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# Family Planning

*Edited by Zouhair O. Amarin*





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# **FAMILY PLANNING**

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Edited by **Zouhair O. Amarin**

## Family Planning

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Edited by Zouhair O. Amarin

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# Meet the editor



Zouhair Amarin is a Professor of Obstetrics and Gynaecology at the Jordan University of Science and Technology. He earned his MD degree from Sofia and holds his membership and fellowship from the Royal College of Obstetricians and Gynaecologists, London. He received his MSc degree in Medical Science from the University of Glasgow and MSc degree in Health Professions

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## Preface

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Family planning allows people to attain their desired number of children and determine the spacing of pregnancies. It is achieved through the use of contraceptive methods and the treatment of infertility. In addition, it reinforces couple's rights to determine the number and spacing of their children, while supporting the health and development of communities.

Millions of women of reproductive age in developing countries want to avoid pregnancy but are unable to use modern contraceptive methods. Family planning and the use of effective contraception reduce the need for abortion, especially unsafe abortion and maternal deaths. Furthermore, barrier methods provide dual protection against unintended pregnancies and sexually transmitted infections including HIV.

Closely spaced and ill-timed births contribute to some of the world's highest infant mortality rates. Babies born to adolescents have higher neonatal mortality rates. Teenage pregnancies have long-term implications for adolescents and their families. In addition, family planning represents an opportunity for them to pursue additional education and paid employment.

The content covers an introduction to the basic principles of family planning and deals in detail with numerous issues that pertain to family planning.

I am thankful to all the authors for their invaluable efforts and contributions. I would also like to thank Ms. Marijana Francetic, Publishing Process Manager, who really worked hard to bring out this book well in time. I would also like to thank Ana Pantar and Senior Commissioning Editors, Ivona Lovric and Iva Lipovic, for their support and advice.

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# Introduction to Family Planning

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# Introductory Chapter: Family Planning

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Zouhair Amarin

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## 1. Overview

Men and women have used contraception, in one form or another, for thousands of years. Most individuals at some time in their lives will use contraception. The worldwide trend towards delayed onset of childbearing and smaller families means that many women will need to use contraception for up to 30 years and will use different methods at different stages of their lives [1].

The ideal contraceptive method needs to be highly effective with no side effects, cheap, independent of intercourse, rapidly reversible, widely available, acceptable to all cultures and religions, and easily distributed and can be administered by non-healthcare personnel [2].

## 2. Classification and key points

Contraceptives are classified into hormonal, in the form of combined oral contraceptives (COCs), combined hormonal patches, progesterone only preparations, that include injectables and subdermal implants, intrauterine contraception in the form of copper intrauterine contraceptive devices (IUCD) and hormone releasing IUCDs, barrier methods in the form of male and female condoms, coitus interruptus, natural family planning, emergency contraception, female sterilisation and vasectomy [1–3].

Natural methods are physiologic-based methods that use neither chemical nor mechanical contraceptive method. These are least effective and not reliable. Fertility awareness and periodic abstinence emphasise avoidance of intercourse shortly before and after estimated ovulation period, therefore it is important to decide the fertile window of the cycle [4–10].

Fertility awareness and periodic abstinence relate to the fertile window of the cycle through the assessment of cervical mucus and the basal body temperature [1–3].

The calendar (rhythm) method is based on the assumptions that a human ovum is capable of fertilisation only for approximately 24 h after ovulation, that spermatozoa can retain their fertilising ability for only 48 h after coitus, and that ovulation usually occurs 12–16 days before the onset of the subsequent menses [1–4].

The menses are recorded for six cycles to approximate the fertile period. The earliest day of the fertile period is determined by the number of days in the shortest menstrual cycle subtracted by 18. The latest day of the fertile period is calculated by the number of days in the longest cycle subtracted by 11. After determining the earliest and latest days of the fertile window as mentioned above, abstinence should be for 2 days before the earliest day and 2 days after the latest day of the fertile period depending on spermatozoa viability [1–4].

Regarding cervical mucus, when a woman is not fertile, the mucus is light or sticky. During the day before and the day of ovulation, the most fertile time period, the increase in oestrogen levels causes more copious mucus that is clear and slippery [3–6].

The basal body temperature method stems from the fact that 2 or 3 days after ovulation, hormonal changes cause a rise in body temperature between 0.3 and 0.9°C, when measured as the first thing in the morning before getting out of bed [3].

Symptothermal methods include checking for breast tenderness or mittelschmerz (the lower abdominal pain or cramping some women feel around the time of ovulation) [3].

The advantages of the fertility awareness and periodic abstinence relate to the non-use of hormones, no side effects, enables a woman to understand her body's cycles, promotes cooperation between partners, and is useful in couples with religious or cultural beliefs not meeting with hormonal or barrier contraception [6–9].

The disadvantages are due to the need for varying amounts of training, and are difficult to use in cases of recent childbirth, breastfeeding, recent menarche, approaching menopause, recent discontinuation of a hormonal method, irregular cycles, and being unable to interpret fertility signs [6–9].

The lactational amenorrhea method (LAM) is the use of breastfeeding as a contraceptive method. Elevated prolactin levels and a reduction of gonadotropin-releasing hormone from the hypothalamus during lactation suppress ovulation. To use breastfeeding effectively as a contraceptive requires mothers either feed the baby nothing but breast milk or, at the very least, breastfeed for almost all feedings. In addition, the baby must be less than 6 months old, and the mother should have amenorrhea. As soon as the first menses occurs, she should start using another method of contraception [4, 10–14].

Withdrawal (coitus interruptus) is a traditional family planning method in which the man completely removes his penis from the woman's vagina before he ejaculates. As a result, spermatozoa do not enter the vagina and fertilisation is prevented. The failure rate of this method is around 20%. Effectiveness depends largely on the man's capability to withdraw prior to ejaculation [3].

Barrier methods include male condoms, female condoms, diaphragms with spermicides, cervical caps, creams, and foams [3].

Male condoms act as a physical barrier that prevents pregnancy by blocking the passage of semen. The available types include latex (natural rubber), natural membrane (lamb intestine), and polyurethane [3].

Advantages of the male condom include male participation, very inexpensive, effective in preventing pregnancy when used correctly, minimal side effects, protection against sexually transmitted infections, except HPV and HSV. Disadvantages include reduced sensitivity, erection problems, lack of cooperation, not very effective with wrong use, and latex allergy [3].

To minimise user error, male condoms should be used with every act of intercourse, used 'from start to finish', rim being held during withdrawal to prevent slippage or leakage, usage of appropriate lubricants (oil-based lubricants may damage the condom, and correct storage. The failure rate with perfect use is 2%, and with typical use is 15% [3].

Female Condoms are 'one-time use', they include a lubricant, spermicides are not recommended, can be inserted up to 8 h prior to intercourse, and can remain in place for up to 8 h. They protect against sexually transmitted infections. The failure rate with perfect use is 5%, and with typical use is 20% [3].

Female condoms contain two flexible rings and measures 7.8 cm in diameter and 17 cm long. The ring at the closed end of the sheath serves as an insertion mechanism and internal anchor that is placed inside the vaginal canal. The other ring forms the external patent edge of the device and remains outside of the canal after insertion [3].

The diaphragm is a dome-shaped latex (rubber) cup which is inserted into the vagina before intercourse and covers the cervix. Diaphragms prevent sperm from gaining access to the upper reproductive tract (uterus and fallopian tubes) and serve as a holder of spermicide. It must be inserted no longer than 6 h prior to coitus and left in the vagina at least 6 h but not longer than 24 h [1–3].

The cervical cap is a small, soft, rubber cap that fits directly over the cervix acting as a barrier to sperms. It is introduced 8 h before intercourse and left for 48 h. It is small, and works for 48 h. It must be fitted by a physician, and does not protect against sexually transmitted infections. The failure rate is 15–20% [1–3].

The mechanism of action of the spermicide nonoxynol-9 is by the virtue of its surfactant effect that destroys the sperm cell membrane. Its advantages include ease of use, and can use intermittently without advance planning. Its disadvantages include not providing protection against sexually transmitted infections, and its frequent use (more than twice per day) may cause tissue irritation that could increase susceptibility to HIV. Failure rates (when used alone) are about 20% with perfect use, and 30% with typical use [1–3].

Injectable progestin (depot medroxyprogesterone acetate 150 mg IM q 12 weeks) has the advantages of being highly effective, discreet and private, its use is not linked to coitus, and it does not require users to remember (only four times a year). Disadvantages include irregular periods or amenorrhea, delayed return to fertility, adverse effects on lipids, and decreased bone mineral density with long-term use [1–3].

Subdermal implants contain levonorgestrel and are inserted subcutaneously in the upper arm. Their use lasts between 3 and 5 years, according to the type [2, 3].

Transdermal patches release 150 mg norelgestromin and 20 mg ethinylestradiol daily. They form a 4.5 cm square that can be worn on the lower abdomen, buttocks, upper outer arm, upper torso (except breasts). One patch is applied every week for 3 weeks, followed by a patch-free week. They are as reliable as combined oral contraceptives, but may cause allergy, and breast tenderness [15–18].

Vaginal rings release etonogestrel 120 mg, and ethinylestradiol 15 mg daily. The ring is used continuously for 3 weeks, removed, and a new ring is inserted 1 week later. They too are as reliable as combined oral contraceptives [15–18].

Intrauterine contraceptive devices are long-acting contraceptives intended to be used for several years. They can be inert, copper releasing, or progesterone releasing devices.

Copper T 380 is a T-shaped IUCD that is made of polyethylene with fine copper wire wrapped around the vertical stem. This device consists of 380 mg of copper covering portions of its stem and arms. Its contraceptive effectiveness continues for 10 years; after which time it must be replaced [2, 3].

Progesterone releasing devices are intrauterine systems that release 20 mcg of levonorgestrel per day into the uterine cavity for as long as 5 years. The direct effect on the lining of the uterus results in less bleeding, than experienced with other IUCDs. They act through fertilisation inhibition, cervical mucus thickening, inhibition of sperm motility and function, endometrial suppression, induction of weak foreign body reaction, and the inhibition of ovulation in some cycles [15–18].

Intrauterine contraceptive devices produce no adverse systemic effects, do not require daily attention, easy to use, not linked with sexual intercourse, provides long acting contraception, can be inserted immediately following an uncomplicated abortion in an uninfected uterus, and allow for rapid return to fertility. Their failure rate is between 0.1 and 0.6%. Ectopic pregnancies are reduced overall; however, the ratio of extrauterine to intrauterine pregnancy is increased if conception does occur [2, 3].

The disadvantages of intrauterine contraceptive devices are that they must be inserted and removed by a trained health care provider, are associated with a risk of uterine perforation at the time of insertion, increased dysmenorrhoea occurs with the copper IUDs, and increased menstrual blood loss occurs in the first few cycles. Whether IUCDs increase the risk of pelvic inflammatory disease (PID) is controversial. They do not have any of the potential non-contraceptive benefits of hormonal contraceptives, and may be expelled unnoticed, and they do not protect against sexually transmitted infections [15–18].

Contraindications to the use of intrauterine devices include a history of previous PID in the past year or active PID, active cervical or endometrial infections, abnormal or distorted uterine cavity, undiagnosed genital bleeding, uterine or cervical malignancy, a history of ectopic pregnancy, increased susceptibility to infection (e.g., those with leukaemia, diabetes, valvular heart disease, or AIDS), Wilson disease, and known or suspected pregnancy [15–18].

Combined oral contraceptives were first licenced in early 60s of the last century. Millions of women worldwide have taken it since. They contain synthetic oestrogen and a progestogen (synthetic derivative of progesterone). Oestrogens are mainly ethinylestradiol: 20, 30, 35, 50 µg, and mestranol 50 µg [2, 3].

Second-generation progestogens include norethisterone acetate 0.5, 1.0, 1.5 mg, and levonorgestrel 0.15, 0.25 mg. Third-generation progestogens include gestodene 0.075 mg, desogestrel 0.15 mg, norgestimate 0.25 mg, anti-mineralocorticoid and anti-androgenic: drospirenone 3 mg [2, 3].

Combined oral contraceptives are metabolised in the liver and are excreted by the kidney. Their types include monophasic, biphasic, and triphasic. Most brands contain 21 pills and 7 days' pill-free interval. Some are taken every day with seven placebo pills. Oestrogens inhibit ovulation by suppressing FSH and LH, thus making the endometrium atrophic. Progestins suppress LH, and thicken cervical mucus (making it less penetrable by sperms).

Counselling topics of COC users should include safety and efficacy (depends on the right use of the pill), how COCs work, possible side effects, what to do with the missed pill, when to consult a physician, and special circumstances (diarrhoea, vomiting, and medication) [2, 3].

The 'must ask questions' before prescribing COCs include the personal characteristics of age, weight, smoker, previous family planning, obstetrics and gynaecology history [(last menstrual period, last delivery or miscarriage, breast feeding, dysfunctional uterine bleeding), past medical history (breast disease, liver disease, gall bladder disease, headache, epilepsy, diabetes, hypertension, cardiac disease, DVT, stroke) and drug history (anti epileptics, antibiotics, anticoagulants)] [15–18].

The WHO issued a list of medical conditions that are considered contraindications for COC prescription. If the woman answers yes to any of the following questions, it is the responsibility of the health care professional to refer her to a physician:

- Do you think you could be pregnant?
- Do you have high blood pressure?
- Do you have diabetes?
- Have you ever had stroke, blood clot in your leg, or other heart problems?
- Do you have breast mass or known breast disease?
- Do you have liver disease, hepatitis, jaundice, or gallbladder disease?
- Do you have migraine headaches?
- Do you have abnormal vaginal bleeding?
- Are you breast feeding?
- Are you above 35 yrs. and smoke >15 cigarettes per day?
- Are you going for a major surgery soon?

Common questions that are posed by users include missing pills, break through bleeding, when to start the pill, what pill is the best, and side effects. Most side effects are minor. A woman should stop the pill immediately when she develops abdominal pain, chest pain, headache, eye symptoms (blurred vision, brief loss of vision), and sharp leg pain.

When non-menstrual problems arise, such as dizziness, women should be reassured as this usually diminishes over time. If there is nausea and vomiting, then pills should be taken with foods. If there is weight gain, women should be counselled about healthy eating habits and exercise. If side effects persist and are unacceptable, switching pill formulation or adopting another method should be considered [1–3].

In cases of unexplained vaginal bleeding or amenorrhea, the cause should be assessed (pregnancy or disease). Reinforcement of correct pill taking should be considered in women with breakthrough bleeding. Non-steroidal anti-inflammatory medication may be administered, or the use more potent progestins may be used in women with prolonged bleeding. In case of amenorrhea, women should be reassured, with no need for medical treatment. If side effects persist and are unacceptable there might be a need to switch to another method [1, 2].

After making sure that the woman is not pregnant, COCs are started in the first 5 days of menstrual cycle. After day 5, a backup method should be used for 7 days. Postpartum, and non-breast feeding women, delay for 3 weeks, and if breast feeding, delay for 6 months [2, 3].

When one or two active pills are missed, the missed pill should be taken as soon as remembered, and other pills should be taken on schedule with no need for a backup method. If three or more pills are missed, then a pill should be taken as soon as it is remembered, to be continued for at least 7 days, and to use back up measures for at least 7 days. The take-home message is to always take the missed pill as soon as remembered, continue taking the pill as usual, with three or more missed pills, backup measures until the woman has 7 days of pills [15–18].

Deciding on what pill is the best is a matter of trial. A woman can switch pills anytime she chooses, and anytime is a good time to stop. On the other hand, there is no need to take a break from the pill once in a while [16].

Some antibiotics and antiepileptic drugs known to induce hepatic cytochrome P450 (CYP450) isoenzyme cause decreased sex hormone levels in women taking oral contraceptives, raising the potential for decreased effectiveness of oral contraceptives and increased risk of unplanned pregnancy. Drugs that do not induce this hepatic isoenzyme are not thought to compromise the effectiveness of oral contraceptives.

Although fertility declines with age, effective contraception is still required in women over 40 years of age who wish to avoid pregnancy. According to International Guidelines, there are no contraceptive methods that are contraindicated based on age alone. However, there are some medical conditions more common in older women that may make the use of some contraceptive methods inappropriate. Effective nonhormonal and progestin-only methods provide safe options for women who should avoid oestrogen-containing contraceptives [15–18].

Lactational amenorrhoea method (LAM) is the use of breastfeeding as a contraceptive method. Elevated prolactin levels and reduction of GnRh during lactation suppresses ovulation. For postnatal contraception, LAM users should begin breastfeeding immediately after delivery. It is highly effective for up to 6 months in amenorrhoeic exclusive breast feeders. As soon as the first menses occurs, the mother should start using another method of contraception [15].

Postnatally, less than 10% of women want another child within 2 years, and about 40% of women in the first year intend to use contraception, but do not do so. Generally, counselling for postnatal contraception should begin antenatally. Some methods are provided at delivery and during hospital stay such as IUCDs, female sterilisation, implants or injectables [15].

For puerperal contraception, spermicides and condoms may be used safely, withdrawal may be a simple but relatively unreliable, and episiotomies may still be tender. Fitting a woman with cervical cap or diaphragm may cause discomfort. The risk of toxic shock syndrome is increased when blood or lochia are present. Copper or progesterone releasing IUCDs may be inserted immediately after delivery, after caesarean section or within 48 h of delivery, otherwise insertion at 6 weeks. In menstruation, insertion is advisable on day 5 of the cycle [15–18].

The health benefits of oral contraception include a decrease in ovarian and endometrial Ca, ectopic pregnancy, anaemia, dysmenorrhoea, functional ovarian cysts, benign breast disease, and salpingitis [2, 3].

Absolute contraindications for oral contraception include venous thromboembolism, pulmonary embolism, cardiovascular disease, cerebrovascular accident, pregnancy, malignancy, hepatitis, tumours, and abnormal liver function tests [3].

Relative contraindications for oral contraception include fibroids, lactation, diabetes mellitus, sickle-cell disease, hypertension, over 35-year-old smokers, over 40-year-old and risk of vascular disease, anovulation, depression, migraine, severe varicose veins, and hyperlipidaemia [2, 3].

Complications of oral contraception include thromboembolism, cerebrovascular accident, hypertension, post pill amenorrhoea, cholelithiasis, and benign hepatic tumours [2, 3].

Combined oral contraception should be avoided in breast feeders for 6 months. In lactational amenorrhoea, it is started when weaning begins. In non-breast feeders, it is started 3 weeks postpartum [3].

Progestin-only contraceptives (POCs) are produced in the form of implants, Depo-Provera and mini pills. Breast feeders should avoid using the progesterone only pills (mini pills) before 6 weeks postpartum. The mini pills can be used after 6 weeks up to 6 months. In lactational amenorrhoea, POCs may be delayed until 6 months. The main side effect of POCs is irregular bleeding [11].

Injectable Progestins include medroxyprogesterone (Depo Provera) 150 mg IM—3 months, norethisterone enanthate 200 mg IM—2 months. They should be considered when women have difficulty remembering, do not tolerate estrogenic, and are lactating [10].

Emergency contraception is the use of a drug or device to prevent pregnancy after unprotected sexual intercourse. The indications for its use include contraceptive failure (condom broke, pills forgotten), error in withdrawal or periodic abstinence, any unintended 'sperm exposure'. Pregnancy is a contraindication for the use of emergency contraception [15–18].

Postcoital emergency contraception includes emergency contraceptive pills, containing estrogenic and progestin. It consists of two pills, and each contains 100 mcg of ethinylestradiol and 0.5 mg of levonorgestrel, ingested 12 h apart for a total of four pills. The first dose should be taken within the first 72 h after unprotected intercourse, or RU 486 (mifepristone) 50 mg single dose up to 96 h following unprotected coitus. Side effects include nausea, vomiting, headache, breast tenderness, abdominal pain, and dizziness [15–18].

Progestin-only postcoital emergency contraception treatment schedule comprises 1 dose of 750 mcg levonorgestrel taken as soon as possible and no later than 48 h after unprotected intercourse, and a second dose taken 12 h later. Side effects include nausea, vomiting, headache, breast tenderness, abdominal pain, and dizziness. Hormonal postcoital emergency contraception is about 90% effective [15–18].

The Copper T380 IUD can be inserted as many as 7 days after unprotected sexual intercourse to prevent pregnancy. Insertion of an IUCD is significantly more effective than other regimens, reducing the risk of pregnancy following unprotected intercourse by more than 99% [1–3].

For permanent contraception, tubal ligation is chosen by about 30% of women in developing countries, and about 10% of men undergo vasectomy. The mechanism of action of fallopian tube sterilisation is by cutting or mechanically blocking them to prevent the sperm and ovum from uniting. Can be performed laparoscopically or through a suprapubic 'mini-laparotomy' incision, or at caesarean section. The failure rate is 0.1% [1–3].

Tubal sterilisation is permanent, highly effective, safe, with quick recovery, lacks significant long-term side effects, cost effective, partner cooperation not required, and is not coitus-linked. Disadvantages include the need for general or regional anaesthesia, possibility of patient regret, difficult to reverse, future pregnancy could require assisted reproductive technology (such as *in vitro* fertilisation and intracytoplasmic sperm injection), and is more expensive than vasectomy [1–3].

At vasectomy, each vas deferens is cut to prevent the passage of sperm into the ejaculated seminal fluid. The failure rate is about 0.1%. Vasectomy is permanent, highly effective, safe, with quick recovery, lacks significant long-term side effects, cost effective, less expensive than tubal ligation, no partner cooperation needed, with removal of contraceptive burden from the woman. Disadvantages include the fact that reversal is difficult, expensive, often is unsuccessful. In addition, patients may regret decision, not effective until all sperm cleared from the tract, with no protection from sexually transmitted infections [2, 3].

For reporting the effectiveness of a birth control method, the Pearl's index is the most common technique used in clinical trials. It is the number of pregnancies occurring in 100 females using a certain contraception method for 1 year [3].



The Pearl index for various contraceptive methods is about 0.5 for COCs, 1 for injectables, implants and IUDs, 2 for progesterone only contraceptives, 2–5 for male condom, 20 for diaphragm, cervical cap and spermicides, and 45 for the rhythm method [2, 3].

The relative cost per patient per year is 1 for vasectomy, 2 for female sterilisation, 2.5 for IUCDs, 8 for COCs, and 14 for barrier methods [2, 3].

Family planning benefits the wellbeing of families throughout the world. Using contraception can avoid unwanted pregnancies and space births, protect against sexually transmitted infections and provide other health benefits [2, 3].

The World Health Organisation and World Bank estimate that \$3 per person per year would provide basic family planning, maternal and neonatal health care to women in developing countries. This would include contraception, prenatal, delivery, and postnatal care in addition to postpartum family planning [1–3].

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# From Eugenicists to Family Planners: America's Religious Promoters of Contraception

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Additional information is available at the end of the chapter

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## Abstract

Early proponents of contraception among American religious groups were staunch eugenicists who promoted birth control in the hopes of curtailing the “runaway fertility” of poor Catholic and Jewish immigrants. By the early 1930s, their campaign to legalize contraception was largely successful, but eugenics would soon go from being a sign of progressive politics and enlightened scientific understanding to a dirty word associated with Hitler. By examining the statements of all of the early liberalizers on contraception from 1920 to 1965, this paper demonstrates that although these groups purged their statements on contraception of the word eugenics by the end of WWII, the fertility of “poor others” remained their focus for the next few decades. Talk of “race suicide” changed to talk of “responsible parenthood” as their focus moved away from the whitening Irish, Italian, and Jewish immigrants to the poor in the Third World and Americans in the inner cities.

**Keywords:** religion, contraception, eugenics, world population

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## 1. Introduction

Religion has long played a role in fights over access to contraception, but few know that early proponents of birth control among American religious groups were staunch eugenicists. By examining the statements of American religious groups who were the most active advocates of contraception between 1920 and 1965, this paper demonstrates that although these groups eventually purged their statements on contraception of the word eugenics, those groups who liberalized in the 1930s because of racialized concerns continued to have racialized reasons for promoting contraception throughout the next three decades. Talk of “race suicide” changed to talk of “responsible parenthood,” as the particular populations they were concerned about shifted away from the whitening Irish, Italian, and Jewish immigrants to the poor of America's inner cities and the global south.

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This paper is structured as follows: it first gives the reader an introduction to the connections between the eugenics movement and progressive Protestantism in the USA in the early twentieth century. While research on both movements is well established, little research until now has examined the connections between the two. Likewise, there has been no investigation into what happened to believers in eugenics when the movement was forced underground with the advent of WWII and the eventual realization of the horrors that Nazi belief in eugenics wrought. After this historical overview, the paper then describes the data and methods we used to examine the seven American denominations that constituted America's staunchest advocates of contraception between 1930 and 1965. The groups we focus on in this paper are listed on **Table 1**, which provides information about mergers, name changes, the dates of their pronouncements on birth control (from the earliest to the latest liberalization), any precursor's early stance on birth control if it was not an early liberalizer, and the periodicals examined for each denomination.

After describing the data and methods we used, the paper then turns to the chronological story, first demonstrating to the reader the strong and open promotion of eugenics each of these groups made in the 1920s and 1930s and then demonstrating that the most explicit talk of eugenics had waned by 1935, even among groups who initially supported Hitler openly. The fact that eugenic talk disappeared, however, does not mean that eugenic beliefs had. The next section of the paper juxtaposes the groups' earlier openly eugenicist reasons for promoting birth control with their later reasons. It demonstrates that the promoters of contraception remained concerned about the fertility of poor and nonwhite populations—with a new focus on the poor in the Third World and the "inner cities" of the USA.

## 2. Data and methods

### 2.1. The sample

This dataset this study is drawn from includes 31 initially distinct religious denominations (please see [1] for more information on the complete sample). This paper focuses on the "early liberalizers" who promoted contraceptives for eugenics reasons in the early 1930s and how their views on birth control evolved over the next 30 years, once the pill was invented and had received FDA approval in 1960 [2]. This paper focuses on what happened to these groups, who were originally nine in number but, because of mergers, were only seven distinct denominations by the time the pill was approved.

An early liberalizer is defined as any American religious groups that promulgated an official statement in support of birth control between the peak years of the first wave of liberalization (1929–1934). All also promoted legalization in their periodicals during this time. Constituting America's most prominent religious denominations, **Table 1** demonstrates that only three of the original denominations made it through the next three decades relatively intact: the Protestant Episcopal Church, the Reform Jews, and the Society of Friends (now called the Friends General Conference).<sup>1</sup>

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<sup>1</sup>The Society of Friends reunified with Hicksite Friends (to become Friends General Conference) in 1955.

Denomination	Periodicals <sup>i</sup> and years available for analysis (1919–1965)	Date liberalized
<b>Reform Judaism</b>	AJC Yearbook	1929
<b>Unitarian Universalist Association</b> (1961)	The Unitarian Universalist Register-Leader (1961–1965)	
• Universalist General Convention (Universalist Church of America after 1942)	The Christian Leader (1926–1945) The Universalist Leader (1953–1961)	1929
• American Unitarian Association	The Christian Register (1919–1961)	1930
<b>United Church of Christ</b> (1957)	United Church Herald (1958–1965)	.
• Congregational Christian Churches (1931) - Christian Church, General Convention - Congregational Churches, General Council	The Congregationalist and Herald of Gospel Liberty (1918–1932) The Advance (1934–1958)	1931 1931
• Evangelical and Reformed Church (1934) - Reformed Church in the United States - Evangelical Synod of North America	The Messenger (1936–1958) Reformed Church Messenger (1919–1932) The Evangelical Herald (1916–1936)	. . .
<b>United Methodist Church</b> (1968) <sup>ii</sup>	The Christian Advocate (1919–1965)	1968
Methodist Church (1939)		.
- Methodist Episcopal Church		1931
- Methodist Episcopal Church, South		
<b>Presbyterian Church (USA)</b> (1983)		
• United Presbyterian Church in the USA (1958) - United Presbyterian Church of NA - Presbyterian Church in the USA	Presbyterian Life (1958–1965) The United Presbyterian (1919–1955) The Presbyterian (1935–1945) Presbyterian Life (1955–1958)	1959 . . 1931
• Presbyterian Church in the USA	Presbyterian Survey (1919–1965)	1960
<b>Society of Friends (Orthodox)</b> <sup>iii</sup>	The Friend (1945–1955) The Friend's Journal (1965)	1933
<b>Protestant Episcopal Church</b>	The Living Church	1934

<sup>i</sup>Other Periodicals Researched: Birth Control Review (1912–1940); Christianity Today (1956–present); Ecumenical Review.

<sup>ii</sup>The Methodist Church merged with the Evangelical United Brethren Church to form the United Methodist Church in 1968.

<sup>iii</sup>Now, the Friends General Conference.

**Table 1.** America's early religious advocates of contraception.

The Unitarian Universalist Church formed from a merger between two early liberalizers—the American Unitarian Association and the Universalist General Convention in 1961.

The United Presbyterian Church in the USA was formed in 1958 as the result of a merger between an early liberalizer, the Presbyterian Church in the USA, and an unofficial supporter, the United Presbyterian Church in North America.

The Methodist Church was formed in 1939 as a result of a merger between the eugenicist early liberalizer of the Methodist Episcopal Church and the silent Methodist Episcopal Church, South.

The United Church of Christ (UCC) is the most complicated denomination examined in this paper. Unlike the other denominations analyzed here, it includes a precursor denomination that was an outspoken critic of eugenics, the Reformed Church in the US, which merged in 1957 with two other denominations, the early liberalizer the Congregational Christian Churches and the Evangelical Synod of North America.

In sum, of the seven remaining distinct denominations, three remained intact, three resulted from mergers of like-minded fellow eugenicist groups, and one, the UCC, resulted from a merger of a wider variety of denominations.<sup>2</sup>

## 2.2. Periodical research

The primary data presented here come from an analysis of each denomination's periodical between 1919 and 1965.<sup>3</sup> Although there was some unavoidable variation in the periodicals, in general, they were remarkably comparable. Two-thirds of the periodicals were weeklies, and all but two of the periodicals were popularly oriented and written for a general, lay audience.<sup>4</sup>

With the rare exception of those that were electronically searchable, research assistants examined each of the periodicals by hand and gathered all articles that mentioned the keywords listed in **Table 2**, which varied by time period, and were added inductively as the research progressed.

On average, about 250 articles were summarized, coded, and analyzed for 50 different periodicals, for a total of about 10,000 articles, about one-third of which we draw on for this paper.<sup>5</sup>

## 3. Progressive Protestantism, race, and contraception (1920–1965)

"Race suicide" was the idea that desirable White Anglo-Saxon Protestants were being outbred by less desirable poor Catholic and Jewish immigrants. The fight against it was led by the American Eugenics Society (AES) [3–6]. Largely a lobbying group, the AES was the premier eugenics education association at the time. The AES cultivated close ties with its "eugenic apostles" ([7], p. 3), most of whom were "nationally prominent ministers" and rabbis ([4], p. 88;

<sup>2</sup>The UCC published four articles on birth control in 1965, which is among the most of any early liberalizer. The tone of their articles is very similar to the others with a focus on the "crisis" in India, China, and Latin America and weaker but still presents concern about the inner cities in the USA.

<sup>3</sup>We do not assume that every member who was reading these periodicals agreed with the views expressed in them or, indeed, with the official stances of their denomination. Instead, we treat these periodicals and the articles we obtained as representative of the general beliefs and opinions of the denomination, the level of analysis that is our focus.

<sup>4</sup>Almost all of the denominations had yearbooks or minutes from their general conventions that we also used for various official statements. These are not included in these periodical numbers (but do show up in the references where relevant), unless we had to perform keyword searches on them because a popularly oriented periodical was unavailable. **Table 1** indicates when this was necessary.

<sup>5</sup>The first half of the research, from 1919 to 1932, averaged about 120 articles for 35 periodicals, for a total of about 4000 articles.

All years (1918–1965)	Early period (1918–1932)	Later period (1935–1965)
<p><b>Sex and gender issues:</b></p> <ul style="list-style-type: none"> <li>• Birth control <ul style="list-style-type: none"> <li>• [Contraceptives]</li> <li>• [Family planning]</li> <li>• [Margaret Sanger]</li> </ul> </li> <li>• Feminism <ul style="list-style-type: none"> <li>• [Women's issues]</li> <li>• [Women's rights]</li> </ul> </li> <li>• Sexuality <ul style="list-style-type: none"> <li>• [Sex education]</li> </ul> </li> <li>• Marriage <ul style="list-style-type: none"> <li>• [Divorce]</li> </ul> </li> </ul> <p><b>Race:</b></p> <ul style="list-style-type: none"> <li>• Eugenics <ul style="list-style-type: none"> <li>• [Juvenile delinquency]</li> <li>• [Overburdened parents]</li> <li>• [Anglo-Saxon]</li> <li>• [Superior race]</li> <li>• [Racial stock]</li> <li>• [Blood/line]</li> <li>• [Genetics]</li> <li>• [Heredity]</li> <li>• [Undesirable/desirable]</li> </ul> </li> <li>• "Race suicide" <ul style="list-style-type: none"> <li>• [Differential birth rates]</li> </ul> </li> <li>• Immigration</li> <li>• Race (black/white) <ul style="list-style-type: none"> <li>• [the Negro]</li> <li>• [Lynching]</li> <li>• [Racial justice]</li> </ul> </li> </ul> <p><b>Theological/denominational issues:</b></p> <ul style="list-style-type: none"> <li>• Fundamentalists or modernists (or -ism)</li> <li>• Federal Council Churches (FCC) <ul style="list-style-type: none"> <li>• National Council of Churches (NCC)</li> <li>• World Council of Churches (WCC)</li> </ul> </li> <li>• "Social Gospel"</li> <li>• Catholicism <ul style="list-style-type: none"> <li>• ["Rome"]</li> </ul> </li> <li>• Religious growth/decline <ul style="list-style-type: none"> <li>• [Revivals]</li> <li>• [Internal division/strife]</li> </ul> </li> <li>• Missions <ul style="list-style-type: none"> <li>• [Domestic missions]</li> <li>• [Foreign missionary activity]</li> </ul> </li> </ul>	<p><b>Historical context:</b></p> <ul style="list-style-type: none"> <li>• Women's Suffrage</li> <li>• Temperance <ul style="list-style-type: none"> <li>• [Prohibition]</li> </ul> </li> <li>• The depression <ul style="list-style-type: none"> <li>• [Capitalism]</li> <li>• [Socialism]</li> <li>• [New deal]</li> <li>• [Social security]</li> </ul> </li> <li>• Science <ul style="list-style-type: none"> <li>• [Evolution]</li> <li>• [Darwin]</li> <li>• [Scopes Trial]</li> </ul> </li> <li>• Labor <ul style="list-style-type: none"> <li>• [Labor unions]</li> <li>• [Labor movement]</li> </ul> </li> </ul>	<p><b>Sex and gender issues:</b></p> <ul style="list-style-type: none"> <li>• Birth control <ul style="list-style-type: none"> <li>• [The pill]</li> <li>• [Malthus]</li> <li>• [Population explosion]</li> <li>• [Food insecurity]</li> <li>• [Voluntary parenthood]</li> <li>• [Responsible parenthood]</li> </ul> </li> <li>• Abortion</li> <li>• Sexuality <ul style="list-style-type: none"> <li>• [Sexual revolution]</li> <li>• [Summer of love]</li> <li>• [Homosexuality]</li> </ul> </li> </ul> <p><b>Historical context:</b></p> <ul style="list-style-type: none"> <li>• WWII <ul style="list-style-type: none"> <li>• [Nazis]</li> <li>• [Hitler]</li> <li>• [Germany]</li> <li>• [Religious persecution]</li> <li>• [Jews]</li> <li>• [Roma or Gypsies]</li> <li>• [Fascists/–ism]</li> <li>• [Conscientious objection]</li> <li>• [United Nations]</li> </ul> </li> <li>• Communism <ul style="list-style-type: none"> <li>• [Cold War]</li> <li>• [Russia]</li> <li>• [USSR]</li> <li>• [China]</li> <li>• [Korean War]</li> <li>• [Vietnam War]</li> <li>• [McCarthyism]</li> </ul> </li> <li>• Growth of higher education <ul style="list-style-type: none"> <li>• [College]</li> </ul> </li> </ul> <p><b>Race:</b></p> <ul style="list-style-type: none"> <li>• Race (black/white) <ul style="list-style-type: none"> <li>• [Brown vs. board of education]</li> <li>• [Segregation]</li> <li>• [Civil rights movement]</li> <li>• [Voting rights]</li> </ul> </li> </ul> <p><b>Theological/denominational issues:</b></p> <ul style="list-style-type: none"> <li>• Catholicism <ul style="list-style-type: none"> <li>• [Ecumenism]</li> <li>• [Vatican II]</li> </ul> </li> <li>• Religious growth/decline <ul style="list-style-type: none"> <li>• [Evangelicals/–ism]</li> <li>• [Evangelism]</li> <li>• [Billy Graham]</li> </ul> </li> </ul>

**Table 2.** Keywords searched.

[8], p. 8) The AES had well-funded standing committees and regular outreach campaigns and columns in *Eugenics* written for and by religious leaders, all dedicated to communicating with America's religious elite [1, 9].

At first, through the mid-1920s, the AES and its religious allies supported immigration restriction and involuntary sterilization and generally promoted positive eugenics, the idea that “desirable” people should have more (“at least four”) children (see [9, 10]). After little success at actually raising birth rates among desirables, however, the AES and the religious leaders affiliated with it turned to “negative eugenics” and began pushing for the legalization of birth control. Working closely with Margaret Sanger and the American Birth Control League, they did so under the assumption that the birthrate differential was due to the poor’s inadequate access to contraceptive methods. Contraceptives were largely available only through a physician, to which most of the poor did not have regular access.

By the early 1930s, the campaign to legalize contraceptives was largely successful, culminating in the 1936 case *United States v One Package of Japanese Pessaries*. The decision of the case stated that distributing birth control, when recommended by a physician for preserving the health of a patient, was not a violation of the Comstock law that had previously prohibited the practice for its obscenity [11–13]. Though birth control products did not immediately become readily available to patients, the court’s ruling allowed an easier and legal pathway to accessing birth control.

By the time birth control was legalized, however, the American Eugenics Society had all but disappeared [14–16]. Researchers offer various reasons for the AES’ demise—from rapid loss of popularity due from the taint of Hitlerism ([17], p. 50) to internal divisions and strife over the direction of the Society ([18], p. 301) to the general decline of the field due to a significant drain in funding ([19], p. 324). Most likely because of a result of all of these factors, researchers agree that by the mid-1930s, eugenics went from being a sign of progressive politics and enlightened scientific understanding to a dirty word associated with Hitler [6, 14–16, 20, 21] and, correspondingly, that the AES was largely defunct.

However, although explicit mention of eugenics largely faded from the public view, much eugenic thought, and activism around birth control, remained but with two differences. First, although the focus was still on poor people of color, instead of being concerned about nonwhite immigrants’ fertility in the USA, activists became focused on fertility in the developing world [5], ([6], p. 186, 187), [22, 23] and, to a lesser extent, African Americans in the inner cities [15]. Second, instead of explicit talk about “race suicide” and open promotion of eugenics, eugenicists began to engage in a more “discreet and mild-mannered form of eugenics” ([18], p. 299) where they attempted to accomplish “eugenic control” through “population control” ([5], p. 186, 187).

Taking advantage of the public’s exhaustion and anxieties after the close of WWII, eugenicists strategically promoted population control as crucial to preventing “the imminent destruction of human society” ([5], p. 83) and the achievement of world peace ([23], p. 153). In a quote that demonstrates this tactic, in 1945, Guy Irving Burch, who was the director of both the Population Reference Bureau and the AES, stated that “uncontrolled human reproduction...favors the least gifted of society...and in the long run will destroy human liberties and any chance for a world at peace” ([22, 23], p. 153).

Those connections between the two movements ran deep and are undeniable. For example, a founding member of the AES, Frederick Osborn, became President of the Population Association



of America from 1949 to 1950 and started the journal *Eugenic Quarterly* in 1954. That same year, he noted great progress in relation to the "growing concern with world population problems" ([24], p. 3a) and "the need to balance the concern over size of population with concern for the quality of that population" ([24], p. 3a). As another example, take AES President Henry Pratt Fairchild, who was the first President of the Population Association of America (as the AES began its decline from 1931 to 1934), and a few years later became the President of the American Sociological Association in 1936.

Thus, the history of eugenics in the USA is well established, as is its relationship concerns about world population and the organizations and academic disciplines (especially demography and sociology) that would attempt to curtail world population in the next few decades. However, although religious groups have always been central to debates over contraception, there has been very little systematic investigation of which groups supported early birth control reform, and why they did (with the exception of 1). Likewise, until now, there has been no investigation into how those religious groups who were advocates of eugenics adjusted their perspectives on contraception overtime, as eugenics became delegitimized. This paper explores these groups' views over the next three decades and demonstrates that by and large they remained staunch advocates of contraception. Like the former eugenic activists who became population control advocates, their focus shifted from the out-of-control fertility of immigrants and their children to the "population explosion" among the poor of the Third World and the inner cities of the USA.

#### **4. Eugenic thought among the early liberalizers**

Working with the AES, during the first wave of liberalization, the early liberalizers worked hard to prevent "race suicide." At first, these religious leaders largely focused on "positive eugenics" or the idea that more desirable people should have more children. For example, in 1932 the *Congregationalist and Herald of Gospel Liberty* insisted "Every marriage must have a minimum of three children in order to fulfill its social obligation in maintaining the present level of population...Those who are able must average four or more in order to prevent race suicide" ([25], p. 1336).

However, such a call was at best a swan song for those hoping to increase the fertility of desirable parents. By the late 1920s, it was clear that positive eugenics was at best a stop gap measure and that race suicide would not be prevented unless something could be done to curtail "the high birth-rate among the inferior" ([26], p. 663) most of whom were Irish and Italian immigrants, populations that were "increasing nearly five times as rapidly as non-Catholics" ([27], p. 514). By that time, the AES had joined forces with the American Birth Control League and began enlisting the support and legitimacy that religious leaders' endorsements would lend to their cause. And, those denominations affiliated with the AES did not disappoint.

##### **4.1. Official statements: open about the eugenic need for birth control**

In the least openly eugenic statement among the early liberalizers, a 1931 resolution by the General Council of Congregational and Christian Churches (CCC) endorsed a report titled

“The Moral Aspects of Birth Control,” wherein birth control was approved as a method to guarantee:

*the rights of children to be wanted and the right of husband and wives to assume parenthood. Therefore, we favor the principle of voluntary child bearing, believing that it sacramentalizes physical union and safeguards the well being of the family and society.* ([28], p. 1031).

While the “good of society” could definitely imply eugenic reasoning, other groups were much less careful in their language choices. Both of the precursors to the Unitarian Universalist Church had eugenic reasons front and center in their official statements. The Universalist Church officially liberalized on birth control at their General Convention in 1929, stating that “This committee finds that birth control is one of the most practicable means of *race betterment*” ([29], emphasis ours). One year later, the American Unitarian Association recommended “to its constituent churches and members an earnest consideration of the fundamental social, economic and *eugenic* importance of birth control to the end that they may support all reasonable efforts in their communities for the promotion of the birth control movement” ([30], emphasis ours).

The Protestant Episcopal Church was such an ardent promoter of eugenics that its statement on birth control was actually indexed under “eugenics” and not contraception or birth control in its yearbook. The statement read:

*[W]e endorse the efforts now being made to secure for licensed physicians, hospitals, and medical clinics freedom to convey information as is in accord with the highest principles of eugenics and a more wholesome family life, wherein parenthood may be undertaken with due respect for the health of mothers and the welfare of their children... Therefore the committee suggests that as members of the Church concerned with the problems of welfare and citizenship we should study amendments to the existing laws which would thereby enable physicians, hospitals, and medically supervised clinics to make scientific birth control information available to women who for physical or economic reasons are in need of this information.* ([31], p. 551).

The statements for the rest of the early liberalizers were similar.<sup>6</sup> In 1929 the Society of Friends made their support for eugenics (and sociology) and concerns about race suicide quite clear:

*Sociology and eugenics emphasize birth control continually as an important means of basically improving the quality of the human race. Obviously there should be a relatively large number of children from those parents who can support and educate them, and a relatively smaller number from less qualified parents.* ([32], p. 4).

In 1931 the Presbyterian Church in the USA stated forcefully that “economic conditions and a worthy standard of living clearly make it wrong to bring children into the world without adequate provision for their nurture and proper consideration for the health of the mother”

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<sup>6</sup>Methodist Episcopal Church: Pronouncements were made on a local level (Committee on Marriage and the Home of the Federal Council of the Churches of Christ in America, 1934). The only official early liberalizer appears to have been the Northeast Conference.

([33], p. 3). The announcement of the denomination's stance went on to add that proponents on birth control believed that it would produce "healthier children, healthier mothers, and that the human stock would be greatly improved...quantity would lessen and quality would increase" ([33], p. 3).

#### 4.2. The periodicals

The eugenic thought apparent in the early liberalizer's official statements was only more apparent in their popular periodicals. For example, the American Unitarian Association's periodical *The Christian Register* (which published at least two articles promoting eugenics annually between 1929 and 1931) asked:

*Shall we harness heredity to produce better types of cattle, dogs, and horses, and do nothing with it to produce better types of men? Surely as human beings we are as much entitled to the benefits of good breeding as are the brutes. If eugenics were to accomplish nothing more than the giving to the members of society a sound physical birthright, would not that in itself be a stupendous achievement?* ([34], p. 516).

The article closed by asserting "The church has a responsibility for the improvement of the human stock" ([34], p. 516). The other precursor to the Unitarian Universalist Church, the Universalist General Convention, made its concerns about race suicide apparent in its periodical, the *Christian leader*, when it cautioned:

*The most alarming tendency of our time is found in the low birth-rate among the superior breeds and the high birth-rate among the inferior. Without much question we are breeding twice as fast from the worst as from the best. No observing and thinking person can overlook this problem.* ([26], p. 663).

Similarly, an article from an early UCC periodical, the *Congregationalist and Herald of Gospel Liberty*, argued:

*For many years the wealthy and the educated classes have profited by modern knowledge of contraceptive methods and techniques...Why must this knowledge remain a class privilege?...How long are we going to allow the unreflective and helpless mass production of the weakest and least fit of our population to continue without attempting to shift the emphasis from quantity to quality?...When and how are...ministers and physicians going to be allowed to give this priceless information to these unfortunate people who need it most?* ([35], p. 1037).

Although they only unofficially supported birth control reform (until their merger with the Presbyterian Church in the USA), the United Presbyterian of North America's periodical *The United Presbyterian* made their belief in eugenics and general views about white supremacy quite clear. For example, they argued:

*The missionary value of all men is not the same. Men are born equal in their rights, but they are not equal in their fitness and ability to serve. They vary in their talents and powers...God needed the white Anglo-Saxon race... In the discovery and colonization of America, God was*

*opening the way for the Anglo-Saxon people, imbued with the spirit of the evangelical gospel, to become a great nation...Deep-seated in the mind and plan of God, lay the Anglo-Saxon race and country, America, strategic in position, powerful and rich in numbers and wealth. ([36], p. 4).*

Likewise, although they never officially liberalized on birth control, the Evangelical Synod of North America's *Evangelical Herald* quoted the father of eugenics, Francis Galton, and decried the use of birth control by "cultured classes" because it "seriously interferes with the progress of race culture and to that extent is a sin against church and state because through it too many families of good blood die out and the burden of progress in civilization is shifted to shoulders least able to bear it" ([37], p. 683).

## 5. The more things change, the more they stay the same

The decline of the eugenics movement in the USA coincided with the acceleration of WWII. As all of the Americas focused on the war, there was little discussion of birth control reform or contraception, a situation that lasted well through the end of the war. By 1955, however, contraception had regained the attention of American elites. However, now the focus of their concern was no longer the whitening Irish and Italian Catholic immigrants and their descendants (whose birthrates had indeed plummeted ([38], p. 34). Instead, concern about fertility was focused on the globe and in the parts of it that had both high birth and poverty rates. For example, in 1955, the *United Presbyterian* reported:

*Malthus worried a great many people about overpopulation, but he is out of style now and there are many learned viewpoints on how population problems can be solved. I haven't heard any good solutions. Overpopulation (and I say again, it is a geometric increase, at a frightful rate) can be solved by terrible wars or by equally terrible pestilence. Now isn't that a nice choice? Or if we continue to mass up we can think of new ways for getting food, and if we get too crowded we can all stand up to eat, I suppose, and take up less room. ([39], p. 2).*

Articles in *The Advance* expressed concern about "the population increase" and "the food situation" in India, noting the need for:

*Christian hospitals, private practitioners, and other qualified persons [to] cooperate with the local churches in setting up counseling centers for a on all family problems, including spacing of births, the problem of fertility and the physical, psychological and/or spiritual maladjustment that grow up between marriage partners. ([40], p. 11).*

The increasing world population incited a sense of urgency for population control among religious advocates for birth control, as one reader of *The Advance* stated in a letter to the editor:

*Our Protestant churches in this country, while giving support to family planning in their national organizations, have been very slow in really supporting the movement throughout the world...India, Thailand, Japan and many more of the countries where resources do not*

*balance with populations are making valiant efforts to start a program aimed at population stabilization. Even the World Health Organization is trying to help with this problem and has done a good deal. But it is hampered in the all out effort by the Catholic countries which are in the United Nations. ([41], p. 26).*

In 1955, population growth in the USA did not go without mention, although the reporting on the fact lacked the same tenor of concern as it did for the rest of the world, as the following example from the *United Presbyterian* demonstrates:

*Census Bureau recently reported that last year witnessed the largest annual population increase in United States history. This increase was 2,823,000. The previous high was 2,718,000 in 1951. In 1940, the census authorities were predicting some eventual decline in population because the annual population increase was then tapering off. The downward trend ended in 1947 with what was known as the "baby crop" of WWII. For the past five years, the bureau termed the growth "remarkably stable at a relatively high level. ([42], p. 8).*

The article went on to clarify that "immigration is a minor factor in the population increase" and to emphasize that the "4000,000 births, an all-time record" the previous year would exacerbate the chronic overcrowding of our public school system and create housing and employment needs but acknowledged that "In the light of our present food surpluses and improved methods of agriculture, it does not appear that food will be a problem" ([42], p. 8).

Groups often released new official statements on the occasion of an official merger. Such was the case when the Presbyterian Church in North America merged with the United Presbyterian Church in the USA, in 1958. The statement released by the new denomination uses two terms which become synonymous with the movement to control world population: voluntary family planning and responsible parenthood. They wrote that they approved the principal of both:

*Voluntary family planning and responsible parenthood, [and] affirms that the proper use of medically approved contraceptives may contribute to the spiritual, emotional, and economic welfare of the family. ([43], p. 385).*

All of the concerns mentioned by America's leading religious advocates of contraception in 1955 would become only more prominent in the next decade.

### 5.1. After the pill

By 1965, with the achieved FDA approval of the pill, the leaders of America's most prominent religious groups remained deeply concerned about overpopulation, especially in poorer countries. Their calls for action were often quite urgent, as was the following from the United Church of Christ's *United Church Herald*:

*Two other acute problems of our mission must engage your attention. I speak of population and poverty. I am told that at the present rate of increase world population will double within the lifetimes of many of us. I do not doubt that scientific advances eventually will alleviate some of the suffering which the exploding population is visiting on mankind. But until that*

*time comes we can imagine all too plainly, the millions of ill-clad, ill-fed, ill-housed people who will live in misery if we do not move at once on two fronts to shape the future. ([44], p. 9).*

Another article in the *United Church Herald* reported that:

*Thoughtful persons in many countries are predicting that within a relatively few years the population explosion will "dwarf our present anxieties" even about nuclear warfare and Communist aggression. Dr. Raymond Ewell, research vice president of the State University of New York, believes that "if present trends continue, famine will reach serious proportions in India, Pakistan and China in the early 1970, followed by Iran, Indonesia, Turkey, Egypt within a few years and by most of the other countries of Asia, Africa and Latin America by 1980." "Such a famine," he believes, "will affect hundreds of millions-possibly even billions-of persons." It will be the most colossal catastrophe in history. ([45], p. 24).*

In many of their statements, this next generation of religious leaders sounded shockingly similar to their predecessors, both in their level of alarm and in their solutions. For example, the *Register-Leader* emphasized the importance of stopping the "unprecedented, malignant growth of world population which thwarts the industrial and educational development of the emerging nations...especially marked in Catholic Latin America" ([46], p. 3). In a review of a book on *The Silent Explosion*, the Unitarian Universalist *Register-Leader* quoted the author, "We are breeding disaster - unless we can curb the silent upsurge of population that perils us all. Here is what America should do about it" ([47], p. 123). Months later, the book was recommended again, this time with a grave message attached:

*The most threatening problem facing mankind at the present time is what has appropriately been called the population explosion—an explosion, however, which in the title of his admirable book Professor Appleman makes quite clear is all the more difficult because it is so silent. ([48], p. 20).*

Although the particular focus varied from group to group, there was a significant amount of consensus about the areas of concern: India, Latin America and, to a lesser extent, the poor in the USA as the following quote in *Presbyterian Life* from 1965 indicates:

*The American population explosion seems to be slackening off somewhat, and the American growth rate is not so menacing as that of parts of Asia and Latin America. India, for example, according to demographers, may well double its population within thirty five years. The growth rate in mainland China is said to be still faster. ([49], p. 30).*

Arguing, it seems, against the focus on the Third World, Reform Jews asserted "The rapid growth of world population affects not only the underdeveloped areas throughout the globe, but the United States and the Western world as well" [50]. The article went on to emphasize that since most people would not seem to be in favor of killing off those already alive in the Third World, promoting contraception was the only humane alternative:

*Another misconception pinpointed in the article is that a "baby-boom," such as was experienced by the US after the war, is the crucial factor in the population explosion affecting the*

*underdeveloped areas. This is not the case, Professor Wrong says. Rather it is the "sharp drop in the death rate" which is spurring the population increase in Asia and Africa...In clearing up some of the misconceptions about the nature of the population explosion, Professor Wrong emphatically concludes: "It becomes brutally apparent that there is no alternative to a decline in population growth, and that the only ways to achieve such a decline are birth control, or a relaxation of death -control. [50].*

By far the most often-mentioned country seen to be in the most dire situation in 1965 was India. In 1965, an article in the Unitarian Universalists' *Register-Leader* wrote:

*It is horrifying to reflect that in India there are at this time eight million more people than there were last year at the same time; that a quarter of a million people in a city like Calcutta have nowhere else to sleep but on the streets. India is but an example of what can happen to a country when its population remains uncontrolled. Every other country is similarly threatened with the disaster that has overtaken India. ([48], p. 20).*

In a statement that harkened very much of eugenicists' darkest statements about racial cleansing, perhaps similar to the rhetoric that spurred Reform Jew's stance on the issue above, one author in the United Church of Christ's *Advance* asked:

*Why, it may be asked, are doctors and nurses striving to heal the sick and prevent disease in India when that country can't adequately support its present population? Under the circumstances is this a Christian or even a humanitarian service? These questions, not frequently propounded, present a problem of growing importance to the medical practitioner -especially to the Christian physician. ([40], p. 11).*

Although there was consensus that the situation was perhaps most dire in India, Latin America received even more attention in many of these religious periodicals. For example, the Protestant Episcopal Church reported that:

*The Rt. Rev. Frederick W. Putnam, Jr., Suffragan Bishop of Oklahoma, said in Dallas, Texas, that more children are being born in Central America than can ever be educated. The bishop, returning from an extensive tour of Central America, spoke at the first of a series of Lenten services at the Church of the Incarnation. About the only solution, suggested Bishop Putnam, is for all religious leaders in Central America to work out some approach to keep the birth rate down. Otherwise, added the bishop, there is little if any hope for ever coping with the problems of illiteracy and the rising population. The bishop visited Guatemala, Honduras, El Salvador, Costa Rica, and Nicaragua. ([51], p. 11).*

Latin America was different largely because as Roman Catholics, the population was actually not supposed to use contraceptives. For example, an article in the UCC's *United Church Herald* reported that:

*Throughout Latin America there is a mood of anticipation, hoping against hope that Pope Paul VI's commission of scientists and theologians will find some acceptable answer to the untenable Catholic attitude toward birth control. This mood is not limited to Latin America, of*

*course, but it is intensified on that continent where the population—which is heavily Catholic, at least in name—is expanding more rapidly than anywhere else. With a growth rate of nearly three percent annually the population doubles every 23 years. ([45], p. 24).*

Finally, it is important to note that just as it was during the first wave, the activism of these denominations was being supported and coordinated by other organizations. This is made abundantly clear in a statement from *The Christian Advocate* that mentions the entire Third World:

*Against the backdrop of the growing worldwide debate on the population explosion, the Board of Missions' World Division is joining other Protestant denominations and a unit of the National Council of Churches in an accelerated program of spreading birth control information and equipment to medical mission outposts and personnel overseas. Fifty hospitals, clinics, and dispensaries in Asia, Africa, and Latin America have been sent informational leaflets from the Planned Parenthood Federation of America discussing newly developed intra-uterine contraceptive devices recommended for use by village peoples. An accompanying letter from William Strong, New York, planned parenthood consultant of Church World Service (interdenominational relief and rehabilitation agency of the NCC), offered various services to overseas medical units, including: Information about new contraceptive devices and the names of doctors in the vicinity of various institutions who can offer help and advice; Educational materials in the field of birth control for varying languages and cultures; Supplies of contraceptive materials; and Funds to extend services or make new services available. Dr. Harold N. Brewster, medical missionary of the World Division, indicated strong support for the worldwide program of family-planning education and action which Church World Service has undertaken. ([52], p. 22).*

## 5.2. America's poor

Although their focus had certainly shifted to the Third World, American religious advocates of birth control remained concerned about fertility in the USA, especially among the poor or those in the "inner cities." For example, in 1965, *The Presbyterian* reported excitedly that "Birth-control clinics are likely to be set up as part of the anti-poverty war in America, supported by Federal funds" ([49], p. 30). Another author writing for the United Church of Christ's *United Church Herald* declared:

*Although the population explosion may not yet affect us personally, American churchmen need to overcome their natural reticence to discuss the meaning and methods of birth control. We can make no greater contribution to the welfare of mankind and to the relevance of the Christian gospel than by providing the knowledge and materials for responsible parenthood in our own country and throughout the world. ([45], p. 24).*

Referring to two laws that were still on the books in 1965 that limited access to contraceptives to populations in the USA, *Presbyterian Life* argued that "Striking down the Connecticut statute, and indirectly the Massachusetts statute...would be a boon to the pioneers in the field



of planned parenthood clinics and eventually to *the people who most need counsel* and encouragement in managing the size of their families" ([53], p. 26, emphasis ours; see also [54]). Some articles, like "Private Rights and Rising Birth Rates" in *Presbyterian Life* emphasized that "rich and poor alike [have an increased understanding] of the need to limit families" ([49], p. 31). However, it was generally apparent that the fertility of America's poor was the main focus—made clear, for example, in another article in *Presbyterian Life* which informed readers that the poor in the USA have a "high rate of literacy" ([49], p. 31).

In a statement that makes its focus on the domestic poor clear only by failing to mention other countries, the Protestant Episcopal Church endorsed:

*[T]he following goals in connection with the augmentation of family planning services to low-income persons: (1) Policy changes by appropriate government agencies to permit investigators, staff workers, and public health personnel to initiate conversation about family planning and child spacing with their clients (2) To increase the scope of referral possibilities to permit referrals to private agencies as well as to the already existing possibilities of clergy of their choice and a private physician. (3) Ultimate placing of clinics services at the point of need, including public financed institutions with staffing and operations paid for from public funds. (4) An interim step, if necessary, of purchasing services from existing private agencies. ([55], p. 8, emphasis theirs).*

The following article in the Quaker periodical *Friends Journal* mentioned "urban unrest" as one of the key problems contraception could help curtail—along with, and this was unique to the Quakers at the time—the destruction of the environment (most of the other early liberalizers mentioned the natural world on in relation to food insecurity, if at all):

*We are deeply concerned as Friends that each (human) life created be enabled to flourish in family love, fully expressing divine potential, through responsible parenthood... The grave approaching problems of urban unrest and world tensions, as well as conservation of the environment for future generations, require prompt attention... We must therefore begin to devote far greater energy to the development of adequate governmental and family planning programs, providing information to all needing it, as well as medical services and material to all in a manner consistent with their belief. ([56], p. 141).*

## **6. Discussion: distancing from the legacy of eugenics while focusing on other peoples' fertilities**

America's religious advocates of birth control changed their focus on whose fertility concerned them between the first and second waves of liberalization on contraception. Initially, concerned about race suicide in the 1920s, the groups examined here promoted the legalization of contraception during the first wave so that poor Italian and Irish immigrants would use them. Thirty years later, the focus of whose fertility was the problem had radically shifted to the Third World and, to a lesser extent, America's "urban poor."

### 6.1. Other people's fertilities: responsibility, not rights

What remained the same, however, was that these groups promoted contraception out of a concern about *other people's* fertilities. America religious advocates of birth control did not promote family planning out of a desire to reassure their flock that they were in good standing for using it—or even to reassure their members that they were fighting for their rights to use it. In fact, rights entered the early liberalizers' periodicals and official statements only a few times and always in relation to others. For example, rights are implied in this relatively brief mentioned by the Quakers in a "Letter from Pakistan," in 1965:

*Of urgently needed changes, the position of women has priority. I must not omit to say that family planning is now getting a lot of support and none too soon!* ([57], p. 108).

However, even in this statement, explicit talk of "rights" does not appear. When it does, the rights these religious leaders referred to are not those we have come to accept as part of the conversation today. Even in an article titled "Private Rights and Rising Birth Rates," which appeared in *Presbyterian Life* in 1965, the rights in focus appear not to have been the right to use contraception (from the individual perspective), but rather the right *not to use* contraception or to reject sterilization:

*In other parts of the world however, even when contraceptives are available, people fail to use them. More than eight thousand birth-control clinics have been operating in India, according to a report by Ford Foundation population-expert Dr. Nicholson J. Eastman. But the attendance at the clinics has been "disappointingly small," and 'only a small fraction of the few women attending these clinics return for new supplies. Several answers to this problem have been proposed, among them the use of intrauterine coil or ring method of contraception, which in new tests has proved satisfactory. This method does not require continuous attention, and seems to be suitable to between 80 and 85 percent of women. Another possibility is the widespread increase of voluntary sterilization, a method useful when couples have had as many children as they wish and 'the only realistic answer,' according to Dr. Buxton. Some see sterilization as too drastic to be widely acceptable, however. ([49], p. 30, emphasis ours).*

Only one article, in the Unitarian Universalists' *Register-Leader*, referenced rights in a way that could apply to both others and their own people, in the following quote that bemoaned the slow state of progress in 1965:

*It should be easy to decide who owns the individual's fertility—the individual himself, the church, or the state. Yet such a decision is not simple. For centuries, fertility ownership has been contested by the three parties. However, I believe that the right of the individual to control his own fertility is slowly gaining ascendancy, but progress is slow, sometimes microscopic. Full emancipation is still distant, as the restrictive birth-control laws of Massachusetts and Connecticut (overturned by the United States Supreme Court in June), the punitive abortion statutes of all United States jurisdictions, and the reticence of physicians to perform sterilization operations all attest. ([46], p. 3).*

## 6.2. Distancing from eugenics by focusing on voluntary and responsible limitation

Thus, these groups were not generally thinking yet in terms of individuals' rights to contraception. Instead, they were still focused largely on encouraging those whose fertility they deemed irresponsible to use birth control. Although this stance, in and of itself, could still be seen as a legacy of eugenics, most of these religious leaders' statements had been largely purged of blatantly eugenicist language. Even so, however, one can still see evidence of these religious leaders distancing themselves from the legacy of eugenics. Much of this comes through in statements that indirectly reference eugenicists' promotion of involuntary sterilization, such as that above or such as when *The Living Church* wrote in 1965 that they would promote contraceptives, "respecting at all times [low income persons'] complete freedom of choice" ([55], p. 8).

Indeed, one could argue that the term "voluntary parenthood" in and of itself is such a move. However, it is telling that the groups most likely to adopt voluntary parenthood were not the staunch and earliest advocates of contraception examined here. Those most likely to stress voluntary parenthood were those groups who took a critical stance regarding contraception in the first wave but had come around to liberalization by the time the pill was invented. The early liberalizers, however, tended to emphasize, instead, *responsible* parenthood—the very term implying that some parents, namely, those who were poor or who had more than two children, were *irresponsible*, as the following example from the *Register-Leader* made quite clear:

*In the eyes the eyes of the state, a female has been a brood sow with the ultimate ideal of producing an annual litter...she is never a responsible parent, the mother of two carefully planned children. Most often she is a woman who has been so preoccupied and so successful with begetting that she has not had time to menstruate between pregnancies during her twenty years of marriage.* ([46], p. 3).

However, as their focus on *responsible parenthood* implies, while there might have been some distancing from the language, and even the policies, of eugenics, it is also clear that all of the religious advocates of contraception had identities as leaders in the movement. In 1965, with no sign of concern regarding their early motives, the *Christian Advocate* proudly declared [58–61]:

*Ministers are not doing the job they need to do in teaching their people about the disastrous implications of the rising tide of world population...Because Methodists were the first denomination to say family planning was a moral necessity, the church has a particular moral responsibility to take the lead in seeing that their communities have family planning facilities, Winfield Best, executive vice-president of Planned Parenthood World Population, reminded the nearly 50 church leaders attending the seminar.* ([58], p. 23).

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# Factors Affecting the Attitudes of Women toward Family Planning

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Additional information is available at the end of the chapter

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## Abstract

Everyone has the right to decide on the number and timing of children without discrimination, violence and oppression, to have the necessary information and facilities for it, to access sexual and reproductive health services at the highest standard. Deficient or incorrect family planning methods, wrong attitudes and behaviors toward the methods and consequent unplanned pregnancies, increased maternal and infant mortality rates are the main health problems in most countries. Individuals' learning modern family planning methods and having positive attitude for these methods may increase the usage of these methods and contributes the formation of healthy communities. It is considered important to examine the current attitudes and determinants in order to spread the choice of effective method.

**Keywords:** women, attitudes, family planning, reproductive health

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## 1. Introduction

Everyone has the right to decide on the number and timing of children without discrimination, violence and oppression, to have the necessary information and facilities for it, to access sexual and reproductive health services at the highest standard [1]. Deficient or incorrect family planning methods, wrong attitudes and behaviors toward the methods and consequent unplanned pregnancies, increased maternal and infant mortality rates are the main health problems in most countries.

Individuals' learning modern family planning methods and having positive attitude for these methods may increase the usage of these methods and contributes the formation of healthy communities [2]. More than 22 million unsafe abortions that occur every year cause about

47,000 maternal deaths in the short or long term, mostly in developing countries [3]. It is estimated that up to one-third of maternal deaths can be prevented by using contraception in women who are seeking to postpone or delay postpartum [4].

Across the world, it is estimated that 222 million women have unmet need for family planning [5]. This unmet need prevalent in particular populations, especially those who are sexually active, those with low socioeconomic status, those living in rural communities and those coping with conflicts and disasters [6].

Increasing usage of contraceptives in some developing countries has reduced the annual number of maternal deaths by 40% in the last 20 years and has reduced the maternal mortality rate (the number of maternal deaths in 100,000 live births) by 26% in recent years. If the need for uncontrolled birth is met, it is estimated that maternal mortality still occurring in these countries can be avoided by more than 30% [7]. The 'Family Planning 2020' initiative was started at the London Family Planning Summit in July 2012. The main objective of this initiative is to provide contraceptive information, services and supplies for 120 million women and girls until 2020 [8].

## 2. Family planning

Family planning is defined as having the freedom and responsibility of all the couples and the individuals to decide the number of children they desire and having the knowledge, education and tools for this purpose. In other words, family planning is a preventive service that allows married couples achieving their desired number of children and deciding the spacing of pregnancies according to their economic opportunities and personal wishes, and to ensure that the births are at appropriate intervals for the mother and child health.

Family planning does not mean limiting the number of people in a family. The goal of family planning is preventing pregnancy-related health risks in women and reducing the need for unsafe abortion and infant mortality (see **Table 1**). Maternal health, risk of pregnancy and even maternal death significantly increase when births made at intervals of less than 2 years. In addition, babies born at frequent intervals are not fully developed (babies with low birth weight), disability rate increases, care becomes difficult and infant mortality increases in the mother's womb.

Family planning can result in higher levels of education, better employment opportunities, higher socioeconomic status and empowerment. Another aim of family planning services is to prevent unwanted pregnancies and related maternal and infant mortalities, to provide help and counseling to every family whenever they want and to have as many children as they want. Family planning services improve the abilities of family members in decision-making and recognize the freedom to make free decision about having a child. Family planning services have an important role within the scope of "Primary Health Care", which must be presented to the public [9–11].

In studies on family planning in the world, differentiation in attitudes, behaviors and the use of contraceptive methods largely lead to change in fertility [4]. Biological, psychosocial,



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- To educate individuals and families about reproductive health
  - To raise the level of maternal and child health by teaching modern and medical ways of protecting the parents from pregnancy
  - Many and frequent births have negative effects on mother and child health
  - Preventing maternal deaths and protecting their health
  - To ensure that babies are born and live well
  - To prevent high-risk and unwanted pregnancies
  - Providing medical assistance to those who want to have children and educating individuals about family planning methods.
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**Table 1.** The purposes of family planning.

cultural factors determining fertility and factors affecting choice and use with birth control instrument are evaluated together in the regulation of fertility [12].

### 3. Unmet need for family planning

Unmet need for family planning is a concept that has come to the agenda in recent years. Unmet need for family planning refers to women who have the ability to give birth before they have another child (want to increase the interval of births) or who do not want to have any other children (want to terminate their fertility) but do not use any contraceptive methods.

In developing countries, there is a significant gap between women's reproductive preferences and the use of contraception. This inconsistency is called an 'unmet need' for family planning [13]. At least 1 in 10 married or in-union women in most regions of the world has an unmet need for family planning. Worldwide, approximately 12% of married or in-union women are estimated to have an unmet need for family planning; that is, they wanted to stop or delay childbearing but were not using any method of contraception.

In general, unmet need is high where contraceptive prevalence is low. The lowest level of contraceptive prevalence in Asia were in Afghanistan and Timor-Leste at 29%. In 59 countries, at least 1 in 5 women on average had an unmet need for family planning in 2015, and 34 of these 59 countries are in Eastern Africa, Middle Africa or Western Africa [14]. In Turkey, the unmet family planning requirement is 6% [15].

Unmet need for contraception and unwanted pregnancy is a major public health problem in most countries. However, the relationship between unmet need for contraception and unwanted pregnancy has not been studied adequately. Bishwajit et al. investigated that the prevalence of unmet need was 13.5%, and about 30% of these women expressed their unwanted birth of their last pregnancy in Bangladesh [16].

An important way to remove unmet needs for family planning is to increase the diversity of contraceptive methods. Individual choosing the contraceptive methods may change depending on their individual needs and family character differences [17]. Also, women refusing to

use contraceptives and without desire to prevent pregnancy are responsible for about 38% of women with unmet needs.

Giving expanded alternatives to different methods, if available, can help to meet some of their needs and increase their usage of contraceptives. Extension of accessibility for different method can reduce contraceptive discontinuation by 8%. Beside this, wider range of options may cause some of women (62%) who have unmet needs to become users [18]. For example, an increase in the availability of a new method may increase the contraceptive prevalence by 8 points [19]. Finally, some users will need contraception to protect against sexually transmitted infections such as human immunodeficiency virus [20].

There are very few studies comparing outcomes among women who have unmet need, depending on whether they are planning for future contraceptive use or not. Analysis of Cross-sectional Demographic and Health Sector (DHS) data reported that 26–83% of women who were unmet need in 48 countries thought to use any contraceptive [21]. Additionally, DHS data show that participants were considered to have unmet needs regardless of their attitudes toward their next pregnancy who indicated that they were pregnant or amenorrheic and wanted this pregnancy or had their last pregnancy. However, most of these women do not desire to get pregnant again in a short span of time, and say that they are willing to use contraceptives. Ross and Winfrey indicate that 40% of postpartum women in 27 countries are intend to use a method within the next year [22].

Between 2006 and 2009, 32% of 2853 women who were married during the survey period between the ages of 13 and 49, got pregnant at least once. Women with or without unmet need in these pregnancies were significantly more equally divided in terms of contraception (30 and 33%). All pregnancies among women who have unmet need are considered unwanted. However, 40% of unmet need pregnancies were among those who said they did not want more children; this result was interpreted as those women changed their childbearing intentions, stopped using the method or were exposed to contraceptive failure [23].

#### **4. Attitudes affecting family planning**

Attitude refers to the positive or negative feelings or tendencies of an individual about an idea, an object or a symbol. According to Bohner, the attitude is anything that a person actually possesses and that he realizes later. According to Arkonaç, attitude, generally attributed to many academicians, is a tendency which is attributed to a person and which creates his feelings and behaviors related to a psychological object in an orderly way. Attitudes naturally affect beliefs as well. Faith includes true or false information, opinions and beliefs based on personal experimentation or external sources. All variables affecting family planning cause behavior to occur [24, 25].

Behaviors and attitudes play an important role among the choice of using family planning methods and so it effects the change of fertility status and population rate indirectly. In order to promote the usage of an effective method, attitudes and behaviors play an important role on preference of choosing a family planning method. The identification of attitudes that affect the use of the family planning method by individuals is an important factor contributing to the scheduling of family planning services [26–28].

The basis of most attitudes depends on childhood and is generally acquired through direct experience, reinforcement, imitation and social learning. The most important feature is that once they have developed, they are very resistant to change [29]. Studies conducted in different countries have found that most women know the methods of family planning but have a lack of practice. This is due to the fact that individuals are in a negative and prejudiced attitude toward modern methods. It is known that positive or negative attitude affects the use of family planning method. It is considered important to examine the current attitudes and determinants in order to spread the choice of effective method [26–28].

Individuals obtain information about family planning methods, emotionally empower them with information and ultimately turn their attitudes toward information into positive or negative behavior. Individuals also respond to the reactions they have through the process of transformation into behavior [2].

Individuals' attitudes for family planning methods are influenced by some characteristics, such as economic factors, sociocultural factors, environmental factors, location, age, educational, traditional beliefs, religion, family type and level of knowledge. It is known that these factors have effects on turning the attitudes into behaviors. Attitude is a notional concept and although it cannot be observed directly, the effects on behavior are well known [30, 31].

Individuals get the knowledge of family planning methods, then they transcribe it emotionally by themselves. After all they combine them with their attitudes and positive or negative behavior is ready for decision of which method is suitable for them [32].

Many anthropologists have insisted that reproductive behavior or decisions made in relation to family planning is not only decided by economic factors, but also affected by sociocultural factors such as fertility preferences or values related to having children. Further, political issues such as national population policy or reproductive health programs, are also influential matters. Subsequently, anthropologists emphasize that it is very important to understand what social, cultural or structural factors may shape peoples thoughts and behaviors [33].

In early 1970s, two factors were found to affect the fertility behavior of women. Surveys on sex preferences have used deductions from attitude and behavior charts due to inadequate direct scales. In this regard it is possible to distinguish three groups of countries: countries where it is reasonable to choose male siblings; male siblings are preferred due to certain criteria; and countries with no sexual preference systematically. There is a period during which the transition from high fertility to low fertility requires couples to decrease the number of family members but yet not practitioners of contraception. Those who do not use any contraception methods, among those at any age, who want to limit their family size are far more numerous than those in developed societies compared to the developing societies. When education is considered as one of the variables of modernization, it is understood that inconsistent behavior tends to decrease with education [34].

By 1980s, comparable data for a large number of developing countries participating in the World Fertility Survey (WFS) have become available. Cross-national studies based on WFS data confirmed that education generally exerts a negative influence on fertility. But even at low levels of socioeconomic development, where education had a negligible, a negative association emerged after a critical level of schooling, was reached [35]. A pronounced preference of parents to have male children has been noted in a number of countries, although a desire of a balanced number of sons and daughters is also common [12].

In recent years, the idea that it is significant to understand the sociocultural contexts in demographic studies has gradually expanded [33]. Some studies have mentioned the importance of the role of men in reproductive health and their influence on decision-making and behavior related to reproduction [36, 37]. As mentioned above, many family planning programs have focused mainly on women. Even though men are increasingly being “involved” in reproductive health programs, the view of men still seem to be that they are peripheral and problematic [36].

#### **4.1. Socioeconomic factors**

Gender indicates the characteristics, positions and roles of man and woman in all social relationships. But in most studies on family planning, women are usually on the front line of factors that affect socioeconomic outcomes. For age, a commitment to supporting gender equality in economic outcomes has underlined women’s empowerment.

However, despite important advances toward equality, differences in the socioeconomic outcomes of men and women still persist. If the population is increasing by forcing natural resources and economic opportunity, the necessity of implementing effective and adequate family planning in the society is emerging. With industrialization, families have better economic opportunities and social security. Thus, aggravating living conditions and taking more roles in women’s work life reduces the desire to have many children.

It is accepted by many scientist upon that human rights are an integral part of the economic process, and that it is impossible to support that process without women. Consequently, it is necessary to expand the aims of existing societies to include the interests of women.

Everywhere in the world, men have an important role in the socioeconomic progress of women. When designing social sex-based policies, ignoring women increases both their effectiveness and inequality. The use of fertility and contraception in developing countries are associated with socioeconomic status and other relevant factors [38].

The withdrawal method is the most commonly used birth control method in the world. There are not enough data on whether withdrawal method choice is influenced by variables such as socioeconomic status and education [39]. It was demonstrated that withdrawal use is quite common among young US females in different study. Because nearly one-third of females aged 15–24 years in study nationally representative sample indicated that they had recently used withdrawal [40].

#### **4.2. Sociocultural factors**

In every cultural group events such as coitus, pregnancy and birth show differences. In a society, appropriate conditions for fertility and bringing the child to the world, pregnancy, how birth will be, what the prenatal and postnatal care standards are, the ‘birth culture’ that is peculiar to the collective and tries to preserve the basic approaches, perhaps changing a little from generation to generation and taught to other generations.

Economic conditions of the society (distribution of income, employment opportunities, etc.), family structure (which is common among the core/extended family models, relationships

among family members, sharing of responsibilities, etc.), gender roles, beliefs of society, marriage models (polygamy, same place, same family marriage, relatives marriage, etc.), sexual behaviors (premarital, out-of-marriage relationships, marriage prohibitions, etc.), using or not using contraceptive methods vary from community to community [41]. Properties of family, economic circumstance of community, the ban of some contraceptive methods in that society, opinion about abortus, concerns about using several contraceptive methods, population policies, gravidity, religion, the idea of sin, traditional practices, etc.; all of which are among the most important factors determining health status. Some are not direct health care determinants but may be preparatory, adjuvant or preventative [41].

Having a strong religious identity affects willingness of women to discuss contraception with their partners/families/communities and an unwillingness to consider accessing it and eventually using it. Similarly, the institutionalized religious doctrines intersect with cultural beliefs in a society which bestows man as the overall head of the house and, such beliefs are inherently subsumed in a patriarchal structure, where women have been relegated as a weaker gender and could only measure their freedom of choice within the acceptable framework.

#### **4.3. Location**

There are large differences by region. Contraceptives are used by almost all of the world's married or majority members. In 2015, 64% of married or in-union women between 15 and 49 years of age in the world were using any form of contraception. However, the use of contraceptives was much lower in less developed countries (40%), and was especially low in Africa (33%). Among other large geographical regions, the use of contraceptives increased significantly in 2015 from 59% in Oceania to 75% in North America [14].

Furthermore, place of residence has an impact on the use of contraceptive, and is higher in urban areas than in rural areas [42, 43]. The factors revealing these differences are better availability of social services such as education, access to health services, information and family planning services [44]. The results of a study support that social factors such as place of residence, affect the contraceptive utilization patterns.

In this study, urban women were found more likely to use contraceptives compared to rural women [44]. Another study showed that utilization of family planning methods was found more in women of age group 30 or more, parity four and more, educational level up to high school and above and those of higher socioeconomic status whereas their residential area (urban or rural) was not found an influencing factor on practice of family planning by them. This study showed that all the women, both in urban and rural area, were willing to adopt a family planning method in future. All the women interviewed were in favor of practicing family planning. However, only 55.9% women were found to have used some form of family planning. When comparing modern and traditional methods, the difference between the preferences of future family planning methods between urban and rural areas is statistically significant. Conservative use of the condom in rural areas (44.6%) and modern methods in urban areas (32.3%) seem to be at the highest level of future use preferences. The study also revealed a good knowledge and favorable attitude toward future use of family planning methods [45].

#### 4.4. Age

The age of women plays an important role in the process of deciding when women will start and finish the process of giving birth and how long to wait after the birth of the next child. Also the use of family planning method varies according to the age of the woman. As women get older, their need for contraception and the rate of contraception decreases [45, 46].

In a study, it was demonstrated that younger women, often have a stronger fertility desire than older women. In this study, 26% of the women aged 15–24 wanted another child within 2 years compared to 16% among women aged 25–34 [47]. The use of pills and condoms are preferred more when the average age is lower. When the contraceptive use of married and fertile women is examined according to their age, it is observed that middle-aged women tend to use the family planning method more than younger and older ones [48]. Another study, demonstrated that use of contraception was maximum (84.8%) in 30 years and more and minimum (2.2%) in 20 years age [45]. Similarly NFHS-III, India reported more use of contraceptive by women of higher age group and parity [49].

Maternal age at first birth is an important determinant of the quality of life of the woman and the baby, maternal and child health and general fertility level.

#### 4.5. Education

Women's education has a great influence on many health indicators and is one of the most commonly studied determinants of the use of contraception and unmet need. Women's attitudes toward family planning are influenced by experiences such as education and pregnancy. It was found that women who had a primary school graduate or higher education, had 1–3 pregnancies and did not want more children in the future got higher scores on the family planning attitude scale. As the level of education increases, the number of children required decreases [50]. The reason for this can be explained by the opportunity to learn about family planning and to raise awareness about the issue.

Similarly, as women's education levels increase, awareness increases. Sociocultural characteristics play an important role in this issue [51]. Education contributes significantly to the quality of women's lives. Improving women's access to education and encouraging continuous and constant exposure would significantly increase use of family planning and reduce unmet need.

In societies with high levels of education and socioeconomic status, marriage, pregnancy and childbearing age occur at a later stage and therefore the need for contraceptive methods increases. Using contraceptive methods prevent advanced pregnancies and high fertility. As the interval between births increases, the number of high-risk pregnancies decreases and maternal mortality declines. It was identified that the use of effective modern methods, intrauterine devices and oral contraceptives, increased as the education level and socioeconomic status of the women improved.

Failure rate of contraceptive methods is reduced by informing pairs. Visual and audiovisual media play an important role in information provision and in creating awareness. Education and counseling services are most accessible and suitable for prenatal and postnatal periods [52].

#### 4.6. Gender

Reproduction is a dual commitment, but in most of the world it is often seen as the responsibility of women entirely, and many family planning programs have focused mainly on women. Men are often described as forgotten reproductive health clients in family planning services.

The role of men in family planning population planners have received more interest in recent years as they begin to notice the importance of male influence on reproductive decisions around the world. Up to this point, many activities are in the effort to determine or develop the knowledge and attitudes of men about family planning. While men play a direct and major role in deciding contraceptives, they play an indirect role as a dominant factor in women's economic, social and family needs. The role of men in decision-making on women's fertility and birth is always dominant.

The United State Agency for International Development has addressed women's participation in many aspects of family planning, such as condom promotion through social marketing or community-based distributors, training and promotion of vasectomy and Information and Education Campaigns to increase awareness and knowledge and to influence behavior change. The prevalence of contraceptive method use in married men was found to be approximately 15.0%, about 6.0% in their wives and 16.0% in couples. The mean age of participants was  $38.3 \pm 9.0$  and the respondents' spouses were  $32.7 \pm 8.4$ . The percentage of married men who do not know how to read and write is 52.0 and 77.5% of their spouses are illiterate. Most married men were now using condoms and their wives were now using oral pills. Most married men (97.0%) were aware of common contraceptive methods. The research findings showed that married men who are illiterate and younger do not exchange ideas or allow their spouses to do family planning and that they do not even discuss family planning with their wives [53–55].

In another study, among married men about their contraceptive use and fertility preference reported interesting findings concerning male involvement in family planning decisions. The report also revealed that majority of the men have supportive attitude toward contraception use and recommended to strengthen efforts to convert the positive attitudes to positive behaviors to achieve greater success in family planning programs [56].

The reasons for inclusion of men in reproductive health issues are multifaceted. Above all, men have their own reproductive health concerns and their involvement should not be seen as a tool for better female reproductive health. Also, men's sexual health and reproductive health welfare and behavior directly affect their partners. Besides decisions about reproductive health occur in relationships between men and women [57].

Male methods of contraception, such as coitus interruptus and condoms, although they have historically played a far greater role than women's methods, are denigrated as being unreliable or associated with extramarital sex, respectively. Birth control pills have been put in place of birth control, but responsibility should be shared by partners regardless of pregnancy, no matters which of them desires. The prominence of behavioral factors is due to the fact that most of the contraceptive failures originate from human error [58].

In the private arena, men can directly influence women's economic and social progress. In many societies men still say the last words about family planning and reproductive health,

the use of family resources, including spouses and girls' participation in the labor market, and medical and educational spending.

In developed countries, men have limited participation in child care and domestic affairs; this situation places a great burden on women's education and professional life. The role of men in developing countries is even more important in patriarchal structures that supervise the health decisions of women of their husbands or other family members. Women's reproductive health is influenced by men's policy makers, male health care providers and men's services. Men also affect women's reproductive health as partners and ancestors.

Accordingly, understanding the behaviors and beliefs of the man about fertility and family planning is very important for the design of successful reproductive health policies. Poor knowledge of reproductive health issues among males may pose barriers for women to seek care for these problems [59].

Men as the heads of government and ministers of state, design and implement policies as leaders of religious and faith-based institutions, judges, chiefs of armies and other power organs. But they do not support women's priorities and needs. As public authorities, they also exercise control over a wide range of resources, such as health, education, transport or finance. This situation continues gender inequality in many parts of the world [59].

Presently, decision-makers are looking for ways and programs to involve men in reproductive health decisions, including family planning and support for safe motherhood. Previous programs have established that a supportive partner facilitates women's reproductive health and contraceptive usage. Women have been the main target of family planning campaigns at the expense of their male counterparts for a long time. Despite this, a greater percentage of women using contraception use a male contraceptive method or a contraceptive method that requires male cooperation [60].

The cause why men have a varied attitude than women and men exposed to family planning counseling at different levels and in the process of decision making, men have different experiences [61]. The authoritarian and patriarchal structure of family relationships also necessitates the approval of the man in using the family planning method. While most of the men in developing countries agree that responsibility is shared by couples, they believe that women should use family planning methods [62].

One of the biggest obstacles to men's participation in reproductive health is the inadequacy of information. Only male information about the contraception is not important, but also how it is used and its effectiveness is important. Various studies have examined how cultural and social organizations influence contraceptive patterns. Studies in Ghana and Nigeria show that women are at high level influence of male's population to contraceptive decisions; however the converse may not be true. In addition, men are effective at the first decade of reproductive marriage and up to the first four children. Males want more children in families with fewer members and it is seen how important the number of surviving children is for women [63, 64].

The importance of men's involvement in policy designs and research on reproductive health is also emphasized by other researchers. Bankole and Zulu claim that contraceptive unmet need data in Sub-Saharan Africa derives from data collected only for women [64, 65].



Men's positive approach makes it easier for women to access and use family planning services, and as a result, availability and continuity in services is ensured [66–68]. Participation of men in family planning involves using more male-oriented methods and supporting their partners in using the family planning method. It is very important for men to decide which method to use in family planning and to act together with women during the selection use and follow-up of methods [62].

Men should be able to lead and support his wife or use one of these methods himself. As a wife and a husband, they may be more aware of the needs of their spouse and family members and may make better plans for their children's future. Positive attitudes of men in family planning can enable their spouses to use their methods and go to the health institution regularly. They can also play an important role in the prevention of sexually transmitted diseases through the use of condoms regularly [62, 69].

Men's attitudes will be used in women's reproductive health decisions family planning methods. Many factors affect women's use of the family planning method, such as the educational status of women and their spouses, the number of children they have, the family structure, the point of view of men toward family planning and the disapproval of spouse or family elders [66, 68]. Dissatisfaction against existing methods in developed countries leads to new methods of searching for men [70].

In Zimbabwe, despite men report having "the final say" in contraceptive use, women are the ones responsible for obtaining contraceptives. These and other studies show that couples in contraceptive use are incompatible. The primary conclusion in past research is that men are on the contraception for the purpose of spacing for restricting family size. Men want more children, this suggests that reproductive health programs or policies in developing countries should occur in both genders. Note that most of the conclusions are derived from surveys where individuals prefer their own preferences and preferences. For this reason, it is necessary to work more accurately to measure the "unmet needs" of women, the difference between fertility preferences and the use of contraception [59].

One of the problems generated by unmet need for family planning is the occurrence of unwanted pregnancies that have impact on abortion. Given that one of the four pregnancies in the world is intentionally terminated, there is also evidence of male opinion about abortion, an important element in contraception. Abortion is perhaps the best example of a direct relationship between laws and policies and inadequate reproductive health outcomes, and in many countries it is men who write, confirm, and enforce abortion. For example, married women in Turkey need permission from their spouse to have an abortion. This situation is about Islamic law. In addition, men can directly influence women's decisions about abortion. For example, in an amniocentesis and abortion inquiry in New York, Rapp found that spouses' beliefs were largely influential on the rejection of prenatal tests such as contraceptive use or amniocentesis.

According to her results, women who felt that her partners would love and help increase a handicapped child were less likely to undergo such test, relying heavily on her partner's beliefs about the attraction of a handicapped child in their decisions about. The study by Browner for Colombia demonstrated the strong influence that spouse have on women's abortion decisions. When it is expressed directly or when it perceives that it will be abandoned,

the abortion rate increases [59]. Getting men involved in the family planning program will lead to increase the usage of contraceptives methods as a result will improve the continuous use of male method.

Identifying individuals' attitudes and behaviors toward the family planning, completing missing information and correcting false information are important to be able to provide an effective family planning service and for planning the training and consultancy services to be given to the women.

Health workers should be guided to choose the right method and use it correctly. This helps couples enhance the quality of their sexual lives. In order to potent scale up reproductive health service provision to meet the present-day and future needs, a sufficient number of educated health care professionals should be available. However, the inadequacy of health workers prevents the provision of family planning services, especially in rural areas. Experiences from some developing countries show that community-based family planning services have been used successfully to deliver family planning methods including distribution of pills as well as injectable contraceptives [71, 72].

Even though literature on uptake as well as methods used for family planning at community level in developing countries is available, literature on perceptions and attitudes of women toward the use of family planning services offered by community health workers is scarce [73].

Adults need more information about how family planning is useful in the severity and severity of known contraceptive side effects. A new literature survey of modern contraceptive use from qualitative research mentions about obstacles similar to contraceptive use for women, such as lack of knowledge, access and fear of side effects. In addition to school-based programs, media campaigns can help remove the myths surrounding the perceived health effects of contraceptive use.

In addition, more researches are needed among younger couples to develop communication and counseling about the family planning. This can be achieved by encouraging more male participation in contraceptive communication and decision-making processes, which may lead to increased use of family planning, better management of side effects and improved health relationships. As young women communicate with their peers and supportive family members, programs that encourage, build and support social networks will provide safe spaces for young adults to talk about the family planning and where they can access services [74].

As a result, more researches are needed in regards to knowledge and attitudes toward contraception use. The knowledge level in many countries of the world is high among both men and women, but the use of contraception is still low. In the future, qualitative research is needed for the reasons behind non-use contraception. Determination of attitudes and fears affecting contraception use could be a huge driver for increasing the prevalence.

## **Conflict of interest**

There is no conflict of interest regarding the publication between authors.

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# **Pregnant and Out of Options: The Quest for Abortion in Latin America Due to the Zika Virus Pandemic**

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Additional information is available at the end of the chapter

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## **Abstract**

Latin America has some of the strictest abortion rules in the world, where the procedure is criminal in cases of rape, incest, or even to save the life of the mother. More than 97% of women in Latin America and the Caribbean live in countries where access to abortion is either restricted or banned altogether. As a result, unsafe abortion is widespread and causes 10% of all maternal deaths in the region. With the onset of the Zika virus pandemic in 2015, and the identification of the virus as causing poor pregnancy outcomes including fetal infection, microcephaly, and other malformations, there became an increased demand for abortions in Latin American countries. The response of many Latin American governments to Zika infection during pregnancy was to recommend that women avoid or postpone their pregnancies. These recommendations were not possible for many women at risk in the affected countries, especially those who were uneducated or living in poverty. As a result of the Zika pandemic, there has been an increased demand for abortion in many of the affected countries that, because of the clandestine and illegal nature of the procedure, carries the heightened risk for additional maternal morbidity and mortality.

**Keywords:** Zika virus, congenital Zika syndrome, unsafe abortion, unmet need, family planning, pregnancy, illegal abortion, microcephaly, Latin America, Central America, South America, abortion, human rights, reproductive rights, reproductive health, viral infection, public health, contraception

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## **1. Introduction**

The accessibility and utilization of family planning methods in Central and South America have historically been limited by several factors, including availability, affordability, and education, especially when comparing indigenous with nonindigenous women, the poor

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and the wealthy, and rural and urban dwellers. Throughout Latin America, multiple studies have demonstrated a variety of ethnic, financial, and social risk factors for unintended and unwanted pregnancies, unmet need for family planning, and unsafe abortion. These include widespread poverty, lower education levels, high fertility rates, early age at first intercourse, adolescent and teen pregnancy, rural areas of residence, cultural and language barriers in health-care facilities which are especially prevalent among indigenous women, sexual violence, and insubordination [1, 2]. Because the predominant religion in these countries is Roman Catholicism, religious doctrine has significantly impacted the use of family planning methods. In particular, abortion is unlawful in almost all Latin American countries, except under certain circumstances that are determined by national laws. Because of widespread unmet need for contraception, poverty, stigmatization, and unacceptably large numbers of adolescent and teenage pregnancies, women have historically sought to terminate unwanted pregnancies by means of unlawful abortion in these countries. With the advent of the Zika virus pandemic in 2015 and its spread throughout Latin America, this situation has increased. With the recognition that girls and women who become infected with the Zika virus while pregnant are at risk for developing such poor obstetrical outcomes as spontaneous abortion, stillbirth, infants with microcephaly, and other forms of fetal malformation, even if they exhibit no symptoms during gestation, the demand for abortion has increased. More than 97% of women in Latin America and the Caribbean live in countries where access to abortion is either restricted or banned altogether. In six Latin American countries, abortion is not permitted for any reason, including rape or to save the life of the mother [3]. As a result, they must often seek terminating their pregnancies through less-than-legal means, including performance of abortions in an environment lacking even minimal medical and sanitary standards and often performed clandestinely by persons lacking the necessary medical skills. The potential health consequences of unsafe abortion to the mother are well known [4]—just prior to the advent of the Zika pandemic in 2014, a minimum of 10% of all maternal deaths in Latin American and Caribbean countries, representing almost 900 girls and women, resulted from complications of unsafe abortions [5]. About 760,000 women in the region are treated annually for complications from unsafe abortion [3]. The ongoing public health problem of unsafe abortion was to be unexpectedly exacerbated when a newly emergent virus, the Zika virus, began to spread through South America in 2015 [6]. As it became known that the virus was responsible for the occurrence of microcephaly and other fetal malformations, it left those women at risk in endemic areas without a viable alternative to carrying a potentially infected fetus through to delivery. As a result, there has been an increased demand for abortion, even though it is illegal in most Latin American countries and, in some cases, can result in the incarceration of both the mother and abortionist, nurse, or physician. Penalties can be extreme—up to 10 years in prison for mothers having abortions in Paraguay and Honduras. In El Salvador, several single mothers have been imprisoned for having miscarriages during their pregnancy; women convicted of having an abortion face imprisonment of up to 50 years [7].

This chapter discusses the legal, medical, and social issues surrounding the dilemma among the predominantly poor women of Latin America who are impacted by the emergence of the Zika virus pandemic, its effect on the unborn fetus, and their fears of having a malformed infant.

## 2. Legal status of abortion in Latin America

The countries which compose Central and South America have the most restrictive and harsh penalties for performance of an abortion of any region in the world (**Figure 1**). In four Latin American countries—Suriname, El Salvador, Honduras, and Nicaragua—abortion is not permitted legally for any reason whatsoever, including in cases of rape, incest, or to save the life of the mother [3, 8–10].

Chile had been included in the list of countries that completely prohibit abortion, with penalties of up to 5 years in prison, until the government lifted the ban in 2017 [11, 12]. In Guyana, abortion is legal in the first 8 weeks of pregnancy, after which it can only be legally performed when it endangers the health of the mother or fetus. The legality of abortion in Mexico is determined by each individual state—in Mexico City, abortion was decriminalized in 2007 only if performed during the first 12 weeks of gestation; however, the rest of Mexico has much stricter regulations [13]. Two countries in Central and South America permit legal abortion



**Figure 1.** The status of abortion law in Latin America, United Nations 2013 report. In some cases, this map may not accurately depict the content of this article. ■ Legal on request; ■ restricted to cases of maternal life, mental health, health, rape, fetal defects, and/or socioeconomic factors; ■ restricted to cases of maternal life, mental health, health, rape, and/or fetal defects; ■ restricted to cases of maternal life, mental health, health, and/or rape; ■ restricted to cases of maternal life, mental health, and/or health; ■ restricted to cases of maternal life; ■ illegal with no exceptions. After Wikipedia, Abortion Law. Available from: [https://en.wikipedia.org/wiki/Abortion\\_law](https://en.wikipedia.org/wiki/Abortion_law).

REGION	NUMBER OF ABORTIONS (MILLIONS)		ABORTION RATE		PERCENT PREGNANCIES ENDING IN AN ABORTION
	1990-1994	2010-2014	1990-1994	2010-2014	2010-2014
CENTRAL AMERICA	0.8	1.3	27	33	24
SOUTH AMERICA	3.1	4.6	43	48	34

**Figure 2.** Number of abortions performed in Latin America prior to the Zika epidemic, 1990–1994 and 2010–2014 [3].

only in those cases to save the life of the mother—Paraguay and Guatemala [14, 15]. Brazil permits abortion to save the life of the mother, as well as in cases of rape and anencephaly [16]. In Panama, abortion can also be performed in cases of rape as well as fetal impairment or with parental authorization [17]. Five Latin American countries permit abortion to save a mother’s life and preserve physical health—Argentina, Bolivia, Costa Rica, Ecuador, and Peru [3, 18, 19]). In addition to the aforementioned reasons, both Belize and Colombia permit abortion to preserve the mental health of the woman [20, 21]. Only one country in Latin America permits legal abortion—Colombia passed the legislation in 2012, and elective pregnancy termination in that country is now widely available [22].

However, criminalizing abortion in Latin American countries does not prevent abortion—similar to other regions of the world, unsafe abortions occur most frequently as a result of harsh regulations governing the access of girls and women to legal and safe termination of pregnancy [4].

During the period extending from 2010 to 2014 (and prior to the Zika virus outbreak), an estimated 6.5 million induced abortions occurred each year in Latin America and the Caribbean, up from 4.4 million during 1990–1994. As can be seen in **Figure 2**, the greatest number occurred in South America, where there were 4.6 million performed annually in 2010–2014. The annual rate of abortion was estimated at 44 procedures per 1000 women of reproductive age (15–44 years old). The Latin American abortion rate is approximately 48 for married women and 29 for unmarried women. Even prior to the introduction of Zika virus in this region, the proportion of pregnancies ending in abortion had increased between 1990–1994 and 2010–2014, from 23 to 32% [3].

### 3. Who performs illegal abortions in Latin America?

In Latin American countries, all but one of which do not legally permit abortion on request, women will often seek the services of untrained or inadequately trained persons in dangerous and unsterile conditions or attempt to self-induce an abortion. Because of such circumstances, abortion mortality rates are up to 100 times higher in Latin America than in industrialized nations. For reasons that are obvious, there are scant published data available on who actually perform illegal abortions in Latin American countries. It must be remembered that not all illegal abortions are unsafe and not all unsafe abortions are illegal. Illegal abortions can be divided into those that are (1) performed clandestinely by medically qualified physicians in their medical offices or clinics; (2) performed by an individual, sometimes a physician but often by an abortionist who is medically unqualified, in an environment lacking the minimum medical standards, often termed “back alley,” “back street,” or “back yard” abortions; and (3)

a self-administered abortion by the pregnant woman. Of these, the latter two are considered unsafe abortions and are probably responsible for the large majority of fatalities and medical complications arising from illegal abortion procedures.

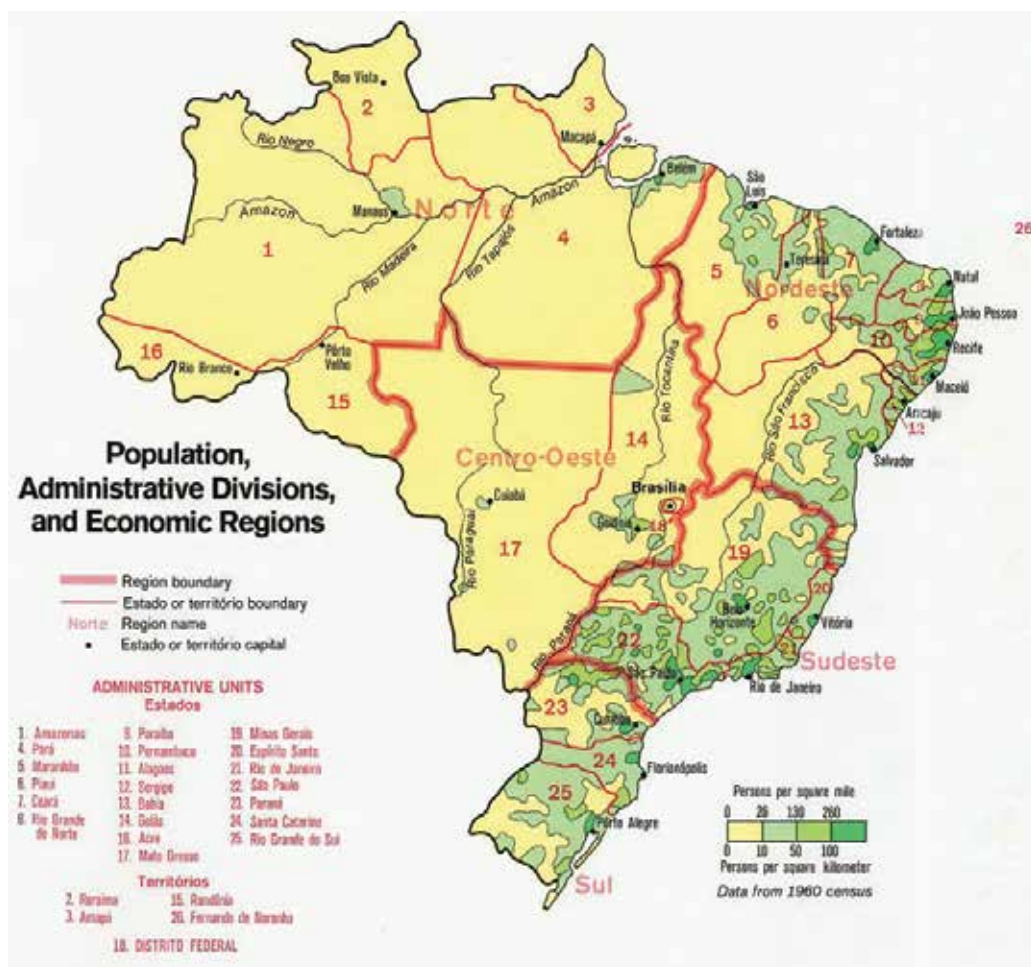
In many Central and South American countries, a large part of the population has indigenous ancestry—this is especially true for Mexico, Honduras, Guatemala, Brazil, Peru, Ecuador, Bolivia, Colombia, and Chile. Unfortunately, indigenous women frequently reside in poor, rural, and medically underserved areas and have little access to modern medical care and family planning education and interventions. As a result, indigenous women in Latin America are more likely to have high rates of adolescent and teen fertility and unintended or unwanted pregnancies and are disproportionately affected by adverse reproductive and sexual health outcomes [23]. It is not surprising that unsafe induced abortion is practiced among indigenous women, where it contributes to the high rate of maternal morbidity and mortality among these populations. It has been estimated that 18% of maternal mortality in Ecuador, 16% in Peru, and 28% in Colombia resulted from complications due to unsafe abortion [24]. In Guatemala, where 40% of women are indigenous and abortion is illegal except to save the life of the mother, the annual abortion rate is 24 per 1000 women of reproductive age, with 22,000 women treated in 2003 for abortion complications [25]. In Mexico, indigenous women are five times more likely to abort unsafely than are nonindigenous women [26]. These figures are probably significant underestimates of the true prevalence of unsafe abortion and burden of abortion-associated complications among indigenous women, a result of underreporting bias and challenges to data collection. Because of harsh penalties to the woman and their abortion provider, demographic research is hampered by the illegality of abortion throughout most of Latin America, together with issues relating to stigmatization, social, religious, and political constraints. This sampling bias is significant, as it often does not include those girls/women who successfully complete an unsafe abortion, cannot seek medical care or hospitalization because of geographic and financial barriers, or decline to seek medical care for fear of legal or social repercussions [27].

Because many indigenous communities where unsafe abortions are practiced are in rural or isolated areas that are not routinely serviced by a physician or nurse, the procedures are typically performed either by the pregnant woman herself or with the aid of another indigenous woman who has some experience in terminating pregnancies. In a study of elective abortion performed among women in Guatemala, 49–63% of indigenous women had obtained their abortions from traditional birth attendants (TBAs), and less than 15% had been attended by trained professionals (compared to two-thirds of higher socioeconomic class women in urban centers) [25]. Self-induced abortion appears to be more common among those women residing in rural areas—abortion services are unavailable or limited because of the geographic isolation. In a study across 20 cities in Peru, Bernabé-Ortiz and colleagues [28] found that the prevalence of induced abortion in the jungle regions was nearly twice as high as that in the coastal and highland regions.

#### **4. The Zika virus pandemic and pregnancy**

In 2015 the already desperate situation that pregnant girls and women in Latin American countries found themselves in when seeking to terminate a pregnancy was made worse by the introduction of a new emerging viral agent into Brazil, the Zika virus. This virus, previously identified only from Africa and Oceania, was new to the Western Hemisphere [29].

The initial recognition that a public health problem was occurring occurred on March 2, 2015, when the Brazilian authorities reported to the World Health Organization (WHO) that a large number of cases of an illness characterized by skin rash had been occurring in its northeastern states. The illness was initially identified from persons in Pernambuco in December 2014, after which there were more reports from Rio Grande do Norte, Maranhão, and Bahia in February and March 2015 (**Figure 3**). From February to April 2015, there were almost 7000 additional cases of illness characterized by skin rash reported from these states, but as Zika virus was not suspected, no tests were conducted for it. On April 29, 2015, the Bahia State Laboratory in Brazil reported to WHO that the Zika virus had been found in patient’s samples, which was subsequently confirmed by polymerase chain reaction (PCR) testing at Brazil’s National Reference Laboratory on May 7th. The same day, WHO and Pan American Health Organization (PAHO) issued an epidemiological alert that Zika virus



**Figure 3.** Map of Brazil. Zika virus infections and fetuses with microcephaly were first identified in Northeastern Brazil from the state of Pernambuco (10 on the map). Public Domain, <https://commons.wikimedia.org/w/index.php?curid=1665180>.

infections were occurring in Brazil and, for the first time, in the Western Hemisphere. By July 2015, Brazil reported the association of Zika infection with neurological disease in adults—these included 49 cases of confirmed Guillain-Barré syndrome (GBS). In October 2015, Colombia announced that PCR-confirmed cases of Zika infection had been identified in that country as well.

It was on October 30, 2015, that the Brazilian authorities first reported an unexplained increase in the number of newborns with microcephaly. Soon after that announcement, a national public health emergency was declared as the number of suspected microcephaly cases continued to increase. Brazil announced on November 11th that there were 140 cases of newborns with suspected congenital microcephaly occurring in Pernambuco State alone and made world headlines by declaring a national public health emergency. The number of Brazilian infants with microcephaly suspected as being associated with Zika virus infections reached over 700 cases by mid-November 2015, and the virus was found in the amniotic fluid of two pregnant women. In response, both WHO and PAHO issued an epidemiological alert and requested that PAHO member states report increases of congenital microcephaly and other central nervous system malformations. On November 28, 2015, Brazil reported that Zika virus genomic material had been isolated from both tissue and blood specimens from an infant with congenital abnormalities, including microcephaly—the neonate had expired within minutes following delivery. Following this important report, both PAHO and WHO issued an alert to the association of ZIKV infection with neurological syndromes and congenital malformations in the Americas [6].

## **5. Governments respond to Zika virus, reproductive health, and pregnancy**

On November 17, 2015, the Pan American Health Organization (PAHO) issued an epidemiologic alert regarding Zika virus in Latin America [30]. As the Zika virus spread throughout Latin America in 2016 (**Figure 4**), the response of many Latin American governments to the threat of Zika virus infecting pregnant women, their unborn fetus, and the possible development of microcephaly was to recommend that women avoid or postpone their pregnancies. However, the restrictive abortion regulations that existed in these countries in the pre-Zika era remained intact. In Colombia and El Salvador, for example, women were cautioned by the Health Ministers of both countries to avoid becoming pregnant [31]. These recommendations provided a paradox, as greater than 50% of pregnancies in Colombia are unplanned, and El Salvador has the one of the highest rates of adolescent and teenage pregnancy in the region, with girls between the ages of 10 and 18 years representing approximately one-third of all pregnancies. In addition, sexual violence is prevalent in both countries. When the World Health Organization stated in June 2016 that women living in Latin American countries where Zika virus transmission was endemic should consider delaying becoming pregnant, the announcement affected millions of women living in 46 Latin American and Caribbean countries [32]. Unfortunately, in order to comply with these recommendations, reproductive-age girls and women would need to have access to family planning services and the corresponding education, which for the majority of impoverished women at risk for infection was either





**Figure 4.** Active Zika virus transmission in the Western Hemisphere up to November 2016. Available from: [https://en.wikipedia.org/wiki/2015%E2%80%99316\\_Zika\\_virus\\_epidemic](https://en.wikipedia.org/wiki/2015%E2%80%99316_Zika_virus_epidemic).

incompatible with religious and personal convictions or financially or geographically beyond reach. In addition, facilities in the most Zika-affected regions lack the capacity to respond to the increased demand for family planning [33]. This is due to inadequate infrastructure and delivery systems, insufficient commodities and supplies (including such medications as emergency contraceptives, long-acting reversible contraception, condoms, electric and/or manual and vacuum aspiration (MVA), and mifepristone and misoprostol), as well as a lack of trained personnel to provide quality care to meet the needs of the population. The deficiency in providing adequate contraceptive and safe abortion services, in combination with severely restrictive abortion laws in most countries where Zika was becoming endemic, forced many girls and women to consider, and eventually seek, clandestine and unsafe abortion methods.

## 6. The Zika pandemic has increased demand for abortion

In the United States and other Western countries where abortions are legal, a number of women whose fetuses have shown evidence of congenital abnormalities as a result of Zika virus infection have chosen to undergo elective pregnancy terminations—subsequent evaluation revealed that the fetal brains had been damaged [34].



In Northeastern Brazil, which was both the epicenter for the Zika virus pandemic and had the highest rates of infection and greatest numbers of cases, the mostly impoverished girls and women in the region were frightened by the news of fetal malformations. Although many attempted to delay or avoid pregnancy, they were hampered by a lack of clear information about reproductive health and family planning, or it was difficult to access contraceptive methods. An investigation by the international nongovernmental organization Human Rights Watch found that the public health system in Brazil may not have been providing consistent and comprehensive reproductive health information to the girls and women in Northeastern Brazil [35]. Many told interviewers that during their prenatal appointments, they had not been informed of how to prevent Zika infection during pregnancy or that it could be transmitted sexually and thus were not using condoms even when they were available. As a result, they were resorting to clandestine (and frequently unsafe) methods to terminate their pregnancies. This was no surprise, as the illegality of abortion in Brazil had resulted in almost one-half million abortions in 2015, most of which were clandestine, just prior to the Zika outbreak [35]. Investigators from Human Rights Watch interviewed several women who stated they had witnessed or even experienced complication from unsafe abortions. Some physicians interviewed stated that they had personally treated girls and women who had terminated their pregnancies using caustic acid and other unsafe methods. Women related that, despite fearing that they had been exposed to Zika virus while pregnant, they had difficulty in obtaining the necessary diagnostic tests or ultrasonographic evaluation to determine if their pregnancies had been affected by Zika.

In 2016, Dr. Abigail R.A. Aiken from the University of Texas at Austin and her colleagues wanted to examine the effect that the Zika virus pandemic has had on requests for abortions from the endemic Latin American countries where the procedure was criminal [36]. To accomplish this, they collaborated with Women on Web (WoW)—a nonprofit online abortion help service based in the Netherlands. They offer an Internet-based portal through which women can request abortion medications—mifepristone and misoprostol. WoW has a small team of physicians who review requests from women desiring access to abortion medications outside the formal health-care setting through online telemedicine in countries where safe abortion is not universally available. If there are no medical contraindications identified, the doctor at WoW then authorizes a partner group in India to ship two drugs designed to induce abortion during early pregnancy to the woman's home [37–39]. The organization has offered free abortion medication for pregnant women with Zika virus [40]. Aiken and her colleagues analyzed the WoW data for all abortion requests from January 1, 2010 to March 2, 2016 in 19 Latin American countries affected by the Zika virus pandemic [36]. They compared these data to three countries where Zika was not expected to have an effect: Chile, Poland, and Uruguay. The sample was large—28,670 requests for abortion were analyzed by employing a regression-discontinuity design to determine if requests for abortion increased after the Pan American Health Organization (PAHO) alert, as compared with preannouncement trends. During the final three study weeks, women were asked specifically if they were seeking an abortion because of concern about Zika virus infection. In their response, women did not confirm whether they had received a diagnosis of Zika infection. The results showed that in those countries with autochthonous Zika transmission, legally restricted abortion, and national public advisories to pregnant women, statistically significant increases of from 36 to 108% over baseline occurred for requests for

abortion through WoW after the PAHO announcement [36]. The increased demand for abortion was most pronounced in Brazil (108% increase,  $p < 0.001$ ), Ecuador (107.7% increase,  $p < 0.001$ ), Venezuela (93.3% increase,  $p < 0.001$ ), and Honduras (75.7% increase,  $p < 0.001$ ). Increases in requests for abortion were also statistically found in Colombia (38.7% increase), Costa Rica (36.1% increase), and El Salvador (35.6% increase). In several countries where health advisories were not issued, the requests for abortions had increased but to a lesser degree. An exception to this was in Bolivia, with an approximately 68% increase demand. Abortion requests increased in Nicaragua, Panama, and Paraguay from 21 to 25% and Guatemala by more than 8% [36]. “It seems as though as though women were responding not only to the threat of Zika but to the advisories issued by their governments,” said Dr. Aiken [37].

Messages sent to WoW requesting abortifacients have reflected not only the strong feelings but also the desperation of the women at risk for Zika virus infection in these countries. From Venezuela, a woman wrote “I contracted Zika four days ago. I need an abortion. I love children, but I don’t believe it is wise to keep a baby who will suffer. I don’t know who to turn to – please help me” [41]. From the same country, WoW received this appeal—“We are going through a really serious situation for the economic and humanitarian crisis unleashed by Zika. There are no treatments, contraceptives nor pills to abort. I want to terminate my pregnancy but I cannot” [38]. A woman pleaded from Brazil “I need to do an abortion because of the great risk of infection with Zika here ... Please help me. My economic situation is extremely difficult.” And there is an entreaty from a women in Colombia—“Here Zika is a major problem and the health authorities do not help with it ... I have no resources at this time and want to ask for your help because fear overwhelms me. What if the baby is born sick?” [38].

Amanda Klasing, a senior researcher with Human Rights Watch who specializes on women in Latin America, said “Regardless of the fact that you can go to jail for having an abortion in many of these countries, it’s not surprising that women and girls would turn to clandestine avenues to procure abortions. Imagine how scary it must feel to be a girl or woman who becomes pregnant in a Zika-affected country right now” [39].

## 7. The past predicts the future

In Latin America, the Zika virus pandemic has disproportionately affected women in the reproductive-age group and especially the most vulnerable members of society—those girls and younger women who live in conditions of poverty. It has brought renewed attention to the multifaceted human rights problems that, although predating the onset of the pandemic in 2015, have significantly been worsened by the spread of Zika virus infection. These include ethnic and socioeconomic health disparities, access to reproductive health education, restrictions on sexual and reproductive rights, inadequate access to water and sanitation, and stigmatization and criminalization of women seeking to terminate their pregnancies [35]. Data published in 2016 clearly indicate an increase in demand for abortions following the advent of the Zika epidemic, but because of the clandestine nature of both unsafe and safe abortions, criminalization of pregnancy termination, and the threat of penalties, the actual numbers of abortions occurring as a result of Zika in these countries are likely much greater. The Zika

pandemic has caused several countries to rethink their reproductive health and education policies, including those on the criminalization and restriction of abortion [16, 42].

The situation of Zika virus infection during pregnancy, congenital infection, and malformation syndromes and abortion rights is not without precedent. Rubella is another virus causing congenital infection which, like the Zika virus, is a TORCH agent. TORCH is an acronym for those infectious agents which can cause congenital infections following vertical (mother-to-fetus) transmission—Toxoplasmosis, Other, Rubella, Cytomegalovirus, and Herpes) [29]. Between 1963 and 1965, rubella (also termed German measles) was epidemic in the United States. Similar to the Zika virus, pregnant women who became infected had relatively minor symptoms. However, the virus produced severe birth defects, and when maternal infection occurred during the first trimester, there was a 90% probability of passing the virus to the fetus [43]. The congenital rubella syndrome included microcephaly and brain damage, congenital heart disease, sensorineural deafness, ocular abnormalities, micrognathia, bone alterations, liver and spleen damage, and neurodevelopmental abnormalities. Miscarriage and stillbirth were also caused by the virus [44]. As the number of cases increased in the United States, the fear caused by the threat of having an infant with congenital rubella syndrome was not confined to any one ethnic or socioeconomic group—the virus could affect any nonimmune pregnant woman and her unborn child. During the epidemic there were approximately 20,000 surviving babies born with the congenital rubella syndrome, with many requiring intensive care or the possibility of lifetime institutionalization. During that time, abortion was illegal in the United States, but that did not stop women at risk for seeking terminations of their pregnancies. Approximately 11,250 pregnant women had miscarriages or, despite their illegality, therapeutic abortions during the epidemic. *Williams Obstetrics*, the standard obstetrical textbook at the time, recommended that abortion be performed in those cases of first trimester infection when the parents did not desire to assume responsibility of caring for an infant with congenital infection [45]. The rubella virus epidemic, and the public response to it, helped to facilitate the eventual 1973 US Supreme Court decision (*Roe v Wade*) that made abortion a fundamental right of a woman. Time will tell what effect, if any, that the Zika virus pandemic will have on abortion rights in Latin American countries.

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## **Resources to Access Contraception and Population Policy**

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# Family Planning Services in Africa: The Successes and Challenges

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Alhaji A Aliyu

Additional information is available at the end of the chapter

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## Abstract

The world population is on the increase, and the majority of this increase will be from sub-Saharan Africa (SSA). It is estimated that by 2030 the population of Africa will rise to 1.3 billion. Published peer-reviewed journals, abstracts, Gray literature (government documents, technical reports, other reports, etc.), internet articles and Demographic and Health Surveys (DHS) reports were used as resource materials. Manual search of reference list of selected articles was checked for further relevant studies. Family planning (FP) programmes that started in 1960s across SSA have made steady progress with contraceptive prevalence rates still very low and unacceptably high unmet need. Despite near universal knowledge on contraceptives, there is an obvious knowledge-practice gap. There are barriers, personal, religious and community levels, to contraceptive use. Contraceptives have a lot of benefits to the mother, child and community. Thus, there is a need for publicity campaigns through information, education and communication (IEC) to address social and cultural barriers to FP including misconceptions and misinformation. Contraception should be vigorously promoted in SSA not only for its demographic dividends but also on socio-economic and health grounds and the attainment of sustainable development goals (SDGs).

**Keywords:** contraceptive use, benefits, barriers, unmet need, SSA

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## 1. Introduction

The world population reached 7.4 billion in 2016 at an annual growth rate of 2.55% with Africa accounting for 1203 million. It is estimated that between 2015 and 2030 the population in Africa will reach 1.3 billion [1]. Sub-Saharan Africa (SSA) (excluding North Africa) has seen remarkable population growth in the past three to four decades. SSA population in 1990 was 510 million, 688 million in 2002 and by 2016 has reached 974 million [2]. By 2050, three countries (Nigeria, 4th, Democratic

Republic of the Congo, 8th and Egypt, 10th) with a combined population of 779 million will be the most populous nations in Africa [1]. Sub-Saharan Africa (SSA) has 11% of the world population but accounts for a pitiable 2% of global trade [3]. The population growth is largely driven by high fertility rate and rising cohort of women of reproductive age group (WRAG) (15–49 years).

Demographically, there is population momentum across most of the countries, as more than half of the population are under the age of 15 years. What this means is that even if replacement-level fertility is achieved, the population growth will continue for at least two decades because of the momentum built up in the age structure due to the past high fertility levels that has given rise to the greater number of couples who are having children. Social forces and pronatalist factors sustaining high fertility and which also impedes family planning (FP) programmes are well known [4, 5]. Added to this is the fact that in SSA husbands tend to want large families than their wives [6, 7]. Sub-Saharan African countries are still undergoing both demographic and epidemiologic traditions. Even though birth rate is declining, it is still in excess of death rates. Thus, the region has the highest rates of fertility globally with total fertility rates (TFR) that ranged from 4.8 children per woman in Kenya, 5.2 in Nigeria, 5.7 in South Sudan, and 7.6 in the Republic of Niger [1, 4, 8, 9]. It also has a high annual growth rate of more than 2.5% per year.

Again, the same continent is vulnerable to the “destructive forces” caused by nature as recent events have shown. The harsh adverse effects of global warming in the Sahel region, draught/famine in the horn of Africa, deforestation, overgrazing with declines in soil fertility and incessant floods in West Africa has contributed in sustaining the vicious cycle of poverty and disease. As the number increases, the pressure on the environment (both built and natural) including natural resources and available fertile land for agriculture increases. Consequently, the net effect is increased in greenhouse gases (GHGs) with its attendant effects on public health.

Before 1970, majority of Africa countries had not viewed population growth as a major factor in their national development strategies because of their small population (34 of the 48 countries had a total population of less than 5 million) [8]. By the mid-1970s, the trend started to change with the rising number of national governments that reported having population policies aimed at reducing the rapid growth of their respective populations: 25% in 1976, 39% in 1986, 60% in 1996 and 64% in 2009 [9]. Previously, pronatalist governments that wanted to maintain or even increase population growth have gradually modified their stance and accepted provision of FP services as integral part of maternal and child health (MCH) which is a key component of primary health-care (PHC) system. Also, government policies regarding access to and availability of modern contraceptives have been an important determinant of reproductive behavior as well as maternal and child health. Many governments have given direct support providing FP services through state-owned health facilities. The provision of FP services is a key component of Safe Motherhood Initiative launched in 1987 in Nairobi, Kenya, to reduce maternal mortality in developing countries, where 99% of all maternal deaths occur [10]. In African region women have 1 in 42 lifetime risk (compared to 1 in 2900 in Europe) of dying prematurely in childbirth [11]. Provision of universal access to high-quality family planning and maternal health services and skilled attendance at delivery are key action strategies under the safe motherhood initiative [12]. Contraceptive use averts about 230 million births every year globally, and family planning (FP) is a primary strategy for prevention of unwanted pregnancy [13].

Contraception refers to the prevention of pregnancy as a consequence of sexual intercourse using either traditional or modern methods. The 1994 International Conference on Population and Development (ICPD) in Cairo was a paradigm shift and was seen as a turning point with respect to the role of FP. The earlier population conferences, Bucharest 1974 and Mexico City in 1984 mainly focused on demographic-economic issues. However, the Cairo Conference highlighted the important role FP plays in the context of social and economic development and goals regarding sexual and reproductive health and right including FP with a focus on women's empowerment [14, 15]. The universal access to FP that links the 1994 Cairo Conference to Millennium Development Goal 5b (MDG 5b) of universal access to reproductive health is very much connected to the successful achievement of sustainable development goal (SDG) themes of people, planet, prosperity, peace and partnership [16]. Voluntary FP brings transformational benefits to women, families, communities and nations. Without universal access to FP and reproductive health, the impact and effectiveness of offering interventions will be less, will cost more and will take longer to achieve [16].

The demand for FP will never cease as long as life continues to exist on earth, and humans want to satisfy their physiological desires and need for procreation (generational species sustainability). At any point in time, there will always be a cohort of young adult couples who not only want to fulfill their sexual desires but also want to delay or postpone pregnancy, and so the demand for contraception will continue.

In SSA, health-care systems are weak and dysfunctional; despite this, there have been some remarkable gains in immunization services with resultant decline in death rates among under-fives. Yet, fertility has remained high. Added to this dimension is the unprecedented rapid urbanization that is sweeping across the continent. There is still a long way to go to achieve small or desired family size. In the whole region, only 17% of married women are using contraceptives, very much lower than the 50% reported from North Africa. Only in five countries (South Africa, Botswana, Zimbabwe, Kenya and Malawi) have FP programmes been a success to increase contraceptive use to higher levels [3]. This chapter is based on FP services in Africa. Published peer-reviewed journals, abstracts, Gray literature (government documents, technical reports, other reports, etc.), Internet articles and Demographic and Health Surveys (DHS) reports were used as resource materials. Manual search of reference list of selected articles was checked for further relevant studies.

## 2. Benefits

The period 1970–1990 marked the golden era of family planning during which reproductive revolution occurred worldwide except in SSA. However, by the early 1990s, changes had begun to occur leading some experts to suggest that population and FP programmes started in the late 1960s in developing countries constituted one of the most important public health success stories of the twentieth century [14]. Benefits of FP were known ever since Beard in 1897 observed that ovarian follicles do not develop during pregnancy and that corpus luteum was responsible [17]. There are a variety of health benefits that are associated with the use of individual FP commodities; for instance, pills, injectable and implants have been associated with protection against uterine and ovarian cancers, benign cysts of the breast or ovaries and pelvic inflammatory diseases (PIDs). Pills can also reduce menstrual flow and dysmenorrhea and decreased prevalence of iron deficiency anaemia.

Family planning is a cost-effective public health and development intervention. Generally, planned pregnancies which are safer for the mother produce healthier children than unplanned pregnancy. FP allows individuals and couples to at least plan one aspect of their lives (reproductive life). The cost of averting unwanted birth is quite insignificant compared to the costs to the family and country of unwanted births [9]. Further, fewer public health interventions are as effective as FP programmes in reducing morbidity and mortality of mothers and infants and result in such a huge positive impacts [9, 18, 19].

The health and socio-economic benefits of healthy motherhood including the use of contraception are known. Contraceptive use promotes small family size, improves child survival and reduces sibling competition for scarce family and maternal resources [20, 21]. When used correctly and consistently, contraceptive use in developing countries have been shown to decrease the number of maternal deaths and also prevent more than half of all maternal deaths if full demand of birth control is met [12, 22]. Spacing children can reduce mortality among under-fives by 10% and among pregnant mothers by 32% [23–26].

At macro-level, national population growth is slower which reduces strains on the environment, natural resources, education and health-care systems. FP reduces the risk of maternal mortality per birth (i.e. number of maternal deaths in 100,000 live births per year) [27] as a result of pregnancies too early, too many, too close and too late (4Ts of maternal mortality) [28–30] all of which are prevalent in SSA. The effective use of contraception can help couples achieve the desired number of children they want, prevent the number of unwanted pregnancies and reduce the risks of sexually transmitted infections (STIs) and thus overall improvement in maternal and child health and the nation.

Contraceptive use allows couples to realize their full potentials, and the woman can better fulfill her roles as a wife, mother, wage earner and community member. The man can better expand his roles as husband, father and family caregiver [30]. All these go a long way in curtailing population explosion, reduce dependency ratio (youth), better the health indices for the country and improve socio-economic conditions. This will also assist Africa to make progress in achieving all the sustainable development goals (SDGs).

### **3. Family planning services**

The decision to limit one's family size is wholly personal intimate decision between husband and wife. The practice to limit family size by whatever means has been known since man developed social conscience. In SSA, national family planning programmes were introduced, respectively, in the late 1960s in Kenya and Nigeria [31], in the early 1970s in Ghana and in the mid-1970s in South Africa [32]. Programmes to promote FP in developing countries began in the 1960s in response to improvements in child survival that led to increase in population growth. The number of developing countries with official policies to support FP rose from only 2 in 1960 to 74 by 1975 and 115 by 1996 [30]. Before the 1960s, African countries had no population policies in whatever form; by the mid-1970s, only 25% had; and this rose to 64% in 2009 [9]. Family planning programmes throughout SSA have made use of three approaches to service delivery:

1. Health-care facilities
2. Commercial outlets
3. Community-based systems

Family planning services and contraceptive commodity supply were started through assistance by the US Agency for International Development (USAID) and other international donors to national governments across Africa. Later on, non-governmental organizations (NGOs) came in to supply and/or donate FP commodities. Initially, the services were provided at health-care facilities in state, district and provincial capitals. During these “infantile” periods, access to family planning methods was under strict control of medical practitioner even in health facilities. During the period clients have to pay a token to access service which also was a huge barrier to many potential users. Firstly, the woman has to meet the eligibility criteria [33], they must be married and husband must give verbal (seen by the doctor) or written consent and be seen by the doctor as soon as she starts her menses. This was a good starting point for FP services delivery, but the burden and disadvantages of this “solo” practice became obviously inconvenient to the clients, long waiting time and other logistics. There was an urgent need to overhaul the system in order to improve access and service utilization. The World Health Organization (WHO) has published international guidelines on medical eligibility criteria that have proven to be invaluable [34].

Studies have shown that if given an adequate training, paramedical staff (nurses and midwives) could insert intrauterine devices (IUDs) and provide injectable contraceptives to high clinical standards and even lay staff, after a short training, could also dispense pills, and over-the-counter sale of pills without prescription was justifiable [9, 35–37]. Facility-based service provision is highly restrictive in terms of geographic access; this means that alternative approaches are in dire need in order to make the commodities easily accessible. However, studies have shown that the use of FP methods falls only modestly with increasing distance or travel time to the nearest source of contraception [38]. But in SSA where poverty index is high, physical accessibility becomes predictable and risky especially during raining season, and transport is available only once or twice (during market days) in a week; these are the real challenges to contraceptive use.

The provision of services through government facilities follows the PHC approach: all the three tiers (primary, secondary and tertiary) of health-care systems. The incorporation of contraceptive services into PHC facilities is an approach to boost contraceptive prevalence rates especially in SSA [39] where this has remained persistently low. In order to improve service availability and increase coverage, private health facilities later got involved. This involvement varies widely across the continent, being 40% in Kenya and more than 50% in Uganda but low (<20%) in areas where national government programmes are strong such as Namibia and South Africa. However, majority of these private facilities are Urban-based and thus serve the needs of urban elites.

Commercial outlets such as pharmacies, drug retail shops and patent medicine or street vendors and bazaars also constitute major significant outlets in which contraceptives (e.g. pills, condoms) can be obtained. Social marketing schemes run by NGOs or international organization are popular where advertising, logistics and product prices are highly subsidized in order to promote utilization. It is most effective when pills, condoms or both are fairly common methods; demand for contraception is well established coupled with a well-developed

infrastructure (radio and television) and no restriction on promotion of FP methods [9]. In a world that is becoming globalized with rapid urbanization developing across Africa and intense exposure to mass media both formal and informal (WhatsApp, Facebook etc) the role of social marketing of contraceptives will likely rise with time.

### 3.1. Community-based distribution (CBD) of contraceptives

Community-based distribution (CBD) of contraceptives can be used to supplement other government and private family planning services to meet the challenges of making the commodity widely available and accessible to those in urban slums, rural areas and hard-to-reach communities. CBD can be an important addendum or alternative to clinic-based services. Usually, it is cheap, easier for many people to reach and available in a wide range of settings. It is a complex concept involving varied operational design to suit local contexts. It is a programme involving non-clinical family planning service approaches that uses community organization, structure and institutions to promote the use of safe and simple contraceptive technologies [40]. It expands acceptability and convenience of contraceptives and resolves the cost of service, thereby extending its use among clientele who seek contraceptives but will not use services that are confined to clinical settings [40, 41].

CBD is thus a good example of the WHO's commitment of PHC by making essential health care available to individuals and families in the community in an acceptable and affordable way with their full participation [42]. CBD is also compatible with the trend in many countries towards the decentralization of health services and the involvement of community in the provision and support of its own health services.

The following factors are used to identify populations in need of CBD programme, all of which are applicable to SSA:

- Low prevalence of contraceptive use
- Lack of awareness of family planning
- Low usage of existing family planning services
- Are far away from family planning clinics
- Cultural barriers that impede attendance at clinics [42]

For a successful implementation, the agency (government, NGOs or international donors) usually worked with its own staff and the communities to identify local leaders and influential community members (gatekeepers). Regular meetings are held in the community centers, and assistance is sought to identify local volunteers (women and men) who will act as distributors of contraceptive methods.

CBD programmes originated in Asia in the 1960s and spread throughout Asia and Latin America in the 1970s and 1980s. It was introduced into sub-Saharan Africa in the late 1980s and 1990s; by 1996 more than half of the population of SSA lived in countries with some kind of CBD programme [41, 43]. At inception CBD programmes were integrated into existing health-care services with health-care providers involved in delivering FP services. But with time, community needs exceeded the abilities of national governments' health programmes [44]. So, lay health workers became a good asset to drive CBD programmes, and selected community members were trained



to provide FP services [45, 46]. CBD programmes are implemented through various approaches. These include home visits, group education meetings, fixed and mobile CBD posts, etc., while a variety of services are offered—contraceptive commodity distribution, health education and referrals for clinic-based services.

According to the WHO [42], different kinds of people can be recruited to work as distributors in CBD programmes across the world (**Table 1**).

Advantages of CBD programmes:

- Easy access to contraceptives by rural folk
- Receiving services in one's own environment
- Convenience for clients (in terms of time spent traveling and consultation)
- Minimal transport costs

In sub-Saharan Africa, Zimbabwe was the first country to initiate CBD programme. On the other hand, Kenya has the greatest diversity in CBD programmes and activities globally. In the 1980s, CBD initiatives proliferated with the encouragement and support of the National Council for Population and Development and financial assistance from Kenyan USAID. Kenya in a sense thus represents a laboratory of CBD diversity in that nearly every type of CBD approach that has been tried elsewhere is present in some way in Kenyan setting [41, 47, 48]. The CBD programme in Tanzania started in 1988, when the International Planned Parenthood Federation (IPPF) launched a programme. By 1996, CBD programmes were fully functionally in 22 of the 104 districts in Tanzania and Zanzibar [43]. In Ghana, CBD programmes started with two experiments: the Danfa Project and Navrongo Community Health and Family Planning Project. The Navrongo Project started in the 1990s to address community explanations for failure of family planning outreach schemes [48]. The Navrongo Health Research Centre (NHRC) is part of a district-wide National Demographic Surveillance System. Mali had its most CBD project in 1986 in the rural district of Katibougou, and by the

- 
- Market traders
  - Traditional birth attendants
  - Community health workers
  - Shopkeepers
  - Factory workers
  - Hairdressers and barbers
  - Traditional healers
  - Taxi drivers
  - Mothers
  - Farmers
  - Agricultural extension workers
  - Waiters and waitresses
- 

**Table 1.** Examples of possible distributors for contraceptive commodities.

early 1990s, the second project was funded by USAID to expand FP service delivery in nine rural districts in two regions using village-level family planning promoters [45, 49].

Nigeria has had some form of CBD programmes since the 1990s; but in 2007, the country reviewed the results of pilot programme in the use of Community Health Extension Workers (CHEWS). CHEWS are the lowest cadre of trained medical personnel, who had at least 2–3 years of training in basic curative and preventive health services. The country also undertook a study tour to Uganda in 2008 to assess its community-based distribution of injectable contraceptives. By 2012, the National Council on Health approved the recommendation that allows CHEWS to provide injectable contraceptives across the country.

Thus, it can be said that CBD programmes has expanded in SSA over the past 20 years. A review of 93 developing countries in 1984 revealed that CBD programmes were functioning in 34 countries across the world with 7 programmes operating in SSA [40]. Between the 1980s and 1990s, the programme has expanded considerably. Countries with coverage <21% were designed as weak effort, while those with  $\geq 21\%$  coverage in all areas are strong [40]. Even though coverage within countries is variable and actual rates of exposure to CBD activities are unknown, more than half of populations of SSA lived in countries where CBD activity is operating by 1996 (**Figure 1**). So, it can be said that CBD programmes are well grounded in Africa, and considerable experience has



**Figure 1.** Sub-Saharan countries with CBD programmes, pilot projects or research (1994–1998) [40].

accommodated over the years despite initial challenges. Family planning service has also been well integrated into other reproductive health services. It is important to note that contraceptive use relies on the principle of demand and supply. Generating demand is critical in the uptake of contraceptives, but this will not happen if supply system cannot guaranty consistent availability of acceptable and affordable commodities.

### **3.2. Family planning methods: Natural and modern**

Pregnancies too early, too frequent, too many and too late are always associated with adverse outcomes [27, 29]. The health of mothers and that of her baby are inextricably bound, and the survival and wellbeing of even the older children are also compromised by their mother's death. To avoid these adverse outcomes, medical guidelines recommend the uptake of family planning method by 6 weeks postpartum [50]. Contraceptive methods are by definition, preventive methods to assist women avoid unwanted pregnancies. The last few decades have witnessed a contraceptive revolution, and advances in medical science have shown us how to interfere with physiology of reproduction-ovulation cycle.

The methods can be categorized into:

- a. Natural
- b. Modern (temporary and permanent)

The production of an "ideal contraceptive" has continued to be elusive (contraceptive that is safe, inexpensive, acceptable, effective, reversible and long-lasting enough to obviate frequent administration which requires little or no medical attention) [51]. It is also difficult to assume that "one jacket" fits all, as a method that may be suitable to an individual may be unsuitable to another for a number of reasons—medical eligibility [34], religious beliefs and socio-economic situations. The current approach in family planning programmes is to provide a "cafeteria choice" where couples or individuals are offered all the available methods for which a choice can be made based on the need. Each method is unique in its mode of action, effectiveness, advantages and disadvantages.

#### *3.2.1. Traditional (natural) family planning methods*

In every human society, there are traditions that are passed down from generation to generation through the teaching of certain beliefs, cultural norms, attitudes, customs and habits. These traditional beliefs and practices cover all aspects of life including reproduction. Throughout human history, traditional family planning practices to space children have been rich and varied [52]. Traditional methods of contraception are those methods which do not involve the use of orthodox medicine. Some of these methods have existed dating back to prehistoric times. Today, traditional family planning is practiced worldwide for a number of reasons: being natural does not involve a third party (health-care provider) and does not fall under any religious ban [53].

Natural family planning (fertility awareness) is a method of family planning and preventing or spacing pregnancy by observing naturally (physiological) occurring signs and symptoms of the menstrual cycle. The couples avoid intercourse in the days (fertile period) during the

menstrual cycle when the woman is most likely to become pregnant. Fertility awareness is based on a scientific knowledge of the female and male reproductive systems and on the understanding of the signs and symptoms that occur physiologically in women's menstrual cycle to indicate when she is fertile or infertile. This is often referred to as safe period.

Natural family planning provides women with alternatives for those who do not wish to use modern (artificial) methods. In low-income countries, women tend to adopt postpartum family planning methods only after resumption of sexual intercourse or menses [54–56]. In sub-Saharan Africa, both events can be delayed as typically women practice prolonged breastfeeding (up to 2 years) which lengthens their period of amenorrhea, and in Middle and West Africa, women abstain from sexual intercourse for extended periods of time after a birth [57]. Indeed, many African cultures discourage sex during breast-feeding because of misconception that semen pollutes the breast milk. However, recent report has shown that the mean duration of postpartum insusceptibility to pregnancy (combined period of amenorrhea and abstinence) is between 15 and 20 months in most SSA countries [58, 59]. The safety of these methods despite their use cannot be guaranteed. For instance, withdrawal method (*coitus interruptus*), one of the oldest methods of fertility control, the slightest mistake in timing of withdrawal may result in deposition of some amount of semen. Thus, the failure rate may be as high as 25% [51]. Many women erroneously believed that they were protected completely when amenorrhoeic. At the population level, amenorrhoea is related to low risk of pregnancy; the absence of menses does not guarantee protection from pregnancy for individual women (except during the time frame of lactational amenorrhoea). Despite these problems, till date they continue to be used alongside modern contraceptives as evidenced by Demographic and Health Surveys (DHS) conducted across Africa.

**Table 2** shows the percentage of women who use modern and traditional methods of contraception in 1992 and most recent DHS reports of some selected countries in SSA.

Country	1			2		
	Any method	Traditional method	Modern method	Any method	Traditional method	Modern method
Burkina Faso	10	6	4	15	1.0	15
Ghana	20	10	10	23	5.0	22
Kenya	33	6	27	58	4.8	53.2
Malawi	13	6	7	59	1	58
Niger	4	2	2	14	2	12
Nigeria	6	3	4	15.1	5.4	9.8
Senegal	7	3	5	25.1	2.1	23.1
Tanzania	18	5	13	38	6	32
Uganda	15	4	9	39	4	35
Zambia	26	12	14	49	4.3	44.8
Zimbabwe	48	6	42	67	1	66

(1) Robey et al.; (2) data from recent DHS of various countries.

**Table 2.** Family planning methods currently used (percentages) by married women (15–49 years) [60, 61].

## 4. Hormonal contraceptives

Since the 1960s when oral contraceptives (OCs) were first marketed, they have symbolized modern contraception and have remained the most widely used hormonal method globally. OCs provide millions of women with effective, convenient and safe protection from pregnancy. Currently, more than 100 million women use OCs. Data on both ever use and current use of contraceptive revealed the continuing popularity of OCs [63]. Hormonal contraceptives can be classified into:

1. Oral pills
  - a. Combined oral contraceptives (COCs)
  - b. Progestogen-only pill (POP)
  - c. Emergency contraception
2. Slow-release (depot) formulations
  - a. Injectable
  - b. Subcutaneous implants
  - c. Vaginal rings

Worldwide, an estimated 8% of all married women currently use the pill and rank third among all family planning methods currently used by married women. The use of pills accounts for about one-quarter of all contraceptive use among both married and unmarried women in sub-Saharan Africa [62]. Overall, about 15% of married women use family planning, and less than 4% use the pill.

In some countries in Africa, OC usage is among the highest in the world: 33% of married women in Zimbabwe, 21% in Mauritius, 1.8% in Nigeria, 18% each in Botswana and Cape Verde respectively [62]. The use of COCs has been associated with health benefits. It reduces menstrual blood flow and dysmenorrhoea and lowers the prevalence of iron deficiency anaemia [63–65]. Generally, when taken correctly, OCs offer highly effective contraceptive. Among perfect users (women who do not miss pills and follow the instructions correctly), only 1 in every 1000 women becomes pregnant in the first year [62]. Among typical users, about 60–80 women in every 1000 will become pregnant during the first year [66]. Appropriate health education and counseling of clients are the key ingredients to the successful use of OCs.

## 5. Injectable contraceptives

When oral contraceptives were introduced in family planning programmes, they were hailed as a major breakthrough. However, overtime, it became obvious that not many women are good in remembering to take their pills on a daily basis and follow the schedule

of administration. The use of injectable contraceptives provides many advantages: no user error, privacy and less dependence on the women's compliance. The most commonly used is depot medroxyprogesterone acetate (DMPA). Irregular spotting, bleeding and amenorrhoea are well-known problems associated with the use of DMPA.

## 6. Intrauterine devices (IUDs)

The story of a small pebble placed in the uterus of a camel to prevent pregnancy during long caravan journeys by Arabs in Middle East is regarded as the beginning of intrauterine contraceptive devices [67]. The IUDs is one of the most effective reversible contraceptive methods with an average pregnancy rate after 1 year of use of 3–5 per 100 typical users. Because IUDs have longer continuation rates than the OCs or injectable contraceptives, the overall effectiveness of IUDs and oral contraceptives are about the same in family planning programmes [68]. A major concern of IUDs is expulsion and pregnancy rates as shown in **Table 3**.

As the use of contraceptives increase in Africa, IUDs are becoming more acceptable. However, its popularity varies widely throughout the continent and even within the countries as evidenced by recent DHS reports. For instance, its use in Nigeria between 1990 and 2013 was 0.8–1.1%, [70], while in Mali and Uganda, very few women use IUD [71].

The training of doctors and paramedical staff to deliver family planning services is the cornerstone to the success of family planning programmes. In Africa, the primary goal is to train doctors, nurses, midwives and other field workers to manage family planning clinics as a team. The family planning nurse is essential to the success of the family planning programme.

Device	Pregnancy rate	Expulsion rate
Lippes Loop		
C	3.0	19.1
D	2.7	12.7
Progestasert	1.8	3.1
Copper-7	1.9	5.6
Cu-T-200	3.0	7.8
Cu-T-200c	0.9	8.0
Nova T	0.7	5.8
Multiload 250	0.5	2.2
Multiload 375	0.1	2.1

**Table 3.** Rates of pregnancy and expulsion per 100 women after 12 months of use [69].

## 7. Condoms

Condoms are the most widely known and used as barrier device by male partners around the world. Condoms are easy, effective and safe method of preventing pregnancy and sexually transmitted infections (STIs) including HIV. Although rates of condom use have been low in many areas of sub-Saharan Africa, many people now use condoms because of HIV education and prevention programmes [72, 73].

## 8. Permanent methods: Female sterilization

Globally, millions of couples of childbearing age in developing countries used voluntary surgical contraceptive (VSC), making it a popular method of family planning in the world [74]. But data for sub-Saharan African countries are scarce; however, based on world fertility survey results for Kenya, Lesotho and Sudan, female and male sterilization appears to be rare [75]. In another report, the use of vasectomy was under 1% [52]. This method of family planning is not too popular in SSA for a number of reasons. The method requires skilled personnel that are not available at the primary healthcare (PHC) level used by majority, and services are only available in urban areas. On the conservative side, in situations where the marriage has failed or death of partner occurred, the woman by cultural and religious norm is encouraged to remarry, and in order to “secure” her marriage, position and respect in the family and the society, she will be desirous to have at least a child to the new husband.

## 9. Knowledge, attitude and practice of family planning

The dividends accrued from improvements in reproductive health are cumulative and key to achieving sustainable development goals (SDGs) by improving maternal health, reducing child mortality and eradicating extreme poverty. Family planning brings transformational benefits to the women, families, communities and nations [16]. In the twenty-first century, the maternal mortality in the continent is still unacceptably high. The lifetime risk of maternal mortality of women in SSA is 1 in 39 live births, the highest when compared to other regions.

Despite recent increases in contraceptive use, sub-Saharan Africa is still characterized by high levels of fertility with TFR of 5 (number of births per woman) and a considerable unmet need for contraception [76]. Sub-Saharan Africa is still undergoing demographic transition (i.e. a shift to low death rate and birth rates). This is largely due to high birth rates with low contraceptive use. It is estimated that 90% of abortion-related and 20% of pregnancy-related morbidity and mortality together with 32% maternal deaths could be prevented by the use of effective contraceptive [9, 77]. In SSA, about 14 million

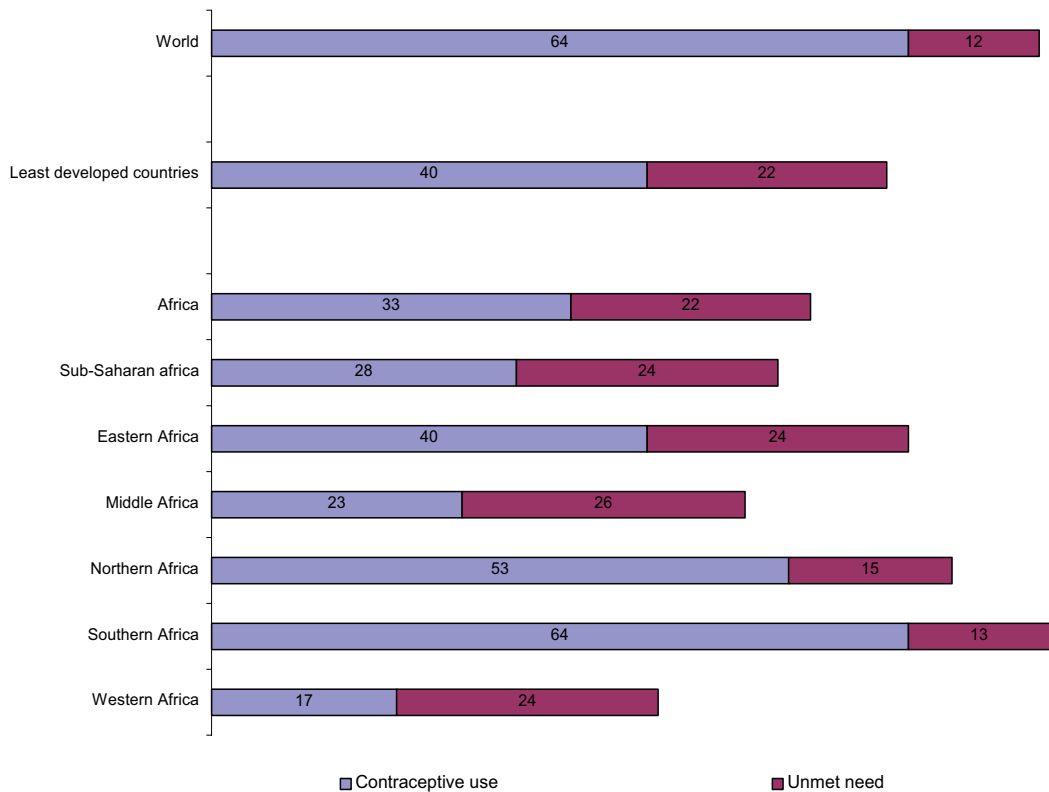
unintended pregnancies occur each year, with about half occurring among women aged 15–24 years [78, 79]. The low level of utilization of contraceptives is due to several factors, the health systems and the framework within which family planning (FP) services are delivered, and suboptimal service factors [79]. Others are barriers at the individual level: risk perception, lack of or insufficient knowledge needed to make desired decision or choices, male partner disapproval and economic and geographic access to service facility. Knowledge of FP is crucial to make informed choice. Also noted are barriers to utilization of FP: commodity stock-out, limited provider skills and limited number of methods [80]. Even though contraceptive methods and services are frequently geared towards women, men are the primary decision-makers on family size and their partners' use of family planning methods [8, 81, 82].

Men's fertility preferences and attitudes towards family planning seem to influence their wives' attitudes towards the use of modern contraceptives [83]. This translates to the fact that the importance of male involvement in any family planning programme cannot be over-emphasized. Information and knowledge on contraceptive methods are necessary tools to informed choices and utilization. Better informed and knowledgeable women are able to seek for desired information and also know where to access appropriate services. On the other hand, lack of knowledge together with cultural, social and religious factors is a major impediment to service utilization [81, 84, 85].

At the community level, since individuals live in communities, it definitely can influence personal health-seeking behavior, as there are intersections between personal beliefs and attitudes and community norms. Previous studies revealed that women may choose to accept family planning or indeed choose a particular method because of the methods adopted by those in the community [86]. Again, recently, several studies have explored the role of contextual factors in contraceptive use in African countries [87–90]. Beyond individual and family factors, the context in which women live does influence their contraceptive decisions. The growing body of literature has identified a number of contextual factors that influence the use of contraceptive: presence and quality of reproductive health services, macroeconomic factors, community fertility norms, female autonomy and availability of physical infrastructure [91]. Previous studies [26, 76, 92] and reports of Demographic and Health Surveys [61] in SSA reported a near universal knowledge on family planning among women of reproductive age group. Unfortunately, this has not translated into increased utilization of contraceptive methods as evidenced by low contraceptive prevalence rates (CPRs). This can well be demonstrated by contraceptive prevalence in the world and by region of Africa (**Figure 2**) [93] with West Africa having the lowest prevalence rate among married or in-union women (15–49 years old) in 2015.

The low usage and CPRs could be attributed to negative attitude directed at the methods and other factors discussed earlier. Thus, the promotion of modern contraceptive use will require multifaceted interventions across all the levels of society. Specifically, addressing some or all of these barriers to the use of modern FP will importantly contribute to family, community and national socio-economic development. Particularly, contraceptive use needs to be promoted in West Africa on both health and economic grounds.





**Figure 2.** Contraceptive prevalence and unmet need for FP (percent) in the world and African region.

## 10. Unmet needs for family planning

The decline in fertility in SSA has been slow than expected and has stalled in some countries [94, 95]. The total fertility rate varies from 4.8 children per woman in Kenya to 7.6 in the Republic of Niger [8, 9] and the lowest contraceptive prevalence of 22% among married women [96] and globally the highest level of unmet need for FP of about 25% [96]. Worldwide, over 222 million women have unmet need for contraceptive [97], and about 34 million women in Africa had unmet need for FP in 2009 [98]. The demand for contraceptives, with improved access and uptake, is the key public health intervention to improve maternal health outcomes, thereby reducing maternal mortality. Increasing contraceptive use has many demographic dividends, and unmet need denies women these benefits and violates their reproductive health rights. Studies have shown that several obstacles have hindered women access to FP services: unavailability of services, cultural and religious barriers, lack of knowledge and rural residence [99, 100]. Additionally, weaknesses in the existing FP programmes coupled with the fact that in SSA FP programmes tended to offer select methods (as a matter of convenience) or as a means of promoting the most effective and long-lasting methods [78]. Reasons for not

using contraceptive are quite unfounded as contraception is a safe medical intervention. It is estimated that mortality risk of unplanned and unwanted pregnancy is 20 times the risk of any modern contraceptive method and 10 times the risk of a “properly” performed abortion [101].

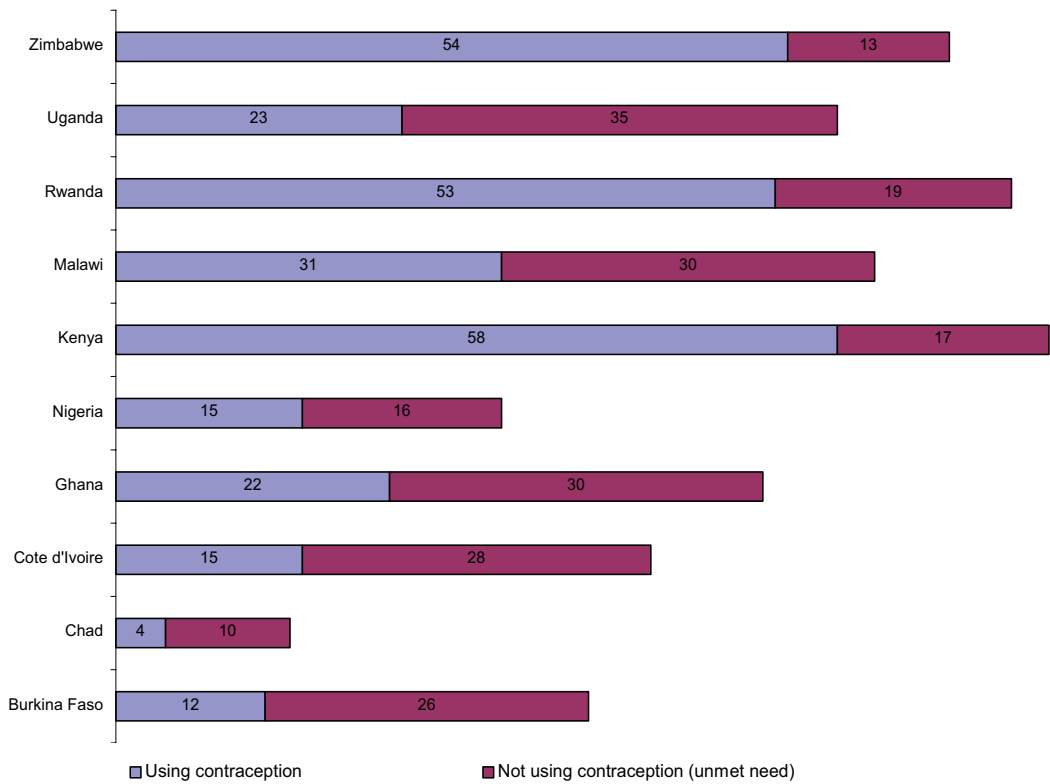
The concept of unmet needs for contraceptive dates back to the 1960s, the “KAP-Gap” era, and was used as a rationale for investment in family planning programmes [102]. It is the proportion of currently married, fecund women who do not want any more children but are not using any form of family planning (unmet need for limiting) or currently married women who want to postpone their next birth for 2 years but are not using any form of family planning (unmet need for spacing) [103]. Unmet need is essentially a conflict between what a woman wants and what she does about it. She might want fewer fertility but fails to take action needed to prevent pregnancy. The total demand for family planning is the proportion of married women with unmet need and married women with met need for family planning. In other words, it is the sum of contraceptive prevalence plus unmet need for family planning. Currently, the total demand for FP (sum of unmet need and current contraceptive use) is around 44% in SSA [104]. Also, unique to the continent is the fact that predominantly the unmet need is for spacing rather than for limiting births. Thus, it shows the importance attached to child spacing in Africa and a reluctance to commit to a final cessation of childbearing [9]. It also shows that demand for contraception (to space) exists within this population that can be explored. In countries where growing numbers of women want to avoid a pregnancy but contraceptive use is low, unmet need is higher. Rwanda, Senegal, Togo and Uganda all have unmet need of about 30% or higher [104]. The main objective for the study of unmet need is to estimate the potential demand for FP [102].

Basically, its purpose is to identify women who are currently exposed to the risk of unintended pregnancy but who are not using any method of contraceptive. In theory, these women either do not want any more births (limiting) or want to postpone the next birth for at least 2 more years (spacing). The computation of unmet need is complex and can vary depending on which categories of women are included in the definition [104]. When this is summed up with current contraceptive use, it provides a picture of total potential demand for FP in a country (**Figure 3**).

Experts have also raised the following concerns on its measurement:

- The term does not necessarily reflect actual or potential interest in method use.
- Women’s personal opposition to family planning.
- It does not reflect how women perceive themselves to be at risk of pregnancy.
- Failure to differentiate between married women who are sexually active and those who are not and thus not at risk of pregnancy [105].
- Underreporting of natural methods [106] in large-scale surveys which is a long standing methodological issue.

Today, the major source of data for measuring unmet need globally is the Demographic and Health Surveys (DHS) and for which data is available in most countries in SSA. Many countries have had two or four rounds of such surveys between 1990 and 2014. The DHS questions administered to women asked whether they are doing anything to avoid a pregnancy. If the woman reports the use of a natural method and does not simultaneously use a more effective method, she is counted



**Figure 3.** Potential demand for family planning.

as a user of natural methods. Currently, in the DHS questionnaire, there is no follow-up questions specific to natural methods resulting in possibility of under reporting in some developing countries [106]. Despite these drawbacks, measurement of unmet need has endured as a good analytical tool till date. Its importance cannot be overemphasized: the estimate is useful as it helps to reveal the size and characteristics of the potential market for contraceptives, allows for projection of how much fertility could decline if additional needs for FP were met. Reducing unmet need for FP is key to helping couples achieve their reproductive rights and achieving demographic goals.

The lessons here are to understand the variations in unmet need across the continent. Respective national governments will need to understand uniqueness of unmet needs in order to strengthen family planning programmes to reduce unmet need. Studies have revealed that strong programmatic interventions not only reduce unmet need and increase contraceptive use but also increase the proportion of women using modern contraceptives [107].

## 11. Challenges

The challenges to family planning programmes are many, varied and require attention at the highest policy level in order to realize the huge demographic, socio-economic and development

dividends of low fertility levels. This will also make SDGs achievable. Continued political will and support are prerequisite for sustainability and acceptability of FP programme:

- Data collection and analysis are still problems coupled with weakened and dysfunctional health-care systems in virtually all countries across Africa. This makes monitoring and evaluation of programmes a challenging task.
- Persuading national governments to adjust their budgetary priorities to meet health requirements is one of the biggest challenges. Indeed, in 2001, African leaders made Abuja (Nigeria) declaration with a commitment to allocate 15% of public expenditure to health by 2015 [108]. Till date, there is still huge funding gaps as the health sector is heavily underfunded.
- There is a need for broader attention to ever-increasing reproductive health needs including FP of women especially the cohort of women coming into motherhood or childbearing age.
- Studies in SSA and around the world reveal a near universal knowledge on contraceptive methods, yet the practice has shown the contrary. So, addressing all or some of these barriers responsible will significantly influence service uptake.
- Expanding FP services in a variety of “right mix” of contraceptive commodity availability to the rural folk and hard-to-reach areas has still persisted and needs to be addressed.
- There is a need to link population pressure on both the built and natural environments to reproductive health interventions as a national policy to FP service utilization.
- More research is needed on family planning: most studies are based on cross-sectional designs that cannot establish temporal sequence of cause and effect. Researches based on longitudinal data analysis methods or experiment or randomized control trial designs are needed to generate quality evidence that underscore important causal linkages between factors of interest and adolescent, maternal, child, family and population outcomes [109].

## 12. Conclusion

Over the past five decades, the use of FP methods has steadily increased in SSA with percentage of married women using modern contraceptives ranging between <20% and 69%. Unmet need for FP is unacceptably high. Despite near universal knowledge on contraceptives, practice remains low. Thus, there is a need for publicity campaigns through information, education and communication (IEC) to address social and cultural barriers to FP including misconceptions, misinformation and myths about modern FP methods.

Since decision-making power still resides with men, creating an environment in which both sexes can seek services and encouraging men to discuss FP with their wives will go a long way in promoting service utilization. Contraceptives for spacing are the predominant forms of FP preferred in SSA and show that even within this population demand for contraceptives exists. So, campaigns and provision of services that frame contraception as a method to space births and improve maternal and child health may be more culturally acceptable to promote use. Contraception should be vigorously promoted in SSA not only for its demographic dividends but also on socio-economic and health grounds and the attainment of SDGs.

### 13. Recommendations

Important shift in political commitment and priorities together with good governance, adequate funding is needed to sustain FP programmes. Efforts need to be intensified to encourage partner communication and engagement in order to improve FP practice. Further, research is needed to address unmet needs for FP.

### Conflict of interest

I declare that I have no conflict of interest in writing this chapter.

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# **Drivers of Unmet Need for Family Planning among Women of Advanced Reproductive Age in Urban Western Africa**

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Bola Lukman Solanke

Additional information is available at the end of the chapter

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## **Abstract**

Studies have examined unmet need for family planning among urban women in a number of countries, but women of advanced reproductive age have not been explicitly examined. This chapter examined drivers of unmet need for family planning among urban women of advanced reproductive age in selected West African countries. Data were extracted from individual recode of the most recent Demographic and Health Survey (DHS) implemented in the selected countries. The study analysed weighted sample sizes of 800 women in Guinea, 4928 women in Nigeria and 1253 women in the Gambia. The outcome variable was unmet need for family planning. Key explanatory variables are sets of individual and community characteristics. Three multilevel logistic regression models were fitted using Stata 12. Results showed that among urban women of advanced reproductive age, unmet need for limiting was dominant. Results further revealed that individual and community characteristics significantly drive variations in unmet need for family planning in the studied countries. Urban interventions to reduce unmet need for family planning in West African countries should target women of advanced reproductive age.

**Keywords:** unmet need, contraceptive, advanced reproductive age, women, West Africa

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## **1. Introduction**

Family planning methods may be described as information and services that enable individuals and couples to control the spacing and timing of their pregnancies through effective natural or artificial methods of contraception [1]. The use of family planning methods, particularly modern methods, has both reproductive and non-reproductive health benefits for women,

families and communities. These include improved maternal and child health, prevention of sexually transmitted infections through adoption of safer sexual practices, reduction in prevalence of unintended pregnancies and unsafe abortion and improved economic growth [2–4]. However, evidence abounds worldwide about women who have desire to either space or limit their next pregnancies, but are not using any family planning method to actualise their pregnancy intention [5–9]. Such women have been described as having unmet need for family planning. The term ‘unmet need for family planning’ evolved in 1977 from ‘KAP-gap’ a term used in the 1960s to indicate the proportion of women in Family Planning Knowledge, Attitude and Practice (KAP) surveys who reported desire to limit childbearing but doing nothing to actualise their fertility desire [10, 11]. Though, the measurement of unmet need for family planning has undergone several refinements [12, 13], in its contemporary form, it measures the proportion of women who have desire to either delay the next pregnancy for at least the next 2 years or stop childbearing, but not using either traditional or modern method of contraception to achieve such intention [14–16]. These women have elevated the risk of unintended pregnancies and its associated consequences [17, 18]. Recent estimates of unmet need for family planning revealed that across the world, the prevalence of unmet need for family planning among women aged 15–49 years reduced from 15.4% in 1990 to 12.3% in 2010. However, the absolute number of women with unmet contraceptive need is not only expected to grow marginally, but also expected to increase in developing countries [19]. Hence, unmet need for family planning methods remains relatively high in some regions particularly sub-Saharan Africa, South Asia, Western Asia and the Caribbean [15, 20, 21]. This has made further investigation of the socio-demographic drivers of unmet need for family planning imperative in the regions. Several studies across developing countries have examined the determinants of unmet need for family planning [22–36]. These studies observed varying prevalence of unmet need for family planning in different countries, identified key determinants of unmet need for family planning (such as women’s education, decision-making autonomy, parity, access to mass media, partner desire for more children, spousal violence and place of residence), and also provided context relevant information for the development of appropriate interventions for reducing unmet need for family planning. A recent study [21] organised the identified determinants into multiple levels of influence such as determinants operating at the individual women level, partner or household level and health service level, indicating that the factors influencing the prevalence of unmet need for family planning operates at different levels of the social environment.

However, in spite of the numerous studies, multi-country studies focusing on urban West Africa are rarely available in literature. Though, a number of studies have focused on urban women in a number of countries [36–43], women of advanced reproductive age, that is women aged 35 years or older [44] in urban West Africa have not been explicitly examined. Five key reasons account for the need to focus on this group of women in West Africa. One, the sub-region has one of the highest levels of unmet need for family planning in the world [15]. Two, urban areas in West Africa not only drives development in the sub-region, but also the urban health in West Africa drives the health of both urban and non-urban dwellers as found in urban areas of most other developing regions [45–47]. Three, there are hardly specific interventions focusing on women of advanced reproductive age across the sub-region [48, 49]. Four, substantial proportions of women in advanced age group in West Africa are high parity women

[50] whose poor health condition may further be aggravated by an additional unintended pregnancy. Five, there are sufficient evidence worldwide that women of advanced reproductive age faces greater health risks occasioned by advanced maternal age pregnancy that results in adverse maternal, newborn and perinatal outcomes [51–54]. The objective of the chapter is thus to examine the drivers of unmet need for family planning among women of advanced reproductive age in urban areas of selected West African countries. The selected countries are Guinea, Nigeria and the Gambia. These countries are selected because they have the lowest proportions of married women using modern contraceptive in the sub-region [55]. Though, family planning programmes remain fragile in these countries, however, the three countries currently implement population and reproductive health policies and programmes that aim to improve men and women’s quality of life through access to and use of effective methods of contraception [56–59]. The study is guided by the question: to what extent are individual and community factors important for explaining unmet need for family planning among women of advanced reproductive age in urban West Africa? The question was based on the finding that the factors influencing unmet need for family planning operates at different levels of the physical and social environment [21]. The socio-ecological theory provides the theoretical underpinning of the chapter. The theory asserts that human health behaviour and actions are influenced by multiple factors at different levels such as individual, household, community, society and policy environment [60].

## **2. Methodology**

### **2.1. Data source and sample**

Data analysed in the study were extracted from individual recode (women’s data) of the most recent Demographic and Health Survey (DHS) implemented in the selected countries. The surveys provided reliable information about fertility, mortality, family planning, nutrition, child health and other basic demographic and health information in each country. The surveys in the Gambia and Nigeria were conducted in 2013, while the survey in Guinea was conducted in 2012. The surveys were conducted using similar design and methodology in line with DHS uniform survey methodology [61]. Samples in each country were drawn using multi-stage sampling techniques and were weighted by cluster. Detailed information about the survey designs have been published [62–64]. The surveys covered 9142, 10,233 and 38,948 women of reproductive age, respectively, in Guinea, the Gambia and Nigeria. However, not all the women were analysed in the study. All women less than 35 years and all rural women were excluded in the study. The study analysed weighted sample sizes of 800 women in Guinea, 4928 women in Nigeria and 1253 women in the Gambia.

### **2.2. Outcome variable**

The outcome variable in the study was unmet need for family planning. This was measured adopting a recent revision of the measurement of unmet need for family planning [12]. The outcome variable naturally had three categories, namely, unmet need for limiting (criteria for

inclusion in this category included being not having desire for additional child, not currently pregnant, not postpartum amenorrheic, not considered fecund, but not using a method of contraception. Women who are currently pregnant with an unwanted pregnancy and postpartum amenorrheic women whose last births in the last 2 years were unwanted are also included in the category); no unmet need (criteria for inclusion in this category included being infecund or being fecund but desire to have a child in the next 2 years); and unmet need for spacing (criteria for inclusion in this category included being not pregnant, not postpartum amenorrheic, not considered fecund, desire to delay the next birth by two or more years but not using any contraception. Women who currently had a mistimed pregnancy or postpartum women whose last birth in the last 2 years were mistimed are also included in this category). However, at the multivariable analysis level, both unmet need for spacing and unmet need for limiting are grouped as unmet need, which is the category of interest in the chapter.

### 2.3. Explanatory and control variables

Two sets of explanatory variables are analysed in the study. The first sets are individual characteristics, namely, healthcare decision, gender norms that justify men's control over women, partner education, marital status, fertility desire, child death and age at first marriage. A number of previous studies have linked some of these variables to unmet need for family planning [30–32, 36, 65, 66]. Healthcare decision was based on who had final say on women's health care decision. Gender norm that justify men's control over women was based on women's response to whether wife battery was justify given some circumstances such as when wife goes out without husband permission, argues with husband, refuses to have sex with husband, burns food, and neglects children. Women who accepted at least one of the norms were grouped as 'norm accepted', while women who rejected all the norms were grouped as 'norm not accepted'. The second sets of variables are community characteristics, namely, community wealth level (proportion of women in the richer or richest wealth quintile in the community), community literacy level (proportion of women who can read and write complete sentence), proportion of women who have ever used contraceptive method in the community and community childcare burden (proportion of high parous women in the community). The community characteristics were derived from individual characteristics aggregated at the cluster level, and divided into low, medium and high categories. Three variables, namely, pregnancy termination, visitation by family planning worker and exposure to family planning mass media messages are selected for statistical control. These variables may impact need for either spacing or limiting pregnancies. While visitation by family planning worker and exposure to family planning media messages may enhance contraceptive use by providing reliable information about contraceptive choice, pregnancy termination experience may give insight into levels of exposures to unhealthy reproductive practices due to either non-use of contraceptive or contraceptive failure.

### 2.4. Data analyses

Statistical analyses were performed at three levels. One, frequency distribution, percentages and charts were used to describe sample characteristics or prevalence of unmet need for family planning. Two, cross tabulations and unadjusted binary logistic regression coefficients were used to



examine association between the sets of explanatory variables and unmet need for family planning. The cross tabulations showed the prevalence of unmet need for family planning given the individual and community characteristics, while the unadjusted binary regression coefficients showed whether the association was positive or negative. Three, the multilevel mixed effect logistic regression was applied to examine the influence of the individual and community characteristics on unmet need for family planning. This analytical method was appropriate for the study because of the need to determine the extent of variation in unmet need for family planning that are attributable to each level of influence on the outcome variable. A multilevel mixed effect regression model has two components, namely, the fixed and random components [67]. The fixed effect was measured by the odds ratios of the binary logistic regression, while the random component was measured by the intra-class correlation (ICC) which measures the effects of the community characteristics. The ICC was calculated as:  $\frac{\sigma_{ui}^2}{\sigma_{ui}^2 + [3.29]}$  with  $\sigma_{ui}^2$  been the variance at the community level [68]. Three multilevel mixed effects regression models were fitted in the study using Stata 12. Model 1 was based on individual characteristics, while Model 2 included both the individual and community characteristics. Model 3 included all the explanatory and control variables. The goodness-of-fit of the multilevel models were examined using the Likelihood Ratio test. Statistical significance was set at 5%.

## 2.5. Ethical considerations

The data analysed were formally requested from MEASURE DHS. Authorisation to download and analyse the data sets were granted. The analyses and inferences drawn from the study are not linked to any individual, couple or communities.

## 3. Results

### 3.1. Sample characteristics and prevalence of unmet need for family planning

**Figure 1** presents the prevalence of unmet need for family planning among the respondents. Unmet need for spacing was higher in the Gambia compared with Guinea and Nigeria, while unmet need for limiting was higher in Guinea compared with Nigeria and the Gambia. Overall, the prevalence of unmet need for family planning among urban women of advanced reproductive age was slightly more than one-fifth in Guinea (22.2%) and the Gambia (22.9%), but slightly more than one-tenth in Nigeria (12.6%). **Table 1** presents respondents' socio-demographic profile. In Guinea, women's healthcare decision was not only mostly taken by husband/others (68.4%), but also the proportion of joint decision with male partners was slightly less than one-fifth among respondents (19.8%). But in Nigeria and the Gambia, more than one-third of women's healthcare decisions were taken jointly with the male partner. However, decision by husband/others was dominant in Nigeria (48.9%), while joint decision was dominant in the Gambia (39.8%). Nearly all respondents in Nigeria and the Gambia did not accept gender norms that justify men's control over women. But in Guinea, one-third of the women (33.0%) accepted the norms. The majority of respondents' partners in Guinea and the Gambia had no formal education. But across the countries, while secondary education was the dominant educational level attained by respondents' partners, higher education was

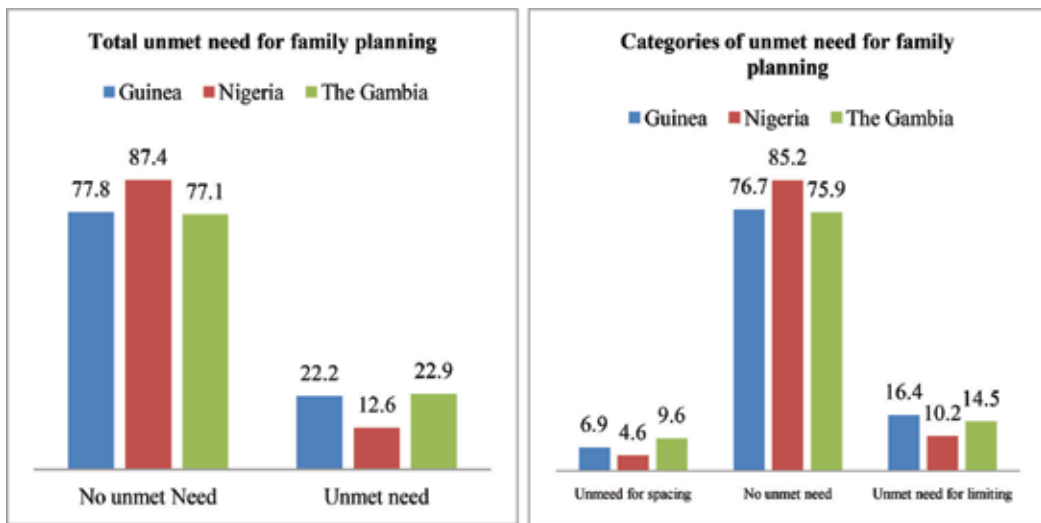


Figure 1. Unmet need for family planning in selected urban Western Africa.

the least attained among the respondent husbands. In Guinea, the majority of respondents' partners desired more children than the women, but in Nigeria, the majority of respondents had the same desired fertility with their husbands, though a substantial proportion of respondents' partners want more children than the respondents. On the contrary, the majority of respondents in the Gambia were unsure about their fertility desire. The majority of respondents in the studied countries were currently married.

More than one-third of respondents in Guinea and Nigeria had experienced child death, but in the Gambia, the proportion was slightly higher than a quarter (27.4%). In the studied countries, high proportion of respondents had no exposure to mass media family planning messages in the last 12 months preceding the surveys. In all the countries, the majority of respondents were not visited by a family planning worker within the last 12 months preceding the surveys. In Guinea, more than half of respondents were 17 years or less at the time of their first marriage (52.7%). In the Gambia, nearly half of respondents were married before the age of 18 years (48.9%). However, across the countries, more than one-third became married within the range of 18–24 years. The proportion of respondents who had ever had a pregnancy termination was similar in the three countries, though with slightly higher proportion in the Gambia. In Guinea and Nigeria, the majority of women lived in communities with high wealth level, but in the Gambia, the majority lived in communities with average wealth level. Likewise, in Guinea and Nigeria, the majority of respondents lived in communities with low literacy level; while in the Gambia, the majority lived in communities with moderate literacy level. In Nigeria, slightly more than one-third of respondents (36.5%) lived in communities with high proportion of women who had ever used a contraceptive method, but this was not observed in Guinea and the Gambia. In Guinea, nearly half of the women (49.5%) lived in communities with low childcare burden, but in Nigeria and the Gambia, more than one-third of respondents lived in communities with high childcare burden.

Characteristics	Country		Characteristics	Country	
	Guinea	Nigeria		Guinea	Nigeria
	Frequency (%)	Frequency (%)		Frequency (%)	Frequency (%)
<b>Healthcare decision</b>					
Woman alone	95 (11.8)	560 (11.4)	Not visited	768 (96.0)	4226 (85.7)
Jointly	158 (19.8)	1957 (39.7)	Visited	32 (4.0)	702 (14.3)
Husband/others	547 (68.4)	2411 (48.9)	<b>Age at first marriage (years)</b>		
<b>Gender norms justifying men's control over women</b>			17 or less	422 (52.7)	1960 (39.8)
Norm accepted	264 (33.0)	237 (4.8)	18-24	294 (36.8)	1975 (40.1)
Norm not accepted	536 (67.0)	4691 (95.2)	25 or older	84 (10.5)	993 (20.1)
<b>Partner education</b>			<b>Pregnancy termination</b>		
None	418 (52.3)	1184 (24.0)	Never experienced	652 (81.5)	4004 (81.3)
Primary	78 (9.7)	1142 (23.2)	Ever experienced	148 (18.5)	924 (18.7)
Secondary	169 (21.2)	1518 (30.8)	<b>Community wealth level</b>		
Higher	135 (16.8)	1084 (22.0)	Low	187 (23.4)	1541 (31.3)
<b>Fertility desire</b>			Medium	265 (33.2)	1614 (22.7)
Both want same	149 (18.6)	1686 (34.2)	High	348 (43.4)	1773 (36.0)
Husband want more	304 (38.0)	1490 (30.2)	<b>Community literacy level**</b>		
Husband want fewer	160 (20.0)	1020 (20.7)	Low	281 (35.2)	1721 (34.9)
Don't know	187 (23.4)	732 (14.9)	Medium	247 (30.8)	1643 (33.5)
<b>Marital status</b>			High	272 (34.0)	1564 (31.7)
Not currently married	115 (14.4)	698 (14.2)	<b>Proportion ever used contraceptive in community**</b>		
Currently married	685 (85.6)	4230 (85.8)	Low	301 (37.6)	1810 (36.7)
					474 (37.8)

Characteristics	Country		Characteristics		Country	
	Guinea		The Gambia		Guinea	
	Frequency (%)	Nigeria	Frequency (%)	Nigeria	Frequency (%)	The Gambia
<b>Child death</b>						
Ever experienced	290 (36.2)	1802 (36.6)	Medium	1319 (26.8)	514 (41.0)	
Never experienced	510 (63.8)	3126 (63.4)	High	1799 (36.5)	265 (21.0)	
<b>Exposure to mass media family planning messages</b>			<b>Community childcare burden***</b>			
No exposure	456 (57.0)	2105 (42.7)	Low	1858 (37.7)	390 (31.2)	
Radio	125 (15.6)	948 (19.2)	Medium	1378 (28.0)	413 (32.9)	
Television	185 (23.2)	1231 (25.0)	High	1692 (34.3)	450 (35.9)	
Newspaper	34 (4.2)	644 (13.1)				
<b>Total (Sample Size)</b>	<b>800 (100.0)</b>	<b>4928 (100.0)</b>	<b>Total (Sample Size)</b>	<b>800 (100.0)</b>	<b>1253 (100.0)</b>	

Source: Author analysis based on Guinea Demographic and Health Survey 2012, Nigeria Demographic and Health Survey 2013 and the Gambia Demographic and Health Survey 2013. Proportion of women in richer or richest wealth groups in community.

\*\*Proportion of women who can read or write complete sentence in community.

\*\*\*Proportion of women who had ever used a contraceptive method in community.

\*\*\*\*Proportion of high parous women in community.

**Table 1.** Socio-demographic characteristics of respondents, Guinea, Nigeria and the Gambia.

### 3.2. Bivariable results

**Table 2** presents the bivariate relationships between the research variables. Healthcare decision and unmet need for family planning were negatively associated in Guinea and Nigeria, but in the Gambia, a mixed association was observed. However, in the studied countries, women who did not participate in the decision had the lowest proportion of unmet need for family planning, while in Guinea and Nigeria, women who had sole participation in the decision had higher prevalence of unmet need for family planning. On the contrary, in the Gambia, women who jointly participated in the decision with their husbands had higher level of unmet need for family planning. In all the three countries, gender norms that justify men's control over women were negatively associated with unmet need for family planning. For instance, in the Gambia, the prevalence of unmet need for family planning was 22.5% among women who did not accept the norms compared with 45.6% prevalence among women who accepted the gender norms. The association between partners' education and unmet need for family planning were mixed in Guinea and Nigeria, but positive in the Gambia. In Guinea and Nigeria, the prevalence of unmet need for family planning decline as education improved from none to primary, and thereafter increased when education improved to secondary. However, at higher education, the prevalence reduced compared to the prevalence at secondary education. In the Gambia, the observed prevalence by variation in the educational level was inconsistent. Across the countries, marital status relates positively with unmet need for family planning, though the proportion of women who are not currently married was rather negligible in the sample which may have occasioned the observed association. Though, fertility desire had mixed relationship with unmet need for family planning across the countries, but in all the countries, while it was positively related with unmet need for family planning among women whose husbands wanted more children, it showed negative association with unmet need for family planning among women whose husbands wanted fewer children.

Child death and unmet need for family planning are negatively associated in the studied countries. In all the selected countries, women who had ever experienced death of a child had lower prevalence of unmet need for family planning. For instance, in Guinea, the prevalence of unmet need for family planning among women who had experienced child death was 21.0% compared with 24.3% among women who had ever experienced death of a child. Likewise, in the Gambia, while women who had ever experienced child death had a prevalence of 26.2% unmet need for family planning, women who had never experienced child death had a prevalence of 21.7% unmet need for family planning. In all the countries, age at first marriage and unmet need for family planning had mixed relationships. But while women whose first marriage occurred at 25 years or older years had lowest prevalence of unmet need in Guinea and Nigeria, there were no difference in the prevalence among women whose first marriage occurred at 18–24 years or older groups in the Gambia. Except in Nigeria, community wealth level and unmet need for family planning are negatively associated, but in all the countries, unmet need was lower in communities with high wealth level compared with women in communities with low wealth level. Except in the Gambia, community literacy level and unmet need for family planning are negatively associated with lower unmet need in communities with high literacy level compared with communities with low literacy level. Except in Nigeria, community childcare burden was negatively associated with unmet need

Characteristics	Guinea		Nigeria		The Gambia	
	% of unmet need	Coefficient	% of unmet need	Coefficient	% of unmet need	Coefficient
<b>Healthcare decision</b>						
Woman alone <sup>ref</sup>	40.3	—	16.5	—	24.5	—
Jointly	22.2	-0.865**	12.9	-0.288	29.0	0.232
Husband/others	19.0	-1.065**	11.5	-0.0425**	13.7	-0.716**
<b>Gender norms justifying men's control over women</b>						
Norm accepted <sup>ref</sup>	22.4	—	18.4	—	45.6	—
Norm not accepted	22.0	-0.021	12.3	-0.474**	22.5	-1.057
<b>Partner education</b>						
None <sup>ref</sup>	22.4	—	12.8	—	22.6	—
Primary	21.8	-0.032	12.4	-0.039	23.2	0.035
Secondary	29.2	0.360	13.4	0.053	23.9	0.075
Higher	12.9	-0.660**	11.5	-0.118	22.7	0.007
<b>Marital status</b>						
Not currently married <sup>ref</sup>	1.2	—	1.2	—	1.0	—
Currently married	25.7	3.319*	14.5	2.680*	26.6	3.567*
<b>Fertility desire</b>						
Both want same	17.5	—	13.5	—	20.2	—
Husband want more	26.4	0.524	14.2	0.062	24.4	0.240
Husband want fewer	9.2	-0.740	3.6	-1.413*	3.0	-2.110*
Do not know	30.1	0.706**	20.1	0.478**	33.2	0.675**
<b>Child death</b>						
Ever experienced <sup>ref</sup>	24.3	—	15.2	—	26.2	—
Never experienced	21.0	-0.191	11.1	-0.358*	21.7	-0.250
<b>Age at first marriage (years)</b>						
17 or less <sup>ref</sup>	22.1	—	13.2	—	23.4	—
18-24	24.3	0.119	14.2	0.084	21.7	-0.096
25 or older	15.1	-0.469	8.3	-0.526*	24.7	0.072
<b>Community wealth level</b>						
Low <sup>ref</sup>	24.9	—	13.8	—	26.2	—
Medium	20.4	-0.255	15.3	0.116	20.6	-0.311
High	22.0	-0.162	9.2	-0.466**	22.6	-0.197

Characteristics	Guinea		Nigeria		The Gambia	
	% of unmet need	Coefficient	% of unmet need	Coefficient	% of unmet need	Coefficient
<b>Community literacy level</b>						
Low <sup>ref</sup>	25.5	—	15.3	—	22.8	—
Medium	24.5	-0.055	13.4	-0.161	21.7	-0.065
High	16.7	-0.539**	8.9	-0.624*	25.7	0.158
<b>Proportion ever used contraceptive in community</b>						
Low <sup>ref</sup>	23.9	—	14.4	—	22.4	—
Medium	19.3	-0.276	13.2	-0.161	20.8	-0.097
High	23.5	-0.027	10.5	-0.624*	27.9	0.288
<b>Community childcare burden</b>						
Low <sup>ref</sup>	19.5	—	9.3	—	17.1	—
Medium	23.2	0.221	13.4	-0.099	25.6	0.513**
High	26.2	0.379	15.6	-0.364**	25.4	0.503**

Notes: ref. (reference category)

\*p < 0.01

\*\*p < 0.05.

**Table 2.** Association between individual/community characteristics and unmet need for family planning among urban women of advanced reproductive age.

for family planning. Across the countries, communities with low childcare burden had the lowest levels of unmet need compared with the prevalence in other communities. In Guinea and Nigeria, communities with low proportion of ever users of contraceptive method had higher prevalence of unmet need for family planning, while in the Gambia communities with high proportion of ever users had higher level of unmet contraceptive need.

### 3.3. Multivariable results

**Table 3** presents the fixed effects of the multilevel logistic regression. In Model 1 which included only the individual characteristics, all the explanatory variables had varying significant effects on the likelihood of unmet need for family planning in Nigeria and the Gambia, but in Guinea, age at first marriage had no significant influence on unmet need for family planning. The inclusion of the community characteristics in Model 2 reduced the effect of some of the individual characteristics. In all the countries studied, health care decision and age at first marriage did not reveal significant effect on unmet need for family planning, while gender norms, education, marital status, fertility desire and child death were significant individual characteristics. However, in the Gambia, partner education did not significantly impact unmet need for family planning. All the four community characteristics

Characteristic predicting unmet need for family planning	Model 1			Model 2			Model 3		
	Guinea	Nigeria	The Gambia	Guinea	Nigeria	The Gambia	Guinea	Nigeria	The Gambia
	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
<b>Healthcare decision</b>									
Woman alone <sup>ref</sup>	—	—	—	—	—	—	—	—	—
Jointly	0.620**	0.535**	1.098	0.707	0.971	1.078	0.714	0.962	1.027
Husband/others	0.345*	0.323*	0.910**	0.608	1.016	0.900	0.599	0.811	0.899
<b>Gender norms justifying men's control over women</b>									
Norm accepted <sup>ref</sup>	—	—	—	—	—	—	—	—	—
Norm not accepted	0.479**	0.616**	0.582**	0.942*	0.452**	0.569*	0.862**	0.698*	0.542**
<b>Partner education</b>									
None <sup>ref</sup>	—	—	—	—	—	—	—	—	—
Primary	0.626	0.687	1.091	0.568	0.874	1.245	0.597	0.868	1.247
Secondary	1.036	0.543**	1.262	1.052	1.219	1.259	1.007	1.193	1.280
Higher	0.486**	0.496**	0.831**	0.461**	1.185	1.272	0.421**	0.539*	0.590**
<b>Marital status</b>									
Not currently married <sup>ref</sup>	—	—	—	—	—	—	—	—	—
Currently married	3.066*	2.260**	2.416**	3.221*	2.149**	2.188*	3.041**	2.092*	2.308*
<b>Fertility desire</b>									
Both want same	—	—	—	—	—	—	—	—	—
Husband want more	1.412*	1.073	1.483	1.537	1.011	1.538*	1.836*	1.023	1.503
Husband want fewer	0.759*	0.596**	0.744**	0.888	0.619**	0.773*	0.467*	0.625**	0.755**
Do not know	1.804*	1.548**	2.304**	1.942**	1.543**	2.481*	1.792**	1.560**	2.542**





Characteristic predicting unmet need for family planning	Model 1			Model 2			Model 3		
	Guinea	Nigeria	The Gambia	Guinea	Nigeria	The Gambia	Guinea	Nigeria	The Gambia
	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Medium				1.144	1.081	2.079**	1.181	1.088	2.086**
High				1.854*	1.463**	1.881**	1.870**	1.472**	1.843**
<b>Pregnancy termination</b>									
Never experienced <sup>ref</sup>									
Ever experienced							0.583	1.034	0.904
<b>Visitation by family planning worker</b>									
Not visited <sup>ref</sup>									
Visited							2.044	1.065	0.908
<b>Exposure to mass media family planning messages</b>									
No exposure									
Radio							1.365	1.039	1.546
Television							1.079	1.604	1.351
Newspaper							0.840**	0.989*	0.755**

Notes: ref. (reference category)

\*p < 0.01

\*\*p < 0.05.

Table 3. Odds ratios showing fixed effects of multilevel logistic regression.

analysed showed significant effects on the likelihood of unmet need for family planning across the studied countries. For instance, in all the countries, the likelihood of unmet need for family planning reduced significantly in communities with high wealth level compared with communities with low wealth level. Likewise, the likelihood of unmet need for family planning reduced significantly in communities with high literacy level compared with communities with low literacy level. Also, the likelihood of unmet need for family planning increased significantly in communities with high childcare burden compared with communities with low childcare burden. In the full model (Model 3), healthcare decision was the only individual characteristic with no significant effect on the odds of unmet need for family planning. Across the countries, women who did not accept gender norms that justified men's control over women, were 13.8, 30.2 and 45.8% less likely to have unmet contraceptive need, respectively, in Guinea, Nigeria and the Gambia. Partner education revealed a significant effect only when educational level reaches higher education. For instance, in Guinea, women whose partner attained higher education were 57.9% less likely to have unmet contraceptive need (OR = 0.421;  $p < 0.05$ ). Also in the Gambia, women whose partner attained higher education were 41.0% less likely to have unmet contraceptive need (OR = 0.590;  $p < 0.05$ ). In all the countries, currently married women were more likely to have unmet contraceptive need, though this may relate more with the dominance of currently married women in all the studied countries.

Though, with a slight variation in Guinea, fertility desire significantly affected the likelihood of unmet need for family planning. But in all the selected countries, the likelihood of unmet need for family planning reduces among women whose husbands wanted fewer children compared with other women. For instance, in Nigeria, women whose husbands wanted fewer children were 37.5% less likely to have unmet contraceptive need compared with women in the reference category (OR = 0.625;  $p < 0.05$ ). In all the countries, women who had never experienced child death were less likely to have unmet contraceptive need. Age at first marriage had mixed effects across the countries. In Guinea, women who were 25 years or older at their first marriage were 23.9% more likely to have unmet contraceptive need (OR = 1.239;  $p < 0.05$ ), but in Nigeria and the Gambia, this group of women were less likely to have unmet contraceptive need. Three of the community characteristics had significant effect on the likelihood of unmet need for family planning. In the three countries, women in communities with high wealth level had less likelihood of unmet need for family planning. For instance, in Guinea, women in communities with high wealth level were 65.2% less likely to have unmet contraceptive need (OR = 0.348;  $p < 0.05$ ). Likewise, in the Gambia, women in communities with high wealth level were 39.1% less likely to have unmet contraceptive need (OR = 0.609;  $p < 0.01$ ). Women in communities with high literacy level were also less likely to have unmet contraceptive need in all the countries studied. For instance, in Nigeria, women in communities with high literacy level were 13.0% less likely to have unmet contraceptive need compared with women in communities with low literacy level (OR = 0.870;  $p < 0.01$ ). Across the countries, women in communities with high childcare burden had higher likelihood of unmet contraceptive need. For instance, in Guinea (OR = 1.870;  $p < 0.05$ ) and the Gambia (OR = 1.843;  $p < 0.05$ ), women in communities with high childcare burden were nearly twice more likely to have unmet need for family planning compared with women in communities with low childcare

Parameter	Guinea			Nigeria			The Gambia					
	Empty model	Model 1	Model 2	Model 3	Empty model	Model 1	Model 2	Model 3	Empty model	Model 1	Model 2	Model 3
Community-level variance (Standard Error)	2.661 (0.312)	2.225 (0.307)	2.008 (0.276)	1.943 (0.250)	3.611 (0.501)	1.862 (0.243)	1.705 (0.239)	1.592 (0.206)	2.066 (0.343)	1.885 (0.299)	1.664 (0.244)	1.522 (0.209)
Log-likelihood	-3028	-2963	-2932	-2908	-4231	-4118	-3794	-3658	-2543	-2117	-2008	-1938.7
LR test ( $\chi^2$ )	932.1*	530.7*	441.3*	372.5*	1624.2*	798.8*	570.8*	318.7*	432.1*	347.6*	319.6*	216.3*
ICC	0.447 (44.7%)	0.403 (44.3%)	0.379 (37.9%)	0.371 (37.1%)	0.523 (52.3%)	0.361 (36.1%)	0.341 (34.1%)	0.326 (32.6%)	0.386 (38.6%)	0.364 (36.4%)	0.336 (33.6%)	0.316 (31.6%)

Note: \*p < 0.001.

**Table 4.** Multilevel logistic regression showing random effects on unmet need for family planning.

burden. Exposure to family planning messages was the only control variable that significantly influences unmet need for family planning with results showing that only exposure through newspaper reduces the likelihood of unmet contraceptive need in the studied countries.

The results of the random effects on unmet contraceptive need are presented in **Table 4**. The goodness-of-fit of the multilevel models were examined by the LR test which showed statistical significance across the countries. The consistent reduction in the values of the log likelihood across the countries also indicated that the fitted models are adequate. The ICC values suggest that the analysed community characteristics had significant effect on the likelihood of unmet need for family planning in the studied countries. When no individual and community characteristics were included in the empty model, the greatest variation in unmet need for family planning was observed in Nigeria (ICC = 0.523). With the inclusion of the individual characteristics in Model 1, the highest variation in unmet need for family planning attributable to community characteristics was observed in Guinea (ICC = 0.403). Also, the full model showed that the highest variation in unmet need for family planning attributable to the community characteristics were observed in Guinea (ICC = 0.371). Overall, the ICC indicated that most women of advanced reproductive age in the urban communities examined have similar unmet contraceptive need.

#### 4. Discussion

This chapter examined the drivers of unmet need for family planning among urban women of advanced reproductive age in selected West African countries. With sufficient empirical evidence that women of advanced reproductive age not only have elevated risks of adverse maternal and child health outcome if they become pregnant [51–54], but also higher risk of unintended pregnancies and its associated consequences [17, 18], this chapter by further revealing levels of unmet contraceptive need among the women provided additional information on the need to focus attention on the reproductive behaviour of women of advanced reproductive age. The chapter by examining unmet need for family planning in a multi-country setting improves upon previous studies that have focused urban women in specific countries [36–43]. The high quality of data analysed in the chapter is not in doubt and provides reliable international comparability of the levels and correlates of unmet need for family planning within the West African region. Findings in the chapter provided more support for the socio-ecological theory [60] by revealing that unmet need for family planning was influenced by factors operating at both the individual and community levels of urban societies. This finding also provided support for the hierarchy of influence on unmet need for family planning identified in a recent study [21]. A number of the findings may impact policy and programmes.

One, unmet need for family planning was relatively higher in urban Guinea and the Gambia compared with urban Nigeria. Levels of unmet need for family planning as found in Guinea (22.2%) and the Gambia (22.9%) though lower than the 41.5% found in one study [28] but were far higher than the recent global estimate of 12.3% [19], and much higher than prevalence reported in some previous studies [18, 27, 30, 33]. Though this study focused only women of advanced reproductive age and not all women of childbearing as analysed in most of the existing studies, the observed level nonetheless suggests that the prevalence of unmet

need for family planning in the studied countries particularly Guinea and the Gambia may require more urgent attention to accelerate pace of reduction in the countries. Bearing in mind that most women of advanced reproductive age in West Africa are high parous women [48, 50], it is important to devise specific programmes to target women in advanced age group by providing expanded counselling and services that addresses their peculiar contraceptive concerns. Such programmes should extensively use the mass media, particularly newspapers, to provide needed information. Two, the study found that gender norms affected the level of unmet need for family planning in all the countries. In virtually all West African countries, men still play dominant roles in women's reproductive health despite increasing attention on gender equity and the implementation of several women-focused social programmes across the region. The key challenge, however, has remained how to effectively alter the balance of power between men and women within households and communities. In this regard, behaviour change communication (BCC) programmes have been developed in all the studied countries [59]. While it is important to sustain the BCC programmes, it is also necessary to scale up the promotion of men's method in West Africa since research has provided sufficient evidence that many men will use modern methods of contraception if they have appropriate information and counselling [65, 66]. This may likely reduce the extent of unmet contraceptive need by reducing the risk of unintended pregnancy and fertility among women.

Three, men's desire for fewer children reduces likelihood of unmet contraceptive need in urban West Africa. In many parts of the world, surveys have shown that men often desire more children than women [65, 66]. This further buttress continued need for male involvement in women's reproductive health particularly in the use of contraceptive. It is not likely that unmet contraceptive need among women in West Africa will substantially reduce without change in men's desire for more children. Governments and family planning providers in West Africa have onerous responsibility of helping more men not only to support or approve partners use of modern contraceptives, but also for men to take the lead in use of modern contraceptives. This may be achieved by developing family planning programmes that presents use of contraceptives as one of men's key responsibility to their partners. In addition, such programmes could provide information detailing how traditional gender roles can adversely affect women's sexual and reproductive health. Four, child death experience impact unmet contraceptive need among urban women of advanced reproductive age in West Africa. In virtually every part of West Africa, children have strong cultural relevance. Births are highly celebrated, and childlessness is not accepted in most communities. Hence, the event of death of a child is viewed as a serious tragedy for individuals, couples and communities. In the event of a child death, women are mostly encouraged to have replacement except such women have been declared infecund. Such practice often elevates the risk of many women of advanced reproductive age. However, this practice and its associated risk could be addressed by taken more actions to ensure child survival in West Africa. Five, community contexts have effects on the extent of unmet contraceptive need among urban women of advanced reproductive age. In several communities, women usually have similar perception and attitude towards issues of childbearing. In many instances, women tend to compare experiences and reacts in like manners. This provides basis for more community-based family planning programmes across West Africa. However, it is important to consider developing specific community-based programmes for urban women of advanced reproductive age.

## 5. Conclusion

This chapter examined drivers of unmet need for family planning among urban women of advanced reproductive age. Though, the chapter analysed a cross-sectional data which usually limits a cause-effect relationship between variables, nonetheless, the analyses provided sufficient empirical associations between the research variables. Individual and community factors are important for explaining variations in unmet contraceptive need among urban women of advanced reproductive age. The key drivers are gender norms that justify men's control over women, partner education, fertility desire, child mortality, age at first marriage, community literacy level, community wealth level, community childcare burden and exposure to mass media family planning messages. The development of interventions to specifically target women of advanced reproductive age is imperative in urban West Africa.

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## Conflict of interest

The author declares no conflict of interest.

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# Family Planning and Fertility Decline in Africa: From 1950 to 2010

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Michel Garenne

Additional information is available at the end of the chapter

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## Abstract

The study analyzes the links between family planning programs, contraceptive prevalence and fertility trends in sub-Saharan Africa. It is based on case studies of countries with demographic surveys. The study reveals a variety of situations. Some countries have completed their fertility transition, while others have reduced their fertility level rapidly in urban areas, but less so in rural areas. In some countries, fertility remained very high, or declined very little, in rural areas, when population policies and family planning programs remained insufficient or almost non-existent. The role of family planning programs in fertility decline is highlighted by contrasting countries with similar characteristics, one of which experiencing a sharp drop in fertility, while the other one is showing a small decline or no decline at all. In each case, the political, economic, and social context is presented in order to explain the differences between family planning programs and their outcomes. These case studies make it possible to draw conclusions about the conditions of fertility control in African countries.

**Keywords:** population policy, family planning, contraception, fertility trends, demographic transition, political environment, economic conditions, social situations, demographic and health surveys (DHS), sub-Saharan Africa

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## 1. Introduction

The demographic transition is a universal phenomenon induced by new behaviors associated with economic development, technical progress, social change and population pressure. The decline in mortality creates an imbalance, unsustainable in the long run, which requires a decline in fertility in order to restore the demographic balance. In Europe and in countries of European settlement in North America and the Pacific, the fertility transition has been the result of individual initiatives, without state intervention, that is changing behavior of

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couples. To give a classic example, that of Sweden, the level of fertility has not exceeded 4.7 children per woman since the 18th century, began to decline rapidly around 1870, reaching 2 children per woman around 1930, a date that can be taken as that of the end of fertility transition. After this date, fertility followed several cycles, up and down, around this average level. The fertility transition itself lasted about 60 years or two generations. The number of births balanced approximately the number of deaths by 1800 and this balance was practically restored around 1980, about 50 years after the end of the fertility transition. This model is fairly general for European countries, with the notable exception of France, where fertility decline occurred much earlier, beginning in the 18th century, and was very slow, since it lasted nearly two centuries. Historical demographic studies in Europe showed that the fertility transition was virtually unrelated to short-term socio-economic indicators and that it affected different countries at different levels of development, as measured by income per capita, level of education level or level of urbanization [1, 2].

Russia presents a different case because the state has begun to play an active role in the decline in fertility in this country. Available evidence suggests a small decline in fertility at the end of the 19th century, probably restricted to large cities. Then, after the troubled period of the Bolshevik revolution, fertility reached a peak in 1924. After this date, fertility started a steady decline, reaching a level of 2 children per woman in 1970, some 45 years after the beginning of the transition, after which it fluctuated upwards and downwards. What is important in the case of Russia is the voluntarist policy of the Soviet state, which authorized medical abortion as early as 1921, induced abortion being the main form of birth control in the USSR until 1990. This policy was above all a social and feminist policy aimed at ensuring greater freedom for women and encouraging them to work in industrial and agricultural production, and not a policy of population control in the Western sense. It was however interrupted at the time of the Second World War, in this case for demographic purposes [3–5].

In the Third World, fertility decline began most often after 1960, and is mainly the result of public policies, that is family planning programs. According to United Nations estimates, fertility in Asia fell from 5.67 to 2.24 children per woman between 1960 and 2010 and in Latin America from 5.95 to 2.20 children per woman during the same period, thus realizing the essential part of the transition of fertility in half a century. In sub-Saharan Africa as a whole, fertility declined only slightly during the same period of time, from 6.62 to 5.26 children per woman between 1960 and 2010 [6]. Africa is the last continent where the transition was delayed and remained largely unfinished by 2010. The consequences of this persistent high fertility are incalculable and will lead some countries to situations very difficult to manage, especially countries located in the Sahel and in Central Africa [7, 8].

The purpose of this study is to trace the history of family planning policies and programs and their impact on fertility and contraception in Africa, to highlight what worked and what did not work, and to document the reasons of successes and failures. The emphasis here is on rural areas, because demographic dynamics are different in urban areas which are much more advanced in the fertility transition. This study is intended for social scientists and policy makers, and therefore provides only few details on the demographic and statistical techniques that underlie the tables and graphs. These technical details are amply covered in other publications cited in text.

## 2. Brief history of population policies and family planning programs

An abundant literature covers the history of population policies and family planning programs in the world since 1950. A synthesis book edited by the World Bank summarizes the major stages of these programs, focusing mainly on Asia and America Latin [9]. A review published by the Rand Corporation provides a detailed analysis of family planning programs and their problems [10]. A recent article presents the challenges for the 21st century [11]. This section presents the main stages of this construction, important for understanding the African context.

### 2.1. Awareness and organization

The first voluntarist movements of birth planning, initially private initiatives, appeared in the United States and in England at the beginning of the 20th century, with activist women, most notably Margaret and Ethel Sanger and Marie Stopes, who installed the first clinics promoting birth control in New York City (1916) and in London (1921).

Awareness of the world population problem dates back to the years following the end of the Second World War, especially in the United States and in some European countries (England, Sweden), and it was from 1950 on that concerted efforts to develop and disseminate contraception and limit population growth were made.

Initially, extensive research was funded to develop modern contraceptives with maximum efficacy and minimal side effects, and best suited to the needs of couples. This research produced a long series of important technological innovations: contraceptive pills (1960), Intra-Uterine Devices or IUDs (1958, 1962, 1968), spermicides (numerous products), injectable hormonal contraceptives (1969), implants (1983), abortion pills (1988), morning-after-pills (1999), non-surgical sterilization (2002), etc. These innovations enabled the development of family planning programs and the spread of modern contraception worldwide. These new methods complemented previously known methods (abstinence, interrupted coitus or withdrawal, condom, diaphragm, sterilization, induced abortion, etc.) and facilitated the adoption of new behaviors. It should be noted here that these new contraceptive methods are the most widely used methods in Africa: five modern methods (injectable, pill, implant, IUD, condom) account for 90% of contraceptive methods used, among which almost half (42% of total) are injectables (source: Demographic and Health Surveys, or DHS).

It was also during this period that were founded the leading organizations responsible for disseminating modern contraception and monitoring its effects, such as the Population Council (1952), the International Planned Parenthood Federation (IPPF, 1952), the Pathfinder Fund (1957), as well as the specialized programs of large American foundations (Ford, Rockefeller, Hewlett-Packard, etc.) and of the American government (USAID). At the level of international organizations, the United Nations created in 1967 an agency specialized in population issues: the United Nations Fund for Population Activities (UNFPA). Other UN agencies will also participate in this movement in various ways: World Health Organization (WHO), UNICEF, World Bank, etc.

With the development of major family planning programs worldwide, many consulting firms and consulting groups, mostly American and financed by USAID, were created since the 1970s,

which played an important role in the establishment, management and evaluation of family planning programs, such as: Family Health International, Futures Group, PSI, JSI, MSH, Abt Associates, World Vision, etc. The programs were monitored mainly through demographic sample surveys, firstly the Contraceptive Prevalence Surveys (CPS) in the 1960s, then through more elaborate surveys: the World Fertility Surveys, or WFS (1972-1984), and especially the Demographic and Health Surveys (DHS), which have been in place since 1985 to date.

## **2.2. Major international programs**

The first population intervention trial was conducted in the 1950s, in the form of a clinical trial with an intervention area and a control area, in the Punjab province of India, around the village of Khanna, in 1954–1959 [12]. India was the first country to officially adopt a family planning program in 1952. Following this trial, many family planning programs were implemented in most Third World countries, in Asia, Latin America, the Middle-East, North Africa and later in sub-Saharan Africa.

## **2.3. African family planning programs**

With respect to modern contraception, very little was happening in Africa during the colonial period, that is, before 1960. At that time, the dominant doctrine was that the continent was under-populated, and that demographic growth, already strong at that time, though little documented, was conducive to economic development.

Awareness of the population problem began to change in the 1960s and 1970s with the emergence of the first population censuses, which showed an extremely high population growth, often between 30 and 40 per 1000, which clearly could not last for a long time. Let us recall that with a growth of 35 per 1000, a population doubles every 20 years, producing a multiplication by 32 within a century. The first population projections made by the United Nations Population Division (UNPD) and subsequent studies of the Futures Group (RAPID project) made it possible to ring the bell: it was clear that the continent would run to catastrophe if fertility remained at a very high level, or even increased, while mortality declined rapidly. Let us recall here that it takes almost a century to stop the devil engine of population growth. It was at this time that the first family planning programs were set up in Africa [13].

## **2.4. Major international conferences**

Another factor that led to awareness and changes in the attitude of governments from pronatalist to neo-Malthusian was the holding of major international population conferences, held approximately every 10 years by the United Nations agencies, by major American foundations, or by other organizations [14, 15].

- The International Conference on Family Planning Programs held in Geneva in 1965 was the first to show the impact of modern contraception on fertility trends in some Asian countries (South Korea, Taiwan), and to seek consensus on the issue.
- The World Population Conference held in Bucharest in 1974: this conference was the first arena of struggle between supporters and opponents of family planning policies. The opponents,



a minority represented by some Third World countries like Algeria and Argentina and some communist countries, supported the slogan: “the best pill is development.” Their argument was that economic development was a prerequisite for declining fertility, that is, economic growth must create the necessary and sufficient conditions for fertility control. In the following years, the experience of many Third World countries showed the opposite, that is that family planning programs could work well in very poor countries with low economic growth. However, this meeting resulted in the adoption of a global action plan (World Population Action Plan), a reference document used extensively thereafter. This very comprehensive document contains 109 recommendations covering all aspects of population, health and development policies which were later implemented in the world, including technical details such as data collection, assessment, training and research.

- The International Conference on Population held in Mexico in 1984: this conference was the first to express an almost unanimous consensus on the need to limit the number of births globally, and received the strong support of Western countries for family planning programs. On one hand, this meeting was an important step forward, because African countries endorsed the “Kilimanjaro Declaration,” which affirmed their support for family planning programs in the continent. On the other hand, the United States of President Ronald Reagan expressed opposition to induced abortion and to programs supporting abortion (Global Gag Rule).
- The International Conference on Population and Development (ICPD) held in Cairo in 1994, emphasized the public health aspects of contraception, introduced the concepts of “Reproductive Health” and “Sexual Health”, in the context of the fight against HIV/AIDS and other sexually transmitted infections. The conference insisted on the rights of women to control their reproduction and on their autonomy of decision. By focusing on the individual, this approach was closer to that of the pioneers of contraception, and avoided the pitfalls of the so-called population control approach that was dominant in the 1950s.
- The International Parliamentarians’ Conference on the Implementation of the ICPD, held in Strasbourg in 2004, continued along the same lines and saw a solemn commitment by parliamentarians from all over the world to continue to implement the ICPD Plan of Action.
- The Family Planning Summit held in London in 2012, under the aegis of the British government and the Gates Foundation, proposed to continue along the same lines, and to focus efforts on the lagging countries (69 countries were selected, including the poorest countries and many African countries), with the goal of universal access to contraception by year 2020.
- This conference was followed 5 years later (10–11 July 2017), also in London, by a new summit with the same actors, focusing on the needs of adolescent girls.

Of course, these large international meetings were complemented by a myriad of small conferences, seminars, scientific and political meetings on the subject since 1950.

## **2.5. Development of family planning policies and programs**

The development of modern contraception and family planning in Africa follows overall the same patterns in most countries, with some local variants:

- Arrival of modern contraceptives, first in pharmacies and among private doctors.
- Establishment of private family planning associations, generally affiliated to IPPF, and opening of the first specialized clinics.
- Establishment of a national family planning program, first in urban areas and then in rural areas, usually supported by a strong international technical and financial assistance. At the beginning, these programs are based on fixed structures (hospitals, clinics, family planning centers), then on mobile teams that make home visits or even distribute contraceptives to women at home.
- Official adoption of a population policy, often with precise objectives (maximum number of children per couple, prevalence of contraception above a threshold, etc.).
- Development of programs as needed: development of integrated reproductive health programs, development of contraceptive mix, awareness campaigns (information, education, communication, or IEC), sex education in schools, adolescent awareness (peer group education), etc.

Thus, there is a wide range of situations in African countries, from countries who adopted a population policy and developed a family planning program early on, who were successful in funding and managing their programs, and who reached the whole population thanks to a good coverage of the fixed posts and of the mobile teams, to countries who started later, who invested little in the program or who mismanaged it, and who reached only a fraction of the national population. There is therefore a wide range of situations in fertility declines, which are presented below.

## 2.6. Legal and religious barriers

There are many ideological, legal and political obstacles to family planning programs, as will be illustrated in the case studies presented below. But there are a few specific obstacles that need to be mentioned with respect to African countries:

*The French law of 1920:* This law, passed on July 31, 1920, following the First World War and the demographic deficit that followed, prohibited “any propaganda on contraception or against the birthrate” and severely repressed induced abortion and its promotion. It was voted in the hope of raising the birthrate in order to have more soldiers in case of war, and to regain the numerical superiority of France as in the previous centuries. This law applied not only in metropolitan France but also in Algeria and in all the French colonies, where it remained in application after independence. This law was abolished only on December 28, 1967 in France (*Loi Neuwirth*). In Africa, countries concerned had to revoke this law before undertaking information and awareness campaigns on family planning. In many francophone African countries, it was not until the 1980s or 1990s that this law was abolished. The project to harmonize legislations in Francophone West Africa came even later. The model law on Sexual and Reproductive Health was adopted at the Abidjan Symposium on June 9, 1999 and subsequently implemented in the 10 countries concerned [16].

*The position of the Catholic Church:* in response to the secular movements and to the positions taken by the Anglican Church, the Catholic Church condemned modern contraception very early on, and on several occasions: encyclical *Casti Connubii* of Pope Pius-XI (1930), encyclical *Humanae Vitae* of Pope Paul-VI (1968), apostolic exhortation *Familiaris Consortio* of Pope

John-Paul-II (1981), and speech of Pope Benedict-XVI (2008). The position of the Catholic Church is essentially philosophical, therefore subject to adjustments, such as for example about the use of condoms. However, the Catholic Church allows certain forms of traditional contraception, defined as “observing the natural rhythms of woman’s fertility”, such as: periodic abstinence, cervical mucus, temperature method, etc.

*The position of certain Islamist groups:* Islam generally favors contraception for two reasons: to improve the health of mother and children, and to take account of economic constraints of the family. However, many Muslim schools of thought are opposed to sterilization and abortion. Moreover, some highly politicized groups are hostile to any population policy aimed at reducing the number of Muslims. These positions vary widely between countries, schools of thought, and periods [17].

## **2.7. Ethical and political debates**

The spread of modern contraception and the introduction of family planning programs raised many ethical issues around the world, which have evolved considerably over the years [10]. The most important debates have been on induced abortion, on male and female sterilization, and on the side effects of hormonal contraceptives (pills and injectables in particular). These debates were fierce in countries where population policies were restrictive or even coercive (China, Indonesia), and in countries where financial incentives for sterilization were important relative to income levels (India, Bangladesh). These issues have little affected African countries, because induced abortion is still largely illegal (except in South Africa and Ghana) and because sterilization is still rare, whereas it is the most frequent method in Asia. In Africa, questions have been raised about injectable contraceptives (Depo-Provera), because they increase the susceptibility to the HIV virus causing AIDS [18, 19].

Furthermore, the 1960s and 1970s saw many debates and polemics on the question of the role of the developed countries, in particular the United States, in the promotion of family planning in the countries of the Third World. These actions were sometimes perceived as a form of “imperialist plot” or “cultural intrusion” in Asia, Latin America and Africa. These discussions virtually disappeared after the 1984 conference, the adoption of a broad consensus at the global level, and the paradigm shift toward reproductive health in 1994.

## **3. Trends in fertility and family planning in Africa**

This section revisits previous studies and provides a general overview of fertility trends in African countries, separating urban and rural areas, because their population dynamics are different. There are even countries in Africa where fertility continued to increase in rural areas, while it was declining in urban areas for decades, such as Congo-Kinshasa.

### **3.1. Data and methods**

It should first be recalled that no country in sub-Saharan Africa maintains a complete civil registration of births and deaths necessary for monitoring precisely changes in birth and death rates. For the purpose of estimating fertility levels and trends, sample demographic surveys,

based on representative household samples, were used, in particular the well-known Demographic and Health surveys (DHS), which collect maternity histories of women in their reproductive ages. These surveys are conducted approximately every 5 years, but are sometimes separated by 10 years or more, and data available in 2017 essentially cover the period before 2010.

DHS surveys and related data have been used to reconstruct levels and trends in fertility since 1950, separating urban and rural areas. The technical details of this reconstruction are presented in other documents [20–22]. In brief, annual fertility rates can be calculated for the 10 years prior to each survey, which allows long-term trends to be reconstructed, despite the large random fluctuations due to small samples (5000–15,000 women in general). This reconstruction has been done separately for urban and rural areas for 35 African countries, which comprise more than 90% of the continent's population.

DHS surveys also permit to reconstruct levels and trends in the use of modern contraception. The technique is somewhat different: trends were reconstructed by cohort (year of birth), which allowed reconstructing the trends by period (calendar year), again since 1950, and separately for urban and rural for 35 countries. The technical details of the calculations are presented in another document [21].

The Futures Group, a USAID sponsored consulting group, produced an indicator of the intensity of family planning programs, called the "Effort index," which is expressed as the percentage completed by the program in relation to an ideal of 100%. The indicator measures several parameters with 30 variables in three chapters: official policy, service activity, and program monitoring. This study is available at intervals of 5–10 years: 1972, 1982, 1989, 1994, 1999, 2004, 2009, which makes it possible to reconstruct the dynamics of the program efforts over a long period of time. The indicator is available for 37 African countries, but with some missing data [23].

This study also refers to other sources of data, in particular to data on Gross Domestic Product (GDP) per capita gathered by Angus Maddison and colleagues, expressed in constant dollars (1990 International Geary-Khamis dollars) and converted to 2011 dollars [24].

### 3.2. Fertility trends in urban and rural areas

The reconstruction of fertility trends from demographic surveys shows firstly a marked increase in fertility in rural areas from 1950 to 1980, followed by a decline, from 7.05 to 6.08 children per woman between 1980 and 2010, that is 19.2% of the fertility transition from the maximum level to the level of 2 children per woman, considered as the end of the transition. The increase in the years 1950–1980 is due to the improvement of sanitary conditions and especially to the control of tropical and sexually transmitted diseases causing primary and secondary infertility. In urban areas, the increase in the first years is markedly lower, and the decline in fertility begins in 1976 (5.90 children per woman), reaching 3.96 in 2010, almost half the transition (49.7%). It should be noted that fertility control in urban areas probably started before 1976, and that without modern contraception, which was already noticeable at that time (10% prevalence), there would probably be an increase in fertility in urban areas as well (**Figure 1**).

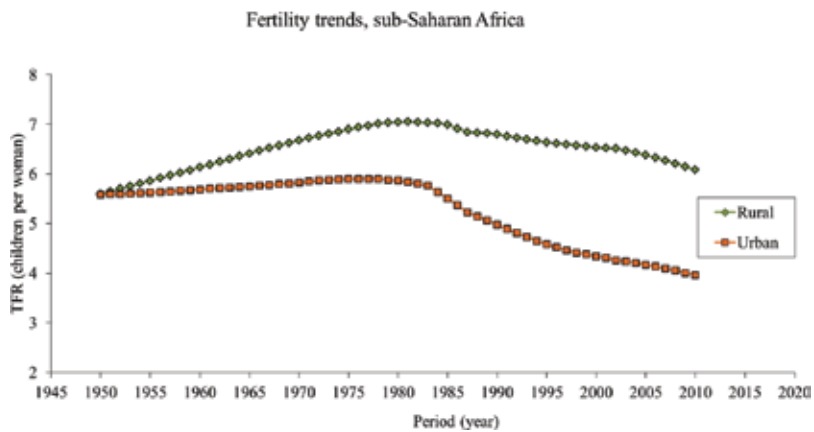


Figure 1. Trends in fertility in sub-Saharan Africa. Source: reconstruction from demographic surveys in 35 countries.

### 3.3. Trends in contraceptive use

Reconstruction of trends in contraceptive use, as measured by the proportion of women who have used modern contraceptives, shows a fairly consistent pattern. In urban areas, contraception appeared in the 1960s, but remained infrequent in the first decades, reaching the 10% threshold in 1974, and covered approximately half of women in 2005 (49.3%). In rural areas, modern contraceptive use started later and its increase was slower: the 10% threshold was reached in 1989, and it covered only 28.4% of women in 2005 (Figure 2).

### 3.4. Intensity of family planning programs (Effort index)

The evolution of the indicator of family planning programs, which measures both the efforts made and the program's operations, revealed a rather rapid rise between 1972 and 1999, followed

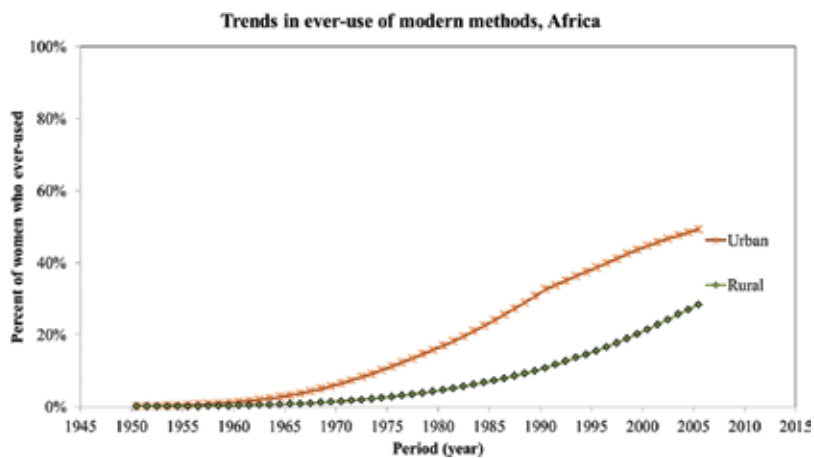


Figure 2. Trends in contraceptive use in Africa (proportion of women who have ever-used modern contraception). Source: reconstruction from demographic surveys in 35 countries.

by an apparent stagnation, which however has not translated into a decline in contraceptive prevalence (**Figure 3**). Ideally, one would have hoped to reach 90% in 2009, but the indicator remained at about half (45.6%). This national indicator corresponds to half of women covered by contraception, which can be compared to half of the fertility transition in urban areas, but hides the significant backwardness of the rural environment.

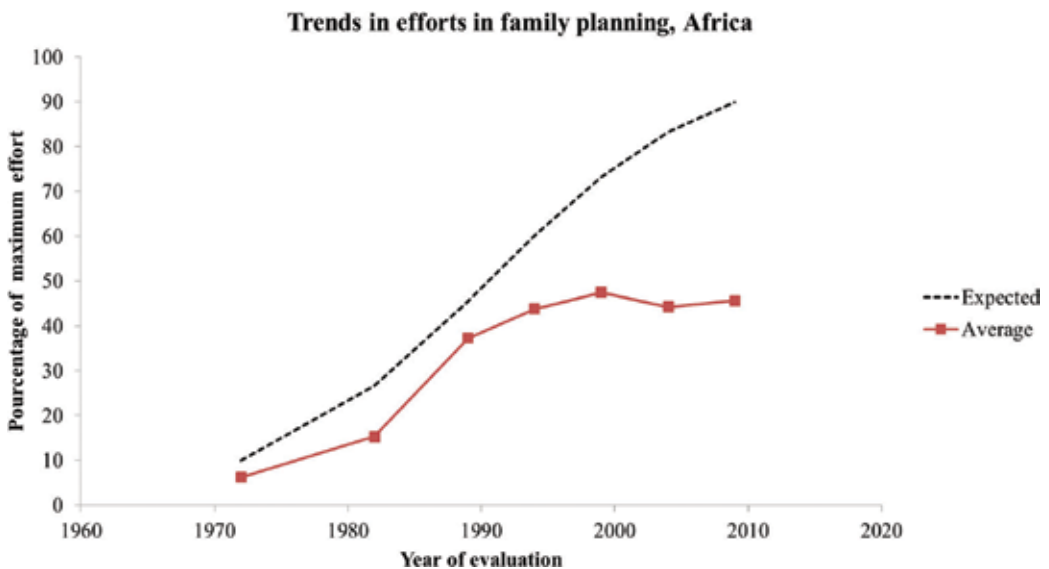
### 3.5. Socio-economic correlates

Most of the numerous studies on the socioeconomic correlates of fertility and contraceptive prevalence are carried out in cross-sectional analyses, that is to say, with data applicable at the time of the survey. They consistently show a correlation, at household level and at any given point in time, between socio-economic status (measured by level of wealth, or by level of education), contraceptive use and fertility level [25].

In contrast, longitudinal studies show different results at aggregate level, when the transition from natural fertility to the adoption of modern contraception is studied in response to changes in income, wealth and education over time. For example, an analysis of African countries between 1977 and 1999 shows that changes in per capita income and in level of education do not explain changes in fertility levels: most of the variations can be explained by changes in contraceptive use, age at first marriage, and urbanization, which follow other dynamics [21, 26].

### 3.6. Contraception and fertility in Africa

Finally, it should be noted that in African countries, at national level, the relationship between prevalence of contraception and level of fertility is surprising. Indeed, one would expect higher



**Figure 3.** Trends in the intensity of family planning programs in Africa. Source: Futures Group: average calculated on 37 countries (some years are missing).

fertility levels if one considers only the prevalence of contraception. At the global level, it is estimated that without contraception some 7 children per woman are expected, and that 80% of contraception is needed to ensure complete control of fertility, or 2 children per woman. In Africa, however, fertility levels are well below the level expected from contraceptive prevalence, indicating that other phenomena, in addition to contraception, are not adequately measured by demographic surveys (induced abortion, separation of couples, traditional contraception, incomplete declarations, etc.). A detailed analysis of 32 African countries showed that the increase in modern contraception explains only about half of the decline in fertility (50.9% in urban and 41.4% in rural), the remainder being unexplained [27].

## 4. Case studies on fertility decline

This section presents some well documented and contrasting specific cases: cases of completed fertility transition, cases of rapid decline in fertility in urban areas, and cases of no significant decline in rural areas, in order to show the great diversity of situations among African countries.

### 4.1. Completed fertility transitions (national level)

According to United Nations recent estimates, only five countries or territories in Africa have completed their fertility transition at national level [6]. Only one is located on the continent: South Africa, a country which benefited from an excellent family planning program since 1974, and which is much more economically and socially advanced than other African countries [28–30]. It should be noted, however, that the case of South Africa is complex: marital fertility (after the first marriage) is now very low (of the order of 1.5 children per woman), and this applies to all racial and ethnic groups, but there are still significant pockets of pre-marital fertility, especially among adolescent girls and disadvantaged groups (Black/African, Colored), indicating incomplete fertility control and a deficiency in the family planning program [31, 32].

The other countries that have completed their fertility transition are islands, which have profiles distinctly different from other African countries: Mauritius, which has been the pioneer in this field among African countries and has fertility below replacement level since 1994; Reunion, which benefits from the French public health system; the Seychelles islands, and the Cabo Verde Islands. All have benefited from excellent family planning programs, excellent health services and a level of development well above the African average (**Figure 4**).

### 4.2. Rapid fertility decline in urban areas

In some countries, the fertility transition in urban areas is almost complete: three southern African countries: Botswana, Lesotho, and Swaziland, which are geographically and culturally close to South Africa, and who adopted family planning programs similar to that of their big neighbor; and two East-African countries: Kenya (discussed in more detail below) and Ethiopia. The decline in fertility in urban areas of the latter country, particularly poor and isolated, surprised many observers and was the subject of several publications [33]. These five cases are illustrated in **Figure 5**.

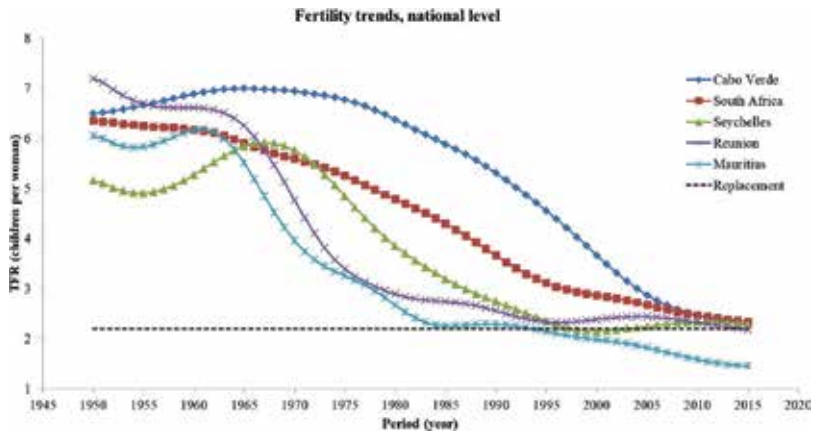


Figure 4. African countries which have completed their fertility transition. Source: United Nations, 2015.

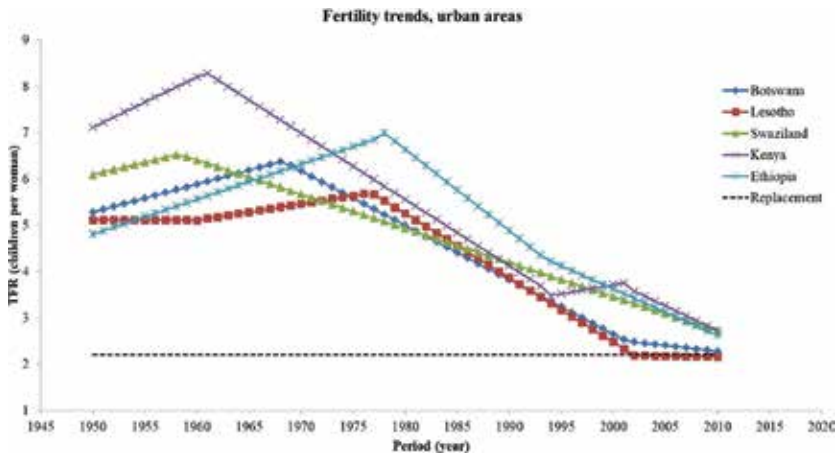


Figure 5. Selection of African countries having nearly completed their fertility transition in urban areas. Source: reconstruction from demographic surveys.

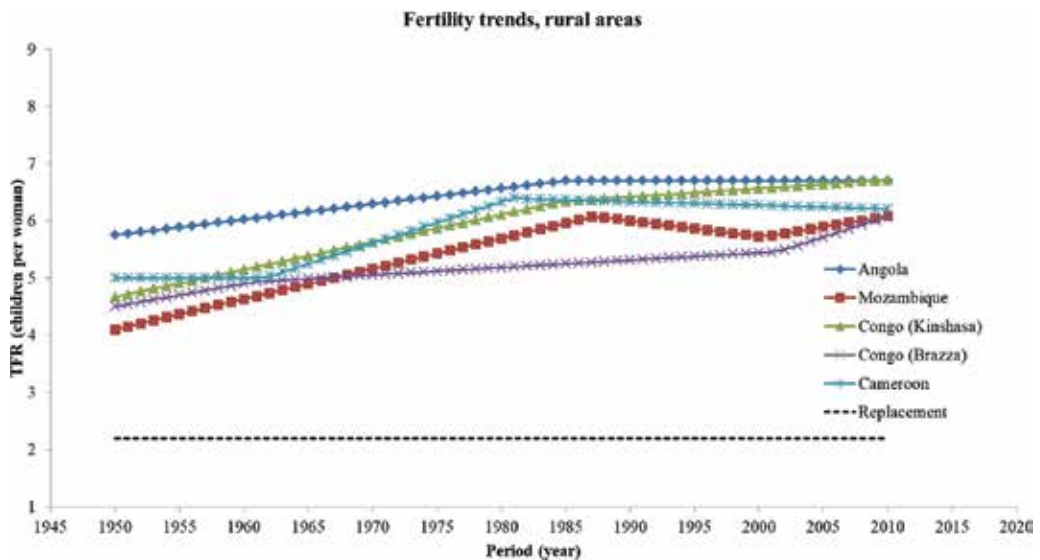
### 4.3. No decline in rural areas

At the other end of the spectrum are countries that have not yet begun their fertility transition in rural areas: these are two former Portuguese colonies that have gone through a period of difficult decolonization: Angola and Mozambique (discussed below), and three Central-African countries: Congo-Kinshasa (former Zaire, or DRC), Congo-Brazza (former RPC), and Cameroon (Figure 6). These five countries did not have effective family planning programs, and four of them (apart from Cameroon) experienced long periods of civil war, which severely disrupted the rural health system.

### 4.4. Other cases

These extreme cases should not hide the other cases, and the great diversity of situations in African countries in terms of fertility transition. Table A1 shows that fertility declines in urban





**Figure 6.** Selected African countries which have not yet begun the fertility transition in rural areas. Source: reconstruction from demographic surveys.

areas, as a percentage of the transition, ranged from 19% (Congo-Brazza) to 96% (Lesotho) with an average of 60%, and in rural areas it ranges from 0% (Angola, Mozambique, Congo-Brazza, Congo-Kinshasa) to 76% (Botswana), with an average of 29%. These large differences between countries are mainly due to differences between family planning policies and programs, as illustrated in the next section.

## 5. Contrasts between countries (rural areas)

This section presents striking contrasts between countries with fairly similar characteristics but very different demographic dynamics in rural areas due to differences in family planning policies and programs. These case studies cover various regions of Africa: Central Africa (Rwanda/Burundi), East-Africa (Kenya/Uganda), West-Africa (Ghana/Nigeria), Southern Africa (Zimbabwe/Zambia) and South-Eastern Africa (Madagascar/Mozambique). The aim of this section is to show the differential impact of family planning programs on fertility decline in rural areas, by comparing cases (successful country) with controls (country failing to control its fertility).

### 5.1. Rwanda and Burundi (rural areas)

Rwanda and Burundi are two neighboring countries located in Central Africa, with similar sizes (10.6 and 9.2 million inhabitants in 2010), very high population densities (403 and 332 inhabitants per km<sup>2</sup> in 2010), low urbanization (18.8 per cent and 10.6 per cent in 2010), low levels of income (1262 and 725 US \$ in 2011), and a similar level of ethnic composition (with two rival ethnic groups: Hutus and Tutsis). These two countries share the same colonial history

and were parts of the same Belgian colony, known as Rwanda-Urundi, until independence (1962). Their economic histories diverge somewhat: Rwanda experienced a period of growth from 1964 to 1986, followed by a severe recession from 1986 to 1997, then by a rapid recovery with strong growth from 1997 to 2013. Burundi experienced a period of growth after independence until 1991, but this was followed by a long recession, lasting until 2013. Both countries experienced a long period of political strife, economic downturns and civil wars.

The stories of population policies and family planning programs also diverge very markedly between the two countries. In Rwanda, modern contraception appeared in 1962. A first family planning program was launched in 1977, which resulted in a first decline in fertility (from 7.9 in 1977 to 6.4 children per woman in 1991 in rural areas). A new phase was launched in 1990 as part of a pro-active population policy, but its implementation was hampered by the period of civil war which culminated in the 1994 genocide and was followed by a period of recovery with an increase in marriages and births, so that fertility remained virtually unchanged during the 1991–2002 period. In 2003, the family planning program took on a new development, a well-organized and well-funded program, with home visits, and even a target of a maximum of 4 children per family. This program resulted in a dramatic decline in fertility, from 6.0 children per woman in 2003 to 4.1 children per woman in 2013 in rural areas [34, 35].

In Burundi, the developments were slower and later, and provoked more reticence and negative reactions. Awareness about the population problem did not appear until the early 1980s, following the 1979 census and the first RAPID population projection studies. The first official political position in favor of family planning and the first pilot project date back to 1983, but faced a frontal opposition from the Church, which in 1986 created a movement hostile to modern contraception (*L'Action Familiale*). This movement considerably hampered the first attempts to promote family planning at the national level (1987–1988). Moreover, family planning programs were severely disrupted by the civil war (1993–2000) and the subsequent political turmoil. A new impetus was given in 2011–2012, including the creation of “Family and Community Development Centers,” with strong support from UNFPA, but it is too early to see their effects since the last DHS survey was conducted in 2010 [36, 37].

**Table 1** summarizes the contrast between the two countries: the effort index of the family planning program was always higher in Rwanda than in Burundi since 1982, home visits were more frequent, and therefore the prevalence of contraception, and the fertility decline was larger. Regarding the rural environment, between 1980 and 2010, Rwanda achieved 56.3% of its fertility transition, while Burundi realized only 5.6%, a huge difference with multiple consequences (**Figure 7**).

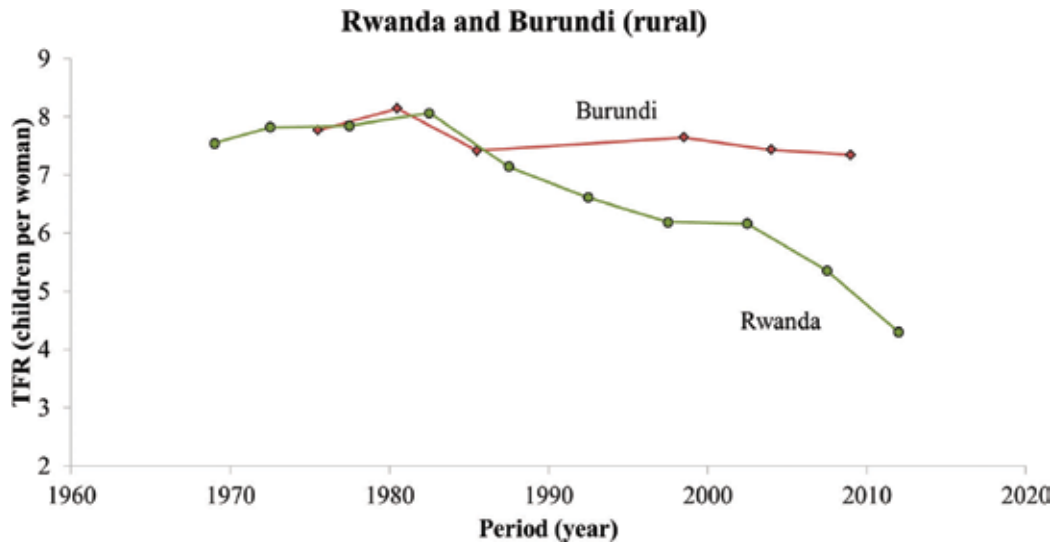
## 5.2. Kenya and Uganda (rural areas)

Kenya and Uganda share a common colonial history, as parts of the British Empire, until independence (1963 and 1964 respectively). At this date, per capita income was equivalent in both countries. From an economic point of view, Kenya had first a favorable period with steady growth until 1990, followed by a period of recession (1990–2003) and then a new period of growth until 2013. Uganda followed a more tortuous path, disrupted in particular by the

		Rwanda	Burundi
Family planning (national)	Effort index, 1982	23.0	10.5
	Effort index, 1999	62.1	40.2
Contraception (rural areas)	Last survey	(2014)	(2010)
	Prevalence	46.7%	16.7%
	Home visit	21.5%	4.1%
Fertility (rural areas)	TFR, 1980	8.03	6.94
	TFR, 2010	4.64	6.67
	% Transition	56.3%	5.6%

TFR, Total Fertility Rate (number of children per woman).

**Table 1.** Comparison of fertility and family planning indicators: Rwanda and Burundi.



**Figure 7.** Comparison of fertility trends in rural areas: Rwanda and Burundi.

period of civil unrest and civil war which followed the seizure of power by Idi Amin Dada: severe recession between 1971 and 1986, then stagnation until 1991, followed by economic growth up to 2013.

Kenya held the world record in fertility at the time of independence, and was a pioneer for family planning in Africa. Modern contraception was introduced in Kenya in 1957 and the first clinics distributing modern contraceptives began in 1960. The Kenyan Family Planning Association (FPAK) was created in 1962 and the national family planning program was launched in 1967, the first national program in sub-Saharan Africa, then expanded in 1975. An official population policy was declared in 1984 and subsequently updated (1996,

2007, 2012). These policies and programs had virtually no opposition, neither from political authorities nor from religious authorities. Since the 1960s, family planning has grown steadily, first in public and private clinics and NGOs, and then through community-based health workers, outreach programs (Community-based distribution), improved communication (Information, Education, Communication program), and integrated reproductive health programs. All these programs have been generously financed by the Kenyan government and various international actors (bilateral aid, multilateral aid, international organizations, NGOs, etc.), in particular British and American, and have benefited from the advice of many international experts. The various contraceptive methods have remained essentially free, and are widely distributed and available to the general population [38, 39].

The development of family planning in Uganda was very different, and was considerably delayed by the political turmoil of the 1971–1986 period. Although modern contraception came very early (1957), as in Kenya, that the Ugandan association has officially existed since 1963, that the first family planning clinic was opened in the same year, and modern contraception was available in public hospitals as early as 1968, many obstacles impaired its development: opposition from traditional, political and religious leaders, and very strong restrictions on access (married women with at least 3 children and with the husband's permission). Then, shortly after his coming to power, Idi Amin banned family planning in 1972, and drove out people of Indian origin, many of whom were doctors. It took about 10 years for the program to restart timidly: contraception became again available in public hospitals and clinics in 1983, adoption of a population policy in 1995, and especially a new start in 2004–2005 with the development of a major awareness campaign (IEC), followed by new actions in 2008 and 2015 [40].

The consequences of these different stories are impressive (**Table 2, Figure 8**). In rural Kenya, fertility declined considerably between 1980 and 2010 (53.3% of the transition), while it stagnated at high levels in rural Uganda, declining only in recent years (2003–2011). It should be noted, however, that in Kenya, the decline in fertility has not been steady: first slow between 1964 and 1981, then rapid until 1994, and then halted or even slightly increased for some

		Kenya	Uganda
Family planning	Effort index, 1982	28.1	17.1
(national)	Effort index, 1999	48.7	50.4
Contraception	Last survey	(2014)	(2011)
(rural areas)	Prevalence	50.9	23.4
	Home visit	6.8	8.7
Fertility	TFR, 1980	8.81	7.92
(rural areas)	TFR, 2010	5.18	6.80
	% Transition	53.3%	18.9%

TFR: Total Fertility Rate (number of children per woman).

**Table 2.** Comparison of fertility and family planning indicators: Kenya and Uganda.

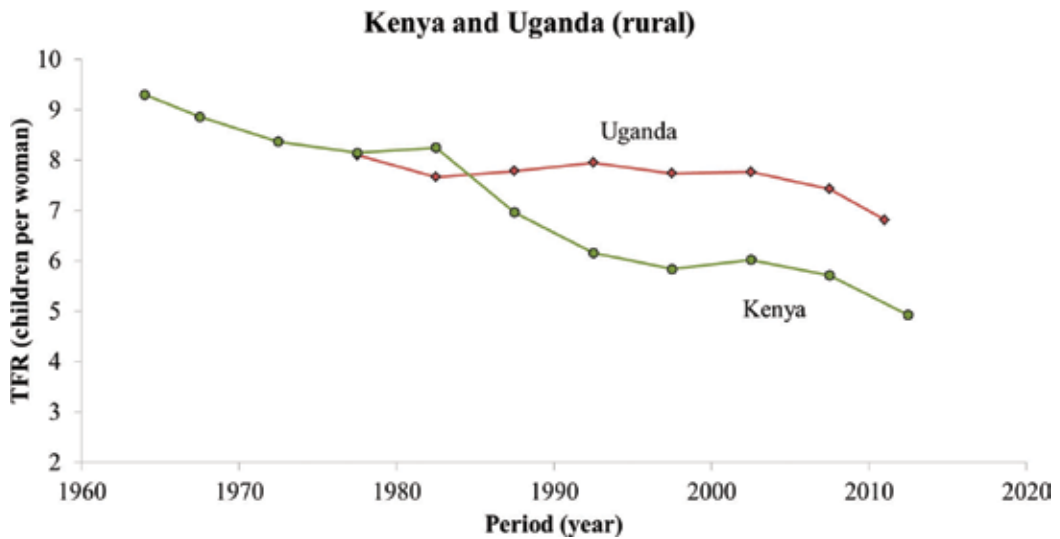


Figure 8. Comparison of fertility trends in rural areas: Kenya and Uganda.

10 years before resuming after 2004. This phenomenon of stagnation (fertility stall), which corresponds to the period of economic recession, was the focus of numerous academic debates but remains largely unexplained [41–44].

### 5.3. Ghana and Nigeria (rural areas)

Ghana and Nigeria, both located on the coast of the Gulf of Guinea in West-Africa, share a similar colonial history, as parts of the British Empire. The two countries had a fairly strong economy and a serious potential at time of independence (1957 and 1960 respectively). Both countries have a fairly high level of education and similar population structures with north/south opposition (savanna/forest and coast) which corresponds roughly to a cleavage between Muslims and Christians. But the divide between ethnic groups and religions is very strong in Nigeria, leading to fierce struggles and even civil wars (Biafra, Boko-Haram), while inter-ethnic or inter-religious tensions are very low in Ghana. The economy of Ghana had a favorable period until 1974, followed by a long recession of about 10 years, due to political instability and corruption of the “kalabule” years, followed by a period of steady and sustained growth (1983–2013), combined with political stability and sound economic policies. Nigeria’s economy, dominated by oil exports, has fluctuated greatly in response to fluctuations in international oil prices and to political instability of the country: growth up to 1965, recession at the time of the Biafra war, growth from 1968 to 1977, strong recession until 1984, followed by rapid growth until 2013.

The history of family planning in Ghana is quite similar to that of Kenya, with an early start, sustained and steady development, and little resistance or barriers. Interest in family planning began shortly after independence, and in 1961 there was a Family Advice Center in Accra, the capital city. Apart from a short period (1964–1966), when President Nkrumah banned contraception,

the country committed itself early on to a voluntary population policy and was the first African state to sign an international convention on the subject in 1967 (World Leaders Declaration on Population). A national population policy was established in 1969, and in 1970 family planning structures were set up in hospitals and public health centers, as well as in private family planning centers. The family planning program developed regularly thereafter, with extensive awareness campaigns (1986) and regular updates such as integration into reproductive health (1994, 2006) [45, 46].

The history of family planning in Nigeria is different and has been marked by several major handicaps: lack of political commitment and recurrent political instability; on social grounds, strong resistance from traditional and religious authorities, especially Muslims in the north and Catholics in the south, as well as sexual taboos, rumors and frontal opposition to certain methods of contraception from selected groups; at organizational level, poor organization and mismanagement of the program, and in particular low reliance on community activities. However, family planning had started early, in 1962, with the creation of an association (Family Planning Council of Nigeria). As in Ghana, but later, a population policy was adopted in 1989 (National Population Policy for Development, Unity, Progress, and Self-Reliance), followed by an awareness campaign (1992), but they were not successful and did not have an impact as in Ghana, although an ambitious goal of four children per woman has been recently adopted. The family planning program was reactivated in 2004, then in 2012, but so far had only modest effects in rural areas [47–49].

As a result, the 2010 indicators differ widely between the two countries: rural Ghana achieved already almost half of its transition (43.3%), while rural Nigeria is still in its early stage (13.0%). In Ghana, all indicators are better: the program effort index, the prevalence of modern contraception, and home visits (**Table 3**). In Ghana, rural fertility declined steadily since 1980, while in Nigeria it has been irregular, fluctuating, and declining only since 2002 (**Figure 9**). In addition, it should be noted that demographic data in Nigeria are problematic, while they are of much better quality in Ghana. Furthermore, in urban areas fertility is low in Ghana (3.2

		Ghana	Nigeria
Family planning (national)	Effort index, 1982	17.8	12.8
	Effort index, 1999	46.4	33.6
Contraception (rural areas)	Last survey	(2014)	(2013)
	Prevalence	24.6	5.7
	Home visit	12.2	5.3
Fertility (rural areas)	TFR, 1980	6.95	7.25
	TFR, 2010	4.80	6.57
	% Transition	43.3%	13.0%

TFR: Total Fertility Rate (number of children per woman).

**Table 3.** Comparison of fertility and family planning indicators: Ghana and Nigeria.

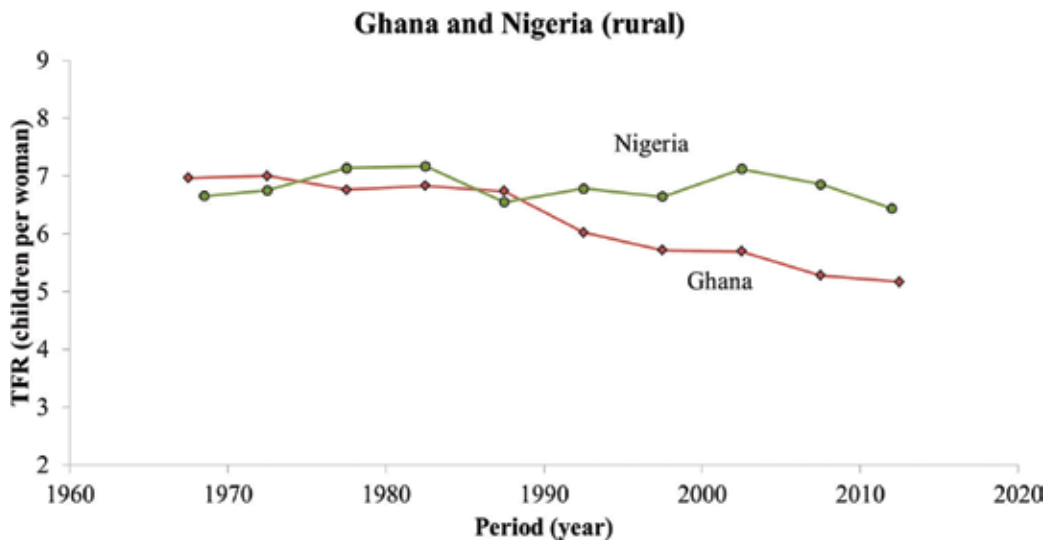


Figure 9. Comparison of fertility trends in rural areas: Ghana and Nigeria.

children per woman in 2010), while it remained abnormally high in Nigeria (4.9 children per woman in 2010), given the level of development and the level of education of the country.

#### 5.4. Zimbabwe and Zambia (rural areas)

Zimbabwe and Zambia, two neighboring countries in Southern Africa, also share a common British colonial heritage, as Southern Rhodesia and Northern Rhodesia. However, their post-colonial stories diverge, like their economic performance and their family planning programs. Zimbabwe became independent late (1980), following a disturbing period of civil war. Power was taken by a very marked left-wing government, a single party (ZANU), and a highly controversial leader (Robert Mugabe). While economic growth was strong in the 1960s, it stopped during the period of struggle for independence and in the years that followed (1973–1998), before collapsing for about 10 years, a consequence of deleterious economic policies and social disasters. Growth has only recovered since 2010, but by 2013 GDP per capita was barely equal to that of 1960. In a very different situation, Zambia became independent in 1964, with no particular hardship at the time of decolonization. Its economic history is marked by a long recession since 1975, which followed the fall in copper prices on international markets, copper ore being its main export good. Growth did not resume until year 2000, and has been sustained since. The period of acute economic crisis (1975–1995) had many consequences: cuts in social budgets, departures of doctors (especially expatriates), and increased mortality of children [50].

In Zimbabwe, despite repeated political and economic crises, the family planning program has been a notable success, often cited as an example in Africa. It should first be noted that modern contraception has been available since 1953, although initially restricted to urban elites and expatriates. Family planning in Zimbabwe has not met with any marked opposition, even if some anti-colonial elites initially doubted its interest. Family planning began in

1965 with the creation of a National Association of Rhodesia and the establishment of the first specialized clinics (1967). It is important to note that the program relied very early on mobile teams (1973), on the distribution of modern contraceptives to families by specialized agents (Community-based distributors), and on information campaigns in schools (Youth Advisory Services). The new government set up at independence continued, unified and developed this pioneering work. The Family Planning Association was incorporated into the Zimbabwe National Family Planning Council in 1985 and became an important element in public health policy. Infrastructure was expanded, staff increased, and resources were sufficient, from national and international sources, to ensure a good geographical coverage. The system continued to function during the crisis years, despite the financial difficulties of the country, despite the departure of some medical staff, and despite the difficulties of supply and management [51, 52].

The case of Zambia is strikingly contrasting, while the country has benefited from a better economic and political situation than Zimbabwe. First, the position of political powers at independence was resolutely pro-natalist, as well as that of the main religious and traditional leaders. The government even went as far as to prohibit modern contraception and related literature in the first years after independence. Even women's associations (the Women's league) opposed it at the time. A first family planning association was founded in 1972 (Family Planning and Welfare Association of Zambia), but again faced a frontal opposition from the Family Life Movement of Zambia. The situation changed only after the Mexico Conference (1984), after which the government changed its position, adopted the Kilimanjaro resolution, and founded a new National Commission for Development Planning to coordinate efforts. A population policy was adopted shortly thereafter in 1989 (National Population Policy), integrated into the development plan and from there family planning spread throughout the country. Planning centers are set up in public hospitals and clinics, guides were developed in 1992 (Family Planning Policy Guidelines and Standards), and an awareness program was set up in 1994 (IEC). This program was updated several times (1996, 2006–2007, 2013), and integrates home distribution by specialized agents in the recent period. Although it has clearly stated goals (families with four children or less, 58% contraceptive prevalence) and if opposition from hostile groups diminished over time, the program has been slow to take off in rural areas [53, 54].

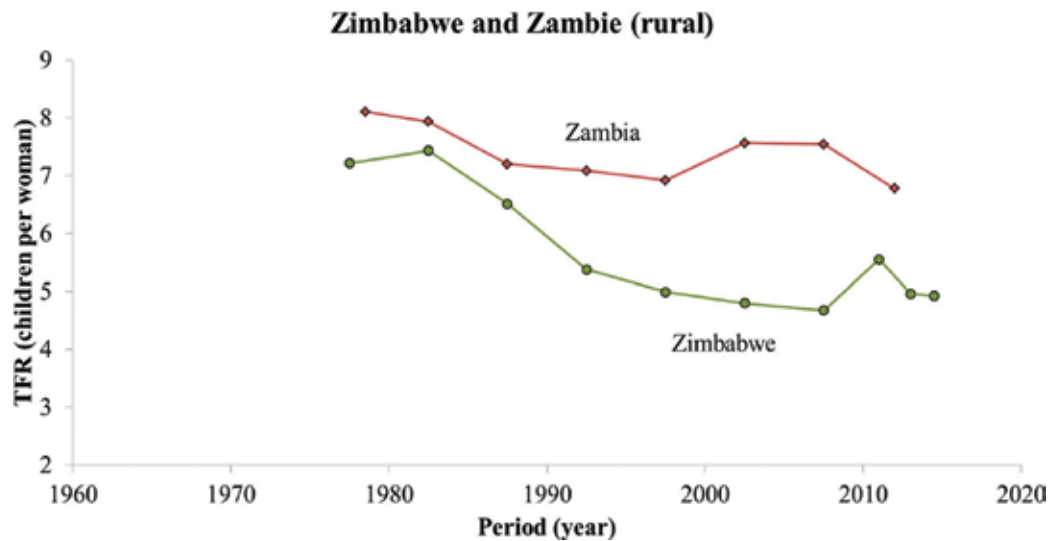
The contrast between the two countries is again striking: by year 2010, Zimbabwe achieved almost half of its transition in rural areas (45.6%), while Zambia experienced only a small decline (16.4% of the transition). Zimbabwe has better indicators in terms of efforts in family planning, and in the prevalence of contraception (**Table 4**). While Zambia made a serious effort to promote home visits, this effort is too recent to have had a significant impact. It should also be noted that fertility fluctuated in Zambia, following the economic crisis and recovery, while the decline has been steady in Zimbabwe, except for the recent period when it has stagnated since 2003: fertility trends showed even a surprising peak during the worst years of the economic crisis, probably due to a shortage in imported supplies of contraceptives, in particular pills and injectables, the most widely used methods in this country (**Figure 10**).



		Zimbabwe	Zambia
Family planning (national)	Effort index, 1982	27.3	16.4
	Effort index, 1999	59.9	44.6
Contraception (rural areas)	Last survey	(2015)	(2014)
	Prevalence	63.2	39.0
	Home visit	13.0	11.6
Fertility (rural areas)	TFR, 1980	7.52	8.11
	TFR, 2010	5.01	7.11
	% Transition	45.6%	16.4%

TFR: Total Fertility Rate (number of children per woman).

**Table 4.** Comparison of fertility and family planning indicators: Zimbabwe and Zambia.



**Figure 10.** Comparison of fertility trends in rural areas: Zimbabwe and Zambia.

### 5.5. Madagascar and Mozambique (rural areas)

Madagascar and Mozambique occupy a special place because they are two countries located in the extreme south-east of the continent, on both sides of the Straits of Mozambique, geographically isolated and having a common characteristic of extreme poverty (GDP per capita of \$ 1390 and \$ 933 respectively in 2010). Their colonial history is different, the large island having been colonized by France (independence in 1960) while Mozambique was colonized by Portugal and became independent later (1975). The two countries faced a serious political and economic crisis shortly after independence (1973–1983 in Madagascar,

1975–1992 in Mozambique), although the crisis in Mozambique was longer and marked by a civil war. Both countries have seen their per capita income drop seriously over a long period of time (1972–2002 in Madagascar, 1973–1995 in Mozambique), and recovered with difficulty.

In Madagascar, family planning began fairly early, was not subject to any particular reluctance, except occasionally by the Catholic Church, and has always been supported by successive governments, despite repeated political crises. A family planning association (FISA or Fianakaviana Sambatra) was set up and active since 1967, and the program was supported from the very beginning by UNFPA. In 1987, the public sector became involved and, in 1987, family planning centers were set up in health facilities. A National Population Policy for Economic and Social Development (PNPDES) was adopted in 1990 and from that date progress was rapid. In addition to fixed structures, the country promoted mobile teams since the 1990s, and it allowed the distribution of contraceptives by mobile teams. The country followed major global developments and updated its program on several occasions: National Policy on Reproductive Health (2000), awareness programs (2003), social marketing (Strategic Pathway to Achieving Reproductive Health Commodity Security), Action Plan for Madagascar (2006), sexual education in secondary schools, clubs for adolescent reproductive health (peer education), etc. Over the years, the country received technical and financial assistance from many agencies and donors, particularly from USAID [55, 56].

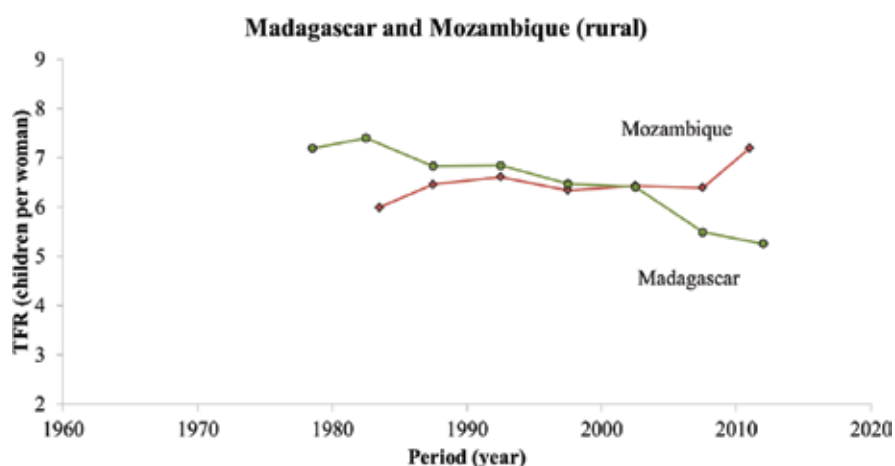
The situation is quite different in Mozambique. From the outset, the FRELIMO government, of Marxist obedience, was hostile to birth control, and did not include family planning in its maternal and child health policy defined shortly after independence (1980). There was also considerable reluctance among the population. A first program was announced in 1978, and the first trials were carried out under the aegis of UNFPA in the 1980s, but they remained timid and affected only a small fraction of the population. Large parts of the country were at civil war, and in particular public health was no longer functioning in rural areas in the central part of the country. Following the 1992 peace agreement, a new impetus was given in 1999 when defining a “Population Policy for Mozambique” and the adoption of the Millennium Development Goals (MDGs), but this effort was hampered by a large-scale HIV/AIDS epidemic, which captured a big chunk of public health resources. New programs were implemented in 2010, as part of a new family planning policy, which involved home visits (*Agente Polivalente Elementar*) and campaigns with volunteers. But until then, family planning has remained the poorest part of public health in Mozambique, and as a result, the prevalence of modern contraception has hardly increased between 1997 and 2011, and even seems to have declined between 2003 and 2011.

The contrast between the two countries is therefore very clear (**Table 5, Figure 11**). Madagascar achieved almost half of its transition in rural areas (46.7%), while in Mozambique fertility remained at a natural level, with no significant decline. The efforts made by Madagascar were much more important, and the prevalence of contraception was almost four times higher in 2010. While home visits have developed in Mozambique, this occurred only recently, within the framework of the new programs, which is very different from the situation in Madagascar where home visits have been practiced for nearly 25 years.

		Madagascar	Mozambique
Family planning (national)	Effort index, 1982	8.6	16.4
	Effort index, 1999	64.0	39.2
Contraception (rural areas)	Last survey	(2009)	(2011)
	Prevalence	28.0	7.2
	Home visit	7.5	8.1
Fertility (rural areas)	TFR, 1980	7.55	6.76
	TFR, 2010	4.96	6.76
	% Transition	46.7%	0.0%

TFR: Total Fertility Rate (number of children per woman).

**Table 5.** Comparison of fertility and family planning indicators: Madagascar and Mozambique.



**Figure 11.** Comparison of fertility trends in rural areas: Madagascar and Mozambique.

	Indicator	Cases (5 countries in progress)	Controls (5 countries late in the transition)	Relative difference
Income per capita (GDP)	GDP, 1980	1985 \$	1723 \$	1.15
	GDP, 2010	1941 \$	2303 \$	0.84
	Growth rate	-0.1%	+1.0%	
Level of education	AYS, 1975	2.20	1.28	1.71
	AYS, 2005	5.19	3.58	1.45
	Changes	+2.99	+2.29	

Note: Income: GDP per capita in 2011 dollars, national data; Level of education: in average years of schooling (AYS), women aged 15–49, rural areas.

**Table 6.** Comparison of income and level of education between cases and controls countries.

## 5.6. Socio-economic correlates

**Table 6** shows socio-economic correlates, women's per capita income and level of education, associated with cases (countries in progress) and controls (countries late in the transition). Both groups had equivalent income levels in both 1980 and 2010, with a small advantage for cases in 1980 and for controls in 2010, which ironically means that the control countries (lagging behind schedule) had better economic development between 1980 and 2010. For adult women's educational attainment, case countries had a small advantage in 1975, which they maintained over the years and even increased, but the differences remained small in relation to the large differences in fertility decline highlighted above. Therefore, these cannot be attributed to socio-economic differences.

## 6. Conclusions

In Sub-Saharan Africa, there is a wide range of situations in population policies, family planning programs and fertility control that reflect the diversity of ideological, political, economic and social situations, and even to a certain extent a diversity of epidemiological situations: some countries had higher natural fertility levels than others, and therefore had more problems to solve, which could take a longer time.

The case studies presented here provide guidance for defining the conditions for successful family planning and fertility control:

1. *On the political standpoint:* political will and commitment of the state to establish, operate and develop family planning programs is the first condition for success. If the state does not support the program at national level, or if it puts obstacles to the operation of private associations, the program has little chances of success. This political will is first of all ideological: the government must be convinced of the desirability of family planning (at least as a right to reproductive choices), and of a neo-Malthusian policy. The government needs to have the necessary charisma to get the message across to the different actors of public health and social action. In the event that the government is still pro-natalist, whatever its motivation, it will be reluctant to make efforts in family planning. However, these attitudes have changed over time, and by 2010 very few African governments still assert pro-natalist positions, while these were predominant in 1960. Another condition for the smooth functioning of programs is political stability, economic growth, and continuity in population policy during the inevitable changes of political regime. When the country is in a period of political turmoil, civil war or severe economic recession, progress in family planning can be halted or even reversed. However, it should be noted that some countries (such as Zimbabwe and Madagascar) have managed to survive periods of political unrest and economic recession by continuing to make the family planning program work, notably through continued support from international aid.
2. *On the social standpoint:* in some countries, the first programs have been subjected to strong reticence, or even frontal oppositions, by various social, religious, traditional or family groups.

In other countries, on the contrary, the transition from a traditional regime (without birth control) to a modern regime (with contraception) has been smooth and with the consent of all social actors. These dynamics are complex, and often specific to each country. Thus, in some cases, Muslim or Catholic religious groups opposed family planning, while in other countries they let things evolve without intervening. It should be noted at the global level that no religion has been an insurmountable obstacle to the development of family planning and birth control, and that some Muslim countries (such as Iran, Bangladesh, Indonesia, Tunisia) as well as some Catholic countries (in Latin American countries, or the Philippines) are considered to be models of rapid transition. In some countries, rumors about the side effects of some contraceptives have hampered their spread. Again, these are groups of activists who developed for different reasons in some countries, but not in others. In most cases, information campaigns can help to narrow down these problems, but this may take a long time. In addition, some forms of contraception, well accepted in other countries, are problematic in many African countries, especially sterilization and induced abortions. These ethically legitimate oppositions should not be a brake on birth control if alternatives exist, that is if the supply of contraceptive methods is abundant, diversified and adapted to the needs of couples. Finally, certain legal provisions have been problematic in some countries, notably the 1920 law prohibiting the promotion of contraception that was in force in the countries of French colonization at the time of independence. This law has been revoked in most countries, but this has taken a long time in some cases.

3. *On the organizational standpoint*: organizing the family planning program is important, and some programs have been poorly designed, poorly implemented, and poorly monitored. The programs that have worked best are those that have targeted the entire population through fixed posts and mobile teams, through public centers and private centers, and which have provided a continuous supply of contraceptives, free products, and which ensured a diversity of contraceptive methods. To the technical questions of management, one could add the question of the relationship with the population, very important in the case of mobile teams (client centered approach). Especially in the extension phase of the program it is important that new clients are welcomed properly, that the information given is simple and precise, that the rights of women are respected, especially confidentiality. This is especially the case for adolescent girls, for whom efforts have been insufficient, even in advanced countries such as South Africa. Moreover, it seems important that the program be stimulated regularly by new multiform actions. The programs that have worked best have been updated regularly, approximately every 10 years, with awareness campaigns, health education, sex education in schools, distribution of new products, and so on. Finally, an important element to obtain a large demographic impact is to cover the entire population, including women who do not come spontaneously in medical consultation. As such, the programs that seem to have had the greatest impact are those that included home visits, motivation visits (information, awareness), and home delivery of contraceptives [57]. In some new programs, the distribution of injectable contraceptives is done through home visits by trained personnel [58].
4. *Funding*: funding family planning programs has rarely been a problem in the past 50 years. Indeed, abundant international resources were available and distributed generously to all countries that requested it. These sources come from international organizations (UNFPA,

World Bank, UNICEF, European Union, etc.), bilateral aid (United States, European countries, Japan, etc.), international federations, American foundations (Ford, Rockefeller, Gates, etc.), and many intermediary actors. This international aid has made it possible not only to provide free contraceptives, but also to finance a significant part of the operation of the programs on the ground.

5. *Population receptivity*: the fertility transition is essentially a paradigm shift for families, from a situation of "natural fertility" to a situation of control of offspring at a low level, the ultimate norm being two children per couple. This radical social change is gradual, on average over two generations, that is to say over periods of 60 years, sometimes faster (as in South Africa or Mauritius), sometimes slower. The receptivity of the population therefore evolves over time, starting from a negative attitude toward a positive attitude. This transformation can take place at different levels of development. It is moving faster in urban areas, where changes are faster due to economic development and social change (income levels, production and consumption structures, educational levels, information, mass media, family models, etc.). But it can also be realized in rural areas, even in societies that are still fairly traditional. The examples presented above illustrate this point for Africa, as has been amply demonstrated for Asia and Latin America a few decades ago. Ethnographic arguments often opposed to family planning and in favor of a maximum number of children (such as the place of the child in traditional societies, the contribution of children to family production, insurance for old age, etc.) do not resist a dynamic analysis of situations. As soon as couples understand their interest in having fewer children, they quickly adopt these new behaviors, even in traditional societies.
6. *Socio-economic correlates*: contrary to what is often stressed in the press and in international circles, low levels of economic development, income, wealth and education are not definite obstacles to the adoption of birth control. Some programs work very well and have a significant impact even in poor countries, where women have low levels of education and little autonomy. This has been well documented in Asia, the Middle-East, North Africa and Latin America in the past, and appears to be the case in sub-Saharan Africa, as illustrated by some of the countries presented in this study (Ethiopia, Madagascar, Rwanda).

This study gave little consideration to the different epidemiological situations. In particular, the HIV/AIDS epidemic has several possible interactions with contraception and fertility. On the one hand, the virus itself induces a decrease in fertility by a biological effect. On the other hand, the fight against AIDS has led to an increase in condom use in many countries. In the case studies presented above, it appears that these interactions had no impact on the fertility transition: in three cases (Rwanda/Burundi, Kenya/Uganda, Ghana/Nigeria) the epidemiological situation of HIV was comparable in the case and control countries. In the case of the comparison between Madagascar and Mozambique, the situation was rather the opposite of what one would have expected, because HIV was rare in Madagascar but frequent in Mozambique. Even in the Zimbabwe/Zambia comparison, there was slightly less condom use in Zimbabwe (3.2% women) than in Zambia (4.2% women), while the first country was slightly more affected by HIV than the second (prevalence of 15.2% and 13.3% respectively). The impact of epidemiological situations seems therefore negligible compared to the functioning of family planning programs.

Finally, population pressure in general, and competition for land in rural areas in particular, may have played a role in the more or less rapid adoption of birth control. This is probably the case in Kenya, Rwanda and Madagascar where population pressure is high, but probably not in Ghana or Zimbabwe where it is moderate. Moreover, the contrast between Rwanda and Burundi shows that population pressure is not decisive in itself, while population policies and family planning programs explain the differences between the two countries.

The demographic outlook for sub-Saharan Africa is therefore not as bleak as it is often presented. It is likely that populations will increase considerably in most countries by 2100, creating unsustainable situations of overpopulation in many cases. However, the analysis presented above shows that this evolution can be modulated, if family planning efforts continue, if countries lagging behind are targeted, if enough financial resources are mobilized, if all actors are actively involved (state structures and NGOs), and if family planning programs are well-organized and well-managed and affect all population strata. The line drawn by the 2012 London Summit seems to be the right one, and should be followed with diligence. If the declared goal of universal access to contraception by 2020 is achieved, the decline in fertility could be faster than that currently foreseen by the United Nations for African countries.

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## A. Annex

Country	Urban (% of transition)	Rural (% of transition)
Angola	53.2	0.0
Benin	41.6	34.6
Botswana	93.9	75.7
Burkina-Faso	65.5	20.6
Burundi	28.4	5.6
Cameroon	52.7	4.2
Central-African Rep.	36.9	9.8
Chad	24.4	6.2
Comoros	53.7	45.0

Country	Urban (% of transition)	Rural (% of transition)
Congo-Brazza (RC)	18.6	0.0
Congo-Kinshasa (RDC)	28.0	0.0
Cote d'Ivoire	68.3	27.6
Ethiopia	87.6	31.9
Gabon	60.4	14.6
Ghana	72.8	43.9
Guinea	59.6	18.5
Kenya	88.6	58.8
Lesotho	95.7	54.9
Liberia	58.7	10.0
Madagascar	76.5	46.7
Malawi	63.4	29.2
Mali	38.9	26.2
Mozambique	39.9	0.0
Namibia	74.7	48.8
Niger	42.8	9.2
Nigeria	40.0	13.0
Uganda	60.5	18.9
Rwanda	73.1	56.1
Sao-Tome & Principe	65.9	50.5
Senegal	64.3	31.2
Sierra Leone	52.8	15.9
South Africa	~100	~100
Swaziland	84.2	64.9
Tanzania	69.5	19.7
Togo	67.3	36.0
Zambia	61.6	16.4
Zimbabwe	75.3	45.6

Note: Percentage calculated as:  $1 - (\text{TFR}_{2010} - 2)/(\text{TFR}_{\text{max}} - 2)$ .

**Table A1.** Percentage of achievement of the fertility transition in 2010, by country (source: Reconstruction from demographic surveys).



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## Contraception Failure

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# Contraceptive Failure among Women in Homa Bay County of Kenya: A Matter of User and Provider Deficiencies

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Additional information is available at the end of the chapter

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## Abstract

Although the Kenya family planning program appears successful at the national level—with contraceptive prevalence rate (CPR) in 2014 surpassing the 2015 target of 56%—sub-national variations suggest the need to understand the patterns at the local levels to inform programs to either sustain or improve further the levels that the country has attained. This chapter examines the reasons for contraceptive failure among 166 women aged 15–39 years in three sub-counties of Homa Bay County in Kenya. The findings show that failure of methods such as injectables, pills and condoms was mostly because of challenges with client adherence and inconsistent use. Failure of long-acting and permanent methods such as implants and female sterilization was partly due to limited provider capacity to offer the methods and partly due to inability to afford the costs of resupplies of implants. These patterns were further exacerbated by limited access to adequate information on the part of users, which could enable them make informed contraceptive choices. The experiences of women regarding contraceptive failures—including highly effective long-acting and permanent methods—suggest the need for targeted interventions to address challenges that might hamper the success of the family planning program in such localized settings.

**Keywords:** contraceptive use, contraceptive failure, user and provider deficiency, rural Kenya

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## 1. Introduction

The potential benefits of family planning have informed efforts to increase investments in contraceptives especially in developing countries since the 1960s [1, 2]. Such benefits include

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improvements in women's and children's health through appropriate spacing of births which in turn contribute to reductions in maternal and child mortality that could arise from having short birth intervals; enhanced educational and employment opportunities for women due to the ability to control their fertility; and environmental sustainability that results from creating a balance between population and available resources [3–7]. Although efforts to improve contraceptive uptake have led to increased use of modern family planning methods in some parts of the developing world, many countries are still characterized by high levels of unmet need for contraception and unintended pregnancies [8, 9]. It was, for instance, estimated that in 2012, 222 million women in developing countries had an unmet need for modern contraceptives, with the prevalence of unmet need being highest in most parts of sub-Saharan Africa [5]. In addition, 40% of 213 million pregnancies that occurred globally in 2012 were unintended, with Africa recording the highest rate of unintended pregnancies per 1000 women aged 15–44 years [10].

Unintended pregnancies result from non-use of contraception, use of ineffective methods, contraceptive discontinuation or switching for reasons other than wanting a pregnancy, and contraceptive failure [8, 9, 11]. With respect to contraceptive failure, which is the focus of this chapter, available estimates show that about a third of unintended pregnancies in developing countries result from method failure [12, 13]. Evidence further shows that contraceptive failure rate (number of failures per 100 episodes of use) within the first year of use is lowest for permanent methods such as female sterilization, followed by longer-acting methods such as implants, intrauterine devices (IUDs), and injectables while short-acting methods such as pills and male condoms have the second highest failure rates after traditional methods including withdrawal, periodic abstinence, and rhythm [12, 13]. Contraceptive failure may negatively affect the success of family planning programs especially in developing countries where uptake of modern methods is further hampered by limited method mix, weak service delivery systems, health concerns about possible side effects, as well as societal opposition to and misconceptions about contraception [6, 14, 15].

Consistent with global efforts to improve family planning uptake in developing countries, national estimates show that the contraceptive prevalence rate (CPR) in Kenya—the proportion of currently married women using any method of contraception—more than doubled from 27% in 1989 to 58% in 2014 [16, 17]. Use of modern methods nearly tripled over the same period from 18% in 1989 to 53% in 2014 [16, 17]. The 2014 CPR level raised excitement among the donor community, policy makers and program implementers since it surpassed the target of 56% that the country had set to achieve by 2015 as part of the Millennium Development Goals (MDGs). The achievement was attributed to a combination of factors, including deliberate efforts to reposition family planning after a decade of focus on HIV/AIDS; implementation of a national program on AIDS, Population and Health Integrated Assistance (APHIA) funded by the United States Agency for International Development (USAID) that focused on health systems strengthening; increased health sector funding for family planning; improvements in the capacity of healthcare workers to provide services; streamlining the procurement and distribution of commodities through the Kenya Medical Supplies Agency (KEMSA); and using innovative service delivery models such as mobile outreaches, in-reach/choice camps in facilities, community-based distribution, and integration of services [18].

However, the success at the national level masked sub-national disparities in contraceptive use and reach of the family planning program in the country. Estimates from the 2014 KDHS, for instance, showed that CPR varied from a low of 2% in Mandera County in the former North Eastern Province to a high of 81% in Kirinyaga County in the former Central Province [17]. Among counties in the former Nyanza Province, Homa Bay County had the second lowest CPR (of 47%) among six counties in the region (with Nyamira County having the highest CPR of 68% in the region) [17]. The sub-national variations in contraceptive use suggest the need to understand the patterns at the local levels to inform programs to either sustain or improve further the contraceptive prevalence rates that the country has attained. This chapter examines the reasons for contraceptive failure among women in Homa Bay County. Contraceptive failure is likely to negatively affect the future of family planning programs not only in Homa Bay County, but Kenya as a whole and other similar contexts. Understanding the reasons for contraceptive failure is therefore important for informing strategies to further improve the performance of family planning programs in such settings.

From a global perspective, the 2012 London Summit on Family Planning set a goal of providing modern contraceptive methods to 120 million women with unmet need for contraception in 69 of the poorest countries by 2020 [19]. One strategy that has been proposed for achieving that goal is to support the women and girls who are already using contraception to continue using their current methods or to adopt other modern methods [12, 20]. The rationale for the strategy is that programmatically, it requires fewer resources to support those who have already overcome some of the barriers to contraceptive use than to address barriers related to non-use of contraception [12, 20]. Contraceptive discontinuation and failure are major contributors to unintended pregnancy among past and current users of contraception [12, 20, 21]. Understanding the reasons for contraceptive failure is therefore important for informing strategies to achieve the global goal of providing modern contraceptive methods to 120 million women with unmet need for contraception by 2020.

## **2. Data and methods**

### **2.1. Data**

Data are from a cross-sectional study that was conducted between November and December 2016 among currently married or cohabiting women aged 15–39 years in three rural sub-counties of Homa Bay County, namely, Ndhiwa, Rachuonyo north and Rachuonyo south. The county, located along the shores of Lake Victoria in western Kenya region, was purposefully selected based on three factors. First, Homa Bay County is one of the counties with rapidly growing population. According to the 2009 Kenya population and housing census, the county was home to 963,794 people at the time of the census [22]. The population was projected to rise to about 1.2 million persons by 2017, of which, 564,843 were projected to be males while 612,338 females [23]. This growth is largely a result of high fertility, which is estimated at 5.2 children per woman, compared to a national average of 3.9 children per woman [17]. Second, the county continues to experience challenges with respect to reproductive

health. According to the 2014 Kenya demographic and health survey, the level of contraceptive use among currently married women aged 15–49 years was modest at 47% while unmet need for family planning was also among the highest in the country at about 26% [17]. Furthermore, the county has a perpetual burden of high unintended pregnancy and overall high HIV prevalence estimated at 26%, which is the highest in Kenya [24]. Third, the county was easily accessible to the research team, having previously conducted operations research on access to comprehensive reproductive health and HIV information and services for married adolescent girls [25].

The study involved structured interviews with 2424 women who were identified in two stages. In the first stage, 12 sub-locations (the smallest administrative unit in Kenya) were randomly sampled from the list of sub-locations in each sub-county. All households in the sampled sub-locations with currently married women aged 15–49 years were identified with the help of village elders, and all individuals in those households were listed to generate the sampling frame. A total of 3118 women aged 15–39 years were then randomly sampled from among 5424 in the sampling frame that were within that age range and were married at the time of listing (1040 each in Ndhiwa and Rachuonyo north and 1038 in Rachuonyo south sub-counties). The upper age limit was informed by plans to interview the women again in future and the desire for such follow-up interviews to find when they are still within the reproductive age cohort.

Out of the women who completed interviews, 2294 (95%) reported having ever used a contraceptive method while 1563 (64%) were using a method at the time of the survey. Slightly more than a third (39%) of past users reported being dissatisfied with at least a method. Those who reported dissatisfaction with a method were asked about the reasons for each of the methods they were dissatisfied with. A total of 166 out of 896 women (18%) who reported dissatisfaction with methods mentioned failure of at least one method. This chapter focuses on women who reported during interviews that they got pregnant while using a contraceptive method. Although reasons for dissatisfaction were not asked to women who were using female sterilization, four women who were using the method mentioned to interviewers that they experienced method failure. In addition, whereas the study tool was not specifically designed to capture reasons for method failure, the research teams collected additional information on such reasons from 69 of the 166 women and prepared reports on the same. We used the information from the reports to supplement the data captured by the study tool.

## 2.2. Analysis

Analysis entailed descriptive statistics (frequencies and percentages) and estimation of multivariate logistic regression model examining variations in the likelihood of experiencing method failure among dissatisfied users of contraceptives. The outcome of the model is whether a study participant reported experiencing failure of any method and was coded zero for 'no' and one for 'yes'. The independent variables included the sub-county, age (coded zero for under 25 and one for 25 years and above), education level (no formal schooling or primary incomplete, primary complete, and secondary and above), religious affiliation (protestant/other Christian or otherwise), number of times married (once or more than once), living arrangements with partner (living away or with respondent), and number of living children

(less than four and four or more). The analysis adjusted for clustering of individuals residing in the same village, and the results are presented as odds ratios (OR) with 95% confidence intervals (CI).

### 3. Results

#### 3.1. Characteristics of women experiencing contraceptive failure

Close to half (43%) of the women reporting contraceptive failure were from one sub-county (Ndhiwa). Similarly, half (50%) of the women experiencing method failure were aged between 20 and 29 years, 6% were aged below 20 years while the rest were aged 30 years and above (**Table 1**). In addition, most of the women (96%) were married as opposed to cohabiting, most (88%) had been married once, and about three-quarters (78%) were living with their partners at the time of the survey. More than half (60%) had completed primary, secondary, or higher level education. More than half (56%) had given birth to four or more children and almost a similar proportion (52%) had four or more living children (**Table 1**).

#### 3.2. Extent of contraceptive failure

Although only about one in five (18%) of the women who were dissatisfied with contraceptive methods mentioned failure as the reason, most of the women reported knowing other friends who got pregnant while on methods. For instance, one woman who got pregnant while on implants reported during interviews that four of her friends who obtained the method from the same health facility on the same day also got pregnant while on the method around the same time that she did. Another respondent who got pregnant while on implants reported that whereas her husband supported and even accompanied her to get the method, he was very disappointed when she got pregnant and did not want to hear about family planning anymore. A woman who got pregnant while on injectables mentioned knowing about 10 other friends who became pregnant while using the method. One who got pregnant while on female sterilization reported that she experienced ectopic pregnancy while on the method, went through Cesarean section, and had to go through another tubal ligation. Another who was on sterilization reported that she had an operation after experiencing ectopic pregnancy, which led to cancer and that she was on treatment for the disease at the time of interview.

#### 3.3. Variations in contraceptive failure

Variations in method failure by type of method showed that it was highest for rhythm (38%), followed by pills (30%), injectables (17%), and withdrawal (15%, **Figure 1**). In contrast, method failure was low for condoms and implants (4% each) while none of the dissatisfied IUD users mentioned failure of the method as a reason. Results not shown indicate that only 62 women reported using female sterilization. Assuming that the four women who mentioned to interviewers that they experienced failure of the method reported correctly, then this represents about 6% of users of female sterilization and 2% of those who reported failure of any method.

Characteristics	Percent	Number of women
Sub-county		
Ndhiwa	42.8	71
Rachuonyo North	32.5	54
Rachuonyo South	24.7	41
Age group (years)		
15–19	6.0	10
20–24	19.9	33
25–29	30.1	50
30–34	28.3	47
35–39	15.7	26
Marital status		
Cohabiting	3.6	6
Married	96.4	160
Highest education level		
None/some primary	40.4	67
Completed primary	34.3	57
Secondary and above	25.3	42
Religious affiliation		
Catholic	10.2	17
Protestant/other Christian	88.0	146
Muslim/other	1.8	3
Number of times married		
Once	88.0	146
More than once	12.1	20
Living arrangement with partner		
Living away	21.7	36
Living with respondent	78.3	130
Children ever born		
0–1	6.6	11
2–3	36.8	61
4–5	33.7	56
6 and above	22.9	38
Number of living children		
0–1	8.4	14

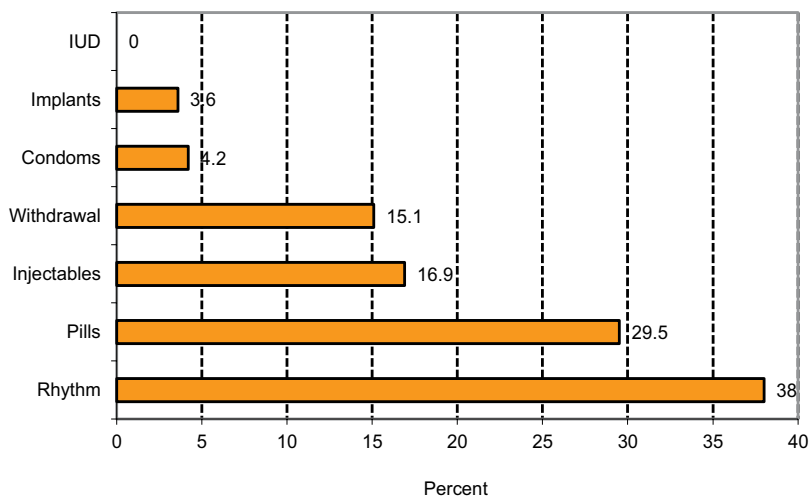
Characteristics	Percent	Number of women
2-3	39.2	65
4-5	36.8	61
6 and above	15.7	26
Total	100.0	166

**Table 1.** Distribution of contraceptive users who experienced method failure.

Results from the multivariate logistic regression analysis showed that there were statistically significant differences in the likelihood of experiencing contraceptive failure by study site (**Table 2**). In particular, the likelihood of experiencing method failure was significantly lower in Rachuonyo North and Rachuonyo South sub-counties than in Ndhiwa sub-county (OR: 0.61; 95% CI: 0.40–0.92 for Rachuonyo North, and OR: 0.43; 95% CI: 0.28–0.66 for Rachuonyo South). A test of whether the difference between Rachuonyo North and South was statistically significant showed that it was not ( $p = 0.13$ ), indicating that the significant differences were mainly between Ndhiwa and the other two sub-counties. There were, however, no statistically significant variations in the likelihood of experiencing method failure by the other background characteristics considered (**Table 2**).

### 3.4. Reasons for contraceptive failure

Failure of injectables and pills was partly because of challenges with adherence to the methods. Some women reported that they forgot to return to the facilities for the methods on the dates of appointments. In some cases, they resorted to obtaining the methods from other



**Figure 1.** Contraceptive failure by type of method. Note: N = 166.

Covariate	Odds ratio	95% CI
Sub-county (ref = Ndhiwa)		
Rachuonyo North	0.61*	[0.40–0.92]
Rachuonyo South	0.43**	[0.28–0.66]
Age group (25 and above = 1)	1.31	[0.82–2.08]
Education level (ref = None/primary incomplete)		
Primary complete	1.21	[0.81–1.80]
Secondary and above	1.28	[0.84–1.95]
Religious affiliation (Protestant/other Christian = 1)	1.11	[0.64–1.92]
Number of times married (More than once = 1)	1.21	[0.71–2.07]
Living arrangements with partner (Living with respondent = 1)	0.91	[0.59–1.39]
Number of living children (Four or more = 1)	1.19	[0.80–1.77]
Number of women	896	

\*p < 0.05.  
\*\*p < 0.01.

**Table 2.** Odds ratios from multivariate logistic regression model examining variations in the likelihood of experiencing contraceptive failure.

sources such as private pharmacies, community health volunteers or community-based distributors for fear of reprisals from health facility providers because of missed appointments. Some reported that they went back to health facilities even after missing appointments but that they were not screened for pregnancy before being given the methods again, which could suggest that they might have already been pregnant at the time. Some women who were on pills reported that they forgot taking the method on certain occasions, while others suspected that the pills did not dissolve but were instead piling in the stomach. Another participant who was on pills reported using strong antibiotics at the time she got pregnant, which she suspected might have interfered with the efficacy of the method and thus exposed her to the risk of pregnancy.

Reasons for failure of implants and female sterilization—which are highly effective methods and are less dependent on client adherence—were, however, not straightforward. Women who got pregnant while on implants suspected that they were provided with expired commodities. Some reported that the implants might have disappeared in their bodies and thus became less effective. Another who got pregnant while on implants and was HIV-positive reported that she was told by a healthcare provider that antiretroviral drugs (ARVs) may reduce the efficacy of the method and that she suspected that it is what happened in her case. Those who got pregnant while on female sterilization reported that they were told by healthcare providers that the procedure entailed turning the uterus inside out, which made them believe that the process is reversible. In most cases, women reported that they got information about the methods they chose from friends who had used them, and that they were not given



sufficient information about other methods when they sought care at health facilities. Others mentioned the costs associated with obtaining implants (equivalent of \$1) as a deterrent to honoring scheduled appointments and ensuring continuous use without interruptions.

#### **4. Discussion**

Contraceptive failure occurs to women and couples who are already making efforts to prevent mistimed or unwanted pregnancy. Contraceptive failure is likely to lead to disillusionment with methods or abandonment of contraception, with possible consequences of a rise in unintended pregnancies and the potential for increased incidents of induced abortion, which if conducted in unsafe conditions are likely to contribute to increased incidents of maternal morbidity and mortality [11, 12]. As the results of this chapter show, some study participants who experienced contraceptive failure reported that they or their partners were disappointed that the methods did not work for them. However, the findings indicate that contraceptive failure resulted from deficiencies either on the part of the user or the provider. In particular, failure of methods such as injectables, pills and condoms was mainly due to challenges with adherence (such as not regularly taking pills or not honoring scheduled appointments for injectables) and inconsistency of use (especially of condoms) on the part of the users. The finding suggests the need for expanding the range of contraceptive methods and providing adequate information and counseling for women and couples to enable them make informed decisions regarding methods that are appropriate and easy for them to use.

The findings further show that failure of more effective methods such as implants and female sterilization was partly due to limited provider capacity to offer the methods and partly due to inability to afford the costs of continuing the use of implants. Provider deficiency could be due to lack of appropriate skills, workload or lack of relevant equipment. For instance, the methods require highly skilled personnel to administer that might be lacking in the rural community where the study was conducted. It could also be that even if the providers had the requisite skills, staffing challenges facing lower level facilities especially in remote settings may negatively impact the quality of care provided in such outlets where in most cases, only one or two providers are available to offer all forms of healthcare including curative, preventive, promotive and reproductive health services. Lack of appropriate equipment is another challenge that could impede providers' ability to administer the methods even if they have the relevant skills. Whatever the reason, provider deficiency was evident from women's reports that they got information about the methods from friends who had used them, and that they were not given sufficient information when they sought services at health facilities. The finding suggests the need for addressing health systems challenges that affect the provision of the more effective long-acting and permanent methods such as implants and female sterilization in such rural settings. Although the cost of continuing use of implants also emerged as an issue, the global Implant Access Initiative that aims to make the method available at low cost has enabled family planning programs to increase its availability, which has contributed to increased use of the method in settings such as Kenya [18, 26]. The reach of the initiative might, however, be hampered by uncertainties about its sustainability and

controversies around the association between hormonal contraception and increased risk of HIV acquisition [18, 27, 28].

Previous studies showed that contraceptive failure was more prevalent among younger than older users, which could be an indication of incorrect use of methods among these sub-groups [29, 30]. The findings of this chapter, on the other hand, show that there were no significant variations in reporting contraceptive failure by age among participants in the study. This could largely be due to the study's focus on married or cohabiting women—one of its limitations—which might have left out many unmarried young women at risk of experiencing contraceptive failure. However, evidence on variations in contraceptive failure by level of education is mixed, with some studies finding higher failure rates among less educated than more educated users, while others found no difference between the two sub-groups [29–31]. The findings of this chapter are consistent with those of previous studies that did not find significant differences in contraceptive failure by levels of education. The significant differences in contraceptive failure between sub-counties included in the study are, on the other hand, consistent with those of other studies that found sub-national variations in method failure, which could be an indication of disparities in provision of quality care [29].

## 5. Study limitations

In spite of the consistency of the findings of this chapter with those of previous studies, they could be affected by the fact that information on contraceptive failure was based on women's self-reports, which could be subject to under- or over-reporting. In strict sense, contraceptive failure refers to the occurrence of a pregnancy during sexual intercourse when contraception is used. It is, however, unlikely that women may precisely determine that a pregnancy occurred during a particular sexual act when she or her partner was using contraception. Some women may also have become pregnant when they were not protected at all due to diminished efficacy of the methods they were using after failing to honor appointments for resupply. In addition, as previously mentioned, the exclusion of unmarried women from the study may result in under-reporting of episodes of contraceptive failure if young women who are likely to be unmarried were at higher risk of experiencing failure than their older married counterparts. Contraceptive failure also came out as an emerging issue during data collection and was not the primary objective of the study that provided data for this chapter. Consequently, some information that could further improve our understanding of the dynamics of contraceptive failure in such contexts was not captured, including the specific user and provider deficiencies that contributed to failure and users' agency after experiencing failure.

## 6. Conclusion

Although the family planning program in Kenya appears to be doing well at the national level, experiences of women at sub-national levels suggest the need for targeted interventions to address challenges associated with contraceptive failure that might hamper the success of

the program at the local levels. Interventions could include expanding the mix of available methods, provision of adequate information, improving counseling, as well as addressing health system factors that impede the provision of quality care such as limited staff skills, staff availability, inadequate supplies, and lack of or faulty equipment for administering long-acting and permanent methods.

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# Interventions for Failed Family Planning

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Additional information is available at the end of the chapter

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## Abstract

Despite the introduction of family planning services in most areas of the world, failures of contraceptive use often lead to unplanned pregnancies. These women often resort to unsafe methods to end their pregnancies, which contributes to the fourth leading cause of maternal mortality worldwide. Demographic variables that may affect the intention to discontinue the pregnancies would be demonstrated. Pros and cons of different types of induced abortions would be presented and discussed. Programs integrating counseling for women after failed family planning for future comprehensive reproductive health care will be shown. The gap between women's reproductive desire to avoid pregnancy and altitude of contraceptive use may contribute to the prevalence of unintended pregnancy. Age, race/ethnicity, marital status, and socioeconomic characteristics should be considered in counseling women after failed family planning. Expanding the program that offers integrated abortion training would prepare more physicians to provide comprehensive care for family planning.

**Keywords:** unintended pregnancy, induced abortion, use of contraception

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## 1. Introduction

It was estimated that 7.9% (95% UI 4.7–13.2) of all maternal deaths were due to abortion by a global systemic analysis conducted by the World Health Organization (WHO) [1]. Although it is lower than that by the previous report, i.e., up to 13% [2], abortion-related deaths remain the fourth leading cause of maternal mortality after hemorrhage, hypertensive disorders, and sepsis (**Table 1**). Moreover, as deaths consequent to unsafe abortion have decreased in recent years, the focus is shifting toward adverse outcomes associated with abortion [3]. It is estimated that 7 million women were treated for complications from unsafe pregnancy termination in 2012 [4]. It is imperative that patients and families have access to the full spectrum of reproductive care options, including contraception method, pregnancy termination, and

	Abortion		Embolism		Hemorrhage		Hypertension		Sepsis		Other direct causes		Indirect cause	
	N	% (95% UI)	N	% (95% UI)	N	% (95% UI)	N	% (95% UI)	N	% (95% UI)	N	% (95% UI)	N	% (95% UI)
Worldwide	193,000	7.9% (4.7–13.2)	78,000	3.2% (1.8–5.5)	661,000	27.1% (19.9–36.2)	343,000	27.1% (19.9–36.2)	261,000	10.7% (5.9–18.6)	235,000	9.6% (6.5–14.3)	672,000	27.5% (19.7–37.5)
Developed regions	1100	7.5% (5.7–11.6)	2000	13.8% (10.1–22.0)	2400	16.3% (11.1–24.6)	1900	12.9% (10.0–16.8)	690	4.7% (2.4–11.1)	2900	20.0% (16.6–27.5)	3600	24.7% (19.5–33.9)
Developing regions	192,000	7.9% (4.7–13.2)	76,000	3.1% (1.7–5.4)	659,000	27.1% (19.9–36.4)	341,000	14.0% (11.1–17.4)	260,000	10.7% (5.9–18.7)	232,000	9.6% (6.4–14.3)	668	27.5% (19.7–37.6)

1. Data shown are the estimated proportion of cause of death (%) with 95% uncertainty interval (95% UI); 2. Revised from Say et al. [1].

**Table 1.** Distribution of causes of deaths by millennium development goal regions.



postabortion care. The provision of family planning policy is thus important in the women's reproductive care to reduce the morbidity and mortality.

## **2. Unintended pregnancy after the use of contraception**

The term "family planning" has been used synonymously with contraceptive practice. In this review, we focus on interventions for failed contraceptive behavior or methods and address unsafe abortion as a preventable outcome.

### **2.1. Unintended pregnancy**

Ineffective contraceptive use contributes to unintended pregnancy. In many Eastern European and South Asian countries, two-thirds of abortions are estimated due to contraceptive failure, mostly from traditional method use, and one-third are due to unmet need for contraception [2, 3]. In developed countries, it has been reported that most abortions occur as a result of contraceptive failure, and a small proportion are due to nonuse of contraception [5]. Based on the data of the National Survey of Family Growth in the United States, the overall failure rate for reversible methods declined from 12% in 2002 to 10% in 2006–2010. Long-acting reversible contraceptives (the IUD and the implant) had the lowest failure rates (1%) and oral pills with the modest failure rate (6%), while condoms and withdrawal carried the highest probabilities of failure (13% and 20%, respectively) [6].

Unintended pregnancies unnecessarily expose women to the risks associated with pregnancy, unsafe abortion, and childbirth, thereby contributing to maternal mortality and morbidity. It has been estimated that 250,000 maternal deaths could have been prevented by contraception and an additional 30% of maternal deaths avoided by fulfillment of the unmet need for contraception in 2008 [7]. A reduction in the number of unintended pregnancies is the greatest health benefit of contraception.

### **2.2. Impact of unsafe abortion**

The World Health Organization defines unsafe abortion as "a procedure for terminating a pregnancy that is performed by an individual lacking the necessary skills, or in an environment that does not conform to minimal medical standards, or both" [4]. Unsafe abortions and abortion complications as well as the demand for postabortion care also vary remarkably by geographic region. In many low- and middle-income countries (LMIC), abortion is illegal or highly restricted, leading some women to seek unsafe abortions. About 7 million women are treated for complications from unsafe abortion procedures annually in LMICs [8]. Two studies indicate that at least 8% of maternal mortality is due to unsafe abortion and the contribution of abortion may be as high as 18% of these deaths [1, 9]. Factors that increase morbidity and mortality of unsafe abortion include lack of provider skill, poor technique, unsanitary conditions for performing the procedure, lack of appropriate equipment, use of toxic substances, poor maternal health, increasing gestational age, and lack of access to postabortion

care [10]. Prevention of unsafe abortion is crucial and requires a multipronged approach including improved access to and accessibility to safe abortion procedures and provision of high-quality postabortion medical care [9, 10].

### 3. Induced abortion

#### 3.1. Option counseling and consent

Counseling women who seek abortions is an essential component of abortion care. Some women may be uncertain or lack of emotional support needed before making their decision [11–13]. It is essential to obtain a complete medical history before the procedure. The risk of providing a procedure in the setting of an uncontrolled medical condition should be weighed against the risk of delaying the procedure, since abortion complications increase with gestational age [14]. Dating of the pregnancy can be calculated by a last menstrual period that correlates with the uterine size on bimanual examination or by ultrasound. If the last menstrual period is discordant from the clinical examination, uterine fibroids are present, or if the physical examination is limited by obesity, ultrasound examination is useful to confirm gestational age. Ultrasonography can also help identify ectopic pregnancy or uterine anomalies before induced abortion.

#### 3.2. Surgical versus medical for induced abortion

Medical and surgical methods are available for both first- and second-trimester abortions (**Table 2**). Medical abortion is generally chosen for early pregnancy, e.g., those less than 7 weeks of gestation. Vacuum aspiration is appropriate for women presenting between 7 and 14 weeks of gestation, although some doctors may offer medical abortion for pregnancy above 12 weeks. Three methods may be considered for second-trimester pregnancy termination: dilatation and evacuation, administration of systemic abortifacients, and intrauterine instillation of abortifacients [15].

To avoid anesthesia and surgery, some women prefer medical (drug-induced) abortion. However, medical abortion is associated with greater extent of pain, bleeding, and discomfort after the procedure, and more side effects in general than surgical abortion [14–16]. In

First trimester		Second trimester
Medical abortion	Combined mifepristone with prostaglandin regimens or prostaglandin-only regimens	Dilation and curettage (D&C)
Surgical abortion	Vacuum aspiration (manual or electric) Dilation and evacuation (D&C)	Administration of systemic abortifacients (e.g., mifepristone and prostaglandins) Intrauterine instillation of abortifacients (e.g., hypertonic saline, prostaglandin F2-alpha)

**Table 2.** Summary of methods of termination of pregnancy in the first and second trimesters.

comparison to surgical abortion, first-trimester medical abortion is more painful, less effective, less acceptable, and associated with more negative experiences and complications after the medications [17]. In the second trimester, surgical abortion is as effective as medical abortion [18].

A systematic literature review assessed the main reasons for women in early pregnancy to choose medical or surgical abortion [19]. Women opted for medical abortion because they thought the method being “more natural,” wished to have abortion in one’s home, and fear of complications. Women selecting surgical abortion viewed the process being quicker and safer, lesser pain, and bleeding. Women made decisions based mainly on rational information from professionals, also on emotions, and especially fears. Support techniques for an informed consent are especially needed [19].

### 3.3. Surgical termination

Surgical approach is the long-standing standard for safe induced abortion through either dilation and curettage (D&C) or vacuum aspiration (VA) [14]. Various methods of pain control for surgical abortion were used: paracervical block, oral medications (nonsteroidal anti-inflammatory drugs, anxiolytics, opiates) with cervical block, intravenous (IV) mild to moderate sedation, and general anesthesia. The most effective pain control during first-trimester abortion has not been proposed, but most women reported lesser pain when given IV sedation [20].

#### 3.3.1. *Dilation and curettage (D&C)*

Cervical dilation is generally needed before surgical intervention. Cervical dilation is generally needed before surgical curettage. As a general rule, the cervix is dilated to the width in millimeter equal to the gestational age in weeks. For example, the cervix is dilated to 7 mm for a 7-week gestation. Serial Hegar’s dilators were inserted until an appropriately sized curette can be introduced safely without a force to avoid cervix laceration (which would create a false passage into the cervix and risk excessive bleeding and severe uterine perforation). The curette is then used to gently scrape the uterine wall and remove the tissue in the uterus, which is examined to ensure the procedure is complete.

If there is difficulty with dilation, try slowly twisting the dilator to find the pathway through the cervix. An OS Finder or uterine sound can also be used for this purpose. The cervical canal and uterus can also be visualized with ultrasound guidance, allowing direct visualization of the dilator in the cervix. Cervical ripening agents, such as osmotic dilators or misoprostol, can help soften the cervix and ease dilation. For early gestations when dilation is difficult, consider delaying the procedure for cervical preparation or offering a medical abortion instead.

#### 3.3.2. *Vacuum aspiration (VA)*

Instead of sharp curettage, first-trimester surgical abortion can be performed by using suction to remove retained products of conception through the cervix. Manual vacuum aspiration

(MVA) uses a manual vacuum syringe and cannula, and electric vacuum aspiration (EVA) uses an electric pump. In both methods, the pump mechanism creates a vacuum that empties the uterus. Although there are no clear gestational age limits for MVA use, most providers will use it up until 8 to 10 weeks of gestation because it may need to be emptied multiple times during a procedure. The EVA machine should be powered on to create suction after the cannula is inserted into the uterus [14].

For patients with a tortuous or angulated cervix/uterus, consider ultrasound guidance to minimize the risk of perforation. If there is difficulty in placing the cannula after dilation because of curvature of the cervix/uterus, a sterile sound may be placed, and the cannula is inserted over the sound. The sound is then removed, and the vacuum aspirator is attached.

In 2010, a Cochrane review found that VA was safer, quicker, and less painful than sharp metal curettage and also led to less blood loss. However, they were similar in the incidence of sepsis post procedure, uterine perforation, or the need for re-evacuation [21]. MVA and EVA do not appear to differ substantially in efficacy [22]. VA can be performed in the absence of a fully equipped facility and at secondary health facilities, with or without electricity, and without the capacity for general anesthesia. It is suitable for low-income settings because it is more accessible and reduces the consequences of blood loss and worsening infection associated with transportation to tertiary health facilities [22].

### 3.3.3. *Complications and management*

First-trimester abortion is safe with 0.6 deaths per 100,000 abortions, while childbirth has 14 times the risk, with 8.8 deaths per 100,000 live births [23]. Overall, less than 1% of women have major complications, and only <0.5% of women will have complications requiring hospitalization [23]. Nonetheless, alertness for complications and subsequent timely management are essential in providing safe abortions. There is a wide variation across studies in the definition of complications that required interventions [24]. The following complications were mostly reported in the literatures.

#### 3.3.3.1. *Hemorrhage*

Hemorrhage as excessive bleeding requiring transfusion, hospital admission, or greater than 500 mL of blood loss occurs in less than 1% of terminations [25]. Hysterectomy for severe hemorrhage is performed in 1.4 per 10,000 abortions of any gestational age. The risk factors for hemorrhage are provider inexperience, increasing gestational age, advanced maternal age, increased parity, prior cesarean section or uterine scar, fibroids, and a history of obstetric hemorrhage and gestational age. The causes of hemorrhage include atony, abnormal placentation, cervical laceration, perforation, coagulopathy, and retained products of conception. Oxytocin given routinely during a first-trimester abortion does not decrease blood loss [25].

#### 3.3.3.2. *Cervical lacerations*

The incidence of cervical laceration is approximately 2 per 1000 procedures [26]. Risk factors for cervical laceration are nulliparity, surgical inexperience, and inadequate dilation. Bleeding from cervical lacerations can be managed with direct pressure or cautery to the bleeding site and

suturing in cases with large laceration. If there is excessive bleeding or bleeding that continues despite repair, one should be concerned for a high laceration with possible uterine artery involvement. High lacerations may require repair by laparotomy or laparoscopy. An important long-term consequence of cervical injury during dilation and curettage is cervical incompetence leading to subsequent late miscarriage, premature rupture of the membranes, or preterm birth [14, 16, 24].

#### 3.3.3.3. Uterine perforation

Uterine perforation occurs in approximately 0.1–3.0 in 1000 procedures [26]. Perforations generally occur at the fundus and are more likely to cause complications if they occur after the first trimester. The instrument penetrates the uterus most likely the suction cannula, followed by a dilator and then a curette [27]. Instruments passing further than expected with little resistance or loss of a gritty sensation may suggest perforation. If a perforation is suspected and there is minimal blood loss and no concern for bowel involvement, patients can be monitored for 2–4 h in the clinic. Patients with perforations with hemorrhage, concern for bowel involvement, or injury to other surrounding structures should be transferred to the hospital for laparoscopy or laparotomy [25].

#### 3.3.3.4. Incomplete abortion

The clinical presentation of retained products of conception (RPOC) may include irregular uterine bleeding, pelvic pain, uterine tenderness, and fever. The ultrasound findings indicative of RPOC are a hyperechoic endometrial thickness combined with abundant low-resistance flow in the myometrium or just beneath the endometrium. Using ultrasound for diagnosis of RPOC can be challenging because the ultrasound findings of asymptomatic and symptomatic women can be quite similar after abortion [28].

Repeat curettage, suction evacuation, removal by clamp ring, or hysteroscopic resection can be employed [29]. Hysteroscopic excision allows the retained placental products to be excised under direct vision and possibly leads to fewer uterine adhesions and incomplete evacuation [29]. Women preferring to avoid surgical intervention can be treated with misoprostol in order to induce uterine contractions. Complete evacuation rates after taking misoprostol were varied in different routes of administration or doses or both [30]. Though there is insufficient evidence to draw firm conclusion, combination of progesterone receptor modulator mifepristone with misoprostol could improve the evacuation rate [31].

#### 3.3.3.5. Infections

Postabortion infections occur in less than 1% of procedures and are decreased with preoperative doxycycline prophylaxis [32]. Infections usually occur days after the procedure is usually diagnosed in the presence of fever, pain, pelvic tenderness, and leukocytosis. Women should be evaluated for possible RPOC and re-aspirated if necessary. Without prompt treatment, the infection can spread to the uterus and pelvis. Further spread may lead to systemic infection presenting as bacteremia, sepsis, or septic shock [33]. The organisms involved are usually common vaginal bacteria. However, clinicians should be alert to potentially lethal infection by bacteria that produce toxins, such as *Staphylococcus aureus*, that may be resistant to some

penicillin: *Clostridium perfringens* and *Clostridium sordellii*; group A streptococcus; and also some toxin-producing strains of *E. coli* [32, 33].

### 3.3.3.6. Anesthesia and late complications

In addition to the complications of anesthesia or intravenous sedation, D&C may result in adhesions (Asherman's syndrome). Intrauterine adhesion increases the risks of future ectopic pregnancy, miscarriage, or abnormal placentation (placenta previa and accreta) [34]. The risk of preterm birth after induced abortion is higher than that in a first pregnancy or after a previous live birth. Surgical but not medical abortion appears to be associated with an increased risk of spontaneous preterm birth [34]. These data warrant caution in the use of surgical uterine evacuation and should encourage safer surgical techniques as well as medical methods [34, 35].

## 3.4. Medical termination

Whenever surgical abortion is difficult or unacceptable, medication abortion should be considered. Mifepristone (RU 486) is a 19-norsteroid that specifically blocks receptors for progesterone and glucosteroids. Acting as a competitive inhibitor of the progesterone receptor, mifepristone is used as a pretreatment 24–48 h before inducing first-trimester abortion with a prostaglandin analog. Misoprostol, a synthetic prostaglandin E1 analog, has been proven effective for pregnancy termination at various gestational ages, cervical ripening, labor induction in term pregnancies, and incomplete abortion treatment. The combination of a mifepristone and a prostaglandin derivative was the most effective regimen for medical pregnancy termination [36].

Mifepristone is approved by FDA for medical abortion up to 49 days of estimated gestational age. However, mifepristone is commonly used in combination with vaginal or buccal misoprostol at higher gestational ages based on studies demonstrating safety and efficacy up to 9 weeks [36]. Recent data support the use of mifepristone for outpatient abortion through 70 days of gestation, since similar safety and effectiveness as those used at 63 days of gestation have been demonstrated [37]. Mifepristone and misoprostol may also be used from 10 to 13 weeks [39]. This will require a setting whereby patients' condition can be monitored and a repeated dose of misoprostol administered given the potential risk of excessive bleeding at this later gestational age. Depending on the local regulations, the candidate setting could be a labor and delivery unit or gynecology inpatient department [37–39].

The combined use of mifepristone and misoprostol for second-trimester termination has a shorter induction time and lower misoprostol dose compared with misoprostol alone [39]. Both sublingual and vaginal routes of misoprostol administration resulted in a shorter abortion duration than the oral route [40]. The differences in duration or side effects between sublingual and vaginal routes of misoprostol administration were not significant. However, sublingual administration may be preferred by patients over vaginal administration due to ease of use [39].

It is effective and feasible to prevent unintended pregnancy with low-dose mifepristone combined with misoprostol before expected menstruation or menstruation regulation after missed period. The success rate of abortion for mifepristone-misoprostol regimen is 95–98%. [41], while 78–90% for misoprostol only [42]. Despite highly restrictive abortion laws in LAC, access

to safer abortion increased. Significant barriers still exist; thus, it is necessary to enhance the use of modern contraceptive and safer abortion methods among women in the region [43, 44].

#### **4. Postabortion care**

Postabortion care is part of the reproductive health care in women after induced abortions. Extreme urgent demand in LMICs is understandable given that, in most of them, induced abortion is either completely illegal or legal but with limited access by women who need it. In such settings, the only option for women wishing to end their pregnancies is to procure clandestine, usually unsafe abortions—with substantial negative consequences for themselves, their families, and their societies [44]. It has been shown that comprehensive family planning would reduce unintended pregnancies and therefore the incidence of unsafe abortions [45].

All women seeking an abortion should be offered a contraceptive method. Long-acting reversible contraceptives, such as the intrauterine device (IUD), the progestin implant or the progestin injection (depot medroxyprogesterone acetate or DMPA), have been found to statistically significantly decrease abortion incidence [46]. IUDs placed immediately after an abortion lower the rate of repeat abortions from 34.6 per 1000 woman-years to 91.3 per 1000 woman-years in controls [47]. Immediate postabortal IUDs are safe and effective, although they have a slightly higher expulsion, ranging from 3 to 5% immediately after an abortion compared with 0–2.7% in interval groups [48]. However, at 6 months postabortion, IUD use is higher following immediate insertion compared to delayed insertion [49]. Women interested in progestin or combined hormonal contraceptives can be given a prescription before leaving the clinic to be started immediately after the procedure [50].

#### **5. Conclusions**

Surgical methods for abortion are effective and more cost-effective than medical management, particularly in LMICs where access to medical interventions might be limited. They are associated with fewer side effects such as pain and bleeding—a critical advantage in LMICs, where health facilities might be distant and transportation difficult.

Access to VA and D&C should be increased by training more health workers and investing in surgical equipment in secondary health-care settings. Although surgical management of incomplete abortion predominates where such services are available in LMICs, increased access should be a priority to improve postabortion care and reduce abortion-related morbidity and mortality. Medical abortion is an effective, safe, private pregnancy termination. It should be provided as a personal choice for use.

Supporting patients to identify high-quality decision aids and facilitating nonspecialist developers' adoption of best practices are needed. Increased investment in family planning will help satisfy the large unmet need for contraception by reducing the number of unintended pregnancies and dramatically lower maternal mortality and morbidity as well as the number of unsafe abortions.

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## Teen Contraceptive Use

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# **Causes of Visiting Teenagers in the Pediatric and Adolescence Examining Room**

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Additional information is available at the end of the chapter

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## **Abstract**

Adolescence is the transitional period between childhood and adulthood. Depending on female gonads' function and on hypothalamic-pituitary-ovarian axis activation, results in teenager's body growth, in secondary sex characteristics' development and finally in their reproductive potential. In adolescence, the negative feedback of gonadal steroids on gonadotropins is disturbed. Teenagers presenting with dysfunctional bleedings are usually suspected of hemorrhagic ovarian cysts or endometriosis and require gynecologic examination, evaluation, and hormone therapy. It is of great importance both for teenagers and their parents to understand that hormone therapy is the first line treatment for bleeding disorders in these ages. A detailed medical history is necessary to determine the appropriate treatment plan. Primary care includes the detection of adolescents with acute or chronic pelvic pain that may be associated with endometriosis or other pathologies like mullerian duct abnormalities, imperforate hymen, ovarian teratomas, ovarian torsion, and vaginal absence or atresia. Mullerian duct abnormalities are associated with increased rates of unexplained infertility, spontaneous abortions, and pathological conditions of pregnancy. Specialists, should help teenagers in getting familiar to their bodies, to their sexuality, inform them about the sexually transmitted diseases, and safety options including vaccination and guide them in contraception issues.

**Keywords:** adolescence, reasons for examination, menstrual disorders, contraception

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## 1. Introduction

Adolescence is a period of rapid physical development triggering the simultaneous secretion of various growth hormones, sexual and thyroid hormones [1]. This period occurs in people aged between 10 and 19 years, in about 18% of the world's population and this period between childhood and adolescence, which causes physiological, psychological changes, and various other health problems and problems of menstruation, is of major importance [2]. During childhood and adolescence, it is necessary for the doctor to have appropriate behavior towards the young girl and the parents when taking history and during gynecological examination. In general, it has been found that all mothers co work to obtain information, but there is some mistrust and skepticism about gynecological examination. This mistrust largely subsides after discussions, in an appropriately configured practice environment, but in a small percentage it remains accompanied by fear and, even less, it turns into neglect in the gynecological examination. The usual reasons why young girls visit the teenage gynecology clinic are as following: amenorrhea, dysfunctional bleeding, lower abdominal pain, to avoid pregnancy due to the presence and association to great problems, great early development of genital organs, breasts, hirsutism, genital anatomy outgrowth, excretion from breast nipple, symptoms from the urethra or bowel, irritation and redness in the vulva, and pain or palpable lymph nodes in the vulva [3, 4].

## 2. Amenorrhea

The main process that marks the start of adolescence is the onset of pulsatile excretion of GnRH. Breast growth (thelarche) is the first natural characteristic of puberty and occurs normally in the 11th year whereas the menstrual is expected to be shown 1 year later. A range of variations in the normal sequence of events among the different populations is observed. In general, significant role plays the body weight and the nutritional balance [5, 6]. Typically, menstruation begins after 2–3 years of thelarche at Tanner IV breast stage and rarely at Tanner III stage. Approximately, 96–97% of adolescent women will have menstruation at the age of 15 [6]. During the first year after menstruation, 50% of the cycles are anovulatory, also during the next 2 years, the intervals between the menstrual cycles show wide variations ranging between 21 and 45 days. The classic definition of amenorrhea includes the absence of menstruation after the 15th year. It is distinguished in primary with or without breast growth and secondary. Amenorrhea in adolescence is a reasonable concern regarding the thorough investigation in order to find the diagnosis and future fertility prognosis. Before the beginning of any hormonal therapy, it is necessary to exclude a certain number of pathological conditions in order to avoid a delayed diagnosis of all causes that in the mature reproductive age will be characterized as infertility [5]. In the case of primary amenorrhea without the development of secondary sex characteristics, the diagnosis can be made earlier, by the completion of the 13th year and is indicative of hypogonadism [5, 7]. The occurrence of primary amenorrhea is a disruption of the interaction of a large complex of processes that contribute to the appearance and normal continuance of menstruation such as normal chromosomal composition, the presence of a functioning hypothalamic-pituitary-ovarian axis, the normal endometrial



response, the anatomical integrity of the entire path of the output of the menstrual content, and sufficient supportive function of other endocrine glands such as thyroid gland and adrenal glands. In the primary amenorrhea of adolescents, there is an increased probability that the underlying pathology is the result of congenital malformations of the genital organs (60%) or endocrine disorders (40%). The most common causes of primary amenorrhea are normal delay, important weight loss, intense exercise, and virginity hymen atresia.

## **2.1. Clinical indications for investigation of amenorrhea in adolescence**

Absence of menstruation at 15 years (complete development of the secondary sex characteristics) is an indication of amenorrhea investigation. Absence of menstruation at 13 years with simultaneous absence of secondary sex characteristics (non-start breast growth) (delayed puberty) should also be investigated [8–10]. Lastly, absence of menstruation at 14 years with simultaneous coexistence of clinical disorders, such as nutritional disorders and clinical signs of hyperandrogenism needs further investigation.

Secondary amenorrhea is characterized by the absence of menstruation for 6 months in teens who previously had an unstable menstrual cycle for three or more consecutive cycles, in adolescents with a previous cycle of 21–45 days, and generally the interruption of menstruation since it had previously begun [8–11]. The most frequent cause of secondary amenorrhea is the polycystic ovary syndrome (PCOS). The most common symptoms are infertility because of anovulation and hyperprolactinemia. Regardless of the type of amenorrhea, the presence of hypertrichosis and galactorrhea, the possibility of pregnancy, the pelvic pain as well as the history of sexual contacts should be thoroughly investigated. Other parameters to be investigated also include height, body mass index, nutritional balance and estradiol, prolactin, testosterone, AMH and FSH levels. The above investigation is considered really useful for the diagnosis of underlying pathology and the distinction between hypogonadotropic hypogonadism (HH) and amenorrhea due to primary ovarian failure. At this point, hormone control plays an important role. Low levels of FSH, LH, and E2 are indicative of hypothalamic damage. High level of FSH and LH and low levels E2 are indicative of ovarian damage. High level of prolactin is indicative of prolactinoma [10–12].

The hypogonadotropic hypogonadism (HH) (hypothalamic amenorrhea) is accompanied by low levels of FSH and E2 and can be hereditary or acquired, organic or functional. In primary amenorrhea, the origin is usually genetic or even organic and the corresponding hypothalamic functional etiology is very rare [13–15]. In the last case, absence or delayed development of secondary sex characteristics is very helpful for the distinction. In the case of hypogonadotropic hypogonadism, it is necessary to perform pituitary imaging to exclude or diagnose neoplastic pathology.

If the imaging test is negative, then hypogonadotropic hypogonadism may be congenital, functional, attributed to absorption disorders, or ultimately due to chronic underlying pathology (renal or hepatic failure) [13–15]. The congenital hypogonadotropic hypogonadism is statistically very rare. It may be appeared as independent pathological entity or associated with pituitary insufficiency, either primary or as a demonstration of a syndrome. Independent HH occurs in 90% of cases with primary amenorrhea and is accompanied by absence or delayed

development of secondary sex features [13–15]. The careful investigation of clinical signs and symptoms such as anosmia or hypoxia when combined with congenital disorders in the palate or teeth is considered necessary because they may be manifestations of Kallman's syndrome. In the case of hypoxia absence, some mutations that adversely affect the functioning of the hypothalamus may be responsible [14–16]. Moreover, some congenital HHs may be associated with other disorders of pituitary function and morphological abnormalities such as the presence of ectopic pituitary tissue. Genetic mutations and polymorphisms are also involved in these cases.

In obese adolescents with amenorrhea, some rare genetic variations regarding the leptin gene or its receptor have been described. Finally, congenital HHs may be a part of various syndromes such as Prader Willi and Bardet-Biedl.

The functional hypothalamic amenorrhea is usually secondary. The abnormal background is often associated with nutritional disorders mainly related to lipid metabolism. This particular pathological condition can be a part of a chronic pathological process or a severe emotional episode that blocks the pulsatile secretion of GnRH. The first priority in case of primary amenorrhea with normal development of secondary sex features is the exclusion of pelvic pain. That is the reason why it is widely recommended application of pelvic ultrasound as well as hormone control (testosterone, estradiol, and FSH) [13–15].

When pain is observed, the possible causes may be vaginal aplasia, presence of a transverse diaphragm covering the vagina, and more often the virginity hymen atresia. In these cases, clinical examination of the abdominal wall reveals the existence of a painful mass that may be caused by the distension of the endometrial cavity (hematometra). Presence of blood in the vagina may also be seen. Ultrasound and MRI examinations always confirm the primary diagnosis [13–15].

When there is no pain, the possible diagnosis is uterine aplasia accompanied in many cases by vaginal aplasia as in Rokitansky syndrome. The incidence is very rare, 1/4000–1/5000 [13–15]. It is a syndrome that reflects abnormal development of Muller's ducts and sometimes abnormalities of the urinary tract, musculoskeletal as well as heart disorders are also observed. Levels of FSH, LH, estradiol, and testosterone hormones are normal. The ultrasound confirms the absence of uterus [12–14]. Karyotype is always XX. The differential diagnosis of uterine aplasia includes androgen resistance syndrome, which is caused by mutations in testosterone receptors, high plasma testosterone levels, and concomitant tubal aplasia as well as aplasia of the upper part of the vagina. Karyotype in these cases is XY.

In the case of painless amenorrhea, with existing uterus confirmed by ultrasound and normal breast growth, the most probable cause is polycystic ovary syndrome.

Finally, according to a review of the American Reproductive Society, 40% of primary amenorrhea is accompanied by the absence of secondary sex characteristics and high levels of gonadotropins, 30% are due to the absence of secondary sexual characteristics and low levels of gonadotropins and 30% are present with normal breast growth [17].

Secondary amenorrhea is characterized by the absence of menstruation for a period of at least 3 months in previously normally menstruating adolescents. In any case, the possibility of pregnancy must first be excluded.

It is also necessary to investigate the history of secondary sex characteristics development, the nutritional balance, the psychological status, the weight ups and downs and the physical fitness, or the presence of hyperandrogenic signs and the rapid increase of weight during puberty. Special points are also hyperinsulinemia, galactorrhea-indicative sign of hyperprolactinemia, signs of hypercortisolemia, and black nozzle in the neck. Coexistence of hyperandrogenism is confirmed by elevated levels of total testosterone as well as of 17-OH-progesterone. In cases that confirmed the lack of hyperandrogenic signs, progesterone test, control of E2, prolactin, and FSH levels can be used for the determination of diagnosis. Oligomenorrhea (less than 8 cycles during a year) undoubtedly raises the interest for further investigation. The most frequent causes of secondary amenorrhea are functional hypothalamic disorders and polycystic ovarian syndrome. Finally, the diagnostic plan should always include the exclusion of less common causes that may also contribute to the demonstration of oligomenorrhea [10–15].

## 2.2. Therapy

Therapy should be mainly based on the underlying cause. If any barrier exists to menstrual flow, surgery is inevitable. It is also necessary to surgically remove androgen-secreting tumors that may be located either in the ovaries or in adrenal glands. Non-pharmaceutical hyperprolactinemia should be treated by dopaminergic agonists. When amenorrhea is caused by functional hypothalamic etiology, the treatment should include changes in dietary habits and possible special psychological support. All other cases, except of Rokitansky and the androgen resistance syndrome where there is no hormonal disorder, require hormonal therapy.

The main target is either to restore estrogen deficiency or to prevent endometrial hyperplasia in cases of anovulatory cycles [10–16]. Replacement treatment also aims to prevent distressing consequences such as osteoporosis and cardiovascular diseases.

When primary amenorrhea is not accompanied by development of secondary sex characteristics, treatment initially includes the administration of small doses of estrogen to induce puberty onset. It is then required to progressively increase the above doses until satisfactory breast growth is achieved. After the second year, it is recommended to add progestogen for at least 10 days/cycle.

When amenorrhea is secondary with normal development of secondary sex characteristics, progestogen is used to assess endogenous estrogen production. The positive test indicates adequate estrogen production and 10 days administration of progestogen allows the cycle's normalization. If the test is negative and there is also a need, treatment with contraception can be administrated starting with a low dose. Basic condition is the absence of any familiar history of thromboembolic events. If contraception is not desired, then replacement therapy is administered. This includes 17 $\beta$ -estradiol either orally, as skin patch, or as gel for 25 days/cycle and progestogen 10–12 days/cycle. In case of hyperandrogenism in PCO syndrome, the administration of acetate cyproterone at a dose of 50 mg/day is recommended for 21 days/month in combination with 17 $\beta$ -estradiol.

The presence of amenorrhea in adolescence should not be underestimated. It is advisable to investigate amenorrhea either after the 15th year or 3 years after breast growth has started.

The clinical examination always evaluates BMI, height, any hyperandrogenic, or galactorrhea signs. Laboratory investigations include estradiol, hCG, FSH as well as testosterone, and 17-OH progesterone levels.

Early diagnosis of genetic causes of hypogonadotropic hypogonadism occurs at <40%. The identification of new genes may improve the scientific knowledge in the function of hypothalamic-pituitary-ovarian axis during puberty.

In the case of hypogonadism, long-term hormone replacement therapy is recommended and sometimes psychological support is also required.

### 3. Polycystic ovary syndrome (PCOS)

The most frequent hormonal disorder in reproductive age's women with oligo or anovulation and hyperandrogenemia is associated with PCOS in the majority of cases. Many factors such as psychological, social, and economic could play role in the disorder of the syndrome. Moreover, the association of PCOS with metabolic syndrome and its effects represent a new challenge of interest of the syndromes in the general population. The major symptoms are:

- a. Hyperandrogenemia or hyperandrogenism
- b. Oligo or anovulation
- c. Polycystic appearance of the ovaries during sonography [18, 19].

In PCOS, many symptoms included hirsutism, acne, alopecia, acanthosis nigricans, and obesity that are also linked to hyperinsulinemia [18–20]. One of seven teenagers (13%) has a major health problem because of obesity. Obesity is a major health problem affecting approximately 13% of teenagers. Normal body mass index (BMI) values range from 19 to 24.9 kg/m<sup>2</sup>. Body mass index <19 kg/m<sup>2</sup> characterizes underweight individuals. Body mass index ranging from 25 to 29.9 kg/m<sup>2</sup> characterizes overweight people, 30–40 kg/m<sup>2</sup> characterizes obese people, and >40 kg/m<sup>2</sup> characterizes severely obese individuals. Menstrual cycle disorders are related to obesity in childhood and in young women. As the abdominal adipose tissue increases, increment of androgens aromatization is observed and subsequent endocrine abnormalities are appeared. Obesity is an independent factor aggravating PCOS endocrine abnormalities as subcutaneous abdominal tissue and liver contributes to extragonadal aromatization [21]. Obese women with PCOS have two types of insulin resistance, one related to the syndrome and the other related to obesity. The pancreas is involved in the mechanism of insulin resistance by increasing the release of insulin, which leads to stabilization of the glucose level in the early stage of the disease [21]. During pregnancy, the morbidity is increased with an increase in labor induction, urgent cesarean section, dystocia and abnormal presentation. The neonates are generally overweight and the risk for fetal death is increased. Moreover, diabetes during pregnancy is increased and needs follow-up. Recent data show an increased rate of overweight and obese women, specifically in the United States of the female population (64.1%) and obese women remain high (35.5%). In Europe, there is a diversity depending of the countries: low rate (6.2%) in Western and Northern Europe, high rate in Central, East and South Europe (36.5%). Oral contraceptives are the major treatment of PCOS decreasing all the

clinical symptoms and the level of androgens. In obese adolescence, the oral contraceptive pills have a different pharmacokinetic profile with a decrease of the estrogens and progesterone clearance, but in contrary an increased SHBG was observed [22–26].

Contraceptive pills constitute the cornerstone of hormone therapy, as they promote reduction of hyperandrogenemia, hirsutism, and acne [27].

Therefore, there is a typical decreased effectiveness of contraceptive pills in obese adolescents, despite there are superior to the contraception with condoms.

### **3.1. Therapeutical strategy**

Any other known disorders, that they are possible to cause hyperandrogenemia and oligo or amenorrhea have to be excluded. These are often associated with: nutrition, exercise, menstrual disorder treatment, metabolic syndrome and diabetes drug treatment and can be treated by contraceptive pills having progestagen with antiandrogenic action, as cyproterone acetate, dienogest, drospirenone [28, 29].

### **3.2. Functional uterine bleeding in adolescence**

In adolescence, it is quite possible a disorder of negative regression of gonadotropins by gonadal steroids to be happened. The average age of menarche, based on recent data, has been reduced in developed as well as in developing countries over the last few decades and is attributed to various conditions, such as metabolic syndrome, eating disorders, gynecological cancer, and heart stroke diseases [30–33].

Dysfunctional bleeding is characterized by abnormal bleeding without functional impairment. It is caused by ovarian dysfunction in 10% of the cases in women of reproductive. The incidence is 10–17% among adolescents and is mainly dependent on the immaturity of the hypothalamic-pituitary-ovarian axis. They are not attributable to structural damage of the genital tract. In addition, they are observed during all the years of reproductive age.

It constitutes an exclusionary diagnosis at the onset of reproductive age and it is anovulatory almost in all cases (80–90%). The reason of the bleeding concludes the lack of cyclic secretion of progesterone resulting in continuous stimulation and endometrial hyperplasia of endogenous estradiol. Throughout of this progress the endometrium is overpowered, its perfusion capacities die resulting in necrosis, while in other places it continues to be repaired [34].

They are usually characterized as anovulatory cycles, even they can also be appeared in normal cycles as well as they are almost the half of the total metrorrhagia cases.

In some cases, asymptomatic structural abnormalities also coexist, such as polyps and subserous or intramural fibroids. They usually do not affect the whole of the endometrium and are often of high intensity without excluding the possibility of remaining drooping for several days. They are generally irregular with fluctuations in their intensity. It is quite often the first clinical manifestation of systemic hematological diseases especially in adolescents. The disorders are limited just to one of the three phases of the hemostatic procedure. In thrombocytopenia and von Willebrand's disease, there is insufficient platelet clot formation (1st phase of hemostasis) resulting in metrorrhagia [9]. Menorrhagia may occur in the rare case of VIII, XIII,

and fibrinogen deficiency (2nd phase of hemostasis), mutation of the M.T.H.F.R. (C677T) gene (LAME). In these cases, there is a lack of primary platelet clot and fibrin production. Finally, fibrinolysis (3rd phase of hemostasis) in endometrium can be also observed, especially in cases of unexplained or intense menorrhagia [9].

#### 4. Anovulatory cycles

Female genital hormone equilibrium disorders observed either in cases of hyperestrogenism (estrogen escape bleeding) or in cases of sudden subestrogenism (interruption of exogenous administration – bilateral ovariectomy), or, finally, in cases of progesteronism (progesterone bleeding bleeding-progesterone withdrawal contraceptive). Diagnosis is often raised by exclusions (malignant diseases, genital tract, PCO, and hypothyroidism liver cirrhosis). The mechanisms involved in the pathophysiology of the above-mentioned bleeding cases are systemic in their nature, although it is possible to observe inadequacy of local hemostatic mechanisms resulting from the absence of cyclic production of progesterone and related endothelin-1, prostaglandins and other substances that contribute positively to local hemostasis of the endometrium [9]. Additionally, lack of ovulation causes unexpected bleeding, which adversely affects the quality of life of the patient. Functional hypothalamic or pituitary disorders that cause suppression of gonadotropin production, anovulation, and the approach to perimenopausal age cause typical changes in the genital cycle.

Progressively shorter cycles due to a gradual decrease in follicles and a corresponding fall in ovarian function lead to metrorrhagia [9].

#### 5. Insufficient follicular maturation

Increased FSH levels are associated with abnormal menstrual in duration and time. Impact on adolescents is including 20–55% of the cycles in the first year and one-third of the cycles in the third year after menstruation which are still anovulatory. Anabolism is the most common cause of dysfunctional hemorrhages in adolescence and indeed it can even lead to hospital care [35]. This is due to functional immaturity of the hypothalamic-pituitary-ovarian axis.

Adolescents whose menstruation appears before the 12th year of age have in 50% anovulatory cycles during the first year, while those who are menopausal at the age of 12–13 years it is needed to pass a period of up to 3 years to make ovulation cycles. Hemorrhage due to hyperestrogenic cycles are usually characterized by histologically persistent productive endometrium and hyperplasia caused by progesterone prolonged and progesterone deficient estrogen mitotic activity [9]. The morphological changes in the endometrium are similar to those observed in women receiving estrogen replacement therapy. The origin of bleeding can be sought in the apoptosis of the layer accompanied by red blood cell extravasation, the formation of platelet thrombi and fibrin clots in the capillaries, and the existence of processes related to the reconstitution, including layer formation and hypertrophy of the regenerated epithelium. Morphological lesions are typically focal and located near or on the

surface of the endometrium. In contrast, in cases of interruption of the E2/P relationship, they are diffuse. The exact mechanism of tissue apoptosis in hyperestrogenic endometrium is unclear. The abnormal development of the endometrium includes additional qualitative and quantitative changes in microvascularization such as spiral arterial compression and venous growth, which are often stretched, thus forming abnormal venous networks. Of particular interest is the fact that the process of neovascularization is inadequate in or near the hemorrhage focal area while adjacent intact endometrium does not show an increase in microvascularization. The abnormal morphology of microvascularization accompanies or is the cause of endometrial hemostasis disorders. Because of the lack of the arachidonic acid precursor, prostaglandin production is inadequate. Prostaglandins cause more dilation than contraction, and angiotensin-2 production is reduced. All of the above leads to the conclusion that bleeding, in these cases, is caused by vascular density disorders accompanied by structural abnormalities leading to rupture or degradation of the microvascular system. This process is followed by the release of lysosomal proteolytic enzymes from the epithelial and stromal cells and from endometrial migrating leukocytes and macrophages, while granulocytes and activated NK cells secrete perforins. In addition, the ability of contraction of basal and myometrial vessels is inadequate or absent. All of the above changes contribute to the inadequate structure and layout and ultimately to the degradation of the capillary network and constitute the major agents of extensive hemorrhage. Based on the above, the best therapeutic results are obtained when the bleeding hypertrophic-hyperplastic endometrium is excluded by performing suction biopsy or scraping. In these cases, an extensive stripping of the base layer is created followed by vasoconstriction of the arteries and arterioles as well as by tissue reconstruction. Functional hemorrhage due to progesteronism manifests as escape bleeding in women taking progestogens or using contraceptive tablets. The intensity, duration, and other features of these cases' bleeding depend on: type, dose and duration of progestogen administration, the estrogen-progestogen relationship, endogenous estradiol levels and the particular endometrial response to hormonal administration [7, 9]. Endometrial histology in these cases is predominantly influenced by progesterone and ranges between atrophy with or without cortical conversion of the layer and mixed appearance of productive and secretory elements. The greater the dose and the duration of administration, the more pronounced is the secretory type atrophy with a pronounced pro-stratum gland-layer relationship. In this case there is a corrugated endometrial layer especially in the initial periods of use containing migratory lymphocytes and macrophages as well as granular endometrial cells. All of the above lesions are associated with abnormalities of endometrial angiogenesis. These changes are accompanied by structural lesions and vasodilation leading to bleeding during the first months of use. The increased concentration of migratory leukocytes and other cells associated with immunity and the imbalance between metalloproteinases (proteolytic MMP enzymes that cause an intrauterine extracellular matrix) and their inhibitors against them, cause even greater vasodilation [7, 9]. In conclusion, the development of an abnormal and fragile network of microvascular surfaces in combination with the release of proteolytic enzymes and poor vasoconstriction due to reduced production of vasoconstrictors as a result of increased degradation by endopeptidase is the key factor in the manifestation of the above functional bleeding. Fortunately, the continuation of contraceptives decreases the frequency with the end result being usually observed only during the first 6–12 months of use.

## 6. Ovulatory cycles

They are related to disorders or inadequacy of local hemostasis mechanisms and decreased spiral arteriolar density. Endometrial histology varies from productive and secretory to menstrual, and the changes are not different from the corresponding premenstrual women with normal cycles. There is an increased blood flow to the endometrium whereas the levels of circulating ovarian steroids are normal. The endometrial prostaglandin production is increased with a priority to vasodilator PGF<sub>2a</sub> and angiopathic PGE<sub>2</sub> types. Prolonged vasodilation leads to decreased platelet aggregation and increased overexpression of potential parathyroid-related vasodilatory protein. High proteolytic activity of lysosomal enzymes in the endometrium as well as fibrinolysis through increased local secretion of agents with heparin analog activity. The mechanism that triggers all these disorders is present unknown [9, 35].

### 6.1. Diagnostic approach

History, gynecological examination, laboratory test such as blood generation, coagulation factors,  $\beta$ hCG, ultrasound through genital organs, parthenoscopy, magnetic resonance, and laparoscopy.

### 6.2. Treatment

Adolescent medium degree functional disorders of uterus: Hb > 9gr cyclic providing of progesterones, contraceptive pills, and iron preparations. In cases of Hb < 9gr, intravenous hydration, blood transfusion, high dosage of contraceptive pills per os, potential intravenous providing available estrogens continuing usage of contraceptive pills, and iron preparations.

Activity of the estrogen-progesterinoides agents in haemostasis led to: increasing of TXA<sub>2</sub>, platelet agglutination, prothrombin, Factors VIII and X, reduction of fibronolysis, PGI<sub>2</sub> in endometrium.

## 7. Adolescent functional disorders of uterus

Metrorrhagia is a symptom, not a specific disease entity. The effectiveness of treatment is based on proper diagnosis. It is very important to establish the stabilization of ovulation cycles. Therapeutic intervention always takes seriously the young of the age [36, 37].

## 8. Dysmenorrhea

It is a Greek word that has prevailed in the international bibliography as painful menstrual bleeding 2–3 years after menstruation with onset of ovulation. Frequent disturbance of adolescence ED has primary — no organic damage to the pelvis and secondary — painful ER due to pelvic conditions such as endometriosis, pelvic inflammation, and congenital abnormalities of the genital system [38, 39].



## 9. Explanatory theories

Theory of Hippocrates: Cervical lumen stenosis and the induced posture of stomach blood are responsible for the occurrence of dysmenorrhea. Myometric factor: increased myometrial activity and increased endometrial pressure. Neuromic factors: changing neuromuscular activity in the uterus after pregnancy may explain the reduction in menstruation pain after childbirth.

- Hormonal effect: women with anorexic cycles do not show painful menstruation.
- Prostaglandins: high levels of PGs are currently the most accepted causal theory

Increased levels of PGF<sub>2a</sub> and PGE<sub>2</sub> and increased PGF<sub>2a</sub>/PGE<sub>2</sub> ratio are observed in adolescents with PD. Also increased levels of LTC<sub>4</sub>, LTD<sub>4</sub>, and LTE<sub>4</sub> angiotensins, stimulation of myometrial contractility, and increase in plasma hormone concentrations in women with dysmenorrhea [38, 39].

### 9.1. Psychological factors

Subjectivity and fluctuation of the pain, dysmenorrhoea very often presented in family history.

### 9.2. Clinical features of dysmenorrhea

Subabdominal pain, nausea, vomiting, diarrhea, irritability, headache, flatulence payment of forces, depression, and inability to concentrate are clinical features of dysmenorrhea.

### 9.3. Treatment of dysmenorrhea

PGs synthetase inhibitors, non-steroidal anti-inflammatory agents act by lowering levels of PGs by reducing levels of PGs, tolfenamic acid, naproxen, and mefenamic acid. The release of PGs into the menstruation blood is maximal in the first 48–72 hours of EGFR. Contraceptive pills reduce the amount of menstruation blood, through the controlled increase of the thickness of endometrial tissue. By inhibiting of ovulation, an endocrine environment with low levels of PGs is maintained.

Other therapeutic proposals are spasmolytics, analgesics, calcium inhibitors, progesterone, magnesium, GnRH analogues, leukotriene antagonists, cervical curettage, acupuncture, electricity stimulation, and psychotherapeutic methods [39, 40].

### 9.4. Pelvic pain

Primary care of the gynecologist specialized in child and adolescent gynecology is the investigation of women with chronic pelvic pain. The rate of disease varies among teenagers between rarity and 19–47% [41, 42]. Typical forms of chronic pelvic pain are relatively common and non-recognition may underestimate their incidence. Mostly have primary secondary dyspnea and dysmenorrheal. In girls, the gynecological examination is not feasible and the rectal examination provides little information. The ultrasound provides information on a

possible chocolate cyst, hematosalpinx, and free fluid in the Douglas space. In non-response to NSAID medication, MRI and laparoscopic approaches are recommended with a detection rate in the specific cases of endometriosis approaching approximately 50%. Endometriosis symptoms in this age group are not specific, not related to adults, but gives continuous pain and a normal menstrual cycle. Atypical forms of endometriosis are more common in teenagers and their non-recognition may underestimate their frequency [43–45].

Primary care is the detection of adolescents with chronic pelvic pain experienced by endometriosis or other pathology. Irritable bowel syndrome is a common bowel dysfunction without attributing to specific etiology. It is characterized by recurrent chronic abdominal and pelvic pain combined with bowel dysfunction either as diarrhea or constipation. It is found in 50–80% of women with chronic pelvic pain and diagnostic criteria are proposed for diagnosis criteria against Rome ii.

Another cause of pelvic pain is congenital abnormalities of the genital system. Clinical symptoms are amenorrhea, metrorrhagia, dysmenorrhea, endometriosis, repetitive abortions, in cases of pregnancy, abnormal position and presentation of fetus, and premature birth [43–45]. Treatment of abdominal pain is a challenge for the specialized gynecologist especially when an exact diagnosis has not been made. Particularly in these young people, there is a major harmonic relationship between a young doctor and his/her parents in order to find an organic cause of the reported symptomatology or in cases where there is no finding of a treatment analogous to the subjective cause [43, 44].

## 10. Contraceptive methods

The purpose of contraception is to prevent fertilization of the ovum from the sperm or to prevent implantation of the fertilized egg in the uterus. There are many methods of contraception for everyone to be educated. The ideal method of contraception attaches to the prevention of an unwanted pregnancy but also protects against sexually transmitted diseases. Of approximately, 3 million unwanted pregnancies that occur in the United States, 54% of these do not use contraception.

### 10.1. Contraceptive methods

Natural methods: withdrawal method (coitus interruptus) of approximately 57% is used in adolescent women with a failure rate of about 22% and lack of protection against sexually transmitted diseases.

#### 1. Reversible (small time action) [46–49].

- Men's condoms
- Hormonal methods (contraceptive tablets, vaginal ring, transdermal patches)
- Other methods (contraceptive diaphragm, cervical cap)

#### 2. Reversible (long time action) [46–49].

- Intrauterine device
- Implants

### 3. Irreversible

- Tubal ligation
- Seminal duct ligation

### 4. Emergency contraception

- Levonorgestrel
- Ulipristal acetate [46–49].

## 11. Contraceptive pills

It is a complex issue that causes family embarrassment to healthcare professionals in government officials in civil servants and young people themselves. There has been extensive effort to increase the use of contraceptive methods and in particular the condom to avoid pregnancies and sexual transmitted diseases.

Definitely it is necessary to set up Family Planning Centers for Teenagers, which must become a priority for each government. Basic award principle for contraceptive pills, as long as necessary, as little as possible [50]. Contraceptive capacity of contraceptive pills is estimated by the Pearl Index (Pearl Index). All formulations with combined oral hormonal contraception have Pearl index  $\leq 1.25$  women (years). There are several differences regarding the hormonal components contained in each formulation which may vary depending on the type, composition, quantity, and number of active tablets. Single-phase formulations contain active tablets with the same constant amount of estrogen and progestogen ratio. In contrast, the above ratio changed in the multiphase pills. Biphasic have two different combinations, the three phase and recently there are also four phases with successive decrease in the estrogen ratio and corresponding increase in the progestogen ratio. Contraceptive pills have not been associated with weight gain and mood changes. It is recommended to take single-phase pills in teenagers for their menstrual bleeding disorders [51–55].

Contraindications of contraceptive pills are BP  $\geq 160/100$  mmHg, liver disease, migraines with focal neurological symptoms, diabetes, nephropathy, neuropathy, retinopathy, or angiopathy complications are also included.

History of thromboembolism (particularly with third generation pills with drospirenone), thrombophilia, factor V Leiden mutation, factor II mutation (G20210A allele), antiphospholipid antibodies, protein C deficiency, protein S deficiency, antithrombin III deficiency, undiagnosed vaginal bleeding, and estrogen-dependent breast cancer compromise contraindications for contraceptive pills. Smoking is a relative contraindication for the use. According to FDA (April 2012), revision of contraceptive pills guidelines with drospirenone increases three times the risk of thrombosis compared to other progestogens. Clots are caused by contained estrogen.

### 11.1. Impact of thrombophilia

- Total population: 1 per 10,000 woman years per year.
- Contraceptive pills: 4 per 10,000 woman years per year.
- Pregnancy: 10–20 per 10,000 woman years per year [56].

## 11.2. Positive actions

Circulation disorders such as hypermenorrhea, hypomenorrhea, metrorrhagia restoring a normal menstrual cycle, and prolong the menstrual cycle. Dysmenorrhea decreases through the action of prostaglandin synthesis. They also improve the presence of premenstrual syndrome, premenstrual edema, irritability, anxiety, and depression.

Ovary cancer risk is decreased by about 20% per 5 years of use and 50% for 15 years.

There is no protective action for mucosal ovarian cancer. They decrease the risk of endometrium cancer by 50% every 4 years of use and 70% after 12 years. Cancer of cervix represents an independent factor with a relative risk probably due to co-factors (HPV, intercourse without condoms). According to the WHO, there is a slight increase in the relative risk for users of contraceptive pills over a period of >4 years. Higher relative risk is increased for users over 10 years. The above may be affected by the use of non-barrier methods by the number of sex partners by multiparity and alcohol consumption.

It is believed that hormonal contraception, especially estrogen as mitotic agents, enhances neoplastic process particularly in women with HPV infection. Estrogenic probably affects specific DNA sequences.

Additionally, there is a direct interaction between estrogen receptors and HPV E6 and E7 protein. The problem of the possible relationship between breast cancer and hormone therapy is still largely unresolved.

The results that are available now suggest that relatively short-term treatment (less than 5 years) does not increase the risk.

For a treatment with longer duration, the existing results based primarily on estrogen monotherapy do not allow clear conclusions without excluding the possibility that the frequency could increase under these conditions. It is difficult to evaluate the role of progestogen added to the above treatment. So, it is preferable to utilize steroid hormones with anti-mitotic activity. It is known that hydroxyprogesterone derivatives such as medroxyprogesterone acetate can inhibit tumor growth activities.

There are indications that use of contraceptive pills over a period of 10 years can cause a moderate increase of the relative risk (24%) to the oncogenic progression for breast cancer. With discontinuation, this risk decreases to 0% in 10 years. It is also gained ground the aspect that this risk is greater in women with a family history, with the risk of being limited to second degree relatives. It is unlikely, however, to incriminate only estrogen because of the fact that there are minimal estrogen receptors in normal breast epithelial cells.

The progesterone may promote the mitotic process and cause atypia. It is known that the mitotic action on MCF-7 cells of human breast cancer of 19 nor-progesterone (norethindrone, gestodene, and 3-ketodesogestrel) [56–60].

In conclusion, progestogen should be emphasized that any attempt to adapt to the clinical practice of the experimental anti-mitotic action of a progestogen should be done very carefully. Only well-tested prospective clinical trials may answer the question whether the protective effect found in the laboratory has the potential clinical application.

Contraceptive pills advantages include ovarian cysts treatment, endometriosis, dysmenorrhea, dyspareunia, metrorrhagia, acne and decreased androgen synthesis, hirsutismus, specific activity of estrogen and antiandrogens, mastodynia, symptom reduction mastopathy, reduction of benign mastopathy, and bone increase density [60, 61].

What do women think about birth control pills from our own child and adolescent gynecology center housed in the Democritus University Family Planning Laboratory. Positive effects: positive effect on sexual life, reliability, easy to use/comfort, less bleeding, regulation of menstruation, and less painful periods.

Negative effects: nausea, headaches, changes in mood, feeling of tension on the breasts, and increase of weight.

### 11.3. Action mechanism of contraceptive pills

- Suspension of implantation
- Ovulation inhibition
- Thickening of cervical mucus
- Sperm motility disorder [62, 63].

Oral contraceptive pills (OCPs) perform their action through a variety of mechanisms, through the inhibition of the mesocyclic peak of gonadotropin secretion resulting in the suppression of ovulation.

Contraceptive action is mainly exercised through the progesterone of OCPs, which cause ovulation suppression by multiple mechanisms:

- ↓ Luteinizing hormone (LH).
- The thickening of the cervical mucus and ↓ of the sperm penetration.
- ↓ of fertilization capacity of the semen, the disturbance of normal motility and occlusion of the fallopian tubes.
- Obstruction of implantation due to endometrial perforation [62, 63].

Estrogens exert their contraceptive action, but they are dose-dependent, by inhibiting the secretion of gonadotropins (FSH and LH), cause the uterus to change its secretory capacity of the cellular structure of the endometrium.

There are several differences regarding the hormonal components contained in each formulation which may vary depending on the type, composition, quantity, and number of active tablets. Single-phase formulations contain active tablets with the same constant amount and estrogen and progestogen ratios. In contrast to multiphase, the above ratio changes of biphasic have two different combinations, the three phase have three and recently, there are also four phases with successive reductions in the estrogen ratio and a corresponding increase in the progesterone ratio [62, 63].

With regard to the first few generations because the dosage did not decrease at the appropriate time, side effects such as unwanted bleeding or spotting often occurred. The second generation was more effective and longer half-life, but with increased androgenic action that helped to sexual desire, however, it could lead to hypertrichosis, acne, and dyslipidemia. The third generation retains the effectiveness of the progestogen while reducing its androgenic effect. Smaller androgenic effect also makes estrogen more effective. This however entails a greater risk for thromboembolic events [62, 63].

#### 11.4. 4th generation contraceptive pills

The widespread use of a combination of estrogen and progesterone as a contraceptive or hormone replacement therapy has made it possible to complete large epidemiological studies that have made it possible to assess the benefits and risks that may have arisen.

Among the major advantages of use, are included primarily the reduced incidence of endometrium cancer, attributed mainly to the antimitotic progesterone activity, and secondly, the reduced frequency of ovaries cancer, due anti-gonadotropic action combination [62, 63].

#### 11.5. Contraceptive vaginal ring

It releases daily and for 21 days 120 µg of etonogestrel and 15 µg of ethinylestradiol (nestorone ring study 15–20 µg EU + 150–200 µg nestorone).

It remains in place for 3 weeks and the fourth week it is removed for bleeding to escape. It is possible to be removed during sexual intercourse.

Existing progesterone: etonogestrel (3-keto desogestrel) 19-nortestosterone derivative.

Nestorone belongs to the norprogesterone family and is weakly active by oral administration. It does not bind significantly neither to the androgen receptor, nor to the estrogen receptor. It is a flexible, transparent silicone ring. It secretes daily 15 µg ethinylestradiol and 120 µg etonogestrel. Its diameter is 53 mm with cross section 4 mm. The duration of usage is 1 month, 3 weeks/1 week.

It is direct start fitting and has possibility to maintain up to 35 days. The next placement can be without delay. There is less interruption for a shorter duration of menstruation. Tampons, spermicide nonoxynol-9, or intravaginal miconazole should not to be used at the same time. It can be removed in less than 3 hours. It does not affect in sexual contact.

It causes breast tenderness, headaches and nausea, spotting, vaginal intolerance or hypersecretion, and unconceivable loss or misuse. There are no studies evaluating its effect on adolescent bones. There is no evidence of VTE in relation to low-dose OCPs. Ease of use has not demonstrated increased compliance or prolonged use (<30% in 6 months) [64, 65].

#### 11.6. Evra patch contraceptives

They release EE 600 µg with norelgestromin 6 mg. They remain placed for 7 days for 3 consecutive weeks followed by 1 week without patch. It is a useful alternative method for women who hardly remember daily taking the pill because if they forget there is a 2 day error margin. It should be avoided when weight greater than 90 kg. The increased exposure to estrogen compared to oral contraceptive pills creates 1.6 and 1.2–2.2 higher probability of deep thrombosis [65, 66].

### **11.7. Implants**

They modify cervical mucus (viscosity in reduced amount) prevent sperm penetration and suppress endometrial growth which becomes inappropriate for implantation.

It is an ideal contraceptive method for teenagers who do not want to deal with contraception often [65].

### **11.8. Injectable contraceptive preparations**

Injectable contraceptive preparations medroxyprogesterone acetate depot, intramuscular protection 3 months with efficacy 99.7%.

Monthly combined contraceptives estradiol cypionate and medroxy progesterone acetate depot, valerian estradiol, and norethron acetate.

They improve dysmenorrhea increase the risk of thromboembolic events and may cause menstrual disorders [65].

### **11.9. Transdermal contraceptive patches evra**

Transdermal contraceptive patches evra release ethinyl estradiol 600 µg with norelgestromin 6 mg. They remain placed for 7 days for 3 consecutive weeks followed by 1 week without patch it is a useful alternative for women who hardly remember daily taking the tablet because if they forget there is a 2 day error margin. They should be avoided when weight of the woman is greater than 90 kg. There is an increased exposure to estrogen compared to oral contraceptive pills 1.6 and 1.2–2.2 with higher probability of deep vein thrombosis [65, 66].

### **11.10. Subdermal implants**

They modify cervical mucus (viscosity in a reduced amount), prevent sperm penetration, and suppress endometrial growth which becomes inappropriate for implantation. It is an ideal contraceptive method for teenagers who do not want to deal with contraception often [65].

### **11.11. Injectable progestogens**

Injectable progestogens contain depot medroxyprogesterone acetate, intramuscular site of injection and they offer protection for 3 months with efficacy 99.7%.

Combined oral contraceptive pills estradiol cypionate and depot medroxyprogesterone acetate, valerian estradiol, and norethron acetate.

They improve dysmenorrhea, increase the risk of thromboembolic events, and may cause menstrual disorders [67].

#### *11.11.1. Barrier methods*

- Male condoms.
- Female condoms.

- Sponge.
- Diaphragm.
- Birth control rings.
- Spermicides.

From contraceptive barrier methods, the most widespread, economic, easy to use, well accepted by both partners, with the greatest contraceptive success and the greatest protection against sexually transmitted diseases is the male condom, 75% of adolescents report using a condom with a failure rate of 18% [68].

### 11.12. Intrauterine contraception

Copper intrauterine device is the most effective reversible method of contraception in terms of cost-effectiveness which is the first method of contraception with a coil used in the world.

Mirena, which was released in 1997, is a type of intrauterine device with levonorgestrel that contains 52 mg levonorgestrel and yields 20 µg/24 h for 5 years.

They can cause amenorrhea or oligomenorrhea.

### 11.13. Innovations

Forming new IUD with less levonorgestrel that will be easily applied to nulliparous women (Femilis and Femilis slim) are under construction and they are another IUD without side arms, for easy adjustment to various sizes of uterus IUD (SPRM) (ulipristol).

Aims of intrauterine devices:

- Contraception.
- Menorrhagia.
- Endometrial protection.

### 11.14. Side effects

The use of IUD can cause temporarily edema, headache, tenderness, depression and breast tenderness, acne or other skin lesions. There are may also be appeared: abdominal pain in the lower part of the abdomen, vaginal discharge, nausea, functional ovarian cysts and rarely spotting, especially in the first months [69].

### 11.15. Mirena

Mirena is an intrauterine device effective in relation to the main indication of its usage which is contraception. It could be also used as a reliable therapeutic method of menorrhagia. In many cases, reduce dysmenorrhea. It reduces the risk of pelvic inflammatory disease and ectopic pregnancies.



Finally, it protects woman in perimenopausal and postmenopausal periods who are under hormonal replacement therapy with estrogens from endometrial hyperplasia indicated in puerperium.

Contraindications conclude pelvic inflammatory disease. HIV and immunosuppressant are not contraindications. Risk of expulsion in women of reproductive age is 3–5% and in adolescents 5–22%.

## 12. Conclusion

From the above mentioned, we conclude that with the preventative gynecological control in females of young age, a prompt diagnosis and appropriate treatment, in particular congenital abnormalities of the genitals and investigation of clinical symptoms of these individuals, can be made.

Early diagnosis and treatment of ovarian tumors despite their small incidence of genital cancers up to 18 years of age is of major clinical importance because they are not always accompanied by a characteristic clinical picture.

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# Forms of Contraception

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# Contraceptive Methods and the Subsequent Search for a Pregnancy

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Additional information is available at the end of the chapter

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## Abstract

Many women are concerned about their future fertility, about pregnancy complications and about the health of their future child when choosing a contraceptive method and sometimes women want to interrupt the contraception – maybe after years of use – in order to attempt pregnancy. Return to fertility, has been thoroughly analyzed in the literature. This chapter provides evidence-based information and discusses the potential doubts of women. Return to fertility has been consistently found to be sure, albeit sometimes slightly slow in the short term: pregnancy rates after 1 year of contraceptive interruption are 79–95% for oral contraceptives, 79–96% for levonorgestrel IUD, 71–91% for copper IUDs, around 80% for implants and 75–80% for injectable contraceptives. About 50% women are pregnant 3–6 months after contraceptive discontinuation; around 90–95% of women had achieved pregnancy 2 years after stopping their contraceptive method. Some studies have found associated risks of fetal malformations when women take oral contraceptive pills *after* conception (though other studies disputed these results). However the offspring of women who used oral contraceptives *before* conception does not show an increased risk of fetal death, miscarriage, gestational hypertension, major newborn structural defects or hypospadias. The effect on birth weight seems small and inconclusive.

**Keywords:** return to fertility, contraceptive, UID, copper, pill, contraceptive implant, hormonal contraceptive, injectable, depot, pregnancy rate

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## 1. Introduction

Contraceptive methods are the instrument that women use to control their fertility at any given time in their lives so that the pregnancy would be produced by choice and not by

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chance. In any case, women's reproductive goals change at any moment of the woman's fertile life; this is why the reversibility of the chosen method is especially important for them [1].

For many authors, infertility refers to the inability of a couple to conceive after having 12 months of regular sexual intercourse without using any contraceptive method; some authors emphasize intercourse "in the fertile phase of the menstrual cycles" [2]. Infertility rate is better estimated by prospective studies; around 80% women become pregnant in the first cycles and approximately, 85–90% couples will conceive within 1 year if they have regular unprotected sex. 50% of couples who did not manage to conceive after 12 months (infertility definition) will manage to conceive spontaneously in the next 36 months; after this time point spontaneous conception in infertile couples is considered only sporadic [2]. Infertility (both male and female) is influenced by many reproductive or lifestyle factors. Physical causes of female infertility include alterations in ovulation and abnormal functioning or structures of reproductive organs, as well as age and lifestyle-related risk factors: alcohol or drug use, obesity, tobacco habit, exposure to a range of environmental toxins, etc. [3, 4] Consequently, studies assessing pregnancy rates or time to pregnancy following cessation of contraceptive use may be influenced by many underlying factors specific to the population under study.

Future pregnancy complications and pregnancy outcome is another important concerning issue of women who want to become pregnant; these events can happen in any pregnancy. Spontaneous abortion is one of the most common pregnancy complications; abortion rates are especially high in the weeks [5]. 14% of pregnancies end with fetal loss, with rates varying between 9% and 75% or more depending on the age, population and other factors [6, 7]. Ectopic pregnancy incidence rates vary between 1 and 2% of live births in developed countries, maybe reaching up to 4% in women subject to assisted reproductive treatments [8]. Preterm birth rates range from 5% of babies in European Countries to 18% in African countries [9]. Induced abortion rates also vary greatly depending in many psychosocial factors [7].

At the time of choosing a contraceptive method, women value aspects such as effectiveness, comfort, price, safety and early recovery of fertility after ceasing using this method. Past experiences with contraception and future fertility intentions also can play a role in this decision. Quite often the reversibility of the method is an important concern for women; the lack of information plus the acquisition of misconceptions about methods can increase general mistrust in long-acting contraceptive methods and lead to reduced use of these. The midwife can exert an important role solving women doubts, considering their concerns and helping them choose the most suitable contraceptive method in each case.

**Male condom** was the mainstay of contraception for several decades, being also immediately reversible and effective at preventing sexually transmitted diseases (STDs). **Combined Oral Contraceptive (COC) Pill**, which contains estrogens and progesterone, was first approved for contraceptive use in the United States in 1960. Combined hormonal methods also include patches and vaginal rings. Unlike combined methods, **progesterone-only** contraceptive methods are not associated with cardiovascular risk or deep-vein-thrombosis risk. These methods are monophasic and can be administered subcutaneously or orally (progesterone-only pills, POP). They lack adverse effects on lactation but cycles and menstrual bleeding become more irregular [10].

**Long-acting reversible contraception** methods are highly-effective reversible contraceptive methods that last for years and are easy to use. These include the intrauterine device (IUD) and

the birth control implant. The pregnancy rates in these methods are comparable to sterilization. IUD risks include uterus perforation, IUD loss, pelvic inflammatory disease, pregnancy during IUD use, etc. [11] Depot medroxyprogesterone acetate intramuscular injection (DMPA) was approved by the FDA in 1992 and became the most common injectable method in use in the USA [12]. LARC has been described to be more cost-effective than COCs, even at 1 year of use [13].

Women's preferences for contraception have varied between different countries and generations [14, 15]. As a documented example for these variations, in the USA the Centre for Disease Control has published several periodic reports on contraception use. Apparently in the 2006–2010 report [16] a slight decrease in condom usage and an increase in intrauterine devices (IUD) was observed compared to 1995 data.

The 2011–2013 National Survey of Family Growth reported that oral contraceptives (OCs) were the most commonly used contraceptive method in the United States (16% of women aged 15–44), followed by female sterilization (15.5%), male condom (9.4%) and long-acting reversible contraceptives (7.2%). The use of sterilization declined and the use of OCs increased with greater educational level and the use of long-acting reversible contraceptives was higher among women aged 25–34 (11.1%) compared to other age groups [17].

This chapter focuses on a particular clinical situation: those women who are using a contraceptive method and want to conceive a child. These future mothers are often worried about when they will be able to conceive and about the health of the future child. With the advent of the Internet and information technologies the access to information has become less of a problem compared to the information overload [18] and the abundance of lesser quality information. Generally speaking openness of information is positive for patients, but many issues.

Some women might have heard reports of secondary effects of contraceptive methods and they might become concerned about this; on the Internet many women talk and discuss reproductive issues via women's forums or family planning forums and this might exacerbate some natural fears of mothers. In these cases it is especially important to expose medical evidence-based facts clearly: many contraceptive methods have been available for decades and there is abundant evidence and clinical experience with them. More than 150 million women around the world use the IUD [15] and clinical studies with contraceptive methods have involved thousands of patients [1]. Case reports are seen as particularly weak evidence when compared to other studies, and personal experiences shared via the Internet should not be considered a reliable source of information. For example, a former user of IUD could have a miscarriage and she could link these two circumstances; attempts to rationalize this situation are normal part of the grief and emotional healing process in many women. However miscarriages are very common (some authors have calculated a rate of >20 miscarriages/1000 women/week in the first 8 weeks [5]) and she might just be experiencing a fortuitous event.

Press and internet newspapers can act as an immediately available and quite reliable bridge between authoritative media sources and women. Reports on contraceptive methods sometimes include expert opinion and consensus statements [19]; information presented this way could be helpful for women. Media sources also usually include noteworthy journalists' opinion articles on reproductive issues [20]; in these the separation between facts and beliefs could be less clear. Experienced midwives and doctors can also act as a reliable bridge for women with reproductive health doubts; they can provide objective evidence-based objective information and statements that can be very helpful for women.

Over the course of many decades contraceptive methods have deeply improved. Secondary effects of oral contraceptives have been detected and lower dose formulations have been developed. Many studies have assessed long-term effects of OCs on various aspects of women's health [14, 21], including their future reproductive health. In some topics conflicting evidence is available as the results and conclusions of some studies differ from others. This is not the case for contraceptive reversibility (which has consistently been observed for decades in many studies and is remarked in NICE [13] and WHO [22] guidelines, as we will discuss later), but for some rare pregnancy events (twin pregnancy, preterm birth). Obtaining contradicting results is not uncommon in clinical research and does not necessarily imply there was a flaw conducting the study [23]. Publishing these studies is not a mistake, but inadequately interpreting them could be. Conflicting and inconclusive evidence should be treated with special caution; unconfirmed results or contradictory results are not ground for evidence-based recommendations.

In this chapter we will analyze the reversibility of physiological changes, the observed fertility changes and the future pregnancy complications of several contraceptive methods: OCs (including progestin only pill and emergency contraception), injectables, implants and IUDs.

## 2. Oral contraceptives

### 2.1. Cessation

The pathway in women using OCs to return to fertility is often straightforward. The information leaflet of the particular regime often includes clear and specific instructions for women seeking discontinuation and pregnancy (which often only consist of ceasing its use). Women are often advised to wait for their menstrual period before seeking a new pregnancy because the day of the last menstrual period is useful in pregnancy date calculations. In our center, midwives provide preconceptional counseling, which can include contraception recommendations and assessment (this applies to contraception in general). Many health issues affecting the health of the mother and the future baby can be addressed in these visits [24] and we can only recommend this practice.

### 2.2. Physiology

The mechanisms of action of oral contraceptives (OCs) are derived from the effect of the estrogen and the progestin in the formulation. Estrogens act by inhibiting follicular development and inhibiting hypothalamic–pituitary ovulation trigger. Progestins increase the thickness of the cervical mucus. The effects of Oral Combined Contraceptives (COCs) on endometrium vary depending on the doses, formulation and duration of use; with current commonly used lower doses contraceptives these effects include arrest of glandular proliferation, abortive secretion, stromal hyperplasia, decidualization and atrophy [25]. Intramuscular or locally administered progestins cause endometrial atrophy [26].

There is not much information on the reversibility of these changes. For example, cervical mucus can have lower scores for the first 2 months after discontinuing OCs and decreased menstrual flow was described to last for four months [27]. Some studies have linked reduced

endometrial thickness and long-term COC usage: Talukdar et al. studied the effect long-term use of combined oral contraceptives on endometrial thickness. They gathered 137 women between 30 and 45 years old subject to frozen embryo transfer cycles and determined the endometrial thickness on day 10. The group with endometrium thin than 7 mm (n = 30, a proposed threshold for successful implantation) had longer COC usage compared to the rest of the women. Authors this could be mediated by the effects of OCs on stem cells in an inactive endometrium. In particular, some authors have said this effect after long-term use of OCs is “infrequent but persistent” [28]. These results should be taken cautiously and require further confirmation in larger groups of healthy women in prospective studies; as we will discuss later infertility has not been associated to OC.

The effects of COCs on gonadotropins have also been studied: Compared to women who never used COCs, women using them showed similar or slightly lower FSH levels, whereas women who used them showed slightly higher FSH levels that seemed to wane over time. (LH showed a similar pattern, but it was only significant in one of the two study groups). The authors attributed this to a possible rebound effect of gonadotropins after withdrawing the hormonal COC and a suppression of endogenous estrogen and progesterone [29]. After withdrawal of COCs normal physiology is gradually restored: in a study with 24 women it was observed that the first cycle is longer and with lower gonadotrophin levels compared to the third cycle; ovulation changes were observed in 17/24 women in the first cycle and in 21/24 women in the third cycle [30]. Recent use of OCs and their long-term use have been associated with longer follicular phases (longer time to ovulation) by some authors, but they acknowledged there are conflicting results on this issue in the literature and many women might choose to start using OCs to help regulate their cycles, which might already be longer [31].

Estrogens are known to stimulate prolactin production. Some reports associated post-pill amenorrhea and galactorrhea and serum prolactin is elevated in OC users; this is more pronounced in women who use high-dose OCs but not significant association was found with long-term usage [32]. However prolactin levels do not seem to be altered in women who previously used COCs [33].

### **2.3. Return to fertility**

Despite these described biochemical or histological findings, the reversibility of OCs has been clinically observed for decades and across many different ethnic groups (**Table 1**); many studies have reported 1 year pregnancy rates between 70 and 90% and 2 years pregnancy rates of 80–90% [1, 34].

In the 1960s, the “postpill amenorrhea syndrome” was described as amenorrhea, anovulation and reduced reproductive fecundity for more than 1 year following discontinuation of OCs in some women who previously had regular menstruation. Some authors noted that many women with this syndrome exhibited oligomenorrhea before starting oral contraceptive usage [35]. It was thought that the exogenous administration of hormonal therapy with OCs delayed the return to normal function of the hypothalamic-pituitary-ovary axis [36]. Some authors advocated “watchful waiting” in women not seeking pregnancy, mentioning that regular menses tend to reappear after 12–18 months, and emphasized the importance of ruling

Study design	Method	Participants	Subjects	Exposure (months)	1-year pregnancy rate	2-year pregnancy rate	Comments
Pardthaisong [34]	Retrospective and Prospective: 2 arms	796 DMPA vs. 125 IUD	Mean age: 24.5 vs. 27.7	Not reported	78.2 vs. 79%	92.1 vs. 93.3%	Median delay to conception: DMPA: 5.5 months. IUD 4.5 months
Harlap and Baras [109]	Retrospective	1403 OC 4477 other contraceptives			The proportion of pill users who conceived in the first month was 30% less than the others, but by the third month this difference had disappeared		
Belhadji et al. [110]	Randomized, prospective	Mirena IUD 20mcg/d vs. CuT380Ag	110 females		>90%		Median time to planned pregnancy was 3 months for the IUD, 380 Ag group and 4 months for the Levonorgestrel 20 group
Skjeldstad et al. [111]	Prospective observational	Copper IUDs	101 IUDs users (Nova T, MLCu 250 vs. MLCu 375) Norway	Mean age 28.3 56% <24m	85%	93%	
Affandi et al. [112]	Prospective	Implant	80 Implanon vs. 80 Norplant Indonesian women	Mean age ~28.0 y. Mean parity ~ 2.3	48.8 vs. 37.5%	60.0 vs. 73.8%	
Wilson et al. [106]	Prospective	IUD	1051 IUD. New Zealand	375 nulligravid 676 gravid women	Not reported	91.5 vs. 95.7%	Removal because of complications: No reduction in fertility or increase in ectopic gestation, miscarriage, or preterm delivery rates in 12 months
Gupta et al. [113]	Prospective	IUD (8 types: 6 Cu-bearing, progestasert IPCS 52 and Lippes Loop)	91 users India.	Mean age ~27.6	92.3%	96.7%	
Silvin et al. [114]	Prospective, multicenter	Norplant vs. Norplant II	178 users (62 vs. 116)	Mean age ~ 27.45	83 vs. 84%	87 vs. 92%	



Study design	Method	Participants	Subjects	Exposure (months)	1-year pregnancy rate	2-year pregnancy rate	Comments
Randic et al. [115]	Prospective,	748 parous (planned pregnancy) 2713 (complications)	Mean age: 27.1 (first group)		82.9%	89.5%	
Andersson et al. [116]	Prospective	209 IUD users (71 Nova-T vs. 138 IUD - LNG)	Mean 27 y	Median 21 months (range 6-53)	71.2 vs. 79.1%	79.7 vs. 86.6%	
Tadesse [117]	Prospective	780 users. Ethiopia	Mean age 29 Nulligravid: 3.2% multip. 93.5% grand multip. 3.3 %	Mean 3.5 years	86.6%	No data	
Buckshee et al. [118]	Prospective	627 India	18-35 years	Mean 55.8 ± 17.7 m	80.3%	88.3%	
Bahamondes et al. [95]	Prospective	70 users Brazil, Chile, Colombia and Peru	Mean age ~25.6	Mean number of injections: 7.1 ± 4.6	82.9%	Not reported	Return of fertility was not related to the woman's age at the time of discontinuation, her weight, or the number of Cyclofem injections.
Zimmerman et al. [119]	Prospective observational	348 users of 30 mcg EE / 2 mg DNG (Valette)	Mean age: 26.8 y	Median 4-6 months	95%	Not reported	
Delborge et al. [120]	Prospective	128 users	Mean age 30.5 y	104.6 ± 93.5 weeks	88%	99%	No statistical differences in pregnancy rates were found for age and duration of use of the IUD
Farrow et al. [42]	Retrospective	8497 users who conceived intentionally South-west England	Mean age 28	From 1 to more of 5 years: >5: 56.8% of the participant 3-4: 20.3%, 1-2: 11%, <1: 7%, never: 4.9%	According to years of use: >5: 89.5%, 3-4: 88%, 1-2: 85.2%, <1: 83.5%	Mean 96.6%	The article includes many analysis categories, such as woman's alcohol consumption or cigarettes smoked

Study design	Method	Participants	Subjects	Exposure (months)	1-year pregnancy rate	2-year pregnancy rate	Comments
Hov et al. [121]	2 branches. A: Prospective Copper IUD	205 users Norway (A: 109 IUD removed due to wish to be pregnant vs. B: 96 IUD removed due to complication)			90% (group A).	93.6 vs. 98%	No difference in cumulative probability to become pregnant by parity, duration of IUD use and age upon removal of IUD
Wiegratz et al. [44]	Prospective observational OC: 30 microg ethinyl E2 and 2 mg dienogest (Valette)	706 users Germany	Mean age: 26.8	21.5m ± 16.8m (median 16m)	86.6% (more than 15.5% in the first 3 cycles) Meantime 3.5 cycles	not reported	
Cronin et al. [46]	Prospective cohort OC (drospirenone and other progestins)	2064 users	Mean age 28.1 years	2.8 ± 0.8 years	21.1 % after first circle. 79.4% 1-year	88.3%	
Stoddard et al. [122]	Prospective IUD	69 IUD (50 Cu, 19 LNG) vs. 42 non IUD. St Louis, USA.	Mean age: 27.6 vs. 29.5		81 vs. 70% (p=0.18)		
Abdimasab et al. [123]	Retrospective cohort study Cu IUD (T-380)	750 non-nulliparous Iranian women 375 Cases: history of using Cu T-380A IUD > 5 months. 375 Controls: history of other contraceptives: OCP, withdrawal method, male condom.	Mean age: 34.8 vs. 33.9	57.46 ± 47.74 m			Mean length from Cu T-380A IUD removal to pregnancy was 14.87 ± 5.18 months

**Table 1.** Studies evaluating return to fertility.

out other causes of amenorrhea [37]. Some women with amenorrhea after discontinuing OCs could have preexistent menstrual irregularities masked by OC. In the 1980s more reliable studies showed no association between oral contraceptive use and secondary amenorrhea and lack of specific findings in this syndrome [38]. Current practice holds that women who do not menstruate 3 months after discontinuing COC usage should be evaluated like any woman with amenorrhea [39].

Diana Mansour published in 2010 an interesting comprehensive review of the literature assessing pregnancy rates following discontinuation of several contraceptive methods; 17 prospective studies were included. One year pregnancy rate following cessation of OCs (3 studies) ranged from 79.4 to 95% and median time to pregnancy, estimated from available data, was 2.5–3 cycles) [1].

The Oxford-FPA study, published in 1978, was one of the first studies that investigated this issue. In this prospective cohort study 12 months after contraception cessation 70.1% of women who used OCs remained undelivered, which is significantly higher than 46.4% for the diaphragm group or 47.6% for the other methods group. After 36 months the differences became non-significant [40].

Doll et al [41] performed a study in nulliparous women from 17 family planning clinics in England and Scotland; they found that duration of oral contraceptive use was linearly associated with decreased fertility and that return to fertility is slower in users ceasing OC (32% delivery after 1 year) compared versus users ceasing IUD (39%) or users abandoning barrier methods (54%); 18 months after ceasing using contraceptives these values were 70% delivery for previous OCs group, 67% delivery for previous IUD group and 76% delivery for the barrier method group. Authors observed significantly faster return to fertility for users of barrier methods (log rank test,  $p = 0.002$ ) without statistical differences between OCs and IUDs. Other studies usually report around 1-year conception rates (>80%) [42]. Temporary (a few months) delays in fertility have been observed in other studies in women using OCs [43, 44] and reflect physiological changes: some women return to fertility faster than others. In this study duration of OC use had no significant effect on fertility and women who interrupted OCs and used barrier methods for 3 months had faster return to fertility than those who tried to conceive immediately after stopping using OCs [41]. After 42 months of ceasing OCs 11% of women had not delivered a baby.

A recent Danish prospective cohort study also observed a temporary reduced fertility in the 3 months after OCs discontinuation compared to barrier methods, but pregnancy probabilities became similar thereafter [45]. From the Kaplan–Meier curves time to pregnancy (TTP) percentiles were obtained, the 25th, 50th (median) and 75th percentiles were 2, 3 and 7 cycles for women who had discontinued barrier methods and 2, 4 and 9 cycles for women whose last method were OCs. A dose–response relationship between time using OCs and increased fecundability was observed, with confidence intervals becoming significant after 10 years of use. High-dose OCs was associated with shorter TTP. This study has some limitations, but the conclusion is very reasonable: there is no evidence that using OCs for years impairs fecundability. Other studies have also showed that long-term OC use is not associated with reduced fertility [46], but not all studies agree on this matter [47].

The effect of other variables (weight, smoking ...) on time to fertility after OC discontinuation has been evaluated in many studies, but small sample sizes limit the interpretation of these results [1].

Many studies do not evaluate COCs and POP separately or focus only on the former. POPs have not exhibited delays in the return of fertility [48]. With Norgestrel pills conception can occur within once cycle of stopping the medication [49]. In a randomized open-label study with 103 women after discontinuing a desogestrel-only pill ovulation appeared as early as 7 days, with an average of 17.2 days; [50] (with traditional POP ovulation occurs in 30–40% of users, but this pill has a remarkable anovulatory effect shared with combined formulations).

Emergency oral contraception (mifepristone) does not harm future fertility [51] and woman should be informed that emergency oral contraceptives do not protect from future pregnancies. In women who had successful abortive expulsion of the gestational sac the mean times to ovulation after mifepristone administration was 20.6 days ( $\pm 5.1$ ; range 8–36) [52].

#### 2.4. Pregnancy complications and outcomes

Some studies have linked previous OCs usage with **twin conception** [53, 54, 55], whereas others have not observed this association or limited its findings to OCs with high doses of estrogen [56]. Increased levels of FSH are observed in mothers of twin pregnancies; the “endocrine hypothesis” of dizygotic twin pregnancies holds that high FSH is responsible for multiple ovulation [57]; it has been suggested this mechanism might be the link between OC usage and dizygotic twin conceptions. However many of the studies reported increased monozygotic twins rates. More recent evidence is lacking on this matter.

The effect of OCs on **fetal loss** has been studied for many decades. The first studies did not find any link or described the effect of OCs as protective [53]. Some studies have shown consumption of oral contraceptives for more than 9 years could protect against miscarriage [58]. On the other hand a Spanish retrospective [59] case–control study (N = 300) did actually identify taking oral contraceptives for more than 2 years before pregnancy as a risk factor of miscarriage (OR: 2.56, 95% CI: 1.16–5.67); the statistical methods included a step-wise regression, a controverted statistical procedure known for its risk of spurious associations. The authors hypothesized that the endometrial atrophy associated to taking (modern) low-dose oral contraceptives for extended periods of time could cause miscarriage or that acquired activated protein C resistance could be the link between oral contraceptives use and miscarriage.

A Danish prospective cohort study published in 2016 did not confirm these findings; 4500 women participated in this study. The hazard ratios were all non-significant and smaller than 1; the study did not find association between spontaneous abortion and discontinuing oral anticonceptives closer to conception (categories: discontinuing 0–1 months before conception, 2–6 months or 7–12 vs. discontinuing more than a year (reference) before conception); or between spontaneous abortion and longer use of oral contraceptives (comparing less than 4 years COC usage (reference) vs. 4–7 years, 8–11 years and equal or more than 12 years) [60].

The Jerusalem Perinatal Study is a cohort study that recorded several variables on 92,408 live neonates and stillbirths from the 1964–1976 period and on their families; these data were linked to several registries and many epidemiological studies were carried out [14]. For instance, in this study former COC usage conferred no risk of obstetric complications [61].

The relationship between OCs and **birth weight** has been controversial in the literature. A study with 260 Boston women found previous OC use increased birthweight and placental weight compared to non-users [62] with more pronounced effects in women with longer use and with stronger hormonal contraceptives. The authors suggested this effect might be mediated by the higher levels of estradiol and progesterone observed in former users.

A 2015 Danish prospective cohort study evaluated the effect of oral contraceptives usage before pregnancy on birth weight [63]. The authors used data from online questionnaires and from the Danish Medical Birth Registry; 5921 women were followed for 12 months and 4046 live births took place. After adjustment for several confounding variables women who had discontinued OCs less than a month before conception exhibited higher mean birth weight (97 g, 95% CI: 26–80 g) compared to those who discontinued more than 12 months before conception; and lower mean birth weight was observed in women with previous >12 years of OCs use vs. <4 years (–85 g, 95% CI: –158, –11).

Previous use of OCs has not been consistently associated with **birth defects** on the offspring. Some studies old studies found this link [55] but other studies did not. In a cohort (n = 732) from the Jerusalem Perinatal Study children were tested up to 3 years age. Although some dim trend in IQ values was suggested, those whose mothers were OCs users did not exhibit statistically significant differences in weight, height, development quotient or intellectual quotient [64].

It might occur that a woman accidentally and unknowingly takes oral contraceptives for some period after conception, a situation sometimes called **breakthrough pregnancy**, thereby exposing the fetus to doses of estrogens or progestins. This situation is especially worrying and distressing for affected women. In the past a frequent case of fetal exposure to potent oestrogens was that of women prescribed diethylstilbestrol (DES) in pregnancy to prevent abortions; after a study [65] linked this to vaginal clear-cell carcinoma in 1971 the FDA banned this drug in pregnant women. The daughters of women treated with DES in pregnancy have shown increased risk of cervical and vaginal precancerous states, a possible slight increase in breast cancer in women older than 40 years old, reproductive tract structural anomalies, infertility and pregnancy complications. The sons of treated women may be at increased risk for epididymal cysts and maybe other genital abnormalities. The NIH and the CDC provide information for healthcare providers and patients on this public healthcare issue [66, 67].

Several studies have evaluated how the use of oral contraceptives with way less estrogenic potency compared to DES after conception could influence male hypospadias and urinary tract anomalies, but the results have been inconclusive and contradictory: In some studies the association was clear [68], but others did not observe this association [69]. A recent 2009 large Danish case–control study evaluated the relationship between use oral contraceptives after conception and male hypospadias. This study used prescription data rather than self-reported maternal exposure data in order to prevent the recall bias, a relevant cause of spurious associations in retrospective case–control studies. The adjusted prevalence ratios were close to one and none of them was significant: for example 0.85 (95% CI: 0.65–1.28) for exposure to COC in early pregnancy and hypospadias detected within 6 months postpartum [70].

Women with **breakthrough pregnancies** or conception close to OCs cessation should also be assured large studies have not identified increased prevalence of **birth defects**. A meta-analysis published in 1990 found no association for OC exposure early in pregnancy and heart defects or

limb reduction defects [71]. Charlton et al. collected data on OCs use and major birth defects on 880,694 live births from Danish registries; the prevalence of major birth defects (per 1000 births) was 25.1 for never users of OCs, 25.0 for OCs used more than 3 months before conception, 24.9 for OCs used less than 3 months before conception and 24.8 for OCs used after conception; the confidence intervals were not significant, and association was not found either for prevalences by defect subgroup [72]. Older studies (with older contraceptive formulations) arrived to more or less similar results: No significant association was observed between congenital malformations and conceiving within 1 month of stopping OC, and in breakthrough pregnancies the ratio of observed to expected major malformations was only significant in mothers one pack or more of cigarettes daily [73]. A recent study in 2010 (with 4000 healthy controls and 9986 infants with birth defects) did not find association for 32 anomalies when OCs usage took place before conception and only found association for gastroschisis (OR 1.82, 95% CI 1.25–1.67) and hypoplastic left heart syndrome (OR 2.33, 1.28–4.25) when OCs usage took place afterwards [74].

**POPs** have some particular characteristics regarding pregnancy outcomes. If the contraception fails a higher incidence of ectopic pregnancy versus other contraceptive methods has been described, but the incidences were similar to those in women not using contraceptives [12]. A proposed explanation is a reduction in the activity of fallopian tube cilia and tubal motility alteration [75]. Fetal male hypospadias was more likely to occur among women who took progestogens to prevent pregnancy complications or to help with becoming pregnant between a month before conception and 3 months after this point (reaching adjusted OR > 3, and stratified OR > 2). However the association was non-significant for those women who took progestogen as a contraceptive [76].

A Norwegian study published in 2015 evaluated the risk of preterm birth and found this risk varied depending on the moment of exposure and the progestin used. COCs with Norethisterone were particularly associated with preterm birth in some exposure periods (with adjusted OR reaching 3.33 (95% CI: 1.69–6.57 for the period 0–12 weeks after conception, a period that seemed particularly critical in some subgroups); for COCs with Drospirenone or Levonogestrel or POPs the association seemed weaker or absent. Authors noted the association for preterm birth seemed consistent across all exposure periods, but they also acknowledged other confounding factors could explain this association. Authors pondered a weakly estrogenic environment could be deleterious for fetal growth. The study also evaluated birth weight using z-scores (a more precise and current definition) and found no association with OCs [77]. A cohort study in China agrees with this association (OR for OCs usage in multiple logistic regression: 8.162, 95% CI: 1.622–41.072) [78]. Other studies found that exposure to OCs in the 6 months before conception was associated with higher birth weight compared to longer duration exposures [63].

There is no evidence that Emergency Contraception is associated with worse outcomes in future pregnancies. The pregnancy outcomes of women undergoing mifepristone-induced abortion were studied in nearly 15,000 pregnant women in China. There were no statistically significant differences in preterm delivery, frequency of low birth weight or mean infant birth weight when comparing these women with those with surgically induced abortion. When comparing mifepristone-induced abortion and women without previous abortion the former had higher mean birth weight and no significant differences in pregnancy length [79]. Other studies have found the outcome of medically terminated pregnancies is similar to those of mothers without them and better than those of mothers with surgically terminated pregnancies [80].

Some authors have noted in the last years we have observed increasing rates of OCs use as well as increasing rates of Autism Spectrum Disorder diagnoses and have raised hypotheses regarding specific consequences in the offspring; this remains to be elucidated in future clinical studies [81].

## 2.5. Conclusion

It seems clear that fertility returns promptly with OCs and that any delay to return to normal physiology does not remarkably influence 1 year or longer fertility rates. There's no consistent evidence to conclude OCs are associated with future miscarriage, preterm birth, low birth weight or hypospadias.

## 3. Implants and rings

Removing the implant is often an easy and uncomplicated procedure. In a clinical trial performed by Bahamondes et al., women perceived the pain of the as none (444, 86%), mild (65, 13%), moderate (8, 2%) or severe (0) for the ENG (etonogestrel) implant; and none (252, 81%), mild (49, 16%), moderate (6, 2%) or severe (1%) for the LNG (levonorgestrel) implant [82]. The ease of removal was reported as easy (492, 94%), slightly difficult (22, 4%) or difficult (8, 2%) for the ENG implant and easy (254, 81%), slightly difficult (47, 15%) or difficult (12, 4%). In this study, two (0.4%) ENG removals were complicated (the implant broke) and seven (2.2%) LNG removals were complicated (in seven cases the implant broke).

The ACOG has published some recommendations regarding the clinical challenges posed by LARC, including the implants [83]. Ultrasonography can be helpful if the implant is impalpable when removal is attempted [84]; in rare cases magnetic resonance might be required to locate it.

There is no evidence fertility is delayed after removal of contraceptive implants [13]. In a study Etonogestrel became not detectable within 1 week of removal of Implanon® implant [85]. Pregnancies have been observed to occur as early as 7–14 days after removal [86]. Within 1 month of Implanon removal ovulation has been observed to return in 40% (16/40) women; and 12 months conception rate was 96% (23/24) in women who had the implant removed and did not implement other contraceptive methods [87].

NuvaRing® is the only ring available to the United States; it releases 15 µg ethinyl estradiol +120 µg etonogestrel per day (which are rapidly absorbed through the vaginal epithelium [88]) and lasts 3 weeks. Ovulation returns after removal of the vaginal ring (in a mean time of 19 days [89]). In the majority of women who discontinue NovaRing ovulation and spontaneous menstrual cycles return within a month [90].

Many other contraceptive preparations are being developed, and prompt return of fertility is usually the rule. After discontinuation of a transdermal patch ovulation has been described to return in the first cycle in 86% of women [91].

The considerations on pregnancy outcomes for OCs can be extrapolated to those methods in which estrogens and progestogens are administered non-orally.

## 4. Injectable contraceptives

Injection-based methods differ from other methods in the return to fertility since they are irreversible in the short-term, but fertility rates eventually reach those of them [13]. In this group methods one year pregnancy rates range between 72.5–82.9% with median time to pregnancy being 4.5–5 months [1].

Depot medroxyprogesterone acetate (DMPA) is the most commonly used injectable, being administered as intramuscular injections every 12 weeks. Product leaflet mentions some pregnancies have occurred 14 weeks after a preceding injection but longer delays are common: the observed mean time to ovulation is 5.3 months and the median time to conception is 10 months after the last injection. About 83% women should conceive within 15 months of the last injection [92].

A large study in over 1000 Thai women remarked that return to fertility and proportions of live births in the offspring of women who used MDPA are similar to those of women using other contraceptive methods (OCs or IUDs): in this study the median delay to conception for MDPA was 5.5 months plus the estimated effect duration of the last injection; this can be compared to 3 months for OCs and 4.5 months for IUD [93].

Intramuscular injections of norethisterone enanthate acts as a contraceptive for 8 weeks; in 11 of 20 women discontinuing this method follicular activity was observed within 90 days of the last injection [94]. The observed median delay to conception is 6 months after the last injection; 14 of 40 women became pregnant within 12 weeks and 31 of 40 after 1 year. Authors remarked the real figures could be higher. The delays in fertility were not correlated with the duration of use.

Intramuscular injections of estradiol cypionate and medroxyprogesterone acetate (Cyclofem®) are administered every month. 1.4% women became pregnant at the end of the first month (since the first missed injection), 52.9% after 6 months and 82.9% after 9 months. Pregnancy outcomes were favorable: 51 (94.4%) pregnancies ended in a live birth [95].

## 5. IUD

### 5.1. Use cessation

The procedure to extract the IUD is often uncomplicated. A speculum and a Foerster clamp are needed: The speculum is inserted into the vagina until the cervix and the IUD threads appear through the external cervical os. The threads are fastened with the clamp and pulled until the total extraction of the IUD. The best time for extraction is during menstruation since the cervical os is slightly more dilated than under normal conditions. Non-visualized IUD strings is a potential challenge, the most common cause being string retraction into the uterus. ACOG recommends sweeping the cervical canal with a cytobrush, a maneuver that often reveals them; if this is not effective, the algorithm includes ruling out pregnancy, confirming abdominal location of the IUD and evaluating the need for a laparoscopic removal [83]. Some women might describe slight temporary mood swings after LNG IUD removal.



## 5.2. Physiology

IUDs elicit foreign body reactions, which turns the intrauterine milieu lethal for embryos, without significant extrauterine effects. In addition to this, different types of IUDs can alter previous processes through varying degrees: Mucus thickening, glandular atrophy and stromal decidualization in LNG IUDs, spermatozoa decay and toxicity by Copper ions in the uterine cavity, transmission of noxa from the uterine lumen to fallopian tube, etc. [96, 97]. The histological changes were found to be reversible within some months. Unlike OCs, IUDs have not been observed to be associated with follicular phase length [31].

## 5.3. Return to fertility

Fertility is not impaired after IUD removal<sup>13</sup>. In Diana Mansour's bibliographic review 1 year pregnancy rates for Copper IUDs were 71.2–91.1% for Copper IUDs and 79.1–96.4% for LNG IUDs (median time to pregnancy were 2–3.7 cycles and 4 cycles respectively)<sup>1</sup>. Currently there is no evidence of a delay in return to fertility after using an IUD [13]; in some studies >50% of women conceived within 3 months after discontinuing it [98]. **Table 1** contains selected studies pertaining return to fertility after contraception.

The history of IUD devices includes some particular case of long-lasting health and reproductive consequences after IUD usage. Despite some previous attempts and projects some decades earlier, it was not until the 1960s that commercial IUDs made their way into the market with the approval of the Lippes Loop and the Safe-t-coil by the FDA in 1966. The **Dalkon shield**, introduced in 1971, attempted to increase the surface of the endometrium in contact with the IUD and to increase retention rate; it included a multifilament tail string encased in Nylon [99]. Several reports associated this IUD with increased infection rates, septic abortions and deaths; apparently the multifilament string could allow vaginal bacteria to access the uterus. Since this IUD was used in many world countries the numbers of women suffering adverse consequences is difficult to estimate. Device sales stopped in 1974 and the company started to recommend device removal if a pregnancy took place, which is now standard practice; women experiencing the adverse events, which includes fertility impairment as sequel, filled many lawsuits and in 1980 the company recommended removal of the Dalkon shield in women who were still wearing them. Distrust and doubt regarding IUDs lasted for several years after this, especially in the USA [100].

The relationship between IUD usage and pelvic inflammatory disease (PID), a well-known cause of infertility, has been studied extensively for decades [101] and many studies had pitfalls [102]: Sexual habits as a confounding factor, diagnosis bias... The described incidence of pelvic inflammatory disease on IUD users is very low (1.6/1000 person-years) and particularly confined to the first weeks after insertion. Preventive strategies include adequate selection of IUD candidates, prophylactic antibiotic during insertion, careful monitoring and treatment of infections, etc.

Long-term usage is not associated with posterior infertility; several studies have shown pregnancy rates are not delayed in women who used copper IUDs for several years [106]. Zhu et al. performed a study with 1770 Chinese women who had their IUDs removed after a catastrophic earthquake in the Sichuan region and were followed up for two years [103]. 71% women conceived within 1 year after removal and 80% conceived within 2 years. In the multivariate logistic regression analysis age was negatively associated with fertility (OR 0.7548, 95% CI: 0.7148–0.7933), while duration of IUD use (OR 1.0596, CI: 1.0244–1.0960) and previous

gravidity were positively associated. The authors described a clear reduction in fertility and increased miscarriage rates with age; 1 year pregnancy rate among women older than 40 years was 49.67%. They reported duration of IUD use was associated with decreased fertility but did not stratify the analysis of this variable and age could be a confounding factor. Women with longer IUD usage are also older women, and fertility and miscarriage rates are known to depend on age.

In the study by Doll et al [41] long-term IUD usage was associated with reduced fertility (log rank test for linear trend,  $P = 0.0035$ ); authors hypothesized that this might be related to pelvic inflammatory disease. This article received media coverage in the UK [104, 105], but remarking that most IUDs in this study were not available for women anymore and that current standard practice included better diagnosis of infections. The posterior NICE Guidelines evidence review highlights that IUD female users were older and had higher rates of miscarriage, termination and ectopic pregnancy [13] and concludes that there is no evidence on delay in the return of fertility after discontinuing IUD usage. This also applies to nulliparous women, whose uterine cavity is usually smaller [15].

#### 5.4. Pregnancy outcomes

One common concern of IUD users is the outcome of their future pregnancies. The different pregnancy outcomes observed in many studies with Copper IUD range from 84 to 88% for live births, 88–82% for term deliveries, 6–12% for spontaneous abortions, 1–4% for induced abortions and 0–2% for ectopic pregnancies (the studies classifications were not uniform) [1]. For LNG IUD the pregnancy outcomes are similar. Pregnancy outcomes of several studies are reported in **Table 2**.

Many studies have assessed the effects of IUD complications on fertility. In a 1989 study with copper IUDs by Wilson et al. with Neo-Zealand woman 16% (164) of IUD removals took place due to complications. 92.4% of these women had conceived after 36 months (compared with 94.2% for the rest of IUD removals). Regarding pregnancy complications slight significant differences were observed only between some subgroups, which could be related to multiple comparisons in this study; for example in women who used IUD for less than 24 months, nulligravid women had smaller conception rates than gravid women (86.7 vs. 93.6%,  $p < 0.005$ ) [106]. Authors noted the observed outcomes in IUD users were similar or better compared to population ones. Other studies have also noted IUD removal was not associated to ectopic pregnancy risks [115].

In the unlikely event that a woman using IUD becomes pregnant it is advised that the device is removed before 12 completed weeks' gestation, regardless of whether she wants or not to continue with the pregnancy [13]. These situations are associated with significant miscarriage and septic abortion risks.

Regarding PID, a dose–response has been established between the severity and number of episodes and ectopic pregnancy risk; for example in women aged 25–44 with 2 or more severe episodes the probability has been statistically modeled to be 84% [107]. These women have many options: careful follow-up, laparoscopy, in vitro fertilization, etc.

	Method	Participants	Term pregnancy (%)	Miscarriage (%)	Ectopic (%)	Preterm birth (%)	Induced abortion	Comment	
Belhadji et al. [110]	TCu380Ag	17 pregnant women	88%	12%					
Wilson et al. [106]	Copper IUDs	1051 IUD. New Zealand	83.2%	11.6%	0.5%	2.0%	2.7%	Similar rates to women from New Zealand, but higher rates of induced abortion. Authors attributed this to women's attitudes and choices after the recall of another IUD.	
Skjeldestad and Bratt [111]	Copper IUDs	95 pregnant women	88.4%	8.4%	2.1%		1.1%		
Andersson et al. [116]	IUD	50 users	84%	6%	2%		4%	2% outcome unknown and 2% still birth	
Sivin et al. [114]	IUD TCu380Ag	66 pregnant women	82%	15%	0%		3%		
Tadesse, [124]	IUD Copper T-200	671 pregnant women	87.8%	8.5%		3.7%			
Randić et al. [115]	IUD.	3461 Croatian women	Ectopic pregnancy: Control: 3.9%, planned pregnancy (parous women) 2.7%; accidental pregnancy 0%; expulsion/displacement 1.2%; bleeding/pain + PID 6%. (Non-significant differences)						Lower rates than general population
Andersson et al. [116]	LNG-20 IUS	104 pregnant women	85.6%	5.8%	1%		2.9%		
Sivin et al. [114]	LNG-20 IUS	68 pregnant women	89%			2%			
Belhadji et al. [110]	LNG-20 IUS	22 pregnant women	86%	14%				17 women still pregnant at time of analysis	
Buckshee et al. [118]	Norplant II	136 pregnant women	89.7%	4.4%			5.9%		
Sivin et al. [114]	Norplant II	86 pregnant women	88% (term delivery)	8%	1%	1%	2%		
Sivin et al. [114]	Norplant	33 pregnant women	93% (term delivery)	4%	0%		4%		
Diaz et al. [125]	Norplant	75 pregnant women	79% (term delivery)	9%		5%			

	Method	Participants	Term pregnancy (%)	Miscarriage (%)	Ectopic (%)	Preterm birth (%)	Induced abortion	Comment
Bahamondes et al. [95]	Cyclofem-monthly	58 pregnant women	98.4%	3.4%				
Hahn et al. [60]	OC	4862 Danish	85.7%	14.3% (SAB)				No evidence that pregravid OC use is associated with spontaneous abortions
Chen et al. [79]	Medical abortion (mifepristone) vs. surgical abortion vs. no abortion	13928, Chinese				2.9 vs. 3.0 vs. 3.7 (P<0.05)		Authors concluded no long-term consequences

**Table 2.** Pregnancy outcomes after using contraceptives.

## 6. Other methods

Return to fertility with barrier methods is prompt and expectable, given the lack of effects on female physiology compared to other methods. The figures have been reported previously as reference group. One year delivery rate after discontinuation was found to be 54% in an English study, which was higher than COCs or IUDs [41].

Natural family planning does not involve persistent physiological changes on women; 1 year pregnancy rates and spontaneous abortion risks can be considered as similar to general population ones. For example, a study observed abortion rates of 10.1% [108].

## 7. Clinical cases pertaining return to fertility

*Case 1: barrier method of contraception.*

*An 18-year-old woman comes to a consultation for contraceptive advice. She has just started a relationship.*

*Personal history: without interest.*

*Family history: DM type II father. Mother HTA.*

*Menarche at 14 years.*

*Not pregnancies.*

*Planning: has not started relationships.*

*The most appropriate method? In this case the most appropriate method would be barrier contraceptives, since she does not yet have a stable relationship. If the patient requested it combined oral contraception could be considered, but in that case we will recommend to keep using barrier methods to prevent STDs (double contraception).*

*Case 2: Combined contraceptives (oral contraception).*

*Female, 26 years old. Stable couple for 2 years. She wants advice on contraception. She remarks she wants to have children at some later point in her life.*

*Personal and family history: no interest.*

*Menarche at age 13.*

*Nulliparous. Last cytology less than 1 year ago.*

*Menstruation: 6/30, quite irregular. Dysmenorrhea.*

*Previous recommendation: Barrier method (condom).*

*The most appropriate method? In this case we can recommend her oral combined contraceptives, since she has no remarkable diseases, has a stable partner and this will help in her dysmenorrhea and menstrual pattern. We can assure her the reversibility of oral contraceptives has been observed for decades and that after interrupting them women's fertility will be similar to the rest of women. She opts for oral contraception.*

*Case 3: Combined hormonal contraceptives (vaginal ring).*

*30 years old Woman with stable couple for 8 years. Uses oral combined contraceptives. She wants to stop taking a pill every day. She wants to have children at some point in the future and is afraid of pregnancy complications.*

*Personal and family history: no interest.*

*Not pregnancies. Last cytology 2 years ago, results: normal.*

*Menarche: 15 years.*

*Menstruation: 4/28, from taking contraceptives.*

*Planning: Combined oral contraceptives.*

*The most appropriate method? After explaining her the alternatives, she decides that she prefers the vaginal ring. We recommend how to start using this method after taking oral contraception. The ring should be administered as later the next day after the termination with the current pill. If the pill pack also has inactive tablets, she should start using the ring the day after the last inactive tablet.*

*Case 4: Subdermal Implant.*

*33 years old woman, she gave birth to a healthy son 2 years ago. She carries a subdermal implant and wants to become pregnant again.*

*Personal history: without interest.*

*Family history: Mother with breast cancer.*

*Pregnant: 3 years ago.*

*Menarche: at 15 years.*

*Menstruation: 4/28.*

*Plan: Remove the implant, preconceptional counseling.*

*The implant is palpable and removed successfully. We advise her to wait for her period before attempting to conceive.*

*Case 5: IUD.*

*Female 34 years old. She does not want more children at the moment, but she does not want irreversible contraception since she does not know if she will want children in the future. She does not want to take oral contraception.*

*Personal and family history without interest.*

*Menarche to the 14 years.*

*Two vaginal births, 2 and 4 years ago.*

*Menstruation: 4/27, are not very abundant.*

*Planning: use a condom.*

*The most appropriate method? In this case we could offer the administration of an IUD, since it is reversible, but can last up to 5 years. We explain her that there is no conclusive evidence that long-term use of IUD leads to impaired fertility. Many other factors influence fertility, like aging or smoking.*

*Case 6: Irreversible.*

*A 42-year-old woman who visits her doctor after a 7-day menstrual delay. Demand planning advice.*

*Personal history: Hypothyroidism under treatment, varicose syndrome, smoking 15 cig / day. Intolerant to metallic chromium.*

*Menarche at age 12.*

*Two pregnancies and vaginal births, babies of 3900gr and 4100gr at 31 and 38 years.*

*Menstruation: 7/26, abundant since always.*

*Planning: coitus interruptus, because her husband does not "tolerate" the condom. Gynecological review less than 1 year ago with ultrasound and cytology, without alterations.*

*Conduct to follow: pregnancy test is performed, being negative. Menstruation at 3 days.*

*Which contraceptive method is the most appropriate? Given her age, having two children, the personal history, for this couple the best method of contraception would be vasectomy or tubal ligation.*

## **8. Conclusions**

None of the contraceptive methods described (OCCs, POP, emergency contraception, implants, rings, Cu IUD or LNG IUD) is associated with impaired fertility. A temporary delay in fertility can occur with COCs, but this does not alter 1 year conception rates significantly. Injectable contraceptives are associated with delays in fertility buy not with fertility impairments.

Previous OCs usage is not associated with birth defects and their effect on birth weight or preterm birth seems small and controversial (some associations have been detected in recent large and powerful studies, but a causal link remains to be confirmed).

In adequate large studies previous IUDs (Cu or LNG) usage has not been consistently associated with adverse pregnancy outcomes. There is not enough evidence to support the hypothesis that long-term IUD harms future fertility.

Preconceptional counseling is advisable for all women who want to abandon contraception to get pregnant.

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# Postpartum Family Planning: Methods to Decrease Unintended Pregnancies

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Additional information is available at the end of the chapter

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## Abstract

Postpartum women are at high risk for unintended pregnancies and subsequent adverse perinatal outcomes often due to insufficient pregnancy intervals. There is a high burden of unmet family planning need caused by factors including inadequate education on postpartum contraception, limited access to healthcare professional in the immediate postpartum period, and lack of access to contraceptive options. This chapter will discuss the different contraceptive methods that can be utilized and their respective efficacies, venous thromboembolism (VTE) risk, and impact on lactation. Tubal ligation, lactation amenorrhea, barrier methods, the copper intrauterine device (IUD), and progestin-only pills (POP) have no clinically significant impact on VTE risk or lactation for the majority of women postpartum. Depot medroxyprogesterone acetate (DMPA) injection, implants, and levonorgestrel (LNG) IUDs are considered to have no impact on breastfeeding based on limited clinical evidence. Contraceptive methods that contain estrogens may increase a woman's risk for VTE in the peri-partum period and should be deferred approximately 30 days postpartum. Sterilization and long acting reversible contraceptives (LARC), including IUDs and contraceptive arm implants, have been proven to be the most reliable and cost-effective methods, which also have high rates of patient satisfaction and continuation. Women have a range of safe contraceptive choices they can use to prevent pregnancy or to space their pregnancies. Health care systems should empower women to become educated about and gain access to postpartum contraception so as to address unintended pregnancy disparities among this group of women. Above all, counseling should be patient-centered when choosing the right method for the woman.

**Keywords:** postpartum contraception, lactation amenorrhea, venous thromboembolism, LARC, unintended pregnancy

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## 1. Introduction (premise and organization of the chapter)

In the United States, approximately 30% of all repeat pregnancies are conceived within 18 months of the previous birth, and approximately 40% of these pregnancies are unintended [1]. In regions of the world with the highest burden of unmet family planning need, the proportions are higher. Robust epidemiologic evidence demonstrates that interconception intervals less than 18 months, and most notably less than 6 months, are associated with adverse perinatal outcomes. Based on this the World Health Organization recommends an interpregnancy interval of 24 months [2]. An estimated 35% of adolescent mothers in the United States experience rapid repeat pregnancy within 2 years. These young women are more likely to experience adverse perinatal outcomes, are unable to attain an educational degree, and depend on public assistance programs [3]. Some women are not offered immediate postpartum contraception planning in many countries around the world. This may be due to the fact that women are absorbed with the range of emotions and adjustments that precede and follow having a baby. However, despite such hesitations or barriers from providers and patients to discuss contraception and sexual behaviors, it is very valuable to explore birth spacing prior to and following a delivery, even in the immediate peripartum time.

Women often rely on physicians and medical visits to access contraception. However, the antiquated and traditional western model of postpartum care delays counseling and initiation of contraception until a 6-week postpartum visit. Prior to the advent of implantable and hormonal contraceptive devices, this 6-week postpartum visit would have been an appropriate time to fit a woman for a diaphragm after involution of the uterus [4]. However, a large percentage of women, many of who are without stable insurance, transportation, housing, or support, are unable to present for their 6-week postpartum visit [5]. This chapter will review the range of contraceptive resources and technologies available to couples for postpartum contraception, with attention to considerations such as risk of venous thromboembolism and impact on lactation. Women have a range of contraceptive choices they can use to prevent pregnancy or to space their pregnancies.

### 1.1. Ovulation, sexual activity, lactation & sterilization

Many women resume sexual activity before their 6-week postpartum visit and are not using any form of contraception [6]. Women surveyed in the following countries reported sexual activity within 6 weeks postpartum: 57% in the United States, 60% in England, 71% in Scotland, 35% in Thailand, and 32% in Nigeria. Teens are also likely to have resumed sexual intercourse if they are living with their partner, and women who delivered by cesarean are more likely to be sexually active than women who had a vaginal delivery [7]. Sterilization is an effective and reliable method of contraception, which has no impact on breastfeeding or risk for venous thromboembolism. At the time of cesarean delivery, tubal ligation is an effective method, with minimal added morbidity or risk. Postpartum minilaparotomy is another excellent option and is typically completed during the same hospital admission as the delivery. Unfortunately, due to difficulty in mobilizing resources, a large percentage of women in the United States who deliver vaginally are discharged without receiving their requested sterilization. Forty-seven percent of these women with unfulfilled sterilization requests will become pregnant within a year of delivery [8].

Serum steroid hormones, such as estrogens and progesterone, decrease to prepregnancy levels after approximately 2–3 days following delivery. It is at this time that most women experience milk letdown with lactogenesis. If a woman does not breastfeed, her prolactin levels fall to baseline 7 days following delivery. Gonadotropin-releasing hormone (GnRH) pulsatility will then resume after 2–4 weeks. Non-nursing mothers may ovulate 26 days postpartum, and 78% of women will ovulate prior to menses. Approximately 40% will ovulate by 6 weeks postpartum [4]. Among women who breastfeed elevated prolactin levels inhibit GnRH, preventing the pituitary from secreting follicular-stimulating hormone and luteinizing hormone, which in turn maintain ovarian suppression and prevent ovulation. Prolactin levels rise 10–20-fold in response to latch and suckling of an infant to the breast and will remain elevated with regular breastfeeding for months. Some research has demonstrated that supplemental feeding of an infant is associated with decreased suckling and ovulation within 6 weeks.

Exclusive and on-infant-demand breastfeeding postpartum is an effective method of contraception, called lactation amenorrhea, for up to 6 months postpartum. However, regular, day, and night breastfeeding of an infant is required. This method requires that the infant's total suckling experience be at the breast, without pacifiers or bottles, and that the mother is amenorrheic [9]. We do not know the impact of using a breast pump on the efficacy of ovulatory suppression.

## 1.2. Barrier methods

Barrier methods, including the female condom and the male condom, have no impact on breastfeeding and also have the benefit of preventing sexually transmitted infections (**Figure 1**). Male condoms are 98% effective with perfect use and 85% effective with actual use. Female condoms are 95% effective with perfect use and 79% effective with actual use. Spermicides, and natural family planning or fertility-based contraceptive methods, have no impact on breastfeeding. However, irregular vaginal bleeding patterns postpartum as well as the risk of ovulation prior to menstruation places couples at high risk for unintended pregnancy if they choose to use natural family planning methods (such as cervical mucus assessment, Billing method, or 2 day methods) during the immediate postpartum period. It is unknown that the failure rates of these methods are in the postpartum setting; however, they are likely much higher than the projected 20–30% rates observed with typical use (**Figure 2**). There is a single-size diaphragm available on



**Figure 1.** Female condom.

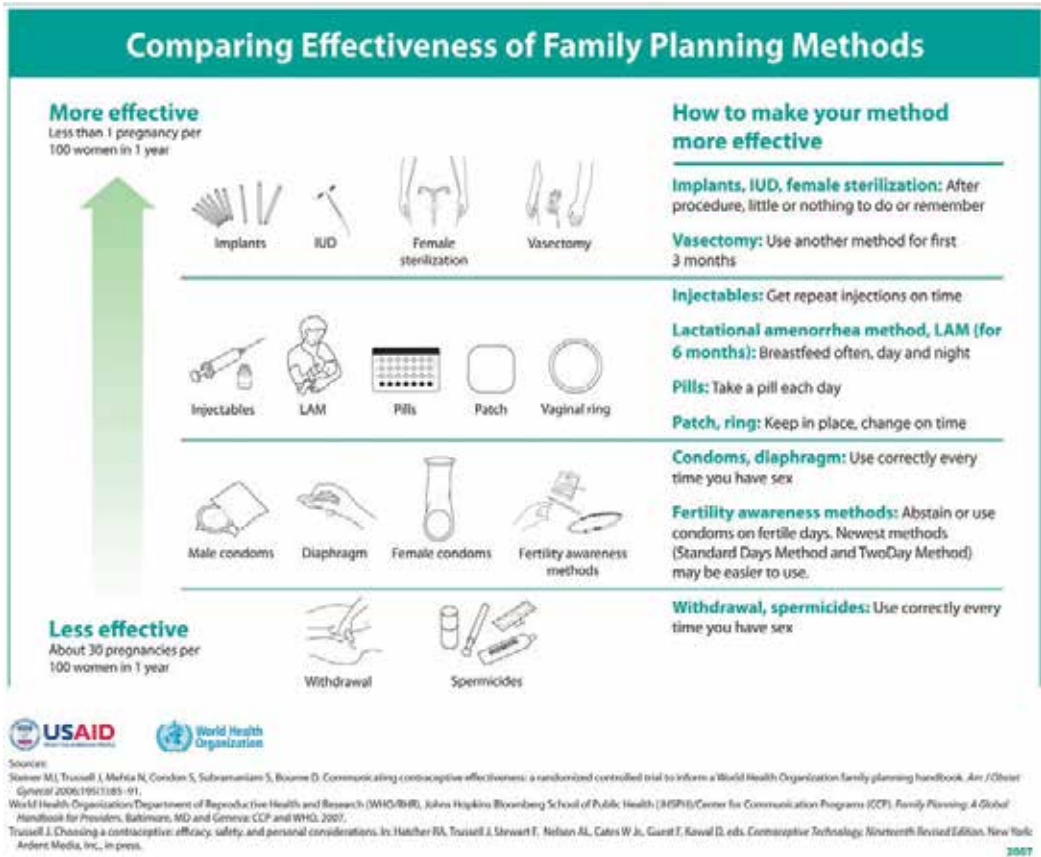


Figure 2. Comparing effectiveness of family planning methods.

the international market. The use of this diaphragm has no impact on lactation (Figure 3). None of these methods impact a woman's postpartum risk for venous thromboembolism.



Figure 3. Single-size diaphragm.

### 1.3. Copper IUD

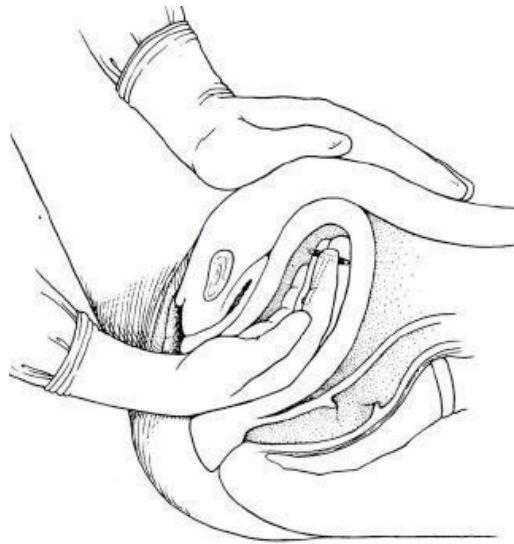
The *copper IUD*, when placed immediately after the delivery of a placenta or at a later interval, has no impact on lactation or a woman's risk for venous thromboembolism (**Figure 4**). The nonhormonal copper IUD is 3.6 cm with 380 mm<sup>2</sup> of copper. It has a failure rate less than 1% and was approved in 1984 for up to 10 years of use. It interferes with sperm function and prevents fertilization. It is associated with increased menstrual blood flow. The copper IUD is one of the most effective methods of emergency contraception. The IUD can be placed immediately following a vaginal delivery by a skilled provider using a sterile technique as shown in (**Figure 5**) or at the time of cesarean delivery. When placed following a vaginal delivery, patients should be counseled about increased risk for expulsion. High satisfaction has been noted among women who received an IUD at the time of cesarean section [10].

### 1.4. Hormonal contraceptive methods

Hormonal contraceptive methods contain progestins, or progestins and estrogens, which have historically raised concerns regarding potential interactions with lactation. Limited research suggests that combined hormonal contraceptives (that contain both estrogens and progestins) such as many of the pills, patches, vaginal rings, and injectables may slightly decrease milk quantity. However, the majority of research supports that progestin-only methods, such as injections (Uniplant and Depo-Provera), levonorgestrel-releasing IUDs, progestin contraceptive implants, progestin-only pills (POP), and the progestin ring, do not adversely impact lactation, fetal growth, or development. A systematic review of 43 studies and five randomized controlled trials (RCT) that assessed the impact of progestin-only contraceptives on



**Figure 4.** Copper IUDs.



**Figure 5.** Post placental intrauterine device placement immediately following vaginal delivery.

breastfeeding continuation or infant outcomes saw no significant impact. However, evidence remains limited [11].

Furthermore, research supports that estrogens, but not progestins, contribute to an increased risk of *venous thromboembolism* (VTE) during the immediate postpartum period, approximately 30 days after delivery. At baseline women of reproductive age are at risk for VTE at a rate of 50/100,000 women-years. During pregnancy and postpartum, this increases fourfold to 200/100,000 women-years. Incidence of VTE is highest in the first week after delivery, and half of all postpartum VTE occurs during the first 2 weeks postpartum. There are increased serum concentrations of clotting factors synthesized in the liver during pregnancy and postpartum. Estrogen-containing contraceptives increase risk of VTE two- to fourfold because they further stimulate the liver to synthesize more clotting factors and serum globulins.

Guidance regarding the risks of various contraceptives in different populations is delineated in the World Health Organization's (WHO) *Medical Eligibility Criteria for Contraceptive Use* (MEC), as well as the US *Medical Eligibility Criteria for Contraceptive Use* [12, 13]. Both documents score the safety of a method in a specific population or scenario. There are four numeric categories: category 1 indicates that the method is safe and can be used without restrictions, category 2 may have some theoretic or proven risks and advantages generally outweigh the risks, category 3 indicates the theoretical or proven risks that outweigh the benefits in most scenarios, and category 4 is consistent with unacceptable health risk to women using this contraceptive method (**Table 1**). Due to the global burden of infant morbidity and mortality related to diarrheal illness and unclean water, the importance of lactation and the nutritional benefits for the infant heavily guide the WHO and Centers for Disease Control and Prevention (CDC) recommendations regarding contraception in the postpartum period. In the absence of data, many committees feel it prudent to ensure that lactogenesis is safely established so as to mitigate the risk of infant malnutrition.

Category	Restriction
1	No restriction
2	Advantages generally outweigh theoretical or proven risks
3	Theoretical or proven risks usually outweigh advantages
4	Unacceptable health risk

Source: Centers for Disease Control and Prevention (CDC) [14].

**Table 1.** US medical eligibility criteria for contraceptive use.

### 1.5. Combined hormonal methods

Combined hormonal methods, which contain estrogens and progestins, are among the most commonly utilized methods among women in the United States. All hormonal contraceptives primarily prevent pregnancy by stimulating the cervix to produce thickened impenetrable mucus, which prevent sperm from entering the upper reproductive tract. Combined hormonal contraceptives often also prevent ovulation. Limited data suggests that estrogen-containing products may decrease the quantity of milk production or shorten the duration of breastfeeding [15]. An eight-year follow-up of children whose mothers took combined hormonal contraceptive pills and breastfeeding demonstrated no effect on the child’s intelligence, behavior, or development of subsequent diseases [16]. The CDC MEC considers combined hormonal methods (such as pills, patches, vaginal rings, and injectables) to be category 4 until 21 days postpartum for breastfeeding and non-breastfeeding women. Among breastfeeding women it is category 3 after 42 days until 6 months postpartum. In non-breastfeeding women, it is category 2 from approximately 22 days until 42 days. After 42 days it is category 1. The American College of Obstetricians and Gynecologists and the World Health Organization recommend delaying initiation of combined hormonal methods until 6 months postpartum for reasons related to breastfeeding.

### 1.6. Progestin-only methods

Progestin-only methods include pills, implants, injections, and a vaginal ring. Progestin-only pills (POP) are taken continuously and without a pill-free, withdrawal bleed cycle, and contraceptive efficacy is approximately 87% with actual use. *Depot medroxyprogesterone acetate* (DMPA) is a progestin-only injection given every 1 or 3 months (depending on the dose) that inhibits ovulation (Figure 6). Trace amounts are transferred in the milk to the infant; however, no adverse events have been reported after decades of widespread global use. The Centers for Disease Control and Prevention (CDC) lists POP and DMPA as category 2 for the first 30 days postpartum for breastfeeding women, predominately due to theoretic concerns regarding lactogenesis and lactation. After 30 days postpartum, both of these methods are a category 1 among postpartum women who are breastfeeding. They are both category 1 among postpartum women who are not breastfeeding immediately postpartum. There is a progestin-releasing vaginal ring, which is intended for use among breastfeeding women after 30 days





**Figure 6.** Progestin-only injection (USAID and PATH).

postpartum. In clinical trials it was effective among women breastfeeding at least four times a day. The product is predominately registered in South American countries.

There are several contraceptive implants on the market. Internationally, levonorgestrel products are packaged as a two-rod *implant* system. In the United States, the progestin-only implant is a 4-cm, single rod that contains etonogestrel. It was approved in 2006, for up to 3 years of use (**Figure 7**). Implants are typically placed on the medial aspect of the arm with placement and removal being extremely safe and fast. Mechanism of action entails thickening of the cervical mucus as well as inhibition on pulsatile secretion of gonadotropin-releasing hormone, which prevents ovulation. Failure rates are less than 1%. Changes in bleeding patterns are common. It is recommended to offer anticipatory guidance and ongoing support to women who choose this method. The CDC MEC classifies both implants as category 2 among breastfeeding women until 30 days postpartum. Among non-breastfeeding women, it is considered category 1 at any time postpartum [13]. Postpartum placement can be anytime during hospital stay or postpartum. Provision of the implant prior to discharge from the hospital significantly lowered rates of rapid repeat pregnancy in adolescents (19 vs. 3%) [17]. Clinical trials have demonstrated no difference in time to lactogenesis in women who received the implant within 3 days of delivery versus those who waited 6 weeks; there also are no differences in breastfeeding rates though 6 months postpartum [18].



**Figure 7.** Etonogestrel contraceptive implant.

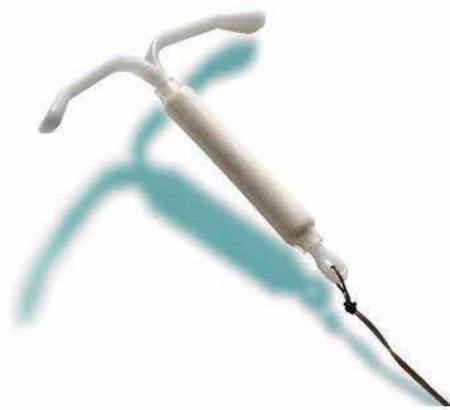


### 1.7. Levonorgestrel intrauterine device

The levonorgestrel (LNG) intrauterine device (IUD), a progestin-releasing hormonal IUD, is approximately 3–3.2 cm wide at the arms (**Figure 8**). In the U.S. there are a range of products that contain different doses of LNG and are approved for 3–5 years. The first product was approved in 2000 in the United States. Cervical mucus is thickened, and over time some users continue to ovulate depending on the product. It is also an effective treatment for heavy menstrual bleeding. The CDC MEC lists the LNG IUD products as category 2 for the first 30 days postpartum for breastfeeding women, predominately due to theoretic concerns regarding lactogenesis and lactation. After 30 days postpartum, they are category 1 among postpartum women who are breastfeeding. They are category 1 among postpartum women who are not breastfeeding immediately postpartum. Increasing clinical trials and observational evidence demonstrate no impact on milk supply and continuation when initiated after 6 weeks postpartum or immediate postplacental at the time of the birth [19].

Both the copper and the LNG IUDs lower a woman's lifetime risk of endometrial cancer and ectopic pregnancy [20]. Scientific evidence has demonstrated that our current IUDs do not cause pelvic inflammatory disease or infertility. Intrauterine devices may be offered to women with a history of ectopic pregnancy. Same-day screening and insertion of IUDs reduce barriers to care and do not present a risk to women. Sexually transmitted infection testing should not delay placement of an IUD. Women with a history of sexually transmitted infections or HIV can safely use an IUD, and antibiotic prophylaxis is not recommended before IUD insertion. Women who are unmarried, nulliparous, or adolescents can safely use most contraceptives including IUDs.

Insertion of an IUD or implant immediately after a delivery does not alter the recovery, bleeding, and infection risk and is overall very safe and effective. It is often convenient for both the woman and her clinician as most women are motivated to delay pregnancy for several months or years following a delivery [6]. There are barriers to IUD and implant due to issues surrounding stock, payment, or provider skill set even among women who present for a



**Figure 8.** Levonorgestrel intrauterine device.

postpartum visit to request contraception. IUDs may be placed at the time of a vaginal delivery by a skilled provider using sterile techniques. For women who request IUD insertion at the time of delivery, the risk of expulsion, symptoms, and follow-up should be discussed. When an IUD is placed immediately after a vaginal delivery, it should be done within 10 min of delivery of the placenta, and it may be subsequently expelled 20–30% of the time. There is some concern that the LNG IUD may have a higher expulsion risk than the copper IUD. When placed at the time of cesarean, it is expelled approximately 8%. When placed at a later interval greater than 4 weeks postpartum, the expulsion rate is 3–5% (**Table 2**). The use of instruments, IUD modifications, and suturing the IUD in situ do not alter expulsion rates [21–23]. Additionally, as the uterus involutes, the IUD strings may lengthen and extend out of the vagina. A patient should be educated that she may need to return to have the strings trimmed and should try not to remove the IUD accidentally. Contraindication to postplacental IUD includes intrauterine infection, uterine anomalies, hemorrhage, and cervical or uterine cancer.

There is a robust body of research demonstrating that IUDs and hormonal contraceptive arm implants are methods that are able to reduce unintended pregnancy rates because they are not user dependent or coitus dependent, removing the need for adherence or maintenance. IUDs and implants are collectively referred to as long-acting reversible contraceptive methods or LARC. They are placed and removed by a practitioner, are extremely discrete, and do not require any ongoing effort from the user. Additionally, return to fertility and conception can occur within days of removal of the device. LARC methods are not only the most effective contraceptive methods but also have the highest satisfaction, cost efficiency, and continuation rates when compared to other forms of family planning [24]. Uptake of IUDs and the implant in the United States has almost tripled over the last decade. In 2002 less than 3% of women using contraception used an IUD or implant; in 2009 that increased to 8.5% women [25, 26]. The American College of Obstetricians and Gynecologists recommends that LARC methods are offered as the first-line contraception for the majority of women, including adolescents and women with complex medical problems. Increased uptake of these methods has the potential to decrease the rate of unintended pregnancy in the United States as well as around the globe [24, 27]. There are very few contraindications to immediate postpartum LARC. Institutions and healthcare systems should work to ensure that the resources, processes, and infrastructure are in place to offer LARC to postpartum women at the time of delivery.

A clinical trial in the United States entitled the Contraceptive CHOICE Project demonstrated that adolescents and adults both had high continuation rates for IUD and implant methods. At 24 months continuation for the copper IUD was 77%, for the LNG IUD 79%, and for the

	Cu IUD	LNG IUD
<10 min after placental delivery	1	2
10 min–4 weeks after delivery	2	2
>4 weeks after delivery	1	1

**Table 2.** United States Centers for Disease Control and Prevention Medical Eligibility for Contraceptive Use for IUDs in breastfeeding women.

implant 69%. Continuation for other short-acting methods including combined and progestin-only methods such as pill, patches, and shots, was 41%. Among postpartum patients continuation at 1 year for the copper IUD was 91 and 89% for the LNG IUD. For the implant it was 74% at 1 year postpartum [28]. A cost parity and public health impact model in the United States demonstrated that the cost of paying for IUDs and the cost of paying for the IUDs and implants is offset by preventing approximately 191 unintended pregnancies per 1000 women. This type of dramatic public health impact supports expanded access to IUDs and implants in the immediate postpartum setting. This would offer compelling and cost effective benefits even if theoretic expulsion/discontinuation rates were as high as 70% or the 1 year continuation rate was as low as 30% [29].

The principal factor in prescribing one method of contraception over another should be the patient's choice. Women who receive contraceptive counseling during the postpartum period have increased rates of contraceptive use and fewer unplanned pregnancies [30]. In the United States, providers and healthcare systems should strive to engage women in care prior to the 6 week postpartum visit and ideally within 3 weeks. There are a wide variety of contraceptive options available, and all women, including adolescents, have the right to decline any method of contraception. LARC methods should be offered as first-line contraceptive methods and encouraged as options for most women. LARC methods have few contraindications, and immediately postpartum and postabortion are ideal times for initiation [31, 32]. The importance of quality and patient-centered contraceptive counseling is crucial as women and families identify their reproductive goals.

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# **Birth Control and Family Planning Using Intrauterine Devices (IUDs)**

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## **Abstract**

Intrauterine devices (IUDs) represent one of the most important methods used for contraception. The methods vary in terms of efficiency, acceptability, costs, and potential complications. Early methods have been improved, and ultrasound (US) evaluation has become an important tool to diagnose the clear majority of IUDs complications. This chapter presents a comprehensive and up-to-date status regarding the use of intrauterine devices (IUDs) for birth control and family planning. The topics discussed in the manuscript will involve the current knowledge on the history, types, mechanisms, health benefits, and risks. More, the present paper presents the medical techniques for inserting and removing a IUD, and the role of US to confirm proper IUD placement. Also, this chapter offers practical guidance in managing problems of continuing users and discusses the clinical circumstances that require reconsideration of the contraception methods.

**Keywords:** intrauterine device, copper intrauterine device, hormonal intrauterine device, contraception, family planning, ultrasound

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## **1. Introduction**

Intrauterine devices (IUDs) represent long-lasting reversible birth control method [1] with the greatest satisfaction among users [2]. However, this contraceptive use generated much heated discussion and debates, with exhaustive studies that are presented in the present chapter.

## 2. History of IUDs

Intrauterine contraception with various devices seems to have a long history, from the ancient Arabs who placed round smooth stones in the camels' uteri to prevent conception during long journeys. In the late nineteenth century, intracervical devices have been used to prevent pregnancy or to induce abortion [3]. Still, the first medical communication on medical IUD was published in Germany, at the beginning of the twentieth century by Richter [4], who reported the results of intrauterine insertion of a metallic ring with catgut tied around it. In the 1920s, Ernest Graefenberg attached a silver wire to the ring for Roentgen visualization, but silver rings were rapidly abandoned as they led to gingival argyrosis. An alloy of copper, nickel, and zinc was used instead [5]. In 1959, the first paper was published who condemned the IUDs as dangerous because of the ineffectiveness, risk of infection, and carcinogenic potential [5]. The modern IUDs evolved from 1960 with a T-shaped product that configured better to the natural shape of the uterus [6]. By the mid-1960s, IUDs became a widely used method with fewer potential cardiovascular risks when compared to oral contraceptives [7]. In 1970, nearly 10% of women were using the Dalkon Shield IUD as a contraceptive method. Since then, the use of IUDs dropped because of the severe septic cases reported, along with the increased risk of pelvic inflammatory disease (PID) and infertility [8]. IUDs were even withdrawn from the US market between 1986 and 1988.

Since the introduction of the levonorgestrel 52 mg IUD in 2001, this intervention achieved a new, therapeutic, dimension—because of significant benefits in treating heavy menstrual bleeding and dysmenorrhea [7].

Today, IUDs are an important component of family planning, as they are used by one in 10 women in the USA and 9–24% of all contraceptives in European countries [9]. The highest rates of IUD use are recorded in Asia: 40% of women in China, 50% in Korea, and 56% in Uzbekistan [10], while the lowest rates are recorded in Africa. The trend of contraceptive method is declining as the use of injectable products is increasing [11]. From the beginning, the gynecologists were preferred for a safe insertion of the IUD, instead of general practitioners [3].

## 3. Types of IUDs: copper and hormonal

The two main types of IUDs are the copper non-hormonal device and the hormonal device.

There are a few types of *copper devices* as well. The most frequent copper device series are the *T380* devices that also consist of the original *T380A*, the *T380Ag* available in Finland, and the *T380S* available in Canada and UK [12]. This IUD has a small plastic "T" frame with a stem wrapped with copper wire and also copper collars on the two arms of the frame, of about 380 mm<sup>2</sup> of copper. *T380A* has been approved around the world for up to 10 years [13], with no uterine perforation reported, but a high rate of medical removal due to bleeding, pain, and pelvic infection [12].



Other types of copper IUDs include the *Multiload* series of devices that consists of *ML250* for a 3 years' use and the *ML375* with more copper to enhance a longer use, up to 5 years. The device has additional plastic fins on the lateral, and curved arms to avoid spontaneous expulsion [12].

The *GyneFix* device has been introduced in 1997 as a frameless copper-bearing device designed especially for nulliparous women. However, it associates an increased risk of expulsion in the first 3 months. Both *GyneFix* and *T380A* are reported to have high efficiency in women contraception [14].

Besides pure copper devices, there is also a gold IUD called *Eurogine Gold T*, *Goldlily*, or *GoldringMedusa*, with a gold core that prevents the copper from fragmenting or corroding [15].

Silver was also being added on a copper device, to reduce fragmentation, and to prolong the lifespan of the device. The production of the initial *NovaT200* was ceased, because of poorer performance and *NovaT 380* was developed [12].

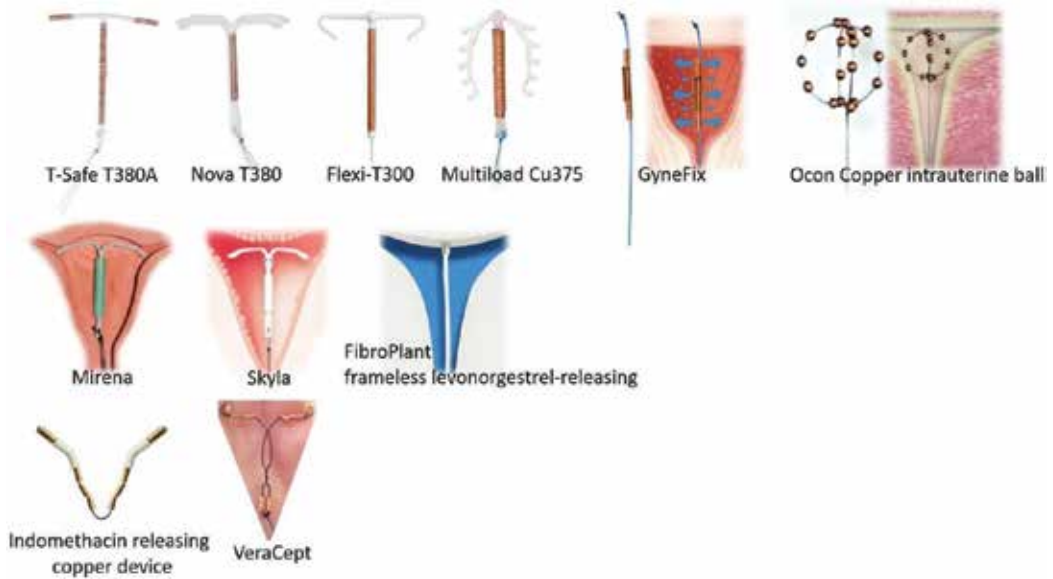
To reduce side effects of IUDs such as bleeding, pain, and expulsion, *Flexi-T300* was introduced, with a smaller and more flexible frame and thinner side arms that are bent back on themselves. *Flexi-T300* is also preferred for emergency contraception, as it is cheap and easily inserted and removed [12].

Since 1976, medicated or *hormonal IUDs* were developed. *Mirena* was produced in 2001 as a hormonal IUD releasing 52 mg of levonorgestrel during a 5 years' period of approved use [7]. *Mirena* releases approximately 20 µg of levonorgestrel daily in the first few weeks with a decrease to 18 µg/day by the end of 1 year and 10 µg/day after 5 years [16]. Other hormonal IUDs, as *Skyla* or *Jaydess*, have a shorter period of use (3 years) because of the lower levonorgestrel content (13.5 mg), that is released 14 µg daily after the first few weeks and with a rapid decrease to 10 µg/day by 2 months and 5 µg/day by the end of 3 years [17]. Besides contraception, the hormonal IUDs reduce the blood flow with amenorrhea in about 20% of cases within 1 year [18]. *FibroPlant* is a frameless levonorgestrel-releasing IUD with a non-resorbable thread through the center and with similar effects on uterine-bleeding patterns as *Mirena* [12].

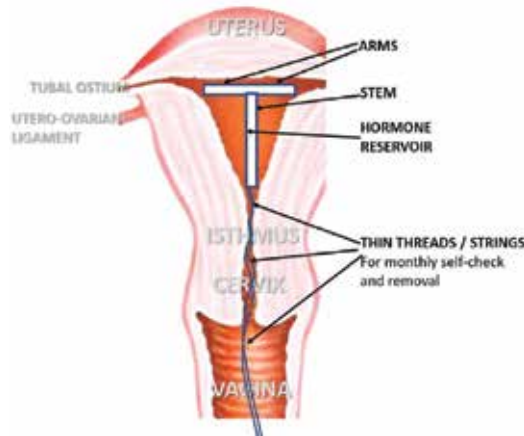
Other IUDs include the *copper indomethacin* type, available in China, with a silicone elastomer beads containing 25 mg of indomethacin that does not interfere with the copper release and reduces the menstrual cramping [12].

In Austria and Israel, a *copper intrauterine ball* is available, which once inserted takes the shape of a sphere. The rationale of the ball shape is to reduce the irritating effect of classic copper IUD. It is also easy to insert with no uterine perforation reported and highly accepted by patients [19].

New IUDs, such as flexible *VeraCept*—that utilize a low-dose copper configuration of 175 mm<sup>2</sup> surface area on a shape memory Nitinol frame—need clinical trials for validation of efficacy and tolerability [20] (**Figures 1 and 2**).



**Figure 1.** Various types of IUD. Copper devices presented in the upper row, from left to right: T Safe Cu380A®, Nova T380®, Flexi-T300®, Multiload Cu375®, GyneFix®, Ocon® Cooper intrauterine ball. In the middle row—hormonal IUDs: Mirena®, Skyla®, FibroPlant® frameless levonorgestrel-releasing device. In the lower row, other IUD types are presented, as the indomethacin-releasing copper device AiMu® and the flexible, low copper dose VeraCept®.



**Figure 2.** General structure with stems, arms, and strings of the IUD. Normal location after proper IUD insertion in the middle of the endometrial cavity with no extension in the myometrium, both arms spread toward the uterine horns and the inferior part of the vertical body stem just above the isthmus.

#### 4. IUDs mechanism of action

Both copper and hormonal IUDs involve multiple mechanisms that provide contraceptive protection. The major described effect is represented by the induction of a *local inflammatory reaction* in the

endometrium. Therefore, the endometrial and myometrial function is disturbed by cellular and humoral immune-inflammatory reaction. Intrauterine foreign bodies are known to interfere with reproduction in all species [21]. Other mechanisms of action for *copper IUDs* are related to copper ions' effect on the *sperm motility and viability* and also to *changes of the cervical mucus* [7]. However, recent studies demonstrated no significant increase in inflammatory reaction, so the effect of copper on the sperm or oocyte remains as the main mechanism of action [22]. The mechanism of inhibiting fertilization or sperm viability impairment may be responsible for the high efficacy of copper IUDs as emergency contraception [23]. The reported failure rate for copper IUD placement for emergency contraception within 5 days of intercourse or ovulation is less than 1%, significantly more effective than any hormonal emergency contraceptive [24, 25]. Even if copper IUDs do not usually influence the menstrual frequency or quantity, 10–13% of women have their IUD removed in the first year due to increase of menstrual flow and cramping-type abdominal pain [26].

Besides the foreign body reaction, another mechanism of the *hormonal IUD* is represented by the release of small amount of progestin hormones, respectively, levonorgestrel. The hormonal effects induce an unfriendly and even *fatal environment to sperm* inside the uterus, with inhibition of capacitation, penetration, and survival [27]. Hormonal IUDs interfere with sperm motility by *thickening cervical mucus*, thus preventing the sperm to travel up into the uterus [28], while copper IUDs rather impair the sperm viability, with various effects as head-tail disruption [29]. A *thinner endometrium* develops under the progesterone influence and egg implantation is affected. Also, menstrual blood flow is reduced, thus hormonal IUDs are frequently used to treat menorrhagia [30].

We underline that IUDs, whether hormonal or non-hormonal, do not provide protection against sexually transmitted diseases. Still, the historical association with pelvic inflammatory disease (PID) and tubal infertility is considered false [31, 32].

The indomethacin-releasing copper IUD contains a nonsteroidal anti-inflammatory agent, indomethacin, that do not interfere with copper ions [33, 34], aimed to reduce the menstrual blood flow and cramping that are frequently related by IUDs users [33] (**Table 1**).

Mechanisms of action	Type of intrauterine device	
	Copper IUD	Hormonal levonorgestrel IUD
<b>Effects on sperm</b>		
Foreign body reaction with toxic changes to sperm	+	+
Copper ions spermicidal or cytotoxic	+	
Thickened cervical mucus affecting sperm motility		+
<b>Effects on fertilization</b>		
Decreased number of fertilized ova in fallopian tubes	+	+
<b>Effects on the endometrium</b>		
Immune-inflammatory reaction with increased leukocytes	+	
Altered cytotoxic cytokine and integrin profile	+	+
Endometrial atrophy, decreased thickness, and secretions		+

**Table 1.** Mechanisms of action of the main types of IUDs. Modified, Schulman et al. [35].

## 5. Adverse and side effects, health benefits, and risks of IUDs

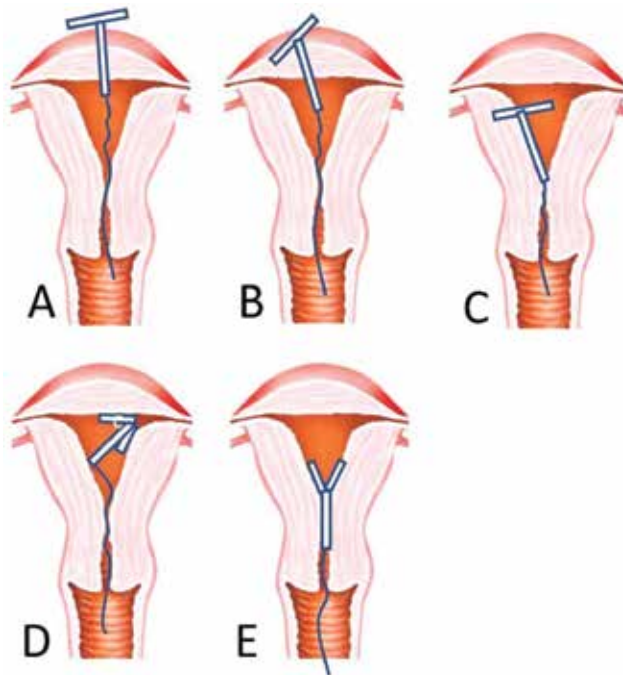
Generally, all IUDs are well tolerated with high rates of continuation in all reversible contraception types [36]. All IUD types present potential side effects: uterus perforation and malposition, especially during the inserting technique; embedment and expulsion, as it is a foreign body, and menstrual pattern alterations (**Figure 3**). All patients should be counseled regarding the possibility of IUD expulsion as this is the most common complication following IUD insertion [37].

The *expulsion* rate is reported to be similar for copper and hormonal IUDs, as well as in nulliparous versus parous women, approximately 5% [38].

Uterine *perforation* is rare and surgical intervention is recommended if this occurs, but this is not an emergency in asymptomatic cases [39]. In these patients, a new IUD placement should be considered after at least 4–6 weeks time interval needed for uterine wall healing [40].

A rarely reported complication is the *embedment* within the endometrium. This should be suspected at the ultrasound (US) follow-up, or clinically, if no IUD strings are visualized at the cervical os or there is difficulty with removal [41].

Copper IUDs can cause *menstrual pattern alterations*, especially irregular, heavy and painful bleeding, and intermenstrual spotting or bleeding as well throughout use [42, 43].



**Figure 3.** IUDs complications. (A): complete uterine perforation; (B): partial uterine perforation; (C): partial embedment into myometrium; (D): malposition; (E): expulsion after insertion.

Regarding the *hormonal IUDs side effects*, they are similar to other progestin-based contraceptives such as headaches, nausea, hair loss, breast tenderness, depression, decreased libido, and ovarian cysts [44, 45]. Also, vulvovaginitis and abdominal or pelvic pain may be experienced by users of hormonal IUDs [44, 45]. On the contrary to copper IUDs, the hormonal IUDs usually cause amenorrhea and oligomenorrhea after 2 years of use [42, 44].

The **contraindications/health risks** for IUD use are current pregnancy or gestational trophoblastic disease, cervico-vaginitis or acute pelvic inflammatory disease, including pelvic tuberculosis, puerperal sepsis and recent septic abortion, uterine (cervical or endometrial) cancer, unexplained vaginal bleeding, and malformed uterine cavity. Other systemic contraindications include copper allergy, immunodeficiency disorders, immunosuppressive therapy, Wilson's disease, acute liver disease or liver carcinoma and breast carcinoma—especially for hormonal IUD, multiple sexual partners for the patient or her partner.

The major **health benefit** of IUD is represented by the efficacy in contraception similar or better than female sterilization. The copper IUD failure rate is reported to be 0.8% at 1 year, while a failure rate for hormonal IUD is reported to be 0.1% at 1 year [46, 47]. Of great importance is that this efficacy is not influenced by or related to patient age, multiple medications, or medical comorbidities and does not require patient compliance [48]. IUDs can be safely placed immediately after abortion or 6 weeks postpartum with high contraceptive benefits [49]. Copper IUD is recommended as the most effective option for emergency contraception [50].

Another IUD benefit is the fact that it can be used as an adjunctive treatment modality for intrauterine adhesions. Several studies have shown that IUD can be beneficial in patients with intrauterine adhesions or Asherman's syndrome, especially when combined with other ancillary treatments [51].

Other noncontraceptive benefits of IUDs include the treatment of menorrhagia, anemia, dysmenorrhea and pelvic pain associated to endometriosis, and endometrial protection during hormone replacement [48]. Since 2009, when Food and Drug Administration (FDA) approved the hormonal IUD as treatment for heavy menstrual bleeding, hormonal IUDs became the most cost-effective alternative to hysterectomy/surgery for the respective patients, with improved hemoglobin concentration [52]. Studies report a decrease of the menstrual blood loss that varies between 74 and 97% at 12 months of use [53, 54]. First, an initial irregular bleeding pattern is noted by most users, but over time the menstrual blood loss is improved. In contrast with copper IUD, the hormonal IUD can also decrease dysmenorrhea [55].

In 30% of patient with deep endometriosis or adenomyosis, an improved control of chronic pelvic pain and dyspareunia is noted after at least 6 months of hormonal IUD use [56, 57].

As the main effect of hormonal IUDs is to decrease the local endometrial response to estrogen, several studies have suggested that this may lead to primary protection from endometrial cancer [58]. Hormonal IUDs can also be used as a component of combined hormone therapy in menopausal women [52].

The use of IUD contraception is considered a health benefit in special groups such as women with comorbidities, in postpartum, postabortion and lactating women, patients with prior

thromboembolic events, bleeding diathesis, or under anticoagulation. Also, IUD contraception can be a preferable option in women with uterine fibroids after uterine artery embolization, endometrial ablation, or magnetic resonance-guided focused ultrasound.

However, the IUD does not protect from sexually transmitted diseases; therefore, caution must be considered when selecting IUD users.

## **6. Correcting misunderstandings, myths, and barriers**

### **6.1. IUD and PID**

Since the introduction of IUDs, scientists manifested a concern that this contraception method may cause or facilitate gynecologic infection. In fact, the relationship between IUD and PID has a long and controversial history dating since 1940 [59]. Moreover, in the 1970s, the reputation of IUD was tarnished in many countries, as the use of a Dalkon Shield IUD was linked to several cases of potentially fatal pelvic sepsis [60]. Today, although there is common reserve regarding the PID incidence in the IUD users' population, valuable research has shown that the risk of PID is no greater with IUD use than the general population [61]. WHO admits a risk of six times greater of PID in the first 20 days after the insertion of IUD [61]. One randomized trial found that the hormonal IUD might provide some protection against PID when compared to the group of copper IUD users and the group of IUD non-users [62]. Due to this risk, prophylactic antibiotics were proposed before IUD insertion, especially doxycycline and/or azithromycin. Multiple large, randomized control studies have demonstrated that the prophylactic antibiotic has no significant beneficial role in reducing the risk of PID before IUD insertion [63].

### **6.2. IUD and tubal infertility**

Tubal infertility was thought to be a consequence of IUD use. Specific research has been conducted and found that the past use of copper IUD did not increase the risk of tubal infertility [59]. Chlamydia infection is the primary cause of PID and tubal infertility in women who use or do not use IUD [31]. A cervix already infected with Chlamydia was considered to be a risk factor for placing an IUD, but proved to have no association with PID on later development [64].

### **6.3. IUD and the risk of ectopic pregnancy**

In the past, IUD was perceived as a high risk factor for ectopic pregnancies (EPs). Actually, a pregnancy with an IUD in situ has an increased risk of being an EP, but the absolute risk of any pregnancy is extremely low in the group of IUD users, much lower than in the group of women with no contraception method [65, 66]. Another important aspect to highlight is that a history of previous EP does not represent a contraindication for IUD insertion [67].

### **6.4. IUD in nulliparous women**

Adolescents and nulliparous women represent a special group that was considered, in the past, not eligible for IUD contraception. Approximately half of adolescents have never heard

of IUD contraception [68]. What is more, approximately one-third to one-half of health providers do not offer IUD contraception method to nulliparous women due to several myths and misconceptions [69]. Nowadays, there is sufficient evidence to support the use of IUDs in the nulliparous women as a suitable contraception method, regardless of all false myths and misconceptions including high risk of PID, tubal infertility, EP, gynecological neoplasia, difficulties of the insertion technique, and IUD expulsion [70].

### **6.5. IUD and gynecological neoplasia**

There is a lack of awareness and understanding of IUD contraception by women worldwide, possibly due to lack of medical education and proper information. A frequent misconception of IUD use is that it increases the risk of genital cancer. Mandatory screening for cervical cancer is a requirement of many guidelines before IUD insertion. In fact, several epidemiological studies suggested that IUDs might protect against cervical carcinogenesis [71]. The role of hormonal IUD as a protective factor against endometrial hyperplasia is well known [58]. Accurate information regarding the use of hormonal IUD must underline the risk of ovarian cysts, but not ovarian cancer.

### **6.6. IUD and female sexual dysfunction**

Female sexual dysfunction was thought to be determined by IUD but in fact has a multifactorial etiology and studies found no difference between IUD users or non-users [72].

## **7. The technique of inserting and removing IUDs**

IUD represents the choice method of contraception for many women as its effects are reversible after removal.

The insertion technique is easy and well tolerated by selected female patients after taking into consideration the contraindications, as well as the health benefits for women with anemia, menorrhagia, or dysmenorrhea [73]. First, it is advisable to have a documentation of a negative pregnancy test as a precaution. Also, exclusion of a possible Chlamydia or gonorrhoea is advisable before an IUD is inserted [74]. The insertion can be performed at any time during the menstrual cycle [42]. In the past, the technique was preferred to be done during menses to exclude pregnancy, but this is associated with a higher risk of expulsion. Several studies found that the pain during the insertion is lower during the sixth and the tenth days of the menstrual cycle [26]. Regarding the insertion of a hormonal IUD, the appropriate timing is considered to be within the first 5 days of menstrual bleeding or immediately after childbirth, abortion, or switching from an alternative contraceptive method [42, 75]. Backup contraception is recommended for a period of 7 days after the hormonal IUD insertion and is not needed after the copper IUD insertion [48]. In cases of emergency contraception, the insertion of the copper IUD can be done within the 5 days of the unprotected intercourse to prevent pregnancy [25]. The use of a hormonal IUD has not been yet studied and so it is not recommended for emergency contraception. The removal of both the copper IUD and the hormonal IUD can be performed anytime preferably during the menstrual cycle. As mentioned before, antibiotic prophylaxis is not needed before IUD insertion

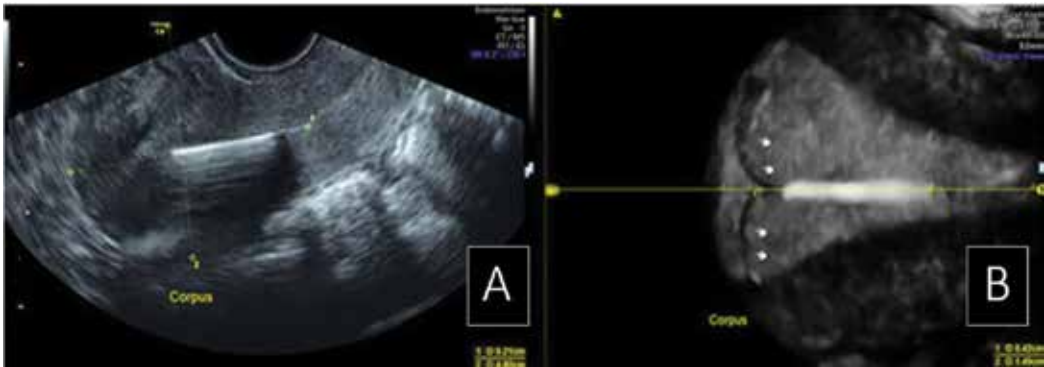
or removal, even in patients at risk for endocarditis [76]. The insertion procedure is usually done by a trained provider in the office, and only in special circumstances, such as mentally limited patients and nulliparous young women, it can be done under sedation. The physician must discuss all risks and benefits of IUD with the patient and must obtain an informed consent. The use of misoprostol before IUD insertion to allow an easier procedure was proposed in 2007 [77]. However, more recent researches found no benefit but increased side effects with misoprostol, and no recommendation has been yet made [78, 79]. On the other hand, the use of a nonsteroidal anti-inflammatory drug, respectively, 600–800 mg of ibuprofen 1 h before the procedure can alleviate discomfort [80]. Also, the physician must educate the patient in locating the IUD threads after each menstruation and consulting earlier if incapacity to locate [80]. IUD insertion is similar for copper IUD and for hormonal IUD. The preparation before IUD insertion must include the determination of uterus position. This can be done by a bimanual examination or by an ultrasound examination. All proper equipment must be sterile and assembled before the procedure. The cervix and vagina must be cleansed with antiseptic solution. A speculum is used to visualize the cervix and a tenaculum to stabilize the cervix. Local anesthesia is preferred with lidocaine gel in the cervical canal, or a paracervical block. The uterine depth must be verified using a hystrometer and the IUD is inserted as shown in the accompanying written material of any IUD. After proper insertion, the threads should be cut to a length of 3 cm. A post-procedure ultrasound should be performed to verify the IUD position [81]. The removal procedure should be considered anytime on patient request. If any contraindication appears or adverse effects persist, IUD can be easily removed by grasping the threads at the external os. Special conditions include impossibility to remove the IUD with a simple traction; deeply embedment IUD should be suspected and in such cases, hysteroscopy is mandatory. Cervical screening is performed the same as in IUD non-users. Colposcopy is performed the same, but excisional procedure for cervical dysplasia must be performed after IUD removal [81].

## 8. The role of ultrasound in IUD users

US evaluation of the pelvis, especially transvaginally, has become an important part of the gynecological care and is essential for the assessment of IUD position after insertion [81]. Moreover, the lack of a pelvic US examination before IUD insertion may predispose to malposition or serious complications such as perforation [82]. US assessment is cheap, easy to learn, perform and interpret, efficient, and without side effects [81]. A correct positioned IUD is visualized in the middle of the endometrial cavity with no extension in the myometrium, with both arms spread toward the uterine horns and the inferior part of the vertical body of the IUD just above the isthmic portion of the uterus [83] (**Figure 4**). The two-dimensional technique has some limits in the evaluation of the IUD position, as the most important plane for this purpose, the coronal plane, usually cannot be imagined. Three-dimensional (3D) assessment is also helpful to identify hormonal IUD, because of the lack of echogenicity (**Figure 4B**), unlike copper IUD that are easily identified due to its high echogenicity.

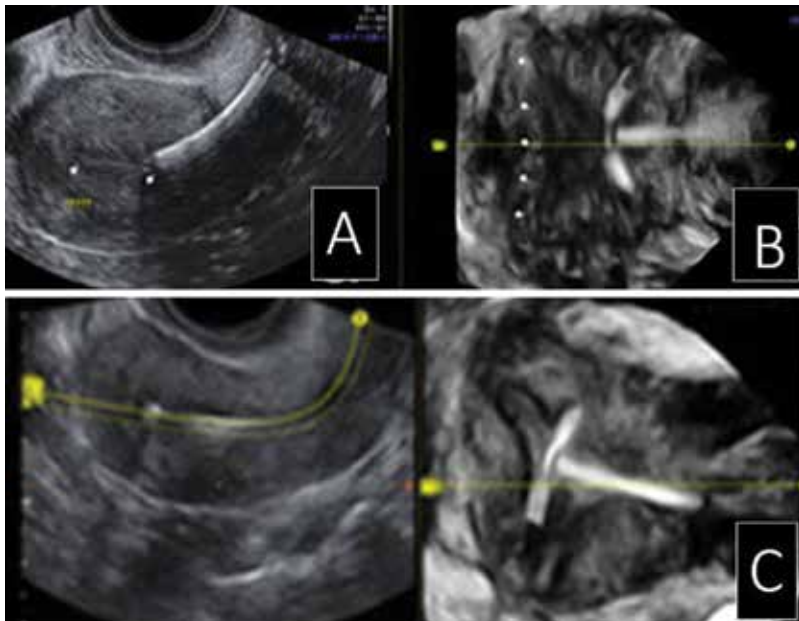
About 10% of IUDs are malpositioned and so the efficacy in contraception is significantly decreased. More than half of the patients with a malpositioned IUD are asymptomatic. Still,





**Figure 4.** Ultrasound image of hormonal IUD. (A) 2D image; (B) 3D rendering, with reconstruction of the coronal plane.

there are no general guidelines for a routine transvaginally US verification after IUD insertion [84]. The 3D US technique has the advantage to allow subsequent reconstruction of the coronal plane [83]. This approach provides a correct diagnosis regarding the malposition, expulsion, displacement, embedment, or perforation (**Figure 5**). It can also detect more specifically uncommon complications such as fragmentation and calcification [81]. So, 3D has become crucial as it is more sensitive in assessing symptomatic IUD users, but also for routine evaluation. However, familiarity with the transvaginal 2D/3D US techniques is essential.



**Figure 5.** Ultrasound image of a malpositioned copper IUD. (A) 2D image; (B) 3D rendering of the coronal plane showing copper IUD displacement; (C) 3D rendering showing copper IUD partial embedment into myometrium.

## 9. Management of problems in continuing users

Patient satisfaction and acceptability are extremely important regardless of their contraceptive method. After a proper counseling regarding the risks and the benefits, women choose the appropriate most effective contraception option to prevent an undesired pregnancy. The *continuation* rates for copper IUD are reported to be as high as 84% at 12 months and 85% for hormonal IUD [85]. Overall, the satisfaction rates of women users of IUDs are the highest between all other contraceptive methods [86]. In terms of IUDs advantages, the most frequently reported reasons are the ease of use, efficacy, and reliability, but also reduction of the menstrual flows when using a hormonal IUD [40].

*Pelvic pain* is the most frequent side effect of any IUDs. Approximately 27% of copper IUD users and 34% of hormonal IUD users have their IUD removed prior to 6 months because of continuing cramping [87]. The post-insertion pain can be managed with 400 mg of ibuprofen/325–650 mg of aspirin/325–1000 mg of paracetamol/200 mg of naproxen. The post-insertion recommendations forbid tampons, vaginal douching, and sex for 24 h [48].

Another reason for discontinuation is represented by irregular *bleeding patterns* especially for hormonal IUD users. With the copper IUDs, most women continue to have regular monthly periods and bleeding may get *heavier* [48]. In such cases, tranexamic acid can be required for a short-term relief, but unfortunately, it is not available in many countries. Another option may be nonsteroidal anti-inflammatory drugs, such as indomethacin, but not aspirin. Anemia may be a serious side effect of using copper IUD, so patients must receive iron tablets for the anemia prevention or indication to a specific diet rich in foods containing iron. *Amenorrhea* is a common side effect when using hormonal IUD. Even if irregular bleeding may bother the user, the menstrual flow is overall decreased [88]. In adolescents, a 7% rate of discontinuation has been reported within the first year, independent to the IUD type, due to abnormal bleeding [89].

Most cases of discontinuation can be prevented by an accurate medical informed discussion between the user and the health provider prior to IUD insertion. Both types of IUD should be taken into consideration and the best decision must consider the benefits, but also all adverse effects. The most important disadvantage of IUD use is the fact that it does not offer protection from sexually transmitted diseases and condom should be used for this purpose. In rare cases, the male partner can feel the IUD retrieval strings or stem during intercourse and this may bother him. Strings can be cut shorter or in some cases the IUD can be removed and a new one inserted. Lack of medical education seems to be the main cause for the reduced uptake and continuation rates for intrauterine contraception among female patients [90].

## 10. When to switch to other contraception methods

Other contraception methods should be considered if *menstrual bleeding* is increased when using copper IUDs or if irregular bleeding induced by using the hormonal IUDs becomes a disturbance in the female patient's routine.

*PID* or *EP* represents a cause for severe pain in the lower abdomen. However, PID does not represent an indication to remove the IUD before starting antibiotic treatment. If EP is diagnosed,

IUD must be removed and proper specific treatment should be initiated. IUD should be removed also in *intrauterine pregnancy* cases. If the woman wants to terminate the pregnancy, the removal procedure is done before the evacuation of the uterus. If the woman wants to continue the pregnancy, early removal of the IUD reduces the risk of preterm delivery or miscarriage.

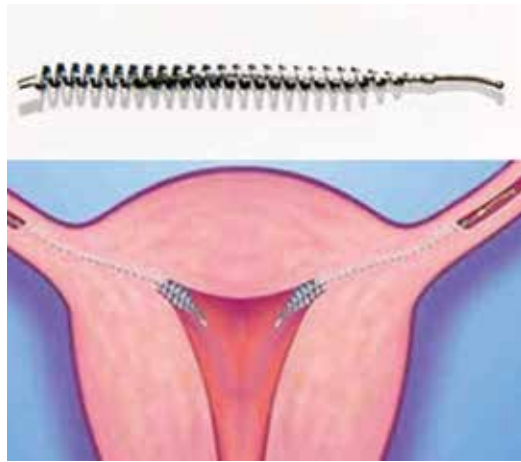
During the insertion procedure, *perforation* may be suspected. In such situations, immediate removal of the IUD is recommended along continuous monitoring of the patient's vital signs. If perforation is suspected after 6 weeks of insertion or later, then the IUD should be removed by an experienced clinician and other contraception method should be considered.

If the IUD is partially *expelled*, it must be removed and insertion of a new one should be decided with the patient after careful counseling. If the IUD is completely expelled, then other contraceptive methods are advisable.

*Male discomfort* during intercourse is a rare cause for switching to other contraception methods.

## 11. New alternative to IUD

A series of medical conditions, due to high maternal mortality rates approaching 50%, represent an imperative indication for the most reliable methods of contraception in women. Essure was introduced in 2002 as a new sterilization method for women who do not desire to preserve fertility or for those who have significant medical contraindications. Essure is composed of two intra-tubal stents that must be inserted into the proximal section of the fallopian tube. This procedure is done hysteroscopically using only oral analgesia or sedation [91]. The contraceptive effect is installed in 3 months after insertion due to mechanical obstruction and inflammation causing fibrosis [92]. Thus, an additional form of contraception must be used in the meantime other than IUD. The main advantages of Essure are represented by the fact that Essure is non-incisional, permanent birth control device [93]. The insertion procedure is ideally performed in the proliferative phase when the tubal ostia can be easily visualized and cannulated. Tubal stenosis and tubal spasm can determine the failure of placement, but also poor visualization [94]. The procedure success rate varies from 85 to 98% [95]. When inserted, there is a risk of vaso-vagal attacks of 1.85% [96]. The Essure contraindications are the uncertainty regarding ending fertility, suspected pregnancy, active or recent PID, uterine anomalies, less than a 6-week interval after delivery or miscarriage, patient unwilling to use other contraceptive methods for the first 3 months, prior tubal ligation, and current immunosuppressive therapy [97]. After 3 months post-insertion, an imaging method to verify the position of the Essure is recommended. Several studies have been done in order to establish the best imaging method between hysterosalpingogram (HSG), X-ray, or hysterosalpingo-contrast sonography. Still, all studies underline the importance of trained staff in assessing the appropriate Essure placement [93] (**Figure 6**). As complications, mild pain has been reported in most cases—80% of patients, while severe pain may be encountered in 17% [98]. Also, minor symptoms like cramping, nausea, and light bleeding or spotting can also occur in the first week [3]. Severe complications like tubal perforation and expulsion are rare. Essure is compatible with 1.5 T of magnetic resonance imaging (MRI), but special caution is indicated in 3 T MRI and with some techniques of endometrial ablation. In terms of efficacy, Essure has a 99.74% successful rate in permanent contraception after 5 years [97]. The minimal risk of



**Figure 6.** The Essure system and placement of the device.

pregnancy with Essure can be overcome by educating patients to respect the recommended instructions and comply to periodic follow-ups, including HSG protocol [98].

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# Abortion and Family Planning

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## Abstract

Abortion, a procedure by which the dead fetus is removed from the maternal organism and considered as a cultural trait, is found in all cultures of developed societies, as well as in the populations of aboriginal peoples. Moreover, it has long been a concern that has drawn social attention. It was only after in 1798, that the attention was drawn to the relationship between population and the production of goods. This concern has been accentuated by the birth rate and the longevity of human being. Abortion has undoubtedly interfered with population growth, the restriction of abortion advocated for human rights, or religious or economics reasons or by others. Family planning is a set of actions that help men and women plan for the arrival of their children, as well as prevent unwanted pregnancies. It is a project for couples to have offspring per their intentions and also the increase in world population that is worrying everyone has a decrease. For this, the Control of Birth is the method proposed to contain pregnancy. Abortion should only be recommended when a woman cannot or does not wish to give birth to a child or when the method used to control pregnancy has failed.

**Keywords:** family planning, birth control, artificial fertility, abortion, legislation, religion

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## 1. Introduction

Culture for Edward Tylor “is all that complex that includes knowledge, beliefs, arts, morals, law, customs as well as all the skills acquired by man as a member of a society”[1] “The word culture, therefore, within an approach to the social sciences, includes everything that human beings have invented, built, adapted, or developed to survive and make life at least a satisfying and enjoyable experience, not only materially but also spiritually” [1].

Culture is an indivisible system that determines social behavior through traits, concepts, and patterns. Although it is an abstract process, culture sums up all the processes of reality that are

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learned in a slow but effective way. Being a learning process through communication between people, culture is a process that precedes and succeeds the components of a society. Thus, it is considered a historical phenomenon, but in another view, the cultural aspects being abstract are kept within the people and, in this sense, can be considered a psychological phenomenon.

The process of learning culture is a slow, continuous, unconscious process that begins at birth and continues throughout life. The culture of a society leads people to think, feel, and act per cultural standards. Cultural pattern is the orientation provided by the complexities and cultural traits that are valued in different ways. It is also in Piovesan's words the paths followed by the customs, ideas, beliefs, and attitudes of a population group. It is possible to consider that in all cultures, therefore in all societies, there is a standard in relation to health, which is composed of concepts grouped in medical knowledge that are characterized by traits, characterizing the behavior of society, at various levels in relation to health. Concepts are derived from medicine based on scientific learning or on empirical learning based on analogical knowledge.

Cultural trait is the least definable element (Kroeber) or identifiable (Herskovits) of culture [1]. Abortion should be considered a component of the standard of health of all cultures.

## 2. Definition and indications

Abortion is the process by which a dead fetus is expelled from the mother's womb. It is a process that occurs with all animals spontaneously. In human societies, it is a process that often occurs in women spontaneously or is carried out in a manner provoked by pregnant women in all cultures, a trait that is considered in a different way as determined by the legislation or the religiosity of the people. What varies is how different societies and consequently how diverse cultures determine how women should be followed.

Regarding whether spontaneous abortion occurs independently of the desire of the woman, we must help some inconvenience and take care that it is not repeated. Spontaneous abortion occurs in women of all social groupings regardless of existing knowledge.

Prolonged abortion can be performed by the oral route through drugs or medications or by performing surgical procedures.

Medicine considers that abortion is one of the events of obstetrics that occurs in a safe way, if the measures prescribed by the medical sciences are taken. Despite this, examining the determinations found in the different societies will lead to findings about countries where there is practically a total liberation for the realization of this event and countries in which the realization is penalized by the death of the woman and of those who carried out the abortion. Thus, an event of intimacy of the woman and of who should proceed to the abortion, in the most differentiated societies, the doctor has no shelter.

Family planning is a set of actions that help men and women plan for the arrival of their children, as well as prevent unwanted pregnancies. It is a project for couples to have offspring per their intentions and also the increase in world population that is worrying everyone has a

decrease. For this, the Control of Birth is the method proposed to contain pregnancy. Abortion should only be recommended when a woman cannot or does not wish to give birth to a child or when the method used to control pregnancy has failed.

### 3. Generalities

Countries through legislation established by the government punish or liberate abortion. At the same time, the doctrine of various religions considers it to be a totally unwanted behavior. A cultural trait that turned into a medical fact is penalized by jurists and priests. Considered a medical act of which presents very little risk to the woman.

As a cultural trait, abortion on many occasions is not obeyed and not even penalized by women or society. This is because there are many reasons for women seeking abortion whether biological or social.

Among these reasons is rape, that is, the sexual act by violence and without the permission of the woman, which in almost all the countries of the Western world and countless of the Eastern world is considered a reason for the punishment of the man, as well as for allowing the woman to resort to abortion in order not to generate the fetus. In addition to rape, other reasons are considered for abortion.

Among the biological reasons are life-threatening or health-related injuries, such as the most relevant ones. The current knowledge of medicine is so developed that if abortion is used to save a woman's life, it is almost abandoned. The emergence of diseases produced by viruses leading to the birth of fetuses with abnormalities, such as anencephaly, that will produce harmful effects on the life of the newborn is also considered. In some countries, incest is remembered [2].

On the other hand, many social reasons are forgotten by many societies that consider, with greater weight, the position of several churches, among them more narrowly Catholic.

Among these social reasons, it is possible to enumerate at once the desire of the woman not wanting the birth of a child, which can occur through several factors: the lack of knowledge of the father; the disappearance of the father; the father's attitude in not recognizing the child; the lack of acknowledgment of childbirth by the woman's family, even causing expulsion from her home; the financial impossibility of the family to support another child; the impossibility of giving pause to a livelihood or future improvement activity; and finally the failure in the process of birth control.

Birth control has always been sought in ancient civilizations for more than 4000 years. In Egypt, the Berlin papyrus refers to fumigation that prevented pregnancy and the Ebers papyrus indicates procedures that prevented a woman from becoming pregnant for 2–3 years. The Old Testament refers to the "coitus interruptus" method adopted in Europe in the nineteenth century and to this day adopted by poorer and less enlightened layers throughout the world.

The abandonment of unwanted children was practiced among the Greeks as well as among the Romans. Chinese were organized on farms for the reception of children who remained until they were sacrificed [3].

Beside infanticide, different, less bloody procedures have always been adopted by various societies.

Realí [3], citing Karl Martius, reports that among primitive peoples who inhabited Brazilian jungles, there was the habit of the Crowned, Purus, and Botocudos Indians to undergo bleeding to avoid pregnancy and to suffer blows in the womb to expel the existing fetus. Among the Pauamari Indians, Prance observed the practice of abortion using leaves of plants such as "Mabi kiri dadi (head of water snake) and Koaka-makha da-di," rubbed in the womb of pregnant women. The missionary couple Morgan found among the Indians of the Denis tribe located on the banks of the Juruá River in northern Brazil the use of a potion elaborated with *Curarea Tecunarum* that produces a contraceptive effect for 2 years.

Popular medicine has among its indications different bottles to produce contraceptive effect, still sought today by populations further away from the developed centers.

Even the most advanced societies that were guided by empirical methods were unconcerned with the situation of population growth. With the expansion of Christianity, the use of contraceptive methodology, almost always a product without a scientific endorsement, was being abandoned to resurface in the eighteenth century after the knowledge of Malthus' work. The work of Thomaz Robert Malthus came to light in London in 1798 under the title "Essay on the Principle of Population ...". Malthus was an important English economist of the late eighteenth and early nineteenth centuries. It was of great importance in the study of population growth in developing the so-called Malthusian theory. He was also a clergyman, university professor, demographer, and scholar. In his theory, Malthus affirmed that while the production of goods grew in arithmetic reason, the world population grew in geometric reason.

A methodology to avoid conception and, therefore, to produce the desired family planning was developing until reaching the recognition as a scientific area. From the second half of the twentieth century, especially in the 1960s, there was a population explosion. With an adaptation concerning historical conditions, it became known as the neo-Malthusian theory. This theory focuses on the population growth of underdeveloped countries; such growth would lead to scarcity of natural resources, as well as worsening poverty and unemployment. To avoid these setbacks, neo-Malthusians proposed effective birth control policies.

The Control of Birth was then sought with greater intensity. Procedures to prevent pregnancy began to be sought. Methods from the safe period resulted from the publication of two surveys conducted in 1923, alone by K. Ogino in Japan and by H. Knaus in Poland, to the process of the intrauterine device or the pills based on progesterone and estrogen, the most sought after 1950 that are intensively studied to verify the efficacy, the advantages, the disadvantages, the risk of failure, and the medical risk.

Without intending to deepen the various processes used in birth control, most of the most widely used methods will be judged by analyzing their advantages and disadvantages as well as the risks of failure and injury to women's health.



The Safe Period method proposed by Ogino and Knaus, as well as the Basal Temperature method and the Ovulation method, is reasonably effective; as advantage, it does not need prescription and is accepted by religions. The disadvantage is that it requires a prolonged period of abstinence, and it has a risk of low failure and no medical risk [4].

The male mechanical device, known as condom or more popularly as small shirt, has moderate efficacy; as advantages, it does not need prescription and is low cost and as disadvantages are the strong motivation to use. It has a risk of low failure and no medical risk [4].

The female mechanical device known as diaphragm has a high efficacy if the use is accompanied using spermicide; has an advantage that requires only a brief medical education; and as disadvantage has the impossibility of not being able to be employed by all women. It has relatively low risk of failure and no medical risk [4].

Vaginal shower comprising the washing of the vagina soon after performing the sexual act proves to be practically ineffective; has the advantage of using sanitary facilities when they are nearby; and has the disadvantage of interrupting the love colloquy. It has a very high risk of failure and no medical risk [4].

Interrupted coitus, which consists of the interruption of sexual activity, has a much-discussed efficacy; as an advantage, can be realized at any time; and as disadvantage, reduces the sexual satisfaction of the couple. It has a risk of moderate failure and no medical risk [4].

Hormonal female contraception is based on the use of progestogen and/or estrogen to interfere in the ovulation, ovule transport, and nesting process, controlling the birth rate. Various avenues are used for its employment [5].

The oral progestogen is highly effective; has the advantage of being a single dose; and has the disadvantage of having a prolonged effect. It has a risk of failure, but a long-term medical risk [5].

Implants in various modalities are easy to implant and to remove, either subcutaneously or intramuscularly. It has high efficacy, with the advantage of slow release of progestogen, but with the disadvantage of facilitating irregular menstruations. They have low risk of failure [5].

Very common pills are prescribed either as a single monthly dose or with other doses. The efficacy is high, with the advantage of having no estrogen effects and with the disadvantage of presenting intermenstrual bleeding. They have risk of failure as well as medical risk [5].

Injectable steroids are given at intervals ranging from 1 to 6 months. They have very high efficacy and advantage of simple application, but with the disadvantage of presenting menstrual disorders and increase in body weight [5].

In this study, the effects of different methods of birth control, among those prescribed in the last years, were not found to be totally efficient, although some of them were highly viable in controlling the birth rate of the women who used them.

It is evidenced that women who have used failed redundant methods of birth control and therefore failed to avoid pregnancy have the only recourse, if they do not really wish or cannot give birth for biological, social, or psychological reasons, to resort to abortion.

Medical abortion should only be performed by a physician in full exercise rights and knowledge, with the consent of the woman, without religious, ethical, or legal obstacles, and preferably during the first 12 weeks of gestation. The importance of this procedure has led the World Health Organization to make a publication on safe abortion that is already in a second edition [6].

Among so many events that worry those who care for health, abortion is highlighted by the difficulty in presenting appropriate measures to minimize its effects on the population. The problem of abortion presents a difficulty in promoting dialogs, since there are contradictory opinions. In the different societies, ideal values are found in relation to abortion, that is, its fulfillment in conditions necessary from the point of view of health and always complying with ethical and legal precepts. Yet the pattern of behavior shows that many times this ideal has not been attained and abortion is carried out in contravention of health, ethical, and law precepts. With liberality in its realization, abortion has long been a concern of societies.

In searching for references to abortion, one already finds that the Hebrews had a code that even punished those who practiced abortion with the death penalty. In Greek mythology, there is a quotation about Aristotle who was in principle opposed to abortion and then agrees to this procedure if the embryo was lifeless. Hippocrates—father of medicine—indeed the forerunner of medical ethics, was an oath-maker that doctors must follow, in which abortion practice is barred. The oath of Hippocrates held in the era before Christ is “I will not give the woman any abortive substance.” In the Hammurabi Code, abortion is also punished. In Sparta, abortion was prohibited because of the need for men to take charge of internal security and to provide armies to intervene in times of war.

The issue of abortion became hot when St. Augustine spoke on the subject and then St. Thomas Aquinas differentiated the fetus formed from the fetus in formation. In the Roman Empire, the issue of abortion was also discussed [3].

Since the eighteenth century, despite the small interest that abortion caused in societies, its practice was deprecated, mainly because scientific knowledge had in the seventeenth and eighteenth centuries launched new foundations leading the fetus to be recognized as an autonomous entity accepting affirmations to echo the law.

With the French Revolution and the emergence of new nations, wars, plagues, and geographical discoveries, new changes occurred in the Western world, population growth slowed, while the need to maintain more effective armies increased. The life of men became valuable and motherhood was a patriotic activity [7].

The idea of a large family led governments in the nineteenth century to protect births for eminent political and ideological reasons, and with that direction, the population grew. After World War II, scientific knowledge revealed techniques and methods that allowed man to live longer. Even so, nations like France, Germany, and Spain have taken more restrictive measures to abortion.

These legal measures and the other measures liberating the realization of abortion began to undergo a pressure of the doctrines of the religions, as of the action of the priests of diverse churches.

From the 1960s, a series of proabortion demonstrations led government officials to worry about these women-generated movements. With the development of scientific knowledge from the end of the 1970s, with new techniques of artificial fertilization, and with concern for population increase, a direction of the light of science has taken the path to prevent this advance. Thus, methods, techniques, uses, and even superstitions were reminded to avoid pregnancy and to avoid birth.

In the United States of North America, the guiding country of scientific education for less developed countries, there were movements so that abortion would not be penalized, as in Europe. From 1966 to 2009, 47 countries of the World Health Organization approved more liberal legislation on abortion, in contrast to 11 that have hardened it [8].

Preventing abortion facilitates birth while the release of abortion has the reason to prevent birth. It was not possible to calculate in what numbers these facts occur, but analyzing theoretically there is no denying that possibility.

The woman and the doctor decide about having/performing an abortion. These are the characters who, per the culture of the society in which they live, may have the freedom to perform it in a lawful, correct, and safe manner or hidden in the penumbra, in an illicit, much more insecure and incorrect way. However, whoever decides to allow or punish, the one who offers the condition of accomplishing it is the society through legislation leading to imprisonment or the church through sin, into the Catholic religion reaching excommunication.

In fact, not all religions consider abortion as a violation of their dogmas, as not all societies consider it to be an infraction of their legislation.

Thus, in various areas of the world, there are diverse opinions about abortion.

#### **4. Legislation**

Rodrigues Torres [2] presents a work comparing legislations of several nations in the twenty-first century. The picture he presents regarding abortion is as follows:

- A. prohibition of abortion, without exception: Malta;
- B. abortion allowed at the request of the woman, with a certain time of gestation (from 90 days to 24 weeks): the United Kingdom, The Netherlands, Sweden, Romania, Denmark, Latvia, Czech Republic, Slovakia, Greece, Hungary, Belgium, Bulgaria, France, Germany, Lithuania, Estonia Portugal, Slovenia, Austria, and Italy;
- C. abortion allowed because of life-threatening risk for pregnant women: the United Kingdom, Denmark, Sweden, Latvia, Poland, Slovenia, Austria, Czech Republic, Slovakia, Romania,

Cyprus, Greece, Hungary, Spain, Portugal, France, Germany, Lithuania, Estonia, and Luxembourg and Ireland (includes risk of suicide);

- D. abortion allowed due to risk of life for the pregnant woman, with some determined time of gestation: Holland and Finland;
- E. abortion allowed because of health risks for pregnant women: Denmark, Slovenia, Austria, Czech Republic, Slovakia, Romania, Cyprus, Hungary, Belgium, Italy, France, and Germany;
- F. abortion allowed because of risk to the health of the pregnant woman, with a certain gestation time (from 90 days to 28 weeks): Lithuania, Latvia, the Netherlands, the United Kingdom, Estonia, Ireland, Luxembourg, Portugal, Poland, and Spain;
- G. abortion allowed when pregnancy results from rape or other sex offenses, including: Romania, Cyprus, Greece, Germany, and Hungary;
- H. abortion allowed when the pregnancy results from rape or other sexual offenses with a certain period of gestation (from 90 days to 28 weeks): Denmark, Finland, France, Spain, Belgium, Poland, Italy, Luxembourg, Portugal, Lithuania, Estonia, Holland, and Latvia;
- I. abortion is permitted when there is poor fetal formation, without gestation time: the United Kingdom, Austria, Czech Republic, Slovakia, Romania, Cyprus, Hungary, France, Germany, and Bulgaria;
- J. abortion allowed when there is fetal malformation, with a certain time of gestation: Holland, Denmark, Sweden, Finland, Latvia, Estonia, and Luxembourg;
- K. abortion allowed for socioeconomic reasons with a certain time of gestation: Holland, Finland, Italy, France, and Luxembourg.

In this work, there is also a passage on the nations of Latin America:

Cuba, which in 1965, legalized abortion up to 12 weeks of gestation and maintains a lower abortion rate of 21 per 1000 women of reproductive age, 10 points below the regional average.

El Salvador, Nicaragua, and the Dominican Republic criminalized abortion and did not allow exception.

In Chile, the Constitutional Court, in August 2017, passed a law authorizing abortion in case of death risk of pregnant women, when the fetus is not viable and in cases of rape.

In Honduras, because of the Code of Medical Ethics, abortion is allowed to save the life of the pregnant woman.

Argentina, Costa Rica, Venezuela, Peru, and Paraguay admit abortion to save the life of women, and in Argentina, the permit also covers when women do not understand reality and in Venezuela to protect the honor of women and men.

Uruguay, Colombia, Ecuador, Bolivia, Mexico, Panama, and Guatemala admit abortion in cases of rape or incest, while Uruguay also allows for cases of economic distress and Colombia, Mexico, and Panama allow when fetal malformation occurs.

Brazil maintains that the criminalization of abortion is not punishable in case of rape or that there is no other way to save the life of the pregnant woman, and it is not considered a crime if the fetus is anencephalic.

Other countries where abortion is not allowed are Haiti, Suriname, Andorra, and the Vatican.

However, the internationally validated human rights system has already recognized that women have the right to freely determine the number of their children and the intervals between their births and to decide on their own bodies.

This exposition shows how the approach that the various nations give to the treatment to be offered for abortion varies. Different cultures have the same traits; others differ frontally.

## 5. Religion

Alongside the legislation of each country, there is a strong influence of the various religions in all cultures. It is calculated more than 3000 between sects and doctrines that have their dogmas and their peculiarities.

Catholicism as a religion was dominant for the first 1500 years in the Western world after Christ's presence on earth. In 1517, Martin Luther, a friar of the Order of St. Augustine, promoted a great movement breaking the unity of the Church. The Reform also addressed political and social aspects of conflict in Europe. In a major sense, the Reformation refers to other movements within the Catholic Church, such as that of Luther and that of Calvin in Switzerland, which originated the Evangelical Church and that of Henry VIII, in England from which the Anglican Church arose. These movements led to the Council of Trent, initiating a process of internal reform in the Catholic Church. Pope Francis in November 2016 extended to all priests the power to forgive the sin of abortion, which was only delegated to the bishops on a temporary basis. The pardon had already been authorized to all Catholic priests during the Year of Mercy, which ended on November 20 [2].

By Catholic doctrine, abortion means a serious sin punished with an automatic excommunication of those involved. Forgiveness can only be given by the priests who had this delegation of the Pope after a confession and repentance.

When one wants to analyze abortion by the religious eye, it is without doubt that the Catholic religion is the first to be observed and deserves the greatest attention. The Catholic Church is not the oldest, but it covers a period of approximately 2000 years and recounts the events of one of the oldest religious institutions in activity, influencing the world in spiritual, religious, moral, political, and socio-cultural aspects. The history of the Church is as follows:

Catholic is integral to the history of Christianity and the history of Western civilization [2].

The Catholic religion is spoken by the majority of the populations of the Latin nations in the world. Like others such as Anglican, Evangelical, Episcopal, Protestant, Lutheran or Calvinist,

and many other sects or doctrines that adopt Christianity, it considers that the human being has life from conception. The followers of this religion do not accept the practice of fully liberalized abortion, since they regard their practice as the death of the unborn child. As for the unborn child, it is necessary that his life be preserved from conception [2]. According to Catholics, life is inviolable from conception, that is, from the moment of fertilization, from the union of the male sperm with the female egg.

Christianity predominates in the societies of the Western world, and being the greatest religion among those who venerate Jesus, the Catholic has its center in the Vatican State, which makes it to be the only religion that has under its rule a nation: the Vatican directed by the Pope. Catholic followers do not accept any reason to interrupt gestation which makes them different from others that justify abortion at specific times. Catholics believe that if they do not commit sins in the passage they are to fulfill on earth, they will have eternal life in heaven as their reward.

For this, the Catholics must fulfill all the obligations of the dogmas and doctrine of the Church.

Most western countries call themselves laymen, but not everyone is able to allow abortion without restriction.

Unlike the Catholic religion that its followers spread without a concern of grouping, the followers of the Jewish religion approach to practice mutual aid. Thus, the marriage generally of the Jews takes place between members of the same religion. It is common for Jewish colonies to have institutions such as hospitals for health care and schools for teaching, obeying religious precepts. Therefore, alongside traces of the cultures of the societies in which they live, the followers of Judaism retain traces of the culture of their religion. In Judaism, it is considered that the fetus or the embryo does not have the condition of person before the birth. Within the Jewish population of the world, which can be considered an ethnic group, there are distinct ethnic divisions, the majority being the result of the geographical ramifications of the Israeli population, and subsequently of independent evolutions [2]. Ethnic divisions among Jews were divided into two major divisions: the Ashkenazi and Sephardic. These two groups are characterized by the locality of habitation. The Ashkenazi settle more in the Anglo-Germanic part of Europe. Sephardic seek to live on the Latin side, while the Mizrahim and the Teimanim or Yemenite are located in the eastern part of the world. As far as abortion in the Jewish religion is concerned, if the embryo or the fetus is a risk to a woman's health, abortion is permitted among Orthodox, Conservative, and Reformist groups. Among reformers, welfare (social and psychological conditions) can be considered for the approval of abortion [2]. According to the tradition of Maimonides, in the twelfth century, if the embryo is to jeopardize the woman's life, mental, and physical health, she may interrupt the pregnancy in self-defense, since the embryo would be considered an aggressor. However, the decision must be made with a rabbi [2]. It is important to emphasize that compared with Christianity the traditionalism of the Jewish religion does not allow the interruption of pregnancy to be an individual decision of the woman, but that this desire be accompanied by the permission of the rabbi who in his wisdom finds it moral and fair [2].

From the Buddhist point of view, abortion is considered murder. However, there may be several motivations for ending the pregnancy. If the motivation is a selfish unconcern, such

as not wanting to take care of a baby, it makes the act more serious in the eyes of Buddhism, because both the motivation and the act itself are destructive [2]. In Buddhism, motivation can also be positive. If the baby is greatly deformed or mentally deficient, then, wishing that the child avoids all future problems, abortion is not condemned because of the bodhisattva secondary vow given by all Buddhists if one does not avoid committing destructive action when motivation is positive. However, the ethics of the problem is still questionable. In another situation, in the case of risk to the mother during pregnancy, many factors and circumstances come into play to make a decision, it being defined that the karma consequent upon the decision will judge the individual in the next life depending on the circumstances of the abortion. In addition to causal motivations, Buddhist teachings dictate that contemporary motivation (what a certain individual thinks at the time of the abortion process) is also very important in justifying the act. In this way, it is fundamental for a Buddhist, who at the time of abortion, to have affectionate thoughts toward the baby [2]. Some Buddhist traditions perform ceremonies for the fetus. Supposedly, the performance of these ceremonies is extremely helpful to the "soul" of the mother. The fetus is named and prayed for their lives. The goal of Buddhists is to attain spiritual enhancement, the "nirvana" state of liberation from unhappiness and pain existing in the world, a spirituality of peace and happiness. Although there is no consensus in Buddhism on abortion, most of its followers consider a break from the precept of not taking life. Traditional Buddhist sources, such as the Buddhist monastic code, point out that the deliberate destruction of life is a serious breach of precepts. The current Dalai Lama considers abortion to be erroneous but believes there can be occasions to justify it [2]. Even when abortion is done to save a woman's life, it is almost always seen as causing suffering and negative karma.

The followers of Islam, although the Koran condemns the act of killing, are very much attached to a fanaticism to follow, for example, to war, in which they do not bother to die, with the idea that death brings them to the presence of Ala. This fanaticism has, in these times, reached the belief of guys that often burst bombs affixed in their bodies, in places crowded with people intending to commit acts of terrorism and without the concern of dying. The main cause of abortion condemnation among Muslims lies in historic roots [2]. The Bedouin peoples saw in infanticide and abortion a concern because of the need for men to equip armies for the desired expansion in Africa, Asia, and Europe. The attitude of these terrorists is reprehensible, therefore, that they are carried out in wars of conquest, including because the colonization of peoples by the Islamists was much more permissive than the European process in the Americas [2]. In the Islamic faith on the last day of mankind, the children will be witnesses against the parents who killed them. Issa refers to the children who would have been born and whose birth was interrupted [2]. Most followers of Islam consider abortion to be permitted up to 120 days from gestation when the fetus or embryo has a similar life condition to animals or plants, and for this reason, it is the maximum limit for the practice of abortion regardless of the fact which leads to it. In the case of women's risk of life, for Islam, it will be preferable to save the main life, that is, the life of the mother. If a pregnancy is accidentally interrupted, an indemnity must be paid to the father since through the accident the life of an embryo is lost. The value of the life of an embryo is different from the life of a fetus. If the pregnancy is interrupted before

the fifth month of gestation, 10% of the value of a life must be paid to the father, if it is then the value will be the total of a lifetime [2]. Abortion in Islam is permitted if there is an acceptable justification. There are, however, groups for which termination of pregnancy is unacceptable.

Hinduism is a religion that contains several gods that are venerated on diverse occasions and sites. However, in a general sense, it classifies abortion as an abominable act. It is a kind of union of beliefs with lifestyles. Their religious culture is the union of ethnic traditions. It is currently the third largest religion in the world by number of followers. It originates in approximately 3000 BC in ancient Vedic culture. Its followers respect old things and tradition, believe in sacred books, believe in deities, persist in the caste system, determine the status of every person in society, know the importance of rites, rely on spiritual guides, and believe in the existence of previous incarnations. The birth of a person within a caste is a result of the karma produced in past lives. Only the Brahmins belonging to the "superior" castes can perform the Hindu religious rituals and assume positions of authority within the temples [2]. Among the principal gods are Brahma who represents the creative force of the Universe; Ganesha, goddess of wisdom and luck; Matsya who saved the human species from destruction; Sarasvati, goddess of the arts and music; Shiva, the supreme god and creator of yoga; and Vishnu responsible for the maintenance of the Universe [2].

The Church of Jesus Christ of Latter-day Saints, the Mormons, does not advise abortion; on the contrary, it opposes. However, if it is to preserve the health of the woman or if the pregnancy is the result of rape, in this case to save the woman's spiritual health, the procedure is allowed by the President of the Church after consulting a doctor. The nicknames of Mormons were created by non-Church members to refer to members of the Latter-day Saints movement. The name comes from a considered sacred scripture book compiled by the ancient Mormon prophet, entitled *The Book of Mormon, Another Testament of Jesus Christ*. According to the official version of the church, the name given by the Lord, by which the members of the Church are to be known, is Latter-day Saints [2]. The doctrine of the church changed before the glorious day of the second coming of Jesus Christ including "of the last days" to designate the members of the church. The word Mormon originates in the *Book of Mormon*, a book compiled by the Mormon prophet, which was named after a place where the people of King Noah lived and which according to the Prophet Joseph Smith himself means simply "very good" [2]. The Mormons have their principal headquarters in the United States of North America where their first Church was formalized on April 6, 1830. The main center is located in Salt Lake City in the State of Utah; Mormons spread throughout the world on a missionary mission preaching Christianity and capturing new followers [7].

For followers of Protestant churches Baptist, Lutheran, Presbyterian, there is a range of attitudes toward abortion. In the religious doctrine of Protestants, there is a greater range of attitudes toward abortion than in the Catholic Church.

The great difference between Catholics and most Protestant churches is in respect for their mother's life. Thus, among Protestants, all agree that it is at the moment of conception that the mother acquires all the personal rights and rights attaching to motherhood, since she is in charge of gestating, caring, and feeding the embryo from the moment of its conception until



the moment of its birth. At the same time, it is necessary to see that the doctor has the primary duty to the mother, because she was the person who requested it. Thus, if a choice has to be made between the life of the mother and the life of the embryo or the fetus, the priority choice will always rest upon it, and so the doctor must decide, in the last analysis, when he can detach the mother from his responsibility in relation to the fetus. Protestant countries were the first in this century to adopt more liberal legislation on abortion [2].

The Anglican Church is considered by many to be Catholic because it does not adopt heresies in its statements of faith. But it is not "Roman," it is not subject to the Pope, nor does it adopt its particular dogmas and practices as: transubstantiation of the elements of the Eucharist; prayer for the dead; compulsory celibacy of parents; veneration of the virgin Mary and the canonized saints; immaculate conception of Mary; Mary's bodily assumption into heaven; the sacrifice of the mass; purgatory; infallibility of the pope; meritorious works for the salvation of the soul; the tradition with the same value of the Holy Scriptures; and others. As far as abortion is concerned, there is a permit that can be made, despite the fact that many followers of the Anglican Church oppose abortion [7].

Methodists admit abortion in special situations, that is, in case of rape or the health or life of the pregnant woman is in danger of life.

The Spiritists who follow Allan Kardec's book are opposed to abortion even in cases where the woman has been raped. They believe that malformed fetuses should be born because they lead parents to an ordeal that must pass through their lives [2].

The Universal Church of the Kingdom of God is a Christian, evangelical, neo-Pentecostal denomination based in the Temple of Solomon in the city of São Paulo, Brazil. Founded on July 9, 1977, by Edir Macedo, it became one of the largest Brazilian neo-Pentecostal groups. According to estimates, there are more than 6000 temples, 12,000 pastors, and 1.8 million faithful followers around the country. There are about 8 million followers and 15,000 pastors in 105 countries, being more popular in Portuguese-speaking nations. It is one of the largest religious organizations in Brazil and the 29th largest church in numbers of followers in the world [7]. In a public statement made more than 10 years ago, and recently reaffirmed, Pastor Macedo clarifies that he is in favor of women's right to choose and in this case in favor of abortion if it is the desire of the woman [2].

Jehovah's Witnesses are a Christian sect that has adherents in 240 countries and autonomous territories, with about 8 million practitioners, even though they congregate a greater number of sympathizers [2]. They are known for their regular and persistent work of preaching their principles and dogmas from house to house, on the streets, and in public places.

They worship exclusively the God who is presented in the Bible, calling him by the name Jehovah, and they are followers of Jesus, possessing a different concept from the other Christian groups that, for the most part, believe in the concept of a Triune God. They claim to follow biblically the instructions left by Jesus Christ, but reject the classification of being fundamentalists in the sense in which the term is commonly used. They seek to base all their practices and doctrines on the content of the Bible. Their organization is underpinned by financial donations provided by Jehovah's Witnesses worldwide. Voluntary donations are important but not vital to maintaining and expanding the number of witnesses who dedicate

their time in their educational work respecting the laws of each country, having legal representation, and are thus legally established as a nonprofit organization [2].

As far as abortion is concerned, there is no definitive positioning, since if they consider that interrupting life is a serious sin and that the fetus is a living being, they accept that the societies in which they are inserted have as correct and legal the established regarding the abortion [2].

Sex and sexual pleasure are accepted as desirable practice among those who follow Taoism and Confusion. This practice should be observed in moderation, which should also be considered in relation to reproduction and abortion as an acceptable resource. However, groups of Taoists aiming at preserving life adopt views contrary to abortion [2].

Other extant religions do not have many followers who may be involved in abortion either because they permit or restrict abortion.

Religions and beliefs are scattered throughout the world with evidence of a higher percentage of each of them in the various areas of the planet: the Catholic religion in South and the Center America and in the Latin countries of Europe; the Jewish religion in Israel and in all parts of the world; Protestantism in its different preaching in Europe in the Anglo-Germanic areas, as well as in the United States and Oceania. In Asia, the predominant religions are Buddhism, Islamism, and Hinduism more or less preaching about abortion.

From this summary analysis of family planning, there is no doubt that birth control is the process of choosing to avoid the growth of the population in order to meet the wishes of couples. In the occurrence of the failure of the proposed methods, abortion can only be used to avoid birth. However, abortion, despite being a safe and effective procedure, is under pressure from population groups motivated by what is established by law as well as by religious beliefs.

We need to focus on who wishes the pregnancy does not wish to abort it; who wishes to abort could not have or does not want the child; medicine is not contrary to abortion; nor the woman, nor the doctor are obligated to make the abortion; who decides for allowing the procedure is the society.

## 6. Final regards

In different societies of which the world is made of, there is a great disagreement that occurs in the legislation and what the beliefs are. That different considering the abortion happens innumerable opportunities in that same societies that on one side the abortion as prohibited by law, but in many others the church with its vast kinds of faith see abortion as inevitable. This differentiation of acceptance in the family planning, of birth control and artificial fertilization, still worth concerning ends up left aside as a minor issue.

The family planning, the birth control, and the artificial fertilization in almost all societies, especially the more modern, are habits comprehended and possible to appeal, whatever reason it is necessary.

These variations are due to, in fact, another point of cultural difference. It is a discussion about who decides if an artificial fertilization must be made or should look to an abortion. That usually occurs when the reason for the debate is whether the fetus is a human being.

Life is continuous, since its beginning the world never let it go. The discussion must rely upon the subject of when the biological being, product of a union of two living cells, the male gamete and the female, is considered a person. The conception consists in the union of two cells that multiply themselves building a conglomerate of cells that constitute a human being, which starts to be considered a person when it personalizes, meaning, when it acquires a life nonvegetative. There is nothing to mistake between a cell conglomerate and a human being. This is an ancient concern in studies, since Greece of Aristotle, we have been looking for an answer to that question. Without offering an answer, we can develop some thoughts.

The idea that from the ovule fertilization a new life emerges used to be predominant in scientific and ethical position if not accepted was not discussed. This concept led us through time, until it started to be polemic and led to ethical positions that presented contradictions and that modifies to attend the changes of technology and medicine in the human reproduction area and followed in whatever possible religious dogmas. The scientific evolution resulted in a changing in ethical position, not of those that were stuck to their religious dogmas, but to those others that considered a secular position.

The technological development of human fecundation extracorporeal, aiming at the possibility of transferring of embryo produced "in vitro" fertilization to the organism of a woman, led to a different ethical perspective.

Who should decide regarding the living being that is located in the uterus of the woman? A fundamental answer is to decide which procedure the family will use, whether that is artificial fertilization or the realization of the abortion.

The development of medicine in the example of the transplants and the possibility of human reproduction made by an assisted way brought, mainly, to those who considered life as something sacred a sensation of no safety with what was happening in this sector. Considering life as something holy, independent of the knowledge of doctors, had nothing to do with praying and waiting for divine solution.

The reflections prevent of the academics complemented with other layers of society that brought light to the knowledge acquired by different forms of coming to the philosophical, empirics, analogic, and scientific.

The defenders of the thesis of heteronomy considered a child as a new being, although, a result of the mother, she is detached from the conception moment. In that way, it is not up to the woman to decide for the abortion, which would be homicide of the newborn.

On the other side the thesis of autonomy, by autonomy it is understood that the right of the patient to be correctly informed of its health situation and which is the action offered by the doctor, as how which are the possibilities of final results expected and having the right to offer its acceptance or not. The autonomy is self-governing, the capability to decide what is considered

good and what to receive the best. The defenders of that thesis consider that the woman is the one who should decide for the birth control, for the family planning, and for the abortion.

From the heart of this discussion about virtues and truths and opinions about beliefs and laws, variables in diverse and different societies, it is hard if not impossible to arrive at an answer. It involves existing moral aspects.

In general, the conception driven away from laws and beliefs, the decisions should rely in the doctors' opinion because they should know, orient, and practice those processes, tied to the knowledge of science. Knowledge like these that in modern society belongs to doctors, independent of laws and of society's laws and religion. There is no doubt that the process of family planning is mutually related to birth control, and in artificial fertilization, it is being related to all those students of medicine in any area of the globe, such as the techniques of abortion. The same relates to ethical and moral aspects of medicine, that for legality reasons need to attach to the determination of legal standards in all countries, independent of their political position.

Of all ways, the final decision goes to the mother. There is no living human being that did not come from a mother, always biological, is real, being that uterus rented or borrowed, today known as belly for rent. The father not always is known; in different societies, many children do not know their father.

Until the beginning of the past century, the 1920s of the twentieth century, humanity did not have the real concern with population increase. There was room for everybody. It was after that time that Malthus' concerns appeared and medicine and science began to have a more emphasized point of view with population aspects in the globe. It was the beginning of the birth control and afterward a little more over half the century the first test-tube baby came to life, consolidating the artificial fertilization that is made in such a number that it is impossible of being recognized that the conception was made in a laboratory.

The first test-tube baby of the world was called Louise Brown and was born in July 25th of 1978, in Bristol, England. Living in England, she has two children that were born of natural birth. She has a sister, also brought to life in an artificial environment. Time has passed; with the successful attempt made in England, others were made throughout the world. Australia, in 1980, had its first successful attempt. In 1981, the first test-tube baby from the USA was born. In the following year in France a new test-tube baby was born. It was only in 1984 in Brazil, São José dos Pinhais, in Paraná 7th October came to life Anna Paula Caldeira. In 1986, it was Portugal the home land of a test-tube baby that played professional Football in his early years.

In the present, nothing more concerns the world that has seen much successful artificial fertilization with the birth of a new child came from three human beings, two women and a man, not only more than a father and a mother. And what is to come?

"The future belongs to god" some would say. Will they be right? It was believed by some that children were prevenient of a holy will and that no man could give birth without god's will.

According to different cultures, in which religious values are strong, doctrine, and dogmas of various existing religions, the beginning of life is given in the moment of the conception, meaning, in the union of the male spermatozoid with the female ovule. Others beliefs more liberal consider different and diverse occasions. Still in respect to considering when the

beginning of life is, there are some aspects to have in mind, and other theory defends that a personality of a person begins at birth.

This era of significance of reunions brought people of various positions to discussion about what society should accept. Today, these discussions are highly forgotten, and it seems that science overcame once again the beliefs, as it occurs when time passes.

Anyhow, still the problem of the beginning of life is not well stabilized. To many, the biological being prevention of the union of male and female gamete is considered when a person has fulfilled three conditions:

In the biological field in his relation to the environment he is going to live in.

In the social field in relation to the people with whom he is going to coexist.

In the spiritual field in relation to the supernatural of any institutionalized form of religious churches or any other, but oriented by one form of values that he will believe.

Others consider a person only when he has a civil register in the book of registers, with his name, place of birth, and date of birth.

Little attention was paid to the fact that many times this union occurs after innumerable attempts and tiring efforts made in the laboratory to achieve this goal. And more is to be considered with the new experience declared, how have the objective achieved, realized with the material that came from two women and a man.

In the past, the idea of a new life would initialize in the fecundation of the ovule, if spread through scientific ways and ethical if not, totally accepted and not discussed. It was the word of the religion that prevailed.

In many occasions, during these procedures of artificial fecundation, during transfers, large quantities of embryos may evolve. The technique predicts the reducing of embryos that will be discarded if frozen for a period of maximum 5 years, to be then eliminated. It brings up the question that this technique could be considered abortive at least to those who consider as a human being the embryo since its fecundation. Still the respect to consider when it is given the beginning of life is something to have in mind. Another theory defends that life occurs when the personality develops. That usually happens in the eastern world, in which the attention to the new being only concretes itself at birth.

The beginning of life is a concern that comes always to be discussed mainly in the religious perspective. Life since its first beginning never ceased to exist; the living beings die and are replaced by others, and so it has been for as long as we know. What is discussed is when a complex cause by the union of biological cells transform or is considered a person. This doubt comes also in the form of mythology from Asclepius, Aristotle, and Hippocrates, which is not solved until today.

The abortion in all of its religious and ethical aspects bring more difficulties in producing a unity of opinion in societies. In some, aborting is totally prohibited in others, the process is liberated; and between these two extremes, we found some that operate with some barriers.

Women's role in one culture is for sure relatively different in countries around the globe. In the eastern part of the world, the position of woman can sometimes go as high as being the

leader of the nation. Such event occurred in Brazil, Argentina, Germany, Chile, and others, as it is permitted by law. In other countries, the women are segregated from man in various activities such as being with her husband and her friends as well as it is prohibited to go to the beach with bikini. Some cultures ask for the women to cover the face at all times and some do not even allow them to drive cars.

The women's sexual aspect tends to vary as time changes and as society shapes it.

Between all aspects, the ones that are tied to the population's health are to be looked closely. The aspect of abortion regulation is a problem that shows a hard example for dialog building due to the fact that there are very opposite opinions. Values and aspects for dealing with sex and abortion by the health system point of view vary within society's ethical and legal standards. Anyway, the pattern of behavior shows that in many situations the ideal way to deal with the abortion is far from what is indeed done, breaking ethics, laws, and health protocols. The scenario shown allows us to interpret that countries with different religious aspects, geographical location, and political system do treat the abortion theme differently. The abortion as well as the artificial fertilization, family planning regulation, is much more a socio-political aspect of life than scientific, even though the risk of an intervention is very low.

What we can learn going through history is that abortion legalized or prohibited according to its cultural aspects is always a practice within the society. Legislation of all countries has gone in different ways following the scientific and social founding. Basically, two different positions are very evident.

One of this positions deny the possibility of the realization of the abortion process in any condition, usually tied to the catholic followers, and of others that consider that the life of a person starts in the conception, that being, when the sperm meets the ovule. It is a position defended by other churches and religious groups that say that life starts before the act of being born as the Islam and Judaism say. Others consider that life starts when the person is born, when the biological has in society a social position as a person. The different beliefs tend to alter the human being's positions. It is not a matter of criticizing but to respect. Anyhow, it is important to quote that Gafo, Spanish catholic priest, in his writings shows a different approach using the bible saying that it does not condemn abortion explicitly.

Another position is the one of acceptance of the abortion process, with or without some regulation. It is without a doubt the biggest position in the world. The abortion made with a justifiable argument does not face any kind of punishment. The variations occur in types of justifications accepted and go from the very rigorous to almost stopping the realization. The most accepted justifications are the abortions that are called therapeutic in which the life of the pregnant woman is in danger, whereas the eugenic abortions are made when the fetus shows anomalies. Apart from these cases, the other reason is that the pregnancy is a result of rape or an incestuous relation.

These justifications are based on defending the woman's health. Justifications for social reasons are not remembered, but by those, innumerable women are led into making an abortion in an illicit way.

As for the abortion, the doctor has almost always the same concern to, varying very little from society to society, what concerns are the religious belief and the local legislation in which the Hippocrates oath is sworn. In this oath, made by Apollo the doctor, Asclepius, Hygeia, and Panacea, it is said that one shall never give abortion substances to his/her patients. The fundamental is not to suffer any problems with the local legislation.

Women, on the other hand, besides having the legislation concern, that in some countries can led to death penalty also have the religious concern. The doctor makes the procedure when searched by a patient because it is his duty. The woman looks for it for many reasons. The main and most frequent reason that leads a woman into this path is rape, known internationally as a valid and justifiable reason and legal in many countries. Other reasons are the therapeutic reason, the eugenic, and the incestuous. Women claim the abortion justification in many reasons, especially when the presence of fetus with anomalies in formation is noted, which leads them into a small life after birth. This last point exemplifies well the important fact for quality of life: which life quality that a very poor women can provide for a child that was abandoned by his dad or kicked out of her house by the family? Unfortunately, these aspects are usually not accounted.

The abortion liberation finds its support in the autonomy right. The woman desires, the protection of the female health, the condition of the family, the consent or not of the partner are reasons for which the abortion is made. All humans should be responsible and able to decide for themselves regardless of which reason justifies this action. This choice between the woman and the doctor should not be made under the black market.

The woman who is openly informed of the risks submits herself to this kind of procedure and decides what is best in a transparent way; scientific medicine is considered the best at maximum 12 weeks for the process to be made.

The problem of abortion is to be considered the most important aspect of family planning, artificial fertilization, and birth control, which are of less resistance in other societies.

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# Male Contraceptives

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Eka Rusdianto Gunardi and Yohanes Handoko

Additional information is available at the end of the chapter

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## Abstract

**Background:** The world's population has been growing exponentially, however, currently the choices for male contraception are limited. This review explores ongoing researches on male contraceptives.

**Method:** A literature search was conducted on PubMed, Cochrane, and Google Scholar on March 2015.

**Results:** There are 15 research done on non-hormonal male contraceptives, 2 of which are already widely used and the other 2 are undergoing clinical trials. Hormonal contraceptives are provided in two regiments, testosterone alone, and testosterone with progestins. Currently, no hormonal contraceptives are available for men.

**Conclusion:** There are a variety of possible methods for male contraception. Non-hormonal methods, such as RISUG and Gandarusa are sent through clinical trials, and may be available in the near future. There are still no hormonal contraceptives for men that are ready for use.

**Keywords:** male contraception, hormonal contraceptives, non-hormonal contraceptives

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## 1. Introduction

The world's population has been growing exponentially in the recent decades is expected to reach 9 billion in 2050. Considering the current difficulties in managing health and poverty, contraception is becoming increasingly important [1, 2].

Contraception is the intentional prevention of conception or pregnancy by various methods; barrier methods, hormonal contraception, intrauterine devices, sterilization and behavioral methods. Of these methods, only two are available for men, the male condom (barrier), and vasectomy (sterilization). The male condom is an effective method of contraception with the added benefit of prevention of STIs, however relies on discipline and availability of the

condom at the time of intercourse. A vasectomy doesn't depend on the occurrence of intercourse, but has poor reversibility rates and is therefore not ideal for men who still plan on having children [1, 3–5].

Long term, reversible male contraceptives are currently being developed. Male contraceptives are aimed to interfere with normal spermatogenesis, or motility, orientation, and binding to ovum. This paper reviews previous studies on male contraceptives to give a general picture of the possibilities and current available methods.

## 2. Methods

A literature search was conducted on PubMed in March 2015 with the search terms male AND contraceptives\* and male AND infertility\* between 2010 and 2015. Titles and abstracts were manually scanned by one researcher and those related to male contraceptives were chosen. When information was found to be lacking, more searches were done with specific terms and no time limit, for example "CDB 4022".

Further searches were done on Google Scholar with Indonesian terms "kontrasepsi pria" and results were once again manually searched for articles related to male contraception. All searches were limited to articles that were available for free.

## 3. Results

### 3.1. Spermatogenesis

Spermatogenesis is the formation of sperm from primordial germ cells. At puberty, spermatogenic germ cells (spermatogonia) produce BMP8B which cause the germ cells to differentiate. Spermatogonia are attached to Sertoli cells, which nourish and protect the cells as they undergo spermatogenesis [6].

Spermatogonia undergo several divisions and forms various forms of Spermatogonia A, intermediate spermatogonia and spermatogonia B. Spermatogonia A1 are stem cells and can continue to divide into more spermatogonia, thus spermatogenesis occurs continuously. Spermatogonia B divides into primary spermatocytes, which undergoes meiotic divisions to form round, haploid cells known as spermatids [6].

Spermatids then go through spermiogenesis to form mature sperm. During spermiogenesis, Golgi apparatus forms the acrosome that caps the nucleus. Flagellum is formed on the opposite side of the nucleus. The nucleus itself is condensed, and mitochondria forms a ring at the base of the tail. Once all of these changes have taken place, mature spermatozoa is released into the lumen, a process called spermiation [6].

In humans the process from spermatogonia to spermatozoa takes up to 65 days. About 100 million sperm are produced every day, and each ejaculation contains up to 200 million sperm. Each day, some 100 million sperm are made in each human testicle, and each ejaculation releases 200 million sperm. Unused sperm are either resorbed or passed out of the body in urine [6].

### 3.2. Nonhormonal contraceptive

Nonhormonal male contraception targets sperm production, maturation and/or function, without interrupting the hormonal pathway. Many nonhormonal targets in the spermatogenesis and fertilization process has been identified, and contraceptive opportunities have been tested and implemented [7].

#### 3.2.1. Condoms

Condoms prevent pregnancies by blocking the path of semen into the cervix. With correct use, the efficacy is 97%, with the added benefit of prevention against STIs and HIV. However with typical use, failure rates are as high as 12%. The correct use of condom refers to application of condom before vaginal penetration, preferably before any penile-vaginal contact. On application, the tip of the condom must be pressed to release trapped air and consequently provide space for semen [7].

Drawbacks of this method apart from its failure rates are latex allergies, possibility of breakage, and decreased pleasure for some couples [7].

#### 3.2.2. Vasectomy

Vasectomy is a procedure in which the vas deferens are divided and ligated so as to prevent flow of sperm from testis. This is an outpatient procedure, conducted with local anesthesia with minimal side effects. Following vasectomies, pregnancy rates drop to below 1%. However reversibility rates after vasectomy is less than 50%. There is no effect on libido [7].

#### 3.2.3. Reversible inhibition of sperm under guidance (RISUG)

RISUG is a method of contraception directed at destruction of sperm as it passes through the vas deferens. RISUG is applied by injection of steric maleic anhydride (SMA) and dimethyl sulfoxide (DMSO) into the vas deferens. Within the next 72 h, RISUG forms electrically charged precipitates in the lumen, with positive charges dominating [7]. This forms an acidic environment. The precipitate then layers the lumen wall, implanting themselves on the microfolds on the vas deferens' inner walls. Sperm that pass through the RISUG injected vas deferens, suffer ionic and pH stress, causing acrosomal damage, rendering them unable to fertilize oocytes [5, 8]. Studies so far have shown RISUG to be 100% effective. Because of the time needed for action, however, condom use is suggested in the first 10 days after injection [8].

RISUG can be flushed out with intravasal injections of sodium bicarbonate, which will reverse its infertility effects, as has been shown in mice [9]. Reversibility testing in humans has not been performed.

There has been no serious side effect within 10 years after RISUG injections in humans. Scrotal swelling may occur after injection, but resolves on its own. A study that studied RISUG's side effects on the prostate found that there was no increased risk of developing prostatic diseases even after a period of 8 years [9].

Smart RISUG [9] comprises of iron oxide-copper-styrene maleic anhydride-dimethyl sulfoxide ( $\text{Fe}_3\text{O}_4\text{-Cu-SMA-DMSO}$ ), and has been shown to give better spermicidal action in vitro and in vivo in rats. Copper has been known to displace molecules such as zinc from sperm membrane, decreasing their potential to fertilize. Studies need to be conducted on toxicity of this new drug before application on humans [9].

#### 3.2.4. *Ultrasound*

Application of low intensity ultrasound to the scrotum can elevate tissue temperatures in the testes [10, 11]. Spermatogenesis cannot occur in body temperature, which is why the human testes is suspended in the scrotal sack with a network of blood vessels to allow for cooling. Studies show that heat stress on the testes lead to apoptosis of germ cells [12]. In the past, local application of heat to the testes, such as immersing in a hot baths, has been used as a method of contraception [1].

Experiments on monkeys have shown that ultrasound exposure to the scrotum was 93% effective in inducing azoospermia in 1–2 weeks with sperm counts rebounding to normal after 7 weeks [11]. Intensity of ultrasound required to cause infertility depended on testes size [10, 11]. Heat treatment during therapy by dipping scrotum in 37C water or saline increased ultrasound potential as seen in rats and monkeys [10]. There are no side effects noted in ultrasound treatments, however there is concern that heat treatment may cause DNA damage in consecutive sperm productions [10, 11].

#### 3.2.5. *Vaccines*

Contraceptive vaccines are developed under the concept of targeting sperm specific antigens [1, 13]. Vaccination with these sperm antigens (recombinant/synthetic peptide/DNA) has been found to cause reversible contraceptive effects in animals through formation of systemic and local antisperm antibody responses. The sperm antigens which have been examined for contraceptive effect include: FA-1, YLP12, LDH-C4, P10G, A9D, SP56, 80 kDaHSA, Eppin, and Izumo. There has been no contraceptive vaccine tested on men [13, 14].

Eppin is a protein secreted by the epididymis for sperm maturation [1, 14]. It is found on sperm surface and aids in fertilization. The vaccinated subjects produce antibodies against Eppin molecules, thus impairing sperm maturation and its capability to fertilize [13, 14].

An in vivo study of Eppin in monkeys resulted in 78% of the monkeys becoming infertile. Seventy one percent of them regained fertility after 450 days. Adjuvants were required every 3 months to maintain antibody levels. Studies are being conducted to improve safety, efficacy and reversibility before application in humans [14]. So far, no other in vivo studies have been conducted on other contraceptive vaccines.

#### 3.2.6. *Indenopyridines*

CDB-4022, an indenopyridine is being studied as a potential oral contraceptive for men [15]. This compound was found to affect sertoli and germ cells, causing alterations in sertoli-germ

cell junctions and causing apoptosis of germ cells in rats. It causes irreversible azoospermia in rats, but reversible oligospermia in monkeys. There are no changes to serum LH and Testosterone levels, but increased levels of FSH attributed to reduction of inhibin B caused by destruction of germ cells [15]. There were no toxicities noted. Efficacy and reversibility are missing on literature.

### 3.2.7. *Adjudin*

Adjudin is derived from an anticancer drug, lonidamine. Lonidamine was found to be anti-spermatogenic, thus causing infertility. However, it also caused several side effects such as muscular pain, testicular pain, and liver damage. To attain the anti-fertility functions without the toxicity, Adjudin was developed. Adjudin targets adherence junctions between Sertoli cells and spermatids, causing early spermiation. One hundred percent infertility was achieved 5 weeks after administration of adjudin and fertility returned 11 weeks after treatment. Serum testosterone, FSH and LH remained normal, however, liver and skeletal muscle atrophy occurred in one third of the rats. To overcome this, adjudin was administered with an FSH mutant, which successfully bypassed the liver and muscle effects. Unfortunately, this made adjudin too costly as a contraceptive [16].

A study was conducted by Wang et al. [17] to assess the possibility of adjudin to be as a spermicide. In vitro evaluation showed that adjudin was found to significantly limit sperm motility and viability by targeting sperm mitochondria [17].

### 3.2.8. *Gamendazole*

Gamendazole is also derived from ionidamine, and causes infertility by targeting Sertoli cells [18, 19]. A study in rats showed that administration of a single dose of gamendazole resulted in 100% infertility 4 weeks post treatment, however, reversibility was only 57%. At half the dose, only 67% infertility was achieved, albeit with 100% reversibility. There were no changes in LH and testosterone levels, but a slight transient increase in FSH was observed due to depletion of inhibin B. There were no noticeable side effects, however at there was 60% mortality in rats given 200 mg/kg gamendazole, but not at any lower dose. Another option being investigated is administration of daily gamendazole at 1 mg/kg to achieve 100% infertility with 100% reversibility. Human trials are still pending [18–20].

### 3.2.9. *Calcium channel blockers (CCBs)*

Calcium is required for sperm motility, capacitation and acrosome reactions. Uptake of calcium is facilitated by calcium channels on sperm membranes. Calcium channel blockers inhibit calcium influx into sperm cell and thus impair fertility. Although there are many CCBs available, none has been tested as contraceptives because of the impracticality of using antihypertensive agents as contraceptives.

Calcium entry into sperm is also facilitated by transmembrane CATSPER channels which exist primarily in the testis. Blockade of CATSPER channels is a plausible mechanism for contraceptives, however as of today, there are still no known antagonists [21].

### 3.2.10. Retinoic acid inhibitor

Vitamin A is crucial for normal spermatogenesis. It is transported as retinol and synthesized into retinoic acid in the testis. Retinoic acid works through Retinoic Acid Receptors (RAR) on Sertoli cells. Retinoic acid inhibition and retinoic acid receptor blockers inhibit spermatogenesis and are easily reversed [22–26].

WIN 18,446 inhibits testicular retinoic acid biosynthesis through inhibition of aldehyde dehydrogenase 1A2 in vitro in humans. Administration of WIN 18,446 in dogs and monkeys have been found to induce azoospermia. Testicular biopsies show complete arrest of spermatogenesis [22, 25]. In the 1960s, administrations of oral WIN 18,446 in men have shown adequate contraceptive effects. These effects were completely reversible upon cessation of treatment. Reduced testicular volume was observed, but serum testosterone remained unchanged [26].

WIN 18,446 caused no liver or kidney toxicities. However when men taking WIN 18,446 consumed alcohol, they develop a “disulfiram reaction,” which consists of nausea, vomiting, palpitations and sweating. This is because inhibition of aldehyde dehydrogenase 1A2 interferes in the metabolism of alcohol [25, 26]. Studies are being conducted to find a compound which inhibits retinoic acid synthesis without affecting alcohol metabolism [26].

### 3.2.11. Retinoic acid receptor antagonists

BMS-189453 is a synthetic retinoic acid receptor antagonist. It binds to retinoic acid receptors (RARs) but do not activate them. The testis and epididymis, especially sertoli cells are rich in RARs. Introducing a RAR antagonist was found to induce the same effects as Vitamin A deficiency in terms of apoptosis of germ cells and inhibition of spermatogenesis [23, 24].

A research done with low dose BMS-189453 on mice fertility showed 100% efficacy in inducing azoospermia. This is followed by 100% reversibility after 4 weeks of stopping treatment. Toxicity analysis showed no hematology or blood chemistry abnormalities, and tissue pathology was isolated to the testis, where there is failure of spermatogenesis, spermatid alignment, and sloughing of germ cells [24].

### 3.2.12. Gandarusa

Gandarusa is derived from the plant *Justicia gendarussa* [27, 28], which has been used by many tribes in eastern Indonesia as a contraceptive medicine. The roots and leaves are boiled in water and the water is then consumed twice a month to elicit contraceptive effects. This plant is also used as herbal medication for pain and inflammation. Gandarusa has since been standardized and is now available in pill form [27].

Gandarusa was found to affect spermatogenesis in rats as well as human. The proposed mechanism of Gandarusa is weakening of the sperm’s hyaluronidase activities required for penetration of sperm into ovum, thus preventing fertilization [27]. Animal studies have shown no liver or kidney toxicities [28]. This drug is currently undergoing phase III clinical trials. There is no available data on efficacy of gandarusa as a contraceptive in humans, as well as reversibility rates and effects on libido.

### 3.2.13. *Gossypol*

Gossypol is found in cotton plant genus *Gossypium* [1, 29]. In 1972, a research on the effects of gossypol on 10,000 men were observed. Gossypol was found to be 99.07% effective as a contraceptive. Gossypol has been reported to interfere in hypothalamus-pituitary axis, disrupt spermatogenesis and reduce sperm motility. In 1996, a study on the effects of gossypol in vitro found that Gossypol decreases sperm motility by inhibiting cAMP production. There are no noted side effects. However, reversibility rates are only 80% [29].

## 3.3. Hormonal contraceptives

The gist of hormonal contraception in men is altering the hormonal pathway so that spermatogenesis does not occur. Gonadotropin releasing hormone (GnRH) from the hypothalamus stimulates the release of luteinizing hormone (LH) and follicle stimulating hormone (FSH) from the pituitary. FSH stimulates sertoli cells to begin spermatogenesis, while LH stimulates Leydig cells to produce testosterone. Testosterone then provides negative feedback to hypothalamus and pituitary, suppressing their activity and subsequently its own production [4].

Male hormonal contraception focuses on suppressing hypothalamus and the pituitary action to inhibit spermatogenesis. This has been done by provision of testosterone alone as well as testosterone and progestins [4].

### 3.3.1. *Testosterone alone*

Oral preparations of testosterone that are safe for consumption are not readily available. Long-acting injections and implants are being developed as alternatives. Testosterone gel and patches are in development, however, they are costly and require frequent application thus making them unaffordable as a commercial contraceptive [30].

Common side effects of testosterone are acne, oily skin, mood changes, increased hemoglobin, weight gain, decreased testicular volume, gynecomastia, and dyslipidemia. Long term effects of testosterone supplementation on the prostate are still unclear. Other considerations in using testosterone preparations are the possible misuse as anabolic steroids [3].

#### 3.3.1.1. *Testosterone enanthate (TE)*

TE is a long acting preparation that requires weekly administration through intramuscular injections [31]. In a study by WHO, azoospermia is achieved by an average of 3 months in 70% of men receiving 200 mg TE weekly. Once azoospermia is reached, TE can be effectively used alone as a contraceptive; with 0.8% failure rate. Reversibility is 100% within an average of 4 months after discontinuation. Side effects of TE were reductions in HDL levels and testicular volumes, albeit reversible after cessation of use.

This method has a few drawbacks. First, not all men receiving this therapy will become azospermic. Second, weekly injections are required. Third, there were worrying side effects regarding to HDL levels and testicular volume. Finally, it requires 3–7 months to achieve azoospermia, therefore requiring another form of contraceptive until azoospermia is achieved.

### 3.3.1.2. Testosterone undecanoate (TU)

TU is formulated in long acting depot preparations with a half-life of 70 days that can be administered intramuscularly in intervals of 4–8 weeks [3]. A clinical trial in China reported that 95% of test subjects achieved azoospermia, defined as sperm concentration < 1 million per milliliter. Pregnancy rates were at 1.1%. Sperm count was reversed after 15 months of stopping therapy. A European clinical trial by WHO produced similar results. However, trials were stopped due to reports of side effects such as mood swings.

### 3.3.1.3. 7 $\alpha$ -Methyl-19-nortestosterone (MENT)

MENT is a synthetic androgen five times more potent than testosterone [3, 31]. MENT was developed to replace testosterone for contraceptive use because of the large amount of testosterone required to achieve long term infertility. Also because it is resistant to 5 $\alpha$ -reductase, there is less prostate stimulation. However, substituting testosterone with MENT led to a decrease in bone density.

MENT has been introduced in implant form as a contraceptive and has been found to cause azoospermia in two thirds of men receiving it. To improve its efficacy researchers combined it with etonogestrel implants and levonorgestrel implants. Results were the same as with MENT alone. In addition, men receiving MENT and etonogestrel experienced loss of libido. Research are continuously being conducted on a form of dosing that will attain a higher rate of azoospermia with minimal side effects.

### 3.3.2. Combination therapy

Exogenous progestins combined with testosterone provide better suppression of gonadotropins, thus more effective at producing azoospermia at lower doses [3]. There has been several researches combining various progestins with androgens for male contraceptive. Among them are:

- Depot medroxyprogesterone acetate (DMPA) + TE (efficacy 98%) [3].
- Antiandrogenic Progestogen Cyproterone Acetate (CPA) + TE [3].
- Androgenic progestin Norethisterone (NET) + TU (efficacy 92%) [3].
- Oral Levonorgestrel (LNG) + testosterone patches (efficacy < 60%) [3].
- LNG + TE (efficacy 93%) [3].
- Synthetic progestin Desogestrel (DSG) + TE (efficacy 100%) [3].
- MENT implant + Jadelle implant (efficacy < 60%) [31].

Data on reversibility, effect on libido of these tested regiments were not found on the literature.



## 4. Discussion

In the past, male contraceptives have been acknowledged. There are few commonly applied methods of male contraception such as local application of heat, consumption of herbal medicines, coitus interruptus, vasectomy, and male condoms. Each of these methods has had drawbacks that cause them to only be used by a minority of the population. Heat application and herbal medicines lack evidence of overall efficacy. Coitus interruptus has a 12% failure rate even when practiced correctly. Condoms depend a lot on correct use, and are rendered useless in the case of breakage. Vasectomy has less than 50% reversal rates. There is still no long term, reversible contraceptive available for men.

Method	Efficacy	Mechanism	Effect on libido	Reversibility	Side effects	Additional information
Condom	97%	Forms barrier to prevent sperm from entering female reproductive tract (FRT)	No effect	100%	Possible latex allergy in 3% of men, decreased sexual pleasure	Highly effective in preventing STI
Vasectomy	99%	Occlusion of vas deferens to prevent sperm from being ejaculated in semen	No effect	50%	Scrotal pain	
Ultrasound	93%	Produces thermal effect on testes	No effect	100% after 7 weeks	No side effects	Intensity and duration of ultrasound depends on size of testes  There are risks of DNA damage in heat treated testes
Indenopyridines	-	CDB-4022 appears to target the Sertoli cell, disrupting germ cell-sertoli time	-	-	Increased FSH	
Adjudin	100%	Adjudin affects fertility by disrupting Sertoli-germ cell junctions, and once this occurs, germ cells slough the seminiferous epithelium prematurely	No changes in testosterone, LH, or FSH	100%	Muscle atrophy and liver inflammation	Adjudin + FSH mutant bypasses liver and muscle atrophy, but is costly
RISUG	100%	Injection of RISUG into vas deferens to destroy sperm ability to fertilize	No effect	100% in monkeys and langurs	No side effects. Reversible scrotal edema may occur after injection	Phase III clinical trial (safety and efficacy on humans established)

Method	Efficacy	Mechanism	Effect on libido	Reversibility	Side effects	Additional information
Calcium Channel Blocker	–	Blocks Ca <sup>++</sup> influx into sperm and affects sperm membrane cholesterol, thereby compromising fertility	–	–	–	CCBs have never been tested as contraceptives
Gamendazole	100% after 4 weeks	Affects sertoli cells	No effect	57% after 11 weeks	No side effects	Causes death in rats at doses 200 mg/kg
WIN 18,446	100%	Suppresses spermatogenesis by inhibiting testicular retinoic acid biosynthesis	No effect	100%	“Disulfiram” effect upon consumption of alcohol	Nausea, vomiting, palpitation when drinking alcohol
BMS 189453	100%	Causes marked testicular degeneration	No effect	100%	No side effects	
Gossypol	99.07%	Decreases sperm motility by inhibiting cAMP production	Not mentioned	80%	No side effects	Research conducted in Chinese men
Gandarusa	–	–	–	–	–	Undergoing clinical trials

Cited from: Blithe [30].

**Table 1.** Non-hormonal contraceptives.

Method	Efficacy	Mechanism	Effect on libido	Reversibility	Side effects	Additional information
Testosterone Enanthate	70%	Suppresses gonadotropin production	No effect	100%	Reduced testicular volume and HDL level	
Testosterone undecanoate	95%	Suppresses gonadotropin production	No effect	100%	Mood swings	
Testosterone gel		Suppresses gonadotropin production through increase of testicular testosterone	No effect	100%	–	Expensive
Testosterone + Progestogen	Variable	Suppresses gonadotropin production	–	100%	–	

Cited from: Blithe [30].

**Table 2.** Hormonal contraceptives.

Considering numerous hormonal contraceptive methods available for women, hormonal pathways have been studied to develop an effective and safe male contraceptive. Disappointingly, no hormonal regiments have yet been approved for contraceptive use.

Non hormonal contraceptives have shown more promise. RISUG and Gandarusa are undergoing relatively successful clinical trials in terms of efficacy and safety [7]. RISUG requires only a single injection, which has maintained infertility for up to 10 years now. Reversibility also requires only a single injection, but has yet to be tested on humans. Gandarusa is available in pill form, giving men the choice to be an oral contraceptives. The success of these agents, however, depends largely on the men's willingness to take responsibility for family planning.

A review on male contraceptives shares the same conclusion that despite the expression of interest and tremendous advances in research however, a modern male hormonal contraceptive method has remained an elusive goal. Testosterone (T) alone, or in combination with a progestin currently provides the most promising lead to male hormonal contraception. The principle relies on enhanced negative feedback of exogenous T to suppress gonadotropins, thereby blocking the endocrine stimulus for the process of spermatogenesis. A serious drawback is the inconsistent suppression among men of different ethnic backgrounds. This has increased the quest for development to include other nonhormonal methods. In reality many obstacles still have to be overcome before an acceptable method is available [32].

To conclude, there are a variety of possible methods for male contraception. Non-hormonal methods RISUG and Gandarusa are undergoing clinical trials, and may be available in the near future. There are still no hormonal contraceptive ready to use for men (**Tables 1 and 2**).

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Women with unmet need for family planning are those who are fecund but are not using any method of contraception, not wanting any more children, or wanting to delay the next pregnancy. This notion points to the gap between women's reproductive intentions and their contraceptive behavior.

The need for contraception remains too high. This circumstance is made worse by both a growing population and a shortage of family planning services. It is important that family planning is widely available and easily accessible.

This book is intended as an aid to substance that all health workers interested in becoming more effective practitioners will consult on many occasions during their clinical practice. It provides views that the readers can test their experiences against. It presents sound and clear advice on some of the most practical guidance applicable to family planning.

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