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Knowledge, attitudes and perceptions of long acting reversible contraceptive (LARC) methods among healthcare workers in sub-Saharan Africa: A systematic review and meta-analysis

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Candidate

Laura Rouncivell

u14022479

School of Health Systems and Public Health

Faculty of Health Sciences

Tel no. +27723145775

Supervisor

Dr S Takuva

Simba.Takuva@up.ac.za

simbataks1@gmail.com

Co-supervisor

Dr N Ledibane

Neo.Ledibane@up.ac.za

Co-supervisor

Ms T Leong

Trudy.Leong@health.gov.za

EXECUTIVE SUMMARY

Introduction: The sub-Saharan Africa (SSA) region is making progress in its contraceptive policies that allow for the provision of long-acting reversible contraceptives (LARC). Despite this, the overall utilisation of contraception, especially LARC is low while the burden of unintended pregnancies remains high. Unintended pregnancies pose a significant threat to global public health with far-reaching consequences. There is a need to explore all the reasons for the low uptake of effective LARC methods. The objectives of this systematic review and meta-analysis, was therefore to determine the state of knowledge, attitudes, and perceptions of LARCs among healthcare workers (HCW) in sub-Saharan Africa.

Methods: A systematic review and meta-analysis were conducted of published qualitative and quantitative studies. A search strategy was developed and applied to three major databases (PubMed, Ovid (Medline), and Scopus). Studies of both a qualitative and quantitative nature were included if they assessed either the knowledge, attitude, perception or a combination of the concepts among HCWs toward a LARC method. Data were extracted using a pre-determined data extraction form to conduct a qualitative synthesis using a thematic content analysis framework using ATLAS.ti version 8. In addition to this, data was specifically extracted relating to 11 pre-determined questions to conduct proportion meta-analyses using Stata version 15. Heterogeneity was further explored using the I^2-statistic and publication bias using funnel plots and Egger's tests.

Results: A total of 3616 records were screened, of which 3510 were excluded. From 106 full-text articles assessed for eligibility, 50 were included for qualitative synthesis and 21 included in the meta-analysis. From the studies, a total of 12 356 participants were included in the analysis. From the meta-analysis, the overall proportion of HCWs with training in family planning was 62% (95% CI: 48%, 76%) while 60% (95% CI: 41%, 80%) reported providing family planning counselling to their clients. Forty-one percent (95% CI: 20%, 61%) of HCWs had received IUCD insertion training with 63% (95% CI: 44%, 81%) expressing a desire for additional training. Only 27% of HCWs (95% CI: 18%, 36%) deemed IUCD appropriate for HIV-infected women. Moreover, restrictions for IUCD and injectables based on a minimum age were imposed by 56% (95% CI: 33%, 78%) and 60% (95% 41 CI: 36%, 84%) of HCWs, respectively. Lastly, minimum parity restrictions were also observed among 29% (95% CI: 9%, 50%) of HCWs for IUCDs and 36% (95% CI: 16%, 43 56%) for injectable contraceptives.

Conclusion: The study revealed that there is a gap in knowledge of HCWs regarding family planning counselling and LARC provision. In addition to this, the results indicate that unnecessary provider-imposed restrictions may hinder the uptake of LARC methods by

women in sub-Saharan Africa. With the deadline for the Family Planning 2020 initiative and the 2030 SDGs quickly approaching, there is a need to address these issues.

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Acronyms and abbreviations

AAC	: Academic Advisory Committee
ANC	: Antenatal Care
ART	: Antiretroviral therapy
CASP	: Critical Appraisal Skills Programme
CRAMMA	: Campaign for the Accelerated Reduction of Maternal, Neonatal and Child Mortality in Africa
Cu-IUD	: Copper intrauterine device
DHS	: Demographic Health Survey
DMPA	: Depot-medroxyprogesterone acetate
DTG	: Dolutegravir
ECHO	: The Evidence for Contraceptive Options and HIV Outcomes Trial
EML	: Essential Medicines List
FP2020	: Family Planning 2020
HCW	: Healthcare workers
HIV	: Human Immunodeficiency Virus
IPC	: Injectable progestin contraceptive
KAP	: Knowledge, attitudes and perceptions
LARC	: Long Acting Reversible Contraception
LMIC	: Low- and middle-income countries
MPoA	: African Union's Maputo Program of Action
NET-EN	: Norethisterone enanthate
NHI	: National Health Insurance
NOS	: Newcastle-Ottawa Scale
NRF	: National Research Foundation
NTD	: Neonatal Tube Defect
PHC	: Primary Health Care
PRISMA	: Preferred Reporting Items for Systematic Reviews and Meta-analysis
PROSPERO	: International Prospective Register of Systematic Reviews
RCT	: Randomised Control Trial
REC	: Research Ethics Committee of the Faculty of Health Sciences
RRP	: Rapid Repeat Pregnancy
SDGs	: Sustainable Development Goals
SHSPH	: School of Health Systems and Public Health

SRH : Sexual and reproductive health

SSA : sub-Saharan Africa

TFR : Total fertility rate

UHC : Universal Health Coverage

WHO : World Health Organization

WLWHIV : Women living with HIV

Glossary of terms

Attitude: The position and opinion of healthcare workers towards Long-acting reversible contraception.

Contraceptive Effectiveness: The effectiveness of the contraception refers to how well it works outside of clinical trials, in actual practice.

Contraceptive Efficacy: The efficacy refers to how well the contraceptive works during clinical trials.

Cu-IUD: The copper intrauterine is a type of long acting reversible contraceptive also knows as ParaGard or the copper-T. The Cu-IUD is a t-shaped device containing a copper coil which is inserted into the uterus to produce an inflammatory reaction that is toxic to sperm and ova. The Cu-IUD is effective for up to ten years.

DMPA (Depot-medroxyprogesterone acetate): A hormonal contraceptive that is similar to the natural progesterone produced by the body. DMPA is administered through an injection every 12 weeks to prevent pregnancy by preventing ovulation while thickening the mucus in the cervix to prevent sperm from entering the uterus.

Healthcare workers: For the purpose of this study, a healthcare worker is defined as a medical practitioner, nurse, pharmacist or clinical associate that is currently practising within sub-Saharan Africa.

Implanon (Implant): A long-acting reversible contraceptive consisting of Etonogestrel. Implanon is a sub-dermal implant placed under the skin of the upper arm providing protection from pregnancy for up to three years.

Knowledge: The information, understanding and familiarity that healthcare workers have toward Long-acting reversible contraception.

LARC: Long-acting reversible contraception

NET-EN: A progestogen-only injectable that is administered

Perception: The interpretation and impression that healthcare workers have towards Long-acting reversible contraception.

Perfect Contraceptive Use: The failure rate of a contraceptive when used under perfect conditions.

Typical Contraceptive Use: The failure rate of a contraceptive when used under typical conditions.

Unintended Pregnancy: For the purpose of this study an unintended pregnancy is defined as one that is mistimed, unwanted or unplanned at the time of conception.

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Chapter 1: Introduction

1.1. Background

The use of and access to contraceptives play a critical role in numerous facets of health including the reduction of maternal and infant mortality, sexual and reproductive health and the human rights of women across the globe.[1,2] The global public health community emphasises the importance of this through prioritisation within the Sustainable Development Goals (SDGs) 3 and 5 as well as in the Family Planning 2020 (FP2020) initiative.[3,4] The FP2020 initiative aims to allow 120 million additional women to use a form of modern contraception by 2020 in 69 of the world's poorest countries.[5] Access to contraceptives furthermore underpin a core principle that must be met in order to achieve family planning goals under Universal Health Coverage (UHC), an initiative towards which many countries are working extensively.[6]

Sexual and reproductive health (SRH) policies throughout sub-Saharan Africa (SSA) gained notable attention in 2006 though the implementation of the African Union's Maputo Program of Action (MPoA) that aimed to provide universal access to reproductive health by 2015.[7] Although these initiatives resulted in an increase in contraceptive utilisation, in 2015 only 25% of married women throughout SSA were using a form of modern contraception in comparison to 58% globally.[8] The low uptake of effective modern contraception is further highlighted by the total fertility rates (TFR) observed in the region.[9] Kenya, Nigeria and the Republic of Niger observe TFR of 4.8, 5.2 and 7.6 children per woman, respectively.[9]

Despite high fertility rates across Africa, contraception use is increasing, particularly the use of injectable progestin contraceptives (IPC) accounting for 45% of modern methods utilised.[8] However, the use of intrauterine contraception and sub-dermal implants which yield higher adherence and lower discontinuation rates remain low.[8,10]

In South Africa particularly, the policy environment regarding reproductive health services and contraceptive provision is comprehensive and progressive.[3] There has been an increasing focus on LARC (long-acting reversible contraception), which are among the most effective contraceptive methods and have the greatest potential to reduce unintended pregnancies. The revision of two key policies: the National Contraception and Fertility Planning and Service Delivery Guidelines (2012) and the National Contraception Clinical Guidelines (2014) allowed for the expansion of contraceptive options to include a broader variety of long-acting reversible contraceptives (LARC) such as IPC (depot-medroxyprogesterone acetate (DMPA), Norethisterone enanthate (NET-EN) and Implanon) and intrauterine contraception such as the copper intrauterine device (Cu-IUD).[11,12] Despite

these noteworthy advancements, according to the latest available data, the country still faces a substantial public health dilemma with a high prevalence of unintended pregnancies (66.5%) and an overall low contraception utilisation prevalence at only 49.1% of sexually active women using any type of method.[2] Regardless of the Cu-IUD being a highly effective method of contraception and available through the essential medicines list (EML), it is vastly under-utilised (1.2% and 1.3% among married and sexually active unmarried women, respectively) within the country.[13] However, injectables are seen as the most commonly used (23.9% and 26.1% among married and sexually active unmarried women, respectively) form of contraception among the female population.[14] Among women, reasons for its popularity have been documented as its convenience; ability to be used covertly; and reduced side-effects in comparison to other LARC methods such as the sub-dermal implant or IUCDs.[15–18] Among HCWs, injectable contraceptives are perceived to be (and therefore regularly promoted) the easiest LARC method to provide, requiring the least amount of skill or training; the contraceptive that is most likely to be in stock; and the least time-consuming longer-acting method to provide.[19–21]

The attitude, knowledge and skills possessed by healthcare workers allow them to be either a facilitator of LARC uptake or a barrier.[22] With the current evidence indicating that LARC uptake throughout SSA is low, it is essential to understand the factors that may be contributing toward this trend. Multiple studies have explored women's KAP toward LARC methods but no study to date has explored the overall state of KAP among healthcare workers (HCWs) regarding these contraceptive methods and their potential to impact on women's choice of method across SSA.

Chapter 2: Literature Overview

The following section provides an overview of the current literature available regarding LARC methods, their utilisation, and unintended pregnancies across SSA. The section further provides the research question, objectives of the study and the justification for conducting the study.

2.1. Long-acting reversible contraceptive methods

LARCs comprise a group of highly effective contraceptives that are not user-dependent once inserted.[23] These types of contraceptives have a proven prolonged efficacy of at least 3 to 5 years.[24] Throughout SSA, multiple LARCs are available in the public health sector including the Cu-IUD, sub-dermal implant and IPC. The Cu-IUD is a small T-shaped device that is wrapped in copper and has a mechanism of action by preventing fertilisation by inhibiting sperm migration.[25] The subdermal rod-shaped implant placed in the arm comprises ethylene vinyl acetate copolymer core containing Etonogestrel.[25]
The single-rod implant lasting up to 3 years and the two-rod levonorgestrel lasting 5 years are available, however, in the majority of SSA countries, only the single-rod implant (Implanon) is available within the public sector.[14] Lastly, IPC (DMPA and NET-EN) are often considered to form part of the LARC category due to their ability to prevent pregnancy for a longer period compared to short-acting reversible contraceptives (SARC) (contraceptive pill, transdermal patch and vaginal ring).[24]

Multiple advantages of LARCs over SARCs exist. The greatest advantage is the increased effectiveness (>99%) as seen by their failure rates.[26] Cu-IUD and implants have a failure rate of 0.8% and 0.05% respectively in comparison to 20 per 100 women in oral contraceptives.[27] The increased effectiveness is largely due to the nature of the contraceptive that reduces errors in use that are commonly seen in SARCs.[26] In addition to this, LARCs require removals to be performed from by a skilled HCW, although this is reported to be a disadvantage to users, evidence suggests that this contributes towards its high efficacy as discontinuation often occurs unwillingly among SARC users.[28] Notably, some LARCs (i.e. injectables), are compliance-friendly as they only require periodic clinic visits, are private and no supplies need to be dispensed.

A partially randomised patient preference trial was conducted to explore the effectiveness of LARCs in preventing unintended pregnancies in comparison to SARCs. The study estimated the 12-month cumulative probability of method discontinuation and unintended pregnancy for each cohort. Among the randomised study participants, the SARC method

continuation probability was 53% compared to 77.8% for LARCs.[29] The implant and Cu-IUD had significantly higher continuation rates (77.5% and 78.4%, respectively) in comparison to DMPA (37.5%).[29] In addition to this, 24 (7.4%) unintended pregnancies occurred among women who chose SARCs, 10 (9.5%) among the randomized SARC cohort and only 1 (0.7%) among the LACR cohort highlighting the effectiveness of LARCs in comparison to SARCs.[29]

The study however reported limitations to the external validity of the results as participants were recruited based on having good follow-up potential.[29] The use of LARCs is further beneficial as there is no male co-operation or awareness required for effective use which is of notable importance considering the various cultural contexts of African regions.[30]

Evidence suggests that a high number of unintended pregnancies also occur in the postpartum and post-abortion period.[24] LARCs have shown to be highly effective and safe in the prevention of rapid repeat pregnancies (RRP) as well as a method of emergency contraceptive (particularly the Cu-IUD) and therefore play a role in the prevention of unsafe abortions and their associated risks.[31] Moreover, a systematic review found that LARCs were safe in nulliparous women, breastfeeding women and adolescents despite common misperceptions.[32] LARCs are safe, effective and exhibit very few contraindications making them a viable option for almost all women including those with oestrogen contraindications.[33]

Despite the numerous observed advantages of LARCs, the most commonly reported disadvantage and reason for discontinuation is the experience of side-effects.[34] A study conducted in Southern Ethiopia found that 683 participants using Implanon, 34.4% experienced side-effects that led to the discontinuation of the contraceptive method.[35] The study however reported recall bias as a limitation to their results but identified that adequate counselling of the potential side-effects by the provider may reduce discontinuation as an effect.[35] Side-effects of the Cu-IUD include discomfort during insertion, possible expulsion and cramping up to 6 months after insertion.[36]

According to a randomised control trial, of the 30 participants who discontinued the use of the Implant of Cu-IUD, 76.9% did so due to side-effects and 1 participant experienced an explosion.[29] In contrast to this of the 90 participants who discontinued in the SARC cohort, only 21.1% cited side-effects as a reason.[29]

2.1.1. Effectiveness of LARC Methods

Both the Cu-IUD and the DMPA injectable provide a highly effective method of contraception for women while simultaneously reducing the need for adherence in comparison to other

methods.[37] According to the South African National Department of Health,[38] the Cu-IUD has a failure rate of 0.8% in typical use and 0.6% in perfect use. These failure rates are comparable to tubal sterilisation. [39] The DMPA, however, has a failure rate of 0.2% in perfect use but a substantially higher 6% in typical use.[38]

A randomised control clinical trial (RCT) conducted in South Africa to determine the rates of pregnancy in Cu-IUD users, comparing the injectable progestin contraceptive (IPC) users, found that 971 women using the Cu-IUD 56 (5.8%) developed a pregnancy compared to 83 out of 99 (8.4%) using the IPC, highlighting that the Cu-IUD was more effective.[13] The study, however, reported multiple limitations. These included the lack of distinction at the final follow up between the type of IPC received (DMPA or NET-EN), significant loss to follow up (20%), as well as multiple protocol violations for which reasons were not recorded.

Additionally, study participants were recruited based on their attendance at a pregnancy termination facility- this may have influenced the discontinuation rates.[13] The study was also terminated before the intended closure due to publication of data which may suggest that DMPA could be associated with HIV acquisition. Evidence suggests that DMPA can increase susceptibility to HIV due to the alteration of local and systemic immunity.[40]

In comparison, the World Health Organization (WHO) affirms that the Cu-IUD is a safe method of contraception among HIV-positive women.[41] Despite this, a sub-study from an RCT conducted in South Africa identified that 3.5% of women in the Cu-IUD arm acquired HIV during the study.[42] This study was conducted at routine healthcare facilities allowing the results to be generalised. However, the RCT was terminated prematurely resulting in a reduced sample size and therefore low power to draw conclusions.[42] Figure 1 below illustrates the efficacy of various contraceptive methods in relation to their failure rate.

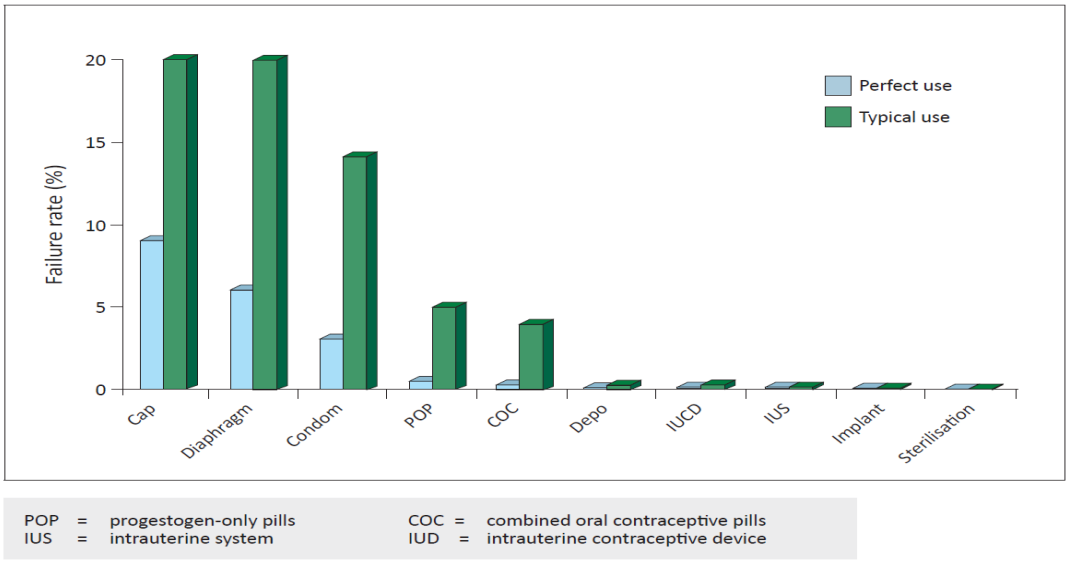


Figure 1: Efficacy of various contraceptive methods - perfect use versus typical use[23]

2.2. Burden of unintended pregnancies

Unintended pregnancies remain a consistent global public health problem of interest due to its resulting adverse health, social and economic consequences.[43,44] The incidence of unintended pregnancies provides an important indicator to help determine progress towards meeting the reproductive health and contraceptive needs within a population.[45] Between 2010 and 2014, approximately 44% of all pregnancies were unintended with a significant disproportion occurring in developing regions.[45]

By utilising a Bayesian hierarchical time series model, Bearak et al.[45] identified that for developed regions the rate of unintended pregnancies dropped from 64 per 1000 women (aged 15-44 years) between 1990 and 1994 to 45 per 1000 women (2010-2014), a 30% reduction. In developing regions, only a 16% reduction was reported with current unintended pregnancy rates estimated at 65 per 1000 women aged 15-44 years.[45] A limitation in these estimates, however, is the lack of data available in certain countries coupled with unrepresentative sampling methods of the surveys. Additionally, authors reported possible inconsistencies in various countries' Demographic Health Surveys (DHS) in defining unintended pregnancies which could have led to misclassification bias.[45] An estimated 21% of women living in SSA have an unmet need for family planning increasing significantly the risk of unintended pregnancies.[46]

A cross-sectional study conducted in Ghana reported that 45% of participants expressed their last pregnancy to be unintended with an additional 63% of women feeling at risk for another unintended pregnancy in the future.[47] The study was strengthened by its exploration of factors that contribute towards the high unintended pregnancy rate from both the male and female perspective but was limited by possible social desirability bias.[47] In Kenya, among women attending ANC across two hospitals, 59% reported an unintended pregnancy.[48] The strength of this study was the distinction between a mistimed pregnancy (45%) and an unwanted pregnancy (14%) but was also limited by recall and social desirability bias.[48]

Another study that distinguished between mistimed and unwanted pregnancy was conducted in Uganda. Among women attending family planning clinics, 25.6% reported their current pregnancy to be mistimed while 18.9% felt their pregnancy to be unwanted.[49] Among studies that only reported the pregnancy to be unintended, the prevalence was 62.9% at two Rwandan health centres[50], 68.5% among patients at family planning clinics in Malawi[51] and 37.2% at a Nigerian tertiary hospital[52]. All the studies were cross-sectional in nature and

reported limitations of recall bias, self-reporting bias, and social desirability bias.

In South Africa, advancements to reduce the rate of unintended pregnancies remains slow.[53,54] A cross-sectional survey conducted at a Kwa-Zulu Natal health facility identified an unintended pregnancy prevalence of 64.3%.[43] This result is consistent with a study conducted in Cape Town identifying an unintended pregnancy prevalence of 60% among the study population.[55] Although this study is strengthened by its large sample size, a key weakness is the sole inclusion of women attending antenatal care (ANC).[55] This sampling frame may underreport the number of unintended pregnancies as the motivation to seek ANC is reduced when a pregnancy is unplanned.[56] Unplanned pregnancy was found to be significantly lower at 33% in an additional Cape Town-based cross-sectional study.[57] The sample in this study was selected from a single urban setting which may account for the large difference in unintended pregnancy prevalence when compared to rural settings.

A concerning trend highlighted in the 2016 Demographic and Health Survey of South Africa is the substantial proportion of unintended pregnancies among adolescent girls. The survey reported a fertility rate of 71 per 1000 girls aged 15-19 years with 16% experiencing a pregnancy in 2016; a perturbing statistic as this demonstrates no change in comparison to the 1998 findings.

Although under South African law contraceptives are readily available to girls aged 12 years and older[58], a systematic review conducted in sub-Saharan Africa found that unskilled HCWs and negative attitudes towards providing adolescents with contraceptives were factors which may have contributed toward adolescent pregnancies.[59] A South African study, conducted at Soweto (Gauteng province) public health facilities and in Giyani municipality high schools (Limpopo province), both identified that HCWs believed that young girls should not engage in sex and therefore were reluctant to provide contraceptive methods to them, particularly IUDs.[60,61] Both studies reported limitations in the extent of generalisability of the results to other regions of South Africa, particularly to more rural areas in the Soweto study and to adolescents who were not attending high school in the Giyani-based study.[60,61]

2.3. Contraception in HIV-infected women

Women living with HIV (WLWHIV) form a key target group for contraception coverage to prevent unintended pregnancies under the UNAIDS four-pronged strategy for HIV prevention.[3] Contraception and planning for conception contribute to the reduction of HIV transmission, thereby supporting South Africa's National Strategic Plan on HIV, STIs and TB (2017-2022).[62] Reports indicate that in 2014, 1.5 million WLWHIV residing in LMICs

experienced a pregnancy.[63] However, of those that occurred in sub-Saharan Africa up to 65% were unintended.[57] Multiple studies indicate that unintended pregnancies are more common among WLWHIV than HIV-negative women. A systematic review and meta-analysis in sub-Saharan Africa revealed an unintended pregnancy pooled prevalence of 55.9% among WLWHIC aged 15-49 years.[63] South Africa reports a similar number of unintended pregnancies among this cohort. A cross-sectional study conducted in Cape Town highlight this phenomenon; 17% more unintended pregnancies occurring in the HIV-infected cohort giving an overall prevalence of 50%.[57] Although the study was retrospective and relied on self-reporting of pregnancy intention, it is the first study in South Africa to compare unintended pregnancy rates among a large cohort of HIV-positive and negative women.[57] This trend is further highlighted in two prospective studies conducted in Johannesburg, a predominantly urban setting, and the Eastern Cape, a peri-urban setting, which found an unintended pregnancy prevalence in WLWHIV of 62% and 71%, respectively.[44,64] In Botswana participants enrolled in a prospective observational cohort study had a prevalence of current unintended pregnancy of 44% with 49% of the pregnancies occurring among HIV-infected women compared to 38% among HIV-uninfected women.[65] The study is limited in its assessment of pregnancy intention as the difference between an unwanted and mistimed pregnancy was not defined. The reporting of an unintended pregnancy was also prone to recall bias especially among HIV-infected women.[65]

The high prevalence of unintended pregnancies among WLWHIV is of interest with the introduction of Dolutegravir (DTG) into the ART regimen. The high efficacy of DTG has been established through multiple randomised control trials (RCTs).[66–68] However, several safety signals have been issued about the drug and its possible link to neural tube defects (NTDs). Concerns arose regarding the safety of dolutegravir during pregnancy after a surveillance study in Botswana reported that preliminary results indicated an increased risk of neural tube defects in infants exposed to dolutegravir at conception or during early pregnancy. Updated data (March 2019) from the Tsepamo surveillance study shows that the prevalence of neural tube defects was higher in infants delivered to women taking dolutegravir at the time of conception when compared to other antiretroviral regimens, 0.3% of all deliveries, 95% CI 0.12-0.69 vs. 0.1%, 95% CI 0.06-0.17 respectively.[69] In women who started dolutegravir-based treatment during pregnancy, there was no significant difference in the prevalence of neural tube defects when compared to HIV-negative women. While the available evidence including that of other registry studies suggests that dolutegravir treatment does not appear to worsen pregnancy or neonatal outcomes, the results are not

conclusive because of the small number of pregnancies. A number of studies are ongoing.[70,71]

The limited data regarding the safety of DTG among women in the preconception phase reiterates the importance of decreasing barriers to accessing reliable and effective contraception such as the Cu-IUD, the implant, and the DMPA injection. Access to these methods, however, are often impeded by a lack of willingness of the HCWs to prescribe and/or administer hormonal methods of contraceptives due to the fear of increased HIV transmission.[60]

Limited data has explored the impact that hormonal contraceptives have on HIV acquisition. However, of the studies that have been conducted, the majority are observational which shows an increase in HIV acquisition among DMPA users.[72] Due to the nature of these studies being observational, it is unknown if this relationship is due to a true biological effect.[72] To address the limitations of previous studies, a randomised, open-label trial across 12 research sites compared DMPA, the Cu-IUD and the levonorgestrel (LNG) implant.[73]
The results from this trial indicate no substantial difference in HIV acquisition or risk among the participants using each type of contraceptive. The HIV incidence among the DMPA and Cu-IUD groups was 4.19 per 100 woman-years (95%CI: 3.54 to 4.94) and 3.94 per 100 woman-years (95% CI: 3.31 to 4.66) respectively.[73] The study provides evidence that hormonal contraception is safe and effective even among HIV at-risk women.

Effective contraception in this population group is not only vital for the prevention of unintended pregnancies but to further ensure that the reproductive health rights of HIV-positive women are not violated; allowing WLWHIV to align their pregnancies with their personal family planning goals.[63]

2.4. Utilisation of long-acting reversible contraceptive methods

2.4.1. Sub-Saharan Africa

The trend of modern contraceptive use and LARC is increasing in SSA but remains significantly lower in comparison to other regions of the world. This trend can be seen in Figure 2 below.

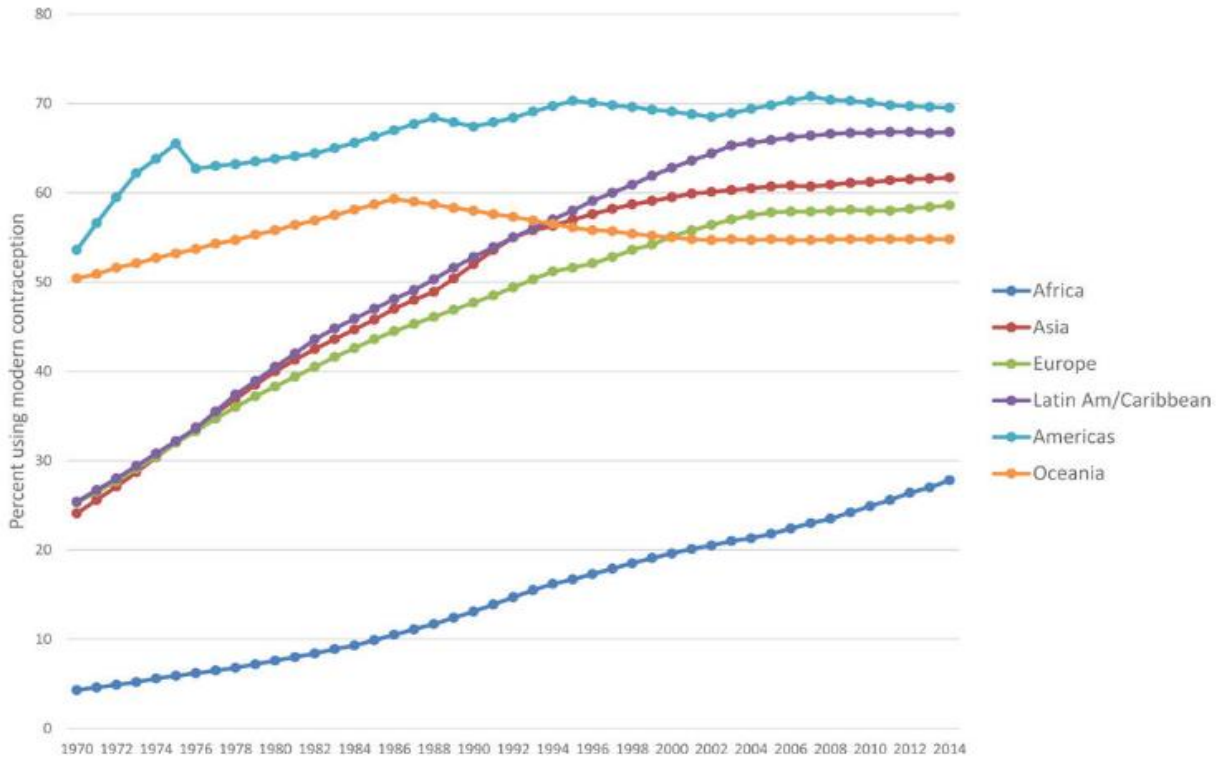


Figure 2: Modern Contraceptive Prevalence (%) among Married Women 15–49 Years by World Region and Year. [74]

According to a study which used data from 132 surveys across the SSA region (including 51 countries), a total of 25.1% of women were using a modern contraceptive method between 2005 and 2015.[7] In SSA, this number was almost double with a reported 54.3% of women using a modern contraception option between 2005 and 2015.[7] For Africa however, the analysis was based on data from only four countries and eight surveys. In contrast to this, according to the United Nations, only 28% of the African region was using contraception in 2015.[75]

A cross-sectional study conducted in Accra, Ghana, identified that of 250 women included, 44% reported using a modern contraceptive method.[47] The study identified that only 1 woman was using the Cu-IUD, 7 were using the implant and 19 were using injectables.[47]

The study also reported that only 54.5% of women received support from a health provider regarding contraception.[47] An analysis exploring implant utilisation from demographic health survey data revealed that 18.1% of married women and 8.1% of sexually active unmarried women used the implant in 2016, 11.5% and 5.8% in Malawi and 9.6% and 14.4% in Zimbabwe.[76] The same analysis highlights IUD utilisation in 12 SSA countries based on their DHS data.

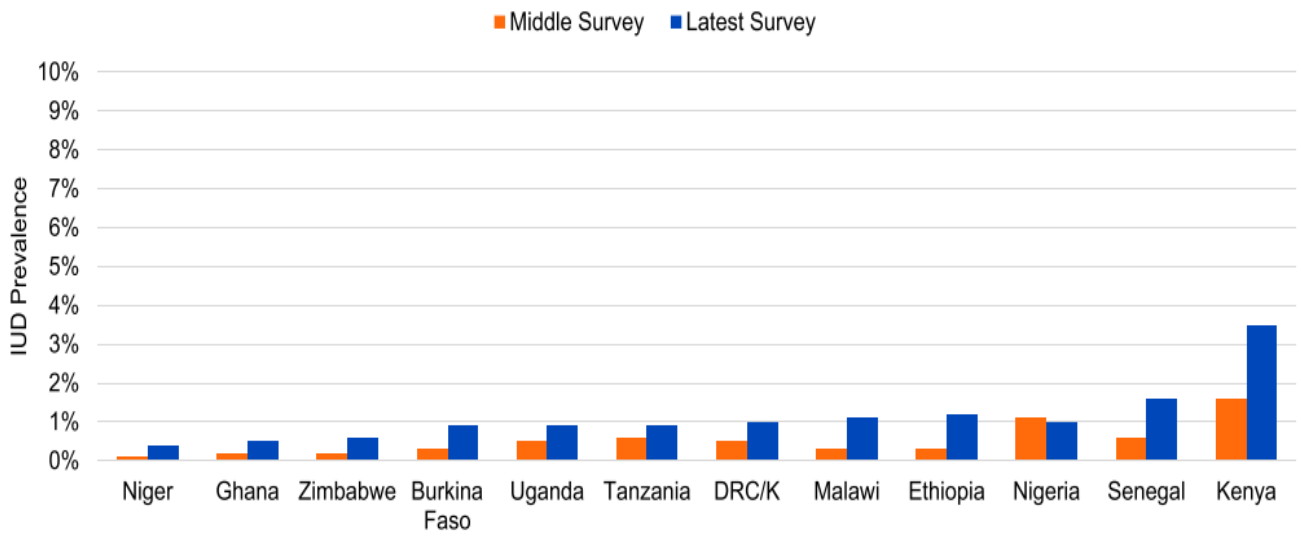


Figure 3: IUD prevalence based on country-specific DHS data.[76]

2.4.2. South Africa

Since the introduction of the National Contraception and Fertility Planning and Service Delivery Guidelines (2012) and the National Contraception Clinical Guidelines (2014) contraceptive options for women have increased. Currently, the EML provides multiple types of LARC options free of charge (Implanon and implants) or at a significantly reduced price (Cu-IUD) within all levels of the public health sector.[3]

Despite a global push towards the Cu-IUD, Implanon remains the most utilised and preferred method of contraception within sub-Saharan Africa including South Africa.[2,77] It is estimated that approximately 5.8 million doses of Implanon are administered each year in South Africa.[78] The popularity of Implanon is most commonly attributed to its low cost, convenience, and acceptability among HCWs.[79] This method of contraception is however greatly impacted by discontinuation due to poor adherence resulting in failure.[80] According to the latest Demographic Health Survey (2016), 24.7% of married and sexually active unmarried women utilise Implanon, 3.9% implants and 1.2% Cu-IUDs.[54]

In addition to this, a South African National Survey identified that 92% of women had heard of Implanon/injectables compared to less than half having knowledge of the Cu-IUD.[2] Moreover, evidence from a multi-country study including South Africa revealed that among the two sites involved (Soweto and Durban) 55.5% and 57.5% of participants respectively were using the IPC method compared to only 2.2% and 0.6% using the Cu-IUD and 2.2% and 12.6% using the implant.[81] The study made use of a cross-sectional survey to obtain information which may be an inherent limitation as authors reported longitudinal studies were needed to account for the difference in discontinuation rates.[81]

The introduction of the implant into the South African public sphere marked not only a landmark decision by increasing LARC options but it was the first new method to be introduced into the sector in 20 years.[14] The launch of Implanon and the training of more than 6000 HCWs made it the largest family planning programme in the country's history.[14] Although initial uptake showed great success in uptake, current trends differ significantly. Within the first years of introduction (2014-2015) approximately 87 000 implants were inserted compared to only 50 000 in 2016-2017.[53] Figure 3 illustrates this trend.

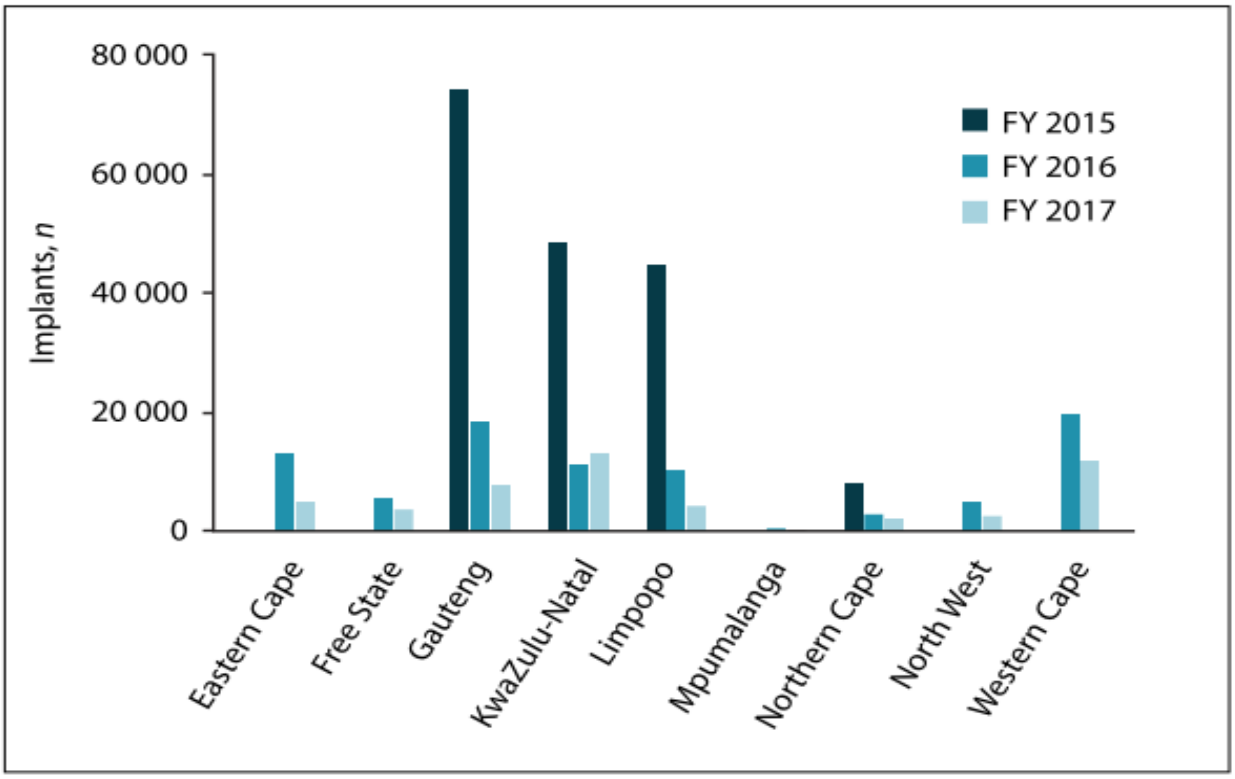


Figure 4: The total number of Implant insertions for each province by financial year.[78]

In contrast to this trend, the latest Health Systems District Barometer (2017/2018) indicates that the past year has shown an increase in implant insertions as well as Cu-IUD insertions and IPC administered as seen in Table 1.[78]

Table 1:LARC data elements comparison between 2015/16 to 2017/18 (adapted from the District Barometer 2017/2018).[82]

Data Element	2015/2016 (Number)	2016/2017 (Number)	2017/2018 (Number)
Contraceptive years equivalent	7 286 939	7 684 503	6 940 471
Cu-IUD Inserted	15 150	23 381	37 415
DMPA	5 578 228	5 814 786	6 027 784
NET-EN	3 676 445	3 631 081	3 720 442
Implant Inserted	87 189	49 813	131 241

Despite this observed increase, overall LARC utilisation remains low. Multiple reports indicate that this may be influenced by a lack of skill and knowledge possessed by HCWs.[83–86] An RCT found that on-going education regarding the provision of Cu-IUD significantly changed HCWs attitudes and perception at 1-year follow up and simultaneously increased the number of IUD insertions by the respective HCW.[87] Although this study was conducted in the United States of America, the evidence may provide a foundation for improved and on-going HCW training within South Africa.

2.4.2.1. HCWs Scope of Practice in Contraception and Service Provision

Multiple health care workers (HCWs) play a role in the provision of contraceptives including LARC. According to the South African National Contraception and Fertility Planning Policy and Service Delivery Guidelines, contraceptives should be available at the following levels: community (schools, workplaces, and pharmacies); primary healthcare (PHC); secondary healthcare; district hospitals; and tertiary and academic hospitals.[38] Table 2 below, outlines the various cadres of HCWs pertinent to this study and their corresponding requirements to provide LARC.

Table 2: HCW Cadres and Corresponding LARC Provision Responsibility

Source: Adapted from the National Contraception and Fertility Planning Policy and Service Delivery Guidelines[38]

KEY:

Y- Required N: Not Required
t- Requires additional clinical training

HCW Cadre	IPC	Cu-IUD	Sub-dermal Implant
Enrolled Nurse	Y	N	N
Professional Nurse, Registered/Enrolled Midwife, Advanced Midwife	Y	Y(t)	Y(t)
Clinical Nurse Practitioner/ Advanced PHC Nurse	Y	Y(t)	Y(t)
Clinical Associate	Y	Y(t)	Y(t)
Medical Officer	Y	Y(t)	Y(t)
Family Physician/Doctor	Y	Y	Y
Medical Specialist (Obstetrician/Gynaecologist)	Y	Y	Y
Pharmacist	N	N	N
Pharmacist (with Primary Drug Therapy Permit)	N	N	N
Authorised Pharmacist Prescriber	N	N	N
Pharmacist Assistant	N	N	N

.

2.5. Problem Statement:

The use of LARC methods among women in SSA remains lower than what is required to address the increasing burden of unintended pregnancies.[74] Healthcare workers constitute the first point of contact for women wishing to utilise a contraceptive method. For this reason, HCWs possess the ability to promote and provide women with longer-acting and reversible contraceptive methods.[22] In addition to being a facilitator of LARC methods, HCWs can also prove to be a barrier to LARC uptake when bias attitudes and perceptions are held, a low level of skill to provide certain methods stemming from a lack of training is evident, and medically unsubstantiated restrictions are imposed.[88–91] By imposing unwarranted restrictions, women's choice of contraceptive method is unnecessarily restricted, potentially leading to lower utilisation rates.[92]

2.6. Research Question:

What is the current state of knowledge, attitudes and perceptions among healthcare workers towards LARCs in sub-Saharan Africa?

2.7. Aim:

To investigate the current state of knowledge, attitudes and perceptions among health care workers towards LARCs in sub-Saharan Africa.

2.8. Primary Objectives:

1) To determine the state of knowledge of health care workers regarding LARCs in sub-Saharan Africa between 2000 and 2020.

2) To determine the attitude of healthcare workers towards LARCs in sub-Saharan Africa between 2000 and 2020.

3) To determine the perception of healthcare workers towards LARCs in sub-Saharan Africa between 2000 and 2020.

2.9. Study rationale and justification

SSA continues to face a high prevalence of unmet family planning needs. Combined with the extremely high unintended pregnancy rate, utilisation of the available LARC options is imperative to improve these trends. Not only does the increase in utilisation of highly effective contraception options improve maternal and child health outcomes outlined in SDG 3 and 5 but it forms part of a critical strategy for the successful implementation of the African

Unions Campaign for the Accelerated Reduction of Maternal, Neonatal and Child Mortality in Africa (CRAMMA).[12]

Both health and socio-economic benefits result from increased contraceptive use.[93] Effective and consistent use of contraception has the ability to reduce the maternal mortality rate.[9] In an analysis of 172 countries, it was found that if the full demand for contraception was met, then up to half of the observed maternal deaths could be averted.[94] The under-five mortality rate could also be reduced by 10% if adequate birth spacing was practiced.[9]

Lower population growth and fertility rates result in less economic and healthcare system strain. Unintended pregnancies result in a surge of unsafe abortions with approximately 500 000 deaths occurring in developing countries and considerable costs arising from treating complications from unsafe abortions.[95] The issue of unsafe abortions is often overlooked and neglected as a public health problem despite contributing toward at least 13% of maternal deaths globally.[96] It is further estimated that of the 80 million unplanned pregnancies occurring each year, 46 million are terminated while 19 million end in an unsafe abortion.[96]

With the high prevalence of unintended pregnancies and resulting unsafe abortions, there is a need for SSA to renew its strategy to provide access to contraceptives, in particular, LARC's to avoid these unnecessary adverse outcomes. In South Africa particularly, the introduction of the National Health Insurance (NHI) scheme envisaged to increase UHC is imminent. The country's current EML which will comprise the basic care package of the National Health Insurance must therefore be optimally utilised. The evidence indicating a stagnant uptake of LARCs mandates the exploration of the underlying reasons in order to effectively and efficiently address these prior to the introduction of the NHI.

The HCW population plays an integral role in shaping women's perceptions of various contraceptive methods and ultimately their utilisation. Healthcare workers constitute the first line of contact when women present for family planning services, they provide contraceptive counselling and are key players in providing contraceptive and reproductive education, thus giving them the power to shape women's attitudes and acceptability of available methods and ultimately usage.[22] Although HCWs have the power to positively impact the LARC utilisation trend, some evidence has indicates to the contrary. Among Indian nurses and midwives, it was found that more than 70% reported restricting access to IUCD based on a minimum age and 50% of doctors restricted access to injectables based on a minimum age.[97] Similarly, among Kenyan[98], Nigerian[91] and Senegalese[99] HCWs, contraceptive methods were consistently reported being restricted to clients based on a minimum age, parity and marital status. Further to this, evidence from Kenyan HCWs revealed that a

primary barrier to providing women with IUCD's was their own perceived lack of skill to insert them.[100] A lack of skill has often been seen as a result of a lack of training. In El Salvador, only 47% of women's health providers reported ever receiving training to insert IUCD's[101], while a global review indicated that providers report a lack of training as a fundamental barrier to their desire to promote IUCD's.[102] Findings from a systematic review of HCWs in developed countries suggest that training HCWs in IUCD's has a positive impact on their knowledge, attitudes for provision of IUCD's and in turn increased rates of IUCD provision.[103] The study further found that when nurses and midwives received comprehensive IUCD training, their procedural outcomes were comparable to those of doctors. This finding provides an important foundation for the exploration of task-shifting IUCD provision to lower levels of HCW cadres.

With a greater exploration and understanding of HCW KAP toward LARC methods, a potential to reduce existing barriers, and prevent future barriers arises.

This research project, therefore, aims to investigate and determine the state of knowledge, attitudes and perceptions of HCWs towards LARC in SSA with an additional analysis of South Africa as requested by the National Department of Health.

Chapter 3: Methodology

A systematic review and meta-analysis were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) checklist.

Systematic reviews and meta-analyses are considered to be the gold standard for conducting a reliable and transparent synthesis of the available literature.[104] By employing a systematic review and meta-analysis study design, the collection of all available studies published between 2000 and 2020 relating to HCWs KAP toward LARC methods within SSA was possible. By combining statistical results where appropriate, the meta-analysis further allowed for the ability to derive conclusions with increased power and accuracy that would not be possible to achieve within individual studies.[105]

3.1. Protocol registration

An application to register with the PROSPERO database was submitted on 7 October 2019.

3.2. Eligibility criteria

3.2.1. Research Design

The following types of studies qualified for inclusion in the systematic review:

- Qualitative research designs that examined (either one or combination of) knowledge, attitudes or perceptions of HCW towards contraceptives with specific reference to the LARC methods. Additionally, studies were included if they addressed HCWs perceptions towards the availability of LARC methods.
- Quantitative research designs that analysed the knowledge, attitudes or perceptions of HCW towards LARC methods.

3.2.2. Study Participants

Multiple studies have explored the KAP of women towards LARC methods. However, to date, a synthesis of the KAP among HCWs within SSA has not been conducted.

For this reason, study participants that were included in the review were healthcare workers (HCWs). For the purpose of this study, HCWs were defined as medical practitioners, nurses, pharmacists, community health (extension) workers, clinical associates, and family planning providers who, at the time when the study was conducted, were practising in sub-Saharan Africa. There was no age restriction of the HCWs.

3.2.3. Study Outcomes

- ***Primary Outcomes:***

The primary outcome of this study was to assess the state of knowledge, attitudes, and perceptions of HCWs towards LARC methods. In order to measure these outcomes, the review included studies that reported on at least one of the characteristics (KAP) towards LARCs. Studies that reported a primary outcome of KAP towards contraceptives or hormonal contraceptives, in general, were also included providing that the HCW KAP towards LARC methods were analysed and reported separately.

The following definitions (based on the KAP survey model[106]) were applied to the study outcomes:

- *Knowledge:* referred to the information and understandings that HCWs possess regarding LARC methods. Knowledge was evaluated by asking questions relating to the following: the types of contraceptive methods available; their confidence in explaining various LARC methods to patients; their skill to provide LARCs (IUD and Implanon insertion and injecting of DMPA/NET-EN); the effectiveness of each contraceptive methods; and the side-effects and contraindications for each contraceptive method.
- *Attitude:* referred to the position and opinion of the HCW towards LARCs. The attitude of the HCW must have been investigated in relation to how their religious, cultural, moral and ethical beliefs impact their attitude towards LARCs; their preferred method of contraception; and their attitude towards contraceptive counselling.
- *Perceptions:* studies must have addressed how the following influenced the perceptions of HCWs towards LARCs and their willingness to prescribe them:
    - the age of the patient and the HCW;
    - the relationship status of the patient;
    - the parity of the patient
    - the HIV status of the patient;
    - the availability of various LARC methods

3.3. Study setting

This systematic review only included studies conducted in the sub-Saharan Africa region as defined by the United Nations.[107]

3.4. Information sources

Multiple methods were used to obtain all relevant studies for this systematic review:

- **Electronic Database Searches:**

The developed search strategy was applied to three electronic databases. These included PubMed, Ovid (Medline) and Scopus. These databases were chosen as they were thought to include the widest range of journal databases to ensure that all relevant published literature was obtained.

- **Hand Searches:**

The bibliographies of relevant studies were searched through the process of snowballing.

- **Grey Literature:**

To ensure the inclusion of all relevant data, grey literature was searched to obtain any governmental, organisational studies or reports and conference abstracts. Repository databases were additionally searched to identify any relevant theses. This was to ensure that both published and unpublished literature be included in the review.

3.5. Search strategy

The principles outlined by the Centre for Reviews and Dissemination[108] were adhered to during the search process and overall conduct of this study. After conducting a preliminary scoping search, three databases (PubMed, Scopus, and Ovid (Medline)) were chosen to apply the search strategy to during October 2019. Two independent reviewers (LR and ST) first individually developed and applied a search strategy to the databases to ensure that all relevant literature was identified. Table 3 outlines the final search syntax that was applied to each individual database to extract relevant records. The search contained no methodological filters to not exclude any specific study designs.

In addition to the electronic database search, a grey literature search was conducted by means of examining conference proceedings, government publications, and university repositories. Further to this, the process of snowballing was applied whereby the reference lists of included studies were scanned for additional records. In the case where full-text articles were unobtainable, the authors were contacted and asked if these records could be supplied.

The search was repeated in January 2020 before analysis was started to ensure that any relevant newly published literature was included in the review.

Table 3: Search syntax applied to each database searched.

Database	Search Syntax
PubMed	((((((((((((“health personnel"[MeSH Terms]) OR ("general practitioners"[MeSH Terms]) OR "primary health care worker") OR "nurse") OR "medical practitioner$") OR Pharmacist$) OR "clinical associate$") OR "physician assistant$" OR provider)) AND ((((((((((KAP) OR Knowledge[MeSH Terms]) OR attitude[MeSH Terms]) OR perception[MeSH Terms]) OR practice[MeSH Terms]) OR availability) OR perspective) OR perceptions$) OR training) OR skill) OR Health Knowledge, Attitudes, Practice[MeSH Terms])) AND ((((((((((((((((((((((((contraception[MeSH Terms]) OR "copper*intrauterine device") OR "intra*uterine device$") OR "intra*uterine coil") OR IUD) OR "Hormonal contraceptive$") OR "contraceptive injectable$") OR "contraceptive devices"[MeSH Terms]) OR "contraceptive agents"[All Fields]) OR "injections"[MeSH Terms]) OR "injectable$"[All Fields]) OR DMPA) OR "Medroxyprogesterone acetate") OR "Depot Medroxyprogesterone acetate") OR "Depo-Provera") OR "Progestin contraceptive$") OR "Copper loop") OR "Birth control") OR "Hormonal Birth control") OR "ParaGard IUD") OR "Norethisterone enanthate") OR "NET-EN") OR "Nexplanon") OR "Implanon") OR "Etonogestrel implant") OR "Sub-dermal implant") OR "rod implant") OR "Long acting reversible contraceptive$") OR "LARC$") OR ("Long term and permanent method$")) AND ((sub-saharan Africa) OR “south of the Sahara”))
Scopus	(contraception OR "birth control" OR "family planning" OR contraceptive OR "long acting reversible contraceptives" OR "IUD" OR "copper IUD" OR dmpa OR implanon OR "hormonal contraceptive" OR "hormonal contraceptives" OR "Medroxyprogesterone acetate" OR " Depot Medroxyprogesterone acetate" OR " Depo-Provera" OR " Progestin contraceptive" OR " rod implant") AND ("health workers" OR "health care professionals" OR "health personnel" OR nurses) AND (knowledge OR practice OR attitude OR perception OR belief OR skill OR training) AND ("sub-saharan africa" OR "south of the sahara")
Ovid (Medline)	(health worker*.mp OR general practitioner*.mp OR primary health worker*.mp. OR nurse*.mp. OR medical practitioner*.mp. OR pharmacist*.mp. OR clinical associate*.mp. OR physician assistant*.mp.) AND (KAP.mp. OR Knowledge.mp. OR attitude*.mp. OR perception*.mp. OR Practi*.mp. OR availability.mp. OR perspective*.mp. OR training.mp. OR skill.mp.) AND (contracep*.mp. OR long acting reversible contracept*.mp. OR copper intrauterine device*.mp. OR IUD.mp. OR contracept* inject*.mp. OR DMPA.mp. OR Medroxyprogesterone acetate.mp. OR Depot Medroxyprogesterone acetate.mp OR Depo-Provera.mp. OR Progest* contracept*.mp. OR Copper loop.mp. OR Hormonal Birth control.mp. OR ParaGard IUD.mp. OR Norethisterone enanthate.mp. OR NET-EN.mp. OR Nexplanon.mp. OR Implanon.mp. OR Etonogestrel implant.mp. OR Sub-dermal implant.mp. OR rod implant.mp. OR LARC$.mp. OR (Long term and permanent method$).mp.) AND (sub-saharan africa.mp. OR south of the sahara.mp.) *[mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy] **For full Ovid (Medline search strategy, see appendix four)

3.6. Study selection

Following the application of the search strategy, the PRISMA flow chart for study selection presented in Appendix 1 was utilised.[109] Two independent reviewers (LR and ST) screened all titles and abstracts produced by the search strategy. Of the records that were deemed

preliminarily relevant, the full-text articles were obtained, and further screening was conducted. The relevance of each study was then assessed according to the inclusion criteria outlined in table 4. All studies that did not meet these inclusion criteria were consequently excluded, with the reasons therefore documented. In the case where discrepancies arose, these were discussed and resolved through consensus.

Table 4: Summarised inclusion criteria

Population	Healthcare workers/ health providers
Outcomes	Knowledge, attitude or perceptions regarding long-acting reversible contraceptive methods
Study Designs	Any
Setting	sub-Saharan Africa* *excludes Algeria, Djibouti, Egypt, Sudan, Libya, Morocco, Somalia, Tunisia

3.7. Data collection process

Upon final selection of relevant studies and the acquisition of full-text articles, data was extracted using the developed data extraction form (Appendix one). The data extraction form was designed to extract data from both quantitative and qualitative study designs. The form was first piloted on three studies and then adjusted where necessary. A data extraction form was filled out for each of the 47 studies included in the systematic review and meta-analysis. The data from the extraction forms were then transferred into two data item tables: study characteristics and participant characteristics.

3.8. Data extraction and data items

The data extraction form was used to obtain the following data items from the studies:

→ **General Information and Eligibility:**
- Study title
- Publication type
- Study design
- Study population
- Outcome measured
- Contraceptive focus

→ **Population and Setting**
- Source population
- Method of participant recruitment

→ **Methodology:**
- Study aim
- Start and end date
- Sampling technique

→ **Study Participants:**
- Sample size

- Type of HCW included
- Demographics of HCWs

→ **Outcomes (Knowledge, attitude, or perceptions):**

- How the outcome was measured
- Outcome definition in the study
- Is the outcome measurement tool validated?

→ **Results and Findings (for each outcome):**

- Response rate
- Results
- Any other results reported
- Statistical methods (if any)

→ **Strengths and Limitations:**

- Strengths
- Limitations
- Strategies to overcome the limitations

→ **Key Conclusions**

3.9. Risk of bias within studies

To assess the risk of bias for the included studies, various tools were used based on the type of study being evaluated. This study utilised four separate tools to assess the quality of qualitative, cross-sectional, observational and mixed-method studies.

For all of the qualitative studies included in the review, the Critical Appraisal Skills Programme (CASP) for qualitative studies[110] was used. The CASP tool is a 10-point checklist developed to identify whether the study results were valid, to explore what the results were and to determine if the results were relevant within the context of the study.[110] Each qualitative study was then assessed and the results recorded in an individual record (PDF document) as well as summarised into a table and reported in the results section.

Cross-sectional studies were assessed using the 'instrument for risk of bias in cross-sectional studies of attitudes and practices'.[111] The tool allowed for various areas of the study to be assessed such as: how representative the sample was to the general population of interest; the response rate; the impact of missing data; and the reliability of the data instrument used for collection. As with the qualitative studies, each study was assessed and individually recorded after which it was summarised and tabulated.

In the case of the observational study, the Newcastle-Ottawa Scale (NOS) was used to assess quality and bias within the study.[112] The NOS tool assessed the study based on the selection of study groups and the comparability of the selected groups.

Lastly, studies that utilised a mixed-method study design were assessed using the Mixed Methods Appraisal Tool (MMAT) version 18.[113] The MMAT was originally developed in 2006, however, the latest version (2018) has been revised based on findings from a literature review of critical appraisal tools.[113] The criteria for mixed-methods studies were applied in which questions assessed the rationale for using the study design, the integration and outputs of each study component and discussion on any divergences or inconsistencies between the results from each component. In addition to this, the tool also provides individual criteria for the qualitative and quantitative components of the studies that were assessed. The results from these quality assessments were summarised and tabulated.

3.10. Synthesis of results

The synthesis of the results for this study was completed in two forms:

3.10.1. Qualitative synthesis

A qualitative meta-analysis was conducted using the meta-analytic approach of thematic content analysis (TCA) using Computer Assisted Qualitative Data Analysis (CAQDAS).[114,115] TCA is described as the method that allows for "identifying, analysing, and reporting patterns (themes) within the data".[116] This method subsequently allows for data to be organised succinctly but with powerful and in-depth detail.[115]

The process of TCA was applied to all of the included studies in the review using ATLAS.ti (version 8) software.[117] The use of ATLAS.ti for coding allowed for a cyclical and iterative approach during data synthesis that was also inductive.[118] An additional advantage of using ATLAS.ti was the functionality of the software that allowed relationships between codes and themes to be expressed in a multitude of different ways.[118]

The use of TCA made it possible to systematically code the data to generate descriptive and analytical themes.[119] Initially, the primary findings from each of the included studies were labelled as preliminary units with the aim of increasing the groundedness by keeping with the original research idea where possible while simultaneously attempting to shape the labels in a way that answered the primary research question of the qualitative meta-analysis.[114] This process was accomplished in stage one of thematic synthesis using line-by-line text coding.[117] Upon completing this initial stage of coding, it was suggested by Levitt[114] that these newly labelled units should underpin and form the foundation for generating descriptive categories and ultimately the themes that formed the central findings of the qualitative meta-analysis.[117] Through the use of this methodology, this study presents results from a semantic level analysis using an inductive approach. It is discussed by Braun and Clarke[116] that a semantic level analysis purely describes the developed themes based on the explicit meaning of the data presented within each study. By employing an inductive approach, it is ensured that the results are data-driven rather than moulded to fit a pre-existing theory.[115]

In order to achieve this, all of the studies were first uploaded as individual PDF files into ATLAS.ti. Hereafter, document groups were created so as to be able to adequately create network diagrams and links later on in the analysis process. The following groups were created:

1. Research design: Qualitative, quantitative or mixed-method

2. Regions: Southern Africa, East Africa, West Africa, and Middle Africa as well as a separate group for studies conducted in South Africa.
3. Construct: Knowledge, attitude, or perception
4. LARC type: IUD, implant, injectable or emergency contraception

The software allowed for studies to form part of more than one group if needed. For example, one study was allowed to be grouped under 'qualitative, South Africa, knowledge, perception, IUD and implant' if those were the constructs reported on.

Following the grouping of the documents, the first stage of coding was conducted. For this, both open coding and *in-vivo* coding were used. The purpose of using this type of coding was to ensure that each section of data was analysed and understood. During this first stage of coding, lines of text that appeared interesting and relevant were highlighted and assigned a code (open coding) or were coded with the name of the highlighted text (*in vivo*). The purpose of this was to build initial concepts.[118] The names of codes were developed continuously. As the articles were analysed, it became apparent that many codes were phrased differently but had the same meaning, this led to the second stage of the coding process in which similar codes were grouped into higher-order categories. During the second stage of coding, code groups were created in order to categorise the developed codes (as shown in the results section).

The final stage of the TCA involved the generation of themes. This was done by first exploring the code categories for ideas on initial themes. Following this, network diagrams were created within ATLAS.ti to explore possible themes through visualisation.[115] Through this process, a total of six themes emerged. For finalisation, the themes and messages were first reviewed independently and then discussed as a group between the primary author and supervisors as to allow for the emergence of any additional themes.[119]

3.10.2. Quantitative synthesis

It was deemed appropriate to combine numerical results from a subset of studies included in the systematic review; therefore, a meta-analysis was performed using Stata version 15 (Stata Corp., College Station, TX, US). A proportion meta-analysis was performed based on questions and data that were comparable across the quantitative studies.[120,121]

During the process of data extraction, specific information relating to the following 11 questions and statements was collected:

Table 5: Questions for meta-analysis with corresponding number of studies

Question/statement:	Number of studies providing information to answer:
Have you received training in family planning counselling?	8
Do you provide family planning counselling to your clients?	4
Have you ever heard of emergency contraception?	4
The number of providers who correctly identify the Copper-intrauterine device as a form of emergency contraception.	7
Are you trained to insert intrauterine contraceptive devices (IUCD)?	6
Do you desire more training on IUCD?	3
Do you perceive IUCD to be suitable/safe for HIV-infected women?	4
Do you impose minimum age restrictions for the provision of IUCD?	5
Do you impose minimum age restrictions for the provision of injectable contraceptives?	4
Do you impose minimum parity restrictions for the provision of IUCD?	5
Do you impose minimum parity restrictions for the provision on injectable contraceptives?	3

Since the questions were not exactly the same across the studies, only the information pertinent to the above questions or statements were extracted for analysis. The meta-analysis reported results on the proportion of respondents who answered yes to the questions.

To conduct the meta-analysis, the first step involved creating the dataset. This was first done in excel and then exported to Stata. The spreadsheet consisted of the numerator and denominator of the proportions; these were manually calculated where individual studies did not explicitly report them. The proportion meta-analysis was then conducted using the "metaprop" command in Stata. A random-effects model was used to compensate for the heterogeneity that was expected among the studies.[122] Forest plots were generated for each of the 11 questions. The forest plot represents the pooled outcome of the meta-analysis.

Within each forest plot, the black squares represented the proportion for the individual study with its corresponding 95% confidence interval. The area of the squares represented the weight reflected within the meta-analysis while the overall proportion across all the included studies was shown by the blue diamond in the forest plot output.[105] Heterogeneity of each proportion meta-analysis conducted was explored using the I^2-statistic and Chi-squared statistic reported in the output. To further explore the heterogeneity of the studies, a sub-group analysis was conducted for each study based on the region in which the study was conducted. Publication bias is a well-documented threat to the validity of meta-analysis results occurring due to the disparity in publication of study results that are deemed clinically favourable compared to those with non-significant results.[123] The presence of publication bias can result in misleading estimates of associations between study variables.[124] For this reason, the possible presence of publication bias was explored visually through funnel plots and statistical methods (Eggers test).

3.11. Additional analysis

An additional analysis was conducted qualitatively to include only studies conducted within South Africa. A quantitative analysis of South African studies only was not possible.

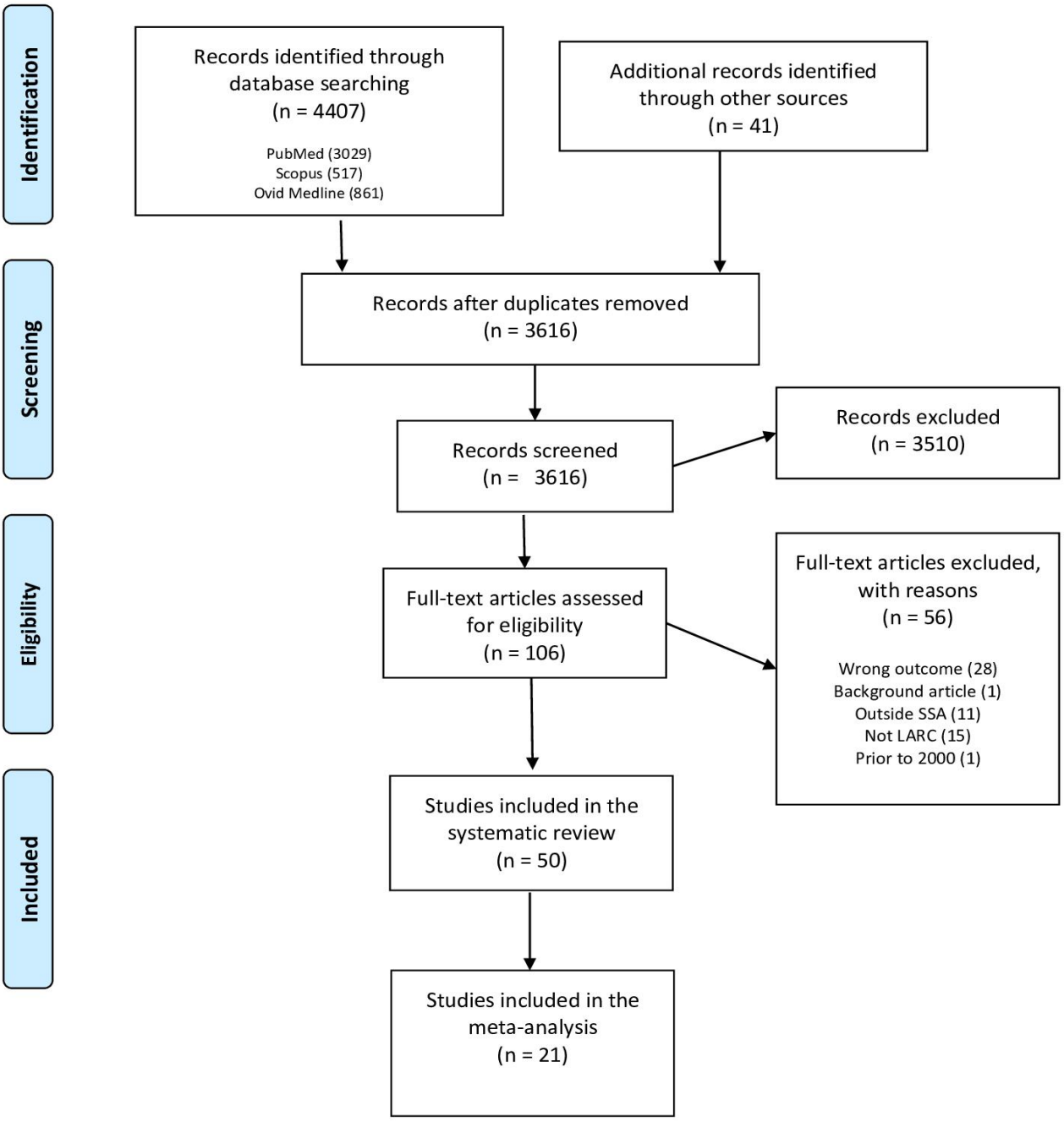
3.12. Ethical considerations

A research protocol was submitted for review to the Academic Advisory Committee (AAC) of the School of Health Systems and Public Health (SHSPH). Upon approval from this committee, the protocol was submitted to the Faculty of Health Sciences Research Ethics Committee (REC) for further approval. All principles relating to the Declaration of Helsinki were acknowledged and adhered to. With regard to data management, all information and articles were stored on a password-protected laptop with restricted access to the authors of the research project only. Backups of this information were additionally uploaded onto a password protected OneDrive account. However, due to the nature of the study being a systematic review and meta-analysis, all information to be included was already in the public domain. Therefore, there were no foreseen ethical issues for this study to be conducted.

Chapter 4: Results

4.1. Study selection

After conducting the electronic and hand searches, a total of 4446 citations were identified. The citations were then downloaded and exported into the systematic review reference manager app, Rayyan QCRI. Rayyan QCRI is an app specifically developed to aid reviewers in the screening stage of the data collection process.[125] A total of 4448 citations were uploaded into Rayyan, after which 252 duplicates were removed and 580 citations of studies published prior to 2000. The titles and abstracts of the remaining 3616 citations were screened for relevance to this review. Those that appeared to be relevant were marked as "included" on the Rayyan system while those that were not, were marked as "excluded" and tagged with a reason. After applying the inclusion criteria, 106 citations appeared to be relevant, thereby excluding 3510. The reasons for exclusion included having: the wrong outcome (2933); wrong population (296), being a background article (242), were conducted outside of SSA (22), were published in a foreign language (1) and not addressing a LARC method (16). Full-text articles of 106 of the remaining citations were then obtained and uploaded into Rayyan. These articles were then assessed for eligibility for the final inclusion in the review. A total of 56 were excluded (wrong outcome (28), background article (1), outside of SSA (11), published prior to 2000 (1), did not address a LARC method (15). After this process, a total of 50 articles remained for inclusion for the systematic review. Of these 21 qualified for quantitative synthesis (meta-analysis). The studies were further imported into the Mendeley referencing software manager. Figure 5 summarises the study selection process.



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

Figure 5: Search Strategy according to PRISMA guidelines.

4.2. Study characteristics

4.2.1. Description of included study characteristics

The 50 studies included in this review were published between the years 2000 and 2019. The majority (10) of studies were published in 2014, followed by the years 2015 (7), 2018 (6) and 2017 (4). All the studies took place within 12 sub-Saharan African countries: Botswana, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Nigeria, Senegal, South Africa, Tanzania, Uganda, and Zimbabwe. Figure 6 below highlights the distribution among the countries.

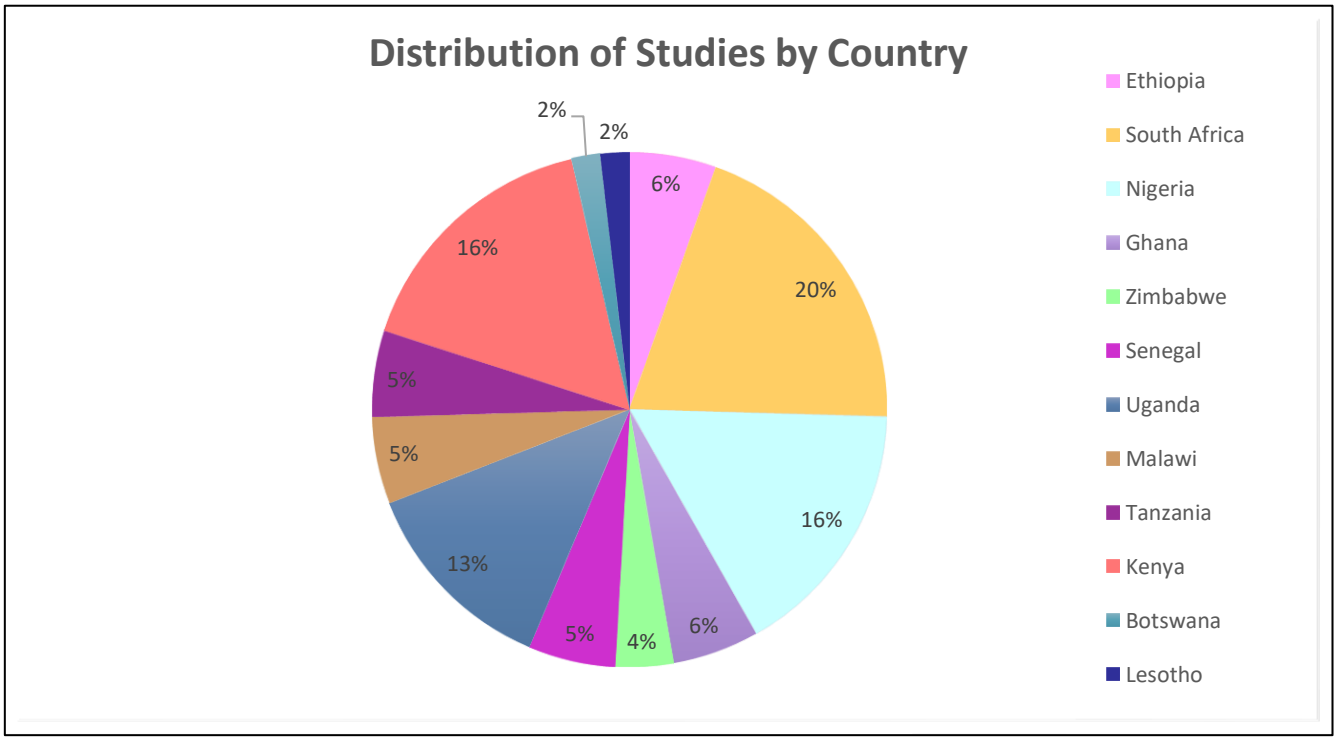


Figure 6: Distribution of countries in which studies were conducted.

In terms of study design, 24 utilised a cross-sectional survey design, 19 studies made use of a qualitative research design (15 gathered information through in-depth interviews (IDIs) alone, one made use of focus group discussions (FGDs) and three used both IDIs and FGDs). Additionally, one study employed a longitudinal observational design and six conducted a mixed-method study.

Lastly, the type of LARC studied included IUCD (Cu-IUD and LNG-IUS), sub-dermal implants (Implanon, Nexplanon), and injectable contraceptives (DMPA-IM, DMPA-SC, NET-EN). All studies reported on either one (or a combination) of the constructs of knowledge, attitude or perceptions regarding these methods (figure 7). A comprehensive summary of the included study characteristics is available in appendix two.

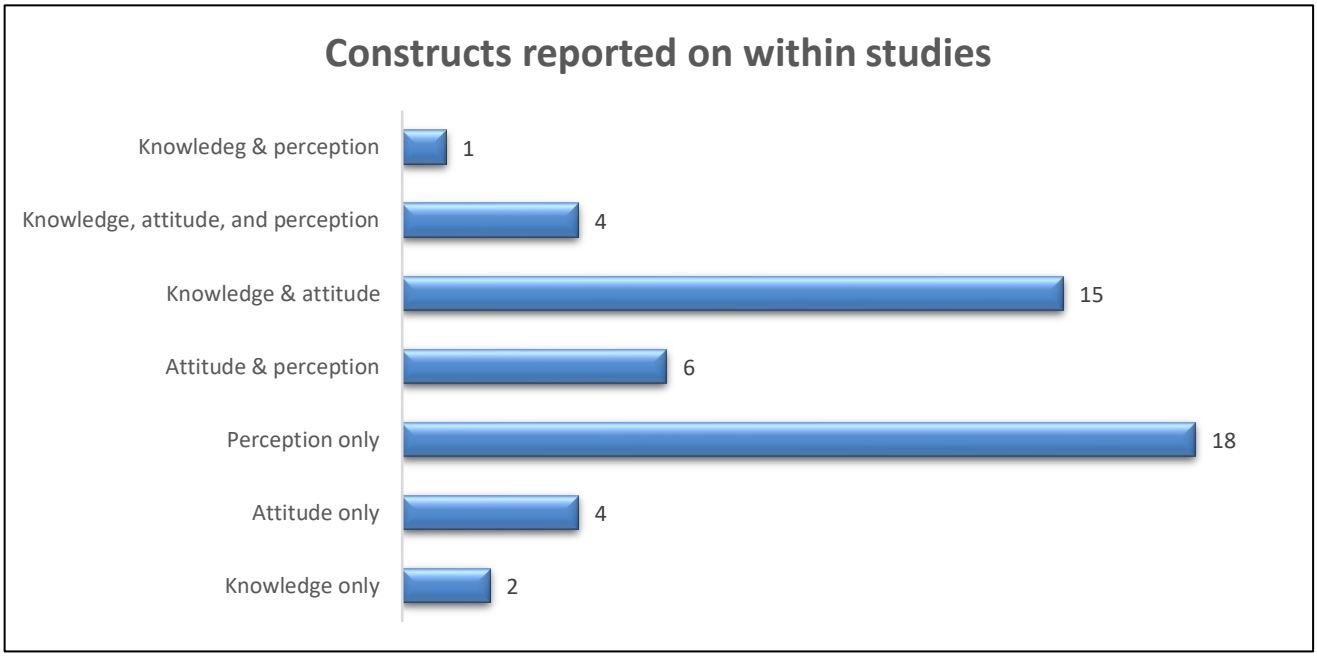


Figure 7: Distribution of constructs reported on within the included studies.

4.2.2. Description of included study participants

Across all the studies, a total of 12 356 participants were included. Figure 8 illustrates the distribution of the cadres of HCWs that participated in the studies. The largest proportion of participants were classified as nurses or midwives (6456), followed by physicians (1666), community health (extension) workers (CHEWs) (635) and pharmacists (226). In addition to this, the category of other included hospital managers, contraceptive counsellors, family planning providers, healthcare associates and healthcare administrators.

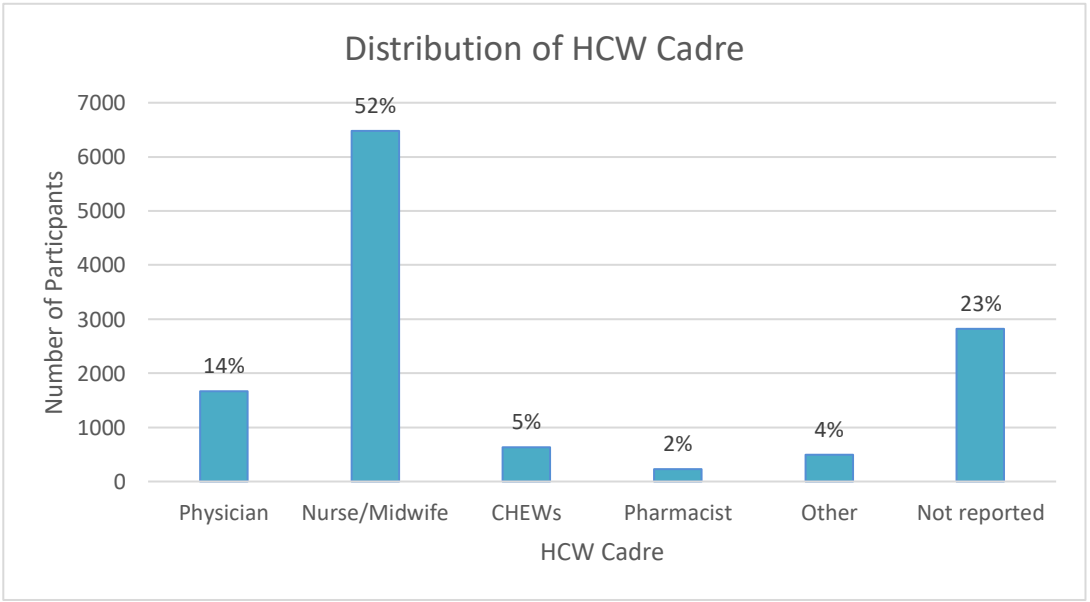


Figure 8: Distribution of healthcare worker cadres across the study population.

However, from the total number of participants, 2823 (23%) were not classified into the specific type of healthcare cadre. Moreover, it is observed that the majority of study participants were female. Of the studies that did report the sex of their participants (8641), a total of 6397 (74%) were female and 2244 (26%) were male. A full summary of the characteristics of the included study participants can be seen in appendix three.

4.3. Risk of bias

A fundamental element of all systematic reviews and meta-analyses is the assessment of the risk of bias through investigation of the quality of each individual study.[126] By assessing the risk of bias for each study, an indication of the strength of the evidence provided by the review is given while simultaneously allowing to inform the direction of quality for future research efforts.[127] Multiple tools exist to conduct risk of bias assessments. For this study, four separate tools were used for each type of study design.

4.3.1. Quality assessment of qualitative studies

Using the CASP tool, the overall methodological quality of the qualitative studies was fair. All 19 studies provided a clear statement of the aim of the research and it was deemed that the qualitative methodology was appropriate. Despite this, however, only six (10, 15, 20, 23, 35, 44) of the studies offered a clear justification or rationale as to why the study design was chosen. All studies except for five (12, 19, 25, 35, 44) reported a clear and appropriate recruitment strategy while three studies (12, 19, 44) did not provide a sufficient description as to how the data was collected. In relation to ethical issues (informed consent and ethical approval), only one study (25) did not adequately report this while four studies (2, 11, 42, 44) scored ‘can’t tell’ as the information provided was insufficient to score a ‘yes’. All 19 studies provided a clear statement of findings; however, one (11) did not provide an in-depth enough description of the data analysis technique that was used. The CASP tool requires that studies report on how the researcher has critically examined their own role and potential bias or influence they may have on question formulation, data collection and choice of location and sample recruitment. All studies apart from two (15, 35) failed to report on this relationship and potential bias.

4.3.2. Quality assessment of quantitative studies

All cross-sectional studies were assessed using the risk of bias tool for KAP studies. Five questions assessed whether there was a low or high-risk bias for each criterion with each question receiving a score between one (high risk) and four (low risk). A total score out of 20 was obtained. Overall, 24 studies were assessed with the tool of which 12 (1, 4, 5, 9, 14, 29, 31, 33, 34, 40, 47, 50) scored at least 15 or higher, and 12 (3, 18, 20, 23, 28, 33, 36, 39, 42, 43, 45, 48) scored between 10 and 14. The majority of the studies scored low with regards

to the survey being clinically sensible as there was little or no indication of a formal assessment to ensure comprehensiveness, clarity or face validity of the survey instrument in a similar population. Similarly, few studies provided a discussion or evidence of reliability or construct validity of the instrument that was used. Only two studies (35, 42) showed a high risk of bias in relation to the source population not being representative of the population of interest while four studies (31, 33, 39, 43) had a high risk of bias due to a low response rate (<75%). Moreover, the majority of studies indicated that there were minimal missing data and those with missing data reported on how this was accounted for during statistical analysis.
One study was assessed using the NOS tool as it employed an open-label observational study design. The study scored eight out of a possible ten, thereby classifying it as a 'satisfactory study'.

4.3.3. Quality assessment of mixed-method studies

Six studies were assessed using the MMAT tool. Five questions were answered in relation to the mixed-method study design. After this, the studies were checked against another five questions for the qualitative component of the study and five questions relating to the quantitative component. Only one study (30) provided a clear and in-depth rationale for conducting a mixed-method study. The remaining five failed to describe their reasoning for choosing the design. All six studies adequately integrated both study components to address the research question, integrated the findings and adequately interpreted the results. Moreover, none of the studies reported any inconsistencies between the qualitative and quantitative results and therefore in line with the MMAT guidelines were given a 'yes' for that question.
For the final criterion, the following was assessed:

- Qualitative component:
    - If the qualitative approach was appropriate
    - If the data collection methods were appropriate
    - Were the results adequately derived
    - If the interpretation of results were substantiated by the data
    - If coherence between data sources, collection, analysis and interpretation was evident.
- Quantitative component:
    - If the sampling strategy was relevant to the research question.
    - If the sample was representative of the target population

- If the measurements were appropriate
- If the risk of non-response bias was low
- If the statistical analysis was appropriate to answer the research question

In accordance with the MMAT guide, for a study to obtain a 'yes' for this criterion, both the qualitative and quantitative components were required to be of high quality as the overall quality of the study may not exceed the quality of the weakest component.[113] Only two studies (19, 48) failed to meet these criteria as both of the studies had a weak quantitative component.

Table 6: Quality assessment of qualitative studies included in the review

CASP 10-item Checklist										
Study ID	A clear statement of the aims of the research	Is a qualitative methodology appropriate?	Was the design appropriate to address the aims? (Justification for choosing study design)	Was the recruitment strategy appropriate to the aims?	Was the data collected in a way that addressed the issue?	Has the relationship between researcher and participants been considered?	Have ethical issued been considered?	Was data analysis sufficiently rigorous?	Is there a clear statement of findings?	Is the research valuable?
2										
6										
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37										
38										
41										
44										
46										

Key:
Yes: Can't Tell: No:

Table 7: Quality assessment for cross-sectional surveys included in the review.

Risk of Bias Instrument for Cross-Sectional Surveys of Knowledge, Attitudes, and Practices						
Study ID	Is the source population representative of the population of interest?	Is the response rate adequate?	Is there little missing data?	Is the survey clinically sensible?	Is there any evidence for the reliability and validity of the survey instrument?	**Total Score (out of 20)**
1	*4*	*4*	*3*	*3*	*3*	***17***
3	*3*	*4*	*3*	*2*	*1*	***13***
4	*4*	*4*	*3*	*3*	*2*	***16***
5	*4*	*3*	*3*	*4*	*4*	***18***
9	*4*	*4*	*3*	*3*	*1*	***15***
14	*4*	*4*	*3*	*4*	*4*	***19***
18	*3*	*4*	*4*	*1*	*1*	***13***
20	*3*	*2*	*4*	*2*	*2*	***13***
23	*3*	*3*	*2*	*2*	*2*	***12***
28	*4*	*4*	*3*	*2*	*1*	***14***
29	*4*	*3*	*3*	*4*	*4*	***18***
31	*4*	*1*	*4*	*4*	*3*	***16***
33	*4*	*2*	*3*	*4*	*2*	***15***
34	*3*	*3*	*4*	*4*	*1*	***15***
35	*1*	*4*	*3*	*1*	*2*	***11***
36	*3*	*4*	*2*	*1*	*1*	***11***
39	*4*	*2*	*3*	*1*	*3*	***13***
40	*4*	*3*	*4*	*4*	*3*	***18***
42	*2*	*4*	*3*	*1*	*3*	***13***
43	*4*	*2*	*2*	*1*	*1*	***10***
45	*3*	*3*	*3*	*2*	*2*	***13***
47	*4*	*4*	*3*	*4*	*4*	***19***
48	*3*	*4*	*4*	*1*	*2*	***14***
50	*3*	*4*	*4*	*4*	*3*	***18***

Key:

→ 4: Definitely yes (Low risk of bias)
→ 3: Probably yes
→ 2: Probably no
→ 1: Definitely no (High risk of bias)

Table 8: Quality assessment of mixed-method studies using the MMAT tool.

Study ID	Is there an adequate rationale for using a mixed methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved? *	Comments:
10						No clear rationale for conducting a mixed-method study is provided. The study satisfied both the qualitative and quantitative criteria outlined by the tool.
15						No clear rationale for conducting a mixed-method study is provided. In addition to the mixed-method study quality criteria, the study satisfied both the qualitative and quantitative criteria for each component.
19						No clear rationale for conducting a mixed-method study is provided. The study failed to sufficiently meet all quality criteria for the quantitative and qualitative components.
30						Clear rationale for using a mixed-method design provided. In addition to the mixed-method study quality criteria, the study satisfied both the qualitative and quantitative criteria for each component.
32						No clear, detailed rationale for conducting a mixed-method study design provided. In addition to the mixed-method study quality criteria, the study satisfied both the qualitative and quantitative criteria for each component.
49						No clear rationale for conducting a mixed-method study is provided. The study failed to sufficiently meet all quality criteria for the quantitative and qualitative components.

*See explanation in text of additional quality criteria to be met to qualify as 'yes'.

Table 9: Newcastle-Ottawa Scale for the assessment of quality of included observational studies (adjusted). (Each asterisk is representative of if a study meets the criterion for the subsections).

Quality Assessment Criteria	Acceptable (*)	Study ID (6)
Selection (Maximum 4 Stars)		
Representativeness of the exposed cohort	Representative of the average health care professional providing contraception to women.	*
Selection of the non-exposed cohort	Drawn from same community as exposed	-
Ascertainment of the exposed cohort	Secured records, structured interviews	*
Demonstration that outcome of interest was not present at the start of the study		*
Comparability (Maximum 3 Stars)		
Study controls	Same education provided to entire exposed cohort	*
Study controls for any additional factors	Control and additional analysis conducted for any other identified confounders	*
Outcome (Maximum 3 Stars)		
Assessment of outcome	Independent assessment, trained interviewers, questions linked to knowledge, attitude and perceptions.	*
Was follow-up long enough for outcome to occur	The outcome of interest occurred	*
Adequacy of follow up cohorts	Complete follow up, lost cases unlikely to introduce bias. Description provided.	*
Overall Quality Score (Maximum = 10)		**8**

Very Good Study: 9-10 Good study: 7-8 Satisfactory study: 5-6 Unsatisfactory study: 0-4

4.4. Synthesis of results

4.4.1. **Qualitative meta-analysis**

The results from the CAQDAS using ATLAS.ti are presented in the following section.

4.4.1.1. Initial coding process

After conducting the initial stage one and stage two coding, the following code categories were developed (Table 10). A total of 25 categories consisting of 216 codes were created.

Table 10: ATLAS.ti code categories and number of respective codes

Code Category:	Number of codes within category
Adolescents	33
Attitude	43
Availability	13
DMPA-IM DMPA-IM: Positive DMPA-IM: Negative	30 15 17
DMPA-SC (Sayana Press) DMPA-SC: Positive DMPA-SC: Negative	31 15 8
Emergency Contraception	2
HIV-Contraception HIV-Contraception: Positive HIV-Contraception: Negative	18 5 9
Implant Implant: Positive Implant: Negative	40 4 26
IUCD IUCD: Positive IUCD: Negative	46 12 28
Knowledge	43
LAI (Longer-acting injectable)	7
LARC_General LARC_General: Positive LARC_General: Negative	50 9 37
MPT (Multiple prevention technologies)	6
Other	8
Perceptions	90
Recommendations	9

Following this, network diagrams were produced to visually explore the themes and links between codes that emerged from the data.

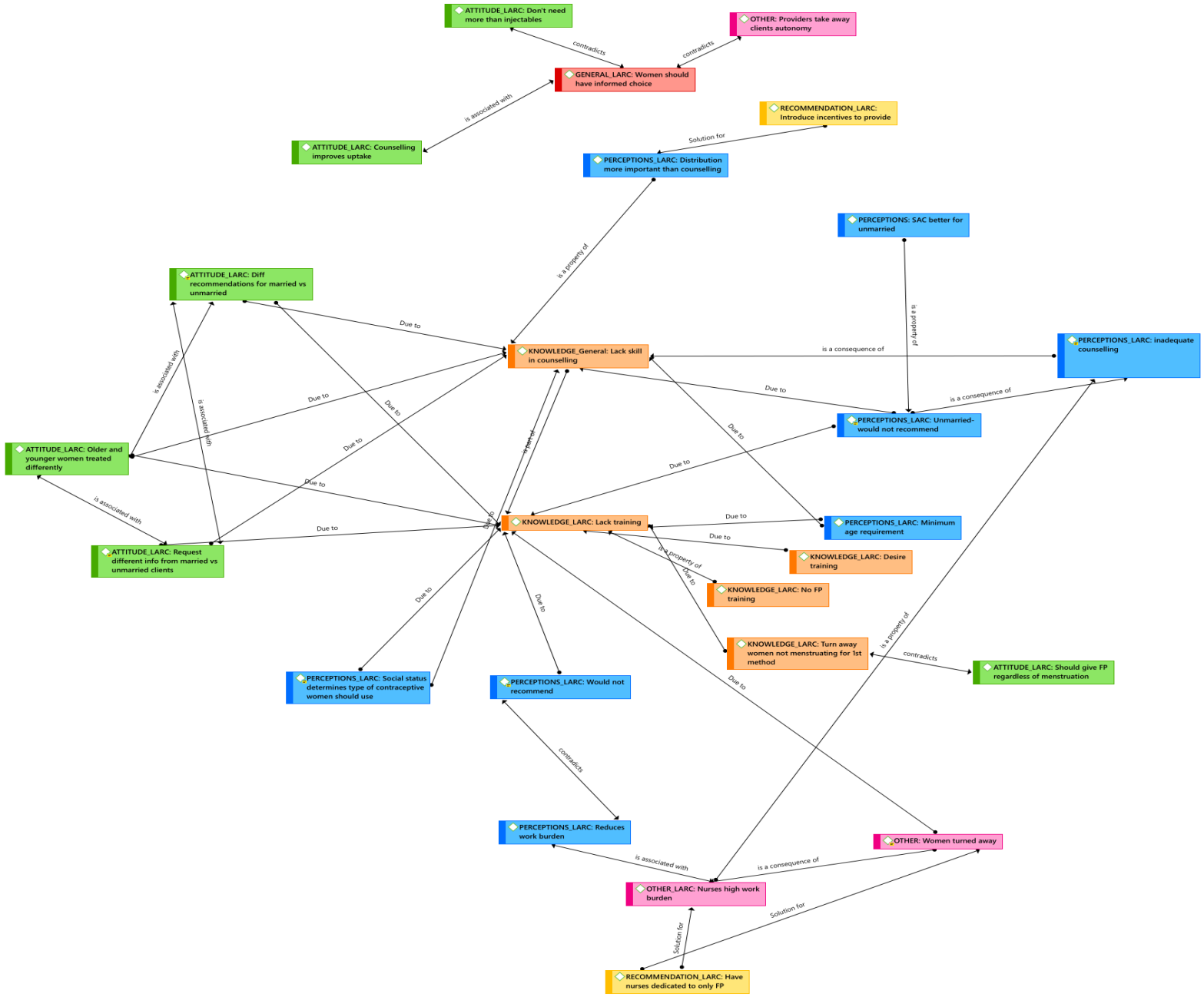

Figure 9: Network diagram for knowledge, attitudes, and perceptions of LARC (general).

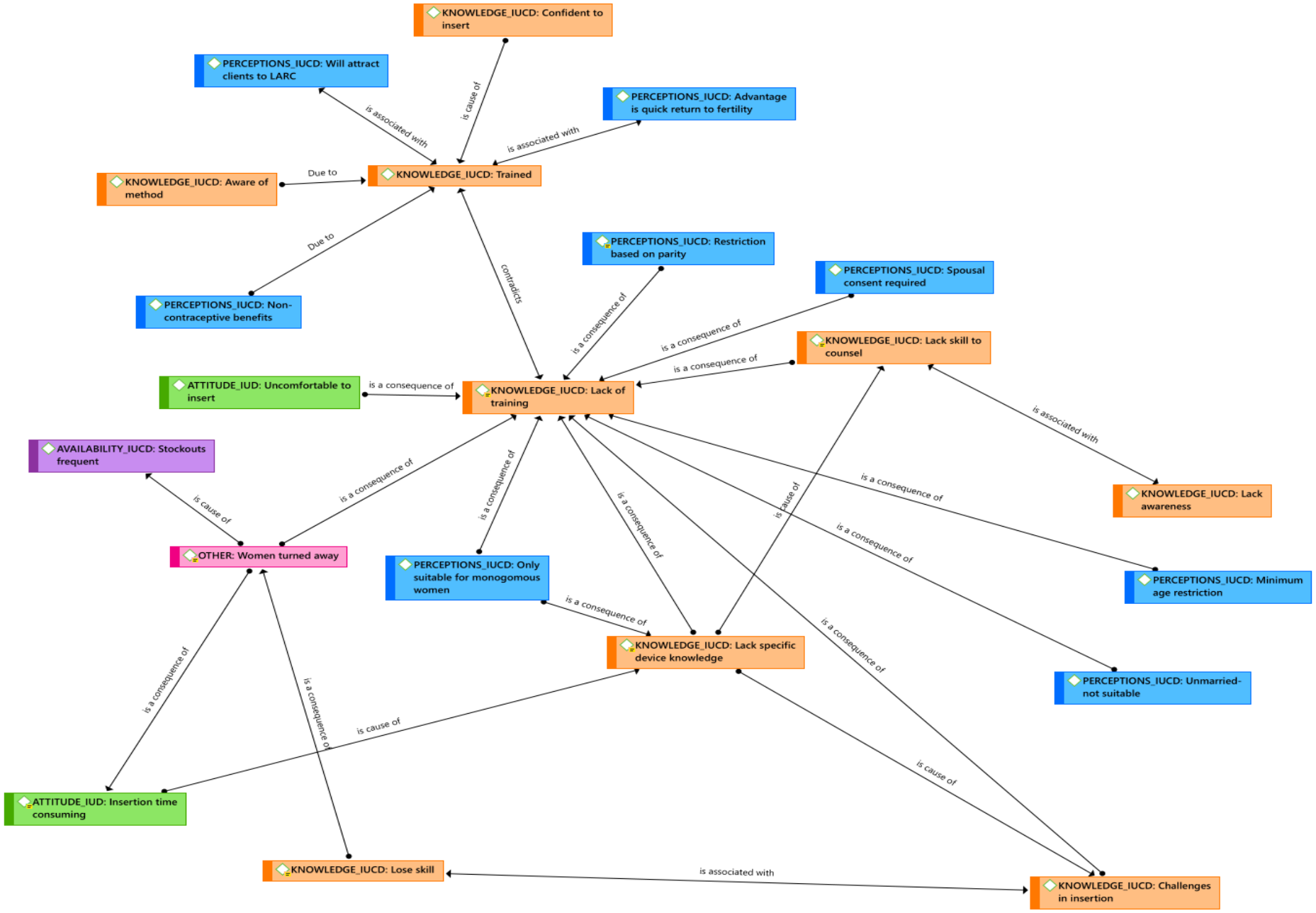

Figure 10: Network diagram for knowledge, attitudes, and perceptions of IUCD.

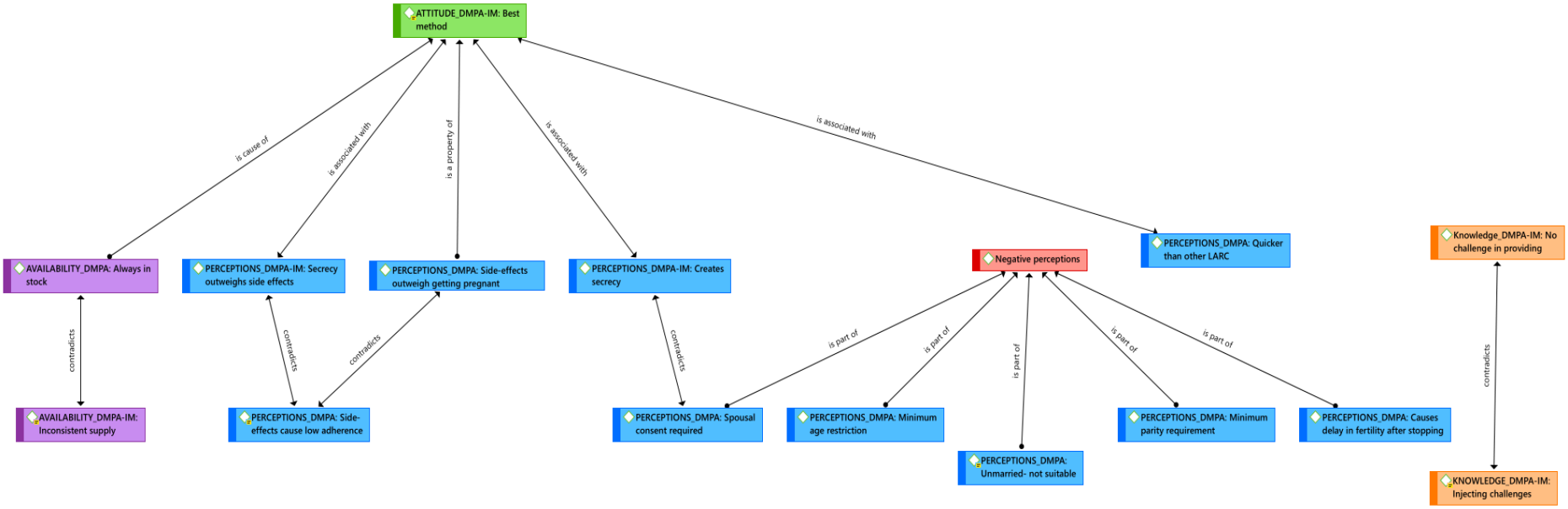

Figure 11: Network diagram for knowledge, attitudes, and perceptions of injectable contraceptives (DMPA).

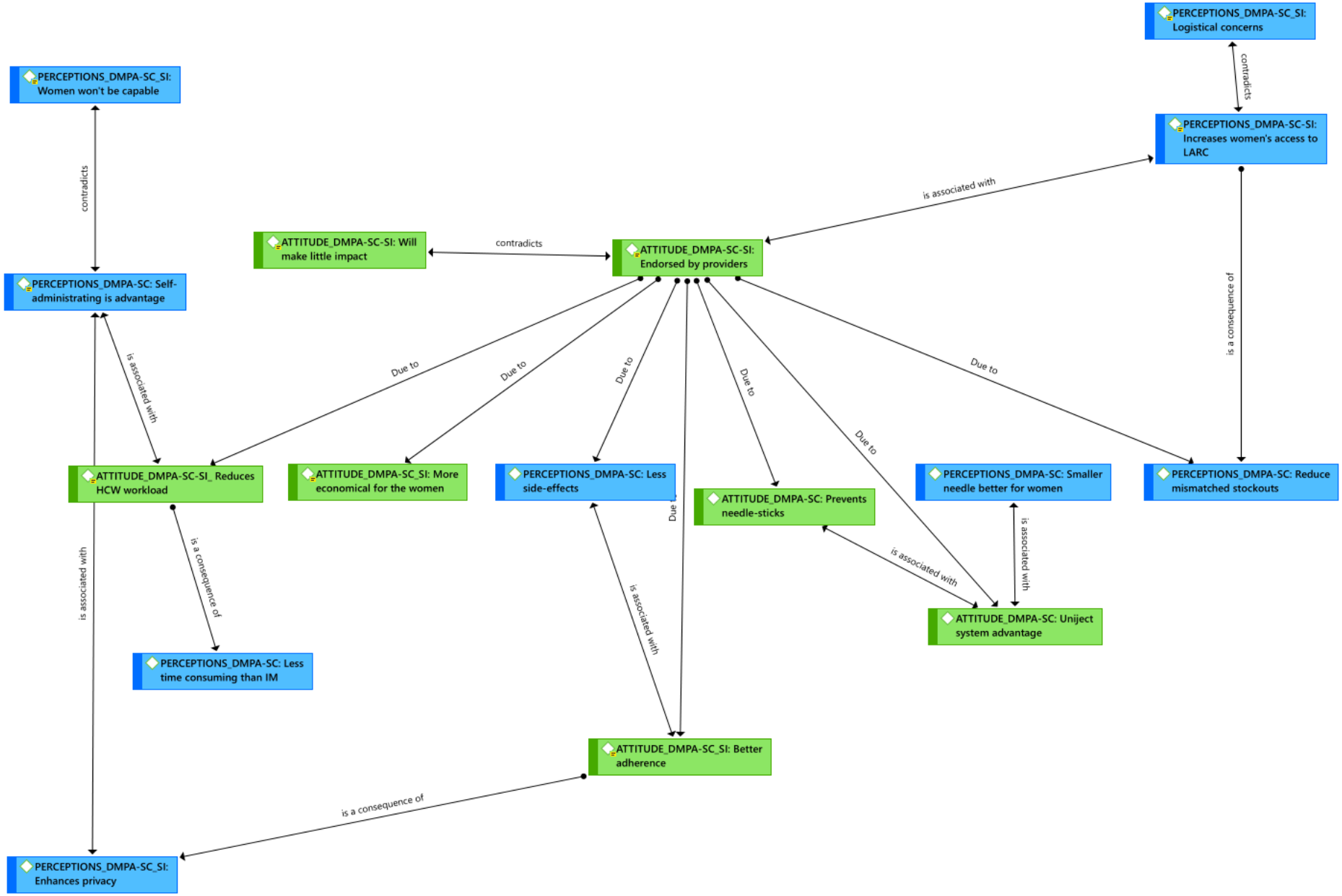

Figure 12: Network diagram for knowledge, attitudes, and perceptions of injectable contraceptives (DMPA-SC).

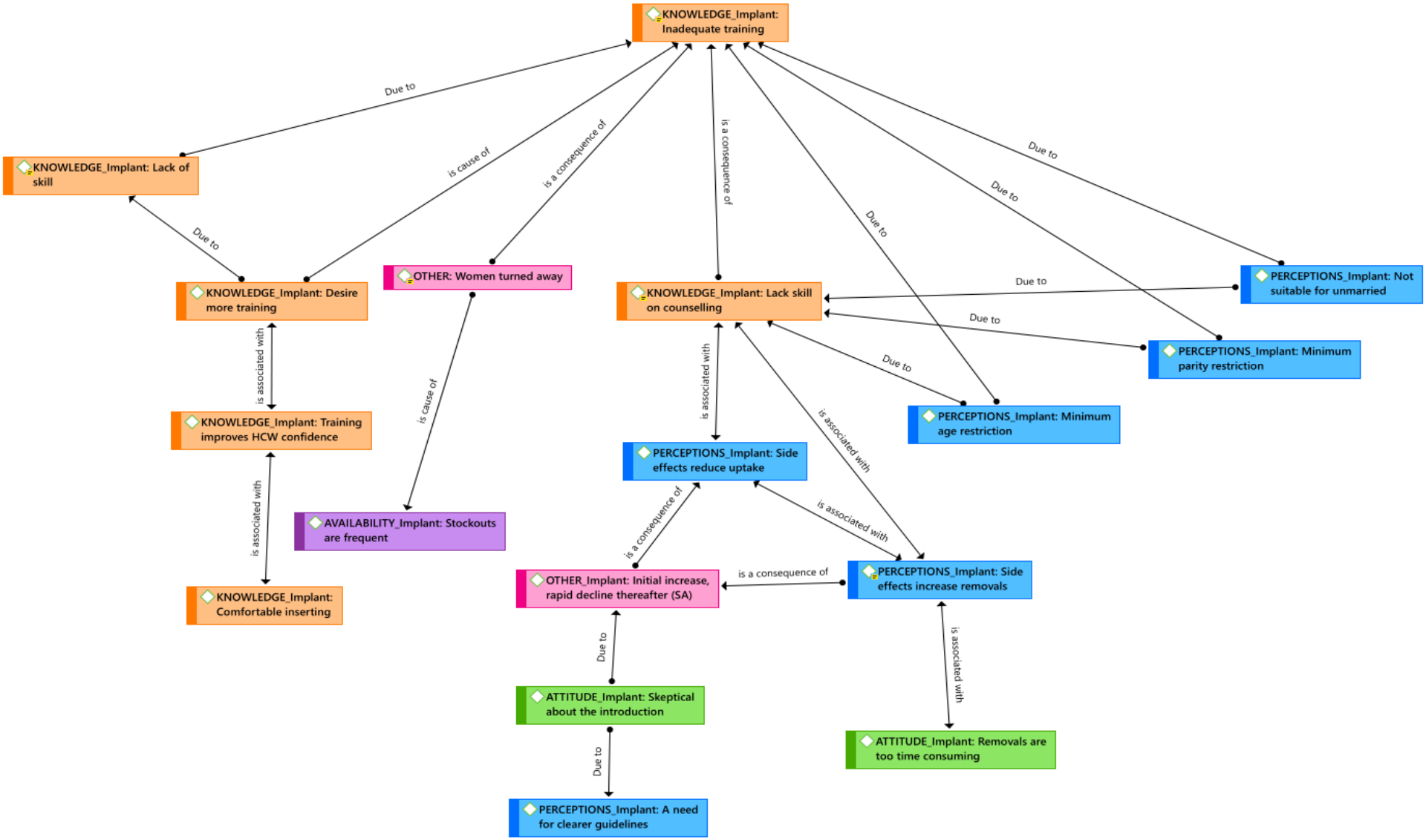

Figure 13: Network diagram for knowledge, attitudes, and perceptions of the Implant.

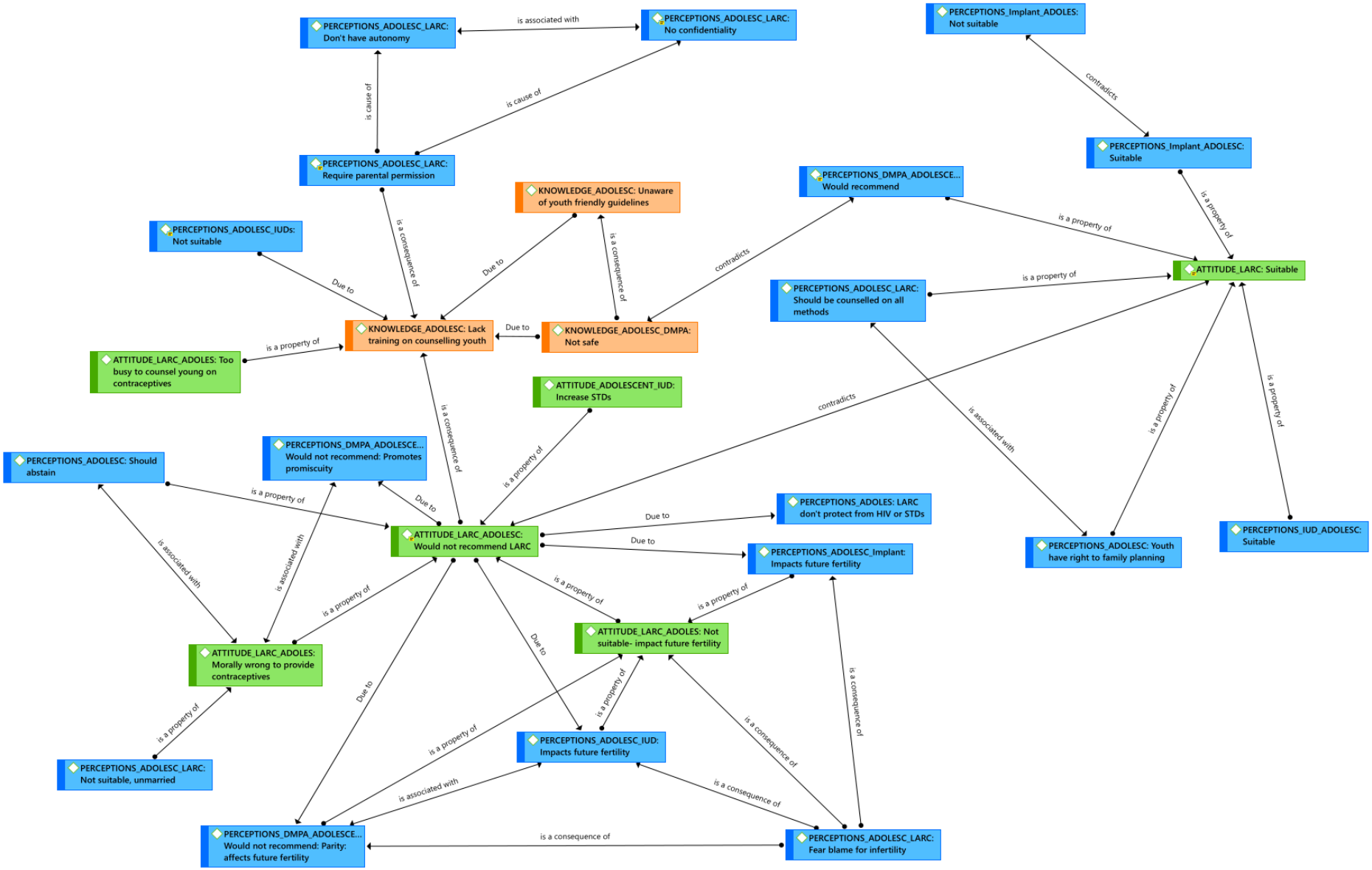

Figure 14: Network diagram for knowledge, attitudes, and perceptions of LARC for adolescents.

Figure 15: Network diagram for knowledge, attitudes, and perceptions of LARC for HIV-infected women.

4.4.1.2. Qualitative synthesis of results by theme

The following six themes were identified to expand upon to address the relative objectives of this study. The themes first provide a general overview of provider knowledge, attitude, and perceptions towards LARCs followed by an in-depth account of each specific method.

4.4.1.2.1. Knowledge, attitude, and perceptions regarding LARCs in general

Knowledge:

Six studies (10, 18, 31, 40, 41,45) reported that HCWs lacked adequate training in the form of additional family planning courses relating specifically to LARC methods. A medical assistant from Malawi expressed:

"I've not had formal training in family planning so it becomes a barrier because I only know two types of methods to provide to the clients, like the condoms and the Depo-Provera, but I cannot provide other methods". (10, pg. 3).

Despite the lack of training, HCWs expressed a desire for training if provided with the opportunity. One study stated:

"Nearly all [participants] were interested in receiving LARC insertion training".[128] (30, p. 65).

Echoing a lack in family planning training, studies reported HCWs to be unskilled or unmotivated to effectively counsel clients in LARCs methods (11, 30, 37). One study (11) described how the emphasis among HCWs was to merely provide family planning methods to improve uptake and meet quotas, most often the method requested by the client (commonly injectables) without counselling on other available longer-acting methods. In contrast to this, however, several studies (11, 19, 22, 26, 30, 41, 44) reported that the majority of HCWs recognised the importance of counselling women on all available methods in order to provide them with the opportunity to make an informed choice on which they prefer. A study conducted in Ethiopia (1) reported that 87.3% of HCWs (out of 142 respondents) regularly provided LARC counselling to clients. Moreover, a female nurse participant in a qualitative study in Malawi (30) highlighted the impact of comprehensive LARC counselling:

"After counselling many people like the method. At the health-centre where I worked before, most of the people were coming for Depo. But after time and counselling, many people came for implants…. even IUC".[128] (30, p. 68).

Attitude and perceptions:

Although the majority of HCWs within the studies acknowledged the importance of providing contraceptive counselling, a number of additional barriers aside from a lack of skill or desire to provide it were identified. The most common barriers reported were a high work burden and time constraints due to the large volume of patients to be attended to, coupled with issues of understaffing (11, 26, 30, 31). These time constraints, therefore, led to a failure to "promote contraception because [we] are rushing the queue"[129] (26, pg. 17). The high work burden faced by providers therefore often lead to prescribing what was considered the easiest and quickest method available rather than discussing all available methods and potential side-effects thereof (11, 26, 30, 31). Thirty percent of clinicians from a nationally representative survey in Zimbabwe and South Africa (29) indicated that they lacked the necessary time needed to comprehensively counsel clients on all available methods. Contradicting this practice however were some providers (13, 30) who expressed a positive view towards LARC methods due to their recognition of their potential to reduce the high workload faced on a daily basis. One nurse described:

"I like inserting Implanon…Jadelle because if I insert that Jadelle, this client is served…for 5 years or 3 years without coming back. So, I prefer Implanon and Jadelle, than Depo. Because it will reduce the workload."[128] (30, pg. 67).

In addition to high workload, HCWs reported a need for community sensitisation and education to reduce misconceptions around the use of LARCs (30, 31, 32). Further to this, a significant hinderance in HCWs ability and motivation to provide LARCs was the perception and persistent experience of stockouts (12, 17, 30, 31, 32, 41). The impact of recurrent stockouts was far-reaching. On a provider level, stockouts of LARCs created a facility-wide demoralised atmosphere that intensified the emotional burden felt by HCWs. As an HCW from Uganda describes:

"You also become stressed when you don't have those methods the mothers want.… You put yourself in the shoes of that woman, she has come, she has now 10 kids and she has come for the type of family planning which is not available…Sometimes I feel demoralized because these mothers keep coming and we push them away, not because I don't know what to do but because I don't have what to use."[130] (17, pg. 147).

On a client level, as a result of LARC stockouts, HCWs either provide clients with short-acting

methods such as condoms (often not approved of by their partners) or more frequently, report turning women away (12, 17, 30, 41). This creates a cycle of distrust between the client, provider and health facility as a whole. A Ugandan provider explains the phenomenon often occurring within the community:

"This can affect the whole facility because if one client comes and you tell her that implants are out of stock, she will go out spreading rumours that the facility doesn't have family planning methods, that is what they normally say, yet there is only one method that is out of stock".[130] (17, pg. 147).

Although studies reported a regular lack of training in LARC provision and counselling, additional mitigating factors such as a high workload, understaffing and regular method stockouts contribute to an overall lack in the uptake of LARC methods.

Concerning adolescents, the most common position taken by HCWs was that adolescents should abstain from sexual activities or otherwise use condoms only (13, 16, 20, 30, 37). The most prevalent reason for these views was that condoms do not cause side-effects; they prevent both partners from contracting STDs and HIV while providing protection from pregnancy. Healthcare workers were especially hesitant to provide LARC methods due to the perceived impact on adolescents' future fertility (13, 16, 31). An additional factor preventing HCWs from providing contraceptives to adolescents was their own moral convictions. A nurse from Botswana stated:

"It's a disgrace that adolescents indulge in sex parties, it's unchristian".[131] (47, pg. 183)

Some HCWs further felt that by providing contraceptives to unmarried adolescents they would be encouraging them to partake in sexual activity, the thought of which made them uncomfortable (13, 16, 20). A Ugandan public provider expressed:

"I don't feel comfortable at all. Being a health worker and at the same time a mother, I would offer because I will be thinking of the future of this girl as important. But again on the other side, I will be having feelings in my heart that am I not pushing this girl to make a mistake because she can now think I cannot conceive so I can do anything at any time".[132] (13, pg. 6).

Despite many HCWs expressing their internal conflicts in providing LARC methods to

adolescents, some were confident that it was good practice for adolescents to have freedom of choice through comprehensive contraceptive counselling (37, 41).

4.4.1.2.2. Knowledge, attitude, and perceptions regarding IUCDs

Knowledge:

A total of 31 studies reported specific information regarding IUCDs (1, 5, 6, 13, 14, 15, 16, 17, 18, 19, 20, 21, 26, 27, 29, 30, 31, 32, 33, 35, 37, 38, 39, 40, 41, 44, 45, 47, 48, 49, 50). In relation to knowledge, the overall awareness of the method varied. Results from two studies reported low familiarity of the method at 2% (out of 100 respondents) in Osun State, Nigeria (33) and 56% of 232 participants from a study in Kaduna State, Nigeria (35). In contrast to this, two studies conducted in a rural setting in Ghana (38) and a study in South Africa reported that all participants were aware of LARC methods including IUCD. In terms of specific device knowledge however, participants failed to consistently report correct information. Most often, information regarding how the device works (mechanism of action), the effectiveness to prevent pregnancy compared to other methods, appropriate selection of candidates, duration of use, and contraindications were incorrectly explained (18, 29, 38, 50). One study (38) comprising of four nurse midwives and three community health nurses described that the HCWs had similar misconceptions to the community that there is a possibility of the IUCD migrating from the uterus to the heart. In the same study, a community health nurse explained her understanding of how IUCD prevents pregnancy:

"[The IUD] blocks the fallopian tubes after insertion into the uterine cavity".[133] (38, pg. 6).

Pertaining to training and ability to provide IUCD, 10 studies provided insight (1, 18, 20, 30, 31, 32, 38, 47, 49, 50). Throughout the studies, the issue of a lack of initial and refresher training to insert devices was evident (18, 20, 30, 32, 33, 38, 47, 50). In addition to a limited number of HCWs being exposed to training, those who were trained lacked real-world experience in its' provision. The lack of experience stemmed from a lack of resources (IUCD stock) available to provide the method (32, 38) and a lack of confidence due to receiving insufficient training. A study conducted in South Africa (18) revealed that 91% (of 32 providers) expressed a need for additional IUCD training before they would feel comfortable counselling and offering the method while only 19% of the providers acknowledged ever providing counselling for IUCD. In a Malawian study (30), only 11 of 37 (30%) participating HCWs had received training, with only 5 of those having ever inserted a device.

A nurse from the study explains:
"I don't feel comfortable to insert IUC. So…I don't…emphasize on the IUC…. I have been trained, but I have just observed once—I have never inserted it. So, I…. just tell them to wait for [the private health organization]".[128] (30, pg. 68).

Additionally, a nurse from Botswana recounted:

"I am not trained to prescribe and insert IUCD, will need training and booklet to help with explanation".[131] (47, pg. 183).

Reaffirming the lack of experience was a Ghanaian study (38) in which only one participating HCW (a midwife) had ever inserted IUCD with none reporting having ever received refresher training on the method.
Overall, HCWs, even those who had received basic training, described feeling inept to provide this method to their clients.

Attitude and perceptions:

Several providers felt that the insertion of IUCD was particularly time-consuming in comparison to other contraceptive methods (27, 38). In addition to the time taken to insert the devices, providers from one study (38) identified that their own personal fears of potential side-effects from the device as well as the cultural barrier affecting women's willingness to expose their genital regions for reasons other than birthing influenced their commitment to counsel clients on it (38). To address this, however, the practice of postpartum IUCD insertion was discussed by a number of HCWs from the studies (1, 29, 38, 39). In describing how postpartum IUCD insertion would address the cultural issues raised, one midwife expressed:

"Yes, that one is different because she is already undressed".[133] (38, pg. 9).

In keeping with postpartum IUCD insertion, a study focussed on maternity HCWs at a tertiary centre in Ghana (39) identified that 90% (of 91 providers) only on an occasional basis or never discussed postpartum IUCD insertion with their clients. Within the same study, only 41% of physician respondents and 33% of midwife respondents felt it was safe for IUCD to be inserted postpartum. Similarly, through a nationally representative study within South Africa and Botswana (29), it was found that less than 25% of the HCWs in the sample considered IUCD to be safe and appropriate immediately postpartum. Providers who were

opposed to postpartum insertion cited reasons of fear for infection or uterine perforation (29, 30, 39). A medical assistant based in Lilongwe, Malawi (30) who had never heard of postpartum insertion voiced his concern:

"As for me, I feel that it is not good, because at that time the woman has just delivered, maybe she is still having some pain…Maybe there can be some problems. So, it's better to wait for, maybe, 6 weeks. I don't know".[128] (30, pg. 67-68).

In contrast to these views, are HCWs from an Ethiopian study in the Amhara region (1) in which 78% of the 864 surveyed regularly counselled their clients regarding IUCD, most often only done at their postnatal visit. However, only 17% had received specific postpartum IUCD training which resulted in the study identifying key gaps in knowledge regarding PP-IUCD counselling; for example, the timing for when counselling and insertion can be conducted.

HCWs further identified a number of advantages relating to IUCDs such as the quick return to fertility once the device is removed (19), the non-hormonal composition of the Cu-IUD (30), and the non-contraceptive benefits provided specifically by the LNG-IUS device (15, 21). A study (21) that explored HCWs views on the LNG-IUS device reported that they believed that the benefits from the device would attract more clients to LARC.

Despite the advantages identified by HCWs, fears regarding IUCD such as an increased risk of infection in young clients and drug interactions in women on ART were also conveyed (19, 30). Through the TCA, a number of providers own biases and perceptions towards IUCD influencing the uptake of the contraceptive method were evident.

A recurring theme across studies was the perceptions providers held that they were required to impose minimum age restrictions (specific age not specified within studies) for the provision of IUCD. A total of nine studies (16, 18, 29, 37, 39, 40, 45, 48, 49) indicated that providers held this belief and felt that IUCD was absolutely contraindicated in adolescent girls. Across studies (29, 47,18, 39), 98%, 25%, 93%, 43%, and 48% of HCWs in South Africa, Zimbabwe, Kenya, and Ghana, respectively reported restricting access based on age. The most commonly cited reason for this was the belief that the provision of IUCD to adolescent girls would greatly increase the spread of HIV and STIs. An HCW from Nairobi, Kenya provides insight:

"…things like IUCD, … [are not acceptable]; youths should be restricted to pills only. Also, IUCD transmits STIs very fast". [134] (16, pg. 5).

Similarly, restriction of IUCD to nulliparous women and restricting provision based on a minimum parity was evident (18, 29, 38, 40, 45, 48, 49). Moreover, some HCWs required women to be in a monogamous marriage in order to be eligible to receive IUCD (38, 44). HCWs described their reasoning for this view was due to the long-acting nature of the device, feeling that young, unmarried women would want it removed early upon deciding to enter a marriage. Further to this, one study conducted in Tanzania (45) reported that 46% (of 1396) HCWs required spousal consent before IUCD could be provided.

From the studies that specifically reported IUCD suitability for HIV-infected women, perceptions were mixed. A study in Cape Town, South Africa (19) described that the majority of the 16 providers involved in in-depth interviews expressed positive views towards HIV-infected women receiving IUCD. In an additional South African study (conducted in Durban) (26), nurses described how contraceptives, including IUCD, was counselled in the same way to both HIV-infected and uninfected women, emphasising for both groups that hormonal contraceptives should be used in conjunction with condoms to stop the spread or contraction of HIV and STIs. Contrary to this, however, four studies (20, 29, 32, 39) reported low percentages of HCWs willing to provide IUCD to HIV-infected women: 16%, 35%, 35.5% and 46% in South Africa and Zimbabwe, Malawi, Nyanza province, Kenya and, Ghana, respectively.

Although unnecessarily imposed restrictions were evident from the studies, a large proportion (82%) of providers across Zimbabwe and South Africa (29) described IUCD as vastly underused by the population. A contributing factor to the underutilisation was the lack of consistent supply of devices identified by five studies (17, 21, 38, 45, 50).

4.4.1.2.3. Knowledge, attitude, and perceptions regarding injectable contraceptives

Knowledge:

Few studies explored HCWs knowledge relating to injectable contraceptives. Concerning the skill to provide injectable contraceptives, overall providers felt competent (12, 31, 47). One study (12), conducted in Uganda, provided more comprehensive information of HCWs ability to provide DMPA-IM. Thirty-three percent (of 44 respondents) experienced challenges in providing the contraceptive. Of these respondents who reported challenges, the majority were clinic-based providers (50%) compared to only 33% of CHWs. The providers identified that the use of auto-disable syringes in which the unit locked before drawing from the vial

could prove difficult. One clinic provider stated:

"DMPA IM requires auto-disable syringes and these can be hard to use."[135] (12, pg. 377)

An additional challenge identified by a CHW was the ability to inject intramuscularly:

"For DMPA IM, one has to be very careful to ensure that he or she does not inject in the vein but injects in the muscle."[135] (12, pg. 377).

Contrary to DMPA-IM, was HCWs competency to provide DMPA-SC (Sayana Press) (7, 8, 13, 24). All providers with experience in providing DMPA-SC identified the design as easy to use with the uniject system a major advantage. Providers additionally reported that DMPA-SC provided an important opportunity for low-level HCWs such as CHWs to easily increase their skillset and knowledge due to the simplicity of the design (7, 8). A CHW from Senegal explained:

"I prefer [SP] because my understanding will be faster so the more I do the more comfortable I am".[136] (7, pg. 371).

Attitudes and perceptions:

Overall, providers experienced that DMPA-IM caused multiple side-effects for women including amenorrhea, headaches, weight gain, lowered libido, and increased menstrual bleeding (19, 22, 26, 41, 46). Providers further believed that the side-effects clients experienced lead to lower adherence to the method, often resulting in them forsaking contraceptives completely (19, 26). Despite these side-effects, providers believed that they were manageable and that the advantage of not falling pregnant far outweighed them. A Ugandan physician re-counted:

[Even if the side effects occur, they can be handled. Unless really it fails to be handled on drugs then maybe it's better to have [side effects] than having unwanted pregnancies".[137] (22, pg. 152).

Providers further felt that the method was specifically useful in cultural contexts where husbands did not approve of contraceptive use, this further emphasised their perceptions that the side-effects from the method were tolerable for the benefits it provided (11, 30, 32).

In addition to these advantages and despite some of the injecting challenges reported by a number of providers, one study conducted in Rwanda and Kenya reported that another key benefit of injectables was their ability to provide it much faster and less invasively in comparison to other LARC methods (27).

Although DMPA-IM was one of the most endorsed contraceptives across the studies, a large number of providers expressed their concerns regarding a delay in return to fertility after stopping the injections (22, 41, 44, 46). This fear translated into many HCWs restricting DMPA-IM based on the age of the client. In a Nigerian study (40), 88.5% (from 1 071) of health facility providers and 84.1% (from 289) of pharmacists reported restricting DMPA-IM based on a minimum age requirement. Although lower proportions, 52%, 43% and 40% of public hospital HCWs, public health centre HCWs, and HCWs in other public facilities, respectively in urban Senegal, reported restrictions based on minimum age (43). The same study also reported that up to 41% of HCWs in private facilities required a minimum age for DMPA-IM provision. Through in-depth interviews, providers further expressed their concerns for a loss of fertility among young women. A pharmacist from Southwest Nigeria shared:

"Generally, introducing young girls to contraceptives who have not had any child before, I feel little bit reluctant to use it, because I have seen people that their fertility did not return after they stopped using the injectable….I would rather prefer her using condom, abstinence and emergency contraceptives".[138] (44, pg. 25).

Additionally, a family planning provider in Southern Tanzania expressed their reasoning for not recommending DMPA-IM to adolescents to delay first birth:

"The temporary side effects from injectables do delay a woman to conceive for up to six or nine months". [139] (41, pg. 9).

Some providers had significantly contrasting views and endorsed DMPA-IM for adolescent girls due to the manageable side-effects, accessibility and secrecy of the method, the short-term length of effectiveness and most importantly its' ability to prevent unwanted pregnancies (13, 20). A public HCW from a study (13) expressed:

"I would [offer injectable contraceptive to adolescents] because first of all I know it has no other future dangerous effect to the youth. Secondly, it's going to protect them from having unwanted pregnancy. And they will also continue with their studies at school".[132] (13, pg. 5).

In addition to the minimum age requirements, some providers felt strongly about enforcing a minimum parity restriction, also due to the feared delay in the return of fertility resulting from an atrophied uterus, a perceived consequence of long-term amenorrhea (40, 45, 46). From a study in Rwanda and Kenya (46), some providers felt that the injectable may even lead to infertility and therefore did not find it suitable for nulliparous women:

"The injectable cannot make one sterile—not unless you had [just] one good ovum … we tell them not to start using family planning when one has not given birth, because a woman can start using family planning and they don't have ova to conceive".[140] (46, pg. 190).

Resonating with this sentiment was a Ugandan private HCW:

"The injection Depo is not recommended for the adolescent because it may interfere with their fertility since they have not produced in their life. So when it comes time for you to conceive, there may come a problem because the Depo takes a time long to leave the body system".[132] (13, pg. 6).

Further to this, a number of providers further restricted access to injectable contraceptives based on marital status due to their own personal convictions relating to pre-marital sexual activity (13, 40, 43, 48, 49, 50).

Six studies also explored HCWs perceptions and experience with the availability of stock regarding injectables (12, 18, 26, 30, 41, 45). Three of the studies (17, 26, 41) reported that HCWs had never experienced problems with the availability of DMPA-IM as it was the one LARC that was always available. The reliable supply of DMPA-IM stock was seen as a key logistical motivation for providers endorsement of DMPA-IM (17, 26, 41). Nevertheless, contrary to this experience were HCWs from Uganda, Senegal, Malawi and Tanzania who indicated that they often faced difficulties with inconsistent DMPA-IM supply (12, 30, 45). Two predominant challenges were faced, the first being a mismatch of stock in which DMPA-IM would be available but the facility lacked a supply of syringes to administer the drug. The second challenge identified was rooted in Ugandan and Senegalese CHW programs whereby there was a lack of available transportation to move the DMPA-IM from the clinics into the community. Community health workers expressed concerns relating to unmaintained roads restricting access to the community, high transportation costs and the time-consuming nature of picking up the stock and travelling back to the community in time to administer the contraceptive (12). In addition to these issues, providers revealed the result of DMPA-IM

stockouts was to provide women with short-acting methods such as COC and condoms until they received a new batch.

Despite the popularity of DMPA-IM amongst HCWs, shortcomings of the drug were identified. DMPA-SC was identified by many HCWs as a method to address the flaws presented from DMPA-IM. Four studies revealed that the majority of providers who had experience with DMPA-SC preferred it in comparison to DMPA-IM (7, 8, 13, 26). The perception of reduced side-effects for the client, its quick provision due to the all-in-one (uniject) design and its' ability to prevent needle-stick injuries were cited as reasons for the preference (7, 8, 13, 26). HCWs also felt that the smaller needle used by DMPA-SC compared to DMPA-IM was an attractive attribute for clients to minimise pain and fear of the injection (7, 13, 24). One Ugandan NGO provider also identified that the system was much simpler to use thereby requiring less skill to administer:

"It has its needle already attached. I don't have to withdraw the Depo or the medicine. So, everything about it is easier or much better or more convenient".[132] (13, pg. 6).

A particularly important benefit identified by HCWs was the ability for DMPA-SC to solve the issue of mismatched stockouts (7, 12, 13, 24). A CHW from Uganda explained:

"Because depo-subQ in Uniject is all in one unit, problems of not having injections [syringes] will not be encountered as has been the case with DMPA IM. The challenge with DMPA IM has been that when the drug is available, the injections are not available and vice versa".[135] (12, pg. 376).

DMPA-SC has also been explored as an option to use as a self-injecting contraceptive for women. HCWs exposed to self-injecting of DMPA-SC also had positive attitudes and perceptions to the practice. Providers specifically felt that this method would increase adherence to injectable contraceptives due to the reduced necessity to travel to clinics every two to three months, thereby reducing transportation costs for the client (7, 13, 26). Providers further felt that providing a self-injecting option for women would significantly reduce their workload as women would be required to visit facilities less frequently. A Kenyan provider conveyed:

"That would be very interesting because it would decrease the work [at the facility]. People could follow their [family planning] program without coming to the hospital".[140] (27, pg. 465)

Despite the positive attitude towards self-injecting DMPA-SC, some reservations were highlighted. Firstly, several HCWs were concerned with providing this method to adolescents with fears that it would be misused, increase promiscuity and even provide a gateway to other injectable drug use (13). Further to this, providers were apprehensive regarding adequate storage and disposal of the product of use. Providers from Uganda raised issues of possible site infection if the injection is not done in a sterile manner, temperature control of the drug, and potential injuries from incorrect disposal, especially if children come into contact with the used needles (13, 24). In addition to this, providers also raised queries regarding the training of women to self-inject and who would responsible for this (13, 24). One Ethiopian physician recommended the following:

"If [Sayana Press] has no difference from insulin; as professionals teach how to inject for diabetes persons, same thing will be done for this too".[141] (24, pg. 382).

Overall, the prospect of self-injecting was seen as a means to increase women's access to LARC methods (7, 8, 13, 24).

Two studies, conducted in Kenya and Rwanda, further explored HCWs views of a potentially longer-acting injectable contraceptive (27, 46). Across both studies, HCWs expressed excitement at the prospect, citing that it would have the potential to relieve the currently high work-burden and be more economically beneficial for the clients. A Rwandan provider conveyed their thoughts:

"Work will decrease because the frequency of clients will also decrease … we will do our work better because sometimes it happens that we don't do our work like we should because of the pressure of a line of people waiting outside the door. But when they are fewer, you can put your things in order without problems".[142] (27, pg. 464).

In addition to the positive outlook HCWs had towards a longer-acting injectable, cautions were also raised. The HCWs in both countries felt that a long grace-period should be allowed between re-injection, with the majority feeling that a six-month effective period would be best. Further to this, HCWs expressed the desire for the injectable to have a long shelf-life (at least three years) without the need for cold storage. The motivation for this was to aid CHWs as mentioned by a Rwandan CHW:

"What's really good is that we, community health workers, we don't have refrigeration … so

for us, a good medicine is one that we can use without difficulty and one in which we can have confidence in how it is stored. If you give CHWs medicines that require a fridge, it's expected that there would be many [commodity] losses".[142] (27, pg. 464).

The HCWs in the two studies further reasoned that the return to fertility should not take longer than that of DMPA-IM while having the same level of effectiveness in pregnancy prevention.

4.4.1.2.4. Knowledge, attitude, and perceptions regarding the implant

Knowledge:

Nine studies (2, 6, 21, 29, 30, 33, 35, 47, 49) report information relating to HCW's knowledge and training on implant contraceptive provision. The overall impression of HCWs regarding the training they had received was poor (2, 6, 30, 31).

In Malawi, one study (30) reported that only 51% of HCWs had received training in implant provision while only 47% of HCWs in Uganda reported feeling competent to provide the implant to their clients (31), while in Kenya 48% (of 27 respondents) described the implant as being the method that they are most comfortable providing (21). The lowest proportions of HCWs that were unfamiliar with implant contraception was seen in Nigeria. In Osun State (33), only 6 of 100 HCWs had knowledge of the implant while Kaduna State (35), the method least familiar among providers was the implant with only 15.9% of 232 respondents aware of it.

All providers included in a Malawian study, even those reporting already receiving training, conveyed their need for further implant training (30). A doctor from Botswana testified to the benefit of additional training in improving confidence and ability to provide the implant:

"I have recently completed my internship, have limited knowledge about contraceptive, but have attended a workshop and CME on contraceptive implants which helped a lot".[131] (47, pg. 183).

Attitudes and perceptions:

The majority of the studies that reported on the attitudes and perceptions of the implant were conducted in South Africa and are therefore reported on in the sub-group analysis. However, six studies provided insight regarding the rest of SSA. A small proportion (29%) of HCWs in across a nationally representative study in Zimbabwe (29) felt that the implant could be

provided to HIV-infected women. Similarly, only 35.5% of clinicians from a Kenyan study perceived an implant to be a viable option for HIV-infected women.

Two studies (43, 48) further investigated if HCWs imposed a minimum age restriction for the insertion of an implant. Forty-five percent of providers in the study based in private facilities in Senegal required a minimum age for the implant compared to 38% of respondents working in public facilities (43). Of a total of 433 HCWs in a Kenyan study who are able to provide the implant, 189 (44%) of theme require their client to be of at least 20 years of age (48). Further restrictions for the implant included that of a minimum parity, although only one study provided insight, 21% of 428 HCWs required a minimum parity before recommendation of the method (48). Specifically, of those who did impose a restriction, 56.2% required at least one child, 32.6% required two children and 11.2% required three or more (48). Although less common, provider-imposed restrictions on implant provision to an unmarried client were identified by three studies (43, 44, 48).

In relation to HCWs perceptions of implant stock, two studies were able to provide insight (17, 41). From the two studies conducted in Uganda and Southern Tanzania, it was reported that implants were one of the primary methods that were frequently unavailable within their facilities.

4.4.1.3. Qualitative synthesis of South African studies

A total of 11 research articles (2, 5, 6, 18, 19, 20, 25, 26, 29, 42, 50) included in this study were conducted in South Africa and utilised in the following synthesis.

4.4.1.3.1. Knowledge, attitudes, and perceptions regarding LARC in general

Training regarding family planning was reported on in only one study (18) conducted with 32 providers across the Eastern and Western Cape. The study identified that 59% of the providers had undergone a designated family planning course. Also, studies conducted in Cape Town (19) and Durban (26) reported that the majority of the included HCWs felt that family planning counselling was essential to allow clients to make an informed choice on the method to use. Nurses in the Durban-based study (26) reported that more time was spent with clients who were reporting for contraceptives for the first time:

"When you are dealing with a patient who is coming for the first time, you have to spend more time with that patient because we have to tell the patient about the methods that we have, we look at the age of the patient, whether the patient is breastfeeding or not, whether the patient is HIV positive or not, so with those patients, we have to spend more time, especially when they are coming for the first visit".[129] (26, pg. 9).

Although HCWs from this study recognised the importance of in-depth counselling, it was at times not possible due to the high volume of clients presenting for contraceptives as well as the additional responsibilities required of them. In a nationally representative survey of South African clinicians (29), 30% reported a lack of time to adequately provide family planning counselling. For this reason, as seen in other SSA countries, some HCWs reported providing clients with what was the quickest and in-stock method available at the time (26).

A recommendation endorsed by HCWs throughout studies was the employment of a nurse or provider dedicated solely to providing family planning services to clients. A nurse from Durban, South Africa described the difficulties faced in having to provide multiple services simultaneously:

"It's time consuming because someone will come with a card for family planning and bring a baby for immunization, so you have to do immunization and family planning and there is no privacy. If there was a room just for family planning, that would be better".[129] (26, pg. 17).

For adolescents, Soweto based HCWs (20), many had firm beliefs that contraception should not be provided due to personal convictions regarding sex before marriage. One HIV-counsellor described:

"If all went according to me… if you are not married why [is there any need to] use a condom?".[60] (20, pg. 286)

4.4.1.3.2. Knowledge, attitudes, and perceptions regarding IUCD

Knowledge:

Eight studies (5, 18, 19, 20, 26, 29, 42, 50) provided insight into the KAP of IUCD among HCWs in South Africa. One study (50) conducted in Cape Town, highlighted HCWs self-reported level of IUCD knowledge: 7%, 27% and 63% reported their own knowledge as poor, fair and good, respectively while one provider rated their knowledge as excellent. Despite HCWs self-assessment, the study identified that actual knowledge was not consistent with current evidence. Healthcare workers knowledge of IUCD effectiveness was varying. In a study of HCWs in the Western and Eastern Cape (18), only 38% believed that IUCD was more effective at preventing pregnancies compared to injectables compared to 77% in a Cape Town-based study (50). In terms of HCWs abilities to insert IUCDs, only two studies (18, 20) provided insight in which two of 32 providers reported feeling comfortable to safely insert IUCDs while 29 expressed a desire to undergo more training (18). Similarly, among family planning HCWs in Soweto (20), a nurse reported having no training to insert devices despite them being offered at the clinic. Four studies reported of HCWs practice regarding IUCDs. Across all four studies, the proportion of HCWs that regularly counselled clients on IUCDs was low. Among Eastern and Western Cape HCWs (18), only 19% had ever counselled a client on IUCD. Among Cape-Town based HCWs (50), 47% reported regularly counselling their clients on IUCDs while in a nationally representative survey (5, 29), 16% of clinicians were identified who provide the Cu-IUD to their clients and only 3% the LNG-IUS. Only one study reported on HCWs knowledge of the Cu-IUD as a form of EC. Among HCWs in Pietermaritzburg, 66% of doctors correctly identified the method compared to only 15% of hospital and clinic nurses.

Attitudes and perceptions:

Studies further reported on HCWs attitudes and perceptions regarding IUCDs. Incorrect

candidate selection based on age, parity and HIV-status was observed. One study (29) conducted on a nationally representative sample of clinicians identified that less than 25% considered IUCD insertion safe immediately postpartum due to infection and perforation fears. Three studies (18, 20, 29) reported HCWs restrictions of IUCD based on a client's age. Among 29 HCWs in Soweto (20), only three identified IUCDs as ideal for adolescents due to their long-acting nature while several HCWs in the ANC and HIV departments admitted to not knowing what IUCDs are. Similarly, across a nationally representative sample of clinicians, 2% believed IUCDs to be appropriate for nulliparous adolescents (29). Contrary to this, among 32 Eastern and Western Cape HCWs, only eight believed IUCDs could not be used among adolescents. Two studies (18, 29) reported conflicting results regarding IUCDs suitability for nulliparous women. Across the Eastern and Western Cape (18), 22% of HCWs believed the devices could not be used while more than 50% found it contraindicated among in national survey (29). For HIV-infected women, evidence was mixed. Among Cape Town and Durban HCWs (19, 26), IUCD was encouraged, especially in conjunction with condoms while in the national survey (29) and study of Eastern and Western HCWs (18) 95% and 25% reported IUCD as unsafe for this population, respectively.

4.4.1.3.3. Knowledge, attitudes, and perceptions regarding injectable contraceptives

There were no studies conducted in South Africa that explored HCWs knowledge regarding injectable contraceptives. Moreover, the number of studies that provided information on HCWs attitudes and perceptions towards the method was also limited.

Attitude and perceptions:

Healthcare workers attitudes and perceptions in South Africa reflect those identified across SSA. The primary disadvantage identified was the occurrence of side-effects that reduced a client's adherence to the method (19, 26). Despite this, some HCWs acknowledged that the side-effects may be managed and that counselling the client was imperative. A nurse explained:

"The most common side effect is the headache, the weight gain. Educate. Don't say "change the method", educate. Stay on the method. Unless there are severe, severe side effects".[129] (26, pg. 11).

Only one study provided insight into HCWs perceptions of HIV-infected women's suitability for injectable contraceptives (26). A nurse from Durban explained that in her facility only the 3-month injectable (not two-month) was provided to HIV-infected women due to interactions with ART regimens. In addition, it was reported that clients were always advised to use dual protection with condoms (26) however, this was not endorsed by the community:

"The HIV positive patients, we advise them to use condoms. They say [condoms] are uncomfortable, I'm going to die anyway, so [I'd rather have] "flesh on flesh" [sex]. We discourage "flesh on flesh" and still encourage them to use condoms. They say they don't enjoy sex with a condom. There are people who say 'I'd rather die than use a condom'".[129] (26, pg. 13).

Only one study (20) reported information regarding HCWs perceptions of injectables suitability for adolescents. Among HCWs in Soweto, the most endorsed method (followed by abstinence) were injectables as they allowed adolescents not to worry about falling pregnant for a period of two to three months.

Further perceptions among HCWs regarding injectables within South Africa were not reported on.

4.4.1.3.4. Knowledge, attitudes, and perceptions regarding the contraceptive implant

Knowledge:

Two studies conducted in South Africa (2, 6) reported that the training HCWs received was insufficient and only conducted over a very short period, often by a colleague in the department. One professional nurse from Johannesburg explained:

"…We were only trained for 2 days … I feel like the training was not sufficient … I think I need intense trainings in order for me to deliver the service effectively". (2, pg. 823).

Another professional nurse from the study reiterated the lack of training received:

"… I was trained by another professional nurse; I would really not call it a proper training honestly … I think I need to start afresh when it comes to the implant and receive training for months …" (2, pg. 823).

An additional study conducted in Cape Town described that respondents felt the training

efforts during the introduction of the implant was unorganised and only target driven. Unsurprisingly, a lack of overall implant training and knowledge translated into a lack of skill and confidence to counsel clients regarding the implant (2, 6). With a clear lack of training received, many providers expressed their desire to undergo more intense implant education. More than 60% of providers across South Africa and Zimbabwe communicated their desire to receive additional training (2, 29) with one professional nurse stating:

"I think I need to start afresh when it comes to the implant and receive training for months".[143] (2, pg. 823).

Two studies further reported that HCWs acknowledge the verity that a lack of skill on insertion, counselling, and knowledge of how the device works directly hinders the quality of service that they can provide to clients while also threatening the trust of the client-provider relationship (2, 6).

Attitudes and perceptions:

Two studies (2, 6) suggested that providers were averse to promoting the implant to their client based on the side-effects experienced by the women which in their opinion was not as manageable as those experienced from DMPA-IM. A South African nurse explained:

"I wouldn't go for it. I would stick to the known method – the pill or the injection. They've been around forever … It has its side-effects, but when you deal with it, it's sorted … For instance, when they take the injection, they bleed and I give them Ovral. It settles as the body adjusts to the method … I don't think it's [Implanon NXT] working, honestly, because of the removals we are doing and they [users] will tell you that they will never go for this method again".[143] (2, pg. 825).

HCWs further attributed their reluctancy to suggest the method to the high rate of implant removals women requested after only a short period of insertion (2). According to HCWs (2), the high number of removals being requested was directly associated with unbearable side-effects experienced by clients, particularly bleeding:

"…people often come here to remove the implant and nobody wants to insert it because of the side-effects".[143] (2, pg. 824)

The high rate of early removals added further pressure on nurses, increasing their workload

significantly due to the time-consuming nature of removals (2). From one study conducted in South Africa (2), nurses questioned whether removals were within their scope of practice due to the surgical-like procedure requiring a high level of skill.

A further cause of reluctance to counsel women, particularly in South Africa (2, 6) was the unclear guidelines for the implant's suitability for HIV-infected women. Providers expressed their difficulty in interpreting current guidelines, indicating their preference to rather exclude the implant in the method mix to women on any ART, not just those on an Efavirenz regime. HCWs further noted their knowledge of WHO recommendations but felt that these contradicted the country's guide. An overall pattern of restricting the implant altogether for HIV-infected women emerged as this was considered the easiest and safest practice. An HIV clinician stated the following with regards to HIV-infected women:

"I do think it's probably easier just to take out the implant – you just learn the rule and then you follow it".[144] (6, pg. 6).

4.4.2. **Quantitative meta-analysis**

The following section outlines the results obtained from the meta-analysis, exploration of heterogeneity (I^2-statistic) and publication bias (through Egger's tests) for each of the pre-determined questions. The results presented included the effect size within each study, the pooled effect size by region and the overall effect size of the studies within the analysis.

Question 1: *Have you received training in family planning counselling?*

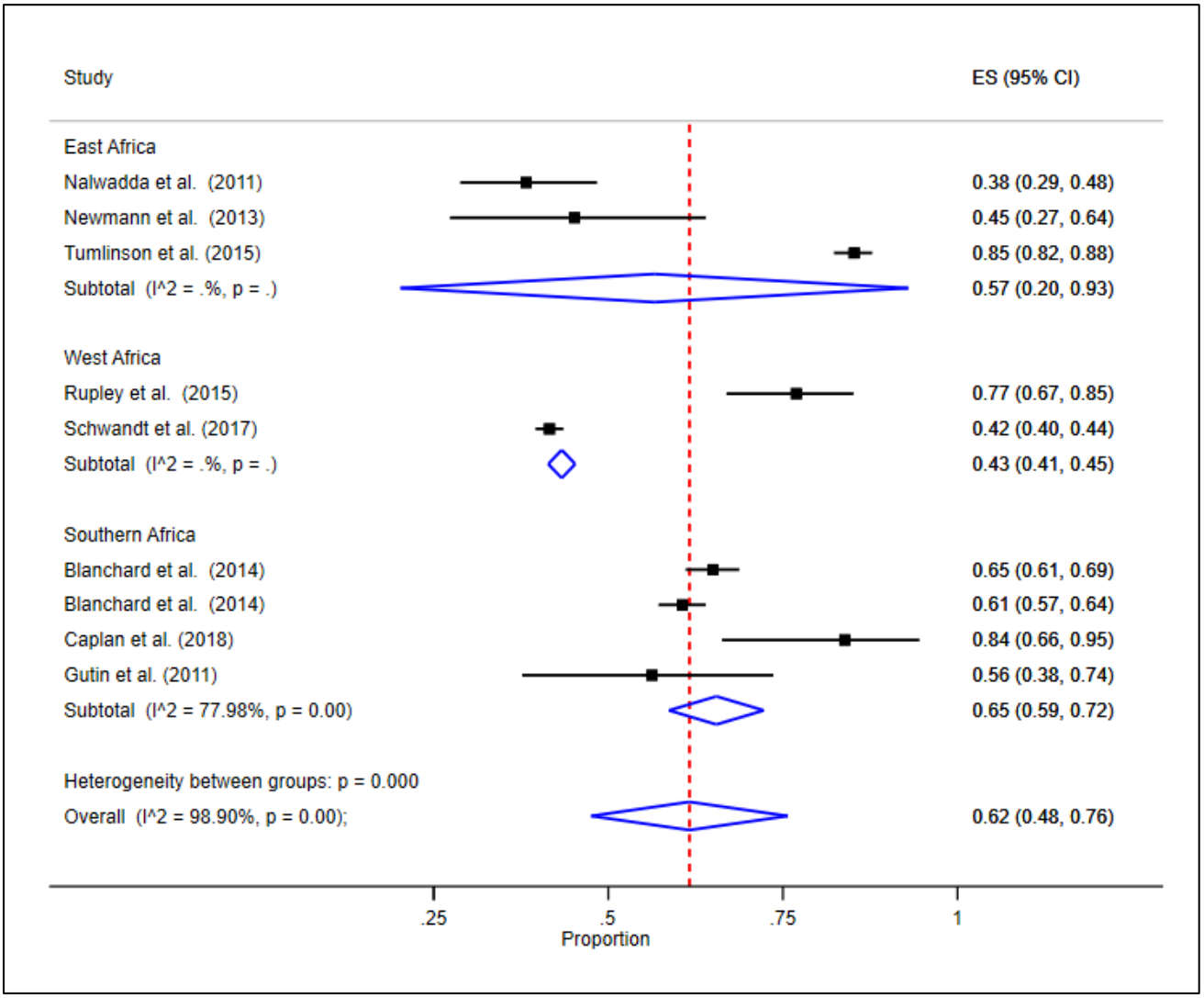

Figure 16: Proportion of respondents who have received family planning counselling training.

The results from the meta-analysis to explore question 1 (figure 16) indicate that overall, 62% (95%CI: 48 to 76) of the health providers included in the analysis had received training in family planning counselling. According to the sub-group analysis, this proportion was highest in Southern Africa at 65% (95% CI: 59 to 72), followed by East Africa with 57% (95% CI: 20

to 93) of providers trained. The lowest proportion of providers who reported having received training is seen in West Africa at 43% (95 CI: 41 to 45).

Through the use of the I^2-statistic, overall heterogeneity was seen to be high (98.90%, p<0.0001). In addition, the evidence for high heterogeneity indicates that the results should be interpreted with caution.

The possibility of publication bias was investigated visually through a funnel plot (figure 17) as well as statistically with an Egger's test. The funnel plot presents symmetry across the studies indicating a lack of publication bias. Statistically, the Eggers test confirms that there is little evidence for publication bias resulting from small study effects (p=0.654).

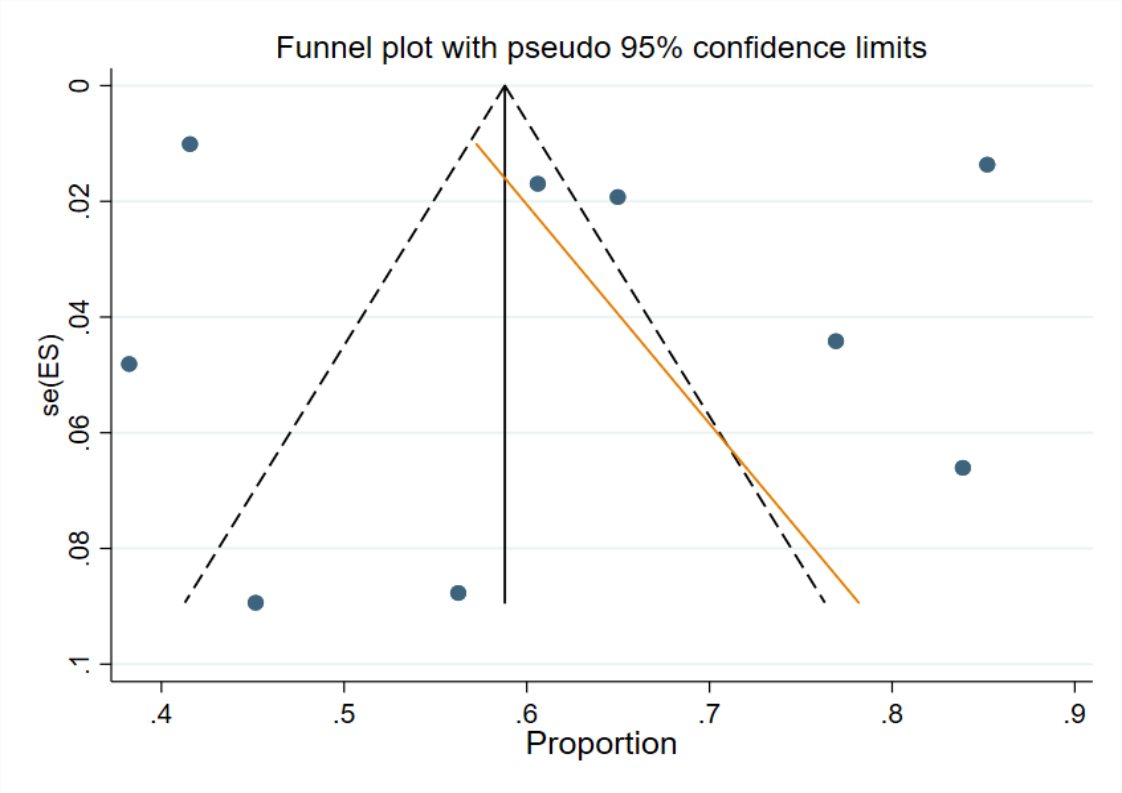

Figure 17: Funnel plot for the exploration of publication bias for question 1.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 9 Root MSE = 10.04

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	0.546	0.112	4.860	0.002	0.280	0.811
bias	2.640	5.641	0.470	0.654	-10.698	15.978

Test of H0: no small-study effects P = 0.654

Question 2: *Do you provide family planning counselling to your clients?*

The meta-analysis to explore the proportion of providers who actually provide family planning counselling to their clients (figure 18) suggests that only 60% (95% CI: 41 to 80) do so. The studies included in the analysis were conducted in East Africa and West Africa. A higher proportion of providers in West Africa (65% [95% CI: 58 to 73]) reported providing counselling in comparison to East African providers (57% [95% CI: 28 to 86]).

The overall heterogeneity of the analysis was high with the I^2-statistic at 97.587% (p<0 .0001). For this reason, the result is interpreted with caution.

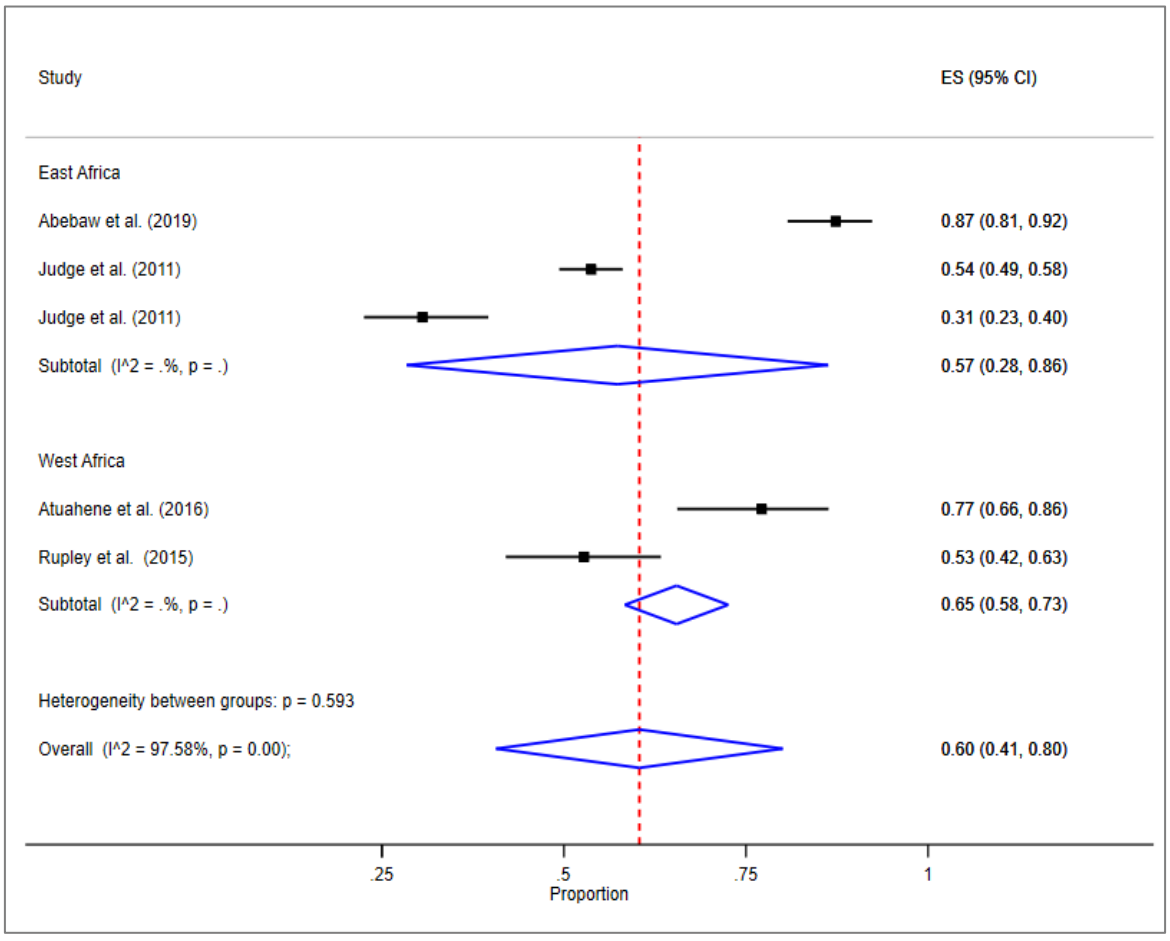

Figure 18: Proportion of respondents who provide family planning counselling

In relation to publication bias, there is little evidence to indicate this to be of consequence in the analysis. The funnel plot showing in figure 19 reveals adequate symmetry with the null hypothesis of the Egger's test for small-study effects failing to be rejected (p=0.880).

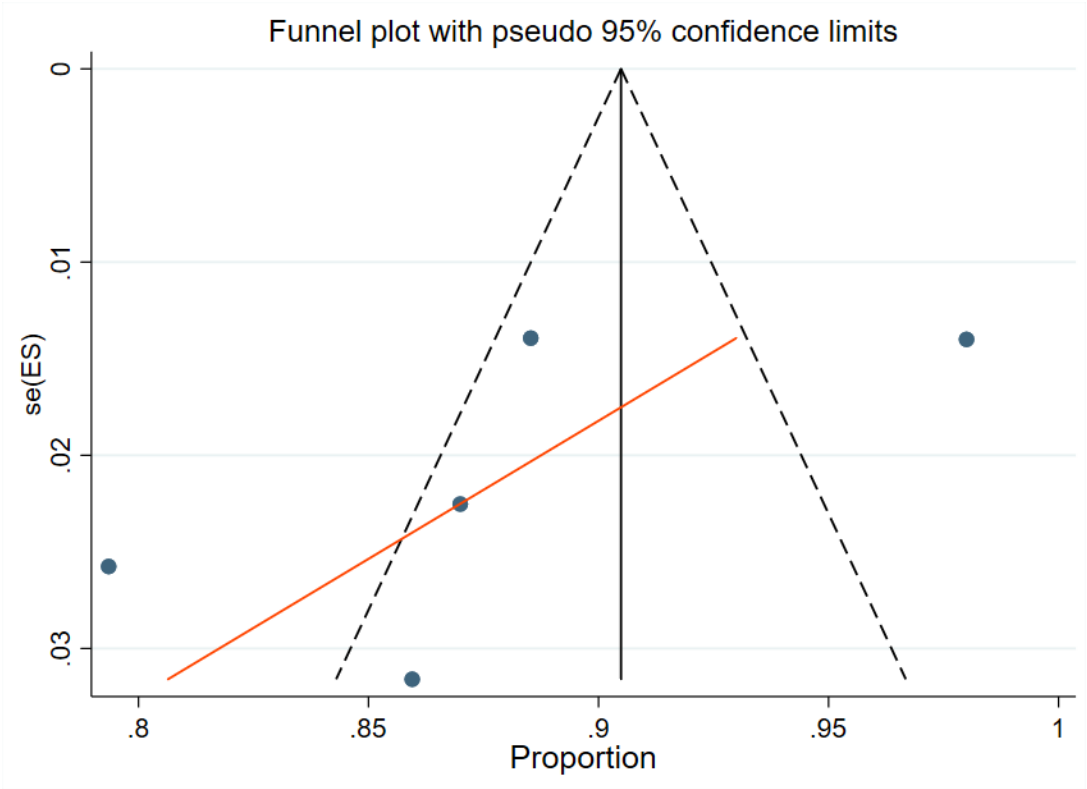

Figure 19: Funnel plot to investigate publication bias for question 2.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 5 Root MSE = 7.387

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	0.669	0.319	2.100	0.127	-0.345	1.683
bias	-1.611	9.789	-0.160	0.880	-32.764	29.541

Test of H0: no small-study effects P = 0.880

Question 3: *Have you ever heard of emergency contraception?*

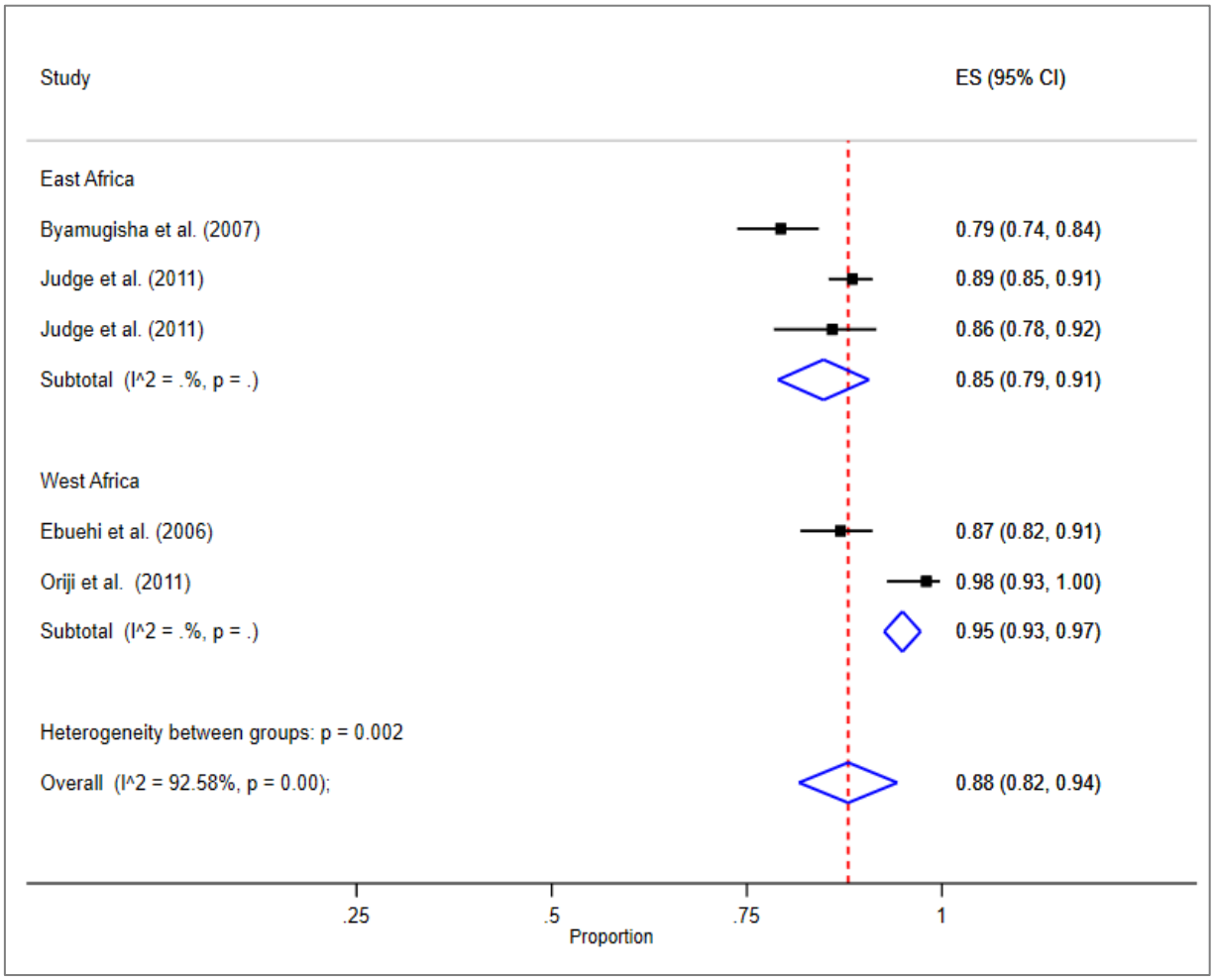

Figure 20: Proportion of respondents who are heard of emergency contraceptives.

Figure 20 above demonstrates that a high proportion of the providers included in the analysis of this question were aware of emergency contraceptives (88% [95% CI: 82-94]). The proportion was high among providers in both East and West Africa, however, there was a moderately large difference between the two regions. A total of 95% (95% CI: 93 to 97) reported having heard of emergency contraceptives compared to 85% (95% CI: 79 to 91) of providers within East Africa.

In relation to heterogeneity, the I^2-statistic was high indicating that 92.58% ($p<0.0001$) of the variance of the effect size may be attributable to heterogeneity. Therefore, the result is interpreted with caution.

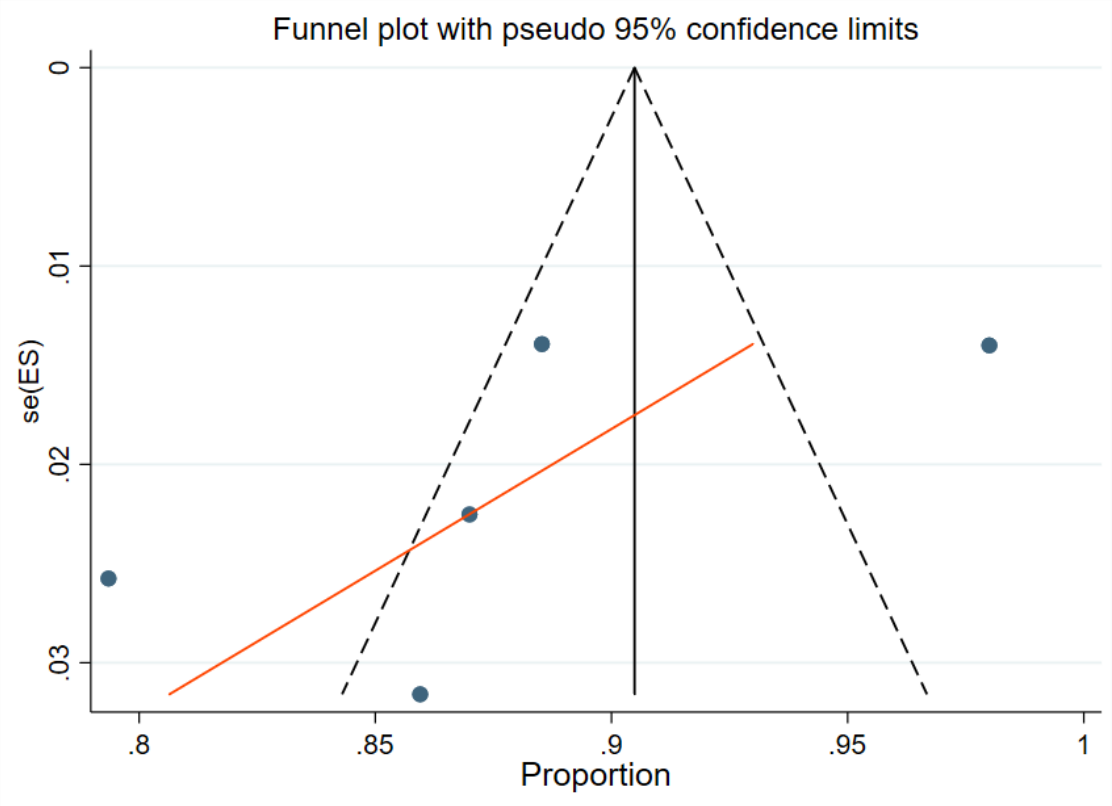

Figure 21: Funnel plot to explore publication bias of question 3.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 5 Root MSE = 3.187

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	1.027	0.085	12.120	0.001	0.758	1.297
bias	-6.996	4.603	-1.520	0.226	-21.644	7.651

Test of H0: no small-study effects P = 0.226

The exploration of publication bias for this question revealed little evidence thereof with the funnel plot visually portraying symmetry. In addition to this, the Egger's test shows a lack of evidence for small-study effects with a p-value of 0.226 thereby failing to reject the null hypothesis.

Question 4: *The number of providers who correctly identify the Copper-intrauterine device as a form of emergency contraception.*

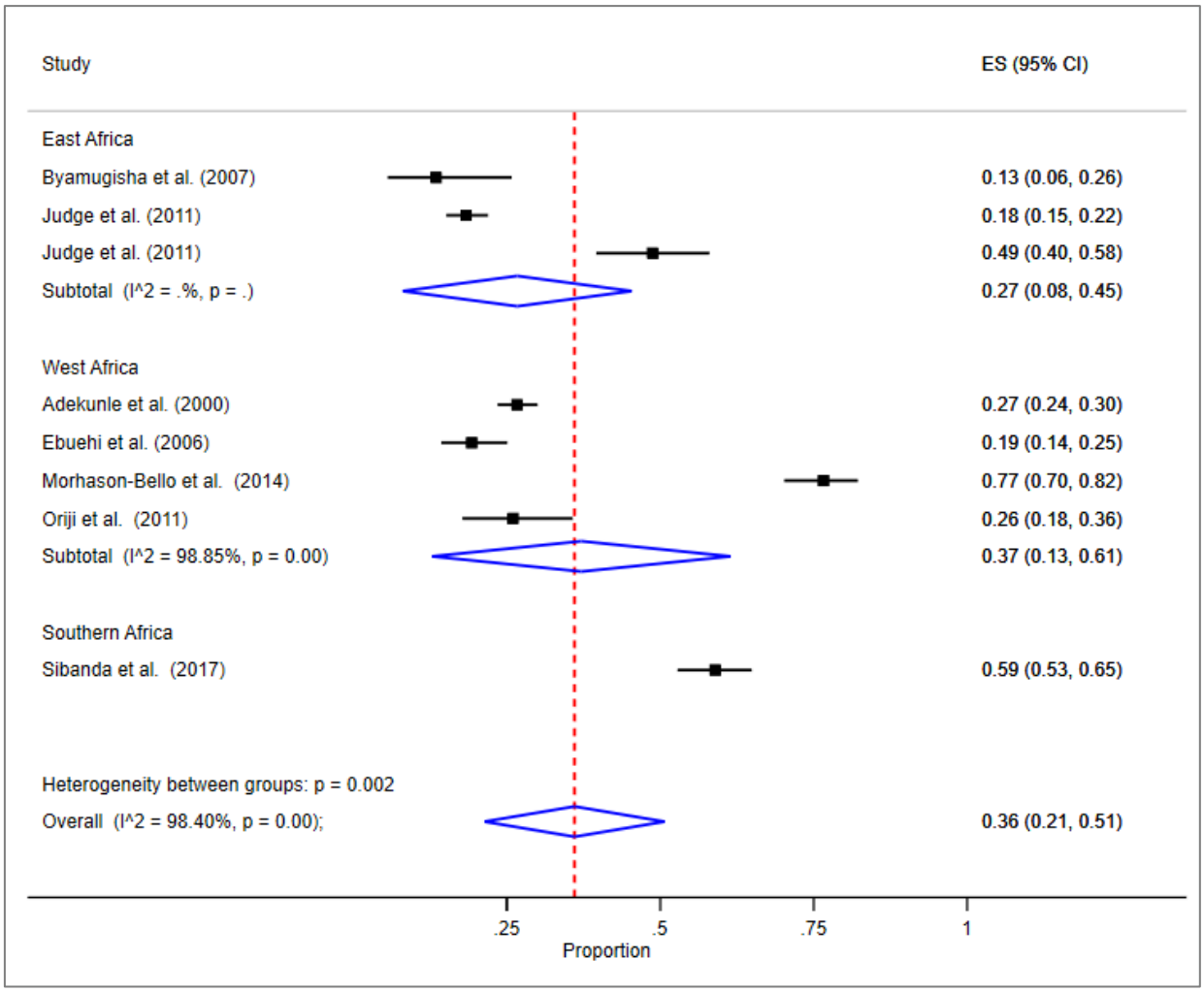

Figure 22: The proportion of respondents correctly identifying the Cu-IUD as a form of emergency contraception

A total of six studies reporting results from seven countries across three regions were included in the analysis of this question. Although only one study was included in the analysis from Southern Africa, the highest proportion (59% [95%CI: 53 to 65) of providers identifying the Cu-IUD as a form of emergency contraception was found here. The lowest proportion of providers identifying the Cu-IUD was found in East Africa at 27% (95%CI: 8 to 45). West Africa was slightly higher at 37% (95%CI: 13 to 61). Overall, across all studies and regions, only 36% (95%CI: 21 to 51) of the providers were able to correctly characterise the Cu-IUD as a method to be used as emergency contraception.

According to the I^2-statistic, overall heterogeneity was high at 98.4% ($p<0.0001$).

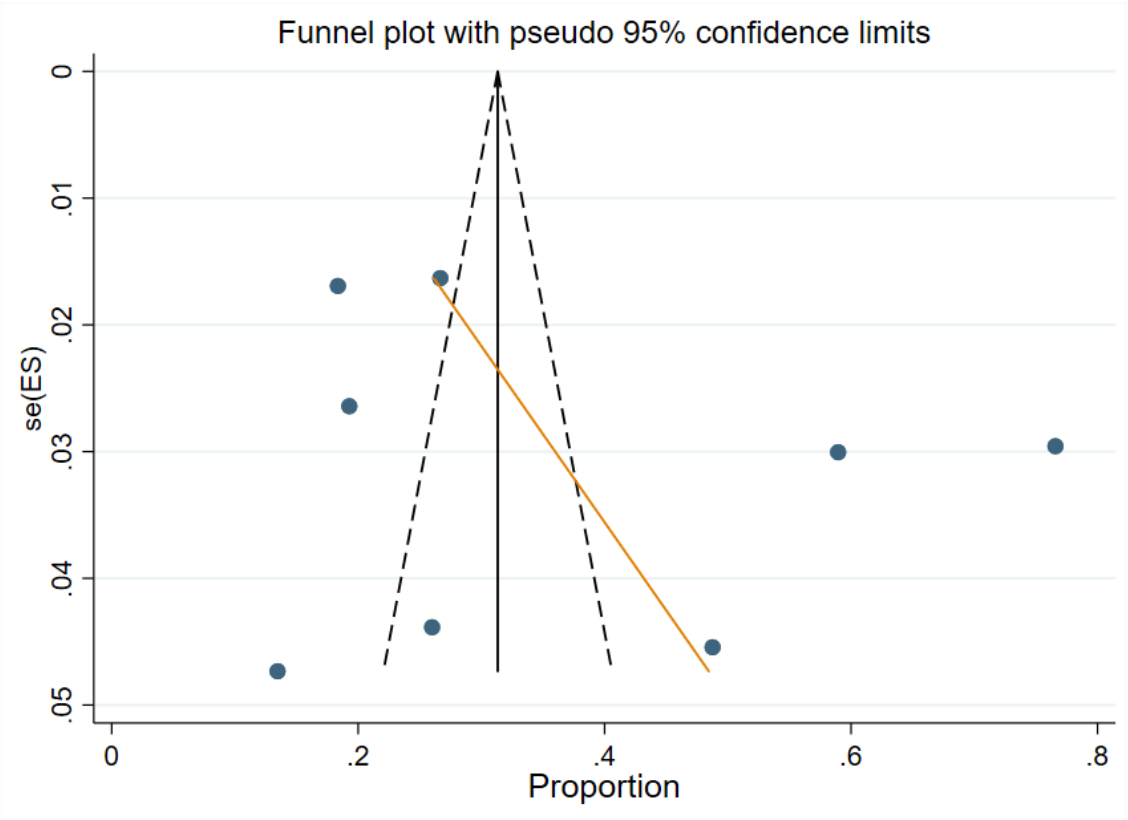

Figure 23: Funnel plot to explore publication bias of question 4.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 8 Root MSE = 7.93

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	0.144	0.188	0.770	0.473	-0.316	0.604
bias	7.194	7.398	0.970	0.368	-10.909	25.297

Test of H0: no small-study effects P = 0.368

In assessing for publication bias, the funnel plot seen in figure 23 illustrates a degree of symmetry. This is substantiated by the results from the Egger's test in which the null hypothesis supporting no small-study effects has failed to be rejected (p=0.368) indicating little evidence for the presence of publication bias.

Question 5: *Are you trained to insert intrauterine contraceptive devices (IUCD)?*

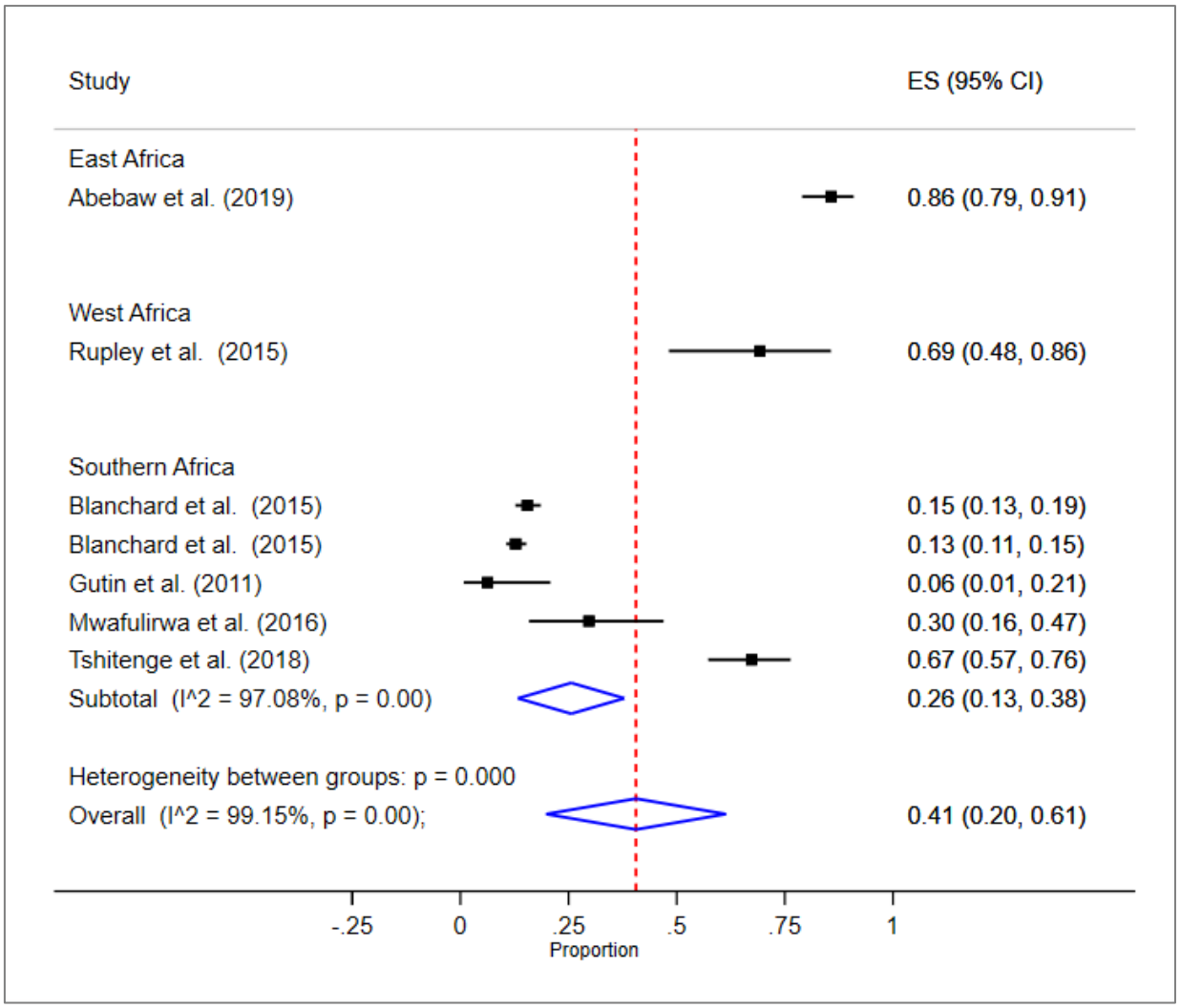

Figure 24: Proportion of respondents trained to insert IUCD.

The majority of the studies (5) included in the analysis for this question were conducted in Southern Africa. Among these studies, the overall proportion of providers who were trained to insert IUCD was 26% (95%CI: 13 to 38). In contrast to this, studies conducted in West and East Africa reported much higher proportions of providers trained in insertion; 69% (95%CI: 48 to 86) and 86% (95%CI: 79 to 91), respectively. Results from the overall analysis of the studies demonstrate that the proportion of providers in SSA trained in IUCD insertion is 41% (95%CI: 20 to 61).

The heterogeneity among the studies was high as indicated by the I^2-statistic of 99.15% ($p<0.001$).

During the exploration of publication bias, as seen in figure 25, the funnel plot demonstrates symmetry indicating a potential lack of evidence for the presence of publication bias.

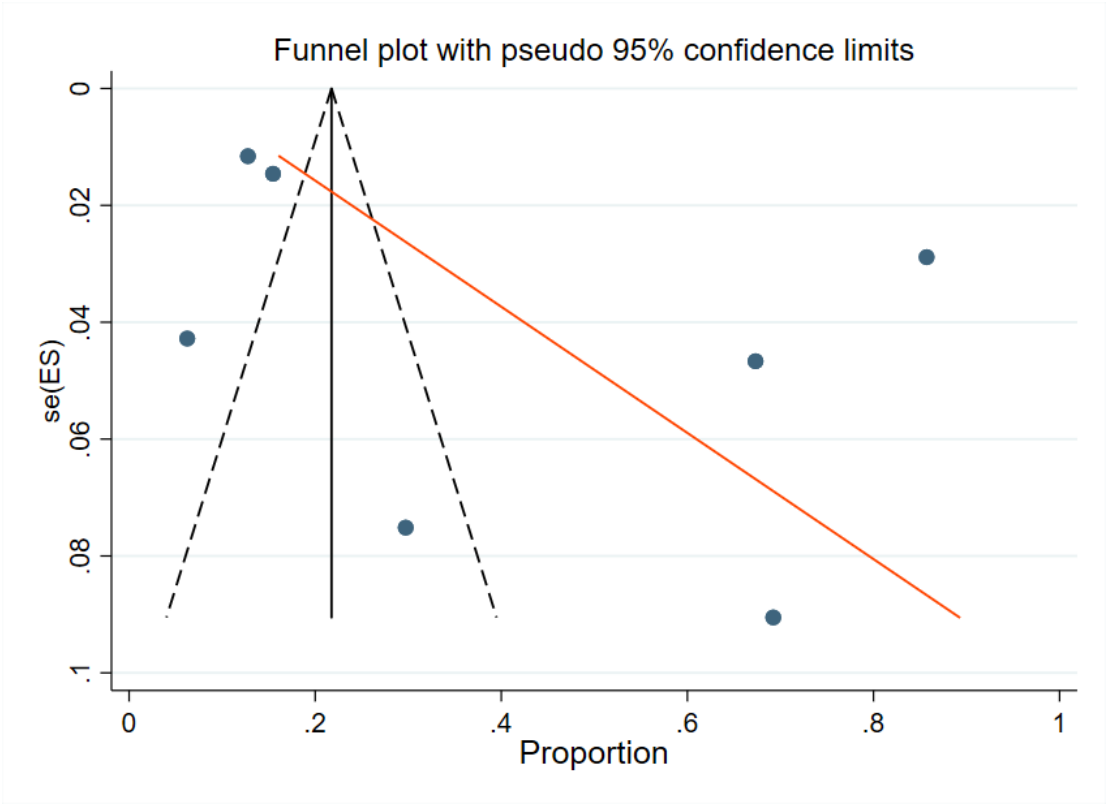

Figure 25: Funnel plot to explore publication bias for question 5.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 7 Root MSE = 9.98

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	0.054	0.140	0.390	0.715	-0.305	0.413
bias	9.263	6.397	1.450	0.207	-7.181	25.707

Test of H0: no small-study effects P = 0.207

The possibility of publication bias was further explored statistically using the Egger's test in which an insignificant p-value was obtained (p=0.207) thereby reinforcing the lack of evidence for the presence of publication bias.

Question 6: *Do you desire more training on IUCD?*

To assess the proportion of providers who indicated a desire for more training on IUCD, only studies conducted in Southern Africa were appropriate for inclusion. Through these studies, it was found that 63% (95%CI: 44 to 81) of providers in the analysis expressed a desire to receive more training on IUCD. Heterogeneity among the studies was high (I^2-statistic= 97.72%, p<0.0001).

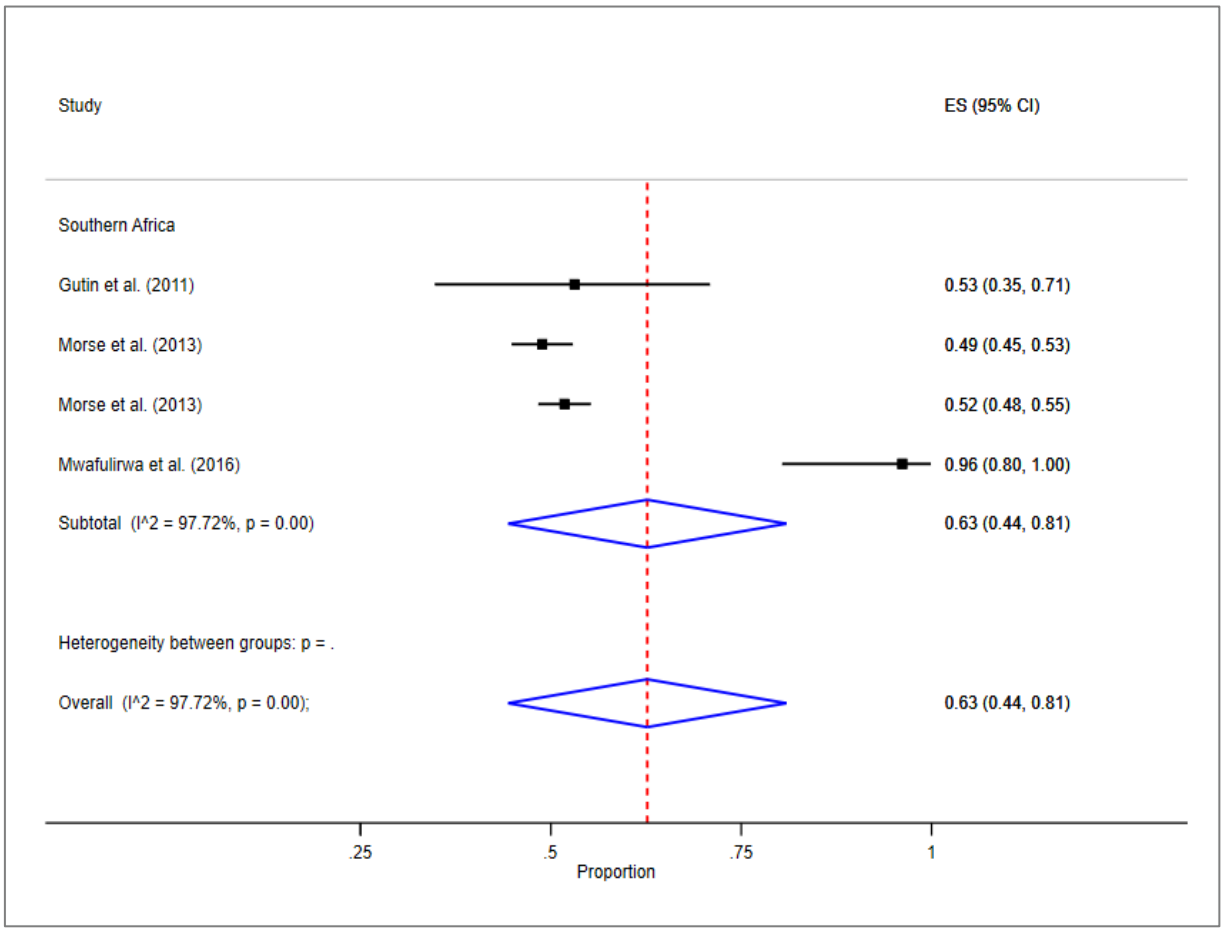

Figure 26: Proportion of respondents desiring training on IUCD.

Publication bias was considered an issue in the analysis due to the observed symmetry within the funnel plot (figure 26) and the failure to reject the null hypothesis (p= 0.503) of the Egger's test for small-study effects.

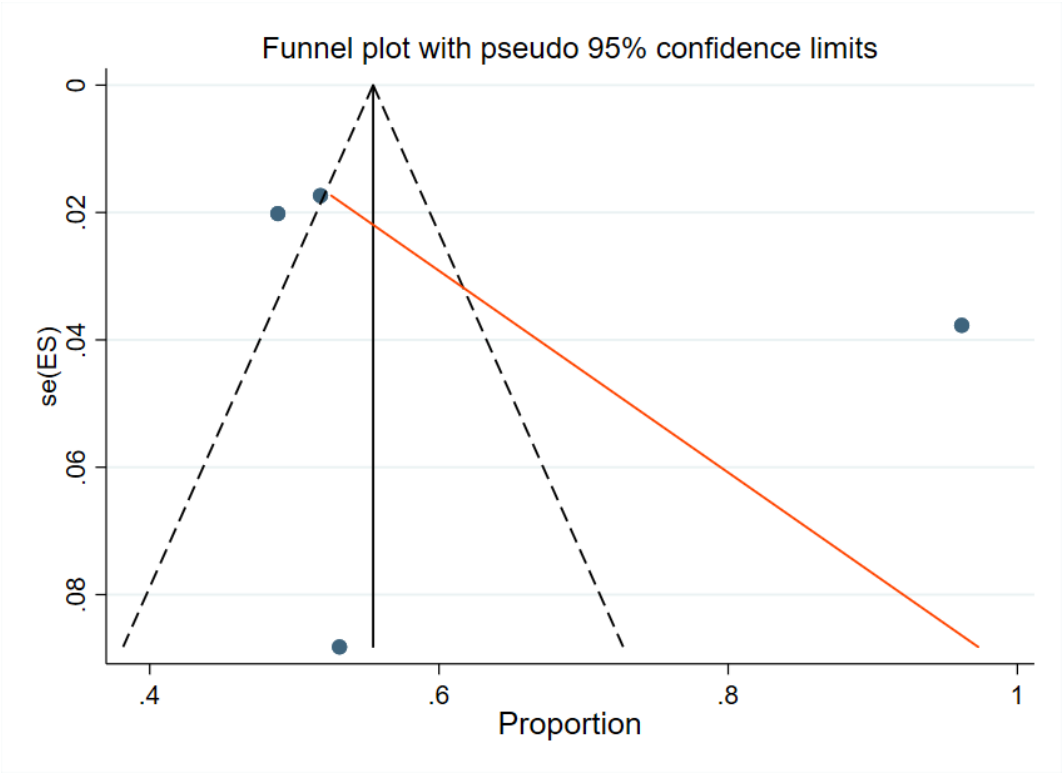

Figure 27: Exploration of publication bias for question 6.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 4 Root MSE = 7.038

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	0.416	0.191	2.170	0.162	-0.408	1.240
bias	6.312	7.785	0.810	0.503	-27.185	39.809

Test of H0: no small-study effects P = 0.503

Question 7: *Do you perceive IUCD to be suitable/safe for HIV-infected women?*

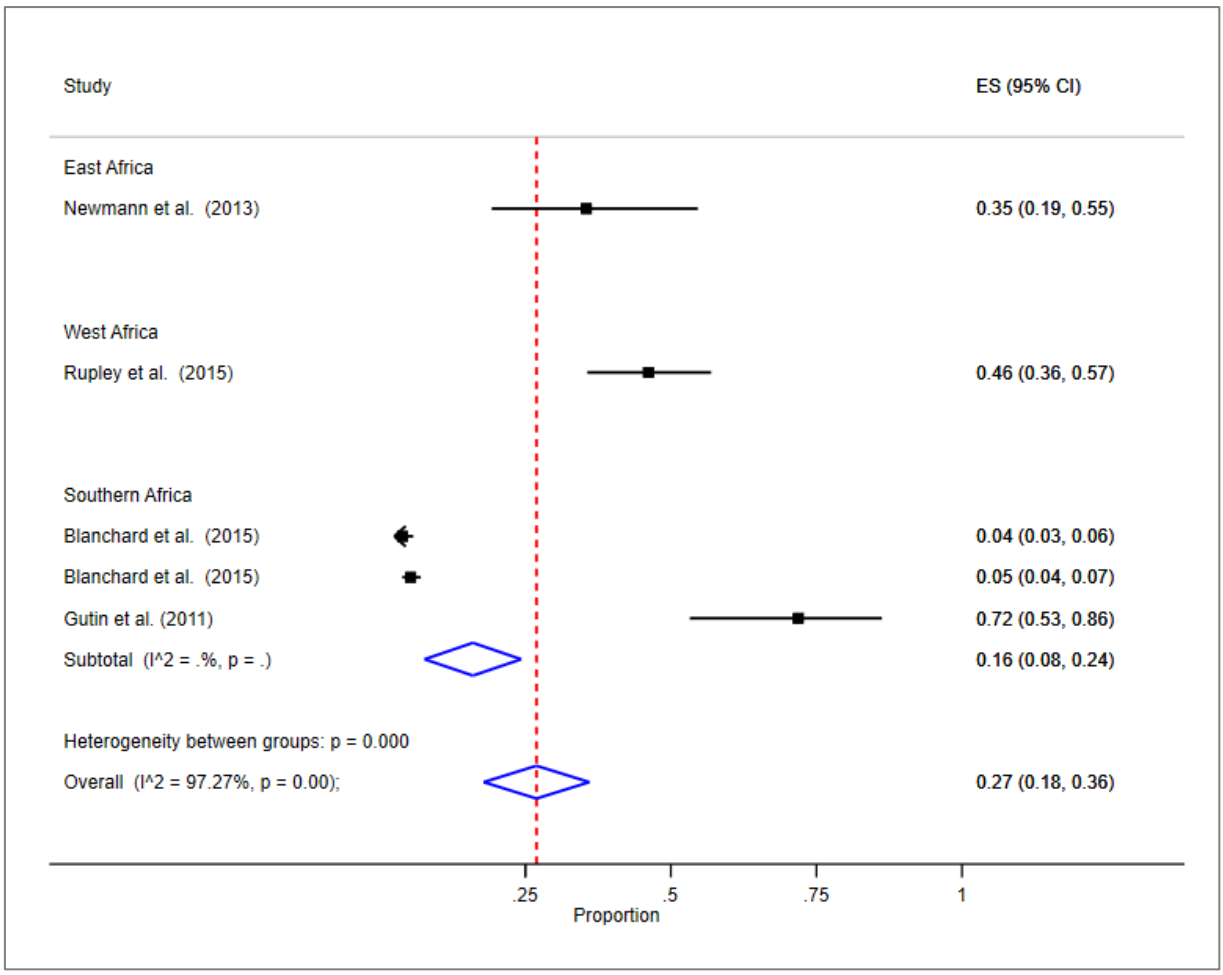

Figure 28: Proportion of respondents who perceive IUCD to be suitable for HIV-infected women

The overall proportion of providers from the analysis (including studies from Southern, West and East Africa) who considered IUCD to be suitable for women infected with HIV was a low 27% (95%CI: 18 to 36). The proportion was low across all regions, particularly the Southern with only 16% (95%CI: 8 to 24) considering IUCD suitable. Although results from two studies within Southern Africa indicated very low proportions (4% (95%CI: 3 to 6) and 5% (95%CI: 4 to 7)), one study revealed a high proportion of 72% (95%CI: 53 to 86). Each study conducted in West and East Africa indicated a proportion of 46% (95%CI: 36 to 57) and 35% (95%CI: 19 to 55), respectively. As with the analysis of the previous questions heterogeneity among the studies was high (I^2-statistic= 97.27%, p<0.0001).

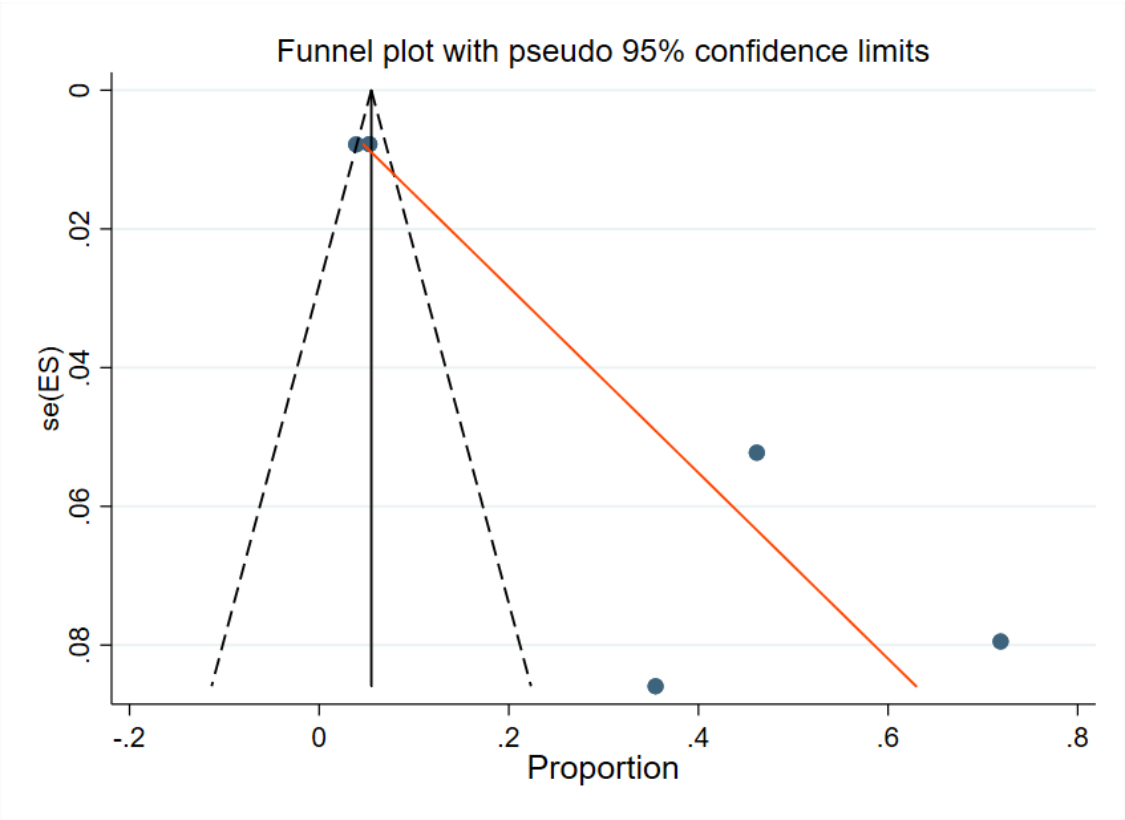

Figure 29: Funnel plot to explore publication bias for question 7.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 5 Root MSE = 2.41

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	-0.012	0.019	-0.600	0.589	-0.073	0.050
bias	7.462	1.582	4.720	0.018	2.428	12.497

Test of H0: no small-study effects P = 0.018

The funnel plot represented by figure 29 indicates a lack of symmetry leading to the possible presence of publication bias. Through further exploration thereof using the Egger's test, it was found that the null hypothesis was rejected (p=0.018) thereby indicating the presence of small-study effects. For this reason, the results of this question are interpreted with caution.

Question 8: *Do you impose minimum age restrictions on the provision of IUCD?*

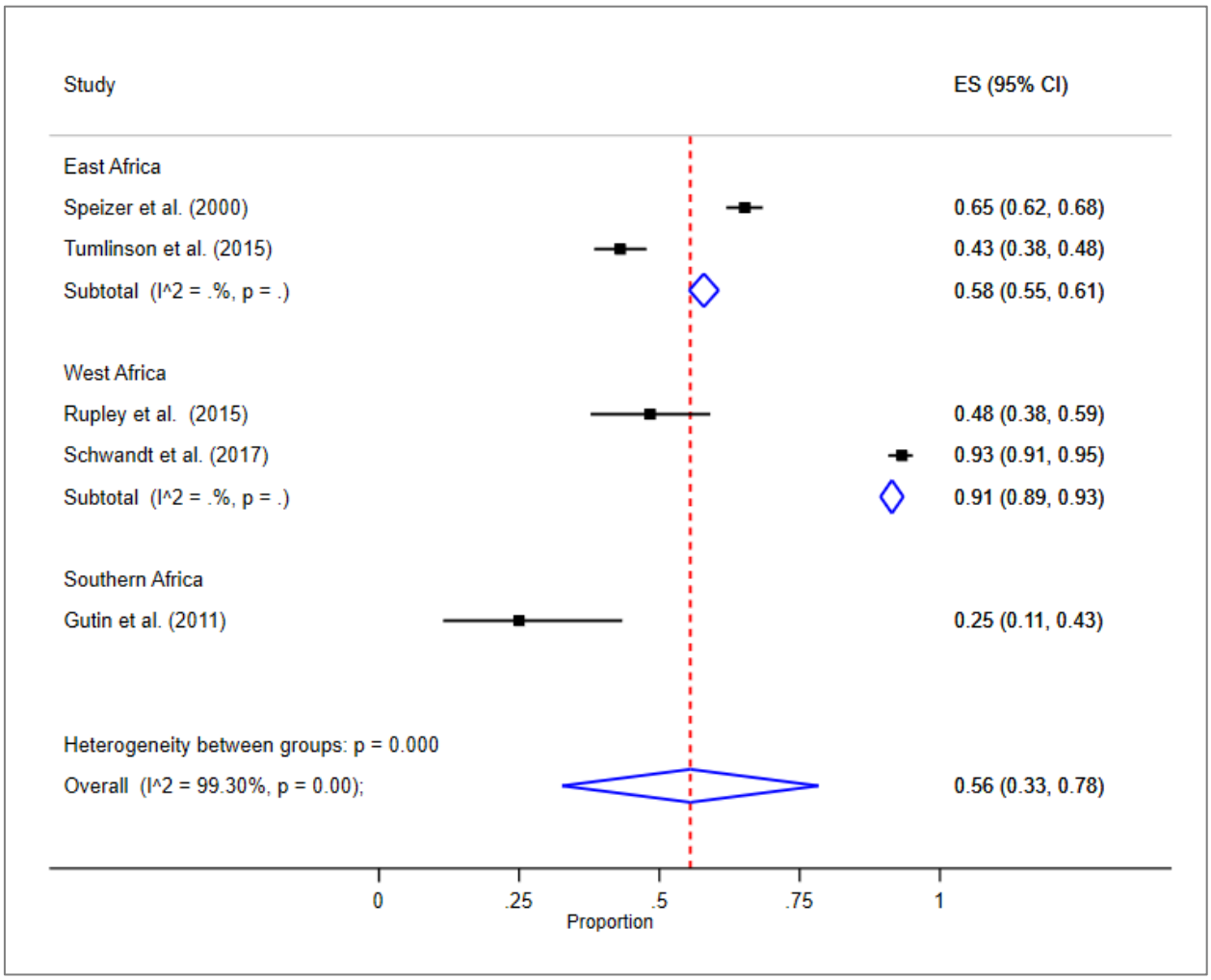

Figure 30: Proportion of respondents who impose minimum age restrictions for IUCD provision

A total of 56% (95%CI: 33 to 78) of HCWs included in the questions' analysis reported restricting the provision of IUCD based on the clients' minimum age. Through sub-analysis it was observed that the highest proportion of HCWs restricting the contraceptive devices on this criteria were in West Africa (91% [95%CI: 89 to 93]), followed by East Africa (58% [95%CI: 55 to 61]) and the lowest in Southern Africa (25% [95%CI: 11 to 43]).

There was a lack of homogeneity among the studies included in the analysis as seen by the high I^2-statistic (99.3%, p<0.0001).

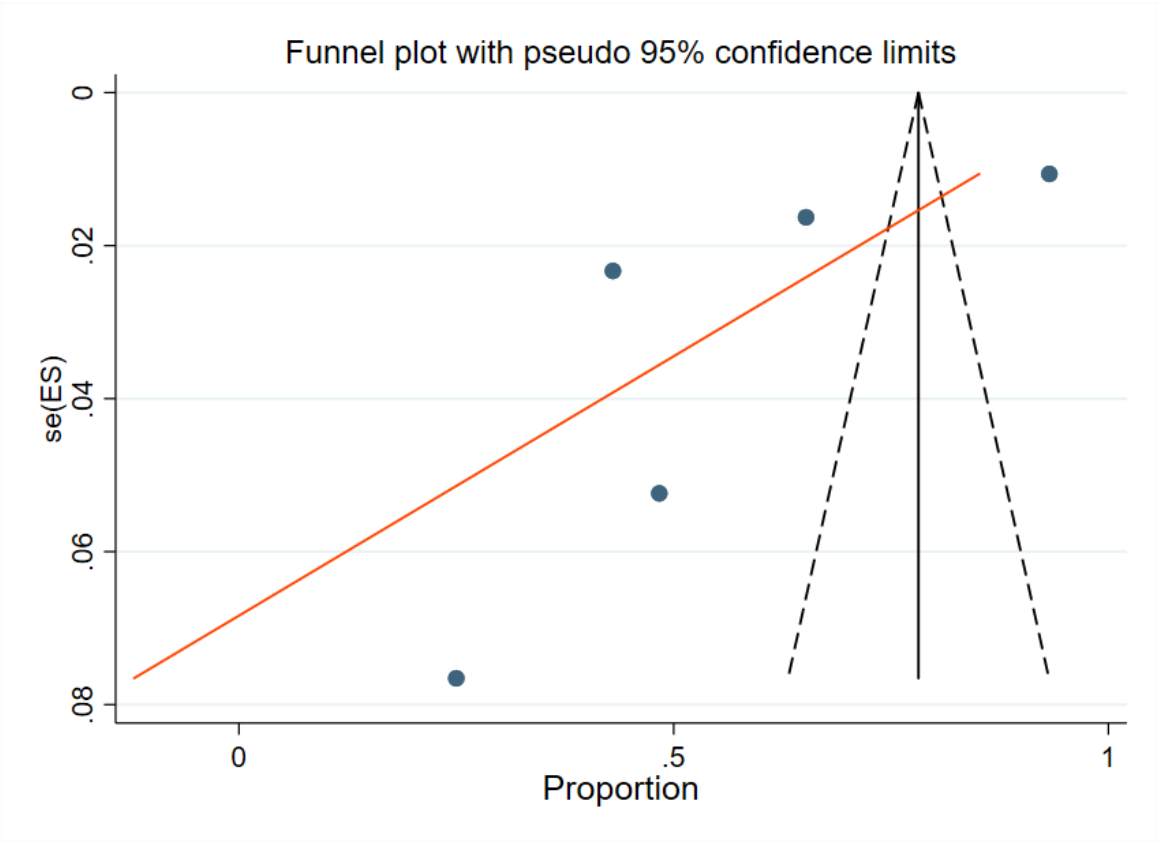

Figure 31: Funnel plot for the exploration of publication bias for question 8.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 5 Root MSE = 9.215

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	1.008	0.139	7.230	0.005	0.565	1.452
bias	-14.748	7.636	-1.930	0.149	-39.048	9.552

Test of H0: no small-study effects P= 0.149

The analysis to explore publication bias revealed symmetry within the funnel plot as seen in figure 31. In addition to this, the Egger's test that was conducted showed little evidence for publication bias (small-study effects) (p=0.149).

Question 9: *Do you impose minimum age restrictions on the provision of injectable contraceptives?*

For the investigation as to whether or not HCWs impose a minimum age restriction when providing injectable contraceptives, four studies reported results suitable to be combined. From the analysis, a total of 60% (95%CI: 36 to 84) of the HCWs restricted injectables based on the minimum age of the presenting client. A large difference was observed between studies conducted in East versus West Africa. Through subgroup analysis, it can be seen in figure 32 that 80% (95%CI: 78 to 82) of HCWs in West Africa restrict injectables based on minimum age in comparison to 57% (95%CI: 54 to 59) in East Africa.

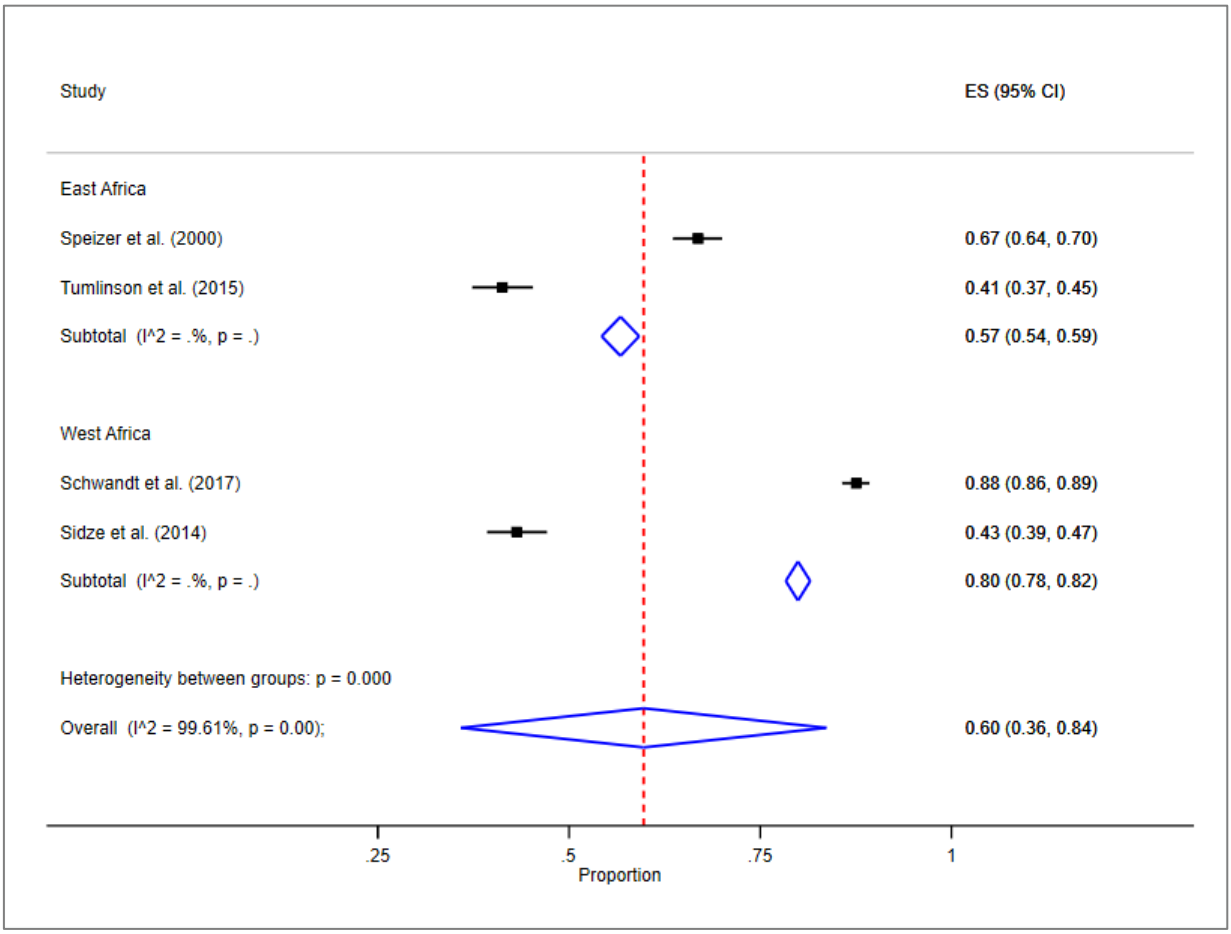

Figure 32: Proportion of respondents who restrict injectable contraceptives based on a minimum age

Using the I^2-statistic, it was observed that heterogeneity was high (99.61%, p<0.0001). Therefore, the results are interpreted with caution.

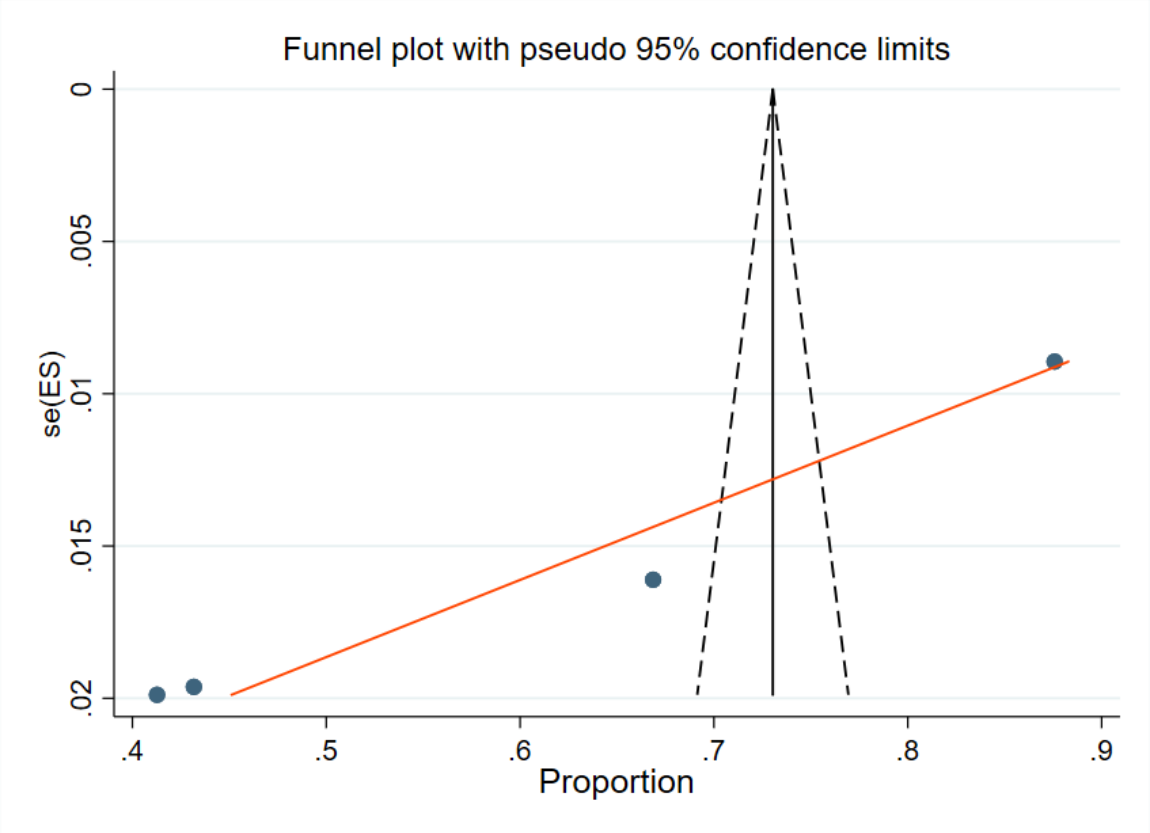

Figure 33: Funnel plot for the exploration of publication bias for question 9.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 4 Root MSE = 3.514

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	1.236	0.070	17.780	0.003	0.937	1.535
bias	-39.462	5.094	-7.750	0.016	-61.379	-17.545

Test of H0: no small-study effects P = 0.016

For the analysis of this question, there was evidence to suggest that publication bias was present. This is seen in asymmetry displayed in the funnel plot (figure 33) as well as in the Egger's test (p=0.016). The results from the analysis from this question are therefore interpreted cautiously.

Question 10: *Do you impose minimum parity restrictions on the provision of IUCD?*

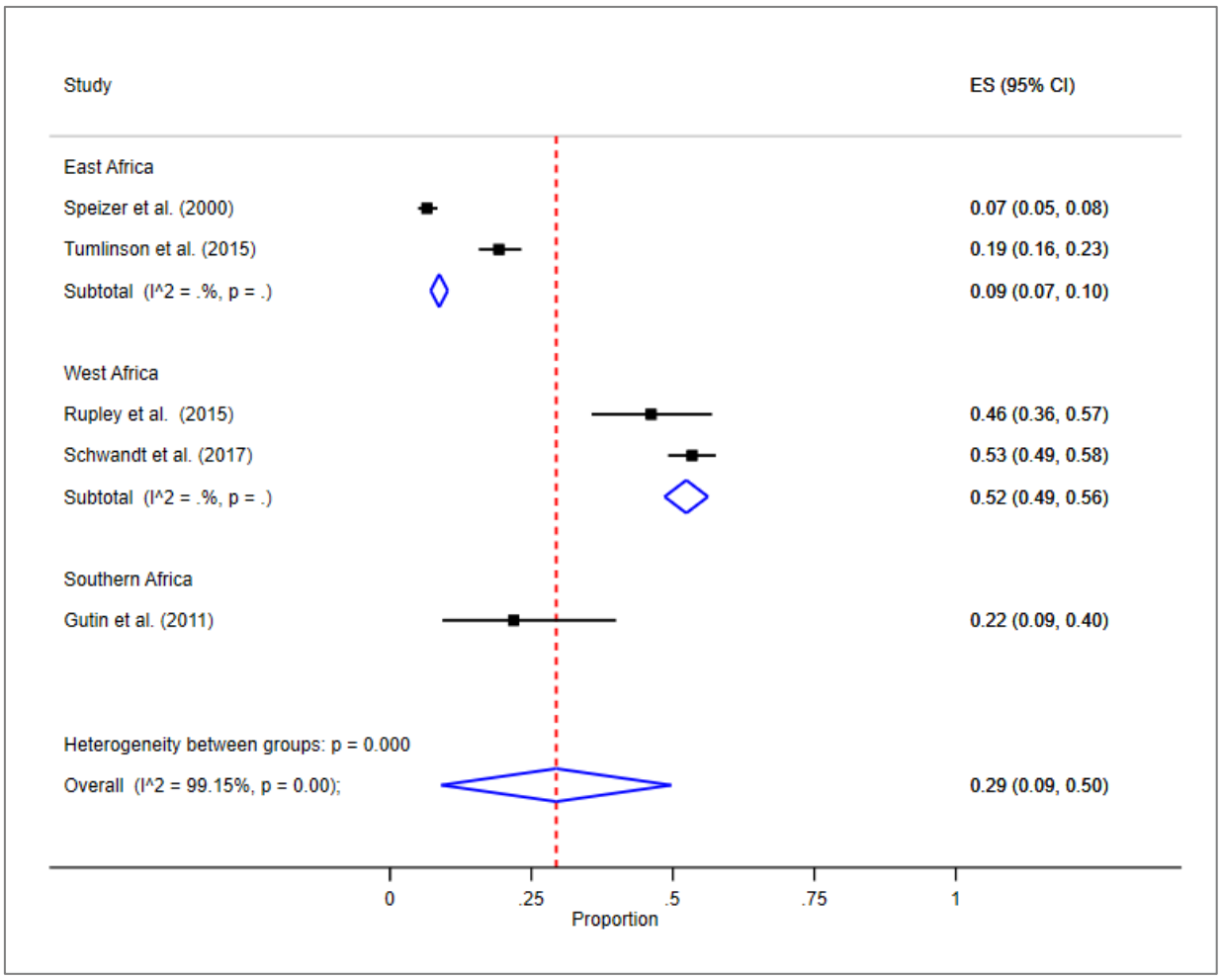

Figure 34: Proportion of respondents who impose minimum parity restrictions when providing IUCD.

The overall proportion of HCWs included in the analysis of this question who reported restricting access to IUCD based on minimum parity was 29% (95%CI: 9 to 50). The proportion of HCWs who did restrict access was highest in West Africa at 52% (95%CI: 49 to 56), followed by Southern Africa (22% [95%CI: 9 to 40), while the lowest proportion was noted in East Africa with only 9% (95%CI: 7 to 10) restricting access. Heterogeneity observed was high as indicated by the I^2-statistic (99.15%, p<0.0001).

In relation to publication bias, the funnel plot represented by figure 35 indicates a degree of symmetry suggesting that there is little evidence for the presence of publication bias. This is further supporting by the Egger's test yielding a p-value of 0.253 thereby failing to reject the null-hypothesis of no small-study effects within the analysis.

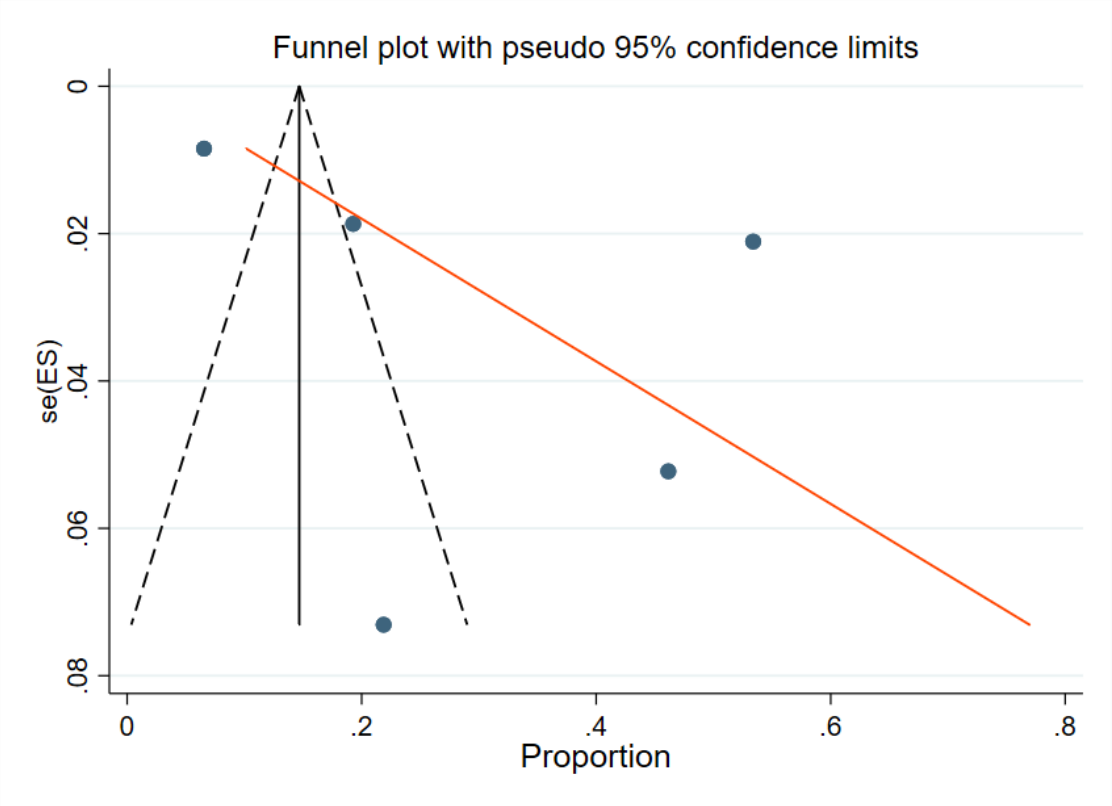

Figure 35: Funnel plot for the exploration of publication bias in question 10.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 5 Root MSE = 9.727

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	0.014	0.117	0.120	0.912	-0.358	0.386
bias	10.339	7.321	1.410	0.253	-12.960	33.639

Test of H0: no small-study effects P = 0.253

Question 11: *Do you impose minimum parity restrictions on the provision of injectable contraceptives?*

For the final question, three studies met the criteria to be included in the analysis, two from East Africa and one from West Africa. Within East Africa, a total of 26% (95%CI: 24 to 29) of HCWs testified to restricting access to injectable contraceptives based on minimum parity eligibility criteria. In comparison, at more than double, 56% (95%CI: 53 to 25) of HCWs in the study conducted in West Africa reported restricting the client's access to injectables due to minimum parity criteria. From this, the overall meta-analysis indicates a total of 36% (95%CI: 16 to 56) of HCWs restricting access to injectable contraceptives as a result of minimum parity requirements.

Due to the analysis including only 3 studies, the I^2-statistic was not computed and therefore not reported.

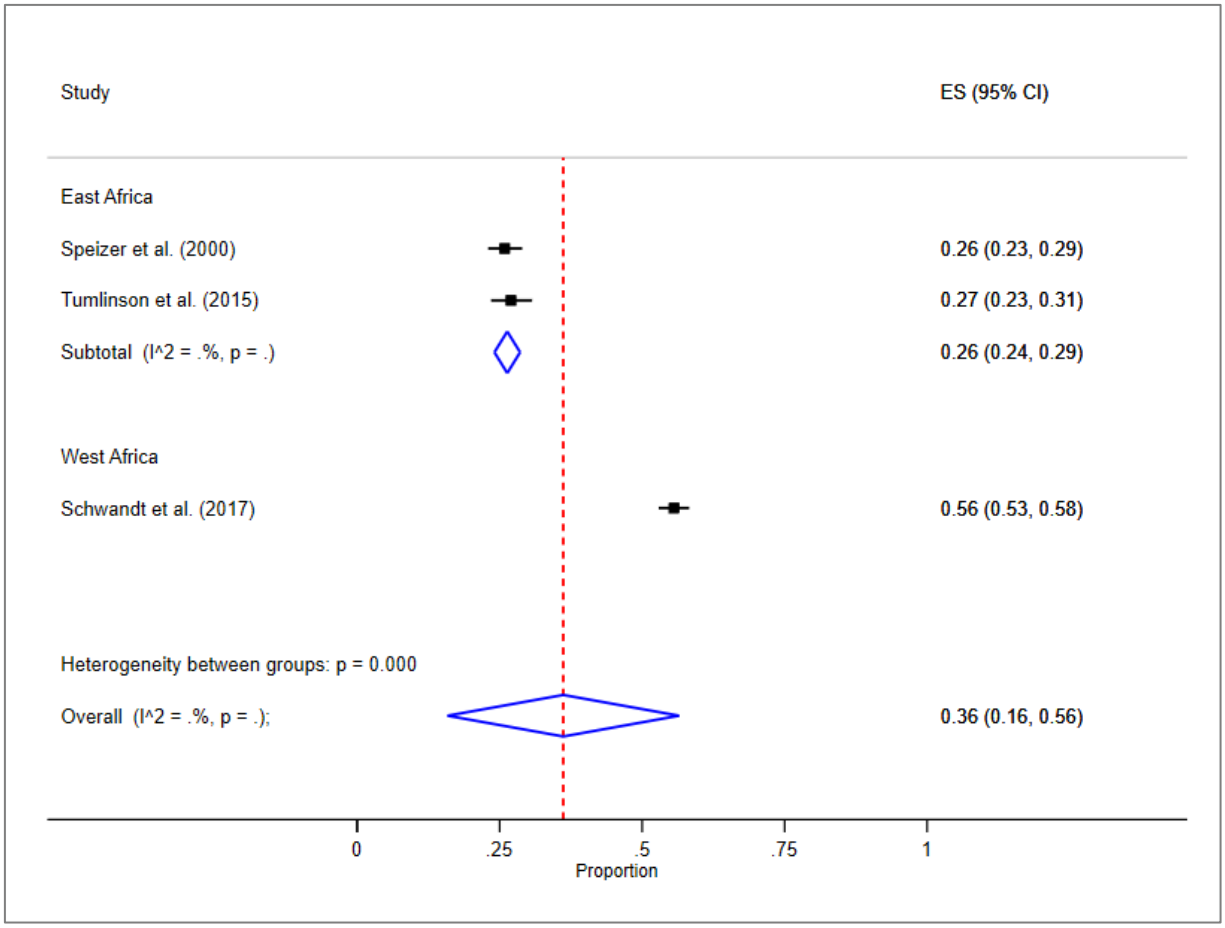

Figure 36: Proportion of respondents who restrict access to injectable contraceptives based on minimum parity requirements.

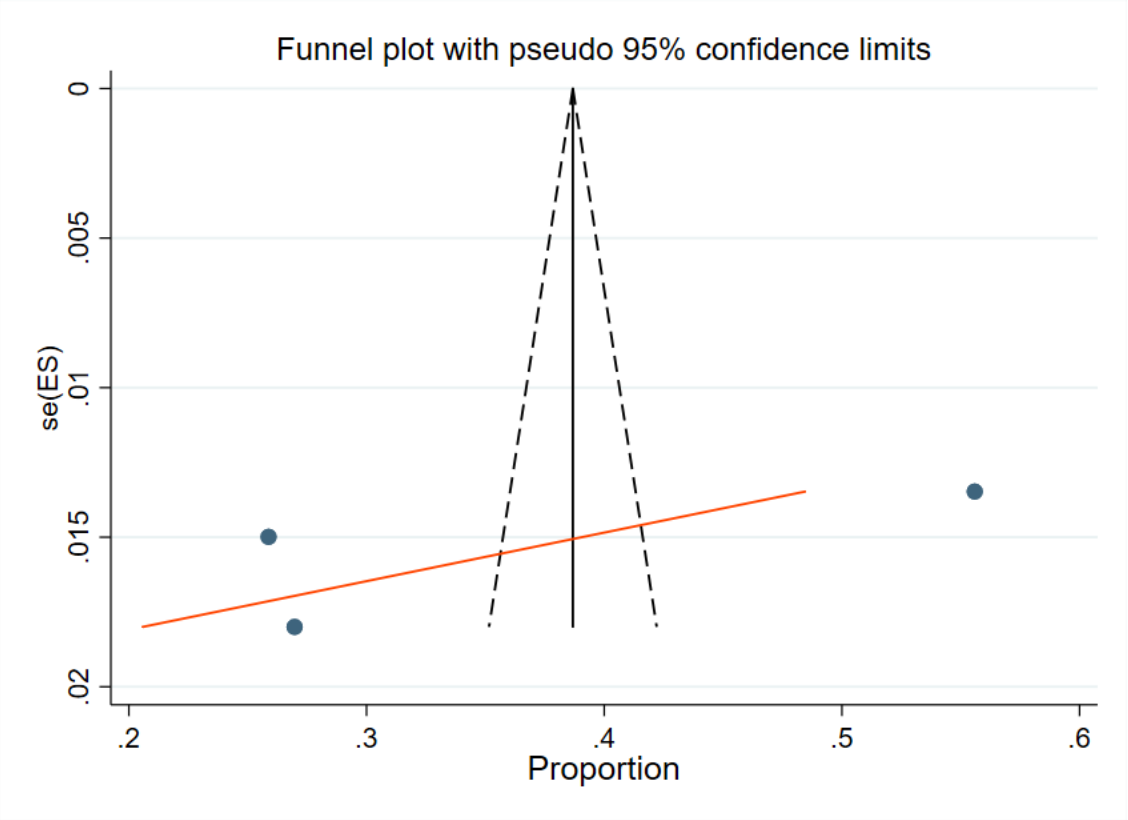

Figure 37: Funnel plot to explore publication bias for question 11.

Egger's test for small-study effects:
Regress standard normal deviate of intervention
effect estimate against its standard error
Number of studies = 3 Root MSE = 10.9

Std_Eff	Coef.	Std.Err.	t	P>t	[95%Conf.	Interval]
slope	1.314	0.821	1.600	0.355	-9.115	11.744
bias	-61.593	54.134	-1.140	0.459	-749.426	626.239

Test of H0: no small-study effects P = 0.459

With regard to publication bias, the funnel plot represented by figure 37 represents symmetry among the studies. Additionally, the Egger's test provides more evidence to conclude a low probability that publication bias was not present within the analysis (p=0.459).

Chapter 5: Discussion

5.1. Introduction

The slow uptake and underutilisation of LARC methods remain a consistent threat to public health across SSA. The burden of unintended pregnancies, in part attributable to the low utilisation of LARC methods, has far-reaching consequences for both maternal and child health outcomes. The purpose of this study was to present a synthesis of all relevant published research relating to the state of knowledge, attitudes, and perceptions of LARC methods among HCWs in SSA. A full qualitative synthesis using a thematic content analysis framework of the included studies was presented as well as a meta-analysis exploring 11 key questions relating to the study objectives. Long-acting reversible contraceptive methods have the potential to greatly increase women's overall access to contraception, family planning, and birth spacing practices. It can be argued, however, that the HCWs knowledge of these methods, attitudes and perceptions towards providing them can greatly influence a women's desire to utilise them. This can consequently influence the success or failure of strategies that are implemented by governments to increase access to these methods to women. This chapter attempts to present the meaning of the results from both analyses in an effort to identify the impact of the study findings.

5.2. Knowledge of LARC methods

This study identified several prominent gaps in knowledge among HCWs regarding injectable contraceptives, implants, and IUCDs. In addition to the KAP of LARCs, some studies reported data on family planning training and the provision of contraceptive counselling as secondary objectives. This was therefore also reported on. From the qualitative synthesis, it was observed that studies described the presence of inadequately trained HCWs in family planning counselling with a specific focus on LARC methods. Substantiating this, was the meta-analysis revealing that 41% of HCWs had not received training in family planning. The qualitative results further indicated that although many HCWs were not trained in the provision of family planning counselling, they did, however, appreciate the value that it could provide in educating women about longer-acting, more effective methods. This view was supported by a number of HCWs expressing their desire to undergo family planning training if provided with the opportunity. The meta-analysis further showed that only 60% of HCWs regularly provided family planning counselling; this percentage is unsurprising with only 59% reporting having received training to do so. The participants involved in the statistical analysis

of family planning counselling included physicians, midwives, nurses, CHWs and pharmacists. The percentage of HCWs having received training in family planning from this study is lower than observed in an Indian study of medical interns and nurses in which 90% and 78%, respectively had received in-service training.[145] This result does, however, concur with the high unmet need for quality family planning counselling identified by women across countries in SSA such as Ghana[146], Cameroon[147], and Ethiopia[148]. This is particularly perturbing as evidence suggests that high-quality family planning counselling can significantly improve LARC uptake. In India, among participants receiving high versus low-quality family planning counselling, the odds ratio for LARC uptake was 4.14 in the high-quality group compared to 2.42 in the low-quality group.[149] Similarly, improved provider-patient communication regarding contraception increased the likelihood of LARC uptake in Nigerian women by 16%.[150]

Concerning IUCDs, the overall knowledge was poor. The quantitative analysis showed that only 41% of HCWs had received training on IUCD insertion. The highest number of HCWs trained in insertion was observed in East Africa (86%) followed by West Africa (69%) and Southern Africa (26%). However, only one study was included in the East and West African regions compared to five in the Southern African region; the results from the Southern African region could, therefore, be considered more generalisable. The lack of HCWs trained in IUCDs was reiterated in the qualitative synthesis that highlighted widespread unfamiliarity with the devices' mechanism of action, appropriate candidate selection, duration of use and contraindications. Moreover, it was seen that even among those who had received some training, often a feeling of unease in providing the method due to lack of experience was expressed, especially among nurse respondents. The results obtained from this study are not uncommon. A global systematic review of health providers[151] and a systematic review across developed countries[152] showed that HCWs regularly lacked adequate knowledge of IUCD, particularly in relation to correct candidate selection. There is a clear need, identified by the results of this study, to increase HCWs exposure to appropriate IUCD training outside of and in addition to conventional medical training programmes.[153] Evidence from multiple studies suggest that further and regular training of HCWs (specifically residents, doctors, and nurses) is highly effective in improving knowledge of IUCDs and confidence to provide the method.[154–156]

Moreover, this analysis identified a clear consequence of few trained staff in IUCD; only 26% of HCWs were able to identify the Cu-IUD as a form of emergency contraception. Evidently, this highlights a missed opportunity to not only prevent a pregnancy occurring from

unprotected sex but to also reduce the number of future unintended pregnancies and abortions.[157]

The availability of studies providing insight into HCWs knowledge of injectables was scarce. From the qualitative synthesis, a high proportion felt confident in their ability to provide DMPA-IM, with only a few, particularly CHWs finding the intramuscular injection difficult. In relation to DMPA-SC, all providers, especially CHWs from the included studies were satisfied with their ability to provide the method due to the simple and efficient design. The effectiveness of providing DMPA-SC through CHWs with no clinical training has been documented in SSA settings. In Benin, the introduction of DMPA-SC by the lowest cadre of CHWs was highly successful in expanding women's access to family planning methods.[158] In contrast to this was a study conducted in Uganda and Burkina Faso that showed no statistically significant difference in continuation rates between DMPA-IM and DMPA-SC when provided by facility HCWs or village health workers (VHTs). The discrepancy in these results may be due to the cultural difference between the regions. Nevertheless, the easy to administer method for CHWs provide an opportunity to expand contraceptive options to even the most rural areas without increasing the already high workload of facility-based HCWs. The qualitative synthesis further identified that HCWs felt confident enough in their own knowledge to teach clients how to self-inject DMPA-SC. Evidence from a Malawian study showed that continuation rates after 12 months among women assigned to a DMPA-SC self-injecting group were 73% compared to 45% among women in the provider-administered group.[159] With the present study showing HCWs competence and willingness to teach women to self-inject, the issue of discontinuation among injectable contraceptive users due to logistical issues of regular transportation access and cost may potentially be addressed.

Studies reporting on the knowledge of the implant were also limited and only included in the qualitative synthesis. From these studies, the overall impression from HCWs regarding the training received for implant provision was inadequate, unorganised and target driven, specifically in South Africa. This resulted in HCWs feeling ill-equipped to provide the method to clients. Across SSA, studies reported low proportions of providers who had received training and, as with IUCD, almost all providers from the studies expressed a desire to undergo training. This result is also seen in an Indian study finding that even among HCWs who had been trained, some lacked the confidence to insert the implants.[160]

The insights yielded from this study show that there are significant opportunities for improvement of HCWs knowledge regarding LARC methods.

5.3. Attitudes and perceptions of LARC methods

Several prominent attitudes and perceptions among HCWs towards LARC methods emerged from this study. A recurring theme among HCWs was the high work burden faced which lead to an overall lack of desire to counsel women effectively and a reluctance to provide LARC methods. This was due to the opinion that LARC methods, particularly IUCDs and implants were too time-consuming, on top of an already high workload, to provide regularly. HCWs, especially nurses, expressed difficulty in coping with the vast variety of client needs that they faced and therefore preferred to promote injectable contraceptives; a quick and time-efficient method to provide. Although this was a prominent finding among the studies, some HCWs identified the ability of LARCs to reduce their work burden in the long run. Regardless, this finding draws attention to the practice of task-sharing in the context of improving access to LARC methods. Task-sharing is defined as the "expansion of the levels of health providers who can appropriately deliver health services".[161] The WHO provides a set of recommendations to guide the adoption of new policies within countries to expand the cadre of HCWs who can provide contraceptives, including LARCs.[162] Although further rigorous research into the practice is required, some SSA countries have already successfully adopted new policies to expand the practice of auxiliary nurses and midwives, and lay workers such as CHEWs and HEWs, thereby increasing the number of women reached in promoting LARC methods. In Ethiopia, task-sharing of implant insertion and removals to HEWs saw that 20% of couple-years of protection, from all methods and cadres, was achieved by an implant inserted by a HEW.[163] Similarly, Nigeria has amended policies to allow CHEWs who have undergone 36 months of training to insert implants and Cu-IUDs. Through this, over only six months, 3 588 implants were inserted.[164] In relation to IUDs, a trial study among four SSA countries showed that IUD task-shifting to mid-level providers including midwives was safe and feasible.[165] Task-sharing offers an important opportunity for mobilisation within all SSA countries to deliver LARC methods to even the most remote and rural women through HEWs.

The qualitative synthesis further identified the advantages of LARCs perceived by HCWs. For IUCDs, HCWs felt that the quick return to fertility was a key advantage while the non-hormonal composition of the Cu-IUD was also favourable. Additionally, the non-contraceptive benefits of the LNG-IUS were also mentioned as positive attributes of the device. For injectable contraceptives, in addition to the quick, non-invasive method of delivery, the secrecy of the method was often cited as an advantage for covert contraceptive users in cultural contexts where it was not accepted. Although estimates on the prevalence of covert

contraceptive use throughout SSA is limited, Ugandan[166] and Ghanaian[167] studies reported a prevalence of 24% and 34%, respectively. Even with relatively low estimates shown in studies, the true prevalence is predicted to pervasive[168], therefore, HCWs acknowledgement of the secrecy that injectables provide is beneficial to current and potential users of the method. Particular to DMPA-SC, HCWs attitudes overall were positive. Relating to self-injecting of DMPA-SC, HCWs also perceived the method as a way to increase adherence to injectables and highlighted the advantage the practice had in reducing economic burdens for women travelling to clinics for doses. Most importantly was the perceived advantage of self-injecting in reducing the work burden for HCWs. The positive attitude of this method is welcomed as a cost-analysis in Burkina Faso, Uganda, and Senegal show that service delivery costs are lowest during community based distribution and self-injecting of DMPA-SC.[169] This study did not identify positive attitudes and perceptions towards contraceptive implants. This is consistent with evidence that the uptake of implants, particularly in South Africa, has decreased in recent years, suggesting that HCWs may be influencing this trend.[86] The negative perception of the implant emerged from predominantly South African studies, with limited research having been conducted on this topic elsewhere in SSA. The HCWs reporting on the implant expressed that their lack of desire to promote the implant stemmed from the high number of early removals, due to unmanageable side-effects, that were requested after the introduction of the method. A high rate of early removals was also seen among women in Ethiopia[170] and Kenya[171].

Both the qualitative and quantitative synthesis revealed the presence of unnecessary restrictions for contraceptives based on HCWs personal biases. The meta-analysis showed that 56% and 60% of HCWs restricted the provision of IUCDs and injectables based on a minimum age. Multiple studies indicated that HCWs felt that adolescents should be restricted to COCs and condoms only, if not abstinence. The included studies showed that particular to IUCDs, HCWs often believed that providing this method to adolescents would increase the spread of HIV and STIs. The result from this study is slightly higher than that found in a Nepalese study[172] in which 40% of HCWs restricted provision of IUCDs to girls under 17 and a Pakistani study[173] where 50% of physicians restricted access to girls 19 years and younger. The difference in findings may be attributable to the conservative cultural context present within some SSA countries. Similarly, 60% of HCWs in this study reported restricting access to injectable contraceptives based on a minimum age. Qualitative results indicated that the primary reasoning for this was the fear of delayed return to fertility, or complete loss thereof. One study did, however, show that some HCWs thought that the prevention of pregnancy

allowing young girls to continue their education outweighed the risk of delayed return to fertility. Similar views were seen among HCWs for the insertion of the implant. Although not included in the meta-analysis, in Senegal[99], 45% of private health facility HCWs and 38% of public facility required a minimum age for insertion while 44% in a Kenyan study[98] required the client to be at least 20 years old. As adolescent pregnancy along with its' health, social, educational and economic impact become a growing concern across the African continent, the trend of restricting LARC methods to this population is worrying.

Further restrictions were also evident from the analyses. The proportion of HCWs who restricted access to injectables based on a minimum parity, primarily due to the fear of infertility, was estimated at 29%. Although the WHO medical eligibility criteria recommend IUCDs for nulliparous women, the meta-analysis suggested that 36% of HCWs reported restricting access to IUCDs based on a minimum parity. From the studies included in the meta-analysis for this question, the highest proportion restricting based on parity was observed in West Africa (56%). This quantitative analysis, however, was not able to distinguish between the proportion of HCWs that restricted the method based on the number of children but instead provides an overall estimate on the proportion who impose any parity restriction at all. Providers raised concerns related to the long-acting nature of the devices; namely that early removals among nulliparous women who want to conceive would increase their workload and that insertions would prove more difficult among the nulliparae. The number of HCWs restricting access based on a minimum parity in SSA seems to be lower than that observed in the USA[174,175], France[176] and China[177]. Another concerning perception identified in the qualitative synthesis was HCWs reluctance to promote post-partum IUCD insertions. Studies from Ghana, South Africa, Botswana, and Malawi all reported high proportions of HCWs perceiving PP-IUCD insertion as unsafe due to increased risk of infection, expulsion and uterine perforation. This may be attributed to a low proportion of HCWs having undergone specific PP-IUCD training.[89] PP-IUCD insertion provides a unique opportunity to increase contraception uptake among women living in remote areas that only have HCW contact during delivery.[178] As most births occurring during the first 12-month postpartum period are unintended, and SSA shows the highest rate of unintended pregnancies, inserting an IUCD before a woman leaves the facility may have a profound effect on addressing this trend.[178]

The final restriction identified from this study imposed by HCWs was observed among HIV-infected women. From the meta-analysis, only 27% of HCWs considered IUCD safe for HIV-infected women. In West Africa the proportion considering it safe was highest at 46%,

followed by East Africa at 35% and lowest in the Southern African region at 16%. In the Southern African region, three studies were included in the analysis, two in South Africa and one in Zimbabwe. A large difference exists in the estimates from the nationally representative survey in South Africa indicating a much smaller proportion perceiving it safe (4%) compared to the study conducted in two South African provinces with an estimated 72% of HCWs considering IUCD safe in HIV-infected women. This discrepancy may arise due to the different sample sizes of the studies (614 compared to 32). Moreover, the generalisability of the proportions observed in East and West Africa may be limited as only one study was included from each region. The qualitative data available on HCWs perceptions of the safety of IUCD for HIV-infected women was also limited and came primarily from South African based studies. The perceptions reported within these studies contradict the quantitative results. The majority of HCWs expressing their perceptions toward IUCDs in HIV-infected women were positive and the use was encouraged in conjunction with condoms. In a study conducted in Johannesburg, South Africa published after the final search strategy was implemented, mixed views of HIV-infected women's suitability for IUCDs were also identified.[179] The meta-analysis conducted for this question did indicate a probability of publication bias; this may also attribute to the conflicting evidence observed. Despite this, further research into the perceptions and practice of HCWs regarding IUCDs among HIV-infected women is needed in SSA to address the current conflicting evidence. However, results in other regions of the world were also low. Among Nepalese HCWs, 36% considered HIV-infected women suitable candidates.[172] In contrast, a nation-wide USA based study of family planning providers showed that seven in 10 providers considered IUCD safe for HIV-infected women.[180] Only two studies provided insight into HCWs perceptions of injectable contraceptives suitability for HIV-infected women. Across South Africa and Botswana, 46% of clinicians felt injectables to be appropriate[181] compared to only 19% in a Kenyan study[182]. As for implants, the evidence was also limited. Overall, the proportions of HCWs considering the implant suitable for HIV-infected women was low. The primary concern among HCWs was contraceptive failure among concomitant implant and Efavirenz users, fuelled especially in South Africa by unclear guidelines. Healthcare workers expressed that it was easier to restrict access to the implant, regardless of which ART-regime clients were on. Although there is evidence to suggest that the rate of pregnancy in implant users among those on efavirenz-based ART is higher compared to nevirapine-based ART, it is still significantly lower than women on efavirenz-based ART using COC or even injectable contraceptives.[183] Overall, there is little insight into HCWs perceptions of HIV-infected women's suitability for LARCs. As

up to 62% of pregnancies among HIV-infected women in SSA are unintended, there is a great need to increase the uptake of LARC methods in this population.[184] Further research into family planning providers counselling practices for HIV-infected women is required to guide SRH policies and improve service delivery to these clients.

5.4. Experiences with the availability of stock

Across all methods, unfavourable experiences were reported by HCWs regarding the availability of stock. However, it must be noted that the experiences and perceptions of the availability of stock are based on SSA countries outside of South Africa as this has not been reported on in South African-based studies.

The results indicated that IUCDs and implants were most frequently unavailable. Healthcare workers indicated that the frequency of stock-outs often hinders their motivation to provide counselling of these methods. Although HCWs experienced the least problems with stockouts of DMPA-IM, the issue of mismatched stock was raised. A consequence mentioned throughout the studies was that women were given SARC or condoms in place of long-acting methods. The HCWs perceptions and experiences of stock-outs coincide with studies documenting the availability of LARC methods within facilities. A study conducted within Ethiopian, Nigerian and DRC facilities saw high variability in LARC availability.[185] The study identified that Ethiopian facilities had the highest availability of LARC methods compared to facilities in Nigeria and DRC. Implants and IUCDs were stocked in 86% and 68% of public facilities in Ethiopia at the time of the survey. Nigeria and DRC had much lower stocked facilities at 22% for implants and 16% and 14% for IUCD, respectively.[185] Contrary to this, the percentage of facilities having a stock-out of injectables was low; the proportion ranged from only 2% in Niger to 4% in Burkina Faso, 6% in Uganda and 12% in Benin.[186] There is a clear need identified by both HCWs from this study and additional service delivery research that supply of implants and IUCDs is inconsistent resulting in a lack of willingness and the ability for HCWs to promote these methods to their clients.

5.5. Strengths and limitations of the included studies

The overall methodological quality of the research included in this study was satisfactory. A high proportion the qualitative studies addressed the majority of the key elements of the CASP tool with only one study not providing an in-depth description of the data analysis techniques. Just over half of the cross-sectional studies scored 15 or higher out of 20 with none of the remainder scoring less than 10. The mix-method studies had moderate quality

as the maximum number of “no’s” scored was two among only two studies. Moreover, the findings within each of the included studies were predominantly consistent but with some exceptions. Qualitative results were largely consistent, however, differences in answers that did arise were seen among different cadres of HCWs. This may be attributed to variable lengths of training and experience between different cadres. The meta-analysis further showed that where differences were present, it was often seen between study regions. Limitations of the studies did exist; the sample sizes and the type of HCW cadre included varied significantly across the studies. This, in conjunction with the traditional risk of bias accompanying the study designs, does slightly contribute to a reduction in the validity of the study results. Despite this, the studies included in this systematic review and meta-analysis allowed for the research question and study objectives to be appropriately addressed. However, due to the limitations acknowledged within the individual studies, emphatic conclusions are drawn with caution.

5.6. Strengths and limitations of this study

This study is, to our knowledge, the first systematic review and meta-analysis to explore the knowledge, attitudes, and perceptions of LARCs among HCWs in SSA. Conducting a proportion meta-analysis on knowledge, attitudes, and perceptions is also to an extent a novel practice with few previously published studies doing so.

Through the application of strict inclusion and exclusion criteria, a rigorous search strategy supplemented with hand searching identified 50 studies for inclusion in the systematic review, and 21 for inclusion in the meta-analysis. This rigorous search strategy provides confidence that all relevant research was included for analysis and that the conclusions drawn are based on all the currently available evidence. Further steps to increase the robustness of the study include the application of the search strategy by more than one person, piloting and then amending the data extraction form and cross-checking of data extraction and quality assessments. The methodology employed to conduct this study is transparent, thorough, and reproducible.

The study did, however, have key limitations for consideration. An analysis based on different HCW cadres was not possible due to many of the studies not publishing this data. Due to time constraints, it was not possible to contact authors for the relevant data to conduct this sub-group analysis. As different cadres undergo different training over different periods, possibly influencing their KAP of LARCs, the generalisability of the findings to HCWs, as a whole entity, may be limited. However, the qualitative synthesis did attempt to address this

issue by reporting cadre-specific results where possible. More cadre-specific research nevertheless would be needed to explore if differences do exist and what the impact of these difference are. Secondly, heterogeneity in the meta-analysis was high. Possible sources of this heterogeneity may arise due to differences in culture across the study settings, HCWs work experience, age of the HCWs and how studies were conducted. The different sample sizes and particularly the different methodologies used for data collection by the studies may have resulted in some polarisation of the results, thereby also impeding on the generalisability. Lastly, publication bias was evident in question seven and nine on the meta-analysis; these results should, therefore, be interpreted with caution.

Chapter 6: Conclusion and Recommendations

This study set out to investigate the state of knowledge, attitudes, and perceptions of LARC methods among HCWs in SSA using a systematic review and meta-analysis study design. LARC methods have the potential to reduce the number of unintended pregnancies in SSA and as a result, reduce the corresponding maternal and infant mortalities. However, the results of this study have identified a critical gap in the knowledge of HCWs concerning LARCs. The number of HCWs with sufficient training in family planning counselling and contraceptive insertion skills is inadequate to successfully expand women's access to these methods. In addition, several attitudes and perceptions held by HCWs may also hinder women's access to LARC methods. This was especially seen in the context of HIV-infected women, adolescents, and nulliparous women. In South Africa, the imminent introduction of the NHI scheme requires sufficient insight on HCWs knowledge, attitudes, and perceptions regarding the LARC methods that will form part of the contraceptive package. This study has attempted to do so with the limited available research that has been conducted within the country.

Women's access to safe and effective contraception forms an integral part of the 2030 SDGs, specifically goal three and five, thereby highlighting the imperative nature of identifying and addressing all possible sources that may hinder their achievement.
Based on the findings of this study, the following recommendations are made:

1. **Further research:** This study has highlighted a number of prominent gaps in research and the following recommendations for future directions are made.
    - There is a need for more cadre-specific research into the KAP among HCWs regarding LARCs.
    - Across SSA, further evidence on the KAP among HCWs regarding the contraceptive implant is needed, as this is currently very limited.
    - There is limited and conflicting evidence on HCWs KAP regarding IUCDs suitability for HIV-infected women, this should be further explored.
    - In South Africa, there is an opportunity for further research into the number of HCWs who have received training in family planning, IUCD insertion, and implant insertion.
    - Due to the high HIV-burden faced in South Africa, it is imperative to further explore HCWs perceptions of LARC methods for HIV-infected women.

- Further research in South Africa should explore HCWs KAP toward adolescents use of LARC methods.

2. **Rigorous efforts to increase the knowledge and skill:** This study identified a number of prominent gaps among HCWs in relation to their knowledge of LARC methods and their ability to provide them. It is therefore recommended that mass educational and training campaigns be developed for HCWs across all cadres, from the lowest to highest. The educational campaigns should include recurrent and compulsory refresher training on IUCD and implant insertion and removal techniques. Education campaigns should further focus on correct candidate selection to dispel current misconceptions of who is and who is not suitable to use LARC methods.
3. **Task-shifting the provision of LARC methods:** sub-Saharan African countries that have not yet implemented policies and guidelines to task-shift the provision of LARC methods should investigate to do so. All SSA countries should implement task-sharing of LARC methods in line with WHO guidelines. In line with this guideline would be further research and piloting of programmes to task-shift not only injectable and implant provision but IUCD provision to CHWs (or similar cadres).
4. **Introduction of DMPA-SC (self-injecting):** In SSA countries where self-injecting of DMPA-SC has not yet been explored, the introduction of this method should be considered. As DMPA-IM is currently the most preferred LARC method, evidence suggests that issues of adherence may be addressed through self-injecting of DMPA-SC.

Reference List

1. Silumbwe A, Nkole T, Munakampe MN, Milford C, Cordero JP, Kriel Y, et al. Community and health systems barriers and enablers to family planning and contraceptive services provision and use in Kabwe District, Zambia. BMC Health Serv Res [Internet]. 2018 [cited 2019 Feb 20];18(1). Available from: https://doi.org/10.1186/s12913-018-3136-4
2. Risher K, Rees H, Rehle T, Evans M, Shisana O, Celentano D, et al. Contraception coverage and methods used among women in South Africa: A national household survey. South African Med J. 2017;107(4):307.
3. Lince-Deroche N, Pleaner M, Harries J, Morroni C, Mullick S, Firnhaber C, et al. Achieving universal access to sexual and reproductive health services: the potential and pitfalls for contraceptive services in South Africa. South African Heal Rev [Internet]. 2016 [cited 2019 Feb 19];2016(1):95–108. Available from: http://www.publichealth.uct.ac.za/sites/default/files/image_tool/images/8/Lince-Deroche et al.pdf
4. Family Planning/Contraception [Internet]. Family Planning/Contraception. 2018 [cited 2019 Feb 19]. p. 92–101. Available from: https://www.who.int/news-room/fact-sheets/detail/family-planning-contraception
5. Bahamondes L, Peloggia A. Modern contraceptives in sub-Saharan African countries [Internet]. Vol. 7, The Lancet Global Health. 2019 [cited 2019 Aug 2]. p. e819–20. Available from: www.thelancet.com/lancetgh
6. Holtz J, Sarker I. Integrating Family Planning into Universal Health Coverage Efforts [Internet]. 2018 [cited 2019 Mar 22]. Available from: https://www.shopsplusproject.org/sites/default/files/resources/Integrating Family Planning into Universal Health Coverage Efforts.pdf
7. Tsui AO, Brown W, Li Q. Contraceptive Practice in sub-Saharan Africa [Internet]. [cited 2019 Aug 2]. Available from: https://onlinelibrary.wiley.com/doi/pdf/10.1111/padr.12051
8. Benova, Cleland, Daniele, Ali. Expanding Method Choice in Africa with Long-Acting Methods: IUDs, Implants or Both? Int Perspect Sex Reprod Health [Internet]. 2018 [cited 2019 Aug 2];43(4):183. Available from: https://www.jstor.org/stable/pdf/10.1363/43e5217.pdf?refreqid=excelsior%3A8be7f2d0257fbce68f36eed441f497d1

9. Aliyu AA. Family Planning Services in Africa: The Successes and Challenges. In: Family Planning [Internet]. InTech; 2018 [cited 2019 Aug 2]. p. 69–93. Available from: http://www.intechopen.com/books/family-planning/family-planning-services-in-africa-the-successes-and-challenges
10. Cleland J, Ali M, Benova L, Daniele M. The promotion of intrauterine contraception in low- and middle-income countries: a narrative review [Internet]. Vol. 95, Contraception. 2017 [cited 2019 Aug 2]. p. 519–28. Available from: http://dx.doi.org/10.1016/j.contraception.2017.03.009
11. Rispel L, Padarath A. South African Health Review 2018. 2018.
12. Bookshelf: National Contraception and Fertility Planning Policy and Service Delivery Guidelines. Reprod Health Matters [Internet]. 2014 [cited 2019 Mar 20];22(43):200–3. Available from: https://tandfonline.com/action/journalInformation?journalCode=zrhm21
13. Hofmeyr GJ, Singata-Madliki M, Lawrie TA, Bergel E, Temmerman M. Effects of the copper intrauterine device versus injectable progestin contraception on pregnancy rates and method discontinuation among women attending termination of pregnancy services in South Africa: A pragmatic randomized controlled trial. Reprod Health [Internet]. 2016 [cited 2019 Mar 22];13(1). Available from: http://apps.who.int/trialsearch/
14. Smit J, Pleaner M, Chersich MF, Makua M, Morroni C, Rees H, et al. Lessons learnt from the introduction of the contraceptive implant in South Africa. South African Med J. 2018;107(11):933.
15. Potgieter F, Kapp P, Coetzee F. Factors influencing post-partum women's choice of an implantable contraceptive device in a rural district hospital in South Africa. South African Fam Pract [Internet]. 2018 Nov 2 [cited 2020 Jul 22];60(6):174–80. Available from: https://www.tandfonline.com/doi/full/10.1080/20786190.2018.1487213
16. Laryea DO, Ankobeah F, Morhe ESK, Amoako YA, Spangenberg K. Characteristics and contributory factors for injectable contraceptive usage among women in Kumasi, Ghana. Contracept Reprod Med [Internet]. 2016 Dec [cited 2020 Jul 22];1(1). Available from: /pmc/articles/PMC5693482/?report=abstract
17. Liu J, Shen J, Diamond-Smith N. Predictors of DMPA-SC continuation among urban Nigerian women: the influence of counseling quality and side effects. Contraception [Internet]. 2018 Nov 1 [cited 2020 Jul 22];98(5):430–7. Available from: /pmc/articles/PMC6197834/?report=abstract

18. Jalang'O R, Thuita F, Barasa SO, Njoroge P. Determinants of contraceptive use among postpartum women in a county hospital in rural Kenya. BMC Public Health [Internet]. 2017 [cited 2019 Aug 2];17(1). Available from: https://link-springer-com.uplib.idm.oclc.org/content/pdf/10.1186%2Fs12889-017-4510-6.pdf
19. Akers AY, Gold MA, Borrero S, Santucci A, Schwarz EB. Providers' perspectives on challenges to contraceptive counseling in primary care settings. J women's Heal. 2010;19(6):1163–70.
20. Paul M, Näsström SB, Klingberg-Allvin M, Kiggundu C, Larsson EC. Healthcare providers balancing norms and practice: Challenges and opportunities in providing contraceptive counselling to young people in Uganda - a qualitative study. Glob Health Action [Internet]. 2016 [cited 2020 Jul 22];9(1). Available from: https://doi.org/10.3402/gha.v9.30283
21. Hoke TH, Wheeler SB, Lynd K, Green MS, Razafindravony BH, Rasamihajamanana E, et al. Community-based provision of injectable contraceptives in Madagascar: "Task shifting" to expand access to injectable contraceptives. Health Policy Plan [Internet]. 2012 [cited 2020 Jul 22];27(1):52–9. Available from: https://academic.oup.com/heapol/article-abstract/27/1/52/659069
22. Lince-Deroche N, Hendrickson C, Moolla A, Kgowedi S, Mulongo M. Provider perspectives on contraceptive service delivery: findings from a qualitative study in Johannesburg, South Africa. BMC Health Serv Res [Internet]. 2020 Feb 21 [cited 2020 Jul 22];20(1):128. Available from: https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-020-4900-9
23. Flemming C. Review Long-acting reversible contraceptives. Obstet Gynaecol. 2009;11:83–8.
24. Itriyeva K. Use of Long-Acting Reversible Contraception (LARC) and the Depo-Provera Shot in Adolescents. Curr Probl Pediatr Adolesc Health Care [Internet]. 2018 [cited 2019 Apr 23];48(12):321–32. Available from: https://doi.org/10.1016/j.cppeds.2018.11.002
25. Committee on Practice Bulletins—Gynecology. Long-Acting Reversible Contraception: Implants and Intrauterine Devices ACOG PRACTICE BULLET IN Clinical Management Guidelines for Obstetrician–Gynecologists. Obstet Gynecol [Internet]. 2017 [cited 2019 Apr 21];130(5):251–69. Available from: https://www.acog.org/-/media/Practice-Bulletins/Committee-on-Practice-Bulletins----Gynecology/Public/pb186.pdf?dmc=1&ts=20190416T1148185921

26. Foster-Rosales A, Stewart FH. Contraceptive Technology. In: Handbook of Women's Sexual and Reproductive Health. 2011.
27. Moodley J, Naidoo S, Wand H, Ramjee G, Moodley MJ. Contraception use and impact on pregnancy prevention in women participating in an HIV prevention trial in South Africa and the Microbicides Development Programme team. J Fam Reprod Heal care [Internet]. 2016 [cited 2019 Feb 20];(42):5–11. Available from: http://srh.bmj.com
28. Glasier A. The advantages and disadvantages of long-acting reversible contraception (LARC). In: Gynecological Endocrinology: The 18th World Congress. Florence, Ital; 2018.
29. Hubacher D, Spector H, Monteith C, Chen PL, Hart C. Long-acting reversible contraceptive acceptability and unintended pregnancy among women presenting for short-acting methods: a randomized patient preference trial. Am J Obstet Gynecol [Internet]. 2017 [cited 2019 May 7];216(2):101–9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5479328/pdf/nihms-814290.pdf
30. Morse J, Chipato T, Blanchard K, Nhemachena T, Ramjee G, McCulloch C, et al. Provision of long-acting reversible contraception in HIV-prevalent countries: Results from nationally representative surveys in southern Africa. BJOG An Int J Obstet Gynaecol [Internet]. 2013 [cited 2019 Mar 20];120(11):1386–93. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3775997/pdf/nihms488869.pdf
31. Goldthwaite LM, Shaw KA. Immediate postpartum provision of long-acting reversible contraception. Current Opinion in Obstetrics and Gynecology. 2015.
32. Foran T, Butcher BE, Kovacs G, Bateson D, O'Connor V. Safety of insertion of the copper IUD and LNG-IUS in nulliparous women: a systematic review. European Journal of Contraception and Reproductive Health Care. 2018.
33. Holton S, Rowe H, Kirkman M, Jordan L, McNamee K, Bayly C, et al. Long-acting reversible contraception: Findings from the Understanding Fertility Management in Contemporary Australia survey. Eur J Contracept Reprod Heal Care [Internet]. 2016 [cited 2019 Apr 23];21(2):116–31. Available from: http://dx.doi.org/10.3109/13625187.2015.1064600
34. Pillay D, Chersich MF, Morroni C, Pleaner M, Adeagbo OA, Naidoo N, et al. User perspectives on Implanon NXT in South Africa: A survey of 12 public-sector facilities. South African Med J. 2017 Oct 31;107(10):815.
35. Nageso A, Gebretsadik A. Discontinuation rate of Implanon and its associated factors

among women who ever used Implanon in Dale District, Southern Ethiopia. BMC Womens Health [Internet]. 2018 [cited 2019 Apr 23];18(1):189. Available from: https://doi.org/10.1186/s12905-018-0678-x

36. Espey E, Ogburn T. Long-acting reversible contraceptives: Intrauterine devices and the contraceptive implant. Obstetrics and Gynecology. 2011.
37. Risher K, Rees H, Rehle T, Evans M, Shisana O, Celentano D, et al. Contraception coverage and methods used among women in South Africa: A national household survey. South African Med J. 2017;107(4):307.
38. South African National Department of Health. National Contraception and Fertility Planning Policy and Service Delivery Guidelines. Pretoria, South Africa; 2012.
39. Mathonsi NW. Is there a real role and place for use of intrauterine contraception in South Africa? Obstet Gynaecol Forum [Internet]. 2014;24(2):24–7. Available from: http://reference.sabinet.co.za/document/EJC152732
40. Blish CA, Baeten JM. Hormonal Contraception and HIV-1 Transmission. American Journal of Reproductive Immunology. 2011.
41. WHO. Hormonal contraceptive eligibility for women at high risk of HIV. Guidance statement. Recommendations concerning the use of hormonal contraceptive methods by women at high risk of HIV. TT - [Internet]. 2017 [cited 2019 Mar 20]. Available from: http://www.hst.org.za/publications/NonHST Publications/Hormonal Contraceptive Eligability for Women at high risk of HIV.pdf#search=contraceptive
42. Hofmeyr GJ, Singata-Madliki M, Lawrie TA, Bergel E, Temmerman M. Effects of injectable progestogen contraception versus the copper intrauterine device on HIV acquisition: Sub-study of a pragmatic randomised controlled trial. J Fam Plan Reprod Heal Care [Internet]. 2017 [cited 2019 Mar 31];43(3):175–80. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5537534/pdf/jfprhc-2016-101607.pdf
43. Govender N, Borg D, Sibiya MN, Ghuman S, Reddy P, O'Connor L, et al. Factors associated with unintended pregnancy among women attending a public health facility in KwaZulu-Natal, South Africa. South African Fam Pract [Internet]. 2017 [cited 2019 Feb 23];60(3):79–83. Available from: https://medpharm.tandfonline.com/action/journalInformation?journalCode=ojfp20http://creativecommons.org/licenses/by-nc/3.0
44. Adeniyi OV, Ajayi AI, Moyaki MG, Goon D Ter, Avramovic G, Lambert J. High rate of unplanned pregnancy in the context of integrated family planning and HIV care services in South Africa. BMC Health Serv Res [Internet]. 2018 [cited 2019 Feb

23];18(1). Available from: https://doi.org/10.1186/s12913-018-2942-z

45. Bearak J, Popinchalk A, Alkema L, Sedgh G. Global, regional, and subregional trends in unintended pregnancy and its outcomes from 1990 to 2014: estimates from a Bayesian hierarchical model. Lancet Glob Heal [Internet]. 2018 [cited 2019 Mar 17];6(4):e380–9. Available from: www.thelancet.com/lancetgh
46. Guttmacher Institute, BMGF. ADDING IT UP: Investing in Contraception and Maternal and Newborn Health. Guttmacher Inst. 2017;
47. Grindlay K, Dako-Gyeke P, Ngo TD, Eva G, Gobah L, Reiger ST, et al. Contraceptive use and unintended pregnancy among young women and men in Accra, Ghana. PLoS One [Internet]. 2018 [cited 2019 Aug 2];13(8). Available from: https://doi.org/10.1371/journal.pone.0201663
48. V. A, S. G, C.B. B, F. A, K. A, R. L, et al. Attitudes toward Family Planning among HIV-Positive Pregnant Women Enrolled in a Prevention of Mother-To-Child Transmission Study in Kisumu, Kenya. PLoS ONE. 2013.
49. Gutin SA, Namusoke F, Shade SB, Mirembe F. Fertility desires and intentions among HIV-positive women during the post-natal period in Uganda. Afr J Reprod Health. 2014;
50. Kikuchi K, Wakasugi N, Poudel KC, Sakisaka K, Jimba M. High rate of unintended pregnancies after knowing of HIV infection among HIV positive women under antiretroviral treatment in Kigali, Rwanda. Biosci Trends. 2011;
51. Haddad LB, Feldacker C, Jamieson DJ, Tweya H, Cwiak C, Chaweza T, et al. Pregnancy prevention and condom use practices among HIV-infected women on antiretroviral therapy seeking family planning in Lilongwe, Malawi. PLoS One. 2015;
52. Ezugwu EC, Iyoke CA, Nkwo PO, Ezegwui HU, Akabueze JC, Agu PU. Unintended pregnancy among HIV-positive pregnant women in Enugu, southeast Nigeria. Int J Gynecol Obstet. 2016;
53. Rees H, Pillay Y, Mullick S, Chersich MF. Strengthening implant provision and acceptance in South Africa with the ‘Any woman, any place, any time’ approach: An essential step towards reducing unintended pregnancies. South African Med J. 2018;107(11):939.
54. Statistics South Africa. South Africa demographic and health survey 2016: Key indicator report [Internet]. Statistics South Africa. 2017 [cited 2019 Feb 20]. p. 1–57. Available from: www.statssa.gov.za
55. Ebonwu J, Mumbauer A, Uys M, Wainberg ML, Medina-Marino A. Determinants of

late antenatal care presentation in rural and peri-urban communities in South Africa: A cross-sectional study. PLoS One [Internet]. 2018 [cited 2019 Mar 23];13(3). Available from: https://doi.org/10.1371/journal.pone.0191903

56. Goshu YA, Yitayew AE. Prevalence and determinant factors of unintended pregnancy among pregnant women attending antenatal clinics of Addis Zemen hospital. PLoS One [Internet]. 2019 [cited 2019 Mar 23];14(1). Available from: https://doi.org/10.1371/journal.pone.0210206
57. Abrams EJ, Brittain K, Iyun V, Zerbe A, le Roux S, Phillips TK, et al. Prevalence and determinants of unplanned pregnancy in HIV-positive and HIV-negative pregnant women in Cape Town, South Africa: a cross-sectional study. BMJ Open [Internet]. 2018 [cited 2019 Mar 22];8(4):e019979. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5892733/pdf/bmjopen-2017-019979.pdf
58. Savage-Oyekunle OA, Nienaber A. Adolescent girls' access to contraceptive information and services: An analysis of legislation and policies, and their realisation, in Nigeria and South Africa. African Hum Rights Law J [Internet]. 2016 [cited 2019 Mar 23];15(2):433–48. Available from: http://dx.doi.org/10.17159/1996-2096/2015/v15n2a10434
59. Yakubu I, Salisu WJ. Determinants of adolescent pregnancy in sub-Saharan Africa: A systematic review [Internet]. Vol. 15, Reproductive Health. 2018 [cited 2019 Mar 22]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5787272/pdf/12978_2018_Article_460.pdf
60. Holt K, Lince N, Hargey A, Struthers H, Nkala B, Mclntyre J, et al. Assessment of service availability and health care workers' opinions about young women's sexual and reproductive health in Soweto, South Africa. Afr J Reprod Health [Internet]. 2012 [cited 2019 Mar 23];16(2):283–93. Available from: https://pdfs.semanticscholar.org/08ca/a242d63d055299c024e849f07c044797e2d5.pdf
61. Mushwana L, Monareng L, Richter S, Muller H. Factors influencing the adolescent pregnancy rate in the Greater Giyani Municipality, Limpopo Province - South Africa. Int J Africa Nurs Sci. 2015;
62. South African National Aids Council (SANAC). National Strategic Plan (NSP) for HIV, TB and STIs: 2017 – 2022 [Internet]. Pretoria, South Africa; 2018. Available from:

https://sanac.org.za/wp-content/uploads/2018/09/NSP_FullDocument_FINAL.pdf

63. Feyissa TR, Harris ML, Melka AS, Loxton D. Unintended Pregnancy in Women Living with HIV in Sub-Saharan Africa: A Systematic Review and Meta-analysis. AIDS and Behavior [Internet]. 2018 [cited 2019 Feb 23];3. Available from: https://doi.org/10.1007/s10461-018-2346-4
64. Mehta S, Schwartz SR, Black V, Rees H, Venter WDF, Taha TE. High Incidence of Unplanned Pregnancy after Antiretroviral Therapy Initiation: Findings from a Prospective Cohort Study in South Africa. PLoS One [Internet]. 2012 [cited 2019 Mar 25];7(4):e36039. Available from: www.plosone.org
65. Mayondi GK, Wirth K, Morroni C, Moyo S, Ajibola G, Diseko M, et al. Unintended pregnancy, contraceptive use, and childbearing desires among HIV-infected and HIV-uninfected women in Botswana: Across-sectional study. BMC Public Health [Internet]. 2016 [cited 2019 Jun 30];16(1). Available from: https://link-springer-com.uplib.idm.oclc.org/content/pdf/10.1186%2Fs12889-015-2498-3.pdf
66. Gutiérrez F, Hocqueloux L, Wynne B, Clumeck N, Maggiolo F, Walmsley SL, et al. Dolutegravir plus Abacavir–Lamivudine for the Treatment of HIV-1 Infection. N Engl J Med. 2013;
67. Trottier B, Lake JE, Logue K, Brinson C, Santiago L, Brennan C, et al. Dolutegravir/abacavir/lamivudine versus current ART in virally suppressed patients (STRIIVING): a 48-week, randomized, non-inferiority, open-label, Phase IIIb study. Antivir Ther. 2017;
68. Stellbrink HJ, Reynes J, Lazzarin A, Voronin E, Pulido F, Felizarta F, et al. Dolutegravir in antiretroviral-naive adults with HIV-1: 96-week results from a randomized dose-ranging study. AIDS. 2013;
69. Zash R, Holmes L, Diseko M, Jacobson DL, Brummel S, Mayondi G, et al. Neural-Tube Defects and Antiretroviral Treatment Regimens in Botswana. N Engl J Med. 2019 Jul 22;
70. Pereira G, Kim A, Jalil E, Fernandes Fonseca F, Shepherd B, Veloso V, et al. No occurrences of neural tube defects among 382 women on dolutegravir at pregnancy conception in Brazil. In: 10th IAS Conference on HIV Science. 2019. p. Mexico City.
71. Raesima M. Addressing the safety signal with dolutegravir use at conception: Additional surveillance data from Botswana. In: 10th IAS Conference on HIV Science. Mexico City; 2019.
72. Polis CB, Curtis KM, Hannaford PC, Phillips SJ, Chipato T, Kiarie JN, et al. An

updated systematic review of epidemiological evidence on hormonal contraceptive methods and HIV acquisition in women. AIDS. 2016;

73. Ahmed K, Baeten JM, Beksinska M, Bekker L-G, Bukusi EA, Donnell D, et al. HIV incidence among women using intramuscular depot medroxyprogesterone acetate, a copper intrauterine device, or a levonorgestrel implant for contraception: a randomised, multicentre, open-label trial. Lancet [Internet]. 2019 [cited 2019 Jun 15]; Available from: http://dx.doi.org/10.1016/S0140-6736
74. Tsui AO, Brown W, Li Q. Contraceptive Practice in sub-Saharan Africa. Popul Dev Rev [Internet]. 2017 [cited 2019 Aug 2];43:166–91. Available from: http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG
75. Nations U. Trends in contraceptive use worldwide 2015 United Nations [Internet]. 2015 [cited 2019 Aug 2]. Available from: https://www.un.org/en/development/desa/population/publications/pdf/family/trendsContraceptiveUse2015Report.pdf
76. Jacobstein R. Liftoff: The Blossoming of Contraceptive Implant Use in Africa. Glob Heal Sci Pract [Internet]. 2018 [cited 2019 Aug 2];6(1):17–39. Available from: www.ghspjournal.org
77. Darroch JE, Singh S. Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: An analysis of national surveys. Lancet. 2013;
78. Massyn N, Padarath A, Peer N, Day C. District Health Barometer 2016/17. Health Systems Trust. 2017.
79. Michalow J, Chola L, McGee S, Tugendhaft A, Pattinson R, Kerber K, et al. Triple return on investment: The cost and impact of 13 interventions that could prevent stillbirths and save the lives of mothers and babies in South Africa. BMC Pregnancy Childbirth. 2015;
80. Smit JA, Beksinska ME. Hormonal contraceptive continuation and switching in South Africa: Implications for evaluating the association of injectable hormonal contraceptive use and HIV. J Acquir Immune Defic Syndr. 2013;
81. Taha TE, Yende-Zuma N, Aizire J, Chipato T, Ogwang LW, Makanani B, et al. The multi-country promote HIV antiretroviral treatment observational cohort in sub-Saharan Africa: Objectives, design, and baseline findings. PLoS One [Internet]. 2018 [cited 2019 Mar 30];13(12). Available from: https://doi.org/10.1371/journal.pone.0208805
82. Massyn N, Pillay Y, Padarath A. District Health Barometer 2017/18 [Internet]. Durban;

2019 [cited 2019 Apr 23]. Available from: http://www.hst.org.za/publications/District Health Barometers/DHB+2017-18+Web+8+Apr+2019.pdf

83. Harper CC, Blum M, De Bocanegra HT, Darney PD, Speidel JJ, Policar M, et al. Challenges in translating evidence to practice: The provision of intrauterine contraception. Obstet Gynecol. 2008;
84. Reiss K, Penfold S, Alabi O, Ali M, Hopkins K, Dinh Ngo T, et al. Safety, quality, and acceptability of contraceptive subdermal implant provision by community health extension workers versus nurses and midwives in Nigeria: protocol for a quasi-experimental, noninferiority study. J Med Internet Res. 2018;
85. Family Health International Knowledge for Health. Addressing Unmet Need for Family Planning in Africa: Long-acting and permanent methods [Internet]. 2007 [cited 2019 Apr 22]. Available from: https://www.k4health.org/sites/default/files/LAPM methods_English.pdf
86. Adeagbo OA, Mullick S, Pillay D, Chersich MF, Morroni C, Naidoo N, et al. Uptake and early removals of Implanon NXT in South Africa: Perceptions and attitudes of healthcare workers. South African Med J. 2017;
87. Thompson KMJ, Rocca CH, Stern L, Morfesis J, Goodman S, Steinauer J, et al. Training contraceptive providers to offer intrauterine devices and implants in contraceptive care: a cluster randomized trial. Am J Obstet Gynecol [Internet]. 2018 [cited 2019 Feb 20];218(6):597.e1-597.e7. Available from: https://doi.org/10.1016/j.ajog.2018.03.016
88. Nalwadda G, Mirembe F, Tumwesigye NM, Byamugisha J, Faxelid E. Constraints and prospects for contraceptive service provision to young people in Uganda: providers' perspectives. BMC Health Serv Res [Internet]. 2011 Sep;11:220. Available from: https://www.ncbi.nlm.nih.gov/pubmed/21923927
89. Abebaw Y, Berhe S, Abebe SM, Adefris M, Gebeyehu A, Gure T, et al. Providers' knowledge on postpartum intrauterine contraceptive device (PPIUCD) service provision in Amhara region public health facility, Ethiopia. PLoS One [Internet]. 2019;14(4):e0214334. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30946759
90. Paul M, Näsström SB, Klingberg-Allvin M, Kiggundu C, Larsson EC. Healthcare providers balancing norms and practice: challenges and opportunities in providing contraceptive counselling to young people in Uganda - a qualitative study. Glob Health Action [Internet]. 2016;9:30283. Available from:

https://www.ncbi.nlm.nih.gov/pubmed/27174861

91. Schwandt HM, Speizer IS, Corroon M. Contraceptive service provider imposed restrictions to contraceptive access in urban Nigeria. BMC Health Serv Res [Internet]. 2017;17(1):268. Available from: https://www.ncbi.nlm.nih.gov/pubmed/28403858
92. Solo J, Festin M. Provider bias in family planning services: A review of its meaning and manifestations. Global Health Science and Practice. 2019.
93. Johnson Chair L, Platt Zolov L, Kimpel KM, Doe NationBuilder Beth Grupp Beth Grupp Associates Ellen Karp Anerca Kai-yan LeeVanke Esmeralda Lyn HO, Rodgers W, Rowe-Finkbeiner MomsRising Elizabeth Schuler K, et al. The Economic Effects of Contraceptive Access: A Review of the Evidence [Internet]. 2019 [cited 2020 Jul 22]. Available from: www.iwpr.org
94. Ahmed S, Li Q, Liu L, Tsui AO. Maternal deaths averted by contraceptive use: An analysis of 172 countries. Lancet. 2012;
95. Yazdkhasti M, Pourreza A, Pirak A, Abdi F. Unintended Pregnancy and Its Adverse Social and Economic Consequences on Health System: A Narrative Review Article. Iran J Public Health [Internet]. 2015 [cited 2019 Mar 17];44(1):12–21. Available from: http://ijph.tums.ac.ir
96. Gebremedhin M, Semahegn A, Usmael T, Tesfaye G. Unsafe abortion and associated factors among reproductive aged women in Sub-Saharan Africa: A protocol for a systematic review and meta-analysis. Syst Rev [Internet]. 2018 [cited 2020 Jul 23];7(1). Available from: https://doi.org/10.1186/s13643-018-0775-9
97. Calhoun LM, Speizer IS, Rimal R, Sripad P, Chatterjee N, Achyut P, et al. Provider imposed restrictions to clients' access to family planning in urban Uttar Pradesh, India: A mixed methods study. BMC Health Serv Res [Internet]. 2013 Dec 23 [cited 2020 Jul 22];13(1):532. Available from: /pmc/articles/PMC3879325/?report=abstract
98. Tumlinson K, Okigbo CC, Speizer IS. Provider barriers to family planning access in urban Kenya. Contraception [Internet]. 2015 Aug;92(2):143–51. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25869629
99. Sidze EM, Lardoux S, Speizer IS, Faye CM, Mutua MM, Badji F. Young women's access to and use of contraceptives: the role of providers' restrictions in urban Senegal. Int Perspect Sex Reprod Health [Internet]. 2014 Dec;40(4):176–83. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25565345
100. Ontiri S, Ndirangu G, Kabue M, Biesma R, Stekelenburg J, Ouma C. Long-Acting Reversible Contraception Uptake and Associated Factors among Women of

Reproductive Age in Rural Kenya. [cited 2020 Mar 28]; Available from: www.mdpi.com/journal/ijerph

101. Hohmann HL, Cremer ML, Gonzalez E, Maza M. Knowledge and attitudes about intrauterine devices among women's health care providers in El Salvador. Rev Panam Salud Publica/Pan Am J Public Heal. 2011;29(3):198–202.
102. Black KI, Lotke P, Lira J, Peers T, Zite NB. Global survey of healthcare practitioners' beliefs and practices around intrauterine contraceptive method use in nulliparous women. Contraception [Internet]. 2013 Nov 1 [cited 2020 Jul 23];88(5):650–6. Available from: http://dx.doi.org/10.1016/j.contraception.2013.06.005
103. Ouyang M, Peng K, Botfield JR, McGeechan K. Intrauterine contraceptive device training and outcomes for healthcare providers in developed countries: A systematic review. PLoS One [Internet]. 2019 [cited 2020 Jul 23];14(7). Available from: https://doi.org/10.1371/journal.pone.0219746
104. Crocetti E. Systematic Reviews With Meta-Analysis: Why, When, and How? Emerg Adulthood. 2016;4(1):3–18.
105. Ahn E, Kang H. Introduction to systematic review and meta-analysis. Korean J Anesthesiol [Internet]. 2018 [cited 2020 Jul 22];71(2):103–12. Available from: https://doi.org/10.4097/kjae.2018.71.2.103
106. Médicins du Monde. The KAP Survey Model [Internet]. 2011. Available from: https://www.spring-nutrition.org/publications/tool-summaries/kap-survey-model-knowledge-attitudes-and-practices
107. United Nations Department of Economic and Social Affairs. Methodology: Standard country or area codes for statistical use (M49) [Internet]. 2020 [cited 2020 May 14]. Available from: https://unstats.un.org/unsd/methodology/m49/
108. Centre for Reviews and Dissemination. Systematic reviews: CRD's guidance for undertaking reviews in health care [Internet]. The Lancet Infectious Diseases. 2009 [cited 2019 Nov 1]. Available from: www.york.ac.uk/inst/crd
109. Moher D, Liberati A, Tetzlaff J, Altman DG. Rand et al. Supplement- Additional Resources: Systematic Reviews and Meta-Analyses: The PRISMA Statement. Annu Intern Med [Internet]. 2009 [cited 2019 Feb 21];151(4):264–9. Available from: www.prisma-statement.org.
110. CASP. Critical Appraisal Skills Programme [Internet]. 2018 [cited 2019 Mar 31]. Available from: https://casp-uk.net/wp-content/uploads/2018/03/CASP-Systematic-Review-Checklist-2018_fillable-form.pdf

111. CLARITY Group. Risk of Bias Instrument for Cross-Sectional Surveys of Attitudes and Practices [Internet]. 2011 [cited 2019 Mar 31]. Available from: https://www.evidencepartners.com/wp-content/uploads/2017/09/Risk-of-Bias-Instrument-for-Cross-Sectional-Surveys-of-Attitudes-and-Practices.pdf
112. Wells G, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses [Internet]. [cited 2019 Mar 31]. Available from: http://www.ohri.ca/programs/clinical_epidemiology/nosgen.pdf
113. Hong QN, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, et al. The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. Educ Inf. 2018;
114. Levitt HM. How to conduct a qualitative meta-analysis: Tailoring methods to enhance methodological integrity. Psychother Res [Internet]. 2018 [cited 2020 Jan 13];28(3):367–78. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=tpsr20
115. Friese S, Soratto J, Pires D. Carrying out a computer-aided thematic content analysis with ATLAS.ti [Internet]. Göttingen; 2018. Available from: http://www.mmg.mpg.de/fileadmin/user_upload/documents/wp/WP_12-12_Annotated-Bibliography_MEDDIV.pdf%5Cnhttp://fabriziogilardi.org/resources/papers/Gilardi-4-Theses-Diffusion.pdf
116. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101.
117. Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. BMC Med Res Methodol [Internet]. 2008 [cited 2019 Mar 31];8. Available from: http://www.biomedcentral.com/1471-2288/8/45
118. Silver C, Lewins A. Using Software in Qualitative Research: A Step-by-Step Guide. Using Software in Qualitative Research: A Step-by-Step Guide. 2017.
119. Nicholson E, Murphy T, Larkin P, Normand C, Guerin S. Protocol for a thematic synthesis to identify key themes and messages from a palliative care research network. BMC Res Notes [Internet]. 2016 [cited 2019 Aug 18];9(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073737/pdf/13104_2016_Article_2282.pdf
120. Gualano MR, Gili R, Scaioli G, Bert F, Siliquini R. General population's knowledge

and attitudes about antibiotics: A systematic review and meta-analysis. Pharmacoepidemiol Drug Saf. 2015;24(1):2–10.

121. Bhagavathula ASK, Elnour AA, Jamshed SQ, Shehab A. Health professionals' knowledge, attitudes and practices about Pharmacovigilance in India: A systematic review and meta-analysis. PLoS One [Internet]. 2016 [cited 2019 Mar 14];11(3). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4807086/pdf/pone.0152221.pdf
122. Kleijnen J, Antes G. Systematic Reviews in Health Care. Meta-analysis in Context. Int J Epidemiol. 2002;
123. Ahmed I, Sutton AJ, Riley RD. Assessment of publication bias, selection bias, and unavailable data in meta-analyses using individual participant data: A database survey. BMJ [Internet]. 2012 [cited 2020 Jul 22];344(7838). Available from: http://www.bmj.com/subscribe
124. Song F, Hooper L, Loke YK. Publication bias: what is it? How do we measure it? How do we avoid it? Open Access J Clin Trials. 2013;(5):71–81.
125. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for systematic reviews. Syst Rev [Internet]. 2016 [cited 2019 Nov 3];5(210):2–10. Available from: http://creativecommons.org/publicdomain/zero/1.0/
126. Viswanathan M, Ansari MT, Berkman ND, Chang S, Hartling L, McPheeters M, et al. Assessing the Risk of Bias of Individual Studies in Systematic Reviews of Health Care Interventions. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. 2008.
127. Centre for Reviews and Dissemination. CRD's guidance for undertaking reviews in health care. York Publishing Services Ltd. 2009.
128. Mwafulirwa T, O'Shea MS, Hamela G, Samuel E, Chingondole C, Chipangula V, et al. Family planning providers' experiences and perceptions of long-acting reversible contraception in Lilongwe, Malawi. Afr J Reprod Heal. 2016;20(2):62–71.
129. Marlow HM, Maman S, Moodley D, Curtis S. Postpartum Family Planning Service Provision in Durban, South Africa: Client and Provider Perspectives. Health Care Women Int [Internet]. 2014 [cited 2019 Feb 20];35(2):175–99. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4083758/pdf/nihms593810.pdf
130. Grindlay K, Turyakira E, Kyamwanga IT, Nickerson A, Blanchard K. The Experience and Impact of Contraceptive Stockouts Among Women, Providers and Policymakers in Two Districts of Uganda. Int Perspect Sex Reprod Health [Internet].

2016;42(3):141–50. Available from: https://www.ncbi.nlm.nih.gov/pubmed/28825905

131. Tshitenge ST, Nlisi K, Setlhare V, Ogundipe R. Knowledge, attitudes and practice of healthcare providers regarding contraceptive use in adolescence in Mahalapye, Botswana. South African Fam Pract [Internet]. 2018;60(6):181–6. Available from: https://doi.org/10.1080/20786190.2018.1501239
132. Cover J, Namagembe A, Tumusiime J, Lim J, Cox CM. Ugandan providers' views on the acceptability of contraceptive self-injection for adolescents: a qualitative study. Reprod Health [Internet]. 2018 Oct;15(1):165. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30285779
133. Robinson N, Moshabela M, Owusu-Ansah L, Kapungu C, Geller S. Barriers to Intrauterine Device Uptake in a Rural Setting in Ghana. Health Care Women Int. 2016;37(2):197–215.
134. Godia PM, Olenja JM, Lavussa JA, Quinney D, Hofman JJ, van den Broek N. Sexual reproductive health service provision to young people in Kenya; health service providers' experiences. BMC Health Serv Res [Internet]. 2013 Nov;13:476. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24229365
135. Cover J, Blanton E, Ndiaye D, Walugembe F, Lamontagne DS. Operational assessments of Sayana® Press provision in Senegal and Uganda. Contraception [Internet]. 2014 May;89(5):374–8. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24565737
136. Burke HM, Mueller MP, Packer C, Perry B, Bufumbo L, Mbengue D, et al. Provider acceptability of Sayana® Press: results from community health workers and clinic-based providers in Uganda and Senegal. Contraception [Internet]. 2014 May;89(5):368–73. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24576792
137. Hyttel M, Rasanathan JJK, Tellier M, Taremwa W. Use of injectable hormonal contraceptives: diverging perspectives of women and men, service providers and policymakers in Uganda. Reprod Health Matters [Internet]. 2012 Dec;20(40):148–57. Available from: https://www.ncbi.nlm.nih.gov/pubmed/23245420
138. Sieverding M, Schatzkin E, Shen J, Liu J. Bias in Contraceptive Provision to Young Women Among Private Health Care Providers in South West Nigeria. Int Perspect Sex Reprod Health [Internet]. 2018;44(1):19–29. Available from: https://www.ncbi.nlm.nih.gov/pubmed/30028307
139. Sedekia Y, Jones C, Nathan R, Schellenberg J, Marchant T. Using contraceptives to delay first birth: a qualitative study of individual, community and health provider

perceptions in southern Tanzania. BMC Public Health [Internet]. 2017;17(1):768. Available from: https://www.ncbi.nlm.nih.gov/pubmed/28974208

140. Tolley EE, McKenna K, Mackenzie C, Ngabo F, Munyambanza E, Arcara J, et al. Preferences for a potential longer-acting injectable contraceptive: perspectives from women, providers, and policy makers in Kenya and Rwanda. Glob Heal Sci Pract [Internet]. 2014 May;2(2):182–94. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25276576
141. Keith B, Wood S, Chapman C, Alemu E. Perceptions of home and self-injection of Sayana® Press in Ethiopia: a qualitative study. Contraception [Internet]. 2014 May;89(5):379–84. Available from: https://www.ncbi.nlm.nih.gov/pubmed/24529492
142. McKenna K, Arcara J, Rademacher KH, Mackenzie C, Ngabo F, Munyambanza E, et al. Policy and programmatic considerations for introducing a longer-acting injectable contraceptive: perspectives of stakeholders from Kenya and Rwanda. Glob Heal Sci Pract [Internet]. 2014 Oct;2(4):459–71. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25611479
143. Adeagbo O, Mullick S, Pillay D, Chersich M, Morroni C, Naidoo N, et al. Uptake and early removals of Implanon NXT in South Africa: Perceptions and attitudes of healthcare workers. S Afr Med J [Internet]. 2017 Oct;107(10):822–6. Available from: https://www.ncbi.nlm.nih.gov/pubmed/29397681
144. Brown A, Harries J, Cooper D, Morroni C. Perspectives on contraceptive implant use in women living with HIV in Cape Town, South Africa: A qualitative study among primary healthcare providers and stakeholders. BMC Public Health. 2019;19(1):1–9.
145. Gupta M, Verma M, Kaur K, Iyengar K, Singh T, Singh A. Competency assessment of the medical interns and nurses and documenting prevailing practices to provide family planning services in teaching hospitals in three states of India. PLoS One [Internet]. 2019 [cited 2020 Mar 27];14(11). Available from: https://doi.org/10.1371/journal.pone.0211168
146. Guure C, Tei Maya E, Dery S, da-Costa Vrom B, Alotaibi RM, Ragab Rezk H, et al. Factors influencing unmet need for family planning among Ghanaian married/union women: a multinomial mixed effects logistic regression modelling approach. [cited 2020 Mar 27]; Available from: https://doi.org/10.1186/s13690-019-0340-6
147. Ajong AB, Njotang PN, Yakum MN, Essi MJ, Essiben F, Eko FE, et al. Determinants of unmet need for family planning among women in Urban Cameroon: a cross sectional survey in the Biyem-Assi Health District, Yaoundé. 2016;

148. Solomon T, Nigatu M, Gebrehiwot TT, Getachew B. Unmet need for family planning and associated factors among currently married reproductive age women in Tiro Afeta District, South West Ethiopia, 2017: cross-sectional study. [cited 2020 Mar 27]; Available from: https://doi.org/10.1186/s12905-019-0872-5
149. Dehingia N, Dixit A, Averbach S, Choudhry V, Dey A, Chandurkar D, et al. Family planning counseling and its associations with modern contraceptive use, initiation, and continuation in rural Uttar Pradesh, India. Reprod Health. 2019;
150. Kalra N, Ayankola J, Babalola S. Healthcare provider interaction and other predictors of long-acting reversible contraception adoption among women in Nigeria. Int J Gynecol Obstet [Internet]. 2019 Feb 1 [cited 2020 Mar 27];144(2):153–60. Available from: http://doi.wiley.com/10.1002/ijgo.12705
151. Daniele MAS, Cleland J, Benova L, Ali M. Provider and lay perspectives on intra-uterine contraception: A global review. Reprod Health [Internet]. 2017 [cited 2019 Apr 23];14(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5615438/pdf/12978_2017_Article_380.pdf
152. Ouyang M, Peng K, Botfield JR, McGeechan K. Intrauterine contraceptive device training and outcomes for healthcare providers in developed countries: A systematic review. PLoS One. 2019;
153. Schubert FD, Herbitter C, Fletcher J, Gold M. IUD knowledge and experience among family medicine residents. Fam Med. 2015;
154. Lewis C, Darney P, De Bocanegra HT. Intrauterine contraception: Impact of provider training on participant knowledge and provision. Contraception. 2013;
155. Kemeny F, Digiusto E, Bateson D. Insertion of intrauterine contraceptive devices by registered nurses in Australia. Aust New Zeal J Obstet Gynaecol. 2016;
156. Romero D, Maldonado L, Fuentes L, Prine L. Association of reproductive health training on intention to provide services after residency: The family physician resident survey. Fam Med. 2015;
157. Dermish AI, Turok DK. The copper intrauterine device for emergency contraception: An opportunity to provide the optimal emergency contraception method and transition to highly effective contraception. Expert Rev Med Devices. 2013;
158. Okegbe T, Affo J, Djihoun F, Zannou A, Hounyo O, Ahounou G, et al. Introduction of community-based provision of subcutaneous depot medroxyprogesterone acetate (DMPA-SC) in Benin: Programmatic results. Glob Heal Sci Pract [Internet]. 2019

[cited 2020 Apr 1];7(2):228–39. Available from: www.ghspjournal.org

159. Burke HM, Chen M, Buluzi M, Fuchs R, Wevill S, Venkatasubramanian L, et al. Effect of self-administration versus provider-administered injection of subcutaneous depot medroxyprogesterone acetate on continuation rates in Malawi: a randomised controlled trial. Lancet Glob Heal [Internet]. 2018 [cited 2020 Apr 1];6(5):e568–78. Available from: www.thelancet.com/lancetgh
160. Wani RT, Rashid I, Dar H, Nabi SS. Knowledge, attitude, and practice of family planning services among healthcare workers in Kashmir – A cross-sectional study. J Fam Med Prim Care. 2019;8(4):1319–1325.
161. Schaefer L. Task sharing implant insertion by community health workers: Not just can it work, but how might it work practically and with impact in the real world. Glob Heal Sci Pract [Internet]. 2015 [cited 2020 Apr 6];3(3):327–9. Available from: http://dx.doi.org/10.9745/GHSP-D-15-00230.
162. World Health Organization (WHO). WHO Recommendations: Optimizing health worker roles to improve access to key maternal and newborn health interventions through task shifting [Internet]. Geneva; 2012 [cited 2020 Apr 6]. Available from: www.who.int/reproductivehealth
163. Tilahun Y, Lew C, Belayihun B, Hagos KL, Asnake M. Improving contraceptive access, use, and method mix by task sharing implanon insertion to frontline health workers: The experience of the integrated family health program in Ethiopia. Glob Heal Sci Pract [Internet]. 2017 [cited 2020 Apr 6];5(4):592–602. Available from: www.ghspjournal.org
164. Charyeva Z, Oguntunde O, Orobaton N, Otolorin E, Inuwa F, Alalade O, et al. Task shifting provision of contraceptive implants to community health extension workers: Results of operations research in Northern Nigeria. Glob Heal Sci Pract [Internet]. 2015 [cited 2020 Apr 6];3(3):382–94. Available from: www.ghspjournal.org
165. Mhlanga FG, Balkus JE, Singh D, Chappell C, Kamira B, Harkoo I, et al. Feasibility and Safety of IUD Insertion by Mid-Level Providers in Sub-Saharan Africa. Int Perspect Sex Reprod Health. 2019;(45):61–9.
166. Heck CJ, Grilo SA, Song X, Lutalo T, Nakyanjo N, Santelli JS. “It is my business”: A Mixed-Methods Analysis of Covert Contraceptive Use among Women in Rakai, Uganda. 2018 [cited 2020 Apr 6]; Available from: https://doi.org/10.1016/j.contraception.2018.02.017
167. Baiden F, Mensah GP, Akoto NO, Delvaux T, Appiah PC. Covert contraceptive use

among women attending a reproductive health clinic in a municipality in Ghana. 2016;
168. Choiriyyah I, Becker S. Measuring Women's Covert Use of Modern Contraception in Cross-Sectional Surveys. Stud Fam Plann. 2018;
169. Di Giorgio L, Mvundura M, Tumusiime J, Namagembe A, Ba A, Belemsaga-Yugbare D, et al. Costs of administering injectable contraceptives through health workers and self-injection: evidence from Burkina Faso, Uganda, and Senegal. Contraception. 2018;(98):389–95.
170. Melkamu Asaye M, Syoum Nigussie T, Mequannt Ambaw W. Early Implanon Discontinuation and Associated Factors among Implanon User Women in Debre Tabor Town, Public Health Facilities, Northwest Ethiopia, 2016. Int J Reprod Med [Internet]. 2018 [cited 2020 Apr 6];2018:1–10. Available from: https://doi.org/10.1155/2018/3597487
171. Maina SW, Osanjo GO, Ndwigah SN, Opanga SA. Determinants of Discontinuation of Contraceptive Methods among Women at Kenyatta National Hospital, Kenya. African J Pharmacol Ther. 2016;5(1):28–34.
172. Chakraborty NM, Murphy C, Paudel M, Sharma S. Knowledge and perceptions of the intrauterine device among family planning providers in Nepal: A cross-sectional analysis by cadre and sector. BMC Health Serv Res. 2015;
173. Agha S, Fareed A, Keating J. Clinical training alone is not sufficient for reducing barriers to iudprovision among private providers in Pakistan. Reprod Health. 2011;
174. Callegari LS, Darney BG, Godfrey EM, Sementi O, Dunsmoor-Su R, Prager SW. Evidence-based selection of candidates for the levonorgestrel intrauterine device (IUD). J Am Board Fam Med. 2014 Jan 1;27(1):26–33.
175. Rubin SE, Fletcher J, Stein T, Segall-Gutierrez P, Gold M. Determinants of intrauterine contraception provision among US family physicians: A national survey of knowledge, attitudes and practice. Contraception. 2011 May 1;83(5):472–8.
176. Moreau C, Bohet A, Hassoun D, Ringa V, Bajos N. IUD use in France: women's and physician's perspectives- ClinicalKey. Contraception [Internet]. 2014 [cited 2020 Apr 7];89(1):9–16. Available from: https://www-clinicalkey-com.uplib.idm.oclc.org/#!/content/playContent/1-s2.0-S0010782413006434
177. Wang Z, Lou C, Jin L, Miao M, Tu X, Liang H, et al. Attitudes and practices related to intrauterine devices for nulliparous women among Chinese health care providers. Reprod Health. 2019 Jan 31;16(1):1–8.
178. Pfitzer A, MacKenzie D, Blanchard H, Hyjazi Y, Kumar S, Lisanework Kassa S, et al.

A facility birth can be the time to start family planning: Postpartum intrauterine device experiences from six countries. Int J Gynecol Obstet. 2015 Jun 1;130(S2):S54–61.

179. Lince-Deroche N, Hendrickson C, Moolla A, Kgowedi S, Mulongo M. Provider perspectives on contraceptive service delivery: findings from a qualitative study in Johannesburg, South Africa. BMC Health Serv Res [Internet]. 2020 [cited 2020 Apr 9];20(1):128. Available from: https://doi.org/10.1186/s12913-020-4900-9
180. Simmons KB, Zapata L, Curtis KM. Health Care Provider Perceptions of the Safety of IUDs for Women with HIV. Perspect Sex Reprod Health. 2018;50(2):67–73.
181. Blanchard K, Chipato T, Ramjee G, Nhemachena T, Harper CC. Clinicians' perceptions and provision of hormonal contraceptives for HIV-positive and at-risk women in Southern Africa: An original research article. Contraception [Internet]. 2014 [cited 2019 Mar 20];90(4):391–8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4437207/pdf/nihms604595.pdf
182. Newmann SJ, Mishra K, Onono M, Bukusi EA, Cohen CR, Gage O, et al. Providers' Perspectives on Provision of Family Planning to HIV-Positive Individuals in HIV Care in Nyanza Province, Kenya. AIDS Res Treat [Internet]. 2013;2013:915923. Available from: https://www.ncbi.nlm.nih.gov/pubmed/23738058
183. Patel RC, Onono M, Gandhi M, Blat C, Hagey J, Shade SB, et al. Pregnancy rates in HIV-positive women using contraceptives and efavirenz-based or nevirapine-based antiretroviral therapy in Kenya: A retrospective cohort study. Lancet HIV. 2015;2(11):e474–82.
184. Patel RC, Morroni C, Scarsi KK, Sripipatana T, Kiarie J, Cohen CR. Concomitant contraceptive implant and efavirenz use in women living with HIV: Perspectives on current evidence and policy implications for family planning and HIV treatment guidelines. J Int AIDS Soc. 2017;20(1).
185. Thanel K, Garfinkel D, Riley C, Esch K, Girma W, Kebede T, et al. Leveraging long acting reversible contraceptives to achieve FP2020 commitments in sub-Saharan Africa: The potential of implants. PLoS One. 2018 Apr 1;13(4).
186. Ali M, Farron M, Dilip TR, Folz R. Assessment of Family Planning Service Availability and Readiness in 10 African Countries [Internet]. [cited 2020 Apr 9]. Available from: www.ghspjournal.org

APPENDICES

Appendix 1: Data Extraction Form

Study title: Knowledge, attitudes and perceptions of HCW towards the Cu-IUD and DMPA injectable contraceptive methods in South Africa.

STUDY ID: *Surname of first author and year of publication. E.g. Carter 2018*

Section A: General Information

Date of completion (dd/mm/yyyy)	
Name of data extracting person	
Study citation (Vancouver)	
Publication type (abstract, full text, report etc)	
Other potential studies from the reference list	
Notes	

Section B: Study Eligibility

Study Characteristic	**Description**	**Location in text** (page)
Study type		
Study population		
Contraceptive focus (Cu-IUD, DMPA – at least one)		
Outcome measures (knowledge/ attitudes/ perceptions)		
Decision to include (Yes/no with reasons)		

Notes:	

DO NOT PROCEED IF THE STUDY IS EXCLUDED FROM THE REVIEW

Section 3: Population and Setting

	Description	**Location in text** (page)
Population description (from which study participants are drawn)		
Source/setting of the population (e.g. urban, rural, ethnic group)		
Method/s of recruitment of participants		
Notes:		

Section 4: Methodology

	Description	**Location in text** (page)
Study aim		
Study design		
Sampling		
Study start and end date		
Notes:		

Section 5: Study Participants

	Description	**Location in text** (page)
Sample size		
Type of HCWs		

Notes:	

Section 6: Outcomes

Outcome 1: Knowledge	**Description**	**Location in text** (page)
How outcome was measured		
Outcome definition in the study		
Is the outcome tool validated?		
Type of measurement (Odds ratio, Risk ratio, percentage)		
Notes:		

Outcome 2: Attitude	**Description**	**Location in text** (page)
How outcome was measured		
Outcome definition in the study		
Is the outcome tool validated?		
Type of measurement (Qualitative, quantitative)		
Notes:		

Outcome 3: Perceptions	**Description**	**Location in text** (page)
How outcome was measured		
Outcome definition in the study		
Is the outcome tool validated?		
Type of measurement (Qualitative, quantitative)		

Notes:	

Section 7: Results and Findings

Outcome 1: Knowledge	**Description**	**Location in text** (page)
Outcome (Contraceptive Type)		
Subgroup (if any, e.g. HCW type, age)		
Results		
Response rate		
Any other results reported		
Notes:		

Outcome 2: Attitudes	**Description**	**Location in text** (page)
Outcome (Contraceptive Type)		
Subgroup (if any, e.g. HCW type, age)		
Results		
Response rate		
Any other results reported		
Notes:		

Outcome 3: Perceptions	**Description**	**Location in text** (page)
Outcome (Contraceptive Type)		
Subgroup (if any, e.g. HCW type, age)		
Results		

Response rate		
Any other results reported		
Notes:		

Section 8: Limitations

	Description	**Location in text** (page)
Strengths		
Limitations		
Strategies to overcome limitations		
Notes		

Section 9: Conclusions

	Description	**Location in text** (page)
Key conclusions		
Notes		

Appendix 2: Characteristics of included studies

Study ID	Author	Title	Country, City	Study Design (Period)	Sample size	HCW Type	Study Outcome	LARC Type
1	Abebaw et al. 2019	Providers' knowledge on postpartum intrauterine contraceptive device (PPIUCD) service provision in Amhara region public health facility, Ethiopia.	Ethiopia, Amhara region	Cross-sectional	864	Gynaecologists, OB/GYN residents, GPs emergency surgeons health officers, midwives, nurses	Knowledge	IUCD-postpartum
2	Adeagbo et al. 2017	Uptake and early removals of Implanon NXT in South Africa: Perceptions and attitudes of healthcare workers.	South Africa, Gauteng and North West	Qualitative, IDIs	8	Nurses	Attitudes and Perceptions	Implants
3	Adekunle et al. 2000	Emergency contraception: survey of knowledge, attitudes and practice of health care professionals in Ibadan, Nigeria.	Nigeria, Ibadan	Cross-sectional survey	735	Physicians, nurses, social workers, pharmacists, hospital administrators, medical officers	Knowledge and attitudes	Emergency contraception (Cu-IUD and Levonorgestrel included)
4	Atuahene et al. 2016	Health knowledge, attitudes and practices of family planning service providers and clients in Akwapim North District of Ghana	Ghana, Akwapim North District	Cross-sectional survey.	70	Midwives SRNs CHNs enrolled nurses, HCAs	Perceptions	IUCD, implants, injectables
5	Blanchard et al. 2014	Clinicians' perceptions and provision of hormonal contraceptives for HIV-positive and at-risk women in Southern Africa: original research article.	South Africa and Zimbabwe	Nationally representative survey	1972	Nurses Physicians	Perceptions	IUCD Implants Injectables
6	Brown et al. 2019	Perspectives on contraceptive implant use in women living with HIV in Cape Town, South Africa: a qualitative study among	South Africa	Qualitative IDIs and FGDs	20	Professional nurses OB/GYNs Specialist contraceptive providers Pharmacologist	Perceptions	Implants

		primary healthcare providers and stakeholders						
7	Burke et al. 2014	Provider acceptability of Sayana® Press: results from community health workers and clinic-based providers in Uganda and Senegal.	Senegal and Uganda	Open-label observational study	86	CHWs Nurses Midwives	Perceptions	Injectables (DMPA-SC)
8	Burke et al. 2018	Client and provider experiences with self-administration of subcutaneous depot medroxyprogesterone acetate (DMPA-SC) in Malawi.	Malawi, Mangochi District	Qualitative, semi-structured interviews	6	Nurses, midwives	Perceptions and experiences	DMPA-SC (self-injecting)
9	Byamugisha et al. 2007	Knowledge, attitudes and prescribing pattern of emergency contraceptives by health care workers in Kampala, Uganda.	Uganda, Kampala District	Cross-sectional	247	Midwives Nurses Clinical officers doctors gynaecologists other	Knowledge	Emergency contraception (Cu-IUD and Levonorgestrel included)
10	Caplan et al. 2018	Provider perspectives on barriers to reproductive health services for HIV-infected clients in Central Malawi	Malawi	Mixed-methods	31	Physicians, Clinical officers, Medical assistants, Nurses	Attitude, perceptions	IUCD Injectables Implants
11	Chebet et al. 2015	"Every method seems to have its problems"- Perspectives on side effects of hormonal contraceptives in Morogoro Region, Tanzania	Tanzania, Morogoro region	Qualitative, IDIs	31	CHWs FBPs	Attitude	Injectables, Implants
12	Cover et al. 2014	Operational assessments of Sayana® Press provision in Senegal and Uganda	Senegal Uganda	Qualitative Semi-structured interviews	58	Health Providers CHWs	Perceptions (Operational)	Injectables (DMPA-SC)
13	Cover et al. 2018	Ugandan providers' views on the acceptability of contraceptive self-injection for	Uganda	Qualitative, IDIs	40	FBPs	Attitude and perceptions	DMPA-SC

		adolescents: a qualitative study.						
14	Ebuehi et al. 2006	Health Care Providers' Knowledge of, Attitudes Toward and Provision of Emergency Contraceptives in Lagos, Nigeria	Nigeria, Lagos	Cross-sectional survey	256	Health care providers	Knowledge, attitudes	Emergency contraceptives (IUCD)
15	Eva et al. 2018	Experiences With the Levonorgestrel Intrauterine System Among Clients, Providers, and Key Opinion Leaders: A Mixed-Methods Study in Nigeria	Nigeria	Mixed-methods IDIs	32	Nurses Midwives Doctors	Attitude, perceptions	LNG IUS
16	Godia et al. 2013	Sexual reproductive health service provision to young people in Kenya; health service providers' experiences	Kenya, Nairobi	Qualitative Focus Groups Semi-structured IDIs	37	Health service providers	Knowledge, perceptions	Injectables, implants, IUCDs
17	Grindlay et al. 2015	The Experience and Impact of Contraceptive Stockouts Among Women, Providers and Policymakers in Two Districts of Uganda	Uganda, Kamuli and Mbarara district	Qualitative, IDIs	24	Family planning service providers	Perceptions of availability of stockouts	IUCDs, injectables, implants
18	Gutin et al. 2011	Survey of knowledge, attitudes and practices surrounding the intrauterine device in South Africa	South Africa, Cape Town and Umtata	Cross-sectional survey	32	Nurses	Knowledge, attitude	IUCD
19	Hoke et al. 2014	Expanding contraceptive options for PMTCT clients: a mixed methods implementation study in Cape Town, South Africa	South Africa, Cape Town	Mixed-methods (IDIs)	16	Family planning, antenatal care and child health service providers	Attitude	IUCD
20	Holt et al. 2012	Assessment of Service Availability and Health Care Workers' Opinions about Young Women's Sexual and Reproductive Health in Soweto, South Africa	South Africa, Soweto	Cross-sectional survey	29	Nurses, midwives, counsellors, operational managers, social worker	Attitude, perceptions	IUCD injectables implants

21	Hubacher et al. 2014	Introduction of the levonorgestrel intrauterine system in Kenya through mobile outreach: review of service statistics and provider perspectives	Kenya	Qualitative, IDIs	27	Doctors Nurses Care assistants	Perceptions	IUCD, Implants
22	Hyttel et al. 2012	Use of injectable hormonal contraceptives: diverging perspectives of women and men, service providers and policymakers in Uganda	Uganda, Mbarara	Qualitative, IDIs	17	Nurses Midwives Physicians Nursing assistants	Perceptions	Injectables
23	Judge et al. 2011	Provider determinants of emergency contraceptive counselling and provision in Kenya and Ethiopia	Kenya Ethiopia	Cross-sectional	644 Kenya (523) Ethiopia (121)	Doctors Nurses Midwives	Knowledge, attitude	Emergency contraception (IUCDs)
24	Keith et al. 2014	Perceptions of home and self-injection of Sayana® Press in Ethiopia: a qualitative study	Ethiopia, Oromia region	Qualitative, IDIs and FGDs	15	Physicians Nurses Pharmacists HEWs	Perceptions	Injectables (DMPA-SC)
25	Lutnick et al. 2019	Two Birds with One Stone: Health Care Providers' Perspectives about Prevention Technologies in Kenya and South Africa	Kenya South Africa	Qualitative, IDIs	24	Doctors Nurses Provider at research centre Counsellor	Attitude	MPT injectable MPT implant
26	Marlow et al. 2014	Post-partum Family Planning Service Provision in Durban, South Africa: Client and Provider Perspectives	South Africa, Durban	Qualitative, IDIs	5	Nurses	Perceptions	Injectables (DMPA, Nursisterate) Postpartum
27	McKenna et al. 2014	Policy and programmatic considerations for introducing a longer-acting injectable contraceptive: perspectives of stakeholders from	Kenya Rwanda	Qualitative IDIs	27	Nurses Midwives CHWs	Perceptions	Potential newer longer acting injectable

		Kenya and Rwanda						
28	Morhason-Bello et al. 2014	Knowledge and use of emergency contraception by medical doctors on internship in a tertiary healthcare facility in Nigeria	Nigeria, Ibadan	Cross-sectional	205	Doctors	Knowledge, attitudes	Emergency contraception (IUCD)
29	Morse et al. 2013	Provision of long-acting reversible contraception in HIV- prevalent countries: results from nationally representative surveys in southern Africa	South Africa Zimbabwe	Nationally representative cross-sectional survey	1444	Physicians Nurses	Knowledge, attitudes	IUCD Implants
30	Mwafulirwa et al. 2016	Family Planning Providers' Experiences and Perceptions of Long- Acting Reversible Contraception in Lilongwe, Malawi	Malawi, Lilongwe	Mixed-method Cross-sectional & FGDs	62: 37 (Cross-sectional) 25 (FGDs)	Clinical officer Medical assistant Registered nurses Nurse midwives Counsellors	Knowledge, attitude, perceptions	IUCD Implants Injectables
31	Nalwadda et al. 2011	Constraints and prospects for contraceptive service provision to young people in Uganda: providers' perspectives	Uganda, Mityana, Mubende	Cross-sectional study	102	Medical officers Clinical officers Midwives/nurses Nursing assistants	Knowledge (skill), attitude, perceptions	IUCD, Injectables, Implants
32	Newmann et al. 2013	Providers' Perspectives on Provision of Family Planning to HIV-Positive Individuals in HIV Care in Nyanza Province, Kenya	Kenya, Nyanza province	Mixed-method (IDIs)	31	Clinicians CHWs	Knowledge, attitude, perceptions	IUCD, Injectables, Implants
33	Omishakin et al. 2015	Knowledge, Attitude and Practice of Family Planning among Healthcare Providers in Two Selected Health Centres in Osogbo Local Government, Osun State	Osogbo, Nigeria	Cross-sectional	50	Physicians Nurses CHEWs	Knowledge, attitude	IUCD Implants Injectables
34	Ontiri et al. 2019	Long-Acting Reversible Contraception Uptake and	Kakamega County,	Cross-sectional	12	Family planning providers	Knowledge, attitude, perception	IUCD, Implant,

		Associated Factors among Women of Reproductive Age in Rural Kenya	Kenya	(Used IDIs for HCWs)				Injectables
35	Onwuhafua et al. 2005	Knowledge, attitude and practice of family planning amongst community health extension workers in Kaduna State, Nigeria	Nigeria, Kaduna State	Cross-sectional survey	232	Community health extension workers (CHEWs)	Knowledge, attitude	IUCD, Injectables, Implant
36	Oriji et al. 2011	Knowledge, attitude, and practice of emergency contraception among medical doctors in Port Harcourt	Nigeria, Port Harcourt	Cross-sectional survey	100	GPs Surgeons OB/GYN Physicians	Knowledge, attitude	Emergency contraception (IUCD included)
37	Paul et al. 2016	Healthcare providers balancing norms and practice: challenges and opportunities in providing contraceptive counselling to young people in Uganda- a qualitative study	Uganda	Qualitative, IDIs	27	Doctors Midwives	Perceptions	IUCD- (postpartum) Injectables
38	Robinson et al. 2016	Barriers to Intrauterine Device Uptake in a Rural Setting in Ghana	Ghana, Bonsaaso	Qualitative, FGDs	7	Midwives CHNs	Knowledge, attitude	IUCD
39	Rupley et al. 2015	Maternity care provider knowledge, attitudes, and practices regarding provision of postpartum intrauterine contraceptive devices at a tertiary centre in Ghana	Ghana, Ashanti region	Cross-sectional survey	91	Physicians Midwives	Knowledge, attitude	IUCD (postpartum)
40	Schwandt et al. 2017	Contraceptive service provider-imposed restrictions to contraceptive access in urban Nigeria	Nigeria	Cross-sectional survey	1894	Doctors CHEWs Midwives/Nurses Pharmacists	Perceptions	IUCD Injectables
41	Sedekia et al. 2017	Using contraceptives to delay first birth: a qualitative study of individual, community and health provider perceptions in southern	Tanzania, Tandahimba district	Qualitative, IDIs	4	Enrolled nurse Registered nurse Medical attendant	Perceptions	IUCD Implants

		Tanzania						
42	Sibanda et al. 2017	Knowledge, attitudes and practices of health professionals in public health institutions on emergency contraception in Pietermaritzburg, KwaZulu-Natal Province, South Africa	South Africa, Pietermaritzburg	Cross-sectional survey	268	Enrolled nurse Professional nurse Medical intern Medical officer (OB/GYN) Registrar (OB/GYN) Specialist (OB/GYN)	Knowledge, attitude	Emergency contraception (IUCD included)
43	Sidze et al. 2014	Young women access and use of contraception: the role of providers' restrictions in urban Senegal	Senegal	Longitudinal baseline data (cross-sectional)	637	Doctors Nurses Midwives Maternal and child aids Medical assistants' Auxiliary staff	Perceptions	Injectables Implants
44	Sieverding et al. 2018	Bias in Contraceptive Provision to Young Women Among Private Health Care Providers in South West Nigeria	Nigeria, South West region	Qualitative, IDIs and Mystery client visits	52	Doctors Nurses Midwives CHWs	Attitude	Injectables IUCD Implants
45	Speizer et al. 2000	Do service providers in Tanzania unnecessarily restrict clients' access to contraceptive methods?	Tanzania	Cross-sectional	901	Doctors Nurses Midwives Child & maternal Health workers Auxiliary workers	Perceptions	Implants IUCD Injectables
46	Tolley et al. 2014	Preferences for a potential longer-acting injectable contraceptive: perspectives from women, providers, and policy makers in Kenya and Rwanda	Kenya Rwanda	Qualitative, IDIs	27	Nurses CHWs Counsellors	Attitude, perceptions	Potential newer longer acting injectable
47	Tshitenge et al. 2018	Knowledge, attitudes and practice of healthcare providers regarding contraceptive use in adolescence in Mahalapye, Botswana	Botswana, Mahalapye	Cross-sectional	80	Nurses Doctors	Knowledge, attitude	IUCD Injectables
48	Tumlinson et al. 2015	Provider barriers to family planning access in urban Kenya	Kenya	Cross-sectional	692	Doctors Medical/Clinical officers	Perceptions	IUCD Injectables

						RN CN VCT provider		
49	Tuoane et al. 2004	Provision of Family Planning Services in Lesotho	Lesotho	Mixed methods	52	Family planning providers	Knowledge, attitude	IUCD Injectables
50	van Zijl et al. 2010	A survey to assess knowledge and acceptability of the intrauterine device in the Family Planning Services in Cape Town, South Africa	South Africa, Cape Town	Cross-sectional	30	Doctors Nurses Health Advisors	Knowledge, attitude	IUCD

Appendix 3: Participant characteristics for included studies

Study ID	Age in years Distribution (n)	Sex	HCW Type Distribution	Religion Distribution	Marital Status Distribution	Experience
1	18-24 (207) 25-34 (570) 35-44 (65) 45-69 (22)	Male (527) Female (327)	Gynaecologist (5) Resident (10) GP (65) Emergency surgeon (48) health officer (105) midwife (341) nurse (290)	Orthodox (705) Muslim (117) Protestant (21) Other (21)	Married (394) Not married (470)	<5 years (481) 5-40 years (299)
2	29-60 Years	Female (8) Male (0)	Nurse (8)	N/A	N/A	N/A
3	<20 (5) 21-30 (237) 31-40 (313) 41-50 (130) 51-60 (34) 61+ (2) NR* (14)	Male (189) Female (546)	Physicians (183) Nurses (436) Social workers (50) Pharmacists (38) hospital administrators (16) medical record officers (12).	Pentecostal (354) Protestant (124) Muslim (112) Catholic (101) other (19) None (7) NR (18)	Single (205) married (485) cohabiting (6) widowed (13) separated (11) divorced (4) NR (11)	N/A
4	Mean: 31.5 years (SD: 9.8)	Male (13) Female (57)	Midwife (7) SRN (1) CHN (55) enrolled nurse (1) HCA (1), other (3)	N/A	N/A	<1 year (15) 1-2 years (34) 3+ years (21)
5	SA: median: 43 (29-69) Zimbabwe: median: 39 (20-74)	SA: Male (62), female (547) Zimbabwe: Male (145), female (674)	SA: Nurses (799) Physicians (220) Zimbabwe: Nurses (915) Physicians (38)	N/A	N/A	SA: FP training (399) HIV training (510) Zimbabwe: FP training (503) HIV training (629)
6	**NOT REPORTED**					
7	Uganda: 28 to 71 years Senegal CHWs: 25 to 57 years Senegal CBPs: 29-58 years	**Uganda:** Female (17) Male (17) **Senegal CHWs:** Female (52) Male (0) **Senegal CBPs:** Female (18) Male (2)	Uganda (34): CHWs (34) Senegal (52): CHWs (32) Midwives (16) Nurses (4)	N/A	N/A	**Uganda:** FP experience: 1-7 years DMPA experience: 1-6 years Senegal CHWs: FP experience: 1-12 years DMPA experience: 4-6 years Senegal CBPs: FP experience: 3-33

						years DMPA experience: 3-32 years
8	**NOT REPORTED**					
9	21-30 (105) 21-30 (84) >40 (33) NR* (25)	N/A	Midwives/nurses (185) Clinical officer (16) Doctors (27) Gynaecologist (11) Other (8)	N/A	N/A	N/A
10	N/A	Female (18) Male (13)	Clinical officer (3) Nurse/ Nurse-technician (20) Medical assistant (8)	Catholic (5) Protestant (20) Other Christian (4) Muslim (1)	N/A	N/A
11	CHWs: Median (Range): 43 (25-52) FBPs: Median (Range): 35 (20-57)	CHWs: Female (9) Male (10) FBPs: Female (9) Male (3)	CHWs (19) FBPs: Clinicians (3) Non-clinicians (ENs, RNs, midwives) (9)	N/A	CHWs: Married/co-habiting (13) Single (3) Divorced (2) NR (1)	N/A
12	**NOT REPORTED**					
13	Median (Range): 32 (24-75)	Female (29) Male (11)	Clinical officer (5) Midwife (7) Nurse (14) Nursing assistant (4) CHW (8) Pharmacist (1) Manager (1)	Catholic (22) Protestant (12) Pentecostal (4) Seventh Day Adventist (2)	N/A	Median (Range): 6 (1-30) years
14	N/A	Female (132) Male (124)	Physician (116) Nurse (69) Pharmacist (46) CHW (25)	N/A		Years of experience: <10 (37.5%) 11-20 (50.4%) 21-30 (11.3%) >31 (0.8%)
15	N/A	Female (28) Male (4)	N/A	N/A	N/A	N/A
16	IDIs: Mean (range): 41 years (27-50 years)	IDIs: Female (16) Male (3) FGDs: Female (13) Male (5)	IDIs: Clinical officers (2) Nurse/Midwives (15) Counsellors (2) FGDs: Clinical officers (1) Nurse/Midwives (16) Counsellors (1)	N/A	N/A	IDIs: Mean (range): 8.7 years (2-20) FGDs: >2 years

17	Median (range): 34 years (22-58)	Female (19) Male (5)	N/A	N/A	N/A	N/A
18	**NOT REPORTED**					
19	**NOT REPORTED**					
20	**NOT REPORTED**					
21	**NOT REPORTED**					
22	N/A	Female (15) Male (2)	Nurse (7) Midwife (7) Physician (1) Nursing assistant (2)	N/A	N/A	N/A
23	**NOT REPORTED**					
24	**NOT REPORTED**					
25	Median (range): 37 (26-68)	Female (21) Male (3)	Nurses (16) Doctors (3) Counsellors (4) Provider at research centre (1)	N/A	N/A	N/A
26	Mean (range): 49 years (37-55)	N/A	N/A	N/A	N/A	Mean (range): 23 years (6-31)
27	**NOT REPORTED**					
28	20-23 (5) 24-27 (127) 28-31 (54) 32-35 (10) NR (10)	Female (79) Male (126)	Doctors (205)	Christianity (166) Islam (32) Other (4) NR (3)	Single (181) Married (23) Divorced (1)	On internship (205)
29	Median (range): SA: 43 (23-69) Zimbabwe: 40 (20-74)	SA: Female (547) Male (62) Zimbabwe: Female (674) Male (145)	SA: Physicians (86) Nurses (528) Zimbabwe: Physicians (38) Nurses (792)	N/A	N/A	N/A

30	20-29 (12) 30-39 (14) ≥40 (11)	Female (24) Male (13)	Clinical officer (1) Medical assistant (4) RN (7) Nurse midwife (23) Counsellor (2) Not reported (25)	N/A	N/A	N/A
31	N/A	N/A	Medical officer (6) Clinical officer (6) Midwife/nurse (68) Nursing assistant (22)	N/A	N/A	FP experience: ≤ 5 years (50) 6-10 years (32) >10 years (20)
32	Median (range): 33 (30-35)	N/A	Clinicians (18) CHWs (13)	N/A	N/A	Median (range): 3 years (1-26)
33	20-29 (17) 30-39 (16) 40-49 (10) 50+ (7)	Female (38) Male (12)	Physician (5) Nurse (18) CHEW (22) Other (5)	N/A	Married (36) Single (14)	N/A
34	**NOT REPORTED**					
35	20-24 (17) 25-29 (37) 30-34 (35) 35-39 (69) 40-44 (51) 45-49 (16) 50+ (7)	Female (154) Male (78)	CHEWs	N/A	Married (188) Single (41) Widowed (3)	N/A
36	N/A	N/A	GPs (40) Surgeons (17) Obstetricians/gynaecologist (12) Physicians (9)	N/A	N/A	0-5 years (58) 6-10 years (30) >10 years (12)
37	**NOT REPORTED**					
38	**NOT REPORTED**					
39	Median (Range): 30 (22-60) **Physicians**: 31 (25-51) **Midwives**: 29 (22-60)	**Females (65):** Physicians (13) Midwives (52) **Males (26):** Physicians (26) Midwives (26)	Physicians (39) Midwives (52)	N/A	N/A	N/A
40	N/A	**Health facility Providers:** Female (1313)	**Health facility Providers (1479):** Doctor (86)	**Health facility providers:** Christian (1019)	N/A	N/A

		Male (166) **Pharmacy:** Female (191) Male (212) NR (12)	CHEW (478) Nurse/Midwife (886) Pharmacist (0) Other (26) NR (3) **Pharmacy (415):** Doctor (0) CHEW (4) Nurse/Midwife (1) Pharmacist (140) Other (270) NR (3)	Islam/Other (460) **Pharmacy:** Not reported		
41	N/A	N/A	EN (2) RN (1) Medical officer (1)	N/A	N/A	FP experience at facility: <1 year (1) 1-10 years (2) >10 years (1
42	Mean (range): 35.73 (20-61)	Female (228) Male (40)	EN (29) Professional Nurse (172) Medical intern (41) Medical officer (OB/GYN) (11) Registrar (OB/GYN) (14) Specialist (OB/GYN) (1)	N/A	N/A	N/A
43	**NOT REPORTED**					
44	**NOT REPORTED**					
45	**NOT REPORTED**					
46	**NOT REPORTED**					
47	20-29 (34) 30-39 (24) 40-49 (14) 50-59 (7) >60 (1)	Female (42) Male (38)	Nurse (50) Doctor (30)	Christian (78) Non-believer/other (2)	Single (40) Married (33) Living together (6) Widow (1)	<5 years (26) 5-10 years (26) 11-15 years (12) 16-20 years (11) >20 years (5)
48	21-29 (218) 30-39 (196) 40-49 (143) 50+ (119)	Female (487) Male (188) NR (1)	Doctors (18) Medical/Clinical officer (115) RN (282) CN (184)	Catholic (188) Protestant/Christian (457) Muslim/other (31)	N/A	<2 years (71) 2-4 years (143) 5-9 years (126) 10-19 years (135) 20+ years (200)

			VCT provider (77)			NR (1)
49	**NOT REPORTED**					
50	**NOT REPORTED**					

Appendix four: Full Ovid (Medline) Search Strategy

1. health worker*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
2. general practitioner*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
3. primary health worker*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
4. nurse*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
5. medical practitioner*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
6. pharmacist*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
7. clinical associate*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
8. physician assistant*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. KAP.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
11. Knowledge.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
12. attitude*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
13. perception*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
14. Practi*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
15. availability.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
16. perspective*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
17. training.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
18. skill.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
19. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18
20. contracep*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
21. long acting reversible contracept*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
22. copper intrauterine device*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
23. IUD.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
24. contracept* inject*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
25. DMPA.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
26. Medroxyprogesterone acetate.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
27. Depot Medroxyprogesterone acetate.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
28. Depo-Provera.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]

29. Progest* contracept*.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
30. Copper loop.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
31. Hormonal Birth control.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
32. ParaGard IUD.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
33. Norethisterone enanthate.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
34. NET-EN.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
35. Nexplanon.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
36. Implanon.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
37. Etonogestrel implant.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
38. Sub-dermal implant.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
39. rod implant.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
40. LARC$.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
41. (Long term and permanent method$).mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
42. 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41
43. sub-saharan africa.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
44. south of the sahara.mp. [mp=ti, ab, tx, ct, sh, ot, nm, hw, fx, kf, ox, px, rx, an, ui, sy]
45. 43 or 44
46. 9 and 19 and 42 and 45
47. remove duplicates from 46