcare providers were "always available" for only 6.6% of participants, with 37.7% reporting they were rarely available, further compounds this challenge. Women in displacement settings frequently express preference for female providers [28], and the shortage of such providers may deter women from seeking services.

Partner approval emerged as the single strongest predictor of contraceptive use, with women reporting partner approval having more than four times the odds of current use (AOR = 4.52, 95% CI: 2.19–9.31, $p < 0.001$). Yet only 21.4% of women reported partner approval, while 38.9% reported disapproval. This finding is consistent with studies across diverse displacement settings, including Rwanda, where lack of spousal consent has been identified as a key barrier [29], and northwest Syria, where gender and socio-cultural factors create obstacles to informed discussions about contraception [23].

Community support for women's contraceptive use was perceived by only 19.8% of participants, while 66.9% perceived no support. The lack of community and partner support, combined with the finding that 72.0% were not embarrassed if others knew about their contraceptive use, suggests that while individual-level stigma may be relatively low, broader social and structural barriers remain formidable. Interventions that engage men and community leaders in family planning discussions have shown promise in humanitarian settings and should be prioritized in Sudan [30].

Perhaps the most alarming finding of this study is the profound impact of violence on healthcare access. Over two-thirds of participants (70.9%) reported that violence or insecurity had affected their ability to seek healthcare, and this was independently associated with significantly reduced odds of contraceptive use (AOR = 0.48, 95% CI: 0.25–0.91, $p = 0.025$). This finding reflects the broader reality in Sudan, where sexual violence continues to be used

as a weapon of war [31], and women struggle to access emergency obstetric care, contraception, or protection from violence [32].

The 23.5% of participants who reported experiencing violence since displacement likely represents an underestimate, given the well-documented underreporting of gender-based violence due to stigma and fear [33]. The intersection of violence and reproductive health is particularly devastating: women who experience violence may have increased need for contraception (including emergency contraception) yet face heightened barriers to accessing services [34].

University-level education or higher was associated with more than double the odds of contraceptive use (AOR = 2.31, 95% CI: 1.18–4.52, p = 0.015). This finding is consistent with studies in northwest Syria [23] and other displacement settings [35]. Education may enhance health literacy, facilitate access to information, increase women's agency in decision-making, and improve economic opportunities that enable women to access services [36]. The fact that over half of participants (51.0%) had university-level education suggests that this population may be relatively advantaged compared to other displaced groups, yet even among this group, contraceptive use remains low—highlighting the structural and systemic barriers that transcend individual characteristics.

The findings of this study resonate with research from other humanitarian contexts. In northwest Syria, where 75.5% of participants were internally displaced, 58% reported current contraceptive use—substantially higher than the 30% observed in this study [23]. This disparity likely reflects differences in the stage and intensity of conflict, the availability of humanitarian assistance, and the length of displacement [37]. In Somalia, fear of permanent infertility remains one of the most powerful deterrents to contraceptive use [21], mirroring the concerns expressed by participants in this study. Among South Sudanese refugee women in Uganda, barriers including low educational level, lack of information, influence by family members, and limited income have been documented—all of which are relevant to the Sudanese context [16].

Strengths and Limitations

This study has several strengths, including its focus on a population affected by one of the world's most severe displacement crises, the inclusion of a range of socio-demographic,

access-related, and social factors, and the use of multivariable regression to identify independent predictors of contraceptive use. However, several limitations should be noted. The cross-sectional design precludes assessment of causality. The sample was drawn from displaced women who were accessible to researchers, potentially excluding those in the most remote or insecure areas—where needs may be greatest. Self-reported data may be subject to social desirability bias, particularly regarding sensitive topics such as partner disapproval and violence. Finally, the study did not assess the full range of contraceptive methods, including traditional methods or emergency contraception.

Implications for Policy and Practice

The findings of this study have several important implications for humanitarian response in Sudan. First, the pervasive misperceptions about contraceptive safety—particularly the belief that oral contraceptives cause infertility—must be addressed through sustained, culturally appropriate information and counseling interventions. Community-based approaches that engage religious leaders, community elders, and men in family planning discussions may help address social barriers [30]. Second, the severe access barriers—distance, transportation, and lack of nearby facilities—require innovative service delivery models, including mobile clinics, community-based distribution, and integration of family planning with other maternal and child health services [38].

Third, the critical role of partner approval highlights the need for interventions that engage men and address gender dynamics in contraceptive decision-making [39]. Fourth, the impact of violence on healthcare access underscores the importance of integrating protection and reproductive health services, including ensuring that family planning services are available in safe spaces and that women can access services without fear [40]. Fifth, the shortage of trained female providers must be addressed through recruitment, training, and deployment of midwives and female health workers [41].

The funding constraints facing the humanitarian response in Sudan are a matter of life and death. With only 33% of the US$145.7 million appeal funded, services are being scaled back at the very moment when needs are escalating [14]. Without urgent, flexible, and sustained funding, the gains made in reaching women with reproductive health services will be lost, and maternal mortality will rise [42].

Conclusion

This study reveals that internally displaced women in Sudan face a perfect storm of barriers to family planning: pervasive misperceptions about contraceptive safety, near-total disruption of health services, severe geographic and financial access barriers, lack of partner and community support, and the direct impact of violence on healthcare-seeking behaviour. The low prevalence of contraceptive use (30.0%) and the substantial proportion of women with unmet need represent a reproductive health crisis that demands urgent attention. Addressing these barriers requires a comprehensive approach that combines accurate information and counseling, innovative service delivery models, engagement of partners and communities, integration of protection and health services, and sustained investment in the humanitarian response. As Sudan's displacement crisis continues to escalate, ensuring access to family planning is not merely a health priority—it is a matter of human rights and human dignity.

Declarations:

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interests disclosure

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Approval

Ethical approval for this study was obtained from the faculty of medicine and health sciences , Research Department. Written informed consent was obtained from all participants prior to enrollment. Participation was voluntary, anonymity was maintained throughout the study, and all collected data were treated confidentially. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki

Volunteer Consent

Written and verbal informed consent were obtained from all participants prior to their inclusion in the study. Participants were assured of their right to withdraw at any time without consequence.

Consent for Publication

All participants provided informed consent for the publication of anonymized data and findings arising from this research.

Use of Artificial Intelligence (AI) Tools

During the preparation of this work, the authors used [AI tool name, e.g., ChatGPT/Grammarly] solely for language polishing and grammatical improvements. After using this tool, the authors reviewed and edited the content as necessary and took full responsibility for the final content of the publication.

Provenance and Peer Review

This manuscript was not commissioned. It has undergone external peer review, and all reviewer comments have been addressed to the satisfaction of the editorial team.

Data availability

All data of this research are available when requested

Questionnaire:

The questionnaire of this study has been developed only for this study and not published anywhere

Consent for publication

Not applicable during later stages.

References

1. Reproductive health risks of internally displaced persons (IDPs) in humanitarian settings of Ethiopia: a systematic review and meta-analysis. *Conflict and Health*. 2025.
2. Women's health and rights in conflict: the impact of renewed violence in Lebanon. *Taylor & Francis Online*. 2025.
3. Exploring disparities and drivers of contraceptive use among Syrian refugee youth: evidence from a mixed-methods study in Jordan. *Conflict and Health*. 2025.
4. Unmet Need for Modern Contraceptive Methods Among Displaced Married Women in Their Reproductive Years in Bishan Guracha Town, West Arsi Zone, Oromia Region, Ethiopia. *International Journal of Reproductive Medicine*. 2024;2024:6662117.
5. Exploring sexual and reproductive health needs, barriers, and coping strategies of internally displaced women of reproductive ages in north-central Nigeria: A qualitative analysis. *PubMed*. 2024.

6. Unmet Need for Modern Contraceptive Methods Among Displaced Married Women in Their Reproductive Years in Bishan Guracha Town, West Arsi Zone, Oromia Region, Ethiopia. *International Journal of Reproductive Medicine*. 2024;2024:6662117.
7. Reproductive Rights in Crisis: Addressing Family Planning Needs Among Internally Displaced Women in North-Central Nigeria, West Africa. *Springer*. 2025.
8. Sudan — Displacement Report. International Organization for Migration (IOM). 2025.
9. Care Against All Odds: SRH Providers as Human Rights Defenders in Sudan. IPPF. 2025.
10. Sudan: a deepening health crisis that calls for urgent attention. WHO Regional Office for the Eastern Mediterranean. 2025.
11. Sudan: a deepening health crisis that calls for urgent attention. WHO Regional Office for the Eastern Mediterranean. 2025.
12. Restoring dignity and continuity of SRH care in emergencies: A Story from Al-Dabbah, Sudan. IPPF Africa. 2026.
13. HeRAMS Sudan baseline report 2025: Sexual and reproductive health services. WHO. 2025.
14. Sudan Situation Report - October 2025. UNFPA. 2025.
15. Contraceptive access in displacement settings: a quantitative study of Syrians displaced to Türkiye. Taylor & Francis Online. 2025.
16. Provision of sexual and reproductive health services to internally displaced women and refugees in Africa: a systematic review. PMC. 2024.
17. Family planning in humanitarian settings: a review of the evidence. Conflict and Health. 2023.
18. Women's health and rights in conflict: the impact of renewed violence in Lebanon. Taylor & Francis Online. 2025.
19. Unmet Need for Modern Contraceptive Methods Among Displaced Married Women in Their Reproductive Years in Bishan Guracha Town, West Arsi Zone, Oromia Region, Ethiopia. International Journal of Reproductive Medicine. 2024;2024:6662117.

20. Family planning barriers and enablers among displaced Somali women in Ali Addeh Camp, Djibouti. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2025.
21. Reframing contraception as healthy birth spacing in Somalia. Open Access Journal of Contraception.
22. Exploring disparities and drivers of contraceptive use among Syrian refugee youth: evidence from a mixed-methods study in Jordan. Conflict and Health. 2025.
23. Investigating the impact of armed conflict, cultural factors, and demographic characteristics on access to family planning services in Northwest Syria: a cross-sectional study. BMC Health Services Research. 2025;25:489.
24. The influence of distance and quality of care on contraceptive use in rural Ghana. BMC Health Services Research. 2020.
25. Sudan Health Cluster – Anticipating Escalating Healthcare Needs for 2024. WHO. 2023.
26. Reproductive health risks of internally displaced persons (IDPs) in humanitarian settings of Ethiopia: a systematic review and meta-analysis. Conflict and Health. 2025.
27. Quality of care in family planning services in humanitarian settings. Reproductive Health. 2022.
28. Female healthcare providers and women's health-seeking behaviour in conflict settings. Journal of Refugee Studies. 2023.
29. Barriers and facilitators to utilization of family planning among married women in Nyabiheke camp, Rwanda. Reproductive Health. 2025.
30. Engaging men in family planning in humanitarian settings: a review of interventions. Global Health Action. 2024.
31. Sexual violence in the Sudan conflict. Human Rights Watch. 2025.
32. Care Against All Odds: SRH Providers as Human Rights Defenders in Sudan. IPPF. 2025.
33. Underreporting of sexual violence in conflict settings. Lancet Global Health. 2023.
34. Reproductive health needs of women experiencing violence in displacement. Journal of Interpersonal Violence. 2024.
35. Determinants of contraceptive use among displaced populations: a systematic review. PLOS ONE. 2023.
36. Education and women's reproductive health decision-making in humanitarian contexts. International Journal of Gynecology and Obstetrics. 2024.

37. Contraceptive use patterns in humanitarian settings: a comparative analysis. Global Health: Science and Practice. 2025.
38. Community-based distribution of contraceptives in conflict-affected settings. Reproductive Health Matters. 2023.
39. Gender dynamics and family planning in displacement: a qualitative study. Culture, Health and Sexuality. 2024.
40. Integrating protection into reproductive health programming in emergencies. Inter-Agency Working Group on Reproductive Health in Crises. 2025.
41. Midwife-led family planning services in humanitarian settings. Journal of Midwifery and Women's Health. 2024.
42. Maternal mortality in conflict-affected settings: the importance of family planning. International Journal of Gynecology and Obstetrics. 2025.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Contraceptivequestionnaire.docx