ANTENATAL CARE INTERVENTIONS TO INCREASE CONTRACEPTIVE USE IN THE PERIOD FOLLOWING BIRTH IN LOW- AND MIDDLE-INCOME COUNTRIES:

A systematic review of the literature

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ABBREVIATIONS

ANC	Antenatal care
CHW	Community health worker
CI	Confidence interval
ESRC	UK Economic and Social Research Council
FIGO	International Federation of Gynecology and Obstetrics
HIV	Human immunodeficiency virus
LAM	Lactational amenorrhea method
LARC	Long-acting reversible contraceptives
LMIC	Low- and middle-income country
LSHTM	London School of Hygiene and Tropical Medicine
NICE	UK National Institute for Health and Care Excellence
OR	Odds ratio
P4P	Pay for performance
PMTCT	Prevention of mother to child transmission
PPFP	Postpartum family planning
PPIUD	Postpartum IUD
RCTs	Randomized controlled trial
RD	Risk difference
SMS	Short message service
TIDieR checklist	Template for intervention description and replication checklist
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

This report prepared by the USAID MOMENTUM Safe Surgery in Family Planning and Obstetrics project summarizes the methods and results from a systematic review of interventions in low- and middle-income countries (LMIC) which attempted to increase voluntary postpartum contraceptive use through contacts with pregnant women in the antenatal period. The aim was to describe the interventions identified and to assess their effectiveness on postpartum contraceptive use and other related outcomes.

We screened 771 records published from 1 January 2012 to the end of July 2022, and included 34 records reporting on 31 unique studies in the review. This was a substantial increase on the 16 studies identified by Cleland and colleagues for the period before 2012. The majority of studies (n=23) were published from 2018 on (in the previous five years).

Most studies (n=21) were conducted in Sub-Saharan Africa. Half enrolled pregnant women (55%, n=17); the rest enrolled postpartum women only (23%, n=7); pregnant and postpartum women (10%, n=3); pregnant women and their male partners (6%, n=2); women aged 15-49 (pregnancy status not specified) (3%, n=1); or postpartum women and female community health volunteers (3%, n=1). Twelve studies had interventions in the antenatal period only; 18 included other periods as well and one was unclear.

Approximately half of the study designs (n=16) were randomized controlled trials and half (n=15) were quasi-experimental. Most evaluations (n=22) were conducted in health facility settings, with seven in community settings, and two in health facilities and communities. These findings are not too dissimilar to a previous review by Cleland and colleagues.

Interventions were highly heterogeneous. We categorized them into: Package (interventions with 2+ distinct components) (n=14); Counseling (n=7); Educational (n=5); Financial (n=2); Digital (n=2); and Provider Training (n=1). The distinction between 'Counseling' and 'Education' was not always clear. The interventions covered a wider range of approaches than seen in older studies which primarily involved counseling.

Twenty-four of the 31 studies reported on the main outcome of interest in this review: postpartum contraceptive use within one year after birth. Among these 24 studies, 18 reported a positive intervention effect, whereby those receiving the intervention had greater contraceptive use within one year postpartum compared to those who did not receive the intervention. This compared to 9 of 16 of the older (before 2012) studies showing a positive effect of the intervention. In the few studies that looked at uptake over time, greater effects were seen early on, but differences between intervention and comparison groups tended to wane over time as more women in the comparison groups took up contraception with increasing time postpartum, so effect sizes tended to diminish.

While the studies in this systematic review were highly heterogeneous, the findings suggest that interventions that included a multifaceted package of initiatives appeared to be more likely to have a positive effect. By contrast interventions with minimal counseling did not appear to be effective.

INTRODUCTION

Background

There is substantial evidence that short birth intervals increase health risks, particularly for infants, and that postpartum women have strong desires to avoid pregnancy following childbirth. Yet, interest in postpartum family planning programs has waxed and waned since the 1960s (1). For example, Koblinsky's (2) review of the literature from 1970s-2004 on community-based interventions aimed at improving postpartum care found that "surprisingly, reports of programs promoting birth spacing in the postpartum period were not identified" despite community-based family planning distribution programs being widely available. However, the last decade has seen a renewed interest in voluntary postpartum family planning, following the World Health Organization's (WHO) issuance of guidelines in 2013 for postpartum family planning strategies (3), and with strong support from the United States Agency for International Development (USAID).

The 2013 WHO guidelines identified a continuum of four points of contact for postpartum family planning, beginning with contacts during pregnancy (via facility-based antenatal care or community-based pregnancy screening programs), and moving on to facility-based contacts in the intra- and immediate postpartum; contacts via postpartum programs; and contacts via infant-care programs. A 2019 systematic review and meta-analysis by Dev and colleagues (4) found that women who received family planning counseling during antenatal or postnatal care were more likely to use postpartum contraception. Moreover, since antenatal care coverage (percentage attended at least four visits) is 66% globally, 45% in low-income countries, 61% in lower middle-income countries, and 91% in upper-middle income countries (5) and with recent WHO recommendations now recommend eight visits (6), there is ample opportunity for family planning counseling during the antepartum period.

Aim of this review

This report summarizes the methods and results from a systematic review prepared by the USAID MOMENTUM Safe Surgery in Family Planning and Obstetrics project of interventions in low- and middle-income countries (LMIC) which attempted to increase voluntary postpartum contraceptive use (including the lactational amenorrhea method (LAM)) through contacts with pregnant women in the antenatal period. The aim was to describe the interventions identified and to assess their effectiveness on postpartum contraceptive use and other related outcomes.

Summary of evidence before the review

Several literature reviews had been conducted on related topics prior to our review, including:

- A 2012 Cochrane review by Arrowsmith and colleagues (7) (literature from 1990-2010), which assessed the effectiveness of ante- and postnatal counseling on uptake of copper IUDs.
- A 2010 review by Kuhlmann et al. (8) (literature from 1994-2009) which examined integration of family planning with other health services and a later 2014 systematic review by Sonalkar and colleagues (9) (literature to 2013) which assessed the use of integration and outreach programs to promote postpartum family planning.
- A 2015 systematic review by Cleland and colleagues (1) (literature to 2013), which reviewed studies of interventions explicitly designed or intended to have an effect on the contraceptive practices of postpartum women in LMICs.

- A 2016 review by Blazer and Prata (10) (literature from 2004-2015) on intervention strategies which presented the most promise for decreasing the unmet need for contraception among postpartum women in LMICs.
- A 2022 systematic review by Mruts and colleagues (11) (literature to 2021) which synthesized evidence on the coverage and effect of both routine and interventional family planning counseling on postpartum modern contraceptive uptake in Sub-Saharan Africa.

With the exception of the most recent review (11), these reviews mostly covered research conducted before the 2013 WHO recommendations (3, 6) and the early reviews were mostly based on studies from high-income countries. The most recent review (11) was restricted to Sub-Saharan Africa, and only considered counseling interventions.

METHODS

Research questions

This review focused on any intervention (or a component of an intervention) delivered during antenatal care with the explicit aim of increasing voluntary postpartum contraceptive use (including use of LAM) after the index birth. Specifically, this review sought to answer the following research questions:

1. Can interventions delivered in the antenatal period increase postpartum contraceptive use?
2. What intervention components/content are present across all the effective interventions?

Context and population

We focused on interventions in LMICs which were delivered to women in the antenatal period (delivered in the community or in primary or secondary health facilities) to increase postpartum contraceptive use (including use of LAM).

Eligibility criteria

Studies published from the start of 2012 to the end of July 2022 were included in this review if they:

- Included pregnant women.
- Were conducted in LMICs.
- Evaluated any intervention that was delivered at some point (but not necessarily exclusively) during the antenatal period which was explicitly designed or intended to have a distinct effect on postpartum contraceptive use (including use of LAM).
- Were experimental in design (i.e., were randomized or non-randomized trials) or quasi-experimental studies (e.g., controlled before-after or interrupted time-series). Descriptive studies, qualitative research, literature reviews, opinion papers, conference proceedings, and unpublished studies were not eligible.
- Were full articles published in French or English.

Search and screening

We used a comprehensive set of search terms for the following four themes: (i) postnatal; (ii) contraceptive methods; (iii) antenatal interventions, and (iv) low- and middle-income countries. These were combined using the Boolean "AND". See Appendix A for the full search strategy for each database. We based our search terms on those used by Cleland and colleagues (1). Because the review by Cleland and colleagues included literature published through the end of 2013, we limited our search to studies published from 2012 onwards (until end of July 2022), relying on the Cleland et al review for citations of 16 studies before 2012. We also searched two additional relevant reviews published after 2012 for additional studies (11).

We searched EMBASE, Global Health, and Medline, and manually searched the reference lists from eligible studies included in the full-text screening for additional relevant studies. Prior to running the formal search strategy, we consulted a librarian from the London School of Hygiene and Tropical Medicine (LSHTM) Library services (JF) for advice. We also validated our preliminary search by checking that the search results included articles of relevance suggested by experts and found in previous reviews. The search result files for each database were uploaded into the systematic review software program, Rayyan. After piloting the study selection process, we formally screened search results against eligibility criteria. All abstracts were double screened, with screeners (NF, OM, OC, AC) masked to the other screeners'

decisions. Decisions were unmasked when all screening was complete. Discordant decisions were then discussed among the team and consensus reached on whether to include or exclude these studies.

Outcomes

We developed an initial conceptual framework – a visual representation of how we thought ANC interventions would work to increase postpartum contraceptive use (Figure 1). This was based on work by Cooper et al., in Bangladesh which described a behavior change continuum moving towards postpartum contraceptive uptake (12). The steps flow in a sequential order, with each step necessary to move to the next.

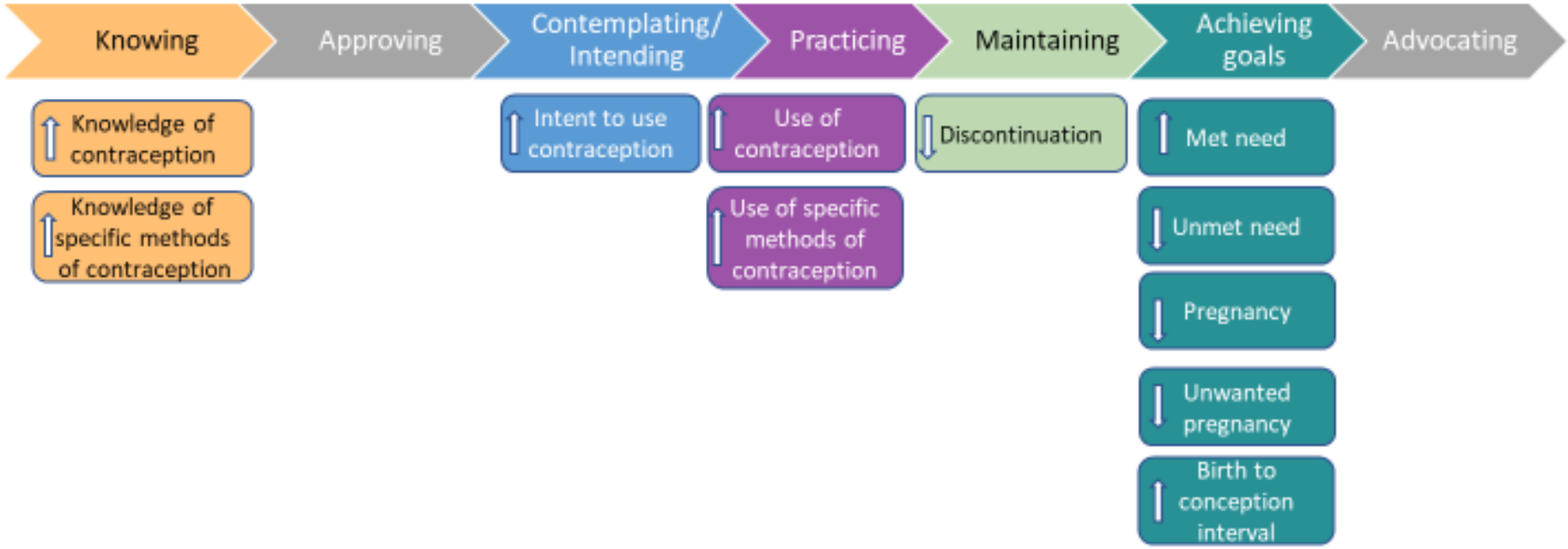
The main outcome of interest was postpartum contraceptive use within one year of childbirth. If studies reported postpartum contraceptive use at multiple timepoints, these were all recorded. If a study did not report the main outcome, it had to include a clear description of the intervention and report at least one of the following outcomes: postpartum contraceptive use extending beyond a year; use of specific contraceptive methods (including use of LAM); contraceptive continuation; postpartum unmet need; pregnancy; length of birth interval; knowledge/awareness of available methods; or intention to use a method in the postpartum period. Any other data on relevant outcomes were also extracted. All measures of intervention effect were considered (e.g., prevalence ratios or prevalence differences).

Data extraction

An Excel-based extraction tool was developed by one team member (OM) and refined in a number of iterations until the final tool was agreed upon. Studies were assigned to four people (OM, NF, OC, and AC) for the initial data extraction. After the initial extraction was complete, the tool was separated into four sections based on tables we anticipated putting in the report: 1) general study information; 2) further details on the intervention; 3) assessment of outcomes; and 4) quality appraisal. In further discussions amongst the core team (OM, NF, OC) the extracted data were 'harmonized', i.e., we agreed upon a set of categories for each component of the data. For example, because the initial data extraction was based on the authors' reports, the same study designs were described in different ways – we harmonized these descriptions. Data were then double extracted by another team member (MP) and discrepancies were reviewed and discussed in the team.

We compiled a concise quality-appraisal tool to extract data on the elements of quality most broadly relevant to our included studies. This drew upon the Cochrane Effective Practice and Organization of Care risk of bias criteria (13) and the UK National Institute for Health and Care Excellence (NICE) Quality appraisal checklist for quantitative intervention studies (14). From the original Cochrane tool, we included (a) 'Random sequence generation'; (b) 'Baseline characteristics similar'; and (c) 'Incomplete outcome data'. From the NICE tool, we included: '(1.1) Is the source population or source area well described?'; '(1.2) Is the eligible population or area representative of the source population or area?'; '(2.2) Were interventions (and comparisons) well described and appropriate?'; and '(4.5) Were the analytical methods appropriate?'. One person (OM) extracted the quality appraisal data from all studies.

Figure 1: Conceptual framework for how ANC interventions work to increase postpartum contraceptive use



Data synthesis

We anticipated the interventions in this review would be heterogeneous, so we planned a narrative synthesis of the measures of intervention effect. We followed the UK Economic and Social Research Council (ESRC) Methods Programme guidance (15), which provides a framework for such a process. The framework includes four main elements: (a) developing a theory of how the intervention works, why, and for whom; (b) developing a preliminary synthesis of findings of included studies; (c) exploring relationships in the data; and (d) assessing the robustness of the synthesis. We did not conduct these elements in a linear way – rather, we moved back and forth through them throughout the review.

In the preliminary synthesis, we developed an initial description of the data and organized it in terms of the geographic distribution, chronological frequency of publication, and intervention type. We stratified studies by intervention type, and then alphabetically under these headings. Studies were then categorized by their study design and by the setting, participants, intervention components (e.g., counseling, home visits, integrated, multimodal, etc.), intervention delivery details, and contraceptive use outcomes. We looked for general patterns in effect direction and size. While we extracted data on a range of contraceptive-related outcomes shown in Figure 1, the main focus of the synthesis was on postpartum contraceptive use within one year.

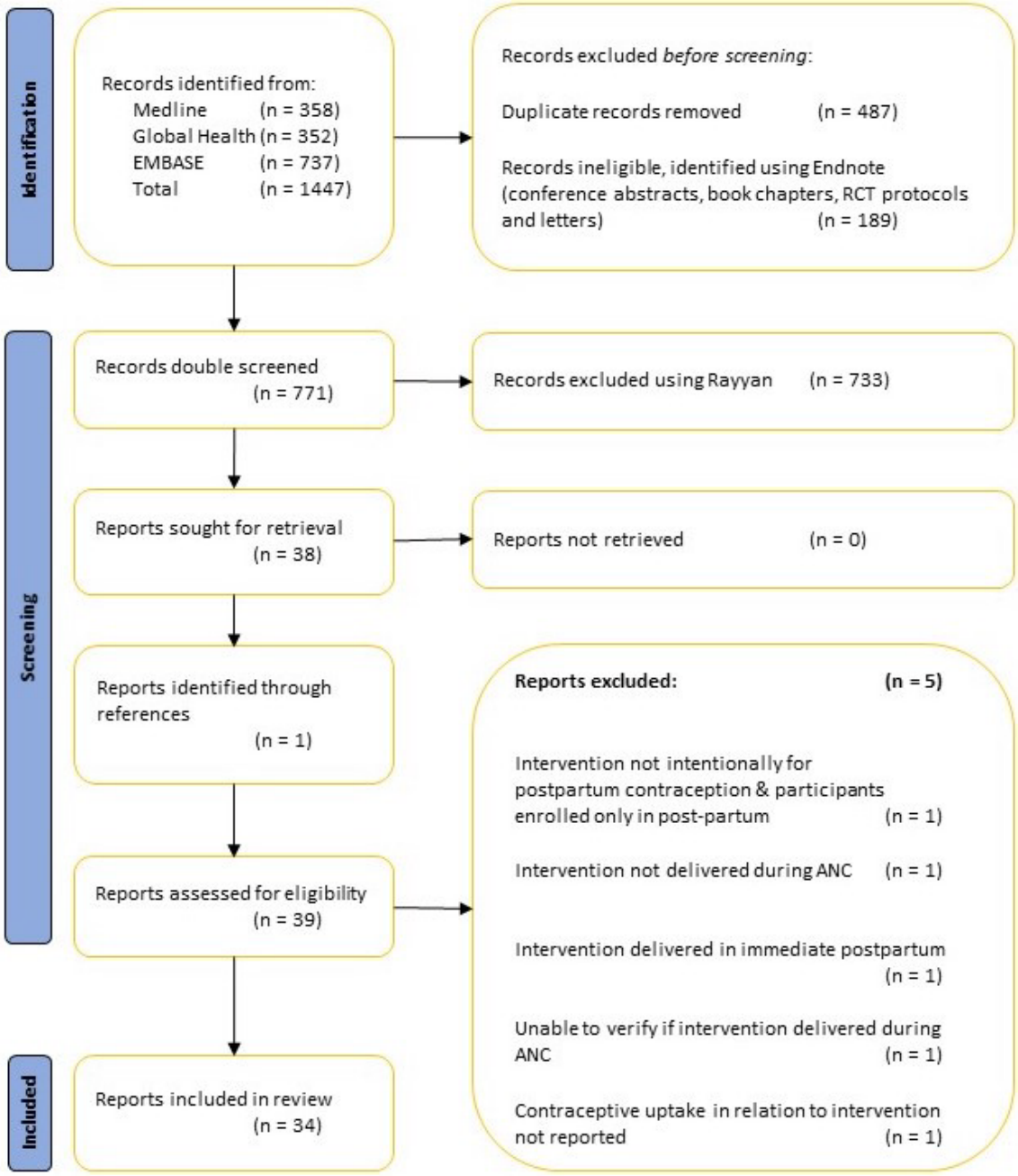
Finally, we interrogated the initial patterns we observed by exploring the relationships within and between the studies. The aim of this stage was to understand how and why the interventions had or did not have an effect on the different outcomes and in doing so, to identify the factors that could explain the differences between the intervention effects.

RESULTS

Search, screening, and extraction

We began preliminary searches at the end of July 2022 and completed double screening in Rayyan on 26 August 2022. We double screened 771 records. After unmasking the screening decisions, there were 16 discordant decisions and 30 records that required further discussion among the team. Thirty-eight records were identified for full text review. After full-text review and double data extraction (completed March 22 2023), 34 records were deemed eligible and included in the review. These referred to 31 unique studies. The Prisma diagram depicting the flow from record identification to review inclusion is presented in Figure 2 (16).

Figure 2 PRISMA diagram



Synthesis

The summaries of the interventions were guided by the TIDieR checklist (17) and are presented in Tables 1-4.

Preliminary synthesis

A number of records were based on the same intervention. Guo 2022 (18), Huber-Krum 2020 (19), Pradhan 2019 (20), and Puri 2021 (21) all reported on the same study in Nepal, but had different outcomes and analytical methods. We considered these four records together and reported on the multiple outcomes under one study. Karra 2019 (22) and Pearson 2020 (23) were also based on the same intervention package as Guo 2022 (18), Huber-Krum 2020 (19), Pradhan 2019 (20), and Puri 2021 (21), but these studies were conducted in different countries (Karra 2019- in Sri Lanka and Pearson 2020- in Tanzania). In this case, we kept the data separate as the intervention mechanism could have been modified by the context. Similarly, Tran 2019 (24) and Tran 2020 (25) were based on the same intervention (Yam Daabo) but were conducted in different countries (Tran 2019- in Burkina Faso and Tran 2020- in the Democratic Republic of the Congo); these reports were also kept separate in the synthesis. Grouping the four Nepal studies together reduced the total number of studies included in the synthesis to 31.

Study characteristics

The main characteristics of the included studies are presented in Table 1. Figures 3 and 4 show where studies were conducted. The majority of studies (68%, n=21) were conducted in Sub-Saharan Africa: Kenya (n=5) (26-30); Burkina Faso (n=2) (24, 31); Democratic Republic of the Congo (DRC, n=2) (25, 32); Nigeria (n=2) (33, 34); Tanzania (n=2) (23, 35); Ethiopia (n=1) (36); Ghana (n=1) (37); Guinea (n=1) (38); Malawi (n =1) (39); Rwanda (n=1) (40); Uganda (n=1) (41); Zambia (n=1) (42) and Zimbabwe (n=1) (43). The region with the second greatest number of studies was Asia (29%, n=9): Nepal (n=4) (18-21, 44-46); Afghanistan (n=1) (47); Bangladesh (n=1) (48); India (n=1) (49); Sri Lanka (n=1) (22); and Thailand (n=1) (50). One study was conducted in Egypt (51).

Figure 3: Count of studies by country

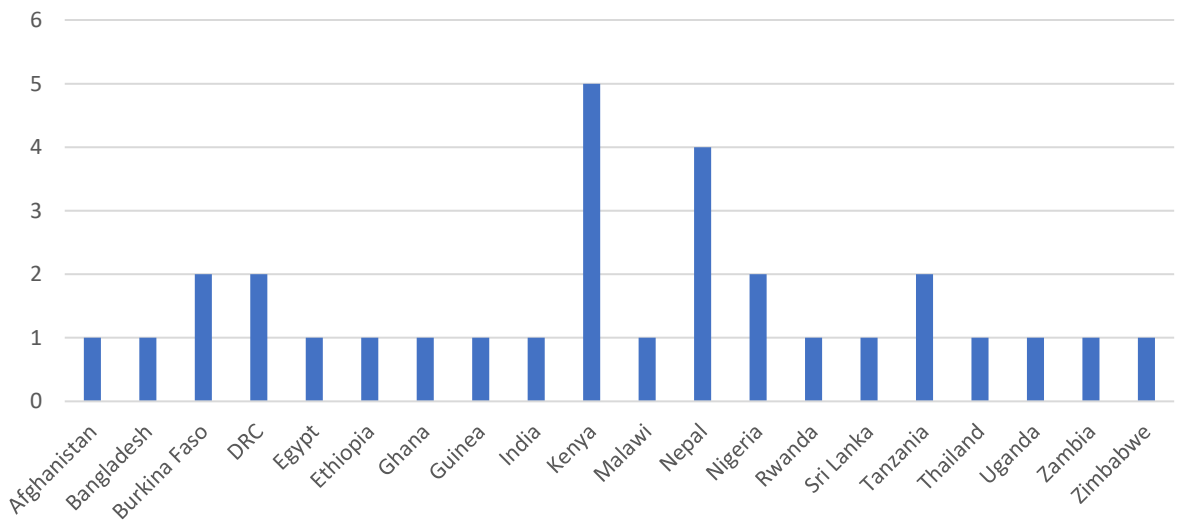
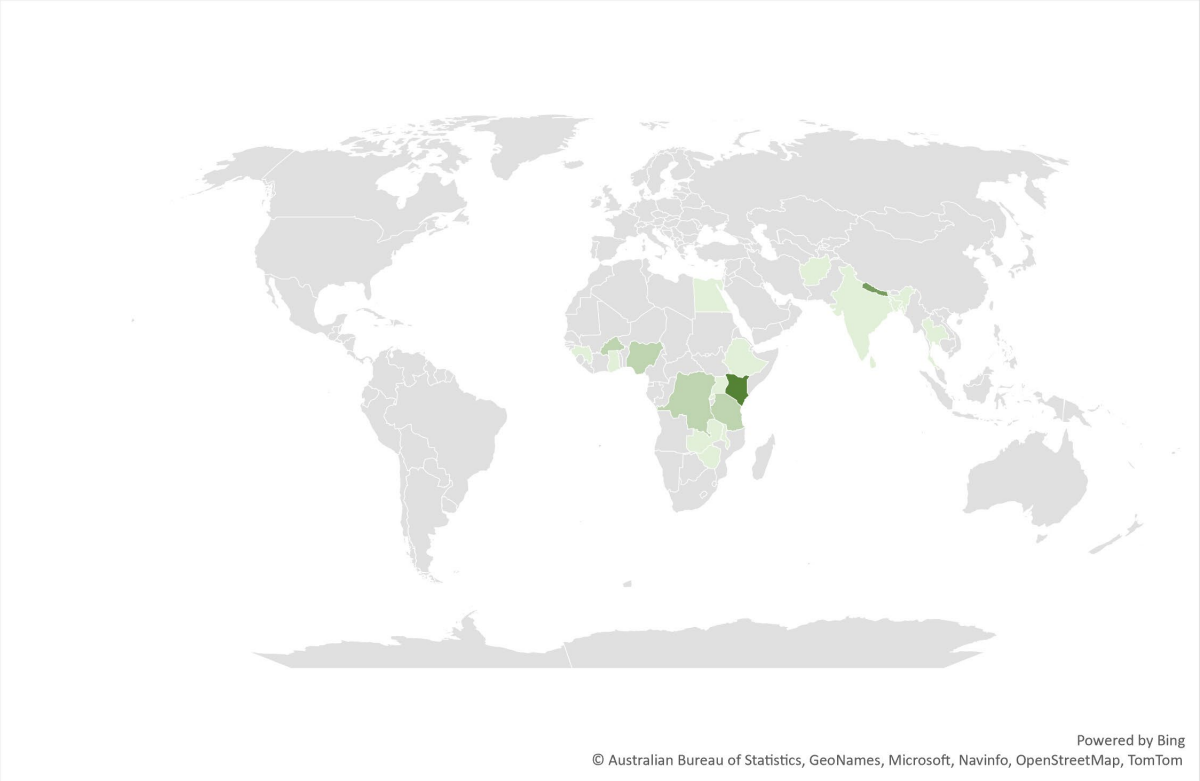
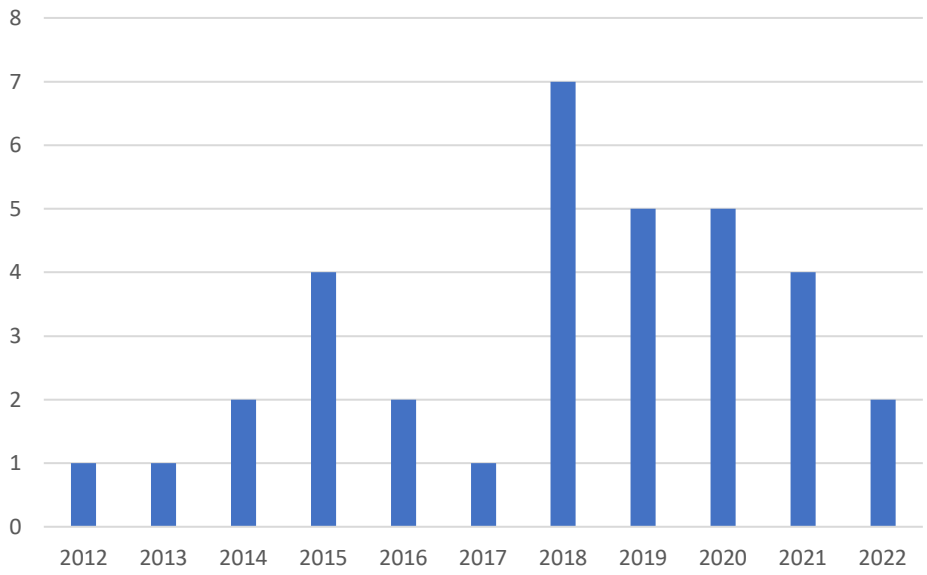


Figure 4: Geographical distribution of studies



Reports were published in all years from 2012-2022 inclusive, with the majority (68%, n=23/34) published in the previous five years (2018-2022) (Figure 5, N=34, grouped Nepal studies presented separately).

Figure 5: Publication year of included studies



**N=34, grouped Nepal studies presented separately*

Around half of the study designs (52%, n=16) were randomized controlled trials (RCTs) and half (48%, n=15) were quasi-experimental. Most studies (77%, n=24) were conducted in health facility settings: hospitals (n=9); lower-level facilities (n=11); mixed-level facilities (n=2) and mixed, health facilities and community (n=2). The remaining seven (23%) studies were conducted in community settings only.

Just over half of the studies specified that participants were pregnant women (55%, n=17). The rest of the studies enrolled: postpartum women only (23%, n=7); pregnant and postpartum women (10%, n=3); pregnant women and their male partners (6%, n=2); women aged 15-49 (pregnancy status not specified) (3%, n=1); postpartum women and female community health volunteers (3%, n=1).

Interventions

Details of the intervention components are presented in Table 2. Twelve studies had interventions in the antenatal period only and 18 in the antenatal and other periods, including in the intra-and postpartum periods. One was unclear. Despite the interventions being highly heterogeneous, we were able to categorize them into six main types: Package (45%, n=14); Counseling (23%, n=7); Educational (16%, n=5); Financial (6%, n=2); Digital (6%, n=2); and Training of providers (without an explicit follow-up intervention with pregnant women) (3%, n=1). Interventions were classified as 'Package' if they contained at least two distinct components. Interventions were classified as 'Counseling' if the provision of counseling was the dominant component (e.g., one intervention provided one-to-one counseling but also offered a pamphlet containing similar information and was classified as 'Counseling' rather than 'Package'). The distinction between 'Counseling' and 'Education' was not always clear (e.g., Bang and colleagues described an educational intervention that consisted of using village level sessions and small-group sessions; we could not be sure what the village-level sessions comprised) (36). In these cases, we classified the intervention according to the description used by the authors. We further categorized the types into 15 subtypes: Counseling: one-to-one (13%, n=4); Counseling: one-to-one plus pamphlet (3%, n=1); Counseling: mixed sessions (3%, n=1); Digital: Short message service (SMS) (6%, n=2); Educational: campaign (3%, n=1); Educational: group sessions (13%, n=4); Financial: client vouchers (3%, n=1); Financial: provider pay-for-performance (3%, n=1); Package: multifaceted (35%, n=11); Package: digital and one-to-one education and counseling (3%, n=1); Package: systems strengthening (6%, n=2); and Training: providers (3%, n=1).

Most counseling interventions consisted of multiple sessions during pregnancy. One (31) consisted of mixed sessions- one-to-one with the pregnant woman, a couples' session, and a male group session. One intervention was a small sub-component of an HIV post-test counseling that included sexual negotiation skills and empowerment, information about HIV, PMTCT, family planning, and communication skills related to sex and condom use (35). Half of the counseling interventions (n=4) were delivered by providers, mostly in antenatal care (ANC) clinics.

The two digital interventions were delivered by SMS; both contained a two-way element and the trial (26) also included a one-way SMS arm and classified participants into 'tracks' (routine, adolescents 14–19 years, first-time mothers, women with a previous caesarean section, and those with multiple gestations), with tailored messages for each.

Of the four educational group sessions, one was delivered by study trainers (43) and one by community health volunteers (30); Lori and colleagues and Bang and colleagues did not mention who delivered the educational sessions (36, 37). The educational campaign was led by community health workers (49).

One financial intervention was client-targeted (29) and provided vouchers for free modern contraception (with different validity periods: one valid for one year and one valid for two months) and SMS reminders to use the vouchers. The other financial intervention was provider-targeted and used 'pay for performance' (P4P), where facilities were given bonus payments based on the number of maternal and

child health services that they provided (ANC, skilled birth attendance, postnatal care, pentavalent vaccination and tuberculosis case-detection), with additional annual payments based on a balanced scorecard that addressed quality of services, and the contraceptive prevalence rates in the health facility catchment areas (47).

One of the two package interventions that focused on system strengthening was based on accountable care principles (44) where "a group of providers were held accountable for achieving pre-specified outcomes for a specific population over a period of time for an agreed cost." This involved strengthening community health worker active surveillance integrating digital health information and increasing monitoring and supervision capabilities. The other system strengthening package intervention had multiple interacting components, including improvements in maternity waiting home infrastructure in the form of equipment and supplies, policies, management and financial structures, and linkages to health systems with skilled midwives (42). Three package interventions consisted of one-to-one counseling plus other components: one study (48) added community-based meetings led by community mobilizers, flyers, and distributed contraceptives; the second (40) added provider training on insertion and removal of postpartum IUD (PPIUD), a refresher on postpartum implant, financial incentives, and stakeholder engagement; and the third (50) included a digital component using computerized media to promote self-efficacy in oral contraceptive use. The remaining multifaceted package interventions contained a wide variety of components, which included counseling, provider training, and the provision of equipment.

The training intervention consisted of training providers on postpartum family planning, including the advantages and disadvantages of each method, focusing on immediate PPIUD insertion (45).

Contraceptive use outcomes: general patterns in effect direction and size

The outcomes are presented in Table 3. Twenty-four of the 31 studies (77%) reported on the main outcome of interest in this review: postpartum contraceptive use within one year after birth. Among these 24 studies, 18 reported a positive intervention effect (75%): nine of these 18 (50%) were package interventions (24, 25, 32, 42, 44, 46, 48, 51) (plus the four publications comprising FIGO's PPIUD intervention in Nepal); four (22%) were counseling interventions (31, 33, 34, 38); three (17%) were educational interventions (30, 37, 49); one (6%) was digital (28) and one (6%) was financial (29) . While the measures of effect captured and the effect sizes were wide ranging, the largest effects were seen in the package interventions. Two studies reported immediate postpartum contraceptive uptake (20, 40) (includes FIGO's PPIUD intervention in Nepal); all of which reported a positive effect of the intervention. Among the six studies where the main outcome was reported, but where there was no positive effect observed (25, 26, 35, 36, 41, 43), one was a package intervention, two were counseling interventions, two were educational group sessions, and one was a digital intervention.

Four studies (39, 48, 51) (plus the four publications on the FIGO's PPIUD intervention in Nepal) reported on postpartum contraceptive use beyond one year after birth; three of these reported a statistically significant intervention effect.

Twenty-two studies reported on the use of specific methods, with 11 (19, 20, 23-25, 28, 31, 32, 40, 41, 46) reporting the intervention had a positive effect on use of at least one of the following methods: PPIUD; implants; permanent methods; or use of highly effective methods. Five studies reported on LAM and three on exclusive breastfeeding. Three of the studies increased use of LAM in the intervention group, one decreased it, and one showed no use of LAM whatsoever. The studies on exclusive breastfeeding all showed increasing use. A further two studies trained on correct use of LAM but did not report results because of measurement problems. Four studies reported on contraceptive continuation (continuation for the first 12 months after adoption, discontinuation at six months, continuation among women starting contraception at ten weeks postpartum and stopping contraception at 6.5 months) (26, 28, 35, 48). None of these reported a statistically significant intervention effect.

Exploring relationships with and between the included studies

We interrogated the studies with regard to the main outcome of interest (postpartum contraceptive use within one year after birth) by considering the intervention components and effect sizes within the studies that demonstrated a positive effect against those that did not find a positive intervention effect. The outcome measures were highly heterogeneous (Table 3) supporting our decision to conduct a narrative synthesis rather than a meta-analysis.

Of the 24 studies that reported on the main outcome of interest, 11 were RCTs and 13 were quasi experimental designs. Of the 11 RCTS that reported on the main outcome, five used cluster or stepped-wedge designs (24, 25, 30, 41) (plus FIGO's Nepal intervention), and six were individually randomized trials (26, 28, 29, 31, 33, 34). All 11 described the source population well, included an eligible population that appeared representative of the source population, and described the intervention and comparator well. However, only four RCTs (25, 26, 30, 34) had low risk of bias with regard to the random sequence generation. Two (33, 41) had a high risk of bias and the sequence generation was unclear in the remaining five trials. The trials with the low risk of bias in sequence generation had moderate differences in effect between the groups (use of modern contraception at six months postpartum 57.4% vs. 35.4%, p=0.002 (34); 4.1% PPIUD prior to the intervention vs. 9.8% after, β =0.027, 95% CI 0.000 to 0.054 (39), contraceptive adoption, risk difference (RD)=7.2%, 95% CI 2.6 to 12.9 (30)).

Twenty-four of the 31 studies reported on the main outcome of interest in this review: postpartum contraceptive use within one year after birth. Eight studies reported prevalence at 12 months exactly, others reported use at 48 hours, 1 week, and at 1.4, 2.3, 2.8, 2.8-4.6, 3 (2 studies), 3.7, 5.1, 5.5, 6 (4 studies), 6-15, 8, 9 (2 studies), up to 11, within 12 (2 studies), within 13, 8-19, and up to 24 months.

The 18 studies reporting a positive intervention effect on the main outcome were also heterogeneous with regard to intervention type. Nine of these studies (24, 25, 32, 42, 44, 46, 48, 51) (plus FIGO's PPIUD intervention in Nepal) evaluated a 'package'-type intervention and six of these nine (66%) were characterized as 'multifaceted' with several interacting intervention components. All but one (Tran 2020) of the multifaceted interventions that reported postpartum family planning use within a year reported a positive intervention effect. Although they did not report on the primary outcome of interest, Karra and colleagues' (22) seven-component package[1] to institutionalize immediate PPIUD services as part of routine ANC and delivery-room services reported a doubling of women choosing PPIUD at 24 months after the rollout of the intervention (from 4.1% before to 9.8% after).

Jarvis and colleagues' (32) quasi-experimental study evaluated an three-armed intervention that provided: a) free family planning vs. b) a 'quality inputs' intervention consisting of: clinical training and provision of PPIUD insertion equipment, training staff on WHO's Medical Eligibility Criteria for contraceptive use, and a systematic family planning screening and referral tool, vs. c) a combination of free family planning and quality inputs (a and b). The authors reported benefits in the quality and free arms (arms a or b), but the greatest effect in the free + quality arm (arm c) (LARC use within 12 months

[1] (1) workshops on postpartum family planning (PPFP) and PPIUD for doctors, midwives, nurses, and general hospital staff who worked in maternity wards; (2) training maternity care providers in hospitals and in surrounding antenatal clinics in PPFP counseling; (3) training doctors in study hospitals in PPIUD insertion; (4) provision of PPFP leaflets to hospitals and MOH clinics to distribute during counseling; (5) provision of a PPFP video to show in the hospital waiting area; (6) provision of Kelley's forceps to hospitals; and (7) monitoring and evaluation of counseling activities and PPIUD insertions.

postpartum, OR=8.4; 95% CI, 3.4 to 20.6). However, this study had a high risk of bias because its baseline group characteristics were dissimilar, and the outcome data were incomplete.

The four studies in Nepal (18-21) evaluated the seven-component intervention through another cluster stepped-edge trial aimed at increasing PPIUD (20). This International Federation of Gynecology and Obstetrics (FIGO)-designed intervention consisted of: 1) informational workshops for female community health volunteers and general hospital staff; 2) training maternity care providers in postpartum family planning (PPFP) counseling, PPIUD insertion and management of complications; 3) PPFP leaflets distributed during counseling; 4) informational wall chart and video displayed in the hospital waiting area; 5) provision of Kelley's forceps for IUD insertion and provision of IUDs; 6) designated service provider in each hospital as facility coordinator for the program; and 7) regular monitoring of counseling and insertion data. The results showed an increase in PPIUD uptake in the immediate postpartum period (adjusted risk difference of 4%; 95% CI 3-6 pp).

Huber-Krum and colleagues' (19) analysis of the Nepal FIGO package intervention looked at the effect of the intervention on modern contraceptive prevalence and method mix, rather than just on PPIUD insertion immediately after birth. The analysis of the cluster stepped-wedge trial in Nepal found an adjusted risk difference of 4% (95% CI -0.00 to 0.10) more uptake of modern methods at one-year postpartum, demonstrating a small and borderline statistically significant effect. They also found the 4% in PPIUD uptake in the intervention group observed by Pradhan and colleagues was somewhat diminished to 3% at 12 months postpartum but remained statistically significant (95% CI 0.02-0.04). By 24 months, most differences between the intervention and comparison group had disappeared, except for PPIUD, which had an adjusted risk difference of 2% (95% CI 0.01-0.03).

Karra and colleagues' (39) FIGO package intervention consisted of four services over a two-year period: 1) up to six family planning counseling sessions; 2) free transportation to a family planning clinic; 3) free family planning services; and 4) treatment for contraceptive-related side effects. The authors of this large cluster stepped-edge trial (39,084 women in six hospitals) reported that contraceptive use after two years of exposure to the intervention increased by 5.9%, mainly through increases in use of implants.

Tran and colleagues (2019) (24) conducted a cluster-randomized trial in Burkina Faso that evaluated a package of three facility-oriented interventions (refresher training of service providers, regularly scheduled and strengthened supportive supervision of providers, enhanced availability of services seven days a week) and three individual-based interventions (a postpartum family planning counseling tool, appointment cards for women, invitation letters for partners). The authors reported that the intervention improved the prevalence ratio of modern contraceptive use at 12 months (adjusted prevalence ratio, 1.7, 95% CI 1.3-2.47). The intervention had its greatest effect in promoting uptake of family planning soon after birth, but effects reduced somewhat over time: at six weeks the adjusted prevalence ratio was 3.88, 95% CI 1.46-10.35), and at six months the adjusted prevalence ratio was 2.31, (95% CI 1.44-3.71).

Cooper and colleagues (51) evaluated a package intervention in Egypt using a controlled before-after design. The intervention consisted of: 1) one-to-one and group counseling; 2) training health care workers; and 3) mobile clinics. The counseling covered: the benefits of family planning; healthy timing and spacing of pregnancies; postpartum return to fertility and pregnancy risk after childbirth; LAM and transition to other modern contraceptive methods. The project coordinated with local health directors to advocate for availability of family planning commodities at government health facilities and mobile clinics. Women in the intervention group were more likely to use a modern method of contraception (Upper Egypt: OR=1.45, p<.001; Lower Egypt: OR=1.29, P<.05) but the difference was not statistically significant for mothers with children 11 months old or younger (Upper Egypt: OR=1.13, p>.05; Lower Egypt: OR=1.20, p>.05).

The package intervention evaluated by Wu and colleagues (46) included: 1) active pregnancy identification; 2) home-based ANC and PNC counseling and care coordination; 3) patient-centered contraceptive counseling; 4) group ANC; and 5) home-based childcare and counseling. Counseling topics covered recommendations and reasons for birth spacing, contraceptive efficacy, contra-indications, timing for postpartum method initiation. Training materials emphasized best practices for contraceptive counseling (e.g., shared decision-making, patient autonomy, guidance on potential side effects). This uncontrolled before-after study reported that use of any modern contraceptive method increased from 29% pre-intervention to 46% post-intervention ($p < 0.0001$).

Twelve studies used a counseling (n=7) (27, 31, 33-35, 38, 41) or an education (n=5) intervention (30, 36, 37, 43, 49), and two (26, 28) used an SMS. Of these 14, 13 measured the outcome of interest. Eight of these 13 (62%) showed a statistically significant impact on uptake of contraception, although most assessed use well short of 12 months postpartum. In general, the magnitude of the intervention was strongest the shorter the time period examined, although in one case (38) the effect was greater at 9 months than at 6 months postpartum. The magnitude of the risk differences for modern/effective methods of contraception ranged from -0.1% at 3 months (43), 17.5% (33) at 16 weeks, to 22% (34) at 6 months; 7.1% (30) and 6.4% (31) at 8 months to 4.6% (38) and 24.2% (49) at 9 months; 40.1% (37) at one year; no significant differences at 6-15 months (35); and 26.3% in a survey two years (midpoint 12 months) after baseline (36).

Quality appraisal overview

The majority of studies described their source population well (n=27, 87%), defined an eligible population that was representative of the source population (n= 26, 84%), described the intervention well (n=28, 90%), and described the comparator well (27/27, 100%). Among the RCTs (n=16), only five (31%) had a low risk of bias with regard to the random sequence generation; two had a high risk of bias (13%) and 9 (61%) had an unclear risk of bias. Among the 26 studies where it was applicable, eighteen (69%) had a low risk of bias with regard to the comparability of the baseline (or group) characteristics.

Table 1: Main characteristics of included studies

Year	Author	Country	Quasi/RCT	Setting	ANC only/ANC+	Participant characteristic at enrollment
Counseling interventions						
2018	Daniele	Burkina Faso	RCT	Health facility, lower level: 5 (large) primary health centers	ANC+	Pregnant women and their male partners: 15-45y, 20-36w gestation, attending routine check-ups at study health centers
2013	Adanikin	Nigeria	RCT	Health facility, hospital: tertiary hospital (referral center), obs&gyn department, obstetric units	ANC only	Pregnant women: 28-37w gestation, booked at study hospital
2015	Ayiasi	Uganda	cluster RCT	Health facility, lower level: 16 health centers	ANC only	Pregnant women: 28w gestation or less attending health centers for ANC
2018	Camara	Guinea	Quasi	Health facility, lower level: 5 health centers	ANC only	Pregnant women: 6m gestation or more, attending ANC visits at study health centers
2014	Ndegwa	Kenya	RCT (unblinded)	Health facility, hospital: hospital	ANC+	Pregnant women: 36w gestation or more, attending the ANC clinic at study site
2015	Keogh	Tanzania	Quasi	Health facility, lower level: 14 antenatal clinics	ANC only	Pregnant women: 3m gestation or more
2020	Abdulkadir	Nigeria	RCT	Health facility, hospital: tertiary hospital, obs&gyn department, antenatal clinic	ANC only	Pregnant women: 15-45y, 32-38w gestation, attending ANC at study hospital
Digital interventions						
2018	Unger	Kenya	RCT (unblinded)	Health facility, lower level: government health center (MCH clinic)	ANC only	Pregnant women: 14y or older, less than 36w gestation, attending ANC at study center
2019	Harrington	Kenya	RCT (unblinded)	Health facility, hospital: 2 public hospitals	ANC+	Pregnant women and their male partners: 14y or older, 28w gestation or more, attending ANC at study hospitals
Educational interventions						
2012	Sebastian	India	Quasi	Community: 1 district, 4 blocks, 48 villages	ANC only	Pregnant women: 15-24y, 4-7m gestation, max. 1 previous child
2018	Lori	Ghana	Quasi	Health facility, hospital: district hospital	ANC only	Pregnant women: 18y or older, 14w gestation or less
2020	Maldonado	Kenya	Cluster RCT	Community: 4 sub-counties, 77 community health units	ANC+	Pregnant women: 32w gestation or less, women attending ANC at a health facility
2014	Sarnquist	Zimbabwe	Quasi	Health facility, lower level: 4 public polyclinics	ANC only	Pregnant women: HIV-positive, 18-40y, 26-38w gestation, attending ANC at study clinics
2018	Bang	Ethiopia	Quasi	Community: 1 district, 2 villages	ANC+	Women: 15-49y, pregnancy status not specified
Financial interventions						
2018	McConnell	Kenya	RCT (unblinded)	Health facility, lower level: 2 private maternity clinics	ANC+	Pregnant women: 18-40y, 7m gestation or more, attending ANC at study clinics
2016	Engineer	Afghanistan	cluster RCT	Health facility, lower level: 442 facilities offering Basic Package of Health Services	ANC+	Postpartum women: ever married, 12-49y, up to 2y postpartum Children: less than 5y
Package of interventions						
2015	Jiusitthipraphai	Thailand	Quasi	Health facility, hospital: teaching hospital	ANC+	Pregnant women: 15-19y, gestational age not specified, women who delivered and received antenatal/postnatal care at study hospital
2020	Wu	Nepal	Quasi	Community: 1 rural municipality	ANC+	Postpartum women: married, 15-49y, up to 1y postpartum
2019	Karra	Sri Lanka	Cluster-randomized stepped-wedge design	Health facility, hospital: 6 tertiary hospitals	ANC only	Postpartum women: women delivering in study hospitals (recruited after delivery and before discharge)
2020	Pearson	Tanzania	Cluster-randomized stepped-wedge design	Health facility, hospital: 6 tertiary hospitals	ANC+	Postpartum women: 18y or older, recruited after delivery and before discharge
2019 2020 2021 2022	Pradhan Huber-Krum Puri Guo	Nepal	Cluster-randomized stepped-wedge design	Health facility, hospital: 6 tertiary hospitals	ANC+	Postpartum women: women delivering in study hospitals (recruited after delivery and before discharge)
2022	Karra	Malawi	RCT (unblinded)	Community: 1 city, recruited through household visits	ANC+	Pregnant and postpartum women: 18-35y, currently pregnant or up to 6m postpartum
2019	Tran	Burkina Faso	Cluster RCT	Health facility, lower level: 8 primary health centers	ANC+	Pregnant women: 3rd trimester, attended ANC at study centers

Year	Author	Country	Quasi/RCT	Setting	ANC only/ANC+	Participant characteristic at enrollment
2020	Tran	Dem. Rep. of the Congo	Cluster RCT	Health facility, lower level: 8 primary health centers	ANC+	Pregnant women: 3rd trimester, attended ANC at study centers
2016	Cooper	Egypt	Quasi	Community: households, 6 governorates	ANC only	Postpartum women: women with a child aged 24m or younger
2021	Espey	Rwanda	Quasi	Health facility, mixed levels: 2 high-volume hospitals, 4 health centers	ANC+	Pregnant and postpartum women: (up to 6w postpartum)
2015	Ahmed	Bangladesh	Quasi	Community: 4 rural unions	ANC+	Pregnant women: gestational age not specified (recruitment must have happened <32w)
2018	Jarvis	Dem. Rep. of the Congo	Quasi	Health facility, mixed levels: 2 hospitals, 2 maternity referral centers	ANC+	Pregnant and postpartum women: 18-49y old, gestational age not specified, exiting services at study hospitals (L&D, FP, ANC, PNC, child immunization)
2021	Buser	Zambia	Quasi	Health facility, lower level: 40 healthcare facilities	ANC+	Postpartum women: 15y or older, women who gave birth in one of the study facilities in the previous 13m
2017	Maru	Nepal	Quasi	Mixed, health facility and community: hospital and community (community health workers [CHWs] in 14 community clusters)	Unclear	Pregnant women: 15-49y, gestational age not specified
Training intervention						
2021	Dhital	Nepal	Quasi	Mixed, health facility and community: two major referral hospitals and catchment area of 23 peripheral health facilities	ANC only	Female community health volunteers and postpartum women

Table 2: Content of interventions in included studies

Year	Author	Intervention type	Intervention components	Who Delivered	How delivered	Timing and dose
Counseling Interventions						
2018	Daniele	Counseling: mixed sessions (couple counseling and group discussions for male partners)	Counseling covered the importance of antenatal and postnatal care; birth preparedness and signs of labor; danger signs for the mother and newborn child; exclusive breastfeeding; the healthy timing and spacing of pregnancies; and postpartum contraception. Group sessions focused on the role of male partners.	Provider: auxiliary midwives or midwives	Private counseling sessions face to face (male partner via phone if needed), group sessions	3 sessions (1h each); group discussion between 20w gestation and term, first counseling session between 20w gestation and term, second counseling session before postpartum discharge
2013	Adanikin	Counseling: one to one	Counseling covered information on genitalia, ovulation, fertility following birth, modern and traditional methods.	Trained senior registrar	In person during antenatal visits	3 sessions, 3rd trimester
2015	Ayiasi	Counseling: one to one	CHWs discussed risk of pregnancy soon after delivery, available options for delaying the next pregnancy, and the importance of regular and exclusive breastfeeding as a means to delay pregnancy. Women were also offered telephone consultations with health workers for advice.	Community health workers (here: Village Health Teams), health workers	Home visits and telephone consultations	Dose not specified; prenatal period
2018	Camara	Counseling: one to one	Counseling focused on postpartum FP methods (modern and traditional).	Provider: trained ANC provider	Face to face (guided by the use of contraceptive samples and a toolbox)	Once (15-20min); during ANC visits
2014	Ndegwa	Counseling: one to one	Intensive counseling was an extra effort in order to enhance informed decision-making.	Trained counsellor	Face to face in ANC clinic in hospital	Not specified
2015	Keogh	Counseling: one to one (plus pamphlet)	Counseling covered benefits of spacing and limiting births; postpartum fertility and LAM; suitability of LAM based on breastfeeding plans; availability and suitability of FP methods for clients; role of condoms; referral to FP clinic and pamphlet. Pamphlet covered postpartum- tum contraception, FP methods and their suitability for couples living with HIV, and a list of FP providers in the catchment area.	Other: HIV post-test counselors	Face to face: FP counseling offered as part of routine post-test HIV counseling to antenatal clients Pamphlet	10 mins of contraceptive advice after HIV post-test counseling session
2020	Abdulkadir	Counseling: one to one (with spouse involvement)	Antenatal counseling using a validated tool that includes information about the contraceptive methods available, mechanisms, efficacy, benefits, risks, and side effects.	Other: Principal author	Face to face (contact with spouse via phone if needed)	2 sessions; first one during 3rd trimester and second one 4w later
Digital interventions						
2018	Unger	Digital: (2-way) SMS messaging	Participants classified into tracks (routine, adolescents 14–19 years, first-time mothers, women with a previous caesarean section, and those with multiple gestations) with messaging tailored to track. Personalized approach that provided gestational age-appropriate educational and counseling messaging. All messages included participant name, clinic and nurse name, an educational message, and actionable advice targeting one of the main study outcomes. SMS topics included ANC, pregnancy complications, family planning, infant health, exclusive breastfeeding, infant immunization, and visit reminders.	SMS & nurse	Automated SMS & SMS conversation with nurse	Weekly SMS; from enrollment to 12 weeks postpartum

Year	Author	Intervention type	Intervention components	Who Delivered	How delivered	Timing and dose
2019	Harrington	Digital: mHealth SMS intervention	SMS covered general perinatal topics, and FP: available methods and their effectiveness, postpartum pregnancy risk, contraceptive safety during lactation, anticipatory guidance about side effects, community misperceptions, and dual protection.	SMS and 2-way SMS dialogue with nurse	Automated SMS messaging (+ 2-way SMS dialogue possible); switch to method-specific messaging possible. SMS also sent to enrolled male partners.	Once a week, from enrollment (ANC visits) to 6m postpartum
Educational interventions						
2012	Sebastian	Educational: campaign	Topics included: healthy timing and spacing of pregnancy; postpartum care, LAM and postpartum contraception (incl. STIs and HIV); educational campaign for husbands and males in the community that taught them about maternity care.	Community workers	Not specified Counseling using educational materials and counseling aids.	During pregnancy; dose not specified
2018	Lori	Educational: group sessions	Educational content and group peer support. One ANC visit dedicated to FP and exclusive breastfeeding as a LAM.	Not mentioned	Face to face: Group ANC sessions Educational content delivered using picture cards, role-play, story-telling, and teach-back methods	Women encouraged to attend seven ANC visits
2020	Maldonado	Educational: group sessions	Educational sessions cover health and social topics relevant to antenatal, postpartum, and early childhood experiences (with an optional financial savings program).	Community health volunteers	Face to face: community health volunteer led group sessions	First 1000 days of the child's life; two 60-90 min sessions per month
2014	Sarnquist	Educational: group sessions	The sessions focused on sexual negotiation skills and empowerment, information about HIV, PMTCT, and FP, and communication skills related to sex and FP. Various learning techniques were used, including discussions, behavior modeling, songs/ dramatizations, and role-playing.	Other: PURSE trainers (had previous group facilitation experience, were trained in the PURSE curriculum and gender-based violence counseling and referral)	Face to face in one study clinic	Three 90min group sessions; Most PURSE sessions happened in the antenatal period, however, 21 (32%) women had at least [sic] PURSE session after delivery due to late study entry or early delivery
2018	Bang	Educational: small-group and village-level sessions, maternal health information disseminated through the village billboard, local radio, T-shirts and calendars	Village-level sessions covered family planning, safe delivery, and postpartum care. Small group classes covered family planning, antenatal care and institutional birth, and postnatal management and neonatal/child care. One education session was given to male community leaders to encourage paternal participation in family planning. Mass media was used to improve women's awareness of maternal health. On-the-job training sessions for various groups of health-care professionals, including nurses, basic emergency obstetric care nurses, midwives, and health extension workers, to improve their capacity in practice and provide quality of care to the women. Education and mobilization of Health Development Army members to help the women in their villages improve the women's awareness of maternal health.	Not specified	Face to face education sessions; mass media	Interventions implemented over 2.5-year study period. 2 village-level education sessions (reaching 196 women); 39 small group classes with 3 sessions each (reaching 2,576 women)
Financial Interventions						

Year	Author	Intervention type	Intervention components	Who Delivered	How delivered	Timing and dose
2018	McConnell	Financial: client voucher for free contraceptive methods	Vouchers for free modern methods or counseling on LAM valid for 1 year and a time limited voucher that expired 8 weeks after expected delivery date. Value of voucher from US$0.92– US$6.45 depending on method; SMS reminders to use vouchers.	Not mentioned/not applicable	Vouchers given in person; SMS via cellphone	Vouchers given during ANC (7+ month gestation); SMS given at 5 weeks PP
2016	Engineer	Financial: pay-for-performance	P4P facilities were given bonus payments based on the MCH services provided. The incentives were based on nine health services indicators:1. First antenatal care visit 2. Second antenatal care visit 3. Third antenatal care visit 4. Fourth antenatal care visit 5. Skilled birth attendance cases (SBA) 6. First postnatal care visit (PNC1) 7. Second postnatal care visit (PNC2) 8. Pentavalent 3 vaccination 9. Tuberculosis (TB) case detection. Additional annual payments also made based on two measures of equity of service provision, a balanced scorecard that addresses quality of services, and contraceptive prevalence rates (CPR) in HF catchment areas.	Funds were channeled through NGOs	Quarterly bonuses paid to health care workers based on the volume of the 9 indicator services. Additional annual payments based on the two measures of equity.	Bonus amounts paid were about 6-11% above their base salary in 2011, and increased to about 14-28% in 2011, depending on the health worker's cadre.
Package of interventions						
2015	Jiusitthipraphai	Package: digital and one to one education/counseling [intervention promoted self-efficacy program on oral contraceptive use combined with standard nursing care]	Motivational lessons covering impacts of adolescent pregnancy, preventing subsequent pregnancies by taking oral contraceptive, mechanism of oral contraceptives, correct taking methods, forgetting to take the contraceptive and sources of assistance. Provision of a handbook to participants. Nurses were meant to praise and encourage participants.	Provider: structural nursing staff	Face to face in facilities (assisted by computer media), telephone calls	3 face to face sessions; antenatal, immediate postpartum, up to 6 weeks postpartum Weekly phone calls (5-10min) for 4 weeks in postpartum period
2020	Wu	Package: multifaceted (active pregnancy identification, home-based ANC and PNC counseling and care coordination, patient-centered contraceptive counseling using the Balanced Counseling Strategy, group ANC and home-based childcare and counseling)	Community health workers were trained on clinical topics included recommendations and reasons for birth spacing, contraceptive efficacy, contra-indications, timing for initiation of methods postpartum, and facilities where each method; training materials emphasized best practices for contraceptive counseling, such as shared decision-making, respect for patient autonomy, and anticipatory guidance on potential side effects.	Community health workers	Face to face: home-based counseling; group ANC sessions	General contraceptive counseling occurred at the eighth month ANC home visit and patient-centered contraceptive counseling was offered at PNC months 1, 5, and 10.
2019	Karra	Package: multifaceted (FIGO's PPIUD intervention)	Training of providers (to improve counseling), information leaflet provision, establishing video broadcast, training and supplies for PPIUD insertion, monitoring and evaluating of counseling services.	Provider: doctors, nurses, midwives, and general hospital staff	Face to face counseling; video broadcast in waiting rooms	Counseling occurred during routine antenatal care or after admission for delivery; provision of PPIUD in the immediate postpartum and prior to discharge
2020	Pearson	Package: multifaceted (FIGO's PPIUD intervention)	Training of providers (to improve counseling), information leaflet provision, establishing video broadcast, training and supplies for PPIUD insertion, regular monitoring and support.	Provider: Ob/Gyns, residents and midlevel providers	Face to face counseling; provider training in two stages (training of trainers, then cascade training from trainers to providers after one month)	Counseling occurred during routine antenatal care or after admission for delivery; provision of PPIUD in the immediate postpartum and prior to discharge
2019 2020	Pradhan Huber-Krum	Package: multifaceted (FIGO's PPIUD intervention)	Training of providers (to improve counseling), information leaflet provision, establishing an information wall chart and video broadcast, training and supplies for PPIUD insertion/removal	Community health volunteers, hospital staff	Face to face counseling; leaflets/wall chart/video broadcast in waiting rooms	Counseling occurred during routine antenatal care, at early labor, and after delivery but before discharge

Year	Author	Intervention type	Intervention components	Who Delivered	How delivered	Timing and dose
2021 2022	Puri Guo		techniques and complication management. PPIUD-specific counseling included advantages and disadvantages of using PPIUD, potential side effects of PPIUD and how to seek removal if women wanted a removal, and how long PPIUD can protect women from pregnancy. General family planning counseling included information on various contraceptive methods (e.g., female sterilization, male sterilization, IUD, injectables, implants, pill, condom, emergency contraception, lactational amenorrhea method, withdrawal, etc.). The intervention was for women to receive this general counseling, as well as the more specific counseling on PPIUD, so they could make an informed choice of a method. All counseling services, contraceptive use, and IUD removals were free of charge.	(general, nurses, midwives, clinical doctors)		from the hospital; provision of PPIUD in the immediate postpartum and prior to discharge
2022	Karra	Package: multifaceted (information provision, counseling, free transportation, free FP services, doctor consultations and referral services, reimbursement for treatment of contraceptive-related side effects)	FP information package and private counseling visits: risk assessment for clinical methods and detailed information on methods switching, side effects associated with each method, the benefits of contraception, birth spacing, dual protection, male partner involvement. Financial: free transportation (taxi) service to a designated high-quality FP clinic with low waiting times; Free FP services at the designated clinic or financial reimbursement for any FP services received at other clinics; and reimbursement for treatment costs in the event that the woman experienced any contraindications or side effects related to her use of FP. Free over-the-phone consultations to discuss side effects if needed.	Provider: trained FP counselors, doctors	One to one counseling, phone consultations, information packages	1 counseling session within 1m after administering baseline, 5 shorter follow-up sessions spaced over 2 years; sessions lasted up to 1h
2019	Tran	Package: multifaceted (refresher training for the provider, a counseling tool, supportive supervision, availability of contraceptive services 7 days a week, client appointment cards, and invitation letters for partners)	Three facility-oriented interventions (i.e., refresher training of service providers, regularly scheduled and strengthened supportive supervision of providers, enhanced availability of services 7 days a week), and three individual-based interventions (i.e., a PPFP counseling tool, appointment cards for women, and invitation letters for partners).	Trained provider	Not mentioned	Individual-based interventions delivered during third-trimester antenatal care visits and postnatal care follow-up visits
2020	Tran	Package: multifaceted (refresher training for the provider, a counseling tool, supportive supervision, availability of contraceptive services 7 days a week, client appointment cards, and invitation letters for partners)	Three facility-oriented interventions (i.e., refresher training of service providers, regularly scheduled and strengthened supportive supervision of providers, enhanced availability of services 7 days a week), and three individual-based interventions (i.e., a PPFP counseling tool, appointment cards for women, and invitation letters for partners).	Trained provider	Not mentioned	Individual-based interventions delivered during third-trimester antenatal care visits and postnatal care follow-up visits
2016	Cooper	Package: multifaceted-counseling, capacity building (stakeholder cooperation),	Counseling covered benefits of family planning, healthy timing and spacing of pregnancies, postpartum return to fecundity and risk of pregnancy after childbirth, LAM. Home visits and group meetings covered discussions on gender	Provider: health facility staff, community health workers	Home visits, and community-based group discussions/seminars	During pregnancy and up to 24m postpartum

Year	Author	Intervention type	Intervention components	Who Delivered	How delivered	Timing and dose
		group meetings, seminars, mobile clinics	roles. Mobile clinics offered free medical care, including FP. Cooperation with health directors and pharmacists to improve access to FP methods.			
2021	Espey	Package: multifaceted- one to one and group counseling, provider training (+ financial incentives, stakeholder engagement)	Group and one to one counseling to expectant mothers (with possibility of partner involvement) on PPFP. Integration of FP counseling in ANC, L&D, and infant vaccination services. Provider training on PPIUD insertion/removal. Higher provider reimbursement for IUD compared to implant. Engagement with Ministry of Health stakeholder.	Counseling delivered by study nurses and other trained staff	Group counseling followed by one to one counseling for interested women. Delivered on ANC, L&D, postpartum ward, and during infant vaccination appointments.	Antenatal period up to 6 weeks postpartum. Group sessions and one to one counseling lasted 20min each.
2015	Ahmed	Package: multifaceted- one to one counseling, group meetings, flyer provision, distribution of contraceptives (added to existing MNH intervention package)	CHWs discussed the importance of pregnancy spacing, effective LAM use and LAM transition (+ flyers summarizing information). In addition, CHWs provided oral contraceptives, condoms, and injectables. Community-based monthly meetings to discuss the importance of pregnancy spacing and postpartum FP, including LAM ("LAM Ambassadors").	Community health workers, community mobilizers	Counseling + contraceptive provision during home visits, community-based meetings	Household visits every 2 months (antenatal and postnatal period; pregnancy-surveillance visits) and community-based meetings every month
2018	Jarvis	Package: multifaceted- provision of free contraceptives and quality inputs (systematic screening and referral, provider training on counseling, immediate provision of LARCs on labor and delivery wards)	Quality inputs: (1) clinical training and provision of equipment for postpartum insertion of the IUD, (2) training on WHO's Medical Eligibility Criteria (MEC) for Contraceptive Use and (3) introduction of a systematic screening and referral tool for family planning (to be implemented by ANC, PNC, immunization, L&D, and FP providers). Free contraceptives provided by L&D and FP units.	Provider: received 'whole-site' training	Face to face in facilities	7-day training
2021	Buser	Package: systems strengthening (improving maternity waiting homes)	(1) infrastructure, equipment, and supplies to address the need for higher quality, safer MWHs (2) policies, management and financial structures, and (3) linkages to health systems with skilled midwives (incl. participation of women living in MWH in maternal and child education courses at the health facility).	Core MWH Model is community owned and operated with community health workers	Face to face	Around births (women in MWH could attend ANC and PNC)
2017	Maru	Package: systems strengthening (use of accountable care principles to improve existing public private partnership- *Possible* program)	Evaluated improvements to existing program: Strengthening community health worker active surveillance, integrating digital health information, and increasing monitoring and supervision capabilities. As part of the *Possible* program, CHWs continuously survey the population for new pregnancies, assist in attaining laboratory and ultrasound testing to identify high risk pregnancies, and follow those pregnancies through the post-partum period. Patient data is collected in an open-source electronic health records platform and key performance measures are tracked and incorporated into the financial contract.	Provider: community health workers	Face to face (in hospitals + outreach) and remote monitoring/linkage via electronic health records	Not specified
Training intervention						
2021	Dhital	Training: providers	The contents covered different methods of PPFP along with the advantages and disadvantages of each method. The content focused on PPIUD in more detail as it was the only long acting	Trained facilitators (under the leadership of Provincial Health Directorate)	Training through orientation program and supervision of FCHV community activities	Not specified

Year	Author	Intervention type	Intervention components	Who Delivered	How delivered	Timing and dose
			reversible method available in the immediate post-partum period in Nepal.			

Table 3: Summary of main effect sizes, by outcome type

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
Counseling interventions					
2018	Daniele	Counseling: mixed sessions (couple counseling and group discussions for male partners)	3m: intervention had positive effect on use of **any** contraceptive method (57.0% VS 49.3% in control, RD=7.7 (1.2 to 13.6), RR=1.16 (1.04 to 1.30)) 8 m: intervention had positive effect on use of **any** contraceptive method (70.6% VS 64.4% in control, RD=6.5 (1.0 to 12.1), RR=1.10 (1.02 to 1.20)) Intervention also had a positive effect on use of **effective modern** contraceptive method (59.6% VS 53.1% in control, RD=6.4, RR=1.12 (1.01 to 1.24)).	8 m: positive effect on use of long-acting or permanent contraception (30.7% VS 22.9% in control, RD=8.1, RR=1.33 (1.09 to 1.62))	Intervention was associated with reduction of unmet need for contraception 8 m postpartum (14-2% VS 18.7% in control, RD= -4.8, RR=0.75 (0.57 to 0.98)) Also looked at: Timely initiation of effective modern contraception, Unmet need for contraception 8 m postpartum
2013	Adanikin	Counseling: one to one	6 m: intervention group reported higher modern contraceptive use (57.4% VS 35.4%; p=0.002); and less use of traditional methods (19.8% VS 32.3%; p=0.044)	Precise method used postpartum (p=0.061): Condom: 30.7% VS 18.2% IUD: 12.9% VS 11.1% POP/COC: 6.9% VS 4.0% Injectables: 5.0% VS 2.0% Implants: 0 VS 0 Sterilization: 2.0% VS 0 LAM: 13.9% VS 21.2% Calendar: 4.0% VS 2.0% Withdrawal: 2.0% VS 9.1%	
2015	Ayiasi	Counseling: one to one	12 m: Only 28.2% (control) and 31.6% (intervention) of mothers were current users of modern contraceptives. Although there was slightly higher proportion of current users in the intervention arm, this difference was not statistically significant (aRR: 1.10; 95%CI: (0.51-1.82); p= 0.810).		About half of postpartum women, 47.1% (control) and 49% (intervention) arm had considered delaying the next pregnancy among the current none contraceptive users signifying unmet needs for contraceptive use. Of these 71.4% among control and 87% in the intervention had considered using a modern method of contraceptive. In the preliminary analysis, the risk of being willing to use was one and half times higher among the intervention group, but this difference was not statistically significant after adjustment (aRR: 0.98; 95%CI: (0.53-1.82); p= 0.955). Pregnancy: Intervention arm (3.3% VS 5.7%; p=0.302) No difference in breastfeeding practices
2018	Camara	Counseling: one to one	6 m: no difference in use of **any** FP method (4.8% VS 5.7 in intervention; p=0.708); no difference in use of **modern** FP method (3.2% VS 4.6% in intervention; p=0.473) 9 m: no difference in use of **any** FP method (2.7% VS 6.7% in intervention; p=0.064); higher uptake of **modern** FP methods in	6 m: no difference in choice of FP method (p=0.282): condoms (2.1% VS 2.1%), pills (0.0% VS 2.1%), IUD (0.0% VS 0.0%), injectable (0.0% VS 0.0%), traditional methods (1.6% VS 1.0%) At 9 m: no difference in choice of FP method (p=0.058): pills (0.0% VS 05%), injectable (0.5% VS	At 9m: women cited more FP methods in intervention group. More women with postpartum FP intention in the intervention group at 6m (88% VS 69%, p<0.01), as well as at 9m (78% VS 54%, p<0.001). However, these proportions were similar at the time of inclusion just after the counseling session. Also asked for reasons for not using FP methods; common ones:

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
			intervention group (1.1% VS 5.7% in intervention; p=0.024)	5.2%), implant (0.5% VS 0.0%), traditional methods (1.6% VS 1.0%). The authors intended to group LAM with modern methods but could not verify its accurate measurement.	preference to abstain from sexual intercourse till the child walks, unavailability of desired FP method, husband does not want it
2014	Ndegwa	Counseling: one to one		Post-placental IUD insertion: 63.3% intensive v 64.3% routine p=0.23	
2015	Keogh	Counseling: one to one (plus pamphlet)	At 6-15 m (median 10.5 m): No evidence of an association between antenatal counseling and starting FP		At 6-15 m (median 10.5 m): No evidence of an association between antenatal counseling and stopping FP. No evidence of an association between antenatal counseling and unmet need. No evidence of an association between antenatal counseling and repeat pregnancy.
2020	Abdulkadir	Counseling: one to one (with spouse involvement)	12-20 w (2.8-4.6 m): intervention group reported higher contraceptive use (48.5% VS 31.0%, p=0.0001 based on Mc Nemar's X2)		Significant predicators of uptake: occupation, education, husbands' participation
Digital interventions					
2018	Unger	Digital: (2-way) SMS messaging	16 w (3.7 m): Contraceptive use was significantly higher in both intervention arms (1-way SMS: 72% and 2-way SMS: 73%; p=0.03 and 0.02 versus 57% control, respectively). However, this difference was not significant when correcting for multiple comparisons. At 10 and 24 w (2.3 m and 5.5 m): No difference in contraceptive uptake between groups.	LARCs use similar across arms: One-way versus control, RR 1.16, 95% CI 0.44–3.03; P=0.77 Two-way versus control, RR 1.41 95% CI 0.57–3.51; P=0.46) with only 25 (11%) of all contraceptive users using long-acting, reversible contraception methods (intrauterine devices and implants), the majority implants. Women in both intervention arms were significantly more likely to exclusive breastfeeding at 10 w and 16 w than women in the control arm. The probability of exclusive breastfeeding to 24 w postpartum was higher in both intervention groups than in the control, but only statistically significant in the 2-way messaging group [0.49 in 1-way, 0.62 in 2-way, and 0.41 in control, (p=0.30 and 0.005 for 1-way and 2-way vs. control, respectively)]	Contraceptive continuation high among women starting contraception at 10 w; however, 44 (30%) of contraceptive users across all arms switched methods between 10 and 24 w.
2019	Harrington	Digital: mHealth SMS intervention	6 m: use of any contraceptive method higher among women in the SMS group (aRR=1.19 [1.01, 1.41])	6 m: use of highly effective methods higher among women in the SMS group (aRR=1.26 [1.04, 1.52]). No difference observed in use of LARC/PC (aRR=0.96 [0.91, 1.02]).	Contraceptive discontinuation at 6 m was comparable in the SMS and control groups at 1.6% (P=.96).

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
				At 6 m, 31.7% of all attendees were using injection. Implant users made up 25.4% of participants at 6 m. No participants reported LAM as their method of contraception at the 6 m visit.	
Educational interventions					
2012	Sebastian	Educational: campaign	9 m: higher proportion of women in the intervention group than of those in the comparison group reported **modern** contraceptive use (57.0% vs. 30.1%, p ≤ 0.01)	9 m – choice of methods: Pill: 13.8% (intervention) VS 7.1% (control) Condoms: 40.9% (intervention) VS 22.6% (control) IUD: 1.9% (intervention) VS 0.2% (control) Sterilization: 0.4% (intervention) VS 0.2% (control) Traditional method: 18.9% (intervention) VS 25.3 (control); p≤0.01 4 m – LAM:23% (intervention) VS 13% (control)	Knowledge of the various contraceptive methods (including LAM) was significantly higher in the intervention group compared with the comparison group at four m postpartum; these differences were even greater at the nine-month post- partum survey.
2018	Lori	Educational: group sessions	12 m: Women who participated in group ANC had higher odds of using a modern or non-modern method of contraception (AOR= 6.690, 95% CI: 2.724, 16.420)	12 m: Women who participated in group ANC had higher odds of using a modern family planning method than those in individual care (AOR=8.063, CI:2.887,22.524). Women enrolled in group ANC had nearly three-fold odds of exclusive breastfeeding for more than 6 m compared with women in individual care (AOR=2.84, 95% CI: 1.298, 6.216).	Women who participated in group ANC were more likely to demonstrate intention to use family planning immediately postpartum than those who were in individual care (63.0% vs. 31.6%, X^2=16.49, p < .001)
2020	Maldonado	Educational: group sessions	12 m: increased contraceptive adoption in intervention clusters (RD 7.2%, 95% CI 2.6 to 12.9, p=0.034)	12 m: increased exclusive breastfeeding in intervention clusters (11.9% ([7.2% to 16.9%], p=0.14). No statistically significant effect on adoption of LARCs (RD=7.1% [0.9% to 13.3%], p=0.099).	
2014	Sarnquist	Educational: group sessions	3 m: uptake of **LARCs** in intervention (87.1%) and standard of care (81.8%) group (p=0.34). Uptake of **other modern** family planning methods in intervention (9.7%) and standard of care (9.1%) group (p=0.12).	Use at 3 m PP (Intervention v control) IUD: 1.6% v 9.1%, p=0.12 Implant: 85.5% v 72.7%, p=0.11	Identified IUD as effective at preventing pregnancy, 3 m PP (Intervention v control) 85.5% v 56.3%, .002
2018	Bang	Educational: small-group and village-level sessions, maternal health information disseminated through the village billboard, local radio, T-shirts and calendars	18-19 m after the baseline survey: In intervention group, contraceptive prevalence increased from 31.3% to 61.8% (in comparison group: from 33% to 35.5%) (p=0.065)		The intervention group showed significantly greater increases in knowledge about family planning compared to the comparison group (p < 0.038).
Financial interventions					

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
2018	McConnell	Financial: client voucher for free contraceptive methods	22 w (after estimated date of delivery; 5.1 m): increased probability of using **modern** contraception among those with standard voucher + SMS (RD=25% [6%, 44%]). None of the other treatment arms were estimated to statistically significantly increase the likelihood of modern contraceptive use	22 w (after estimated date of delivery): increased probability of using LARCs among those with standard voucher + SMS (RD=20% [0%, 41%]). None of the other treatment arms were estimated to statistically significantly increase the likelihood of LARC use.	
2016	Engineer	Financial: pay-for-performance			23-25 m after P4P rollout- current use of modern family planning methods: 10.7% vs 11.2% (P -value: 0.90)
Package of interventions					
2015	Jiusitthipraphai	Package: digital and one to one education/counseling [intervention promoted self-efficacy program on oral contraceptive use combined with standard nursing care]	12 w (2.8 m): mean scores on oral contraceptive self-efficacy (OCSE) and oral contraceptive used behavior (OCUB) of study group were higher than control group with a statistical significance (p<0.001)		
2020	Wu	Package: multifaceted (active pregnancy identification, home-based ANC and PNC counseling and care coordination, patient-centered contraceptive counseling using the Balanced Counseling Strategy, group ANC and home-based childcare and counseling)	Within 12 m: Use of any modern contraceptive method increased from 29% pre-intervention to 46% post-intervention (p < 0.0001). The adjusted OR for any modern contraceptive use of women in the post-intervention group as compared to pre-intervention group was 2.3 (CI 1.7, 3.1; p < 0.0001).	With respect to method mix, use of LAM, injectables, and implant increased significantly. Condom use decreased significantly from 4.5% to 1.6% (p=0.01)	
2019	Karra	Package: multifaceted (FIGO's PPIUD intervention)		Assessed choice not insertion: 4.1% of women choosing PPIUD prior to the intervention compared to 9.8% of women choosing PPIUD after the rollout of the intervention (0.027; 95% CI 0.000–0.054). The adherence-adjusted estimate implies that receiving counseling due to the intervention increases uptake of PPIUD by around 8.9% [95% CI: 2.7–15%].	
2020	Pearson	Package: multifaceted (FIGO's PPIUD intervention)		Assessed choice not insertion: Increased choice of PPIUD by 6.3% (95% CI: 2.3 – 8.0%). The adherence-adjusted estimate implies that	

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
				receiving counseling due to the intervention increases uptake of PPIUD by around 31.6% (95% CI: 24.3-35.8%).	
2019 2020 2021 2022	Pradhan Huber-Krum Puri Guo	Package: multifaceted (FIGO's PPIUD intervention)	12 m: use of **modern** contraception (0.04 [-0.00, 0.10]) (Huber-Krum)	IUD insertion in immediate postpartum period: Intervention increased PPIUD uptake by 4.4% [95%CI: 2.8–6.4%]. The adherence-adjusted estimate implies that receiving counseling due to the intervention increases uptake of PPIUD by around 17% [95% CI: 14–40%]. (Pradhan) At 1 year: Short-acting contraception: Y1 (0.02, 95%CI -0.02-0.07, p>0.05) Long-acting contraception: Y1 (0.03, 95%CI 0.01-0.05,p<0.05) Postpartum intrauterine device: Y1 (0.03, 95%CI 0.02-0.04, p<0.05) Non-postpartum intrauterine device LARC: Y1 (-0.00, 95%CI -0.01-0.01,p>0.05) Sterilization: Y1 (-0.01, 95%CI -0.02--0.00, p<0.05) 24 m: Short-acting contraception: Y2 (-0.01, 95%CI (-0.04,0.02),p>0.05) Long-acting contraception: Y2 (0.02, 95%CI -0.00,0.04), p>0.05) Postpartum intrauterine device: Y2 (0.02, 95%CI 0.01-0.03,p<0.05) Non-postpartum intrauterine device LARC: Y2 (-0.01, 95%CI -0.02-0.01, p>0.05) Sterilization: Y2 (-0.01, 95%CI -0.02-0.00, p>0.05) (Huber-Krum)	At 24 m: use of modern contraception (0.00 [-0.04, 0.4]) (Huber-Krum) Women counseled in either the pre-discharge period (adjusted Odds ratio [aOR] 0.86; 95% CI: 0.80, 0.93) or in the post-discharge period (aOR 0.86; 95% CI: 0.79, 0.93) were less likely to have an unmet need in the postpartum period compared to women with no counseling*; women who received counseling in both the pre- and post-discharge period were 27% less likely than women who had not received counseling to have unmet need (aOR 0.73; 95% CI: 0.67, 0.80). (Puri) The adjusted probability of having incident pregnancy was 0.7 percentage points (95 percent CI: –3.0, 1.4) lower among women in the intervention group than among women in the control group. (Guo)
2022	Karra	Package: multifaceted (information provision, counseling, free transportation, free FP services, doctor consultations and referral services, reimbursement for treatment of contraceptive-related side effects)		At 24 m: Use of long-acting methods increased by 5.4% [0.020, 0.089]. Use of implants increased by 4.3% [0.011, 0.075]. No change in use of injectables (0.00088 [-0.039, 0.040]).	At 24 m: contraceptive use increased in intervention group by 5.9% [0.024, 0.094]. Intervention group's hazard of pregnancy was 43.5% lower 24 m after the index birth (based on a hazard rate of 0.565 [0.387, 0.824]).

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
2019	Tran	Package: multifaceted (refresher training for the provider, a counseling tool, supportive supervision, availability of contraceptive services 7 days a week, client appointment cards, and invitation letters for partners)	12 m: prevalence of modern contraceptive methods in the intervention arm was about twice that of the control arm (55% vs 29%, adjusted prevalence ratio [PR] 1.79, 95% CI 1.30–2.47). Also, significant changes in modern contraceptive use were observed at 6 w and 6 m.	At 12 m: In the intervention group, increased use of LARCs (aPR: 1.66 [1.17, 2.35]) and short-acting methods (aPR: 2.01 [1.18, 3.43]) was observed. Also, significant changes were observed in LARC use at 6 m and in use of short-acting methods at 6 w and 6 m.	
2020	Tran	Package: multifaceted (refresher training for the provider, a counseling tool, supportive supervision, availability of contraceptive services 7 days a week, client appointment cards, and invitation letters for partners)	12 m: prevalence of modern contraceptive methods in the intervention arm was not significantly different from the control group (aPR: 1.58 [0.74, 3.38]). No difference was observed also at 48 hours, 1 week, 6 w, 6 m.	Significant change was observed in the use of implants (long acting) at 6 w, 6 m and 12 m.	
2016	Cooper	Package: multifaceted-counseling, capacity building (stakeholder cooperation), group meetings, seminars, mobile clinics	Up to 11 months: Effect statistically insignificant for mothers with children 11 m or younger. Up to 24 m: overall, there was a decline in modern contraceptive use over the study period. However, intervention might still have positive effect (In Upper Egypt: OR=1.45, p<0.001; in Lower Egypt: OR=1.29, p<0.05).	Use of LARCs generally decreased in intervention and comparison sites over the study period. Measured LAM incorrectly as a breastfeeding method, limiting the ability to interpret this indicator.	When stratifying by age of children, effect only statistically significant in women with children 12-24m *(these are the women that were hardly exposed to antenatal visits*) Positive effect on (lower) risk of pregnancy in both Lower (OR=0.40, p<0.001) and Upper Egypt (OR=0.67, p<0.001) The intervention appears to have had a positive effect on knowledge of optimal birth spacing in Upper Egypt (OR=1.68, p<0.001); negative effect on the same outcome in lower Egypt (OR=0.55, p<0.001) Positive effect on joint contraceptive decision making in both Lower and Upper Egypt
2021	Espey	Package: multifaceted- one to one and group counseling, provider training (+ financial incentives, stakeholder engagement)		Over the 15-month intervention period, providers at our intervention facilities inserted 83.5 PP implants per month (SD=51.9) and 224.8 PPIUDs per month (SD=75.3). Notably, prior to our intervention, only 30 PP implant insertions per month and 8 PP IUD insertions per month occurred in our selected facilities	Receiving more promotions was associated with client uptake for PP implants (test for trend, X2=65.8, p<0.0001) and PPIUDs (test for trend, X2=26.9, p<0.0001)*; Of the 12,068 women who received our intervention and delivered at a study facility, 1252 chose a PP implant (10.4% uptake), 3372 chose a PPIUD (27.9% uptake), and 7444 declined a postpartum LARC method (61.7% non-uptake)

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
2015	Ahmed	Package: multifaceted- one to one counseling, group meetings, flyer provision, distribution of contraceptives (added to existing MNH intervention package)	12 m: cumulative probability of adopting any **modern** contraceptive method=65.9% in intervention and 39.1% in comparison arm. **CPR=**42% in intervention and 27% in comparison (p<0.001).	In intervention arm: higher acceptance of oral contraceptives (aHR=1.33, p<0.001), condoms (aHR=3.39, p<0.001), and reduced acceptance of traditional methods (aHR=0.59, p=0.001). No difference in adoption of injectables and female sterilization. Low acceptance of IUDs in both groups (0.6% in intervention VS 1.3% in control) Higher use of LAM in intervention arm: 3m – 23% VS 0%; 6m – 12% VS 0%; no use in either arm at 12 m or 24 m (not reported in article table)	24 m: Cumulative probability of adopting any modern contraceptive method=76.6% in intervention and 54.5% in comparison arm The hazard of all-method adoption was higher in the intervention arm than in the comparison arm (adjusted hazard ratio=2.57, p<0.001; excluding LAM: aHR=1.51, p<0.001). CPR=46% in intervention and 35% in comparison (p<0.001). Continuation rates for the first 12 m after adoption show that continuation of oral contraceptives was not significantly (in the multivariate analysis) higher in the intervention arm [aHR=0.81]; The continuation rate of IUDs/implants was also higher in the intervention arm (85.3 percent) than in the control arm (59.0 percent) but was not significantly different in the multivariable model [aHR:0.32). The continuation rates of other methods were not statistically significant. After discontinuation (n=745), 34 percent of LAM users switched to oral contraceptives, 21 percent to condoms, 12 percent to injectables, 1 percent to IUDs/implants, and 2 percent to sterilization; 26 percent remained nonusers at 24 m.
2018	Jarvis	Package: multifaceted-provision of free contraceptives and quality inputs (systematic screening and referral, provider training on counseling, immediate provision of LARCs on labor and delivery wards)	Within 12 m (timing unclear): Family planning use among all nonpregnant women Modern FP Use OR(95%CI)/AOR(95%CI) Arm 1 (quality): 0.4(0.2,0.8)/0.4(0.2,0.9) p<0.05 for both Arm 2 (free): 1.2(0.7,2.0)/0.9(0.5,1.8) Arm 3 (free/quality): 2.3(1.4,3.9) p<0.005/2.3(1.2,4.3) p<0.05 Control=reference	Among all **nonpregnant** women: Modern FP use Excluding condoms Arm 1: 0.8(0.4,1.7)/1.4(0.6,3.2) Arm 2: 3.2(1.8,5.8) p<0.001/ 3.2(1.4,7.2) p<0.005 Arm 3: 6(3.4,10.7)/8.6(3.9,19.0) p<0.001 for both LARC Use Arm 1: 2.1(0.8,5.4)/2.**9**(1.1,7.9) Arm 2: 6.3(2.8,14.2)/5.6(2.3,13.7) p<0.001 for both Arm 3: 8.2(3.7,18.4)/8.4(3.4,20.6) p<0.001 for both Implant use Arm 1: 1.7(0.6,4.8)/2.3(0.8,6.9) Arm 2: 7.0(3.0,16.4)/5.7(2.2,14.4) p<0.001 for both Arm 3: 6.8(2.9,16.0)/5.6(2.2/14.4) p<0.001 for both	
2021	Buser	Package: systems strengthening (improving maternity waiting homes)	Women who gave birth in the last 13 months: aOR contraceptive use (also referred to as avoiding pregnancy/actively avoiding pregnancy) among those who used the Core MWH Model compared to those who did not: 1.33 (1.08-1.63, p<0.05)		
2017	Maru	Package: systems strengthening (use of accountable care principles to improve existing public private	12 m: post-partum contraceptive prevalence increased from 19.0% to 46.5% (difference=27.5%, 95% CI: 20.8% to 34.2%, p-value <0.001).		

Year	Author	Intervention type	PP contraceptive use within one year of birth	Use of specific methods	Other outcomes
		partnership- *Possible* program)			
Teaching intervention					
2021	Dhital	Training: providers			In the adjusted model, a 25-fold increase in FCHV knowledge had been observed at the post-test [AOR=25.4 (CI 12.6–50.2), P<0.001], and at one-year post-intervention it remained approximately 11-fold higher [AOR=10.7(CI 6.3–18.1), P<0.001] as compared to the pre-intervention phase.

Table 4: Quality appraisal

Author	Quasi/RCT	Source pop. Description	Eligible pop. representative of source pop.	Intervention(s) description	Comparator(s) description	Random sequence generation	Baseline (or group) characteristics similar	Outcome data completeness	Analytical methods
Counseling interventions									
Daniele	RCT	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Low risk of bias	Adequate
Adanikin	RCT	Well described	Representative	Well described	Well described	Low risk of bias	Low risk of bias	Low risk of bias	Adequate
Ayiasi	RCT	Well described	Representative	Well described	Well described	High risk of bias	High risk of bias	Unclear	Inadequate
Camara	Quasi	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Low risk of bias	Inadequate
Ndegwa	Quasi	Unclear	Unclear	No description/poorly described	Well described	Unclear	High risk of bias	Low risk of bias	Inadequate
Keogh	Quasi	Well described	Representative	Well described	Well described	Not applicable	High risk of bias	High risk of bias	Adequate
Abdulkadir	RCT	Well described	Representative	Well described	Well described	High risk of bias	Low risk of bias	Low risk of bias	Adequate
Digital interventions									
Unger	RCT	Unclear	Unclear	Well described	Well described	Low risk of bias	Low risk of bias	Low risk of bias	Adequate
Harrington	RCT	Well described	Representative	Well described	Well described	Unclear	High risk of bias	Low risk of bias	Adequate
Educational interventions									
Sebastian	Quasi	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Low risk of bias	Adequate
Lori	Quasi	Well described	Representative	Well described	Well described	Not applicable	Low risk of bias	High risk of bias	Adequate
Maldonado	RCT	Well described	Representative	Well described	Well described	Low risk of bias	Low risk of bias	Low risk of bias	Adequate
Sarnquist	Quasi	Well described	Representative	Well described	Well described	Not applicable	Low risk of bias	Low risk of bias	Adequate
Bang	Quasi	Well described	Representative	Well described	Well described	Not applicable	High risk of bias	Unclear	Adequate
Financial interventions									
McConnell	RCT	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	High risk of bias	Adequate
Engineer	RCT	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Unclear	Adequate
Package of interventions									
Jiusitthipraphai	Quasi	Well described	Representative	Well described	Well described	Not applicable	High risk of bias	Low risk of bias	Adequate
Wu	Quasi	Well described	Representative	Well described	Well described	Not applicable	Low risk of bias	Low risk of bias	Adequate
Karra	RCT	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Low risk of bias	Adequate
Pearson	RCT	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Low risk of bias	Adequate
Pradhan Huber-Krum Puri Guo	RCT	Well described	Representative	Well described	Well described	Unclear	Low risk of bias	Low risk of bias	Adequate
Karra	RCT	Well described	Representative	Well described	Well described	Low risk of bias	Low risk of bias	High risk of bias	Adequate
Tran	RCT	Well described	Representative	Well described	Well described	Unclear	High risk of bias	Low risk of bias	Adequate
Tran	RCT	Well described	Representative	Well described	Well described	Low risk of bias	Low risk of bias	Low risk of bias	Adequate
Cooper	Quasi	Well described	Representative	Well described	Well described	Not applicable	Low risk of bias	Unclear	Adequate
Espey	Quasi	Not reported	Not reported	Well described	Not applicable	Not applicable	Not applicable	Not applicable	Unclear
Ahmed	Quasi	Well described	Unclear	Well described	Well described	Not applicable	High risk of bias	Unclear	Adequate
Jarvis	Quasi	Well described	Representative	Well described	Well described	Not applicable	High risk of bias	High risk of bias	Adequate
Buser	Quasi	Well described	Representative	Well described	Not applicable	Not applicable	Not applicable	Not applicable	Adequate
Maru	Quasi	Unclear	Unclear	Unclear	Not applicable	Not applicable	Not applicable	Not applicable	Adequate
Training intervention									
Dhital	Quasi	Well described	Representative	Unclear	Not applicable	Not applicable	Not applicable	Low risk of bias	Adequate

DISCUSSION

Summary of findings

We double screened 771 records and included 34 records reporting on 31 studies in the review. This is a substantial increase on the 16 studies identified by Cleland and colleagues for the period before 2012 and is the first review to capitalize on the increasing recent research and the growing interest in PPFP among donors and policymakers. The majority of studies (n=21) were published since 2018.

Most studies (n=21) were conducted in Sub-Saharan Africa. Half of the studies targeted pregnant women (n=17); the rest involved: postpartum women only (n=7); pregnant and postpartum women (n=3); pregnant women and their male partners (n=2); women aged 15-49 (pregnancy status not specified) (n=1); postpartum women and female community health volunteers (n=1). Twelve studies had interventions in the antenatal period only and 18 in the antenatal and other periods, including in the intra-and postpartum periods. One was unclear. In the earlier review by Cleland and colleagues where 7 studies were antenatal interventions, and 9 covered both ante- and postpartum interventions.

Approximately half of the study designs (n=16) were RCTs and half (n=15) were quasi-experimental. The quality appraisal showed generally positive results with the majority of studies describing their source population, representativeness, intervention and comparator well. In the trials, random sequence generation could have been improved in many studies. About two thirds of studies had a low risk of bias with regard to the comparability of the baseline (or group) characteristics.

Most evaluations (n=24) were conducted in health facility settings (with 2 also in community settings); seven were in community settings only. These findings are not too dissimilar to Cleland and colleagues.

Interventions were highly heterogeneous and categorized into: Package (2+ distinct components) (n=14); Counseling (n=7); Educational (n=5); Financial (n=2); Digital (n=2); and Training of providers (n=1). The distinction between ‘Counseling’ and ‘Education’ was not always clear. The studies covered a wider range of approaches than seen in older studies which primarily involved counseling.

Twenty-four of the 31 studies reported on the main outcome of interest in this review: postpartum contraceptive use within one year of birth. Eighteen of these 24 studies reported a positive intervention effect. This compared to 9 of 16 of the older studies reviewed by Cleland and colleagues. In general, the magnitude of the effect of the intervention was stronger the shorter the time period examined, and in studies that looked over several timepoints, saw a decrease in the effect, although in one case, the effect was greater at 9 months than at 6 months postpartum. Eight studies reported prevalence at 12 months exactly, others reported use at a wide range of time points, from 48 hours postpartum to 24 months postpartum. Given that effect sizes tended to decrease over time, this could be expected to greatly affect comparability of the studies.

Twenty-two studies reported on the use of specific methods, with sixteen studies specifically reported on use of one or more LARCs or permanent methods. Eleven (19, 20, 23-25, 28, 31, 32, 40, 41, 46) reporting the intervention had a positive effect on use of these methods. Two further studies showed increases in women choosing PPIUD, although actual insertion was not measured, and so these were not part of the 11 studies.

Four studies reported on contraceptive continuation (continuation for the first 12 months after adoption, discontinuation at six months, continuation among women starting contraception at ten weeks postpartum and stopping contraception at 6.5 months) (26, 28, 35, 48). None of these reported a statistically significant intervention effect.

Seven studies reported on LAM or on increases in exclusive breastfeeding. Correct use of LAM should meet three criteria and requires exclusive breastfeeding in the absence of menstruation and should not be relied on beyond six months postpartum. Worryingly, two studies reported increases in exclusive breastfeeding beyond 12 months. Two other studies trained on LAM but could not accurately measure this. At least one study promoting LAM alongside other methods showed that uptake could be adversely influenced by offers of other methods.

The studies in this systematic review were highly heterogeneous. Nevertheless, the findings suggest that interventions that included a multifaceted package of initiatives appeared to be more likely to have a positive effect. By contrast interventions with minimal counseling did not appear to be as effective. Given the relatively small number of studies for any given type of intervention, it is challenging to draw firm conclusions beyond the broad ones made above. Future implementation research needs to more specifically address the issue of amenorrhea and perceived and actual susceptibility to pregnancy (perhaps by looking at waiting time to conception); it could also focus on obtaining more definitive results on counseling interventions in group versus individual contexts and on the most promising packages, that consider specific contexts and health service gaps.

Strengths and limitations of this review

Our synthesis approach was robust and there appeared to be enough information to assess eligibility of the studies. The quality and quantity of the included studies, as shown in Table 4, was generally good. The measures taken to minimize bias in the review included double screening and double extraction.

However, the studies were highly heterogeneous in terms of interventions, population, outcomes, and the time period when outcomes were assessed. This made it difficult to identify themes and precluded conducting a meta-analysis. This means the body of evidence may be too small for any given approach to make definitive recommendations. Moreover, we did not fully consider all the relationships between the intervention characteristics and all the outcomes, or how contextual variables could affect the outcomes. For example, Gahungu and colleagues (52) found that women who perceived that they were at low risk of pregnancy, perhaps because of lactational amenorrhea or spousal separation, were less likely to take up contraception. Yet few studies reported on these variables, making it hard to assess potential confounders or contextual differences explaining the magnitude of effects in the different studies. Studies promoting multiple methods, for example LARCS and LAM, might see declines in some methods relative to others, whereas studies promoting only one method are more likely to see this increase.

Conclusion

The studies in this systematic review were highly heterogeneous and the number of studies with any given approach were small. Nevertheless, the findings suggest that interventions that included a multifaceted package of initiatives appeared to be more likely to have a positive effect and that those with minimal counseling did not appear to be effective.

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APPENDIX – SEARCH STRATEGIES

Ovid MEDLINE(R) ALL <1946 to July 29, 2022>	
1	(postpartum or post-partum or postnatal or post-natal or puerperium or "after deliver*" or "after childbirth" or "after birth*" or "since birth*" or "following deliver*" or "following childbirth" or "following birth*").mp. or exp Postpartum Period/ [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
2	(contracept* or "family planning" or "birth control" or "fertility control" or "birth regulation" or "fertility regulation" or (birth* adj2 spac*) or (child adj2 spac*) or (childbirth adj2 spac*) or (birth* adj2 timi*) or (pregnanc* adj2 timi*) or (pregnanc* adj2 spac*) or (childbirth adj3 interval*) or (birth* adj3 interval*) or (pregnanc* adj3 interval*) or (conce* adj2 interval*)).mp. or exp Contraception/ or exp Contraceptive Devices/ or depo? Medroxyprogesterone.mp. or Depo-Provera.mp. or Sayana Press.mp. or IUD.mp. or IUCD.mp. or IUS.mp. or intra?uterine device*.mp. or intra?uterine system*.mp. or oral contraceptive pill*.mp. or hormonal contraceptive pill*.mp. or birth control pill.mp. or mini?pill.mp. or progesterone?only pill.mp. or emergency contraceptive.mp. or cervical cap.mp. or cervical caps.mp. or vaginal diaphragm*.mp. or vaginal ring*.mp. or implant*.mp. or subdermal implant*.mp. or implanon.mp. or jadelle.mp. or norplant*.mp. or sino?implant.mp. or sterili?ation.mp. or vasectomy.mp. or contraception behavio?r.mp. or long-acting reversible contraception.mp. or LARCS.mp. or family planning/ or birth control/ or contraception/ or Contraception Behavio?r/ or Family Planning Services/ [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
3	(method* or interven* or meet* or consult* or advi* or counsel* or visit* or session* or educat* or communicat* or involve* or communit* or facilit* or service* or deliver* or provi* or program* or campaign* or scheme* or outreach*).mp. or exp intervention studies/ or (Family planning counsel?ing or family planning information or family planning advice or contraceptive counsel?ing).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
4	(ANC or PNC or ((antenatal or prenatal or pre?natal or pregnancy) and care)).mp. or exp Prenatal care/ [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5	(trial* or control* or randomi* or evaluat* or prospective or longitudinal or blind* or single-blind* or "single blind*" or double-blind* or "double blind*" or "before and after" or crossover or cross-over or cluster* or placebo or arm or arms or "quasi?experiment*" or "pre?post" or meta-analysis or synthesis or literature or published or extraction or search or review*).mp. or (quasiexperiment$2 or quasi experiment$2).ti,ab. or exogenous variation$1.ti,ab. or natural experiment$2.ti,ab. or Matched controls.ti,ab. or Counterfactual outcome$1.ti,ab. or Rubin causal model$1.ti,ab. or potential outcomes model$1.ti,ab. or (Identification adj (strategy or assumptions or conditions)).ti,ab. or (conditional adj (independence or ignorability)).ti,ab. or unobserved heterogeneity.ti,ab. or Unconfoundness.ti,ab. or Confounding.ti,ab. or (instrumental variable$1 adj (analysis or analyses or estimation)).ti,ab. or (overidentification or overidentifying).ti,ab. or regression discontinuity analys$2.ti,ab. or ((balancing or imbalance or balanced or imbalanced) adj3 covariates).ti,ab. or interrupted time series.ti,ab. or difference studies.ti,ab. or (controlled adj3 before adj3 after).ti,ab. or ((exact or score or genetic or nearest

	neighbor or nearest neighbour or caliper or radius or kernel density or blocking or stratification of interval) adj3 matching).ti,ab. or (Inverse probability weight$ adj4 estimat$).ti,ab. or (doubly robust adj4 (regression or estimate$)).ti,ab. or ((treatment or switching or selection or selectivity) adj3 regression).ti,ab. or (selection model or selectivity model).ti,ab. or (heckit model or heckman sample selection).ti,ab. or selection correction.ti,ab. or two stage residual inclusion.ti,ab. or regression discontinuity.ti,ab. or (sharp design or fuzzy design).ti,ab. or Forcing variable$1.ti,ab. or (difference$1 adj3 difference$1).ti,ab. or (change$1 adj3 change$1).ti,ab. or (Fixed effects and panel data).ti,ab. or full information maximum likelihood.ti,ab. or ((health or economic) adj shock$1).ti,ab. or natural controls.ti,ab. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
6	(emerging country or emerging countries or emerging nation or emerging nations or emerging population or emerging populations developing country or developing countries or developing nation or developing nations or developing population or developing populations or developing world or less developed country or less developed countries or less developed nation or less developed nations or less developed population or less developed populations or less developed world or lesser developed country or lesser developed countries or lesser developed nation or lesser developed nations or lesser developed population or lesser developed populations or lesser developed world or under developed country or under developed countries or under developed nation or under developed nations or under developed population or under developed populations or under developed world or underdeveloped country or underdeveloped countries or underdeveloped nation or underdeveloped nations or underdeveloped population or underdeveloped populations or underdeveloped world or middle income country or middle income countries or middle income nation or middle income nations or middle income population or middle income populations or low income country or low income countries or low income nation or low income nations or low income population or low income populations or lower income country or lower income countries or lower income nation or lower income nations or lower income population or lower income populations or underserved country or underserved countries or underserved nation or underserved nations or underserved population or underserved populations or underserved world or under served country or under served countries or under served nation or under served nations or under served population or under served populations or under served world or deprived country or deprived countries or deprived nation or deprived nations or deprived population or deprived populations or deprived world or poor country or poor countries or poor nation or poor nations or poor population or poor populations or poor world or poorer country or poorer countries or poorer nation or poorer nations or poorer population or poorer populations or poorer world or developing economy or developing economies or less developed economy or less developed economies or lesser developed economy or lesser developed economies or under developed economy or under developed economies or underdeveloped economy or underdeveloped economies or middle income economy or middle income economies or low income economy or low income economies or lower income economy or lower income economies or low gdp or low gnp or low gross domestic or low gross national or lower gdp or lower gnp or lower gross domestic or lower gross national or lmic or lmics or third world or lami country or lami countries or transitional country or transitional countries or Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America or Atlantic Islands or Pacific Islands or Indian Ocean Islands or Eastern Europe or Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores

	or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Melanesia or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Syrian or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Tuvalu or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia or Developing Countries or Africa or Asia or Caribbean Region or West Indies or South America or Latin America or Central America or Atlantic Islands or Pacific Islands or Indian Ocean Islands or Afghanistan or Albania or Algeria or American Samoa or Angola or "Antigua and Barbuda" or Argentina or Armenia or Azerbaijan or Bahrain or Baltic States or Bangladesh or Barbados or Benin or Belarus or Belize or Bhutan or Bolivia or Bosnia-Herzegovina or Botswana or Brazil or Bulgaria or Burkina Faso or Burundi or Cambodia or Cameroon or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Congo or Costa Rica or Cote d'Ivoire or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Djibouti or Congo or Korea or Dominica or Dominican Republic or East Timor or Ecuador or Egypt or El Salvador or Eritrea or Estonia or Ethiopia or Equatorial Guinea or Fiji or French Guiana or Gabon or Gambia or Georgia or Ghana or Greece or Grenada or Guatemala or Guinea or Guinea-Bissau or Guam or Guyana or Haiti or Honduras or Hungary or Samoa or India or Indonesia or Iran or Iraq or Jamaica or Jordan or Kazakhstan or Kenya or Korea or Kyrgyzstan or Laos or Latvia or Lebanon or Lesotho or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malawi or Malaysia or Mali or Malta or Mauritania or Mauritius or Melanesia or Mexico or Micronesia or Middle East or Moldova or Mongolia or Montenegro or Morocco or Mozambique or Myanmar or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Oman or Pakistan or Palau or Panama or Papua New Guinea or Paraguay or Peru or Philippines or Poland or Portugal or Puerto Rico or Romania or Russia or Russia or Rwanda or "Saint Kitts and Nevis" or Saint Lucia or Grenadines or Samoa or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Somalia or South Africa or Sudan or Suriname or Swaziland or Syria or Tajikistan or Tanzania or Thailand or Togo or Tonga or "Trinidad and Tobago" or Tunisia or Turkey or Turkmenistan or Uganda or Ukraine or Uruguay or USSR or Uzbekistan or Vanuatu or Venezuela or Vietnam or Yemen or Yugoslavia or Zambia or Zimbabwe or Southern African Development Community or East African Community or West African Health Organisation or "resource-poor settings" or "resource-limited settings" or "low-resource settings" or "tropic*").mp.

Embase Classic+Embase <1947 to 2022 July 29>	
1	(postpartum or post-partum or postnatal or post-natal or puerperium or "after deliver*" or "after childbirth" or "after birth*" or "since birth*" or "following deliver*" or "following childbirth" or "following birth*").mp. or exp Postpartum Period/ [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
2	(contracept* or "family planning" or "birth control" or "fertility control" or "birth regulation" or "fertility regulation" or (birth* adj2 spac*) or (child adj2 spac*) or (childbirth adj2 spac*) or (birth* adj2 timi*) or (pregnanc* adj2 timi*) or (pregnanc* adj2 spac*) or (childbirth adj3 interval*) or (birth* adj3 interval*) or (pregnanc* adj3 interval*) or (conce* adj2 interval*)).mp. or exp Contraception/ or exp Contraceptive Devices/ or depo? Medroxyprogesterone.mp. or Depo-Provera.mp. or Sayana Press.mp. or IUD.mp. or IUCD.mp. or IUS.mp. or intra?uterine device*.mp. or intra?uterine system*.mp. or oral contraceptive pill*.mp. or hormonal contraceptive pill*.mp. or birth control pill.mp. or mini?pill.mp. or progesterone?only pill.mp. or emergency contraceptive.mp. or cervical cap.mp. or cervical caps.mp. or vaginal diaphragm*.mp. or vaginal ring*.mp. or implant*.mp. or subdermal implant*.mp. or implanon.mp. or jadelle.mp. or norplant*.mp. or sino?implant.mp. or sterili?ation.mp. or vasectomy.mp. or contraception behavio?r.mp. or long-acting reversible contraception.mp. or LARCS.mp. or family planning/ or birth control/ or contraception/ or Contraception Behavio?r/ or Family Planning Services/ [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
3	(method* or interven* or meet* or consult* or advi* or counsel* or visit* or session* or educat* or communicat* or involve* or communit* or facilit* or service* or deliver* or provi* or program* or campaign* or scheme* or outreach*).mp. or exp intervention studies/ or (Family planning counsel?ing or family planning information or family planning advice or contraceptive counsel?ing).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
4	(ANC or PNC or ((antenatal or prenatal or pre?natal or pregnancy) and care)).mp. or exp Prenatal care/ [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
5	(trial* or control* or randomi* or evaluat* or prospective or longitudinal or blind* or single-blind* or "single blind*" or double-blind* or "double blind*" or "before and after" or crossover or cross-over or cluster* or placebo or arm or arms or "quasi?experiment*" or "pre?post" or meta-analysis or synthesis or literature or published or extraction or search or review*).mp. or (quasiexperiment$2 or quasi experiment$2).ti,ab. or exogenous variation$1.ti,ab. or natural experiment$2.ti,ab. or Matched controls.ti,ab. or Counterfactual outcome$1.ti,ab. or Rubin causal model$1.ti,ab. or potential outcomes model$1.ti,ab. or (Identification adj (strategy or assumptions or conditions)).ti,ab. or (conditional adj (independence or ignorability)).ti,ab. or unobserved heterogeneity.ti,ab. or Unconfoundness.ti,ab. or Confounding.ti,ab. or (instrumental variable$1 adj (analysis or analyses or estimation)).ti,ab. or (overidentification or overidentifying).ti,ab. or regression discontinuity analys$2.ti,ab. or ((balancing or imbalance or balanced or imbalanced) adj3 covariates).ti,ab. or interrupted time series.ti,ab. or difference studies.ti,ab. or (controlled adj3 before adj3 after).ti,ab. or ((exact or score or genetic or nearest neighbor or nearest neighbour or caliper or radius or kernel density or blocking or stratification of interval) adj3 matching).ti,ab. or (Inverse probability weight$ adj4 estimat$).ti,ab. or (doubly robust adj4 (regression or estimate$)).ti,ab. or ((treatment or switching or selection or selectivity) adj3 regression).ti,ab. or (selection model or selectivity model).ti,ab. or (heckit model or heckman sample selection).ti,ab. or selection correction.ti,ab. or two stage residual inclusion.ti,ab. or regression discontinuity.ti,ab. or (sharp design or fuzzy design).ti,ab. or Forcing variable$1.ti,ab. or

	(difference$1 adj3 difference$1).ti,ab. or (change$1 adj3 change$1).ti,ab. or (Fixed effects and panel data).ti,ab. or full information maximum likelihood.ti,ab. or ((health or economic) adj shock$1).ti,ab. or natural controls.ti,ab. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]
6	(emerging country or emerging countries or emerging nation or emerging nations or emerging population or emerging populations developing country or developing countries or developing nation or developing nations or developing population or developing populations or developing world or less developed country or less developed countries or less developed nation or less developed nations or less developed population or less developed populations or less developed world or lesser developed country or lesser developed countries or lesser developed nation or lesser developed nations or lesser developed population or lesser developed populations or lesser developed world or under developed country or under developed countries or under developed nation or under developed nations or under developed population or under developed populations or under developed world or underdeveloped country or underdeveloped countries or underdeveloped nation or underdeveloped nations or underdeveloped population or underdeveloped populations or underdeveloped world or middle income country or middle income countries or middle income nation or middle income nations or middle income population or middle income populations or low income country or low income countries or low income nation or low income nations or low income population or low income populations or lower income country or lower income countries or lower income nation or lower income nations or lower income population or lower income populations or underserved country or underserved countries or underserved nation or underserved nations or underserved population or underserved populations or underserved world or under served country or under served countries or under served nation or under served nations or under served population or under served populations or under served world or deprived country or deprived countries or deprived nation or deprived nations or deprived population or deprived populations or deprived world or poor country or poor countries or poor nation or poor nations or poor population or poor populations or poor world or poorer country or poorer countries or poorer nation or poorer nations or poorer population or poorer populations or poorer world or developing economy or developing economies or less developed economy or less developed economies or lesser developed economy or lesser developed economies or under developed economy or under developed economies or underdeveloped economy or underdeveloped economies or middle income economy or middle income economies or low income economy or low income economies or lower income economy or lower income economies or low gdp or low gnp or low gross domestic or low gross national or lower gdp or lower gnp or lower gross domestic or lower gross national or lmic or lmics or third world or lami country or lami countries or transitional country or transitional countries or Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America or Atlantic Islands or Pacific Islands or Indian Ocean Islands or Eastern Europe or Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Jamaica or

	Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Melanesia or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Syrian or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Tuvalu or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia or Developing Countries or Africa or Asia or Caribbean Region or West Indies or South America or Latin America or Central America or Atlantic Islands or Pacific Islands or Indian Ocean Islands or Afghanistan or Albania or Algeria or American Samoa or Angola or "Antigua and Barbuda" or Argentina or Armenia or Azerbaijan or Bahrain or Baltic States or Bangladesh or Barbados or Benin or Belarus or Belize or Bhutan or Bolivia or Bosnia-Herzegovina or Botswana or Brazil or Bulgaria or Burkina Faso or Burundi or Cambodia or Cameroon or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Congo or Costa Rica or Cote d'Ivoire or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Djibouti or Congo or Korea or Dominica or Dominican Republic or East Timor or Ecuador or Egypt or El Salvador or Eritrea or Estonia or Ethiopia or Equatorial Guinea or Fiji or French Guiana or Gabon or Gambia or Georgia or Ghana or Greece or Grenada or Guatemala or Guinea or Guinea-Bissau or Guam or Guyana or Haiti or Honduras or Hungary or Samoa or India or Indonesia or Iran or Iraq or Jamaica or Jordan or Kazakhstan or Kenya or Korea or Kyrgyzstan or Laos or Latvia or Lebanon or Lesotho or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malawi or Malaysia or Mali or Malta or Mauritania or Mauritius or Melanesia or Mexico or Micronesia or Middle East or Moldova or Mongolia or Montenegro or Morocco or Mozambique or Myanmar or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Oman or Pakistan or Palau or Panama or Papua New Guinea or Paraguay or Peru or Philippines or Poland or Portugal or Puerto Rico or Romania or Russia or Russia or Rwanda or "Saint Kitts and Nevis" or Saint Lucia or Grenadines or Samoa or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Somalia or South Africa or Sudan or Suriname or Swaziland or Syria or Tajikistan or Tanzania or Thailand or Togo or Tonga or "Trinidad and Tobago" or Tunisia or Turkey or Turkmenistan or Uganda or Ukraine or Uruguay or USSR or Uzbekistan or Vanuatu or Venezuela or Vietnam or Yemen or Yugoslavia or Zambia or Zimbabwe or Southern African Development Community or East African Community or West African Health Organisation or "resource-poor settings" or "resource-limited settings" or "low-resource settings" or "tropic*").mp.
Global Health <1910 to 2022 Week 30>	
1	(postpartum or post-partum or postnatal or post-natal or puerperium or "after deliver*" or "after childbirth" or "after birth*" or "since birth*" or "following deliver*" or "following childbirth" or "following birth*").mp. or exp Postpartum Period/ [mp=abstract, title, original title, heading words, cabicodes words]

2	(contracept* or "family planning" or "birth control" or "fertility control" or "birth regulation" or "fertility regulation" or (birth* adj2 spac*) or (child adj2 spac*) or (childbirth adj2 spac*) or (birth* adj2 timi*) or (pregnanc* adj2 timi*) or (pregnanc* adj2 spac*) or (childbirth adj3 interval*) or (birth* adj3 interval*) or (pregnanc* adj3 interval*) or (conce* adj2 interval*)).mp. or exp Contraception/ or exp Contraceptive Devices/ or depo? Medroxyprogesterone.mp. or Depo-Provera.mp. or Sayana Press.mp. or IUD.mp. or IUCD.mp. or IUS.mp. or intra?uterine device*.mp. or intra?uterine system*.mp. or oral contraceptive pill*.mp. or hormonal contraceptive pill*.mp. or birth control pill.mp. or mini?pill.mp. or progesterone?only pill.mp. or emergency contraceptive.mp. or cervical cap.mp. or cervical caps.mp. or vaginal diaphragm*.mp. or vaginal ring*.mp. or implant*.mp. or subdermal implant*.mp. or implanon.mp. or jadelle.mp. or norplant*.mp. or sino?implant.mp. or sterili?ation.mp. or vasectomy.mp. or contraception behavio?r.mp. or long-acting reversible contraception.mp. or LARCS.mp. or family planning/ or birth control/ or contraception/ or Contraception Behavio?r/ or Family Planning Services/ [mp=abstract, title, original title, heading words, cabicodes words]
3	(method* or interven* or meet* or consult* or advi* or counsel* or visit* or session* or educat* or communicat* or involve* or communit* or facilit* or service* or deliver* or provi* or program* or campaign* or scheme* or outreach*).mp. or exp intervention studies/ or (Family planning counsel?ing or family planning information or family planning advice or contraceptive counsel?ing).mp. [mp=abstract, title, original title, heading words, cabicodes words]
4	(ANC or PNC or ((antenatal or prenatal or pre?natal or pregnancy) and care)).mp. or exp Prenatal care/ [mp=abstract, title, original title, heading words, cabicodes words]
5	(trial* or control* or randomi* or evaluat* or prospective or longitudinal or blind* or single-blind* or "single blind*" or double-blind* or "double blind*" or "before and after" or crossover or cross-over or cluster* or placebo or arm or arms or "quasi?experiment*" or "pre?post" or meta-analysis or synthesis or literature or published or extraction or search or review*).mp. or (quasiexperiment$2 or quasi experiment$2).ti,ab. or exogenous variation$1.ti,ab. or natural experiment$2.ti,ab. or Matched controls.ti,ab. or Counterfactual outcome$1.ti,ab. or Rubin causal model$1.ti,ab. or potential outcomes model$1.ti,ab. or (Identification adj (strategy or assumptions or conditions)).ti,ab. or (conditional adj (independence or ignorability)).ti,ab. or unobserved heterogeneity.ti,ab. or Unconfoundness.ti,ab. or Confounding.ti,ab. or (instrumental variable$1 adj (analysis or analyses or estimation)).ti,ab. or (overidentification or overidentifying).ti,ab. or regression discontinuity analys$2.ti,ab. or ((balancing or imbalance or balanced or imbalanced) adj3 covariates).ti,ab. or interrupted time series.ti,ab. or difference studies.ti,ab. or (controlled adj3 before adj3 after).ti,ab. or ((exact or score or genetic or nearest neighbor or nearest neighbour or caliper or radius or kernel density or blocking or stratification of interval) adj3 matching).ti,ab. or (Inverse probability weight$ adj4 estimat$).ti,ab. or (doubly robust adj4 (regression or estimate$)).ti,ab. or ((treatment or switching or selection or selectivity) adj3 regression).ti,ab. or (selection model or selectivity model).ti,ab. or (heckit model or heckman sample selection).ti,ab. or selection correction.ti,ab. or two stage residual inclusion.ti,ab. or regression discontinuity.ti,ab. or (sharp design or fuzzy design).ti,ab. or Forcing variable$1.ti,ab. or (difference$1 adj3 difference$1).ti,ab. or (change$1 adj3 change$1).ti,ab. or (Fixed effects and panel data).ti,ab. or full information maximum likelihood.ti,ab. or ((health or economic) adj shock$1).ti,ab. or natural controls.ti,ab. [mp=abstract, title, original title, heading words, cabicodes words]
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	Islands or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Syrian or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Tuvalu or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia or Developing Countries or Africa or Asia or Caribbean Region or West Indies or South America or Latin America or Central America or Atlantic Islands or Pacific Islands or Indian Ocean Islands or Afghanistan or Albania or Algeria or American Samoa or Angola or "Antigua and Barbuda" or Argentina or Armenia or Azerbaijan or Bahrain or Baltic States or Bangladesh or Barbados or Benin or Belarus or Belize or Bhutan or Bolivia or Bosnia-Herzegovina or Botswana or Brazil or Bulgaria or Burkina Faso or Burundi or Cambodia or Cameroon or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Congo or Costa Rica or Cote d'Ivoire or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Djibouti or Congo or Korea or Dominica or Dominican Republic or East Timor or Ecuador or Egypt or El Salvador or Eritrea or Estonia or Ethiopia or Equatorial Guinea or Fiji or French Guiana or Gabon or Gambia or Georgia or Ghana or Greece or Grenada or Guatemala or Guinea or Guinea-Bissau or Guam or Guyana or Haiti or Honduras or Hungary or Samoa or India or Indonesia or Iran or Iraq or Jamaica or Jordan or Kazakhstan or Kenya or Korea or Kyrgyzstan or Laos or Latvia or Lebanon or Lesotho or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malawi or Malaysia or Mali or Malta or Mauritania or Mauritius or Melanesia or Mexico or Micronesia or Middle East or Moldova or Mongolia or Montenegro or Morocco or Mozambique or Myanmar or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Oman or Pakistan or Palau or Panama or Papua New Guinea or Paraguay or Peru or Philippines or Poland or Portugal or Puerto Rico or Romania or Russia or Russia or Rwanda or "Saint Kitts and Nevis" or Saint Lucia or Grenadines or Samoa or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Somalia or South Africa or Sudan or Suriname or Swaziland or Syria or Tajikistan or Tanzania or Thailand or Togo or Tonga or "Trinidad and Tobago" or Tunisia or Turkey or Turkmenistan or Uganda or Ukraine or Uruguay or USSR or Uzbekistan or Vanuatu or Venezuela or Vietnam or Yemen or Yugoslavia or Zambia or Zimbabwe or Southern African Development Community or East African Community or West African Health Organisation or "resource-poor settings" or "resource-limited settings" or "low-resource settings" or "tropic*").mp.

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