

Review



Emergency contraception among female sex workers: systematic review and meta-analysis

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Abstract

Introduction: Female sex workers (FSW) experience an elevated risk of unintended pregnancy due to condom failure, covert condom removal (stealth) and sexual violence. Emergency contraception (EC) can prevent pregnancy after such exposures, but evidence on EC knowledge and use in this population has not been comprehensively synthesised.

Objectives: To summarise EC knowledge and use among FSWs and estimate the pooled lifetime EC use

Methods: A systematic review of peer-reviewed studies published from 1 January 2000 to 8 February 2025, was conducted using Lens.org, Dimensions, PubMed and Google Scholar. Study quality was appraised using the Joanna Briggs Institute checklist for prevalence studies. Lifetime EC use was pooled using a random-effects model, with subgroup analyses by region and sampling design.

Results: Twenty-four studies were included in the systematic literature review, whereas eight studies (11 samples; n=5670; 1166 ever-users) were eligible for meta-analysis. Pooled lifetime EC use was 21.0% (95% CI: 12.0%, 35.0%), with very high heterogeneity ($I^2=97.8\%$). Pooled estimates were similar in Asia (18.0%) and sub-Saharan Africa (22.0%). Studies using respondent-driven sampling yielded a lower pooled prevalence (15.0%; 95% CI: 7.0%, 29.0%) compared to other sampling approaches (43.0%; 95% CI: 28.0%, 59.0%). Across settings, knowledge was uneven and EC use after condom failure or rape was frequently missed; barriers included misconceptions, fear of side effects, cost, stigma and limited access to suitable services.

Conclusions & Recommendations: EC use among FSWs is modest and highly context dependent. Programmes should prioritise timely, low-barrier and stigma-free EC access (including advance provision) and integrate EC within post-exposure and broader sexual and reproductive health care.

Key words: Emergency contraception, Condom failure, Rape, Female sex workers, Sexual violence

Introduction

Sex work; the consensual exchange of sexual services for money or equivalents among adults (1); occurs in diverse, context-specific forms, ranging from informal arrangements to organised systems (2). Female sex workers (FSWs) face distinct sexual and reproductive health (SRH) risks shaped by occupational exposures and structural constraints (3). Compared with the general female population (4), these risks are amplified by inconsistent condom use (5-6), low uptake of non-barrier contraception including long-acting reversible methods (7-8) and emergency contraception (EC) (4, 9), high partner exchange (3, 6), limited access to health care (10), illicit drug use including alcohol use during sex (6, 11), and restricted bodily autonomy (12). Vulnerability is further heightened by sexual violence (13-14) and condom breakage, slippage or client tampering, intentional or otherwise, during intercourse (15-17). Collectively, these factors contribute to a higher burden of HIV and other sexually transmitted infections (STIs) (6, 10, 18), unintended pregnancy and both induced and spontaneous abortion (7, 19-21), with unintended pregnancy carrying long-term repercussions for FSWs' lives (22-23).

Emergency contraception (post-coital contraception) prevents pregnancy when used within a few days after unprotected or inadequately protected sex. It is indicated after contraceptive failure (e.g. missed pills, condom breakage) and following rape or coerced sex, but it does not prevent STIs including HIV (24-25). Because effectiveness is time-sensitive, EC should be taken as soon as possible and within five days of intercourse. Globally, three main EC options are used, namely dedicated EC pills (levonorgestrel or ulipristal acetate), higher-dose of combined oral contraceptives and copper-bearing intrauterine devices (26). The World Health Organisation recommends universal access to EC for women and girls at risk of unintended pregnancy and integration of EC within national family planning programmes; while repeated use may increase side effects (e.g.

menstrual irregularities) and warrants caution in some medical conditions, it is not associated with known health hazards (26).

Despite extensive SRH research among FSWs, often focused on HIV, STIs, unintended pregnancy and abortion (4), evidence on EC remains comparatively limited, and no systematic review and meta-analysis has specifically examined EC use among FSWs globally. This study addresses that gap by synthesising evidence on EC utilisation among FSWs to inform future research and support policymakers to design inclusive, integrated programmes that prevent unintended pregnancy and reduce abortion-related harms in this population.

Methods

This systematic review and meta-analysis adhered to Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidance (27). A comprehensive search was conducted in Lens.org, Dimensions, PubMed and Google Scholar from 1 January 2000 to 28 February 2025. The search strategy combined controlled and free-text terms related to FSWs and EC: ("Sex Worker" OR "Prostitute*") AND ("Emergency Contraceptive*" OR "Emergency Contraceptive Pill*" OR "Morning After Pill*"). Eligibility was restricted to peer-reviewed journal articles. To address search currency, an update (top-up) search was undertaken for the period after 28 February 2025 using the same search strategy across all four databases. No additional eligible peer-reviewed studies were identified; therefore, the stated search end date and PRISMA flow counts were retained unchanged.

A broad operational definition of FSWs was applied, encompassing women engaged in transactional sex (full-time or part-time) and analogous groups known to practice sex work, such as female entertainment workers in Bhutan (9). Empirical qualitative and

quantitative studies reporting EC knowledge and/or practices among FSWs were eligible. Exclusions included non-empirical publications (e.g. editorials, commentaries, policy briefs), conference abstracts without accompanying full papers, grey literature and studies lacking FSW-specific data or disagreeable outcomes. Following de-duplication, two reviewers independently screened titles and abstracts, resolved

discrepancies through discussion and then assessed full texts against predefined criteria, with disagreements reconciled by consensus. The reference lists of included studies were hand-searched, yielding 6 additional records; study selection is presented in the PRISMA flow diagram (Figure 1).

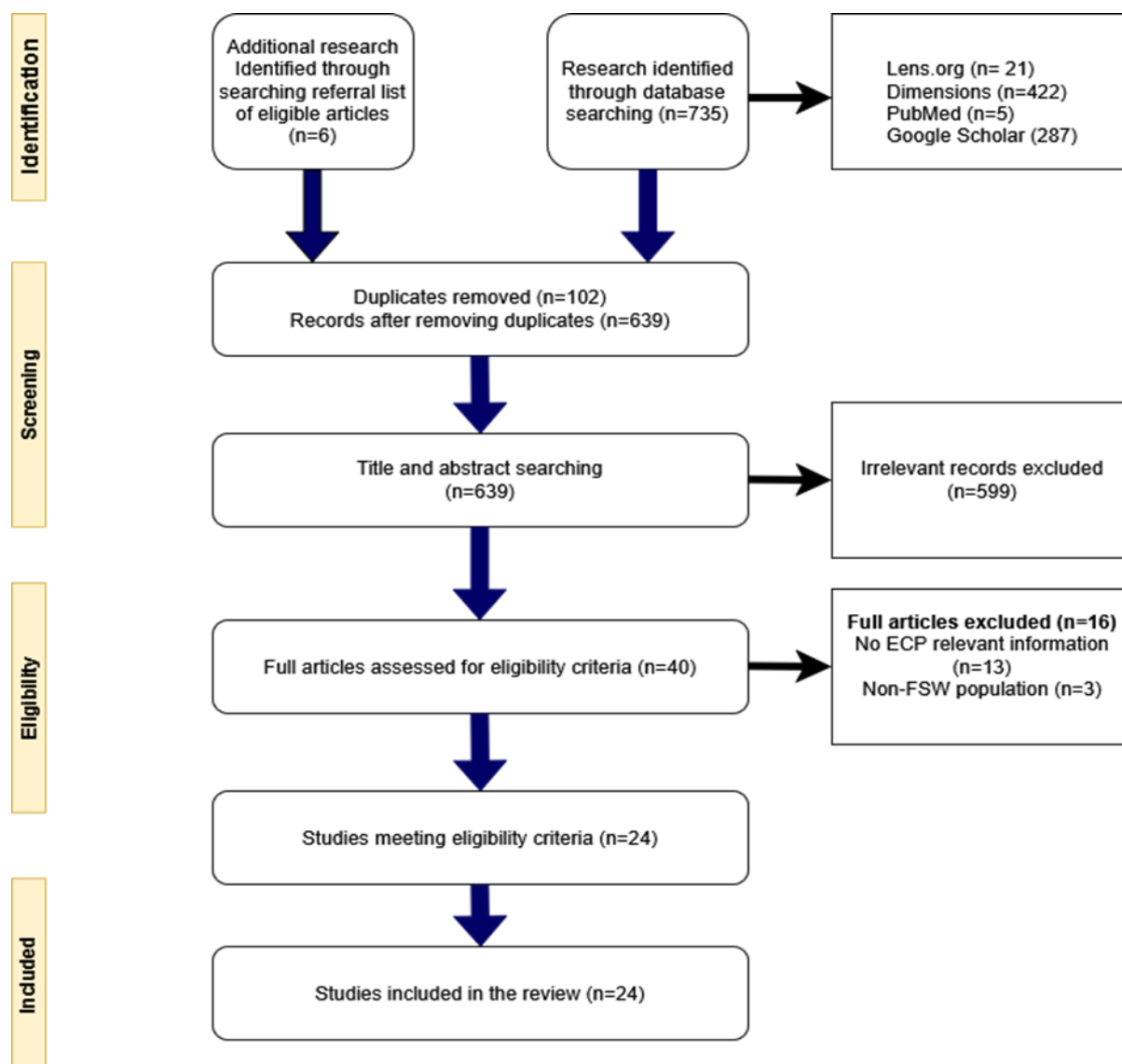


Figure 1: PRISMA flow diagram showing study identification, screening, eligibility assessment and final inclusion

Next, data were charted using a pre-piloted extraction form aligned with the review objectives, capturing bibliographic details, setting and population characteristics, study design and outcomes related to EC knowledge (awareness, correct timing/use and

misconceptions) and EC practices (use after unprotected sex or condom failure, sources and barriers). Two reviewers extracted data independently to minimise bias; inconsistencies were reconciled by discussion, and the final dataset was cross-checked by

the full team for completeness and internal consistency prior to analysis.

The study quality was assessed using the JBI Critical Appraisal Checklist for Prevalence Studies (28). Two reviewers (MSS and KK) independently appraised all studies, with disagreements resolved through

discussion; a third reviewer (IDS) was consulted to resolve any unresolved discrepancies. We summarised ratings by item as study counts (Figure 2). No study was excluded on the basis of quality; nevertheless, all meta-analysed studies were appraised as having ≥ 5 'Yes' responses on the JBI tool.

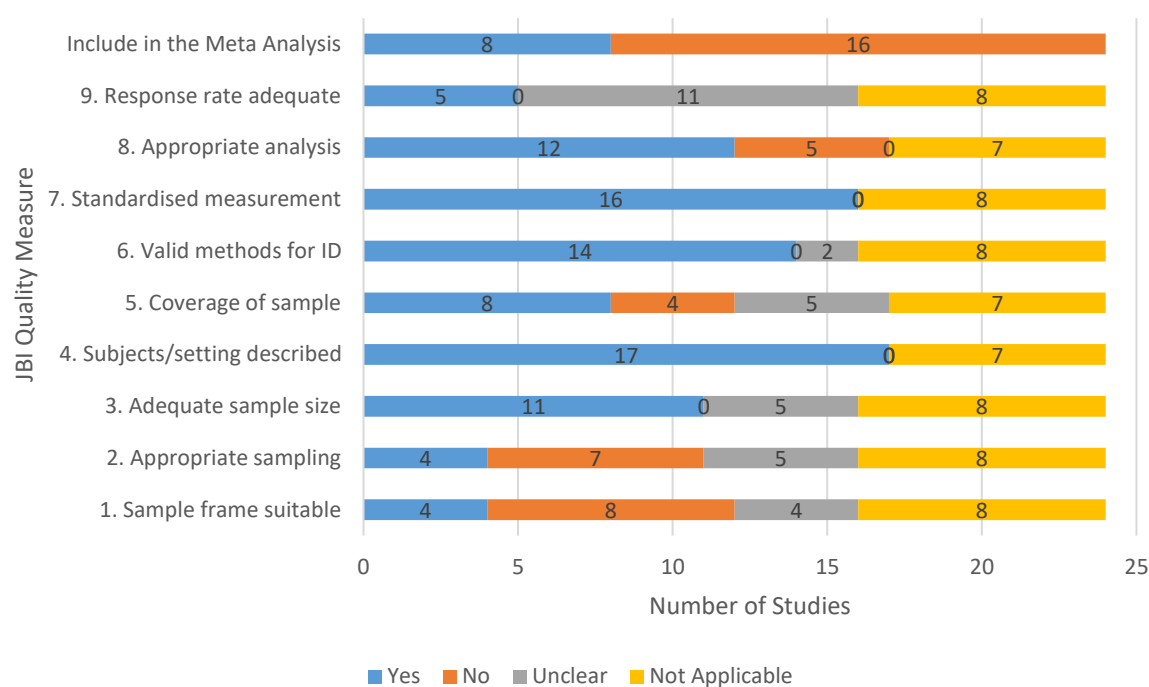


Figure 2: JBI Critical Appraisal of included studies: distribution of ratings by checklist item

Evidence from the included studies was integrated using a combination of descriptive summarisation and thematic synthesis. The primary outcome (and the only outcome included in the meta-analysis) was the prevalence of lifetime (“ever”) EC use among FSWs. Secondary outcomes included EC knowledge/awareness, EC use following condom failure/“stealth” or rape/sexual assault, correlates of EC use and reasons for non-use; these were synthesised only narratively because data were not sufficiently comparable for quantitative pooling across studies.

Studies were eligible for quantitative synthesis if they were empirical, peer-reviewed publications reporting lifetime use of EC among FSW, and if an extractable numerator (number reporting ever use) and

denominator (sample size) were available for each analytically distinct sample. Where a single publication reported results for more than one country/site or provided analytically independent subgroup estimates, each was treated as a separate sample in the meta-analysis; all other included studies contributed to the narrative synthesis. Accordingly, eight eligible single-arm prevalence studies were pooled using a random-effects generalised linear mixed model with a logit link, as recommended for proportions (29) and implemented in the R “meta” package. Study numerators and denominators were modelled directly; individual study confidence intervals were calculated using Clopper–Pearson limits. Between-study variance (τ^2) was estimated by maximum likelihood, heterogeneity was summarised with I^2 and the Q test, and random-effects confidence

intervals applied Hartung–Knapp adjustment. Pooled and study estimates are reported as back-transformed proportions with 95% confidence intervals (CI), together with a 95% prediction interval. Subgroup analyses were conducted to explore sources of heterogeneity by stratifying studies according to sampling design (respondent-driven sampling [RDS] vs non-RDS) and region (Asia vs sub-Saharan Africa). The sampling design was assessed because network-based RDS recruitment and estimation procedures may yield prevalence estimates that differ from those of non-probability or venue-based approaches in hidden populations. Regional subgrouping was used to assess whether broad contextual differences in EC access and service environments contributed to between-study variability.

Sensitivity analyses were conducted post hoc to address substantial heterogeneity in the primary meta-analysis. These included (i) exclusion of the adolescent-only study to assess sensitivity to population composition and (ii) leave-one-out re-estimation to evaluate the influence of individual studies on the pooled prevalence estimate; material changes in the pooled estimate and/or its 95% CI were considered indicative of sensitivity. Potential small-study effects were explored using a contour-enhanced funnel plot on the logit scale and Peters' regression (logit prevalence regressed on $1/n$ with inverse-variance weights); an Egger-type linear test was run as a cautious sensitivity check. Two-sided $p < 0.05$ was considered statistically significant.

Results

The database searches yielded 735 records. After de-duplication, 633 unique citations remained. Title and abstract screening shortlisted 34 papers for full-text assessment. Of these, 16 were excluded at the full-text stage: three did not specifically address female sex workers, and 13 contained no data on emergency

contraception. Reference list screening identified a further six relevant studies (Figure 1).

In total, 24 studies were included in the final review and are described in Table 1.

Knowledge/awareness on EC among FSWs

Seven included studies reported quantitative findings on EC knowledge/awareness among FSWs, spanning Uganda, Côte d'Ivoire, China, Ethiopia (two studies), Bhutan and one multi-country cross-sectional study. Across the studies, EC knowledge among FSWs was often suboptimal, characterised by variable awareness and frequent misconceptions about indications, timing and correct use. In Uganda, 67.9% of FSWs reported having heard of EC (30). In Côte d'Ivoire, only about one-third recognised EC as a pregnancy-prevention method (31). Among adolescent FSWs in China, approximately 64% reported prior awareness of EC (32). A multi-country cross-sectional study reported wide contextual variation, with awareness ranging from 74.81% in higher-income settings to 96.1% in low- and middle-income countries (33).

Importantly, awareness did not consistently translate into accurate knowledge. In Bahir Dar, Ethiopia, although 90% had heard of EC, only 12% ($n=48$) demonstrated complete knowledge of correct use (34). In another Ethiopian study of 346 FSWs, 52.92% ($n=183$) had never heard of EC; among those aware, 38.6% ($n=63$) incorrectly believed EC could be taken at any time, including beyond 120 hours after unprotected intercourse (35). Similar, context-specific gaps were reported in Bhutan's entertainment industry, while 78% knew EC could be used after unprotected sex, far fewer identified condom breakage (15.9%) or sexual assault (13.61%) as indications. Although 71.23% cited the correct dosage and 58.3% the appropriate time window, 68.9% correctly understood that EC does not protect against HIV or other sexually transmitted infections (9).

Table 1: Studies included in the final review

No.	First Author	Year	Title	Research Design	Country / Region	Population
1	Tasnuva Wahed	2019	A narrative review of the literature on the reproductive health of female sex workers having age below twenty years	Narrative review	Global	Female sex workers under 20 years
2	Donatien Twizelimana	2020	Actions taken by female sex workers after condom failure in semi-urban Blantyre, Malawi	Cross-sectional, qualitative study	Malawi	Female sex workers
3	Alemayehu C Misganaw	2013	Assessment of sexual violence among street females in Bahir-Dar Town, North West Ethiopia: a mixed method study	A mixed method cross-sectional study	Ethiopia	Street females
4	Bukenya Justine Nnakate	2019	Contraceptive use, prevalence and predictors of pregnancy planning among female sex workers in Uganda: a cross-sectional study	Cross-sectional quantitative study	Uganda	Female sex workers
5	Deki Pem	2018	Emergency Contraceptive Pills (ECP) knowledge, attitudes, and practices among women working in the entertainment industry and men in the trucking industry, Bhutan	Cross-sectional quantitative study	Bhutan	Women working in the entertainment industry
6	Saud Sarmila Kumari	2024	Experience of violence and health issues among female sex workers in Kathmandu	Descriptive phenomenological research	Nepal	Female sex workers
7	Khezri Mehrdad	2023	Global epidemiology of abortion among female sex workers: a systematic review, meta-analysis and meta-regression	Systematic review & meta-analysis	Global	Female sex workers
8	Bartholomew B Ochonye	2021	Grassroots sexual and reproductive rights interventions on sexual risk behaviour among female sex workers in Nigeria	Cross-sectional quantitative study	Nigeria	Female sex workers
9	Rachna Kapoor	2018	A study on knowledge and use of emergency contraceptive pills among female sex workers of Ahmedabad	Cross-sectional quantitative study	India	Female sex workers
10	Tsitsi B Masvawure	2017	Intentional and unintentional condom breakage and slippage in the sexual interactions of female and male sex workers and clients in Mombasa, Kenya	Cross-sectional quantitative study	Kenya	Female and male sex workers

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No.	First Author	Year	Title	Research Design	Country / Region	Population
11	Ippoliti Nicole B	2017	Meeting the reproductive health needs of female key populations affected by HIV in low- and middle-income countries (LMIC): a review of the evidence	Narrative review	LMIC	Female key populations affected by HIV
12	Bradburn Caitlyn K	2016	Risky business: condom failures as experienced by female sex workers in Mombasa, Kenya	Cross-sectional Qualitative	Kenya	Female sex workers
13	Jennifer Sherwood	2015	Sexual violence against female sex workers in the Gambia: a cross-sectional examination of the associations between victimization and reproductive sexual and mental health	Cross-sectional quantitative study	Gambia	Female sex workers
14	Weldegebreal Rishan	2015	Unintended pregnancy among female sex workers in Mekelle City, Northern Ethiopia: a cross-sectional study	Cross-sectional quantitative study	Ethiopia	Female sex workers
15	Eileen A Yam	2013	Use of emergency contraceptive pills among female sex workers in Swaziland	Cross-sectional quantitative study	Swaziland	Female sex workers
16	Ampt Frances H	2019	Use of long-acting reversible contraception in a cluster random sample of female sex workers in Kenya	Baseline cross-sectional study	Kenya	Female sex workers
17	Sibanda Euphemia	2021	Values and preferences of contraceptive methods: a mixed-methods study among sex workers from diverse settings	Cross-sectional mixed method study	38 countries	Sex workers
18	Macleod Catriona Ida	2022	Women who sell sex in Eastern and Southern Africa: a scoping review of non-barrier contraception, pregnancy and abortion	Scoping review	Eastern and Southern Africa	Women who sell sex
19	Sheree Schwartz	2015	An urgent need for integration of family planning services into HIV care: the high burden of unplanned pregnancy, termination of pregnancy, and limited contraception use among female sex workers in Co'te d'Ivoire	Cross-sectional mixed method study	Co'te d'Ivoire	Female sex workers

Table 1: Studies included in the final review

No.	First Author	Year	Title	Research Design	Country / Region	Population
20	Yves Lafort	2017	Sexual and reproductive health services utilization by female sex workers is context specific: results from a cross-sectional survey in India, Kenya, Mozambique and South Africa	Cross-sectional quantitative study	India, Kenya, Mozambique and South Africa	Female sex workers
21	Anna L Bowring	2020	Unmet need for family planning and experience of unintended pregnancy among female sex workers in urban Cameroon: results from a national cross-sectional study	Cross-sectional quantitative study	Urban Cameroon	Female sex workers
22	Megan S. C. Lim	2015	Sexual and reproductive health knowledge, contraception uptake, and factors associated with unmet need for modern contraception among adolescent female sex workers in China	Cross-sectional quantitative study	China	Adolescent female sex workers
23	Ferdinand C. Mukumbang	2017	Actions of female sex workers who experience male condom failure during penetrative sexual encounters with clients in Cape Town: implications for HIV prevention strategies	Cross-sectional quantitative study	Cape Town	Female sex workers
24	Xu-Dong Zhang	2014	High rates of abortion and low levels of contraceptive use among adolescent female sex workers in Kunming, China: A cross-sectional analysis	Cross-sectional quantitative study	China	Adolescent female sex workers

Utilisation of EC among FSWs

Nine included studies reported EC utilisation among FSWs. Of them, only two studies provided estimates of current EC use (Uganda and China). The current use of EC among FSWs differed markedly across settings. Reported estimates ranged from 3.1% in Uganda (30), to 21% in China (32).

The eight studies which contributed lifetime EC use data were included in the meta-analysis. The eight studies contributed 11 analytically independent samples ($n=5670$; events=1166), drawn from 11 settings/countries (India, Côte d'Ivoire, Ethiopia,

Mozambique, Cameroon, Eswatini/Swaziland, South Africa, Bhutan, Kenya, China-adolescents only and Nigeria). Lifetime use also showed wide variation (Figure 3), from 2.41% in India (36) up to 50.71% in Nigeria (37), the median lifetime prevalence was 27.5%, reported in Swaziland (4). Given the availability of comparable measures, the meta-analysis was undertaken using lifetime use as the primary outcome. The estimated pooled lifetime prevalence of EC use among FSWs was 21% (95% CI: 12%, 35%). Between-study heterogeneity was very high ($I^2=97.8\%$; $\tau^2=1.0716$; $p<0.0001$) and the prediction interval was wide (0.02–0.75), indicating substantial dispersion of true effects across settings.

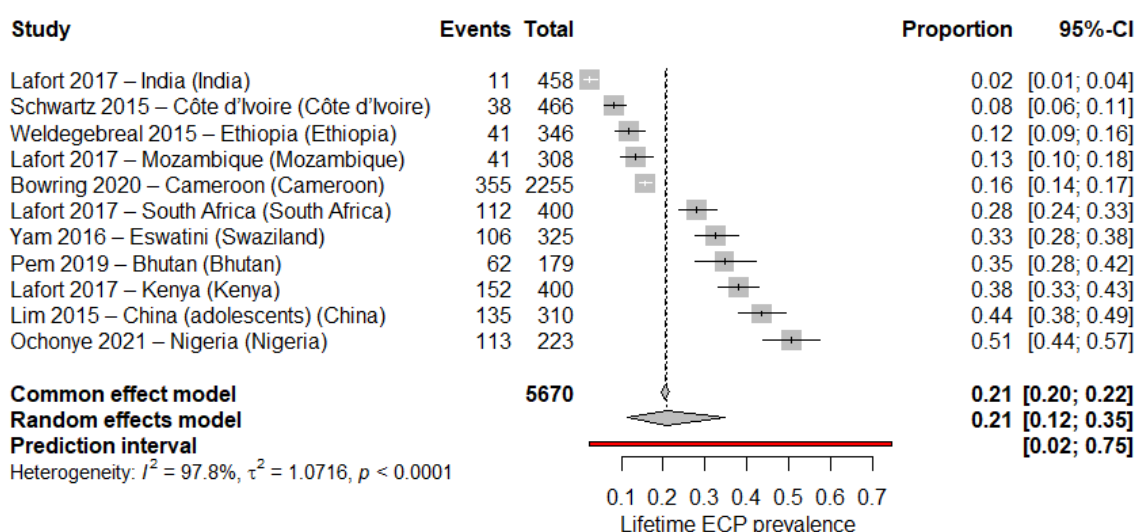


Figure 3: Lifetime emergency contraception use among female sex workers: random-effects pooled prevalence with 95% CI and prediction interval

Subgroup analyses suggested that context and the study design contributed to this variability (Supplementary material). Pooled prevalence was 0.18 (95% CI: 0.0, 0.91) in Asia ($k=3$) and 0.22 (95% CI: 0.13, 0.36) in Sub-Saharan Africa ($k=8$), with no evidence of a between-region difference under the random-effects test ($Q_B=0.08$; $df=1$; $p=0.78$). However, studies using respondent-driven sampling ($k=8$) yielded a lower pooled prevalence of 0.15 (95% CI: 0.07, 0.29) than non-RDS designs (0.43; 95% CI: 0.28, 0.59), and this difference was statistically significant ($Q_B=14.98$; $df=1$; $p=0.001$).

Sensitivity checks supported the stability of the overall finding (Supplementary material). Leave-one-out analyses produced fixed-effect pooled estimates within 0.19–0.24, and heterogeneity remained 97–98%. Excluding the adolescent-only study (China) yielded a pooled prevalence of 0.19 (95% CI: 0.1, 0.33), which is close to the main result. Assessment of small-study effects revealed asymmetry in the contour-enhanced funnel plot on the logit scale (Figure 4), and Peters' regression for all studies demonstrated a positive slope ($\beta=303.28$; 95% CI: 9.33, 597.24; $p=0.044$). However, when restricted to

RDS studies, the slope decreased and was not significant ($\beta=217.78$; 95% CI: 290.5, 726.06; $p=0.335$), suggesting that the apparent asymmetry

may be partly attributable to design or contextual differences rather than selective reporting alone.

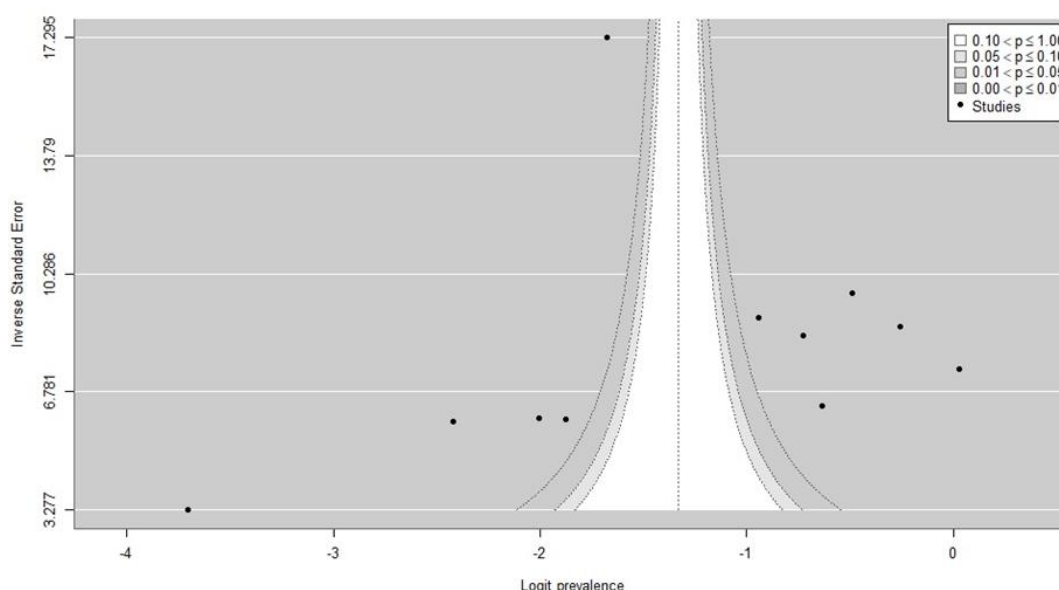


Figure 4: Funnel plot with 90/95/99% significance contours—logit prevalence of lifetime emergency contraception use among female sex workers

Response to condom failure: missed opportunities for EC use

Condom failure appeared to be common in sex work settings and a major driver of unintended pregnancy and STI risk, with lifetime prevalence among FSWs

ranging from 33% in China (39) to 90% in Cape Town (16), and a median of 72% across studies (Table 2). Estimates varied by recall window (past 30 days, past 3 months, or lifetime) and by setting but consistently indicated a high burden.

Table 2: Prevalence of condom failure among female sex workers in selected countries

	Country	Type*	Year (Study)	Condom failures	Sample size	Prevalence (95% CI)
1	China	LT	2002 (39)	159	482	33.0 (28.83–37.41)
2	Malawi	LT	2020 (40)	18	40	45.0 (29.34–61.51)
3	**Greece	LT	2023 (41)	45	71	63.5 (51.12–74.53)
4	Kenya	LT	2018 (17)	61	75	81.0 (70.72–89.42)
5	China	LT	2007 (42)	168	195	86.2 (80.5–90.72)
6	Cape Town	LT	2017 (16)	90	100	90.0 (82.42–95.1)
7	Ethiopia	M	2019 (43)	1250	4,900	25.5 (24.3–26.82)
8	Ethiopia	M	2023 (44)	1819	6085	29.9 (28.71–31.11)
9	Bangladesh	M	2015 (45)	181	354	51.0 (45.82–56.41)
10	China	Q	2008 (46)	72	200	36.2 (29.43–43.1)

*LT = Lifetime prevalence; Q=Prevalence during past 3 months; M=Prevalence during past 30 days; **Prevalence of stealthing, the nonconsensual condom removal in sex

Responses to condom failure varied widely and were frequently inadequate (47). In semi-urban Blantyre, Malawi, only three of the 18 women who reported condom failure stopped intercourse and sought clinical care, including EC; most instead used ineffective measures such as douching, urinating, or squatting (40). In Cape Town, although exposure to condom breakage (90%) and slippage (85%) was very common, only 8% reported using EC. More than half reported taking no action, while others relied on ineffective strategies such as vaginal spermicides or immediate washing; a small proportion described using alcohol or drugs as a coping response (16).

Qualitative accounts from Kenya describe frequent failure events and proactive mitigation strategies, bringing their own condoms and applying them correctly; yet post-failure care focused only on STI management, with EC rarely mentioned (17). Beyond

accidental failure (e.g. inebriation, incorrect use), intentional interference is a widespread phenomenon. Kenyan and Malawian participants reported covert removal or puncturing by clients, and a study in Greece found 63.5% had experienced stealthing (15, 41-40). Collectively, the evidence shows that EC is markedly underused following condom failure among FSWs, representing a missed prevention opportunity.

Response to rape and sexual violence; role of EC

Sexual violence against FSWs is common across settings, with reported prevalence ranging from roughly 11% to 58% depending on country and recall period (48), and it substantially elevates the risk of unintended pregnancy (Table 3). FSWs who reported forced sex were 2.7 times more likely to experience an unwanted pregnancy compared to those who had not been raped (14).

Table 3: Prevalence of rape or sexual violence among female sex workers

	Country	Type*	Year (Study)	Violence / Rape	Sample size	Prevalence (95% CI)
1	Sri Lanka	LT	2020 (6)	48	442	10.9 (8.11–14.12)
2	Ethiopia	LT	2013 (34)	96	395	24.31 (20.2–28.8)
3	Gambia	LT	2015 (14)	73	251	29.0 (23.51–35.12)
4	Uganda	LT	2015 (49)	719	1467	49.0 (46.43–51.64)
5	Uganda	2Y	2019 (30)	172	819	21.01 (18.32–24.0)
6	Canada	2Y	2009 (50)	104	237	44.0 (37.52–50.5)
7	Ethiopia	Y	2013 (34)	45	395	11.43 (8.42–14.9)
8	India	Y	2016 (51)	576	2,400	24.0 (22.32–25.8)
9	South Africa	Y	2021 (52)	1740	3005	57.9 (56.12–59.71)
10	Ethiopia	SW	2019 (43)	745	4,900	15.21 (14.24–16.2)

*Y= during the last year; 2Y= during the last two years; SW= since they start sex work; LT = Lifetime

Although sexual violence is common among FSWs, there is limited literature specifically examining EC use after rape. The available studies indicate that, even though EC is most effective when taken promptly (25), uptake following sexual assault remains very low. Evidence from Ethiopia illustrates the missed prevention opportunity: among 395 street-based FSWs, 24.3% reported rape in their lifetime and 11.42% within the previous year; condoms were not

used during these assaults, and only four survivors (4.23%) reported using EC afterwards (34). In Uganda, where 21% reported rape over a two-year period, fewer than half (40.7%) obtained EC following the assault (30). A qualitative study from Nepal similarly described EC as an important, potentially life-saving option for those experiencing sexual violence; supervisors noted its relevance but highlighted that uptake was constrained by access

barriers (13). Not using EC after forced unprotected sex increases the likelihood of unintended pregnancy, particularly among those not using a non-barrier contraceptive method (30).

Correlates of EC use among FSWs

Only two included studies reported correlates of EC use among FSWs (Eswatini/Swaziland and Cameroon). Both were cross-sectional analyses examining associations between lifetime EC use and individual-level determinants. Reported correlates spanned socio-demographic and economic indicators, sexual risk and condom-related behaviours, and reproductive/contraceptive history (4, 38).

Secondary education was strongly associated with EC use (almost fourfold higher likelihood compared with primary schooling or less), and older age was inversely associated (FSWs aged ≥ 25 years had lower odds of use). Marital status showed a similar pattern, with higher EC use among single FSWs (34.9%) than ever-married FSWs (16.71%; $p=0.029$), corresponding to more than threefold higher odds among single women (4). Economic position also appeared relevant, as higher-income FSWs, particularly those reporting partners with higher exchange rates, were more likely to report EC use ($p=0.006$) (4). Condom-related behaviours were closely linked to EC uptake: higher EC use was reported among those who did not use condoms consistently in the past month (38.12% vs. 15.83%; $p<0.001$) and among those reporting condom failure in the past month (40.7% vs. 23.12%; $p=0.001$) (4). Reproductive history and broader contraceptive behaviour were also associated with EC use: a previous termination of pregnancy was linked to a 34.00% higher likelihood of EC use, and FSWs who had ever used EC were 2.72 times more likely to be using a non-barrier contraceptive method (e.g. hormonal methods, IUDs, or sterilisation) than never-users (38), suggesting EC may be used alongside broader contraceptive strategies rather than being relied as the sole “emergency” method.

Reasons for non-use of EC among FSWs

Three included studies reported explicit reasons for non-use of EC among FSWs (two studies from Ethiopia and one from Bhutan). Those studies assessed non-use and elicited self-reported barriers, capturing concerns related to attitudes and willingness to use EC, perceived or anticipated side effects, misconceptions and health-related fears, limited awareness, and structural access constraints (service availability, affordability, and stigma).

In a study of 395 street-based FSWs in Ethiopia, 95.82% reported non-use. The most common explanations were a general unwillingness to take EC (41.8%) and fear of side effects (19.82%). Other reported barriers included difficulty identifying or accessing appropriate services (12.00%), lack of financial resources (10.90%), limited awareness of EC (10.92%), and concerns about stigma (7.81%) (34, 53). Health-related concerns were also prominent in Bhutan. A large proportion of respondents (79.93%) believed that EC could be harmful. The main fears related to potential impacts on future fertility (76.14%), short-term adverse effects (70.2%), and a perceived increase in HIV/STI risk (69.42%) (9).

Discussion

Overall, about one in five FSWs have ever used EC (pooled prevalence 21%; 95% CI: 11.6%, 34.81%). Despite very high heterogeneity, pooling was retained because true lifetime EC use prevalence was expected to vary across countries and contexts. I^2 thresholds can be misleading in prevalence meta-analyses and were therefore not used as the sole criterion to avoid quantitative synthesis (54-55). A random-effects model was applied to estimate the mean prevalence across settings, and τ^2 and the prediction interval were reported to characterise the dispersion of true prevalences; accordingly, the pooled estimate must be interpreted as an average across heterogeneous contexts.

The very wide prediction interval (2.3%–74.7%) indicates that results vary significantly across settings. A key reason is how studies recruit participants. RDS often reaches women who are closely connected to sex-work networks and may face stronger structural barriers (e.g. policing, unsafe venues, limited after-hours services), which can lower EC use. In contrast, non-probability and other conventional samples may include more women already linked to services, which can lead to an overestimation. Signals of “small-study effects” seen in the full dataset mostly weaken when we examine only RDS studies, suggesting that the pattern is more related to study design and participant mix than to selective publication. Finally, an uneven funnel plot in a single-arm prevalence meta-analysis should be interpreted with caution, because prevalence cannot be below 0% or above 100%. Additionally, due to the logit scale and the modelling approach used, the plot can appear asymmetric even when publication bias is not present (29).

The latter part of this review focusses on “how much EC is used” to “why it is or is not used when risk occurs”. The wide variation across included studies suggests that EC uptake among FSWs is shaped by local contextual conditions such as the legal and policy environment, the organisation and accessibility of services, and the reliability and affordability of supplies. However, these potential explanatory mechanisms warrant further empirical investigation to confirm their influence (56-57). In many settings, those at highest risk of pregnancy, because of condom breakage, coercion or client tampering, are also the least able to act quickly (10, 58-59). Services may be far away, closed after hours, stigmatising or feel unsafe (60). Cost also matters; even small price differences can be decisive and push people towards unsafe alternatives (59). The problem is therefore not only low overall coverage but a persistent mismatch between need and timely access (61).

Programmatically, the priority is to make access easy,

not just to promote use. Clear post-exposure pathways are also needed after condom failure or sexual assault, combining EC with STI/HIV prophylaxis, trauma-informed counselling and support for legal documentation. These service fixes will not last without action on the structural barriers that limit agency: criminalisation, police harassment and unsafe venues (3, 62).

The evidence highlights several often-overlooked barriers on the demand side, including misunderstandings about how EC works and its safety, moral stigma surrounding “repeat use” and hesitation among some providers (10). These can be addressed with clear, consistent messages for all groups, including adolescents and migrants and with services designed to minimise judgement. EC should also be framed as a bridge, not the end of care: each post-exposure visit is a chance to offer the person their preferred ongoing contraception, while respecting autonomy and the economic realities of sex work.

Important gaps limit what we can conclude and should guide future research. Event-level studies that record the time from exposure to EC use would move beyond “ever-used” measures and show how often critical windows are missed. Standard indicators such as awareness, advance possession, use within 72 hours and source of supply would improve comparisons across settings. Given that the included evidence comprised both RDS and non-RDS studies and included an adolescent-only FSW sample, future RDS studies should report weights and key recruitment diagnostics to support interpretation and comparability of weighted estimates and results should be stratified by age group (adolescents vs. adults) where feasible to avoid masking age-specific patterns and to improve comparability across studies. Mixed-methods evaluations are needed to test low-barrier delivery models (e.g. peer distribution, pharmacy vouchers, after-hours kiosks) against outcomes that matter: timely EC use after condom

failure or assault, uptake of ongoing contraception and unintended pregnancy.

Overall, the key message is not that EC use among FSWs is uniformly low or high, but rather that it is highly sensitive to the surrounding system. When access is fast, stigma-free and reliable, women use EC; when it is distant, conditional or risky, they turn to less effective responses (25). Policies that prioritise speed, safety and agency rather than narrow coverage targets are most likely to reduce unintended pregnancy while upholding rights and dignity (57).

Limitations

Several methodological limitations should be considered when interpreting the findings of this review. The absence of prospective protocol registration may reduce transparency regarding any deviations from planned methods; however, we mitigated this by pre-specifying eligibility criteria and analyses prior to data extraction and by providing the complete search strategy. Subscription databases such as Scopus, Web of Science and CINAHL were not searched due to access and resource constraints; as a result, relevant studies indexed only in these databases may have been missed. This risk was mitigated by searching multiple complementary sources and screening the reference lists of included studies. Grey literature was not searched, which may

have resulted in omission of relevant evidence and may increase susceptibility to publication bias.

Conclusions & Recommendations

This review demonstrates that lifetime EC use among FSWs is modest (pooled=21%) and highly dispersed across settings, confirming substantial between-study heterogeneity. The apparent small-study asymmetry in the full dataset largely weakens when restricted to respondent-driven samples, indicating that case-mix and design (but not selective reporting) are the primary sources of imbalance. The significant constraint on EC uptake is timely, stigma-free access at the point and time of risk; information deficits matter, but access logistics and structural conditions determine use. Programmes should therefore strengthen evidence-based EC access for FSWs by integrating EC counselling and provision within existing SRH and HIV/STI services that already reach this population, ensuring clear post-exposure pathways following condom failure and sexual assault, alongside appropriate STI/HIV prevention and trauma-informed support. Policy action should prioritise removing structural impediments that curtail agency and delay care. Future research should adopt event-level, time-to-use metrics and standard indicators (awareness, advanced possession, ≤ 72 -hour use, source) and report RDS diagnostics to ensure comparability.

Public Health Implications

The findings of this study have the following public health implications:

- Emergency contraception (EC) should be systematically integrated within existing SRH and HIV/STI service platforms that reach FSWs, with clear post-exposure pathways following condom failure and sexual assault, and counselling that emphasises correct indications, the time-sensitive nature of use, and that EC is not a routine contraceptive method and does not protect against HIV or other sexually transmitted infections.
- Targeted risk communication should address persistent misconceptions and health-related fears (including concerns about side effects and fertility) while reducing stigma through non-judgmental, confidential service delivery.
- Between-setting heterogeneity is substantial; thus, implementation should be locally tailored, with attention to supply reliability, affordability, and service accessibility in the environments where risk exposures occur.

Author Declarations

Competing interests: The authors declare that they have no competing interests.

Ethics approval and consent to participate: This work involved only secondary analysis of published literature and did not include any human or animal participants; accordingly, formal ethical approval was not required for this review. Ethical clearance for the wider parent study, which includes later data collection involving human participants, has been obtained from the Ethics Review Committee of the University of Kelaniya, Sri Lanka (UoK/ERC/MDS/2024/038).

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Author contributions: MSS led the study conception and design, managed data extraction and curation, conducted the analyses, and prepared the initial manuscript draft. KK and IDS supported the study by contributing to article screening and inclusion decisions, providing supervision throughout the work, and critically revising and approving the final manuscript.

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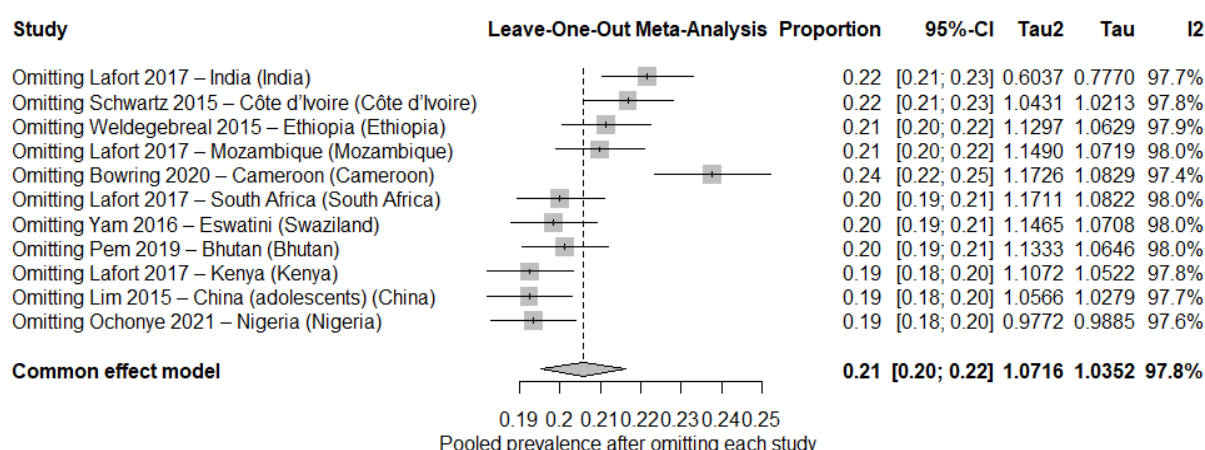
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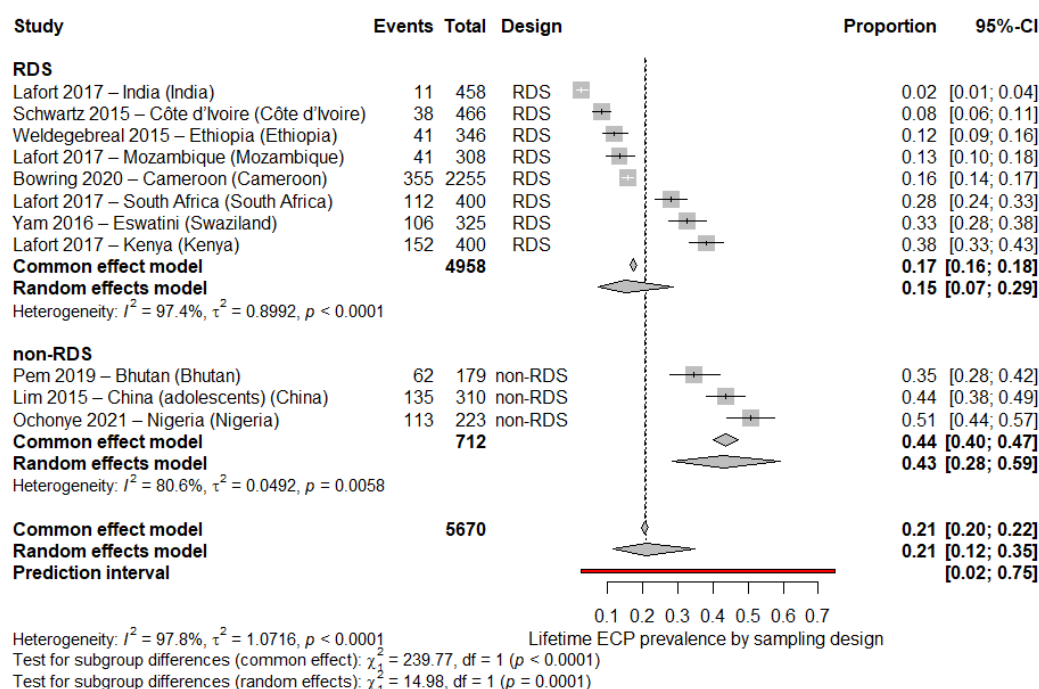
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Supplementary Material: Sensitivity and Subgroup Analysis

1. Leave-one-out sensitivity analysis of pooled lifetime emergency contraception use among female sex workers



2. Lifetime emergency contraception use among female sex workers, by sampling design (RDS vs non-RDS): subgroup random-effects meta-analysis



3. Lifetime emergency contraception use among female sex workers, by geographical region: subgroup random-effects meta-analysis

