Federal University of Pelotas
Medical School
Department of Social Medicine
Postgraduate Program of Epidemiology

PhD Thesis

PATHWAYS TO UNIVERSAL ACCESS TO SEXUAL AND REPRODUCTIVE HEALTH CARE IN LOW- AND MIDDLE-INCOME COUNTRIES

Franciele Hellwig

Supervisor: Prof. Aluísio J. D. Barros

Pelotas, RS

2022

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FRANCIELE HELLWIG

PATHWAYS TO UNIVERSAL ACCESS TO SEXUAL AND REPRODUCTIVE HEALTH CARE IN LOW- AND MIDDLE-INCOME COUNTRIES

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To my family.

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“Μουνογενὴς δὲ πάις εἴη πατρώιον οἶκον
φερβέμεν· ὣς γὰρ πλοῦτος ἀέξεται ἐν μεγάροισιν·
Γηραιὸς δὲ θάνοις ἕτερον παῖδ' ἐγκαταλείπων.
ῥεῖα δέ κεν πλεόνεσσι πόροι Ζεὺς ἄσπετον ὄλβον·
Πλείων μὲν πλεόνων μελέτη, μείζων δ' ἐπιθήκη.” [1]

Hesiodi, Ἔργα καὶ ἡμέραι

[1] *“There should be an only son, to feed his father's house, for so wealth will increase in the home; but if you leave a second son you should die old. Yet Zeus can easily give great wealth to a greater number. More hands mean more work and more increase.”* (Hesíodo, Works and Days, 8th century B.C.)

Resumo

Hellwig, Franciele. **Pathways to universal access to sexual and reproductive health care in low- and middle-income countries**. Tese de doutorado. Programa de Pós-graduação em Epidemiologia. Universidade Federal de Pelotas; 2022.

O acesso universal aos serviços de saúde sexual e reprodutiva é fundamental para uma melhor qualidade de vida, estando presente em dois dos Objetivos de Desenvolvimento Sustentável: seja no objetivo três, boa saúde e bem-estar; seja no objetivo cinco, equidade de gênero. Durante os últimos 40 anos, vários países conseguiram aumentar a cobertura de serviços de planejamento familiar. No entanto diferentes níveis de progresso foram identificados. Vários países de baixa renda ainda apresentam baixos níveis de demanda por planejamento familiar satisfeita e, em diversos outros, uma grande parte dessa demanda foi satisfeita com métodos permanentes. Nosso primeiro objetivo foi estimar a proporção de esterilização feminina entre as mulheres com demanda por planejamento familiar satisfeita, bem como avaliar os padrões de desigualdades de acordo com nível de riqueza, idade e número de filhos vivos, considerando também a interseccionalidade entre idade e número de filhos. Nossos resultados indicam que em 20 dos 105 países analisados, 25% ou mais das usuárias de métodos contraceptivos modernos eram esterilizadas, especialmente na Índia, onde 79% da demanda por planejamento familiar foi satisfeita por esterilização feminina. Foi identificada na Índia, na República Dominicana, em El Salvador e no México alta proporção de esterilização feminina entre mulheres com menos de 30 anos. Esta alta proporção foi igualmente identificada entre mulheres com menos de dois filhos vivos, na Índia e em Tonga. No segundo artigo, nosso objetivo foi explorar diferenças na fonte de serviços de planejamento familiar de acordo com a idade da mulher e o seu estado civil. Nossos resultados indicam que a demanda por planejamento familiar satisfeita por métodos modernos ainda é menor entre adolescentes do que entre mulheres adultas, especialmente entre adolescentes não casadas. Uma menor proporção de uso de serviços públicos também foi identificada entre adolescentes. O setor público foi uma fonte ainda menos usada por adolescentes não casadas, para as quais o setor privado foi a principal fonte de serviços de planejamento familiar. Enquanto uma proporção mínima das mulheres adultas recebeu contraceptivos de amigos, familiares ou redistribuição, identificamos que tais fontes foram significativas entre as adolescentes não casadas. O nosso último objetivo foi investigar países que fizeram progressos notáveis na satisfação da demanda por planejamento familiar, explorando mudanças no mix de métodos contraceptivos usados e nos respectivos contextos sociais, por meio de medidas agregadas de pobreza e desigualdade de gênero. Nesta análise, identificamos que nos

seis países incluídos, o aumento na demanda por planejamento familiar satisfeita foi acompanhado de reduções tanto na pobreza quanto na desigualdade de gênero. De acordo com nível de riqueza, idade e educação da mulher, os seis países reduziram as desigualdades na cobertura, com um aumento notável entre as mulheres em situação de maior vulnerabilidade. Quanto às estratégias implementadas nesses países, identificamos que a maioria envolveu a inclusão dos serviços de planejamento familiar em serviços de atenção primária, o fornecimento de diferentes tipos de métodos contraceptivos e a promoção de treinamento dos trabalhadores de saúde. Apesar do aumento no nível de demanda por planejamento familiar satisfeita nas últimas décadas, ainda há muito a ser feito para alcançar cobertura universal de serviços de planejamento familiar de qualidade. Conjuntamente, nossos resultados indicam que alguns aspectos foram centrais para o alto nível de cobertura observado em alguns países, como a disponibilidade de uma ampla variedade de métodos e a capacitação dos provedores para atender sem qualquer forma de discriminação as diferentes necessidades de mulheres de diferentes contextos e com diferentes anseios.

Palavras-chave: planejamento familiar, cobertura universal de saúde, equidade em saúde, países de baixa e média renda, inquéritos nacionais de saúde.

Abstract

Hellwig, Franciele. **Pathways to universal access to sexual and reproductive health care in low- and middle-income countries**. Thesis (PhD). Postgraduate Program in Epidemiology. Federal University of Pelotas; 2022.

Universal access to sexual and reproductive health is fundamental to a better quality of life and it is on two of the Sustainable Development Goals, as part of goal three, focused on good health and wellbeing, and of goal five, on gender equality. In the past 40 years, most countries managed to increase family planning coverage, but more progress was observed in some of them than in others. Several low-income countries still present low levels of demand for family planning satisfied and, in several others, a high share of total modern contraceptive use is due to female permanent contraception. Our first objective was to estimate the share of female sterilization among modern contraceptive users and evaluate patterns and inequalities regarding wealth, age, number of living children, and considering the intersectionality between women's age and number of children. Our findings indicated that in 20 of the 105 countries analyzed, at least 25% of modern contraceptive users were using female sterilization, India being the leading country with 79% of the demand for family planning satisfied by female sterilization. High reliance on female sterilization among women younger than 30 was found in India, Dominican Republic, El Salvador, and Mexico, and among women with fewer than 2 living children in India and Tonga. In paper 2, we aimed to explore differences in the source of family planning according to women's age and marital status. Our findings indicated that demand for family planning satisfied by modern methods is still lower among adolescents than among adult women and that it is even lower among unmarried adolescents than among those who were married. Adolescents also use less the public sector than adult women, especially unmarried adolescents, among whom private facilities were the main source of family planning. Although a small proportion of adult women received their contraceptives with friends, family, or via relay, we found that it represented a significant share of the demand for family planning satisfied by modern methods among unmarried adolescents. Our last objective was to investigate countries that made remarkable progress in satisfying the demand for family planning, exploring the mix of contraceptives used and the social context of those settings, in terms of aggregated measures of poverty and gender inequality, and exploring how it evolved. Our findings indicated important reductions in both poverty and gender inequality along with an increase in the demand for family planning satisfied in the six selected countries. According to wealth, women's education, and women's age, all countries managed to reduce gaps, presenting a remarkably

increase in coverage among the most vulnerable women. In terms of the main policies implemented, it usually involved the inclusion of family planning services in primary health care, the provision of a wide range of methods, and high-quality training of the health providers. Despite the increase in the level of satisfied demand for family planning observed in recent decades, there is still much to pursue to achieve universal coverage of high-quality family planning services in low- and middle-income countries. Collectively, our findings indicate that some aspects are central to the achievement of universal access to family planning, such as the provision of a wide range of methods and high-quality training of health professionals to attend the needs of women from different backgrounds and with different wishes without any form of discrimination.

Keywords: family planning, universal health coverage, health equity, low- and middle-income countries, national health surveys

Table of Contents

Presentation

This PhD thesis was produced under the supervision of Professor Aluísio J.D. Barros and it is composed of the PhD research project, a description of the fieldwork in the International Center for Equity in Health (ICEH), three original scientific articles, and a press release. Due to methodological limitations of one of our sources of data, one of the articles originally planned in the PhD research project (article 2) was replaced with another original article.

Family planning is part of human history, present even in ancient times. How this practice is seen by couples and societies, and the means used to control reproduction have been evolving over time and across societies. This PhD thesis is an investigation of the aspects related to the satisfaction of the demand for family planning in low- and middle-income countries. It explores not only essential policies and strategies on family planning that have been implemented in the last forty years but also investigates elements that, although can be effective to increase the contraceptive prevalence rate, are not fully aligned with the current recognition of family planning as a parental right to decide freely the number and the spacing of their children and to have access to affordable, indiscriminate, and high-quality family planning services.

The three original articles are presented in the thesis in the same order proposed in the PhD research project. The first article is titled 'The role of female permanent contraception in meeting demand for family planning in low-and middle-income countries' and was published in Contraception; the second one, 'What are the sources of contraceptives for married and unmarried adolescents: public services or friends? Analysis of 59 low- and middle-income countries' was accepted for publication on a Research Topic on adolescents' sexual and reproductive health of the Frontiers in Public Health; and the third article, 'Learning from success cases: ecological analysis of pathways to universal access to family planning care in low- and middle-income countries' was published in Gates Open Research.

PhD Research Project

Federal University of Pelotas

Medical School

Department of Social Medicine

Postgraduate Program of Epidemiology

PhD Research Project

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This project is a partial requisite for the doctoral degree from the Postgraduate Program of Epidemiology – Federal University of Pelotas, Brazil.

Pelotas, RS

2020

Table of Contents

List of Figures

List of Tables

Executive summary

Family planning can be defined as the capability of women, men, and couples to determine responsibly the number and spacing of their children, without any form of discrimination or coercion. Universal access to sexual and reproductive health is fundamental to a better quality of life and sustained development and is on two of the Sustainable Development Goals, as part of goal 3, of good health and well-being, and goal 5, of gender equality.

During the last decades, most countries presented progress in increasing coverage, however, at different levels in different settings. Despite the increase in modern contraceptive use in the last decades, it is still low in several countries, especially those from low-income regions, and in several others, a high share of total modern contraceptive use is due to permanent methods of contraception.

High use of sterilization hinders a correct view of family planning coverage through its association with coercion and through an overestimation of family planning access and use where the highest share of modern contraception is achieved with sterilization among women at the end of their reproductive lifespan, being a large proportion of younger women left without meeting their need for family planning.

An outlining of pathways to increase family planning coverage among women with different characteristics and different needs could provide relevant information to better design programs and policies. The main aim of this research project is to identify barriers, limitations, and helpers to universal coverage of family planning practices in low- and middle-income countries. Considering it, we propose three original articles. The first article aims to identify where demand for family planning is highly satisfied by female sterilization and the presence of inequalities according to wealth, age, number of living children, and considering the intersectionality between age and number of living children. Using PMA2020 data and a multilevel approach, the second article will analyze the role of health facilities in the demand for family planning satisfied in selected geographies. The last article will use an ecological approach to investigate which social and cultural characteristics changed along with the increase in demand for family planning satisfied by modern methods. Countries will be included according to their progress in the last decades, the availability of data for multiple times and their location, to guarantee global representativeness. To address this aim, we will promote partnerships with reproductive health experts from success countries and carry out standardized analysis using publicly available data from Demographic Health Surveys,

Multiple Indicator Cluster Surveys, Reproductive Health Surveys, Performance Monitoring and Accountability 2020 surveys, and other national health surveys.

Planned articles to be part of the PhD thesis

1. **Inequalities and the role of female sterilization in demand for family planning satisfied in low- and middle-income countries.**

   Considering the invasive and irreversible nature of permanent contraception, this article aims to identify patterns of female sterilization and associated inequalities in countries where permanent methods account for more than 25% of modern contraceptive use.

2. **Family planning services supply and demand for family planning satisfied: analysis using PMA2020 data.**

   PMA2020 collects data on family planning in priority countries in Africa and Asia, including individual information and characteristics of health services in the surveyed area. This analysis will address the association between modern contraceptive use and health services mix of methods, regularity of stock, and other relevant characteristics.

3. **Learning from successful ones: pathways to universal access to reproductive health care in low- and middle-income countries.**

   Based on countries that managed to increase the proportion of women with demand for family planning satisfied with modern methods in the last years, we will explore individual and contextual characteristics associated with family planning practices in those settings, including socioeconomic and demographic characteristics, cultural norms, sexual and reproductive practices, public programs and financing of sexual and reproductive health services.

Glossary of terms and abbreviations

CPMO: modern contraceptive prevalence

DHS: Demographic and Health Survey

FP2020: Family Planning 2020

ICEH: International Center for Equity in Health

IUD: intrauterine devices and systems

LARC: long-acting reversible contraceptives

LMIC: Low- and middle-income country

mDFPS: demand for family planning satisfied by modern methods

MICS: Multiple Indicator Cluster Survey

PIC: Permanent (irreversible) methods of contraception

PMA2020: Performance Monitoring and Accountability 2020

RHS: Reproductive and Health Survey

SARC: short-acting reversible contraceptives

SDG: Sustainable Development Goal

TFR: Total Fertility Rate

UHC: Universal Health Coverage

UNFPA: United Nations Found for Population Activities

WHO: World Health Organization

1. Background

Family planning can be defined as the capability of women, men, or couples to determine freely and responsibly the number and the spacing of their children (Starbird et al., 2016). International assistance and investments in family planning programs started to be made in the mid-20th century, aiming to reduce fertility and control population growth (Bongaarts and O'Neil, 2018; Levine et al., 2001). Such approach was developed based on a neo-Malthusian theory, putting control of population growth as an essential aspect to allow socioeconomic development in countries at that point stereotyped as third-world (Bongaarts, 1994). Local governments in Latin America, Asia, and Africa implemented national birth control policies guided by international donors (Raulet, 1970) and by the United Nations (Mirkin, 2005). The first countries that asked for this support were Brazil, India, Indonesia, and Thailand (Mirkin, 2005). India implemented programs based on monetary incentives for sterilization and promotion of a 2-children family norm (ESCAP, 1987, 1984), in Indonesia and Thailand the focus was on reducing their birth rate through an increase in contraceptive use (ESCAP, 1984; Ismartono, 1984). Brazil was one of the earliest developing countries to implement the idea of integrated woman's health care instead of the isolated promotion of contraceptive methods (Faundes and Hardy, 1995) and to consider the importance of mass media to change family planning norms (Faria, 1997; Ferrara et al., 2012). Brazil achieved universal coverage of modern contraception in 1996, through the massive use of contraceptive pills and female sterilization (Cavenaghi and Alves, 2019).

Malthusian[2] theories on population growth are opposed to Marxist theories[3], where economic development is independent of population size and where there is no problem in an overpopulation, relative to the means of subsistence, if the country turns into a socialist society (Brackett, 1968; Podyashchikh, 1968). According to the Marxist-Leninist theory, rapid population growth in a socialist society would be a sign of strength and, therefore, the decision on parity should be made by the woman (Brackett, 1968). Despite this view, contradictory birth control policies were also implemented in the most powerful socialist/communist countries during the 20th century. In Russia, where the total fertility rate (TFR) was already below the replacement level (2.1 children per

[2] The main difference among Malthusian and neo-Malthusian theories is regarding the way to limit family size, while Malthus advised on sexual abstinence only, neo-Malthusians advice also on modern contraceptive methods.

[3] The Marxist theory of population growth was continuously updated along the history, so there are several arms of it. A complete explanation of each arm is present in Brackett, 1968.

woman), modern contraceptive methods where not widely available and the main method to avoid childbirth was abortion (in 1992, the abortion rate was 2.2 abortions per birth among women aged 15 to 44 years) (Tulchinsky and Varavikova, 1993). The other example, China, decreased its TFR of 5.4 children per woman in the 1940s to 2.6 children per woman in 1980 (Vlassoff, 1986), through policies that restricted fertility to 2 or 1-child (Hardee, 1984; Wang and Yang, 1983; Yin, 1981) and subsequent coerced sterilization (Reilly, 2015).

With the establishment of the United Nations Fund for Population Activities (UNFPA), during the 1960s, the United States became the most important founder of birth control policies in the developing world (Hartmann, 1997). There were discussions regarding Western incentives to control the global population, especially in the context of the Cold War, and if it could have affected the adherence by the target population (Critchlow, 1995; Sharpless, 1995). Even though, the average TFR in less developed countries decreased from 6 children per woman to 4 children per woman between the 1960s and the 1980s (McNicoll, 1992).

Despite the reduction in TFR, population continued to grow massively in low- and middle-income countries (LMICs) as a result of their passage through the demographic transition, with improvements in public health and intense reduction in mortality rates (Bongaarts and O'Neil, 2018). During the 1980s, a new concept emerged about birth control, focusing on fertility control and assuming that with a small number of children, parents would be able to provide better education and health conditions to their children (Becker, 1981; Levine et al., 2001). With the International Conference on Population and Development in 1994, the importance of reproductive health and rights surpassed fertility control aspects and access to sexual and reproductive health services has been recognized as a basic human right (Bongaarts and O'Neil, 2018; Ortayli and Malarcher, 2010). Several measures first adopted to control population growth were not suitable into the assumption of no coercion over women and couples and programs were re-evaluated including family planning education, and efforts to improve women's and children's health (Faundes and Hardy, 1995; Sharpless, 1995), and to improve women's empowerment (Levine et al., 2001). In a context of poor maternal health and high incidence of sexually transmitted infections, the general view of sexual and reproductive health initially led to a replacement of funding for family planning for funding for other reproductive health outcomes (Bongaarts and O'Neil, 2018; Ortayli and Malarcher, 2010). More recent approaches are putting family planning as a central aspect of reproductive health, and it has been included in several policies and programs. In this sense, a

landmark was the London 2012 Summit on Family Planning, where policymakers, advocates, and donors gathered in to discuss new efforts to reach universal access to family planning services. The meeting resulted in the launch of the Family Planning 2020 (FP2020) initiative, intending to give access to family planning to 120 million additional women by 2020 in 69 of the world's poorest countries (FP2020, 2017a). Since its launch, the FP2020 initiative has led several governments to design strategies and launch actions to improve access to sexual and reproductive health services (FP2020, 2017b). Common aspects of these strategies are the provision of contraceptives free of charge, increase in contraceptive method mix, public-private partnerships, the inclusion of family planning services into the continuum of care, partnerships with community and religious leaders to advocate for family planning, and a special attention to address adolescents and men (FP2020, 2017b).

Universal access to sexual and reproductive health is also on two of the 17 Sustainable Development Goals (SDG) and it has been identified as one of the most cost-effective targets, given its benefits to several other outcomes (Jurczynska et al., 2018; Starbird et al., 2016). Besides guaranteeing the human right of deciding whether and when to use contraception, family planning has the potential to save lives through the reduction of unsafe abortions and reduction of maternal and newborn deaths (Singh et al., 2009). Unintended pregnancies are especially delicate among young adolescents, among whom pregnancy and childbirth complications are the leading causes of death and postnatal complications (The Global Partnership to End Child Marriage, 2017).

Adolescent maternity is also associated with a higher risk of poor nutritional outcomes, low birth weight, and child stunting (Starbird et al., 2016). Spacing births also improve nutritional outcomes, by helping women to replenish essential nutrients and breastfeed their children for longer periods (Starbird et al., 2016). Meet the needs of family planning can also improve education and employment opportunities for girls and women, leading to the reduction of poverty and gender inequality, and promoting economic growth (Singh et al., 2009).

Another benefit of universal access to reproductive health services is the reduction of transmission of sexually transmitted infections, through more information and greater use of condoms (Singh et al., 2009). The reduction of unintended pregnancies can also be favorable to population dynamics, reducing pressure on natural resources and helping governments to reduce spending on sanitation and on the provision of social services (Singh et al., 2009). Aiming to measure the impact of family planning on other SDGs, several approaches have been developed in the last years (FP2020, 2018).

Through the reduction in unintended pregnancies and infant and maternal mortality, family planning can reduce the costs of other health services and, in the long term, it can reduce poverty and food insecurity and promote economic growth (FP2020, 2018). In addition, worth noting that the cost of contraceptive commodities tends to decrease as the number of users increases. Larger programs of family planning have the benefit of reduction in the unit costs of contraceptive methods by the economy of scale (Levine et al., 2001).

Despite all the efforts, the goal of meeting the demand for family planning was still out of reach for several countries (Hellwig et al., 2019; United Nations, 2015), and the current global sanitary crisis due to COVID-19 pandemic is likely to slow up or even break improvements. Responses to the COVID-19 pandemic are increasing people's fear of seeking health care and it is leading health facilities to limit their services or even close to prevent the spread and to treat people with COVID-19 (Bolarinwa, 2020; Hall et al., 2020; Mmeje et al., 2020). A decrease in sexual and reproductive health funding due to the COVID-19 budget and disruptions of supply chains may also increase stock-outs of many contraceptive methods, through disruption of the manufacture of key pharmaceutical components and contraceptive methods themselves and through restrictions on transportation (Riley et al., 2020; Schaaf et al., 2020). Response to epidemics can also affect family planning practices due to their potential to increase gender-based inequalities (Riley et al., 2020).

The total fertility rate is already established below the replacement level in several countries and projections indicate that it is expected to decrease to lower levels than 1.5 child per woman in all countries (Vollset et al., 2017). Growing attention has been directed to the socioeconomic consequences of extreme changes in population structure, underlying the importance of family planning policies to favor the trajectory of population growth (Vollset et al., 2017). Despite the importance of maintaining a larger proportion of the population in working-age, increasing the fertility rate through the increase of unmet need for family planning during a sanitary crisis, with increased economic insecurity and uncertain risks of Sars-CoV-2 to maternal and fetal health (Mmeje et al., 2020), is not in agreement with the nature of family planning, defined as a human right of individuals to decide freely the number and spacing of their children.

Projections indicate that, depending on the degree and time of mobility restrictions due to the COVID-19 pandemic, 13 to 51 million additional women in LMICs will have their needs for family planning unsatisfied, and 325,000 to 15 million additional unintended pregnancies are expected to occur (UNFPA, 2020). Another study (Riley et al., 2020) projected the annual impact of a 10%

proportional decline in the use of sexual and reproductive health care in LMICs due to COVID-19 responses, which can lead to 3 million additional unsafe abortions and 29,000 additional maternal deaths. Mechanisms to reduce the potential adverse effects of pandemic response are strengthening partnerships between governments, international donors, non-governmental organizations, and private-sector aiming to reinforce supply chains, decentralize the distribution of contraceptive methods, promote service delivery and multi-month provision of contraceptives (Riley et al., 2020). It is also important promote family planning services provision at postpartum contacts, especially long-acting reversible contraceptives (LARC), and increase the availability of telehealth for counseling and screening for medical eligibility for contraception wherever access to such technologies is already sufficient (Nanda et al., 2020).

2. Justification

Universal health coverage (UHC) means that all people have access to the health interventions and services they need, without discrimination. It has been extensively recognized as fundamental to a better quality of life, sustained socioeconomic development, and global peace and security (WHO, 2010). However, in several countries, the aim of delivery UHC is far from being achieved (Horton and Das, 2015). Problems in the provision and access of health services are important and easily fixable barriers to universal coverage. These problems include the availability of resources, requirement of direct payments at the time people need care, and inefficient and inequitable use of resources (WHO, 2010). The basic right of individuals and families to have information and means to decide the number, spacing, and timing of their children freely and responsibly is a well-recognized human right (UNFPA, 2009). Several keys to effective and sustainable family planning policies are already known, such as legislation, political commitment, adequate funding, availability of a range of methods, and support from upper classes and community leaders (Cleland et al., 2006). Based on it, new approaches to address the barriers to family planning coverage have been implemented in LMICs in the last years, increasing contraceptive use through the promotion of self-administration injections and implants among vulnerable women living in remote areas, and through peer education to reduce contraception stigma among adolescents (IPPF, 2015). Despite the progress made (Hellwig et al., 2019), important socio-demographic inequalities are still being identified in family planning indicators (Blumenberg et al., 2020; Ewerling et al., 2018; Hellwig et al., 2019), being among the largest observed in health (UNFPA, 2009). In addition, making a wider range of methods available is fundamental to achieve universal coverage of family planning. In many

countries, permanent methods of contraception account for a high share of modern contraceptive use. In several cases, permanent contraception is associated with coercive practices on women in different moments of their reproductive lifespan, especially among poor and unempowered women (Bertrand et al., 2014; Patel, 2017; Singh et al., 2012).

There are several ways to deliver and promote family planning services. Among those, some can be more powerful or more consistent with the principals of humanity, justice, and equity than others. The need for more evidence to assist decision-making in what are the best approaches to deliver UHC has been requested in the literature (Horton and Das, 2015), along with a better understanding of what is holding some subgroups behind regarding family planning coverage. An outlining of favorable pathways to increase family planning coverage in low- and middle-income settings could provide important information to help governments and international agencies to design and implement more efficient and equitable policies.

3. Literature review

While girls and women from high-income countries have had access to voluntary family planning since the 1990s, the average modern contraceptive use in low- and middle-income regions is still far from satisfying the demand, being around 60% in 2015 (United Nations and Department of Economic and Social Affairs, 2016). It is much lower considering only lower-income regions, where it is around 35%, on average (United Nations and Department of Economic and Social Affairs, 2016). There are also documented inequalities between and within countries, as well as important differences according to patterns of contraceptive use share (Ewerling et al., 2018; Ponce de Leon et al., 2019).

This literature review was carried out in PubMed and Web of Science databases, aiming to identify articles on family planning in low- and middle-income settings. To the main search term (family planning OR contraception OR reproductive health), were added terms related to the specificities of the three articles of this project: relation of health services characteristics to demand for family planning satisfied; sterilization; and critical contexts for successful policies in family planning promotion.

3.1. Health services characteristics determining contraceptive use

Since the launch of the FP2020 initiative, the world saw an increase in the number of users of modern contraception by 53 million (FP2020, 2019). This increase is partly due to the growing

number of women of reproductive age in several African countries as a result of population growth and the decrease in HIV mortality (Bongaarts and O'Neil, 2018; RHSC, 2009). The African population is expected to still be growing for the next decades, especially in the sub-Saharan region (Bongaarts and O'Neil, 2018). Expanding service capacity to guarantee the availability of methods will be crucial to attend to people's needs in the next years (FP2020, 2019). Persistent limitations in vulnerable settings are the lack of private space for family planning counseling (Dixit et al., 2020), the need for the upgradation of training of health workers (Lince-deroche et al., 2020; Millogo et al., 2019), negative health worker's attitude on contraception among young unmarried women (Chandra-mouli et al., 2014; Tilahun et al., 2012), insufficient community family planning workers, shortage of health workers trained to insert and remove long-acting contraceptives (Lince-deroche et al., 2020), insufficient funding and unsatisfactory management (Akinyemi et al., 2019).

Another aspect strongly related to contraceptive use is the contraceptive method-mix made available. Access to contraception methods that attend to couples' needs and circumstances is central to reach universal coverage of reproductive health. Several countries, especially in Africa and Asia regions, have a skewed contraceptive method mix (United Nations Population Fund (UNFPA), 2016). The dominance of one contraceptive method is partly due to the relationship between method choice and cultural preferences (Bertrand et al., 2014) and because the increasing dominance of one method may be a result of the replacement of less effective methods for more effective ones (United Nations, 2015). However, individual preferences, medical needs, and different reasons for family planning require a wide range of contraceptive options to address the needs of women in different personal and family contexts (Fagan et al., 2017; Pradhan and Dwivedi, 2019). In addition to a wider range of methods, health provides play an important role in the decision of if and what contraceptive method women will choose (Ippoliti et al., 2017). In Ethiopia, there is evidence of persuasive practices of health provides, where women felt coerced through the use of LARC (Yirgu et al., 2020).

Distance to health facilities is also relevant to demand satisfied, being modern contraceptive use higher among women who live close to health facilities (Agadjanian et al., 2015; Ettarh and Kyobutung, 2016; Shiferaw et al., 2017). Although provide access to health care has been well recognized as a responsibility of the government (Ettarh and Kyobutung, 2016), human and economic resources for health care are limited (Scott et al., 2015). An efficient approach to minimize this limitation and expand coverage in harder-to-reach populations is the promotion of family

planning services through community health workers, who usually are from the communities they attend and who are trained in a short-period of time (Azmat et al., 2016; Scott et al., 2015). There is evidence that community health workers are effective to increase knowledge of family planning and contraceptive use (Perry et al., 2014; Scott et al., 2015).

The provision of family planning counseling and modern contraceptive methods is the elementary condition of any family planning policy. Despite the advance in family planning provision over the past decades it still has aspects to improve, especially in more vulnerable settings. The literature on global reproductive health lacks a deeper analysis of the relationship between health services characteristics and demand for family planning satisfied in priority countries trapped at low levels of coverage and high levels of socioeconomic and demographic inequalities.

3.2. The role of permanent methods of contraception

One fundamental aspect of universal access to family planning is the provision of counseling on all contraceptive methods without any form of coercion. This aspect is even more important regarding permanent methods. Male and female sterilization can be the best option for some couples, and it should not be denied to those who choose it, provided they are well-informed of its advantages and disadvantages. In addition to the invasive nature of the method and the potential surgeons' risks, its permanent aspect can lead to regret in the future, especially among women who are young and have lost a child (Bertrand et al., 2014; Levine et al., 2001; Pal and Chaurasia, 2020). High rates of sterilization regret were found among women less educated, who do not have a formal job, and those who are separated or divorced (Singh et al., 2012).

In places where the use of sterilization is predominant, there is always a concern if it can be due to pressure to adopt it (Bertrand et al., 2014). There is evidence that sterilization use is associated with coercion among marginalized women, such as those who are poorer, who have HIV, or those who have other disabilities (Patel, 2017). Despite the recommendation of female sterilization among women with delicate health conditions, which could be worsened through pregnancy, such as when they have breast cancer or cardiovascular diseases (Ehman and Costescu, 2017), tubal ligation is largely more common than vasectomy, which usually represents a small fraction of total use of permanent contraceptive methods (Bartz and Greenberg, 2008; Bertrand et al., 2014; Hannah and Green, 2020). Gender-based inequalities related to the increased use of female sterilization are partly due to intimate-partner violence, as a consequence of repeated abortions (Patil et al., 2020),

and due to concerns and misconceptions about male sterilization (Hannah and Green, 2020; Singh et al., 2012).

There is also a concern in public health that sterilization may be chosen due to the lack of other methods (Bertrand et al., 2014). The wider range of methods being offered in LMICs is associated with a decrease in the role of sterilization in most countries. However, sterilization still being the predominant method in India, Mexico, and Dominican Republic (Bertrand et al., 2014). During the last years, there is evidence that the proportion of women and men looking for sterilization has increased in India, Mexico, the Dominican Republic, Costa Rica, Colombia, Cuba, and Sudan (Bertrand et al., 2014).

India has a long history of pro-sterilization policies (Singh et al., 2012). The country was the first to launch a family planning policy aiming to control population growth, in 1952. The first attempt to accelerate fertility reduction was the use of financial incentives for sterilization, in 1967. As it did not lead to the desired reduction in India's fertility rate, the government introduced aggressive sterilization camps during the 1970s. Later on, family planning programs were more focused on voluntary contraceptive choices, however, sterilization continued to be promoted (Singh et al., 2012). The country has cultural norms that encourage women to marry at young ages, to have 2 or 3 children soon after they get married, and to be sterilized once they achieve the desired fertility. The average age of sterilization in India was 25 years in 2005, while 81% of women declared they have been sterilized before 30 years of age. Culturally, the decision if the couple is going to choose male or female sterilization is made by the husband (Singh et al., 2012).

According to data from the 2007 Demographic and Health Survey, sterilization accounted for 90% of total contraceptive use in the Dominican Republic. Since sterilization is a major component of sexual and reproductive health programs in the country and there are no legal barriers to sterilization, its use by young women also contributes do its high prevalence (Bertrand et al., 2014). Another country in Latin America and the Caribbean region where sterilization is the predominant method is Mexico. During its demographic transition, Mexico dropped its TFR from 5 children per woman in 1978 to 2.4 children per woman in 2002 (Rudzik et al., 2011). Along with the promotion of LARC, family planning policies in Mexico were also focused on permanent contraception, especially during the post-partum period (Bertrand et al., 2014; Rudzik et al., 2011).

3.3. Progress toward universal coverage of family planning in low- and middle-income regions

Family planning policies are efficient to increase contraceptive use as well to reduce poverty, improve women's and child's health, and to empower women (Bongaarts et al., 2012). Being one of the most successful interventions, family planning is often characterized as a "best buy" investment that promotes development at all levels (FP2020, 2018; Starbird et al., 2016). Programs are currently funded by several sources, from international donors to out-of-pocket purchases (FP2020, 2019). In 2017, the total expenditure on family planning in FP2020 countries was estimated at US$ 3.8 billion, being almost half from international donors, about 30% from governments, and almost 20% out-of-pocket (FP2020, 2019). In 2018, bilateral donor funding reached the highest level since the 2012 London Summit, with several high-income countries increasing their funding and with the United States being the largest donor, responsible for approximately 42% of the total bilateral funding (FP2020, 2019). In a context of global funding crisis and uncertain donor funding, several governments were already increasing their domestic investment in family planning (IPPF, 2016). The situation is even more worrisome with a global pandemic, as domestic crises and the need of nurturing national trust may lead governments to reduce international donations (Schaaf et al., 2020). Currently, there is no estimate of how much the pandemic already affected or how much it will affect international aid.

Lack of knowledge of family planning practices and access to contraceptive methods seems not to be the main barrier to contraception, even in the world's poorest countries (Haider and Sharma, 2013). Choices of limiting family size, delaying first birth or spacing births depend on the beliefs and norms of each society (Haider and Sharma, 2013; von Mises, 1949). Gender norms are well recognized as a barrier to contraception at all levels. It ranges from negative perceptions of society regarding sexual activity, contraception, and its possible side effects to couple dynamics driving method choice (Do and Kurimoto, 2012; UNFPA, 2017). In terms of women's empowerment, it is associated with lower fertility, higher birth spacing, and lower occurrence of unintended pregnancy. However, its effects on contraception are not consistent in different settings and using different approaches, being positive or null (Prata et al., 2017).

Large families are still being coveted in several societies (Elmusharaf et al., 2017; Mayaki and Kouabenan, 2015; Varley, 2012) as well as motherhood at early ages to prove woman's fertility (Chandra-mouli et al., 2014; The Global Partnership to End Child Marriage, 2017). This is especially

the case of muslin families, among which modern contraceptive use is lower in comparison with non-muslin ones (Najafi-Sharjabad et al., 2013; Shaikh et al., 2013). Despite the higher desired family size among muslin women, there is evidence that they are less likely to use contraceptives even when they want to avoid pregnancy (Najafi-Sharjabad et al., 2013). In addition, the promotion of contraceptive use is also sometimes seen as an attempt of the western to control and weaken the Islamic world (Shaikh et al., 2013).

There is evidence of the impact of education on the effect of social norms on contraception (Emina et al., 2014; Ettarh and Kyobutung, 2016; Mayaki and Kouabenan, 2015). Education plays an important role in empowering women regarding decision-making and providing knowledge of the advantages of family planning. In several LMICs, modern contraception is higher among highly educated women, who usually are better informed regarding contraceptive methods and who are more likely to live in wealthier households (Emina et al., 2014). In addition, it seems that subjective norms have no effect on contraception among women who had access to formal education, in both urban and rural areas (Mayaki and Kouabenan, 2015).

In addition to the provision of contraceptives, family planning services are also important in creating demand. Besides contraceptive methods, family planning policies must offer counseling, making women and couples aware of the benefits of delaying, limiting, and spacing births and of their autonomy to make reproductive choices (Haider and Sharma, 2013). Rather than an imposition of an ideal number of children or the best contraceptive method to be used, policies need to be sensitive and respectful to cultural contexts and traditional views of family planning to provide proper information and integrative care (Najafi-Sharjabad et al., 2013). Satisfaction of contraceptive users who would speak in favor of it if another pathway to improve social norms related to family planning. Some recent strategies have taken demand generation into account (Speizer et al., 2014). These strategies include targeted messages in local and mass media, engagement of religious and community leaders, and interpersonal communication to reduce the social stigma of contraception, which have all been significantly associated with an increase in modern contraceptive use (Speizer et al., 2014; WHO, 2009).

Cultural norms and socioeconomic contexts varied greatly between and within regions. Latin America and the Caribbean is a region composed mainly of middle-income countries. High levels of contraceptive use were already achieved in several countries in the region, such as Brazil, Colombia, Costa Rica, Cuba, and Paraguay. However, it is still below 40% in Bolivia, Guyana, Haiti, and Trinidad

and Tobago. Short-acting reversible contraceptives (SARC) make up the largest share of contraceptives in the region, except in Mexico, Colombia, Dominican Republic, and El Salvador, where sterilization is the most common (Ponce de Leon et al., 2019). Sources of family planning financing also vary greatly in the region. Out-of-pocket spending is the primary source of financing in Honduras, whereas government health expenditure on family planning is the main source in Colombia. In Haiti, one of the poorest and more vulnerable countries in the region, foreign aid is still the primary source of reproductive health financing (Fagan et al., 2017). Inequalities in contraceptive use according to socioeconomic and demographic characteristics persist, which low levels of coverage among those who are poorer, less educated, and among indigenous women (Fagan et al., 2017). Indigenous ethnicity has been strongly related to barriers to modern contraception in the region (Fagan et al., 2017). Indigenous women have low levels of empowerment, with the husband playing a special role in family decision-making regarding family planning (Terborgh et al., 1995). Indigenous families also tend to see contraception as equivalent to abortion and they tend to be suspicions about the political motivations to promote family planning practices among indigenous (Terborgh et al., 1995). In Latin America, most countries have shifted from external donors to domestic government funding and out-of-pocket payments (Fagan et al., 2017). The independency of international donors and the highest share of family planning expenditure being from the domestic government reflects the country's commitment to family planning policies and indicates their long-term stability (FP2020, 2019).

LMICs in Europe have a different pattern of contraception, with low levels of fertility (Alkenbrack et al., 2015; Ewerling et al., 2018) and low levels of unmet need for family planning, being it satisfied mostly by traditional methods (United Nations, 2015). This is especially the case of Albania, where TFR is 1.6 birth per woman and, despite modern methods being available free of charge at government health centers, withdrawal is the method most used, accounting for 70% of total contraceptive use prevalence (Paravani and Orgocka, 2013; United Nations, 2015). Common barriers to modern contraception are a lack of knowledge regarding the methods' effectiveness and fear of side effects (Paravani and Orgocka, 2013).

Asian regions have achieved high levels of demand for family planning satisfied by modern methods. Countries with persistent low levels of coverage are Lao, India, Tajikistan, and the Philippines (Ewerling et al., 2018). The method most used in the region is intrauterine devices and systems (IUD). However, its use has fallen overtime (Seiber et al., 2007), especially in Mongolia and Vietnam,

where the use of pills, injectables, and condoms have increased (Ross, 2015). India presents a different pattern of contraception, which female sterilization accounting for almost 70% of its total contraceptive prevalence rate (Pradhan and Dwivedi, 2019). Family planning services in Asian countries are mainly financed by the domestic government (FP2020, 2019). Most users obtained contraceptives in the public sector, except among the richest where it is mainly obtained in the private sector (Campbell et al., 2016). A review of the literature found low women's empowerment, social norms, and health system barriers as the main obstacles to modern contraception in Asian countries (Najafi-Sharjabad et al., 2013). Limited knowledge and misconception are also important barriers in the region, especially among adolescents (Najafi-Sharjabad et al., 2013; Regmi et al., 2010).

Africa presents the lowest average demand for family planning satisfied by modern methods in the world, especially the West & Central region, where it is strongly affected by its social norms of early marriage and low levels of women's empowerment (Ewerling et al., 2018). Sub-Saharan Africa also has a desired fertility higher than other regions. While desired family size is below 3 children per woman in Latin America, Asia, the Middle East and North Africa, the average desired fertility is higher than 5 children per woman in Sub-Saharan Africa, with no significant decline overtime (Bongaarts, 2011). Larger families tend to be desired in places with a lower average of education, higher child mortality, and lower economic development (Bongaarts, 2011). In addition, most African countries did not provide sufficient resources for family planning in the past decades, resulting in a high level of unmet need for family planning (Bongaarts, 2011), especially in Sub-Saharan Africa, where are almost 30% of women with their need for family planning unsatisfied (Bulto et al., 2014; Fruhauf et al., 2018b). Among Sub-Saharan countries, important improvements were seen in Ethiopia, Malawi, and Rwanda (Hellwig et al., 2019; USAID, 2012). Despite all countries still having high TFR, around 5 children per woman, through community engagement, broad political commitment, and efficient family planning programs, the three countries managed to increase their modern contraceptive use prevalence, especially trough injectables, implants, and sterilization (Bertrand et al., 2014; USAID, 2012).

During the last years, the reduction in African average TFR has been slower among the poorest than it has been among the richest, being around 6 children per woman among women from the poorest quintile and 4 children per woman, on average, among those from the richest quintile (Akachi and Finlay, 2018). Coverage of family planning services is also lower among harder-to-reach subgroups,

such as younger women, who live in rural areas, who are poorer and less educated (Ewerling et al., 2018). Most family planning expenditures in Africa are financed by international donors (FP2020, 2019), being the contraceptive use prevalence composed mainly of SARC, especially injectables (Ross, 2015; Shiferaw et al., 2017). In Kenya, the highest share of modern contraceptive use is also of SARC, however, the country has a more balanced mix. According to PMA2020 data, the share of SARC decreased from 73% of Kenya's total modern contraceptive use to 55%, between 2014 and 2018, while LARC increased from 23% to 41% (Blumenberg et al., 2020).

4. Objectives

Identify patterns of contraceptive use as related to health facility characteristics and overuse of sterilization and explore pathways to universal access to reproductive health care in selected LMICs, through national health surveys.

4.1. Specific objectives

For each article proposed in this PhD project, specific objectives are presented below.

Article 1 – Female sterilization in LMICs

- Estimate the share of female sterilization among women using modern contraceptive methods in LMICs and evaluate patterns and inequalities in terms of wealth, age, and the number of living children.

Article 2 – Family planning services characteristics and demand for family planning satisfied.

- Evaluate the impact of characteristics of health facilities on the use of family planning methods in FP2020 priority countries. The most important characteristics to be explored are:
    a. The mix of methods available
    b. Availability of free contraceptives
    c. The frequency of shortages of methods
    d. How much information and support is offered to women by the health facility staff

Article 3 - Pathways to universal access to reproductive health care

- Based on countries that managed to remarkable progress in satisfying demand for family planning, explore:

a. The social context of those geographies in terms of wealth, education, women's empowerment, and social norms
b. The mix of contraceptives used and how this evolved over time
c. Health care financing schemes and changes in financial dynamics in reproductive health services
d. Family planning policies and programs implemented.

5. Hypotheses

Article 1- Female sterilization in LMICs

- We expect a high variability in the share of sterilization, both within and between regions. We also expected a higher prevalence of use among women who are older and who have three or more children.
- According to wealth, we expect a higher share of female sterilization among the poorest in countries where this procedure is offered in the public sector while it will be higher among the richest otherwise. Further, in those settings we expect that female sterilization will be unjustifiably higher among the more vulnerable women.

Article 2 – Family planning services characteristics and demand for family planning satisfied

- We expect a higher contraceptive use prevalence in areas with facilities that provide contraceptives free of charge and those who work with community health workers.
- We also expect that the offer of a wider range of contraceptives in nearby facilities will be associated with higher contraceptive use.

Article 3 - Pathways to universal access to reproductive health care

- Countries with higher use of contraceptives will have a wider range of contraceptive methods available, being the short-acting reversible ones the most used. According to the social context, we expect those geographies to have a higher proportion of women with high levels of education, higher levels of women's empowerment, with more tolerant social norms.
- Geographies that managed to succeed in increase family planning coverage in the last years are the ones that made national investments in family planning services, in addition to donor funding.

- Success in increasing contraceptive use is likely to be associated with investments in youth-friendly reproductive health services, integration of family planning services with other health programs, and advocacy through community leaders.

6. Methods

This section describes the methodology of the three articles proposed to this thesis and where available, we present preliminary results.

6.1. Outcome

The main outcome, common to the three planned papers, is the demand for family planning satisfied by modern methods (mDFPS). mDFPS is defined as the proportion of women of reproductive age (15-49 years old) in need of contraception that is currently using a modern contraceptive method. Women were considered in need of contraception if they are fecund and do not want to become pregnant within the next two years or are unsure if or when they want to become pregnant. Those who were pregnant at the time of the survey and declared the pregnancy as unintended were also considered in need of contraception. Women were classified as infecund if they were menopausal; had had a hysterectomy; had never menstruated; had had their last period more than six months ago and were not postpartum amenorrhoeic; said they cannot get pregnant; or if they had been married for at least five years, had never used contraception and not become pregnant in the previous five years (Bradley and Casterline, 2014).

Modern contraceptive methods are defined here as a technological product or a medical procedure that prevents natural reproduction (Hubacher and Trussell, 2015). Considering this definition, the methods classified as modern were:

- male and female condom
- diaphragms and cervical caps
- vaginal rings
- spermicidal agents
- contraceptive pills
- injectables
- patch contraception
- emergency contraceptive pill
- intrauterine devices (IUD)

- implants
- male and female sterilization

Withdrawal, lactational amenorrhea, and methods based on calendar (such as rhythm method, Standard Day Method, Basal Body Temperature Method, TwoDay Method, and Sympto-thermal Method) will not be considered as modern methods for the purpose of our analyses.

6.2. mDFPS in non-standard surveys

Information to identify women in need of contraception is usually not available in non-standard surveys. It is the case of the more recent data for Brazil, for example, the national health survey carried out in 2013 by the Brazilian Institute of Geography and Statistics. Brazil is an important country for both articles one and three. Since the country presented great progress in achieving universal access to family planning and sterilization is a common method, accounting for around 30% of modern contraceptive prevalence.

Given that mDFPS and modern contraceptive prevalence (CPMO) are highly correlated at the national level (Barros et al., 2015), we will estimate national mDFPS in Brazil using the following predictive equation:

$$logit(mDFPS) = 0.61 + 0.68\,log(CPMO) + 3.57CPMO^2$$

The same approach is going to be used with other non-standard surveys included in our third article if mDFPS is not available.

6.3. Female sterilization in LMICs

6.3.1. Data sources

For each country with data, we will use the latest available survey from the Demographic and Health Survey (DHS) or Multiple Indicator Cluster Survey (MICS), carried out since 2010. DHS and MICS are nationally representative highly comparable cross-sectional health surveys, with standardized data collection procedures across countries (Corsi et al., 2012; Hancioglu and Arnold, 2013; UNICEF, 2016).

The survey methodology comprises a two-stage sampling selection process. The first stage randomly selects census enumeration areas, considering a probability of selection proportional to size and stratification characteristics. Then, the fieldwork teams visit the selected areas, where a complete list of dwellings and households is collected. From these lists, 20–30 households are selected by

systematic sampling. The selected households are visited by a trained interviewer, who conducts a brief household interview and identifies the eligible respondents. The surveys include a household questionnaire, answered by any capable household member age 18 or older; a women's questionnaire, which includes all resident women aged 15 to 49 years; a children's questionnaire, for children under 5 years of age whose mother lives in the household. The surveys present a very high response rate, generally higher than 90% (Corsi et al., 2012; Khan and Hancioglu, 2019).

6.3.2. Stratifiers and predictors

mDFPS will be analyzed among women who were married or with a partner, since several surveys do not collect reproductive information on never-married women. Despite removing unpartnered sexually active women from our analyses, limiting the analysis to ever-married women allow us to a larger number of countries in the analysis. Also, never-married women are usually young and will have a very low probability of being sterilized, unless they have a strict medical indication such as a hysterectomy due to cancer.

We will estimate the share of mDFPS according to three groups of contraceptive methods. Short-acting reversible contraceptive methods (SARC) include oral contraceptive pills, injectables, diaphragms and cervical caps, vaginal rings, male and female condoms, spermicidal agents, patch contraception, and emergency contraception. Long-acting reversible contraceptives (LARC) do not require frequent intervention by the user and include IUDs and implants. Finally, permanent (irreversible) methods (PIC) comprise sterilization, either female (tubal ligation) or male (vasectomy). In low-and middle-income countries, female sterilization accounts for nearly all cases of sterilization (RHSC, 2009; Ross and Hardee, 2017), therefore, we will estimate the national use of male and female sterilization separately for all countries and the inequalities will be analyzed only in female sterilization.

The patterns and inequalities in female sterilization will be measured according to wealth, women's age, number of living children, and according to the intersectionality of age and number of living children. According to the number of living children, women will be divided into three groups: no child, one or two children, and three or more children. Women's age will be stratified into six groups: 15-19 years, 20-24 years, 25-59 years, 30-34 years, 35-39 years, and 40-49 years. Wealth will be analyzed based on an asset index obtained from information on household assets, the presence of electricity, water supply, sanitary facilities, and building materials of the dwelling, among other variables (Filmer and Pritchett, 2001; Rutstein and Johnson, 2004). To calculate the wealth score,

separate principal component analyses are carried out in urban and rural areas, because relevant assets may vary in each area. Results are later combined into a single score using a regression-based scaling procedure to allow comparability between urban and rural households (Rutstein, 2008). The households are then classified into five equally sized groups based on the value of the score, households weighted by the number of residents.

6.3.3. Inclusion/exclusion criteria

We will estimate mDFPS for all countries with a DHS or MICS survey carried out since 2010 and, among those who are using any modern method, we will estimate the proportion of use of each of the three contraceptive groups SARC, LARC, and PIC. There is no guide to what an excessively high share of sterilization would be. Looking at the distribution of PIC in our countries, we considered 25% of female sterilization among all women using any modern contraceptive method as a reasonable cut-off point as it separated the mass of countries from a set presenting much higher proportions, as evident from Figure 1. Inequalities in the share of female sterilization will be analyzed in countries indicated in Figure 1. A list of all surveys included in the first step of the analysis, as well as mDFPS and the share of permanent methods, is presented in the supplementary material (Table 8).

In the currently available surveys, sterilization accounts for more than 25% of women using modern methods in 17 countries. The surveys which will be included in this analysis, as well as their sample sizes and mDFPS, are presented in Table 1. The share of permanent methods in each survey is presented in Figure 2.

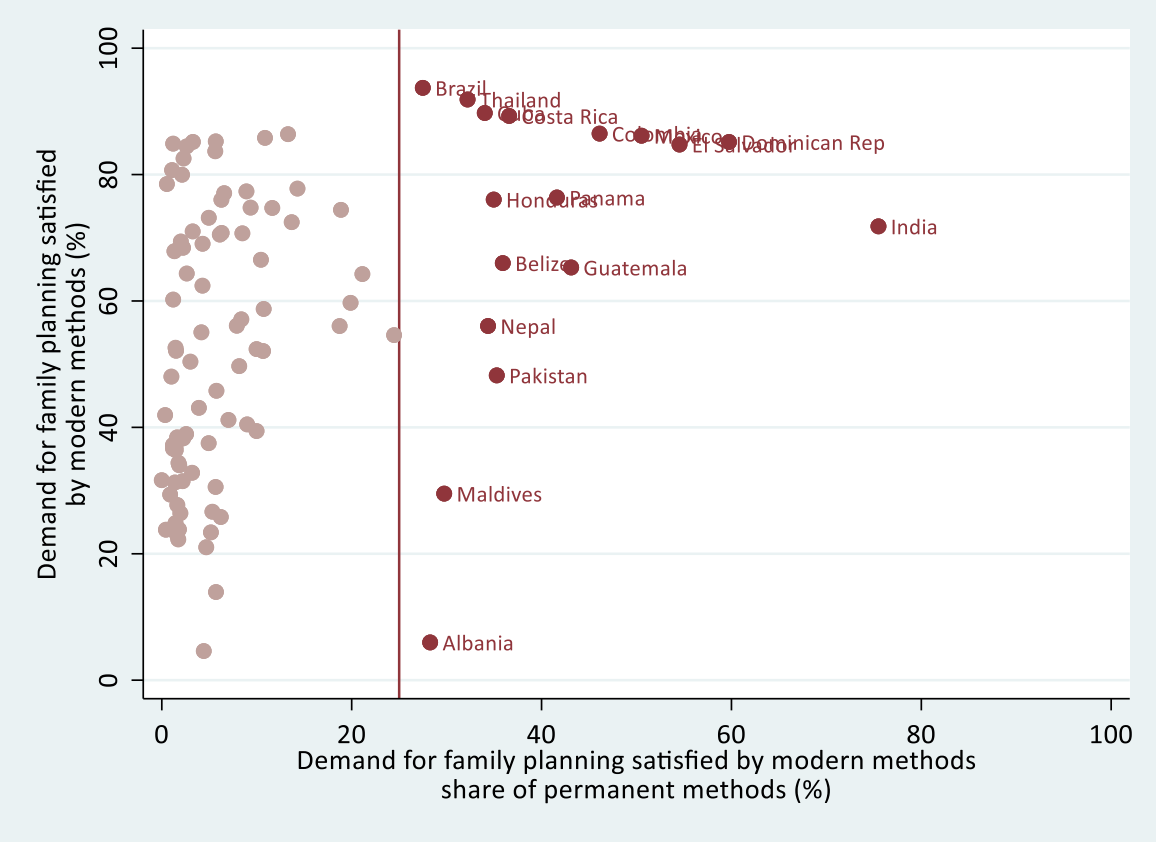

Figure 1 - Demand for family planning satisfied by modern methods (mDFPS) and share of female sterilization.

Table 1 - Selected countries, total fertility rate (TFR), sample sizes, and demand for family planning satisfied by modern methods (mDFPS) at the time of the survey.

Country	Year	Source	Income group	TFR*	Number of women	mDFPS (%)
Eastern Europe & Central Asia						
Albania	2017	DHS	Upper-middle	1.6	7,554	6.0
South Asia						
India	2015	DHS	Lower-middle	2.3	499,627	71.8
Maldives	2016	DHS	Upper-middle	2.0	5,620	29.5
Nepal	2016	DHS	Low-income	2.0	9,904	56.0
Pakistan	2017	DHS	Lower-middle	3.6	11,902	48.2
East Asia & the Pacific						
Thailand	2015	MICS	Upper-middle	1.5	25,614	91.9
Latin America & Caribbean						
Brazil	2013	NSS[#]	Upper-middle	1.7	12,437	93.7
Belize	2015	MICS	Upper-middle	2.4	3,085	66.0
Colombia	2015	DHS	Upper-middle	1.9	19,757	86.5
Costa Rica	2011	MICS	Upper-middle	1.9	2,942	89.3
Cuba	2014	MICS	Upper-middle	1.7	5,851	89.7
Dominican Rep	2014	MICS	Upper-middle	2.4	16,891	85.2
El Salvador	2014	MICS	Lower-middle	2.1	7,672	84.8
Guatemala	2014	DHS	Lower-middle	3.1	14,996	65.3
Honduras	2011	DHS	Lower-middle	2.9	13,178	76.0
Mexico	2015	MICS	Upper-middle	2.2	7,887	86.1
Panama	2013	MICS	Upper-middle	2.6	6,115	76.4

*Total Fertility Rate: births per woman, available at https://data.worldbank.org/. Accessed: 7 Jul 2020.
[#]Non-standard survey: *Pesquisa Nacional de Saúde*.

6.3.4. Preliminary results

Total mDFPS and share of female and male sterilization are presented in Table 8. The only country where male sterilization in more prevalent than female sterilization is Bhutan (11% of mDFPS is satisfied by female sterilization and 19% by male sterilization). Preliminary results indicated that India is the country with the larger share of demand for family planning satisfied by female sterilization, where it accounts for 76% of mDFPS. Female sterilization is also the majority of modern method in the Dominican Republic (60%), El Salvador (55%), and Mexico (51%)(Figure 2).

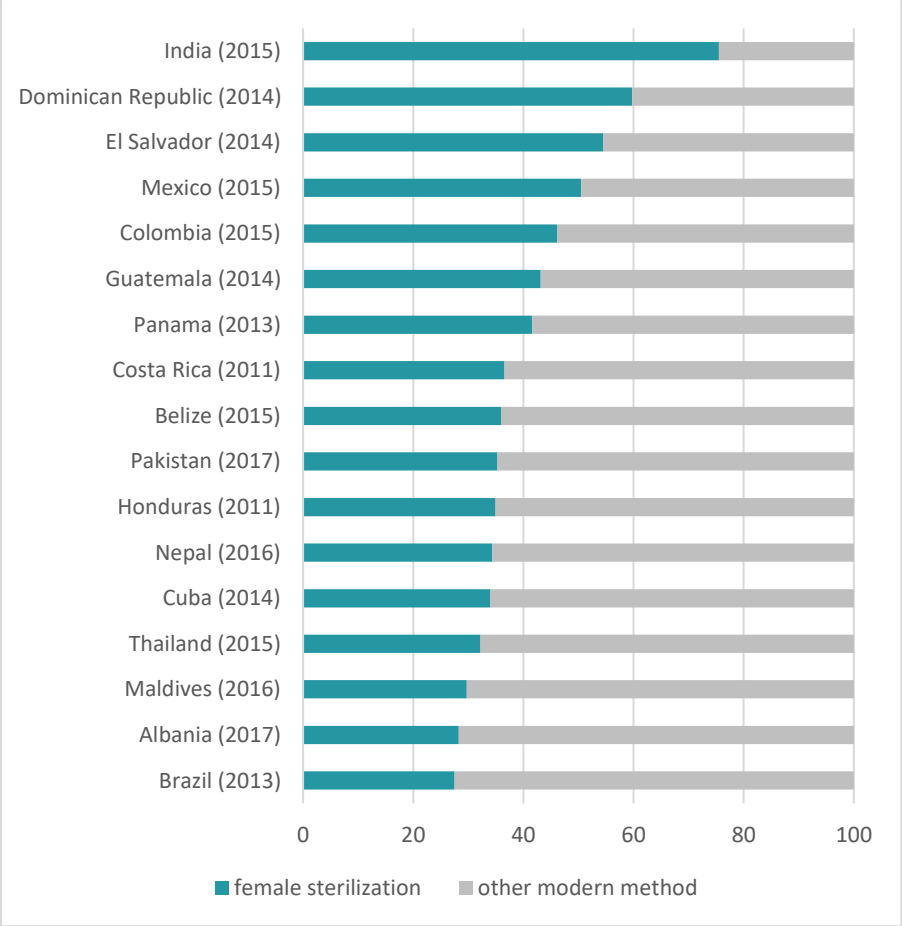

Figure 2 - Share of demand for family planning satisfied by female sterilization in each survey.

Regarding inequalities, Figures 3-6 present the proportion of sterilized women among those who were using any modern method by wealth quintiles, woman's age, number of living children, and intersectionality of younger age (15 to 29 years) and less than 3 living children. Complete results, with the percentage of mDFPS satisfied by PIC, LARC, and SARC, as well as the sample sizes, are presented in the supplementary material. According to wealth, there is no clear pattern. Higher

shares of female sterilization were found among the richest in Dominican Republic, El Salvador, Colombia, Guatemala, Honduras, and Thailand. It was higher among the poorest in India, Pakistan, Albania, and Brazil (Figure 3).

Figure 3 - Share of demand for family planning satisfied by female sterilization in selected countries according to wealth quintiles.

Despite the expected monotonic increase observed with woman's age, the pattern among younger women differs between the countries included in our analysis. In India, about 60% of women aged 25-29 years have their demand for family planning satisfied by sterilization, and it accounts for 40% among women 20-24 years of age. Other countries did not present such a high share of female sterilization, however, the proportion of women younger than 30 years old sterilized was also high in Dominican Republic, El Salvador, Mexico, Colombia, Nepal, Guatemala, Belize, and Honduras (Figure 4).

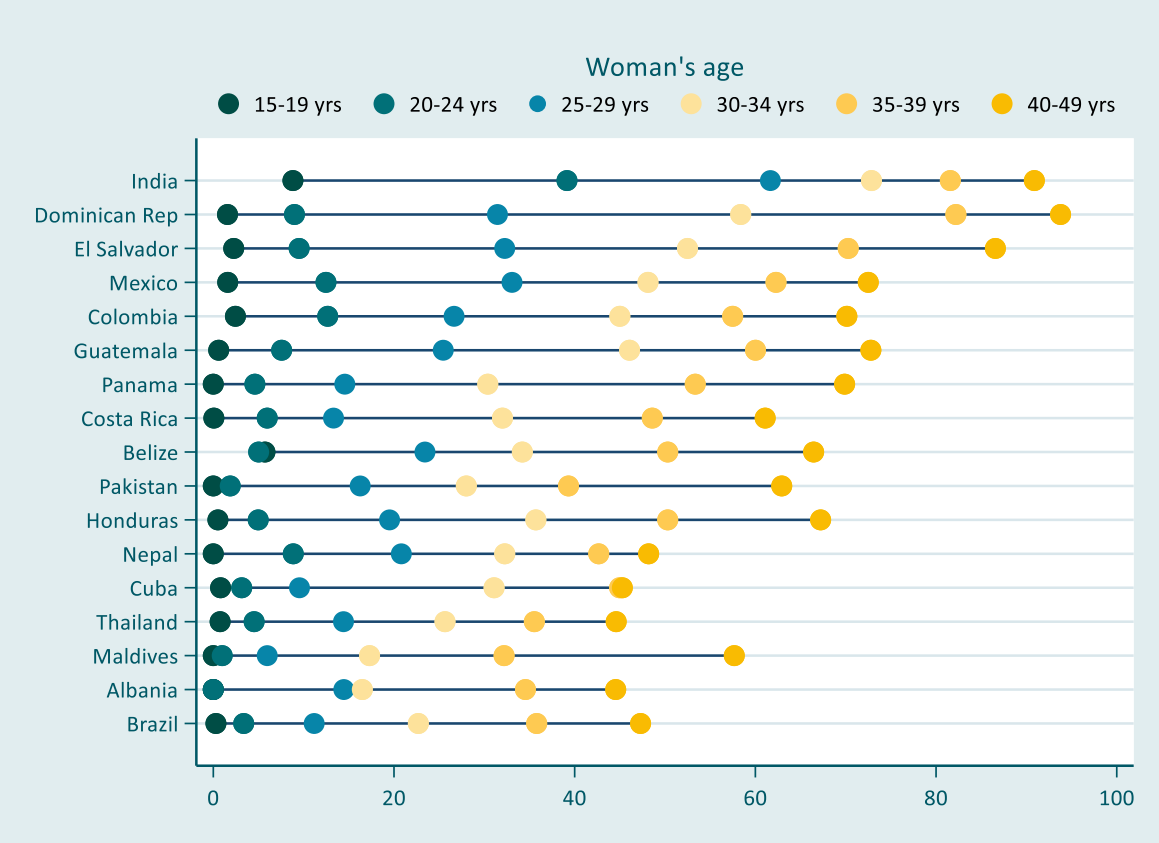

Figure 4 - Share of demand for family planning satisfied by sterilization in selected countries according to woman's age.

There is also a monotonic increase according to the number of living children, with high proportions of sterilized women with 1 or 2 children in India, El Salvador, Colombia, Dominican Republic, Mexico, Nepal, Cuba, and Thailand. India, Mexico, and Cuba presented an important proportion of mDFPS satisfied by female sterilization among women with no child. Brazil also presented a high proportion of women with few children sterilized (Figure 5).

Considering the intersectionality between age and number of living children, we highlighted the share of mDFPS which is satisfied by female sterilization among young women with few children in Figure 6. Most of the countries presented high shares of sterilization, especially among women aged 25 to 29 years who have 1 or 2 living children. The critic setting with a high level of female sterilization use among young women with no child is India. The country also presents higher levels

of female sterilization among young women with only 1 or 2 children, being it almost 20% of the share of mDFPS among adolescents, 38% among women aged 20 to 24, and 58% among women aged 25 to 29 years. Brazil seems to have a high proportion of young women with no child sterilized, however, the sample size of this group is very small (Table 2). Only three countries, Pakistan, Maldives, and Albania, presented small shares of sterilization among young women with few children, as was expected.

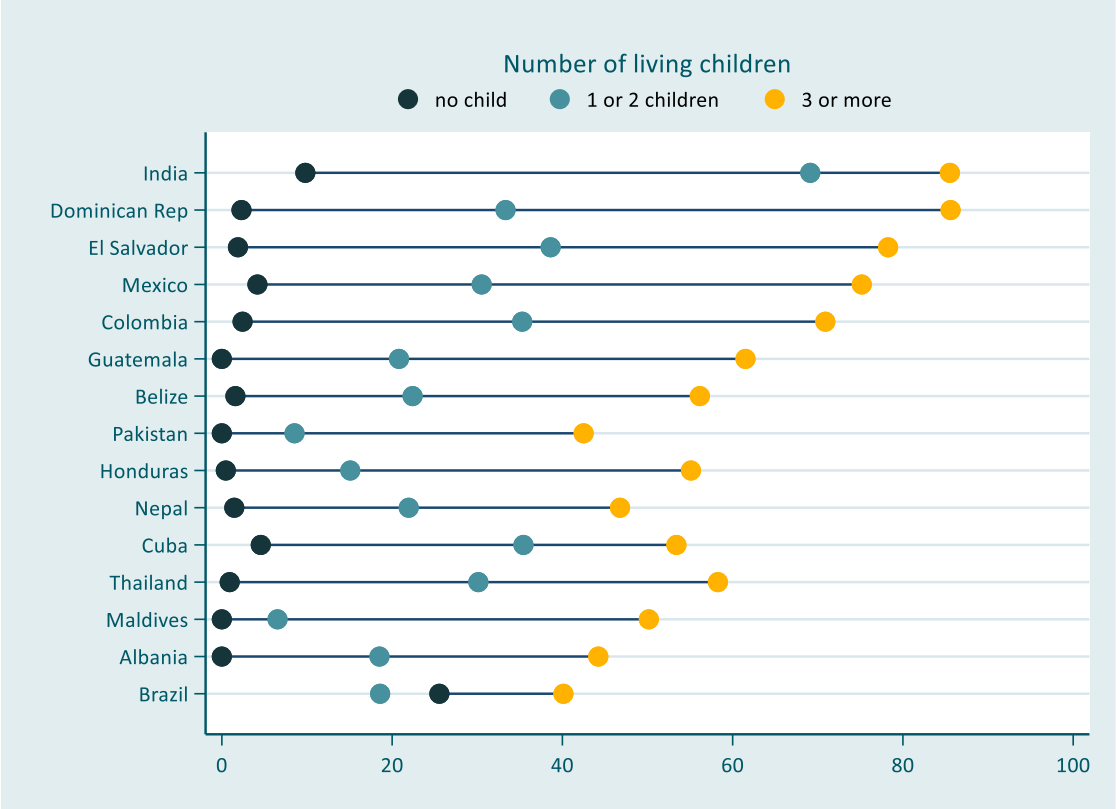

Figure 5 - Share of demand for family planning satisfied by sterilization in selected countries according to the number of living children.

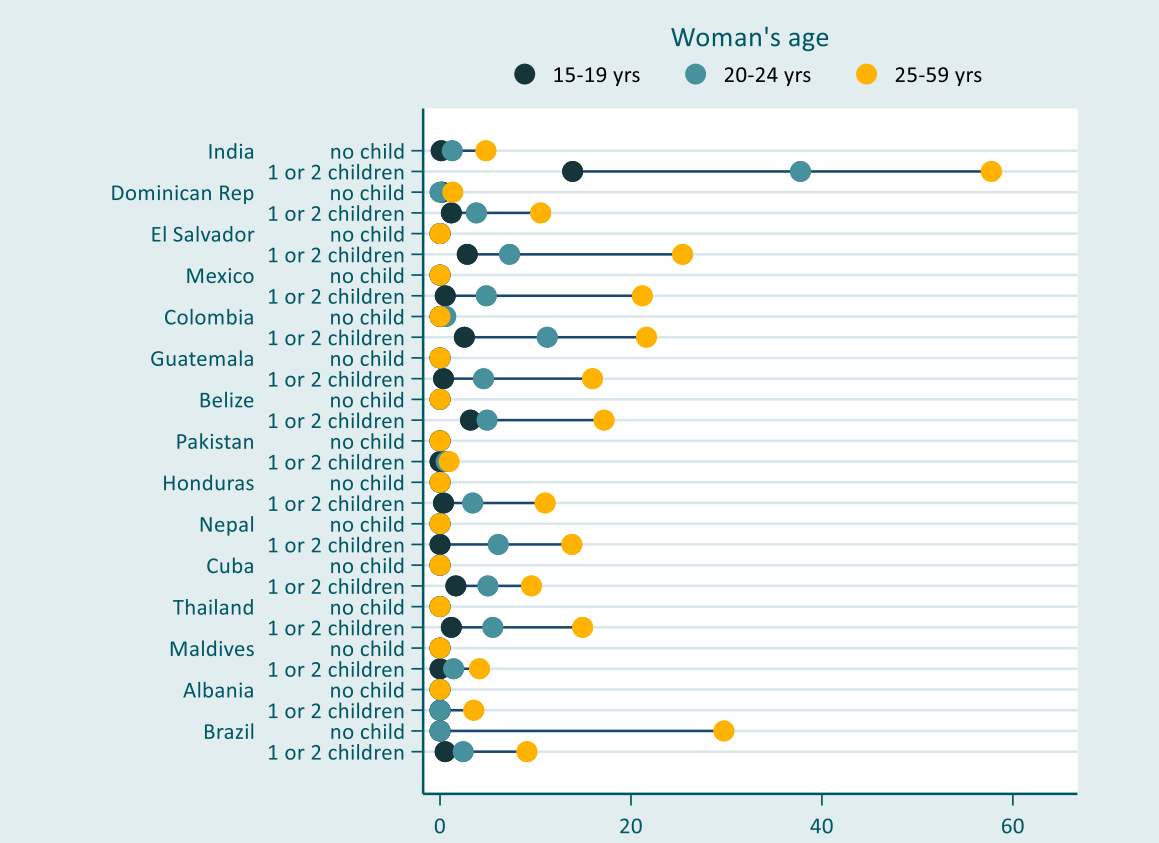

Figure 6 - Share of demand for family planning satisfied by female sterilization among women with less than 3 living children and younger than 30 years old in selected countries.

Table 2 - Share of mDFPS by permanent methods according to double stratification of woman's age and the number of living children. mDFPS % (N).

Country		15-19 yrs	20-24 yrs	25-29 yrs	30-34 yrs	35-39 yrs	40-49 yrs
South Asia							
India (2015)	no child	0.1 (697)	1.3 (1183)	4.8 (671)	18.0 (153)	71.0 (112)	83.3 (164)
	1 or 2	13.9 (1103)	37.8 (15675)	57.8 (30695)	68.8 (29716)	79.2 (25811)	89.2 (32381)
	3 or more	81.1 (6)	74.8 (1870)	75.5 (11460)	79.1 (20713)	84.1 (24922)	92.0 (46482)
Maldives (2016)	no child	0 (1)	0 (17)	0 (4)	0 (7)	0 (7)	0 (0)
	1 or 2	0 (1)	1.4 (41)	4.1 (107)	0.7 (90)	8.9 (57)	35.3 (30)
	3 or more	0 (0)	0 (2)	20.5 (15)	34.9 (91)	47.0 (105)	60.1 (209)
Nepal (2016)	no child	0 (31)	0 (33)	0 (9)	0 (6)	0 (2)	68.7 (2)
	1 or 2	0 (70)	6.1 (327)	13.8 (496)	25.5 (438)	35.1 (300)	37.9 (331)
	3 or more	0 (1)	37.1 (42)	37.5 (219)	40.7 (376)	46.8 (566)	51.6 (977)
Pakistan (2017)	no child	0 (0)	0 (1)	0 (2)	0 (2)	0 (0)	0 (0)
	1 or 2	0 (34)	0.6 (183)	1.0 (198)	11.8 (113)	32.1 (65)	63.6 (24)
	3 or more	0 (1)	5.9 (57)	25.9 (319)	31.2 (586)	40.1 (597)	62.9 (756)
East Asia & the Pacific							
Thailand (2015)	no child	0 (124)	0 (283)	0 (259)	2.7 (142)	0.8 (113)	4.9 (116)
	1 or 2	1.2 (200)	5.5 (685)	15.0 (1095)	23.7 (1526)	32.4 (2048)	41.1 (4055)
	3 or more	0 (0)	37.0 (18)	44.3 (106)	55.2 (210)	60.0 (424)	59.7 (1249)
Europe & Central Asia							
Albania (2017)	no child	0 (0)	0 (12)	0 (2)	0 (0)	0 (2)	0 (0)
	1 or 2	0 (0)	0 (9)	3.5 (20)	4.5 (30)	15.1 (34)	42.8 (41)
	3 or more	0 (0)	0 (0)	50.4 (7)	28.0 (32)	55.3 (35)	46.4 (43)
Latin America & the Caribbean							
Belize (2015)	no child	0 (31)	0 (50)	0 (28)	18.6 (11)	0 (4)	0 (2)
	1 or 2	3.2 (40)	4.9 (172)	17.2 (158)	24.6 (131)	52.4 (73)	51.0 (75)
	3 or more	100 (3)	18.9 (19)	42.9 (85)	44.6 (137)	50.7 (138)	71.4 (265)
Brazil (2013)	no child	0 (4)	0 (15)	29.7 (14)	20.7 (20)	28.9 (31)	41.0 (28)

	1 or 2	0.5 (168)	2.4 (901)	9.1 (1183)	15.4 (1656)	24.6 (1350)	33.4 (1689)
	3 or more	0 (155)	5.2 (641)	14.1 (803)	34.4 (1076)	52.8 (948)	62.0 (1680)
Colombia (2015)	no child	0 (116)	0.6 (237)	0 (137)	4.8 (112)	5.3 (41)	20.4 (37)
	1 or 2	2.6 (366)	11.2 (1394)	21.6 (1935)	35.7 (1771)	47.8 (1472)	63.3 (1886)
	3 or more	41.4 (6)	42.1 (165)	53.2 (503)	69.5 (856)	72.9 (1068)	76.1 (2459)
Cuba (2014)	no child	0 (35)	0 (154)	0 (65)	0 (54)	29.4 (34)	21.2 (34)
	1 or 2	1.7 (34)	5.0 (201)	9.6 (391)	33.5 (393)	42.7 (500)	45.1 (1495)
	3 or more	0 (0)	33.2 (4)	44.1 (18)	50.9 (37)	66.5 (77)	50.2 (217)
Dominican Rep (2014)	no child	0.2 (150)	0 (154)	1.3 (57)	0 (28)	44.1 (5)	81.1 (7)
	1 or 2	1.2 (335)	3.8 (979)	10.5 (1008)	31.0 (769)	66.8 (574)	88.6 (823)
	3 or more	38.4 (9)	48.6 (159)	66.1 (657)	79.0 (1109)	89.4 (1349)	96.3 (2149)
El Salvador (2014)	no child	0 (53)	0 (45)	0 (23)	0 (9)	0 (9)	38.0 (7)
	1 or 2	2.9 (204)	7.3 (549)	25.6 (572)	43.7 (434)	64.9 (324)	83.4 (477)
	3 or more	0 (1)	54.0 (37)	64.7 (143)	64.1 (370)	74.9 (518)	88.5 (969)
Guatemala (2014)	no child	0 (38)	1.8 (32)	0 (14)	0 (5)	0 (2)	0 (2)
	1 or 2	0.4 (310)	4.6 (946)	16.0 (802)	33.6 (584)	47.5 (258)	63.3 (264)
	3 or more	10.9 (10)	34.4 (115)	41.3 (500)	54.0 (951)	63.3 (264)	74.6 (1449)
Honduras (2011)	no child	0 (126)	0 (95)	0 (37)	6.3 (21)	0 (4)	0 (2)
	1 or 2	0.4 (437)	3.4 (1066)	11.0 (951)	21.4 (632)	35.6 (372)	55.1 (278)
	3 or more	68.8 (2)	22.2 (123)	35.4 (555)	46.3 (910)	55.8 (1035)	69.5 (1550)
Mexico (2015)	no child	0 (24)	0 (19)	0 (22)	0 (3)	0 (6)	26.9 (14)
	1 or 2	0.6 (111)	4.9 (508)	21.2 (445)	26.1 (474)	47.8 (367)	57.6 (599)
	3 or more	73.5 (2)	68.3 (74)	57.4 (247)	73.5 (416)	72.5 (558)	83.0 (901)

6.4. Family planning services characteristics and demand for family planning satisfied

6.4.1. Data sources

We will use data from the Performance Monitoring and Accountability 2020 (PMA2020) surveys, which is a series of surveys carried out to monitor progress in achieving the FP2020 goal in 11 priority countries. Countries are from Africa (Burkina Faso, Congo Democratic Republic, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Niger, Nigeria, and Uganda) and Asia (India and Indonesia). PMA2020 is a large-scale, nationally or sub-nationally representative survey, founded by the Bill & Melinda Gates Foundation and led by the Johns Hopkins Bloomberg School of Public Health. Surveys are conducted every six months to one year. In each round, interviews are conducted by local female residents through smartphone technology.

The survey methodology comprises a two-stage cluster design with typically urban-rural and administrative regions as the strata. A representative sample of enumeration areas is drawn from a master sampling frame covered, usually provided by the national statistical agency in each country. Within each enumeration area, a random sample of households is selected. All women aged 15 to 49 years who are either usual members of the household or who slept in the household the previous night are selected to answer the individual questionnaire. At each enumeration area, three types of public health facilities are included in the PMA sample (a lowest-level facility, a primary health center, and a hospital) as well as up to three private health facilities, usually pharmacies or private health clinics. The questionnaire applied to service delivery points is focused on family planning services, including information regarding the availability of methods and the integration of family planning with other services. It also collects information regarding facility characteristics, infrastructure, and staffing (PMA2020, n.d.).

We understand that family planning practices are not easy or quick to change and as the initial year is not the same for all geographies our analysis will be based only on the last survey of each geography. The year and sample size of each geography is presented in Table 3.

6.4.2. Inclusion/exclusion criteria

At the individual level, all women of reproductive age with available information will be included, regardless of their marital status. From the service delivery point dataset, we will include all health facilities with available information.

6.4.3. Data analysis

The main outcome to be analyzed in this article is the mDFPS. Among women who have their demand for family planning satisfied by modern contraceptive methods, we will estimate the share of method groups SARC, LARC, and PIC (here considering both male and female sterilization), and the proportion of them who were informed of other methods, side effects, and what to do in presence of side effects.

Characteristics of health services explored as exposure variables will include:

- if the health facility offers SARC, LARC, or PIC methods, either separately or as a score, representing how many contraceptive groups are offered
- if there is any charge for SAR, LARC, or PIC methods in the facility
- an indicator of how often facilities run out of stock of contraceptives
- presence of higher-level services at an accessible distance[4] (health center or hospital, for example)
- if health facilities have community health workers making contact with residents in the area

Using urban-rural areas for each sub-national unit as strata, we will analyze the association between mDFPS and characteristics of health services through a multilevel model. This will be set up so that mDFPS is the outcome in the model, along with other woman-level characteristics as predictors. Facility-level indicators, aggregated at the stratum level will also be included in this model, as contextual predictors. Using geospatial data, each woman will be linked to the nearest facility, based on straight line distance. One limitation of this analysis is that we do not have information on which facility each woman is using. We realize that other factors may influence women's decision on what facility to use, such as quality of services, type of facility, or confidentiality. However, considering PMA2020 geographies where the distance between facilities is usually large and service density is low, the use of the nearest facility enables us to have reasonable information, on average.

We will run exploratory analyses by each country separately and joining countries together, in a pooled analysis.

[4] The criteria of what we will consider as an accessible distance will be defined during the analysis, based on the average distance in each geography.

Table 3 - Data availability and number of eligible women and facilities in the samples.

Geography	Year	Round	Number of women	Number of facilities
Burkina Faso	2018	6	3,485	101
Congo Democratic Republic (Kinshasa)	2018	7	2,728	186
Congo Democratic Republic (Kongo Central)	2018	7	1,781	124
Cote d'Ivoire	2018	2	2,864	139
Ethiopia	2018	6	7,691	476
Ghana	2017	6	4,394	199
India (Rajasthan)	2018	4	6,076	623
Indonesia	2016	2	11,393	992
Kenya	2018	7	5,776	428
Niger	2017	4	3,180	132
Nigeria (Oyo)	2017	1	1,952	229
Nigeria*	2018	5	11,476	730
Uganda	2018	6	4,454	361

*Oyo region was not included in this survey.

6.5. Pathways to universal access to reproductive health care

6.5.1. Conceptual model

Based on the literature review presented above, we elaborated a conceptual model for use of contraceptives (Figure 7). The model was constructed based on interconnected factors influencing modern contraceptive use at distal, intermediate, and proximal levels. However, giving this study proposes the inclusion of countries from different world regions and with different structures, the weight of each factor on modern contraceptive use depends according to each context.

On the more distal level are the factors related to national characteristics: economic development (Myrskylä et al., 2009; Panopoulou and Tsakloglou, 1999); child mortality, which has indirect impacts on contraceptive use through the relationship between fertility and desired family size (Montgomery and Cohen, 1998; Nanitashvili, 2014; Panopoulou and Tsakloglou, 1999); governance, about quality of institutions and laws regarding contraception among young unmarried women and sterilization (Amaral, 2019; Berquó and Cavenaghi, 2003); government commitment with family planning

programs, through increases in budget and promotion of partnerships with private sector and organizations (Starbird et al., 2016). Partnerships of local government with the private sector and with international organization contributes to the development and availability of more contraceptive methods, of higher quality, and at lower costs (Azmat et al., 2016; Munroe et al., 2015; Munroe and Thurston, 2015). Another factor at national level is international funding, which is particularly important in lower-income countries that depend on it to provide family planning services to a larger proportion of its population (RHSC, 2009). Family planning programs are drivers of family planning practices not only because they reduce contraceptive costs, but also because they provide legitimization to contraceptive practices (Bongaarts, 2014; Panopoulou and Tsakloglou, 1999).

In the next level are characteristics related to social context. Sociodemographic aspects: wealth (Ezeanolue et al., 2015; Kaggwa et al., 2016; Lowe and Moore, 2014); woman's and partner's education (Kaggwa et al., 2016; Padmadas et al., 2014; Panopoulou and Tsakloglou, 1999); woman's occupation (Cavenaghi and Alves, 2019; Kaggwa et al., 2016; Padmadas et al., 2014); cultural background such as religion (Colleran and Mace, 2015; Padmadas et al., 2014; Pinter et al., 2016) and ethnicity (Agadjanian, 2008; Cavenaghi and Alves, 2019); woman's and partner's age (Ezeanolue et al., 2015; Kaggwa et al., 2016); area of residence (Cavenaghi and Alves, 2019; Ezeanolue et al., 2015; Kaggwa et al., 2016; Lowe and Moore, 2014), and women's empowerment (Blackstone, 2017; Do and Kurimoto, 2012; Mboane and Bhatta, 2015; Olaolorun and Hindin, 2014; Prata et al., 2017). Community family planning norms such as family size norms, community exposure to family planning services contraceptive method mix, community acceptance of modern contraception, and age of marriage and first childbirth (Colleran and Mace, 2015; Dynes et al., 2012; Kaggwa et al., 2016).

At the proximal level are characteristics related to reproductive decisions: desired family size (Banerjee and Duflo, 2011) and its difference with the actual number of children (Kaggwa et al., 2016; Panopoulou and Tsakloglou, 1999). Other factors are union (Lowe and Moore, 2014; Sedgh and Hussain, 2014) and if the partner agrees with the woman's desired fertility and with contraceptive use. Partner-related reasons for non-use are an embarrassment to buy, their thought that contraception is not necessary with wives or girlfriends, and loss of pleasure as a result of condom use (Kaggwa et al., 2016; Rakhi and Sumathi, 2012). Characteristics of health services are also proximal determinants of contraceptive use. It is related to infrastructure (Cronin et al., 2018), availability of methods (Fruhauf et al., 2018a; Rakhi and Sumathi, 2012), and integration of family planning with maternal and child health services, especially during antenatal, delivery, and postnatal care (Levine et al., 2001; Malarcher and Polis, 2014). Contact with health professionals and family planning practices through other health

services or mass media are also important tools to provide family planning knowledge (Kaggwa et al., 2016; Levine et al., 2001; Mohan et al., 2020).

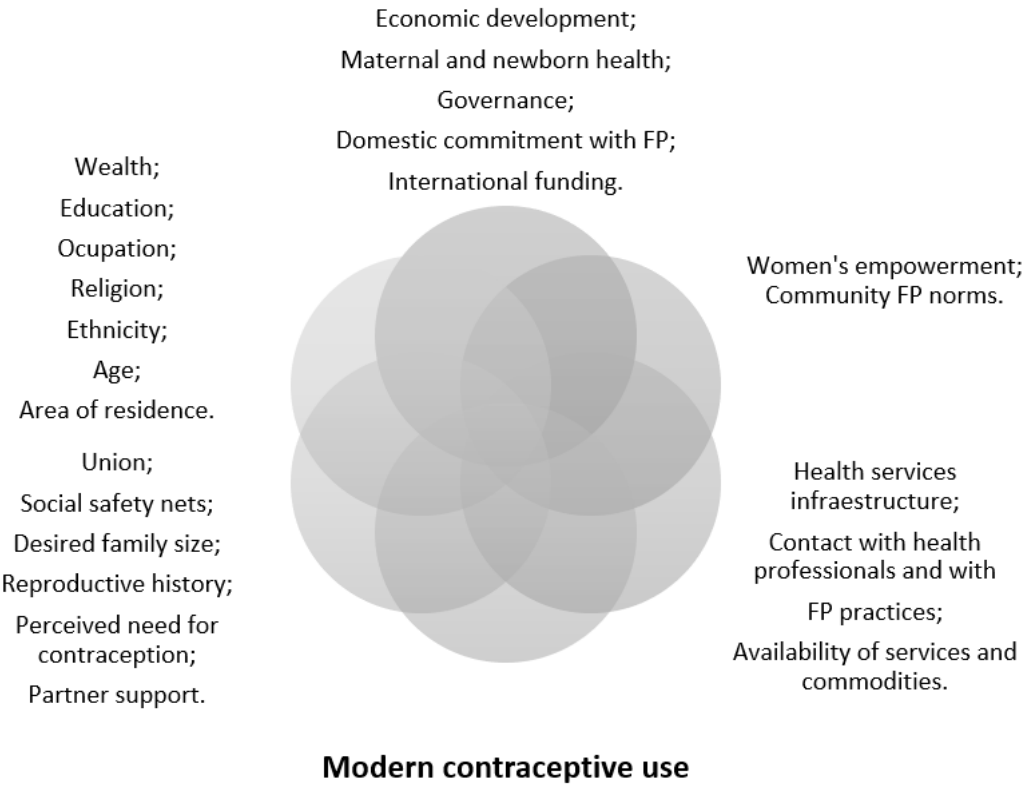

Figure 7 - Conceptual model of modern contraceptive use.

6.5.2. Selected geographies

Based on a previous project on the International Center for Equity in Health (Hellwig et al 2019) and additional pieces of evidence already published (Alkema et al., 2013; United Nations, 2015), we identified countries from all world regions with a successful story of increasing coverage of contraceptive use and reducing inequalities, aiming to investigate pathways to universal coverage in reproductive health.

To obtain an analysis representative of all low- and middle-income regions, without overloading the proposal and loose specificity, we define to include one or two countries per region. We selected one country from the Middle East & North Africa (Egypt), two from Eastern & Southern Africa (Ethiopia and Rwanda), two from South Asia (Afghanistan and Bhutan), one from East Asia & the Pacific (Lao), and three countries from Latin America & the Caribbean (Brazil and Ecuador).

In the Middle East & North Africa, Egypt has high levels of mDFPS with a satisfactory reduction of wealth-based inequalities over time (Hellwig et al., 2019). Egypt had low levels of contraceptive use prevalence during the 1980s and, despite its persistent more conservative religious and social norms, the country almost doubled its contraceptive use prevalence in the 2010s (Table 4). There was no expressive change in the method mix over time, only a slight reduction of LARC and an increase of SARC between 2008 and 2014 (Table 5).

In a previous study of ours (Hellwig et al., 2019), Rwanda was the country with the fastest progress in mDFPS. We identified an average annual absolute increase of 5 percentage points between 2000 and 2014, with important reductions in wealth-based inequalities. The increase was faster between 2005 and 2010, when modern contraceptive use increased from 9% to 44% (Table 5). Another country with very good progress in the region was Ethiopia (Alkema et al., 2013; United Nations, 2015). The country had extremely low levels of modern contraceptive use during the 1990s (3%) and it achieved almost 40% of coverage in the 2010s (Table 4). Both Eastern & Southern African countries had positive changes regarding method mix, with an increase in the use of long-acting reversible contraceptives (Table 5).

Despite its conservative social norms, Afghanistan has succeeded in increasing contraceptive use (United Nations Population Fund (UNFPA), 2016). Even before its commitment with the Family Planning 2020 initiative in 2016, its modern contraceptive use increased from 9% to 20% between the 2000s and the 2010s (Table 4). SARC are the methods most used in the country (Table 5). In South Asia, Bhutan also made good progress (Alkema et al., 2013; United Nations, 2015; United Nations Population Fund (UNFPA), 2016), increasing its modern contraceptive prevalence from 19% to 65% between the 1990s and the 2010s (Table 4). Bhutan has low levels of wealth-related inequality in modern contraception, with SARC being the most used (Table 5).

In East Asia & Pacific, the highest increase in modern contraceptive use was observed in Lao (from 15% to 49% between the 1990s and the 2010s) (Alkema et al., 2013; United Nations, 2015; United Nations Population Fund (UNFPA), 2016). Lao also managed to reduce wealth-based inequalities and presented a slight increase in the use of LARC. SARC are the most used contraceptives there as well (Table 5).

We selected two countries from Latin America & the Caribbean – Brazil and Ecuador. The fastest increase in modern contraception was observed in Ecuador, where coverage increased from 36% to 72% between the 1980s and the 2010s (Table 4). The country also made great progress in the reduction of wealth-related inequalities over time (Table 5). Both short- and long-acting reversible contraceptives are largely used (Table 5). Modern contraceptive use is also high in Brazil, with similar levels of coverage in urban and rural areas and in the five regions of the country since the 2000s (Barros

et al., 2019). In terms of wealth, Brazil also has very low levels of inequality (Ponce de Leon et al., 2019). The most common type of modern contraception in 1996 was permanent contraception (specifically female sterilization), which decreased over time in favor of SARC (Table 5).

Table 4 - Contraceptive prevalence (modern methods) between the 1980s and the 2010s. Source: The World Bank (accessed: 18 Sept 2019).

Country	1980s	1990s	2000s	2010s
Middle East & North Africa				
Egypt	28.7	45.5	56.6	56.9
Eastern & Southern Africa				
Ethiopia	NA	2.9	6.3	37.8
Rwanda	NA	12.9	5.7	47.5
South Asia				
Afghanistan	NA	NA	8.7	19.8
Bhutan	NA	18.8	30.7	65.4
East Asia & the Pacific				
Lao	NA	15.1	28.9	49.0
Latin America & the Caribbean				
Brazil	56.5	70.3	77.1	77.7
Ecuador	35.8	45.9	58.7	71.7

Table 5 - Prevalence of modern contraceptive use and absolute and relative socioeconomic inequality in modern contraceptive use.

Country	Year	Source	CPMO			SARC	LARC	PIC
			%	SII*	CIX*	%	%	%
Middle East & North Africa								
Egypt	1995	DHS	45.5	34.2	12.9	31.6	65.9	2.5
	2000	DHS	53.9	21.4	6.9	31.0	66.4	2.6
	2005	DHS	56.5	11.9	3.6	31.8	66.0	2.2
	2008	DHS	57.6	12.1	3.6	34.8	63.4	1.8
	2014	DHS	56.9	6.8	2.0	44.0	53.9	2.1
Eastern & Southern Africa								
Ethiopia	2000	DHS	6.3	18.9	50.6	92.5	2.5	5.0
	2005	DHS	13.7	33.0	40.3	95.0	2.0	1.2
	2011	DHS	27.3	38.8	24.4	84.5	13.8	1.7
	2016	DHS	35.0	32.0	15.2	70.5	28.3	1.2
Rwanda	2000	DHS	4.3	13.6	50.1	76.3	6.0	17.7
	2005	DHS	9.0	14.5	28.0	89.1	4.9	6.0
	2010	DHS	44.0	14.6	5.7	82.5	15.4	2.0
	2014	DHS	46.5	4.3	1.8	77.9	18.9	3.1
South Asia								
Afghanistan	2010	MICS	19.5	22.8	19.4	89.6	12.0	4.1
	2015	DHS	18.5	17.2	15.9	81.3	8.6	10.2
Bhutan	2010	MICS	65.4	-6.7	-1.8	64.2	5.8	30.1
East Asia & Pacific								
Lao	2011	MICS	42.1	8.9	3.5	85.5	4.0	10.9
	2017	MICS	51.0	6.3	2.0	84.5	7.2	9.0
Latin America & Caribbean								
Brazil	1996	DHS	70.3	21.5	5.3	37.6	1.6	60.8
	2013	NSS	79.4	3.2	0.7	64.7	2.6	32.9
Ecuador	1994	RHS	43.1	37.4	15.0	30.0	28.1	42.0
	1999	RHS	50.4	15.3	11.2	37.0	22.3	41.4
	2004	RHS	58.4	26.2	7.6	41.2	18.6	41.5
	2012	NSS	71.3	4.2	1.0	42.2	40.0	17.8

Source: DHS = Demographic and Health Survey; MICS = Multiple Indicator Cluster Survey; RHS: Reproductive Health Survey; NSS: Non-standard Surveys.
CPMO: Contraceptive use prevalence (modern methods); SARC: short-acting reversible contraceptive; LARC: long-acting reversible contraceptive; PIC: permanent contraceptives.
*SII: Slope Index of Inequality; CIX: Concentration Index.

6.5.3. Data source

In addition to DHS and MICS carried out since 1986, we will use data from the Reproductive and Health Survey (RHS). RHS is also a publicly available, nationally representative cross-sectional survey that collects information on women aged 15 to 49 years. Among the countries selected, there are three rounds of RHS available for Ecuador, between 1994 and 2004.

To obtain a wider range of information, our analysis will include non-standard surveys. A complete list of surveys that will be analyzed in this article is presented in Table 6.

6.5.4. Data analysis

In line with the conceptual model, an ecological approach will be used to carry out statistical analyses to describe the trajectory of each selected country to increase family planning coverage. We will estimate changes in both mDFPS and the mix of contraceptive methods used in each geography.

The increase of mDFPS will be explored according to its social context in terms of wealth, women's education, women's empowerment, social norms, and policies and programs related to family planning.

- Wealth: will be analyzed using the wealth index
- Women's age: in addition to changes in the use of any modern contraceptive method according to groups of age, we will analyze changes in the type of method chosen along the reproductive lifespan
- Women's education: according to the highest level achieved (none, primary, secondary or higher)
- Changes in the average ages of first sexual intercourse, marriage, and first child
- Changes in women's perception regarding their power to refuse marital sex
- Changes in the number of children
- The proportion of women whose last child was not wanted
- Women's empowerment: it will be measured using the Gender Inequality Index (GII). GII is a composite measure, composed of three dimensions: reproductive health (which includes maternal mortality rate and adolescent birth rate); empowerment (proportion of the population with at least a secondary level of education and share of parliamentary sets held by women); and labor market (UN, 2015)

Other predictors which would be relevant to analyze, such as desired family size, are not available for MICS surveys.

For each geography, we will contact a person involved with sexual and reproductive health who can help us to identify the best way to investigate the pathways to UHC of family planning. In each of the above aspects, variables will be included according to recommendations from our partners and according to data availability. Key information to be collected with our partners is presented below:

- Additional surveys which could be used

- Agreement of the predictors included
- Reliable information on the domestic and foreign budget for sexual and reproductive health
- Identified helpers and opposers of family planning practices in the setting, such as religious institutions, ethnic groups, mass media
- Laws related to access to contraceptive methods, such as restriction to access by adolescents or unmarried women
- Provision of family planning services integrated with other health services
- Public policies that could affect demand for family planning

Table 6 - List of data included in the analyses.

Country	Survey	Year
Brazil	DHS	1986
	DHS	1996
	Pesquisa Nacional de Demografia e Saúde	2006
	Pesquisa Nacional de Saúde	2013
	Pesquisa Nacional sobre o Acesso, Utilização e Promoção do Uso Racional de Medicamentos no Brasil	2015
Ecuador	RHS	1994
	RHS	1999
	RHS	2004
	DHS	2012
Lao	MICS	2006
	MICS	2011
	MICS	2017
Afghanistan	Afghanistan Health Survey	2006
	MICS	2010
	DHS	2015
Bhutan	National Health Survey	1994
	NHS	2000
	MICS	2010
Ethiopia	DHS	2000
	DHS	2005
	DHS	2011
	DHS	2016
	PMA2020	2014
	PMA2020	2015
	PMA2020	2016
	PMA2020	2017
	PMA2020	2018
Rwanda	DHS	2000
	DHS	2005
	DHS	2010
	DHS	2014
Egypt	DHS	1995
	DHS	2002
	DHS	2007
	DHS	2012
	DHS	2014

7. Ethical considerations

This research project works with secondary data, for which the ethical responsibility is entirely of the institutions that conducted them in each country. All the surveys have already been approved by each

country's local ethical committee, which eliminates the requirement of this project's ethical approval. Also, the respondent's confidentiality is preserved as all data are anonymous.

Information is collected after the woman agrees with the informed consent read to her. Models of the informed consents used in PMA2020, DHS, and MICS are presented in the supplementary material.

8. Timetable

The activities will follow the chronogram presented below. We expected the conclusion of the course in approximately 32 months.

Table 7 - Chronogram of activities.

Year	2019			2020				2021			
Activity	Mar to Jun	Jul to Sept	Oct to Dec	Jan to Mar	Apri to Jun	Jul to Sept	Oct to Dec	Jan to Mar	Apri to Jun	Jul to Sept	Oct to Dec
ICEH activities											
Literature review											
PhD work planning											
Research Project defense											
Data analysis – Paper 1											
Paper 1 writing											
Data analysis – Paper 2											
Paper 2 writing											
Data analysis – Paper 3											
Paper 3 writing											
Thesis defense											

9. Relevance and impact

The identification of universal access to sexual and reproductive health services as a basic human right has put it as a central priority in the global agenda. Family planning is a fundamental aspect for a better quality of life and socioeconomic development and has been considered an essential intervention.

An approach of progressive coverage, starting with a package of services that will effectively impact a larger proportion of the population, is inherent in a world with limited resources. Several approaches have been implemented to increase access to sexual and reproductive health services in LMICs. Among these, some seem to be more effective than others. Each geography has its method of achieving UHC, given its health system, and its cultural and economic context. Identifying favorable aspects of contexts and policies in a giving setting would help governments and international organizations to promote effective improvements where family planning is still far from achieving UHC. The results of this thesis have great potential to fill this gap and provide a basis for future policies and programs.

The main results of the thesis will be presented at scientific events and published in indexed academic journals. Our results will be also shared with Bill & Melinda Gates Foundation, to be used as a support to their policy design.

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12. Supplementary material

12.1. Preliminary results of article 1.

Table 8 - Countries included in the first step of analysis in article 1, as well as their sample sizes, demand for family planning satisfied by any modern method (mDFPS), and share of permanent methods.

Country	Source	mDFPS		Permanent contraception		
		%	N	female (%)	male (%)	N
West & Central Africa						
Benin (2017)	DHS	24.9	5341	1.4	0.0	1328
Burkina Faso (2010)	DHS	36.6	5518	1.2	0.0	2022
CAR (2010)	MICS	23.8	3438	1.8	0.4	820
Cameroon (2014)	MICS	36.4	2528	1.5	0.0	920
Chad (2014)	DHS	14.0	3791	5.7	0.0	529
Congo Brazzaville (2014)	MICS	37.2	3001	1.2	0.1	1117
Congo Dem Rep (2017)	MICS	23.4	6372	5.2	0.3	1490
Cote dIvoire (2016)	MICS	31.3	3099	1.4	0.7	969
Gabon (2012)	DHS	32.8	2578	3.2	0.1	846
Gambia (2018)	MICS	38.4	3675	1.6	0.1	1412
Ghana (2017)	MICS	41.2	4801	7.0	0.1	1977
Guinea (2016)	MICS	22.3	1598	1.7	0.2	356
Guinea Bissau (2014)	MICS	34.4	1952	1.8	0.0	671
Liberia (2013)	DHS	37.0	2765	1.4	0.0	1022
Mali (2015)	MICS	34.0	6508	1.8	0.0	2213
Mauritania (2015)	MICS	29.4	4631	0.9	0.0	1360
Niger (2012)	DHS	27.7	2956	1.6	0.0	819
Nigeria (2016)	MICS	26.4	9379	2.0	0.1	2478
Sao Tome and Principe (2014)	MICS	52.1	1169	1.5	0.2	609
Senegal (2017)	DHS	52.6	5413	1.5	0.0	2847
Sierra Leone (2017)	MICS	42.0	5339	0.4	0.0	2240
Togo (2017)	MICS	37.5	2650	4.9	0.4	994
Eastern & Southern Africa						
Angola (2015)	DHS	23.8	4111	0.4	0.0	979
Burundi (2016)	DHS	38.3	5699	2.3	0.6	2181
Comoros (2012)	DHS	25.8	1686	6.2	0.0	435
Eswatini (2014)	MICS	85.3	1467	5.7	0.0	1251
Ethiopia (2016)	DHS	60.2	5949	1.2	0.0	3582
Kenya (2014)	DHS	70.5	6577	6.1	0.0	4637
Lesotho (2018)	MICS	84.5	2648	2.6	0.7	2237
Madagascar (2018)	MICS	67.9	6347	1.3	0.2	4308
Malawi (2015)	DHS	74.4	12567	17.8	0.1	9352
Mozambique (2015)	DHS	48.0	2291	1.0	0.1	1100
Namibia (2013)	DHS	74.7	2298	11.6	0.5	1717
Rwanda (2014)	DHS	64.3	5041	2.6	0.5	3243
South Africa (2016)	DHS	77.8	2119	14.3	1.1	1648

South Sudan (2010)	MICS	4.6	1951	4.4	1.2	90
Tanzania (2015)	DHS	52.1	4965	10.7	0.2	2586
Uganda (2016)	DHS	49.7	7555	8.2	0.2	3754
Zambia (2013)	DHS	62.4	6917	4.3	0.1	4318
Zimbabwe (2015)	DHS	84.9	4747	1.2	0.1	4030
Middle East & North Africa						
Algeria (2012)	MICS	80.7	11233	1.1	0.0	9067
Egypt (2014)	DHS	80.0	14553	2.1	0.0	11638
Iraq (2018)	MICS	57.1	12195	8.4	0.3	6963
Jordan (2017)	DHS	55.0	8996	4.2	0.0	4952
Qatar (2012)	MICS	68.4	1854	2.2	3.3	1268
State of Palestine (2014)	MICS	69.1	4900	4.3	0.0	3383
Sudan (2014)	MICS	31.6	4354	0.0	0.0	1378
Tunisia (2018)	MICS	82.6	4457	2.3	0.2	3679
Yemen (2013)	DHS	40.5	9685	9.0	0.3	3920
South Asia						
Afghanistan (2015)	DHS	39.4	13457	10.0	0.2	5304
Bangladesh (2019)	MICS	83.7	36058	5.6	0.9	30178
Bhutan (2010)	MICS	85.8	7640	10.9	19.3	6556
India (2015)	DHS	71.8	339540	75.5	0.6	243814
Maldives (2016)	DHS	29.5	2648	29.7	1.0	782
Nepal (2016)	DHS	56.0	7539	34.4	12.8	4225
Pakistan (2017)	DHS	48.2	6092	35.3	0.2	2938
East Asia & the Pacific						
Cambodia (2014)	DHS	56.1	8183	7.9	0.2	4590
Indonesia (2017)	DHS	77.1	26436	6.6	0.3	20371
Kiribati (2018)	MICS	54.6	1432	24.5	0.8	782
Lao (2017)	MICS	77.3	12239	8.9	0.0	9465
Mongolia (2018)	MICS	70.8	4930	6.3	0.3	3489
Myanmar (2015)	DHS	74.8	5314	9.4	0.5	3973
Philippines (2017)	DHS	56.0	10654	18.7	0.1	5969
Thailand (2015)	MICS	91.9	13770	32.2	0.7	12652
Timor Leste (2016)	DHS	45.8	3947	5.8	0.0	1807
Vietnam (2013)	MICS	73.2	5478	4.9	0.2	4008
Europe & Central Asia						
Albania (2017)	DHS	6.0	4529	28.3	0.0	270
Armenia (2015)	DHS	38.9	2713	2.6	0.0	1057
Belarus (2012)	MICS	76.0	2683	6.3	0.0	2039
Bosnia and Herzegovina (2011)	MICS	23.0	1438	1.6	0.0	330
Kazakhstan (2015)	MICS	85.2	5140	3.3	0.0	4378
Kosovo (2013)	MICS	21.0	2067	4.7	0.4	435
Kyrgyzstan (2018)	MICS	71.0	2218	3.3	0.6	1575
Moldova (2012)	MICS	66.5	2554	10.4	0.0	1699
Montenegro (2018)	MICS	30.6	523	5.7	0.0	160
North Macedonia (2011)	MICS	26.7	1215	5.3	0.0	324
Serbia (2014)	MICS	31.5	1665	2.2	0.0	524

Tajikistan (2017)	DHS	50.4	4030	3.0	0.0	2031
Turkey (2013)	DHS	59.7	5279	19.9	0.1	3152
Turkmenistan (2015)	MICS	78.5	2932	0.5	0.2	2302
Ukraine (2012)	MICS	69.4	3423	2.0	0.0	2376
Latin America & Caribbean						
Barbados (2012)	MICS	70.7	781	8.5	0.2	552
Belize (2015)	MICS	66.0	2155	35.9	0.3	1422
Brazil (2013)	NSS	93.7	10478	27.5	5.4	9818
Colombia (2015)	DHS	86.5	16839	46.1	4.7	14562
Costa Rica (2011)	MICS	89.3	2291	36.6	6.3	2045
Cuba (2014)	MICS	89.7	4168	34.0	0.0	3741
Dominican Rep (2014)	MICS	85.2	12093	59.8	0.2	10298
El Salvador (2014)	MICS	84.8	5596	54.5	0.4	4743
Guatemala (2014)	DHS	65.3	11198	43.1	1.3	7312
Guyana (2014)	MICS	52.4	2145	10.0	0.3	1124
Haiti (2016)	DHS	43.1	5350	3.9	0.5	2306
Honduras (2011)	DHS	76.0	10782	35.0	0.4	8199
Mexico (2015)	MICS	86.1	5558	50.5	1.9	4788
Panama (2013)	MICS	76.4	454185	41.6	0.8	346862
Paraguay (2016)	MICS	86.4	3235	13.3	0.1	2795
St Lucia (2012)	MICS	72.5	516	13.7	0.0	374
Suriname (2018)	MICS	58.7	3151	10.7	0.0	1851
Trinidad and Tobago (2011)	MICS	64.3	1183	21.1	0.2	760

Table 9 - Demand for family planning satisfied by modern methods and share of female sterilization according to wealth quintiles in selected countries.

Country	Wealth quintile	mDFPS		Permanent contraception	
		%	N	%	N
South Asia					
India (2015)	Poorest	61.6	54656	80.3	33678
	Poorer	70.3	65568	77.4	46079
	Middle	74.6	70439	80.2	52513
	Wealthier	74.9	74206	76.7	55610
	Wealthiest	74.9	74671	65.4	55934
Maldives (2016)	Poorest	27.9	495	30.9	138
	Poorer	31.6	578	26.5	183
	Middle	26.7	545	33.6	146
	Wealthier	24.0	551	27.7	132
	Wealthiest	38.3	479	30.5	183
Nepal (2016)	Poorest	54.9	1284	14.2	705
	Poorer	58.1	1502	35.2	872
	Middle	57.7	1542	49.5	889
	Wealthier	56.4	1557	41.1	878
	Wealthiest	53.2	1655	27.7	881
Pakistan (2017)	Poorest	39.6	920	42.9	364
	Poorer	46.6	1106	40.8	516
	Middle	49.1	1304	34.1	641
	Wealthier	51.8	1309	33.1	678
	Wealthiest	50.9	1452	30.7	739
East Asia & the Pacific					
Thailand (2015)	Poorest	95.1	2347	31.2	2233
	Poorer	91.6	2745	30.6	2514
	Middle	91.1	3087	30.5	2812
	Wealthier	91.3	3055	31.8	2791
	Wealthiest	90.8	2535	37.6	2303
Europe & Central Asia					
Albania (2017)	Poorest	6.3	894	40.3	57
	Poorer	6.0	925	33.6	56
	Middle	4.6	862	27.1	40
	Wealthier	6.2	866	16.4	54
	Wealthiest	6.6	981	23.6	65
Latin America & Caribbean					
Belize (2015)	Poorest	52.2	334	28.4	174
	Poorer	63.7	471	35.9	300
	Middle	67.4	481	39.2	324
	Wealthier	70.8	460	37.8	325
	Wealthiest	73.0	409	34.7	298
Brazil (2013)	Poorest	93.0	2432	37.9	2262

	Poorer	93.2	2578	33.6	2403
	Middle	94.9	2731	27.7	2592
	Wealthier	93.4	2809	23.0	2624
	Wealthiest	93.7	2651	16.9	2484
	Poorest	82.1	3579	42.7	2937
	Poorer	86.3	3413	48.2	2945
Colombia (2015)	Middle	87.1	3446	44.8	3001
	Wealthier	89.4	3332	47.9	2979
	Wealthiest	88.0	3069	47.1	2701
	Poorest	84.9	472	32.2	401
	Poorer	87.5	456	33.6	399
Costa Rica (2011)	Middle	88.6	451	40.1	399
	Wealthier	91.9	448	33.7	412
	Wealthiest	93.6	464	42.9	434
	Poorest	79.5	2289	54.9	1819
	Poorer	85.9	2565	59.1	2203
Dominican Republic (2014)	Middle	85.9	2484	60.2	2133
	Wealthier	85.7	2392	59.4	2051
	Wealthiest	88.5	2364	64.5	2092
	Poorest	81.3	1055	45.8	858
	Poorer	83.5	1142	52.1	954
El Salvador (2014)	Middle	85.3	1161	54.1	990
	Wealthier	86.7	1142	57.0	990
	Wealthiest	86.7	1097	62.6	951
	Poorest	47.9	1967	28.5	943
	Poorer	57.5	2051	35.8	1179
Guatemala (2014)	Middle	66.8	2256	43.7	1508
	Wealthier	72.5	2525	46.9	1831
	Wealthiest	77.2	2399	51.0	1852
	Poorest	68.0	1939	25.5	1318
	Poorer	75.4	2074	33.3	1563
Honduras (2011)	Middle	77.9	2249	35.0	1752
	Wealthier	79.2	2348	36.6	1859
	Wealthiest	78.6	2172	42.0	1707
	Poorest	80.7	1084	52.7	875
	Poorer	83.2	1122	51.5	934
Mexico (2015)	Middle	86.0	1161	52.4	998
	Wealthier	88.9	1110	50.4	987
	Wealthiest	92.0	1080	46.0	994
	Poorest	56.1	89755	33.5	50386
	Poorer	78.6	94353	42.8	74163
Panama (2013)	Middle	76.2	93139	47.7	70954
	Wealthier	84.6	93381	38.7	79000
	Wealthiest	86.6	83557	43.2	72359

Table 10 - Demand for family planning satisfied by modern methods and share of female sterilization according to woman's age in selected countries.

Country		mDFPS		Female permanent contraception	
		%	N	%	N
South Asia					
India (2015)	15-19 yrs	26.4	6848	8.8	1806
	20-24 yrs	45.6	41092	39.2	18728
	25-29 yrs	62.6	68430	61.7	42826
	30-34 yrs	74.5	67913	72.9	50582
	35-39 yrs	80.0	63584	81.6	50845
	40-49 yrs	86.2	91675	90.9	79028
Maldives (2016)	15-19 yrs	9.5	20	0.0	2
	20-24 yrs	18.3	321	1.0	59
	25-29 yrs	21.2	594	6.0	126
	30-34 yrs	30.5	617	17.3	188
	35-39 yrs	34.5	488	32.2	168
	40-49 yrs	39.3	608	57.7	239
Nepal (2016)	15-19 yrs	24.9	409	0.0	102
	20-24 yrs	37.0	1088	8.9	403
	25-29 yrs	48.7	1485	20.8	723
	30-34 yrs	57.0	1436	32.3	819
	35-39 yrs	67.1	1293	42.7	867
	40-49 yrs	71.6	1829	48.2	1310
Pakistan (2017)	15-19 yrs	23.3	150	0.0	35
	20-24 yrs	35.3	685	1.9	242
	25-29 yrs	42.6	1216	16.3	518
	30-34 yrs	47.9	1463	28.0	700
	35-39 yrs	53.1	1246	39.3	662
	40-49 yrs	58.6	1331	62.9	781
East Asia & the Pacific					
Thailand (2015)	15-19 yrs	85.5	378	0.8	324
	20-24 yrs	88.8	1110	4.5	986
	25-29 yrs	90.5	1613	14.4	1460
	30-34 yrs	92.3	2034	25.6	1878
	35-39 yrs	92.5	2795	35.5	2585
	40-49 yrs	92.8	5840	44.6	5419
Europe & Central Asia					
Albania (2017)	15-19 yrs	5.5	68	0.0	4
	20-24 yrs	5.1	408	0.0	21
	25-29 yrs	3.7	761	14.4	28
	30-34 yrs	7.5	835	16.5	63
	35-39 yrs	8.8	802	34.6	71
	40-49 yrs	5.1	1654	44.5	84
Latin America & Caribbean					
Belize (2015)	15-19 yrs	46.8	157	5.7	74

	20-24 yrs	57.8	417	5.0	241
	25-29 yrs	65.1	416	23.4	271
	30-34 yrs	70.6	395	34.2	279
	35-39 yrs	69.4	311	50.3	216
	40-49 yrs	74.6	458	66.5	342
Brazil (2013)	15-19 yrs	91.9	356	0.3	327
	20-24 yrs	92.8	1677	3.4	1557
	25-29 yrs	92.2	2169	11.2	2000
	30-34 yrs	94.0	2929	22.7	2753
	35-39 yrs	93.6	2489	35.8	2330
	40-49 yrs	94.9	3580	47.3	3397
Colombia (2015)	15-19 yrs	71.8	680	2.5	488
	20-24 yrs	82.1	2188	12.7	1795
	25-29 yrs	87.2	2953	26.6	2576
	30-34 yrs	88.5	3094	45.0	2739
	35-39 yrs	88.7	2910	57.5	2582
	40-49 yrs	87.4	5014	70.1	4382
Costa Rica (2011)	15-19 yrs	76.5	102	0.1	78
	20-24 yrs	87.7	305	6.0	267
	25-29 yrs	82.5	377	13.3	311
	30-34 yrs	88.6	444	32.0	394
	35-39 yrs	95.0	366	48.6	348
	40-49 yrs	93.0	697	61.1	648
Cuba (2014)	15-19 yrs	72.8	94	0.8	69
	20-24 yrs	85.1	421	3.1	358
	25-29 yrs	90.8	522	9.5	474
	30-34 yrs	92.3	523	31.1	483
	35-39 yrs	92.5	660	45.0	611
	40-49 yrs	89.7	1948	45.3	1746
Dominican Republic (2014)	15-19 yrs	67.7	729	1.6	493
	20-24 yrs	74.1	1716	9.0	1272
	25-29 yrs	81.3	2119	31.5	1722
	30-34 yrs	86.2	2211	58.4	1906
	35-39 yrs	91.6	2103	82.2	1927
	40-49 yrs	92.6	3215	93.8	2978
El Salvador (2014)	15-19 yrs	71.1	361	2.3	257
	20-24 yrs	76.7	824	9.5	631
	25-29 yrs	82.9	890	32.3	738
	30-34 yrs	85.1	956	52.5	813
	35-39 yrs	87.1	977	70.3	851
	40-49 yrs	91.5	1589	86.6	1453
Guatemala (2014)	15-19 yrs	50.1	712	0.6	357
	20-24 yrs	58.3	1874	7.6	1093
	25-29 yrs	62.3	2111	25.5	1316
	30-34 yrs	67.2	2290	46.1	1539
	35-39 yrs	69.2	1868	60.0	1292

	40-49 yrs	73.2	2345	72.8	1715
Honduras (2011)	15-19 yrs	67.4	839	0.5	565
	20-24 yrs	74.5	1725	5.0	1284
	25-29 yrs	74.9	2059	19.5	1543
	30-34 yrs	79.1	1977	35.7	1565
	35-39 yrs	79.0	1786	50.3	1411
	40-49 yrs	76.4	2395	67.2	1830
Mexico (2015)	15-19 yrs	63.1	217	1.6	137
	20-24 yrs	77.6	774	12.5	601
	25-29 yrs	79.7	895	33.1	713
	30-34 yrs	86.9	1026	48.1	892
	35-39 yrs	90.8	1025	62.3	932
	40-49 yrs	93.4	1620	72.5	1513
Panama (2013)	15-19 yrs	36.0	17222	0.0	6207
	20-24 yrs	64.2	67341	4.6	43234
	25-29 yrs	71.8	72455	14.6	52044
	30-34 yrs	76.6	85421	30.4	65470
	35-39 yrs	80.7	81110	53.3	65415
	40-49 yrs	87.6	130636	69.9	114492

Table 11 - Demand for family planning satisfied by modern methods and share of female sterilization according to number of living children in selected countries.

Country		mDFPS		Female permanent contraception	
		%	N	%	N
South Asia					
India (2015)	no child	28.9	10327	9.8	2980
	1 or 2	69.9	193679	69.1	135381
	3 or more	77.8	135535	85.5	105453
Maldives (2016)	no child	18.8	187	0.0	35
	1 or 2	22.9	1423	6.5	325
	3 or more	40.6	1038	50.2	421
Nepal (2016)	no child	22.8	359	1.5	82
	1 or 2	49.5	3969	22.0	1963
	3 or more	67.9	3211	46.8	2180
Pakistan (2017)	no child	5.7	97	0.0	6
	1 or 2	38.7	1596	8.5	617
	3 or more	52.6	4398	42.5	2315
East Asia & the Pacific					
Thailand (2015)	no child	84.1	1231	0.9	1035
	1 or 2	92.5	10386	30.1	9610
	3 or more	93.2	2153	58.3	2007
Europe & Central Asia					
Albania (2017)	no child	7.4	264	0.0	19
	1 or 2	4.4	3085	18.5	134
	3 or more	9.9	1180	44.2	117
Latin America & Caribbean					
Belize (2015)	no child	43.9	288	1.6	126
	1 or 2	68.7	944	22.4	648
	3 or more	70.1	923	56.1	647
Brazil (2913)	no child	89.4	7772	18.6	6948
	1 or 2	94.7	118	25.6	112
	3 or more	92.3	5748	40.1	5305
Colombia (2015)	no child	68.7	991	2.4	680
	1 or 2	86.3	10222	35.3	8824
	3 or more	89.9	5626	70.9	5057
Cuba (2014)	no child	86.1	436	4.6	376
	1 or 2	90.4	3334	35.4	3014
	3 or more	88.3	398	53.4	351
Dominican Republic (2014)	no child	67.4	564	2.3	380
	1 or 2	80.5	5571	33.3	4487
	3 or more	91.2	5958	85.6	5431
El Salvador (2014)	no child	52.2	278	1.9	145
	1 or 2	84.2	3039	38.6	2559
	3 or more	89.4	2279	78.3	2038

Guatemala (2014)	no child	29.1	317	0.0	92
	1 or 2	63.8	4961	20.8	3164
	3 or more	68.5	5920	61.5	4056
Honduras (2011)	no child	54.1	526	0.5	285
	1 or 2	76.4	4894	15.1	3737
	3 or more	77.9	5362	55.1	4176
Mexico (2015)	no child	56.4	154	4.2	87
	1 or 2	84.0	2981	30.5	2503
	3 or more	90.7	2422	75.2	2197

12.2. Informed consent of service delivery point questionnaire of PMA2020. Uganda, 2018.

INFORMED CONSENT

Find the competent respondent responsible for patient services (main administrator and family planning in-charge) who is present at the facility. Read the greeting on the next screen:

Hello. My name is _____. We are working with the School of Public Health, college of Health Sciences, Makerere University, in collaboration with the Ministry of Health, and the Uganda Bureau of statistics. Your facility was randomly selected to participate in this study. We would like to ask you questions about family planning, post-abortion care, and other reproductive health services and will ask to see client registers. No client names from the registers will be reviewed, recorded, or shared. The information about your facility may be used by health organizations for planning service improvements or further studies of health services. The data collected from your facility will also be used by researchers for analyses. However, the name of your facility will not be provided, and any reports by researchers who use your facility's data will only present information in aggregate form so that your facility cannot be identified.

We are asking for your help to ensure that the information we collect is accurate. If there are questions for which someone else is the most appropriate person to provide the information, we would appreciate your introducing us to that person.

You may refuse to answer any question or choose to stop the interview at any time. Do you have any questions about the survey?

009a	Provide a paper copy of the Consent Form to the respondent and explain it. Then, ask: **May I begin the interview now?**	Yes ..... 1 No..... 0	008=1
009b	**Respondent's signature** *Please ask the respondent to sign or check the box in agreement of their participation.*	Gather signature: Check box: ☐	009a=1

12.3. Informed consent of woman's questionnaire of PMA2020. Ethiopia, 2018.

	◯ Not acquainted
008. Has the respondent previously participated in PMA 2020 surveys?	006 = 1 ◯ Yes ◯ No ◯ Do not know ◯ No response
INFORMED CONSENT *Find the woman between the age of 15-49 associated with this Female Respondent Questionnaire. The interview must have auditory privacy. Read the following greeting*	
Hello. My name is _____ and I am working for the Addis Ababa University, and Federal Ministry of Health. We are conducting a local survey that asks women about various reproductive health issues. We would very much appreciate your participation in this survey. This information will help us inform the government to better plan health services. The survey usually takes between 15 and 20 minutes to complete. Whatever information you provide will be kept strictly confidential and will not be shown to anyone other than members of our survey team. Participation in this survey is voluntary, and if we should come to any question you don't want to answer, just let me know and I will go on to the next question; or you can stop the interview at any time. However, we hope that you will participate in this survey since your views are important. At this time, do you want to ask me anything about the survey?	
009a. May I begin the interview now?	◯ Yes ◯ No
010. Interviewer's name Please record your name as a witness to the consent process. You previously entered "[Interviewer's name]."	

Section 1 – Respondent's Background, Marital Status, Household characteristics

12.4. Informed consent of woman's questionnaire of DHS. Rwanda, 2014.

SECTION 1. RESPONDENT'S BACKGROUND

INTRODUCTION AND CONSENT

INFORMED CONSENT

Hello. My name is _____. I am working with the National Institute of Statistics of Rwanda. We are conducting a survey about health all over Rwanda. The information we collect will help the government to plan health services. Your household was selected for the survey. The questions usually take about 30 to 60 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.
Do you have any questions? May I begin the interview now?

SIGNATURE OF INTERVIEWER: _____ DATE: _____

RESPONDENT AGREES TO BE INTERVIEWED . . . 1 ↓ RESPONDENT DOES NOT AGREE TO BE INTERVIEWED . . . 2→ END

12.5. Informed consent of woman's questionnaire of MICS. Bhutan, 2010.

Bhutan Multiple Indicator Survey (BMIS)

QUESTIONNAIRE FOR INDIVIDUAL WOMEN

WOMAN'S INFORMATION PANEL WM	
This questionnaire is to be administered to all women age 15 through 49 (see column HL7 of Household Listing Form). Fill in one form for each eligible woman	
WM1. Block/Chiwog name and code: _____ ___ ___ ___	WM1A. Gewog/Town name and code: ___ ___ ___
WM1B. Dzongkhag Name & Code: _____ ___ ___	WM2. Household serial number: ___ ___
WM3. Woman's name: Name_____	WM4. Woman's serial number: ___ ___ _
WM5. Interviewer name and number: Name_____ ___ ___	WM6. Day / Month / Year of interview: ___ ___ / ___ ___ / ___ ___ ___ ___

Repeat greeting if not already read to this woman:

We are from National Statistics bureau. We are conducting a survey on the situation of household, women and children. I would like to talk to you about these subjects. The interview might take about 30 minutes. All the information we obtain will remain strictly CONFIDENTIAL. While your participation is voluntary it is of utmost importance that you respond to the survey as the results will help the government in planning and decision making.

If greeting at the beginning of the household questionnaire has already been read to this woman, then read the following:

Now I would like to talk to you more about your health and other topics. This interview will take about 30 minutes. Again, all the information we obtain will remain strictly CONFIDENTIAL

If you have no objection, may I start now?

☐ Yes, permission is given ⇒ *Go to WM10 to record the time and then* begin the interview.

☐ No, permission is not given ⇒ Complete WM7. Discuss this result with your supervisor.

Project adjustments along the course of the work

During the development of the analysis, we faced several barriers that led us to adjust a couple of methodological aspects in relation to the project presented in 2020.

Concerning the first article, published in Contraception, we changed the categorization of the exploratory variable of number of living children. We had initially considered exploring inequalities in three groups: no living child, 1 or 2 living children, or 3 or more. However, the number of women at reproductive age without a living child was too small in most of the countries. Therefore, we classified it as 0 or 1 living child, 2 children, or 3 or more living children. Compared with the preliminary results presented in the project, we have also included more countries, based on data availability. The initial idea for the second article was to evaluate the impact of the characteristics of health facilities on the use of family planning methods linking individual and facility data from PMA2020 surveys. Using a probabilistic linkage approach, we considered the number of enumeration areas (EAs) and the type of contraceptive used/offered by the women/facility as matching variables. However, we faced a very low match rate for some countries, with differences between matched and unmatched pairs regarding women's wealth and area of residence. Non-match rates were higher for the richest and those living in rural areas. We then noticed that several EAs presented in the women's questionnaire were not present in the service delivery point questionnaire (SDP). In addition, some EA from the SDPs had only one health facility. We identified that the countries with low match rates presented limited data on private health facilities (BLUMENBERG; HELLWIG; BARROS, 2021). Given these limitations in the sampling methodology of PMA2020 surveys and considering that the characteristics of the health providers are related to the type of service, we replaced this initial idea to a study of differences in the source of family planning services by women's age and, among adolescents, by their marital status. The plan of analysis of the second paper is presented below. About the article on pathways to universal access to family planning services, published at Gates Open Research, we opted to exclude Bhutan and Lao since we were not able to access previous surveys of these countries, making it impossible to compare time trends in mDFPS, method mix, and in inequalities in coverage.

Plan of analyses of the original article 2

Background

Universal access to family planning services goes far beyond the achievement of a high level of coverage. One key aspect of universal health coverage is equitable access to high-quality services without financial hardship. Although some countries have built their strategies to increase modern contraceptive use strongly in the public sector, several others have argued that it would be necessary to involve private and nongovernmental organizations to achieve universal access.

There are natural differences in the choice of the source according to the choice of method. Women may seek family planning services from nonmedical providers if they are looking for short-acting reversible methods and medical facilities to get long-acting reversible or permanent methods. However, the choice of method source may also depend on services characteristics such as the level of privacy, the proximity of care, the provision of family planning knowledge, and their adequacy to attend to the needs of specific subgroups (FRUHAUF, TIMOTHEE; ZIMMERMAN, LINNEA; KIBIRA, SIMON PETER SEBINA; MAKUMBI, FREDRICK et al., 2018; SHAH, NIRALI M; WANG, WENJUAN; BISHAI, DAVID M, 2011). These intrinsic characteristics are highly variable between public and private facilities, especially among unmarried adolescents who are still under restrictive contraception policies or unfavorable attitudes of health providers and community leaders in several countries (COLL; EWERLING; HELLWIG; DE BARROS, 2019; DENNIS; BENOVA; OWOLABI; CAMPBELL, 2018; KANANURA; WAISWA; MELESSE; FAYE et al., 2021).

Methods

The study will be conducted based on the following research questions:

1. Are adolescents still lagging behind in terms of family planning?
2. Where do women from different age groups seek family planning services?
3. If there are differences in coverage and source of method by age, is the source of method different according to the marital status of the adolescents?

Due to data availability on demand for family planning satisfied by modern methods and source of method, analysis will be conducted using data from 59 DHS surveys conducted in low- and middle-income countries from 2010 onwards. The first outcome will be the demand for family planning satisfied by modern methods (mDFPS), defined as the proportion of women who were using (or whose partner was using) a modern contraceptive method among all those in need of contraception. A woman is considered in need of contraception if she is sexually active, fecund, and does not want to become pregnant within 2 years, or if she is unsure about whether or when she wants to become

pregnant. Pregnant women with a mistimed or unintended pregnancy are also considered in need of contraception. Methods are classified as modern if they are medical procedures or technological products, including oral contraceptive pills, injections, male and female condoms, diaphragms, spermicidal agents, emergency contraception, intrauterine devices (IUD), implants, and sterilization (female or male).

All modern contraceptive users were asked where they obtained the contraceptive method in the most recent time. To evaluate the proportion of modern contraceptive users who paid for the current method and where they get it, the source of method will be classified into five groups: (I) public sector, including all governmental institutions; (II) private for-profit, considering private hospitals, clinics, doctors, pharmacies and shops; (III) private non-profit, including non-governmental organizations, religious institutions, and specific programs such as free distribution at schools; (IV) friends, relatives or relay; and (V) other sources (not specified or not answered).

To contextualize the use of family planning services among adolescents, mDFPS and source of method will be first explored among all sexually active women, considering their age (15-19 years, 20-34 years, 35-49 years). The second analysis will be conducted only among adolescents, considering their marital status (married or unmarried).

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Fieldwork

The routine of the students based at the International Center for Equity in Health (ICEH) involves secondary data analysis. Therefore, instead of presenting the fieldwork experience, this section will rely on the activities I was involved at the ICEH during this period.

International Center for Equity in Health

The ICEH focuses on monitoring inequalities in health, especially in maternal and child health in low- and middle-income settings. The ICEH was created by a team of researchers from the Federal University of Pelotas known for their wide experience in equity research, and the Center currently provides relevant data to the WHO's Global Health Observatory Health Equity Monitor and the Countdown to 2030 Initiative for monitoring health equity in low- and middle-income countries. Among the main activities of the ICEH are the analyses of relevant data sources, particularly Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and other non-standard national health surveys to generate a standardized set of indicators and assess the inequalities related to them. The analyzes are performed periodically as new survey data is released. The ICEH team is subdivided into four main groups that are responsible for the analyses of a set of related indicators: (1) fertility and mortality; (2) Maternal, Newborn, and Child health; (3) Nutrition; and (4) Reproductive health, Sanitation, and Malaria. During most of my PhD period, I have led the Maternal, Newborn, and Child health group, which comprises a set of indicators related to antenatal care, delivery, postnatal care, vaccination, case-seeking for illness, and child development. In August 2022, I started to work in the group of Reproductive health, Sanitation, and Malaria, which comprises the indicators related to sexual and reproductive health, women's empowerment, child marriage, gender-based violence, tobacco use, sanitation, use of improved sources of water, and prevention and treatment of malaria.

The analysis routine includes writing and checking the codes, running the analyses, checking whether the national estimate was consistent with the published estimates, and, when there was an inconsistency, identifying the reason for the differences. In addition, we constantly check the integrity of our datasets and if new results are consistent with time trends and if the stratified results are coherent with the patterns we have already identified as common, such as higher levels of coverage among those from more privileged subgroups. All potential issues are double checked, and the validity of the estimates is confirmed before integrating new results into our database.

Specific tasks

In addition to the analysis routine, the ICEH also has various projects with specific analyses being produced for different organizations. The article of my master's and the third article of my PhD were directly related to a project funded by the Bill and Melinda Gates Foundation, so I was one of the main

researchers working in all phases of this project. The first phase of the project relied on the evaluation of time trends in mDFPS. In this analysis, published in my master's dissertation, we identified that some countries made enormous progress in increasing mDFPS coverage and reducing inequalities. The following phase of this project aimed to explore the contexts that allow the progress we observed, and it resulted in the third article of this thesis. For the last phase of the project, we prepared a report specifically on policies and programs implemented in these successful countries. For this analysis, we had the help of local experts from all the countries that helped us to identify all relevant documents and interpret the findings given their experience on how all those policies took effect in the real world. In this report, we identified that several strategies were developed to increase the coverage of family planning in these countries, especially involving the inclusion of family planning in primary care and the training of community health providers to provide knowledge and methods of contraception. In addition, in almost all of them, family planning is recognized as a human right and universal coverage as fundamental. The report is turning into a literature review article to be submitted for publication in a peer-reviewed journal in the following months.

Given the association between family planning and gender equality, I was also involved in two projects related to women's empowerment. One of them, also funded by the Bill and Melinda Gates Foundation, involved the validation of the Survey-based Women's emPowERment (SWPER) index, initially developed for African countries (EWERLING; LYNCH; VICTORA; VAN EERDEWIJK et al., 2017), to all low- and middle-income countries. The article was published in December 2020 in the Journal of Global Health (EWERLING; RAJ; VICTORA; HELLWIG et al., 2020). In the last phase of this project, we conducted a literature review of the measures that have been proposed in the literature for women's empowerment, which is also being turned into an article to be submitted to a peer review journal. In this report, I contributed especially in a section of review of reviews of the association between women's empowerment and health outcomes. Concerning sexual and reproductive health, we identified four literature reviews that summarized the evidence on its association with women's empowerment (JAMES-HAWKINS; PETERS; VANDERENDE; BARDIN et al., 2018; NKHOMA; LIN; KATENGEZA; SOKO et al., 2020; PRATA; FRASER; HUCHKO; GIPSON et al., 2017; UPADHYAY; GIPSON; WITHERS; LEWIS et al., 2014). Among those, the strongest and most consistent associations found were with outcomes related to modern contraceptive use, with empowerment represented by a composite score or index composed of several variables related to decision-making and women's freedom of movement.

I was also involved in a project with the Countdown to 2030 and the International Development Research Centre. The focus of this project was to investigate the intersectionality between the sex of the household head and health outcomes. The project aimed to quantify the proportion of female headed households in low- and middle-income countries and to compare the health of women and children living in such households to those living in households headed by men. As the first steps of this project, we organized workshops with local experts from the Middle East and Africa, aiming to better understand the contexts that led the households to be headed by a woman and to provide training in the monitoring of inequalities by household typologies in health. I was able to participate in one of those workshops, which took place in Dakar, Senegal, in November 2019.

As final products of this project, we are working on five original articles, one about defining and describing female headed-household typologies (SAAD; GHATTAS; WENDT; HELLWIG et al., 2022) and four articles exploring inequalities in health outcomes by household headship. One study is already published, in which we explored inequalities in immunization coverage and stunting prevalence (WENDT; HELLWIG; SAAD; FAYE et al., 2021). In the other two articles, we explored inequalities in birth registration (accepted for publication in BMC Public Health) and in women's empowerment by household headship. I am the first author of the fifth article, focused on inequalities in demand for family planning satisfied by the sex of the household head, submitted to the Journal of Global Health in August 2022.

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Original Research Article

The role of female permanent contraception in meeting the demand for family planning in low- and middle-income countries☆,☆☆

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ABSTRACT

Objective: Our aim was to describe the reliance on female permanent contraception among women with demand for family planning satisfied with modern methods (mDFPS) in low- and middle-income countries (LMICs) and to describe socio-economic and demographic patterns of permanent contraception in countries with high use.

Study Design: Using data from the latest national health survey carried out in LMICs, we estimated mDFPS and the share of each contraceptive method used. Countries with a share of more than 25% of female permanent contraception were further explored for differences by wealth, number of living children, woman's age, and by the intersection of woman's age and number of living children.

Results: In the 20 countries studied, between 6% and 94% of the contracepting population used modern methods. Female permanent contraception accounted for more than half of women using modern contraceptives in India, Dominican Republic, El Salvador, Mexico, and Colombia. In India and Tonga, more than 20% of women using contraceptives with fewer than 2 living children were using female permanent contraception. Among women with 2 living children, countries with the highest reliance on permanent contraception were India (79%), El Salvador (61%), Cuba (55%), Colombia (52%), and Thailand (51%). Dominican Republic, El Salvador, India, and Mexico presented high levels of permanent contraception among younger women, with reliance higher than 30% among women aged 25 to 29 and 50% or more among women aged 30 to 34.

Conclusions: Reliance on permanent contraception was high in several countries and among women aged less than 35 years.

Implications: Our results may help policymakers and health managers improve family planning services in low- and middle-income settings. We identified high use of female permanent contraception among modern contraceptive users in several countries, even among young women with fewer children.

1. Introduction

Satisfied demand for family planning has increased in most low- and middle-income countries (LMICs) in the past decades [1–4], with several countries reaching above 70% of coverage [5]. However, despite the development and improvement of reversible modern contraceptives and the concomitant decrease in the use of female permanent contraception [6], the proportion of female contraceptive users relying on it is still large in several countries [7,8]. Permanent contraception is the predominant method in India, Dominican Republic and Mexico, where it accounts for 70%, 66%, and 58%, respectively, of modern contraceptive use among women [7,8].

Permanent contraception is highly effective and does not require any further action to prevent pregnancy [9]. However, the main concerns of permanent contraception are its invasive nature and irreversibility, which might lead to regret in the future [8,10–12]. In places where permanent contraception use is predominant, lack of availability of other methods, coercion or pressure to adopt it is a concern [8]. Evidences of coercion to accept permanent contraception have been documented among marginalized women, such as those who are poor or live with disabilities [13,14].

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Despite the abundant literature on family planning, limited evidence describes social disparities on reliance on female permanent contraception. We present estimates of demand for family planning satisfied with modern contraceptive methods (mDFPS) in LMICs and the share of female permanent contraception among women using modern methods. We evaluate within country disparities in terms of wealth, woman's age, and number of living children in the countries with the highest reliance on permanent methods. Also, considering the intersectionality between woman's age and number of living children we identify situations of high reliance on permanent contraception in women who are young and have few children.

2. Methods

We estimated demand for family planning satisfied by modern methods (mDFPS) using nationally representative Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) carried out since 2010 in 105 LMICs. For Brazil and Ecuador we used data from the 2013 *Pesquisa Nacional de Saúde* (PNS) and from the 2012 *Encuesta Nacional de Salud y Nutrición*, respectively. Both surveys have similar characteristics to DHS and MICS. Since several surveys only collect reproductive information for women who are married or in a union, we restricted the analyses to this group. Recent data from DHS and MICS covers 75% of the LMICs in Eastern & Southern Africa, 92% of those in West & Central Africa, 62% of those in Middle East & North Africa, 88% of South Asia countries, 52% of those in East Asia & the Pacific, 84% in Europe and Central Asia and in Latin America and the Caribbean.

Demand for family planning satisfied by modern methods is a highly used measure. It is estimated as the proportion of women of reproductive age (15–49 years) in need of contraception that are currently using a modern contraceptive method. Women in need of contraception are those who are fecund and do not want to become pregnant within the next 2 years, or are unsure [15]. Modern contraceptive methods are technological products or medical procedures that prevent natural reproduction [16].

We classified modern contraceptive methods in: (1) short-acting reversible methods (pill, male and female condom, injectables, patches, diaphragms, spermicidal agents, and emergency contraception); (2) long-acting reversible contraceptive methods (intrauterine device and implants); (3) permanent female contraception; and (4) permanent male contraception. The share of permanent methods was calculated for countries and population subgroups as the proportion of women relying on female permanent contraception among users of modern methods.

Surveys from Brazil, Ecuador, Argentina, Georgia, and South Sudan do not allow for the estimation of need for contraception. Considering the high correlation between mDFPS and modern contraceptive use prevalence, for these surveys, we estimated satisfied demand for family planning from contraceptive prevalence using the following predictive equation [17]:

$$(mDFPS) = 0.61 + 0.68\,log(\mathrm{CPR}) + 3.57\,\mathrm{CPR}^2$$

where CPR is contraceptive prevalence. This equation was developed and validated in a multicountry analysis. More details are presented elsewhere [17].

All the analyses considered the survey design, including sampling weights and clustering.

We focused our analysis of inequalities in the 20 countries where the share of female permanent contraception was higher than 25%. We investigated inequalities in terms of wealth quintiles, women's age (15–19, 20–24, 25–29, 30–34, 35–39, and 40–49), number of living children (0–1, 2, 3+), and according to the intersectionality of age and number of living children. Wealth was estimated based on an asset index obtained from information on household assets, presence of electricity, water supply, sanitary facilities, and building materials of the dwelling, among other variables [18,19].

The wealth score was obtained through principal component analyses, estimated separately for urban and rural areas and later combined into a single score using a regression-based scaling procedure [20]. The households were then classified into 5 equally sized groups based on the value of the score and weighted by the number of residents.

We also measured wealth inequalities using the Slope Index of Inequality (SII). The SII is a complex measure of absolute inequality which represents the difference between the coverage for the top and the bottom of the wealth scale. It ranges between -100 and 100, being the outcome coverage more equal when it is closer to zero [21].

3. Results

Country-level coverage of demand for family planning satisfied by modern methods, share of female and male permanent contraception, and unweighted sample sizes for the 105 countries screened are presented in Supplementary Table 1. Among these countries, mDFPS ranged from 6.0% in Albania to 93.7% in Brazil. India was the country with the largest share of female permanent contraception, with 75.5% (95% CI: 75.1%–75.8%). Latin America & the Caribbean was the region where more countries presented higher reliance on female permanent contraception. Its share was higher than 25% in 12 of the 21 countries studied. The leading countries in the region were Dominican Republic (59.8%; 95% CI: 58.3%–61.1%), El Salvador (54.5%; 95% CI: 52.7%–56.4%), and Mexico (50.5%; 95% CI: 47.4%; 53.6%). West & Central Africa was the region with lower reliance on female permanent contraception, where the share was above 5% only in Chad (5.7%; 95% CI: 2.7%–11.6%) and Congo Democratic Republic (5.2%; 95% CI: 3.3%–8.0%). The region also presented the lowest level of mDFPS, with most countries presenting mDFPS below 50%, except for Sao Tome and Principe (50.2%; 95% CI: 47.1%–53.4%) and Senegal (52.6%; 95% CI: 50.3%–54.8%).

Figure 1 shows the levels of mDFPS and share of female permanent methods for each study country, revealing no clear correlation between the 2 ($r = 0.26$, $p = 0.008$). Highlighted countries, with share of female permanent contraception above 25%, were selected a for an in-depth equity analysis.

Gaps in the share of female permanent contraception in term of wealth, age and number of children are presented in Figures 2–5. Estimates for each subgroup and 95% CIs are presented in the supplementary material. Large gaps between rich and poor were found in several countries but there was no single pattern in terms of direction. Twelve of the 20 countries presented positive values of SII, indicating higher share of female permanent contraception among the richest women in comparison to the poorest. The largest gaps were found in Guatemala (SII = 24.5), Papua New Guinea (SII = 20.7), El Salvador (SII = 18.3), Honduras (SII = 17.0), Thailand (SII = 13.3), Nepal (SII = 12.7), and Tonga (SII = 11.3). The share of female permanent contraception was higher among the poorest compared to the richest in Albania (SII = -25.4), Brazil (SII = -24.6), India (SII = -16.2), Pakistan (SII = -14.7), Mexico (SII = -7.2), and Costa Rica (SII = -5.1). India presented a peculiar pattern, with similar shares of female permanent contraception for the 80% poorer women, while the richest 20% were well below, with a share of 65%.

India stands out again in permanent contraception by woman's age (Fig. 3), where younger women present much higher levels of permanent contraception compared to the other countries. 39.2% (95% CI: 38.0%–40.4%) of women 20 to 24 years and 61.7% (95% CI: 60.9%–62.5%) or women 25 to 29 had already been sterilized.

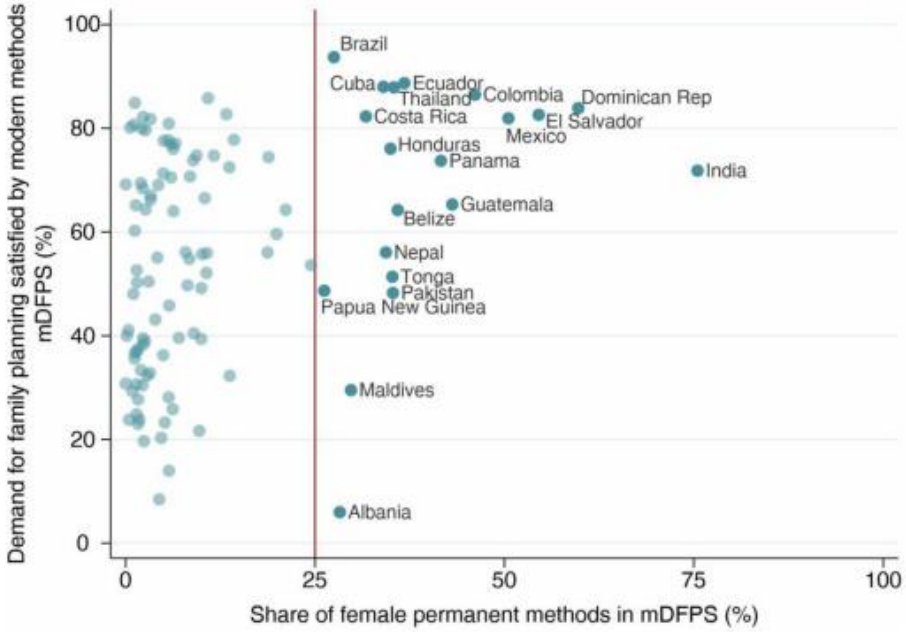

Fig. 1. Demand for family planning satisfied by modern methods (mDFPS) according to the most recent survey from low- and middle-income countries and share of female permanent contraception. Data source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and National Health Survey (Brazil).
*Countries in the right from the vertical line were those selected to the inequality analysis.

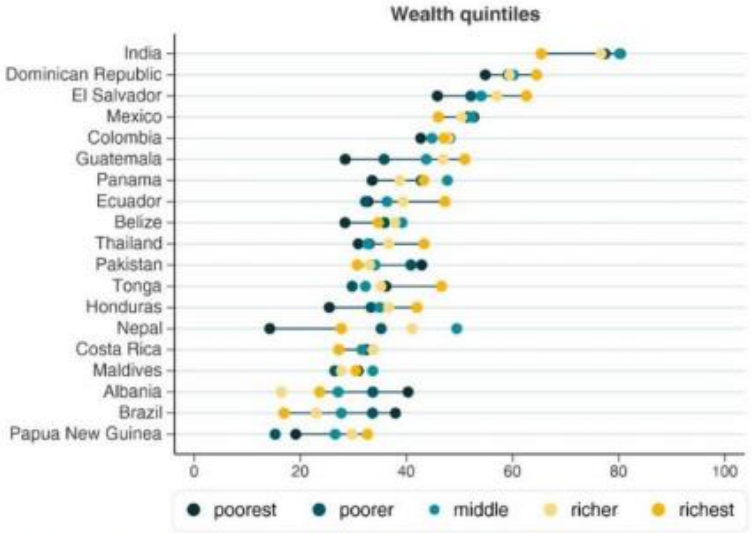

Fig. 2. Inequalities in the share of female permanent contraception in terms of wealth according to the most recent survey, ordered according to overall share of female permanent contraception for countries with a share of 25% or more. Data source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and National Health Survey (Brazil).

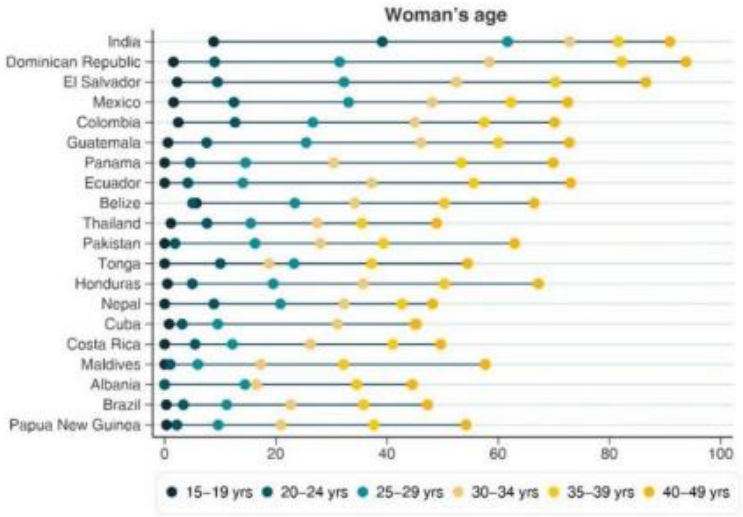

Fig. 3. Inequalities in the share of female permanent contraception in terms of woman's age according to the most recent survey, ordered according to overall share of female permanent contraception for countries with a share of 25% or more. Data source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and National Health Survey (Brazil).

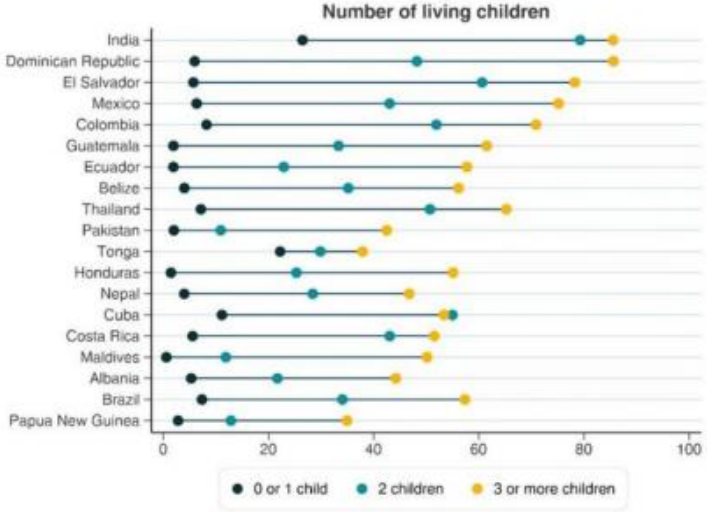

Fig. 4. Inequalities in the share of female permanent contraception in terms of number of living children according to the most recent survey, ordered according to overall share of female permanent contraception for countries with a share of 25% or more. Data source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and National Health Survey (Brazil).

Other countries with a high share of permanent contraception in women 25 to 29 years were, in decreasing order, Mexico (33.1%; 95% CI: 27.8%–38.9%), El Salvador (32.3%; 95% CI: 28.5%–36.3%), and Dominican Republic (31.5%; 95% CI:28.5%–34.6%).

We also observed a monotonic increase of permanent contraception by number of living children (Fig. 4), with 2 countries standing out in permanent contraception among women with 0 to 1 child: India (26.5%; 95% CI: 25.5%–27.5%) and Tonga (22.2%; 95% CI: 7.5%–50.1%). Considering women with 2 living children, the countries with the highest shares of female permanent contraception were India (79.3%; 95% CI: 78.8%–79.7%), El Salvador (60.6%; 95% CI: 57.4%–63.8%), Cuba (54.5%; 95% CI: 50.3%–59.6%),

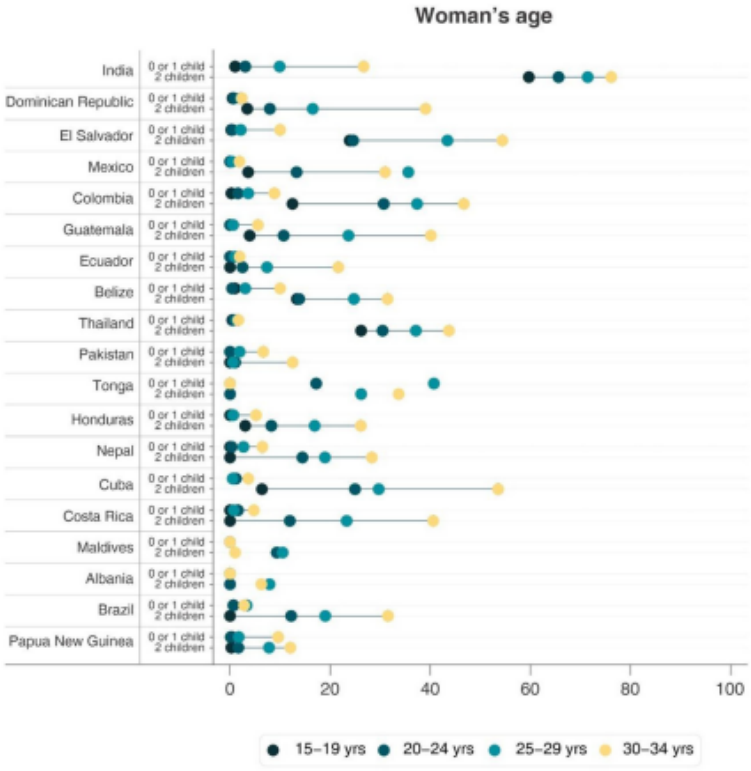

Fig. 5. Intersectional inequalities in the share of female permanent contraception in terms of woman's age and number of living children in the most recent survey, ordered according to overall share of female permanent contraception for countries with a share of 25% or more. Data source: Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and National Health Survey (Brazil).

Colombia (51.9%; 95% CI: 49.1%–54.8%), and Thailand (50.7%; 95% CI: 47.7%–53.7%). Cuba was the only country with similar shares among women with 2 and those with 3 or more children.

Considering the intersectionality between women's age and number of living children, Figure 5 presents the share of female permanent contraception among women younger than 35 and with less than 3 children. Results considering all groups of age and number of living children are presented in the supplementary material. India again stands out with the highest shares of permanent contraception for women with 2 children in all age groups. El Salvador and Thailand were the 2 other countries with higher reliance on permanent contraception for young women with 2 children.

4. Discussion

Using data from national health surveys carried out in LMICs, we presented the proportion of women relying on female permanent contraception among modern contraceptive users. In the countries with higher reliance on permanent methods, we assessed differences between and within countries in term of wealth, number of living children, woman's age, and considering the intersectionality between number of living children and woman's age. Our findings show that in several countries with high levels of mDFPS coverage, this is largely achieved by female permanent contraception. The countries where this was most marked were India, Dominican Republic, El Salvador, Mexico, and Colombia, with large gaps in terms of wealth. We also found relatively high reliance on permanent contraception among women who are young and have less than 3 children in some countries. Being irreversible, permanent methods are more indicated for women who are sure that they will not want more children, a situation more common in older women with more living children [22].

Permanent contraception can be utilized by any woman [23,24], except in countries with specific legal restrictions, such as Guatemala, Kyrgyzstan, Myanmar, Rwanda, and Sudan [25]. Permanent contraception is highly effective, it does not affect hormonal levels, neither requires user intervention nor involve any additional cost [9]. It is a relatively simple medical intervention [26], however, given the fact it is irreversible (or rather difficult to revert), ethical issues are a primary concern. We found a high reliance on female permanent contraception among women younger than 30 years and among those with less than 3 living children in several countries. Permanent contraception regret is not uncommon and it is higher among those who are unmarried, non-white, with less than 4 children, who were sterilized at young ages, who have been sterilized during a postabortion procedure, and among those who had felt pressure to adopt permanent contraception [22]. The World Health Organization reinforces the importance of making it an informed choice based on detailed counseling by the provider who

Table 1
Demand for family planning satisfied by any modern method (mDFPS), share of permanent methods, and Slope Index of Inequality (SII) in female permanent contraception in 20 low- and middle-income countries with representative data since 2010 and higher use of female permanent contraception

	Source	mDFPS		Share of permanent methods			SII in female permanent contraception
		% (95% CI)	N	female % (95% CI)	male % (95% CI)	N	
South Asia							
India (2015)	DHS	71.8 (71.5; 72.1)	323291	75.5 (75.1; 75.8)	0.6 (0.5; 0.6)	220811	-16.2
Pakistan (2017)	DHS	48.2 (46.4; 50.1)	5996	35.3 (32.6; 38.1)	0.2 (0.1; 0.6)	2770	-14.7
Nepal (2016)	DHS	56.0 (54.3; 57.8)	7605	34.4 (31.8; 37.1)	12.8 (11.1; 14.8)	4258	0.13
Maldives (2016)	DHS	29.5 (27.2; 32.0)	2915	29.7 (25.0; 35.0)	1.0 (0.3; 2.9)	4258	0.7
East Asia & the Pacific							
Thailand (2015)	MICS	87.9 (86.5; 89.1)	14861	35.4 (33.4; 37.4)	0.5 (0.3; 0.8)	12971	13.3
Tonga (2019)	MICS	51.3 (46.9; 55.8)	791	35.2 (30.1; 40.7)	0.4 (0.1; 1.3)	354	11.3
Papua New Guinea (2016)	DHS	48.6 (46.3; 51.0)	6565	26.2 (23.3; 29.3)	2.7 (1.7; 4.2)	3285	20.7
Europe & Central Asia							
Albania (2017)	DHS	6.0 (5.1; 7.0)	4334	28.3 (22.6; 34.7)	0	300	-25.3
Latin America & Caribbean							
Dominican Republic (2014)	MICS	83.9 (83.0; 84.8)	14356	59.8 (58.3; 61.2)	0.2 (0.1/ 0.5)	11932	9.4
El Salvador (2014)	MICS	82.6 (81.3; 83.8)	6502	54.5 (52.7; 56.4)	0.4 (0.2; 0.7)	5306	18.3
Mexico (2015)	MICS	81.9 (80.1; 83.7)	6584	50.5 (47.4; 53.6)	1.9 (1.0; 3.4)	5235	-7.2
Colombia (2015)	DHS	86.5 (85.6; 87.3)	17268	46.1 (44.7; 47.6)	4.7 (4.1; 5.4)	14639	4.5
Guatemala (2014)	DHS	65.3 (63.9; 66.6)	11116	43.1 (41.6; 44.7)	1.3 (1.0; 1.6)	7151	24.5
Panama (2013)	MICS	73.7 (71.0 76.3)	4951	41.6 (38.4; 44.9)	0.8 (0.4; 1.6)	3280	4.8
Ecuador (2012)	NSS	88.7	11094	36.8 (35.0; 38.6)	0.4 (0.3; 0.4)	8636	8.7
Belize (2015)	MICS	64.2 (61.5; 66.9)	2398	35.9 (32.7; 39.3)	0.3 (0.1; 0.8)	1540	4.2
Honduras (2011)	DHS	76.0 (75.0; 77.0)	10925	35.0 (33.7; 36.3)	0.4 (0.3; 0.6)	8128	17.0
Cuba (2014)	MICS	88.0 (85.8; 89.9)	5198	34.0 (31.0; 37.1)	0.0 (0.0; 0.1)	4636	NA
Costa Rica (2011)	MICS	82.3 (79.9; 84.4)	3572	31.7 (28.6; 35.0)	7.8 (6.3; 9.6)	2953	-5.1
Brazil (2013)	NSS	93.7	11657	27.5 (26.0; 29.1)	32.9 (31.2; 34.6)	9801	-24.6

should offer advice and access on alternative suitable reversible methods [23]. In order to respect the woman's and couples' autonomy, the provider also needs to be aware of possible bias in recommendation of female permanent contraception [24]. A careful discussion on alternative methods is important to ensure informed consent [24], especially given the current availability of long-acting reversible methods (Table 1).

Previous studies have identified that women who were more educated and those who were well informed on long-acting reversible methods are more likely to choose them rather than permanent contraceptives [27,28]. Furthermore, there are also strong gender inequalities in the use of female permanent contraception, knowledge about vasectomy is poorly in some countries, where it is associated with negative effects on sexual performance and saw as a threat to virility [29,30].

India, the leading country in female permanent contraception, has a long history of pro-sterilization policies [31]. Currently, family planning programs are focused on voluntary contraception [31], however, the adoption of contraception in high fertility districts, either with reversible methods or permanent contraception, is stimulated with financial incentives to women and to health facilities [32]. The country has cultural norms that encourage women to marry at young ages, to have 2 or 3 children, and to be sterilized once they achieve it [31]. We found that more than 80% of Indian women had been sterilized before 30 years of age. Considering the amount of evidence already available on family planning and contraception in India, indicating the high resistance on female permanent contraception despite the several reversible methods already developed, the country could strongly benefit from evidence-based policies aiming to reduce the current reliance on female permanent contraception through a stronger promotion of reversible contraceptives, especially the long-acting methods.

Permanent contraception is a major component in sexual and reproductive health programs in Dominican Republic, El Salvador, Colombia, and Mexico [8,33]. Our findings show high reliance on permanent contraception even among women younger than 30 and among those with less than 3 living children in all these countries. The use of long-acting reversible methods is virtually null in almost all of them, except for Mexico [8,33–36]. Despite the availability of contraceptive methods in health services, the choice for female permanent contraception is strongly influenced by the belief that it is much more effective than reversible methods and by the understanding that it has fewer side effects [34].

In agreement with our findings, wealth inequalities have been identified within countries, with pro-poor and pro-rich inequalities, depending highly on characteristics of public and private health services, as stock and price of contraceptive methods [37,38]. We found a higher share among the poorest in India and in Mexico, countries where permanent contraception is offered free of charge and where forced sterilization has been documented among more vulnerable women [39–42]. In Guatemala, Dominican Republic, El Salvador, and Colombia, where it was higher among the wealthiest, family planning services are mostly paid out-of-pocket and tubal ligation is either unavailable in public services or involve long waiting lists [43–45].

Our study has some limitations. First, to include a larger number of countries, we had to exclude never married women from our analysis. These women are usually younger and less likelihood to be sterilized. Despite having included Brazil and Ecuador, for which no recent DHS or MICS surveys were available, we may have missed other countries with available non-standard surveys. Also, we have neither information on method availability in the health services, nor on quality of the information received by the women. The collection of this information by national health surveys could allow us to better differ if the predominance of female permanent contraception is due to cultural preferences or limitations in family planning services provision.

We showed that female permanent contraception accounts for a high proportion of mDFPS in several LMICs, being it highly variable according to the socioeconomic and demographic characteristics included. The high reliance on female permanent contraception in some subgroups found in our study raises a concern on how well informed those women are regarding the permanent nature of the method, and on the availability of other modern contraceptive methods. High quality of sexual and reproductive health education is fundamental to high-quality family planning coverage, especially in settings with higher levels of gender-based inequalities and lower levels of human development. It is fundamental that family planning services provide both reversible and permanent contraceptive methods, information on all available options, and empowerment assistance to the more vulnerable women. A high level of mDFPS coverage in a country must be achieved preserving women's and couples' autonomy on reproductive health, what requires high-quality family planning services.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.contraception.2022.04.003.

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The role of female permanent contraception in meeting the demand for family planning in low- and middle-income countries

Hellwig, F et al. Contraception, 2022.

Supplementary material

Table 12. Demand for family planning satisfied by any modern method (mDFPS) and share of permanent methods.

Country	Source	mDFPS		Share of permanent methods		
		% (95% CI)	N	female	male	
				% (95% CI)	% (95% CI)	N
South Asia						
Afghanistan (2015)	DHS	39.4 (37.4; 41.5)	13144	10.0 (8.7; 11.4)	0.2 (0.1; 0.5)	4719
Bangladesh (2019)	MICS	77.7 (77.2; 78.2)	39003	5.6 (5.3; 5.9)	0.9 (0.8; 1.0)	30532
Bhutan (2010)	MICS	85.8 (84.7; 86.9)	7671	10.9 (9.9; 11.9)	19.3 (17.8; 20.9)	6601
India (2015)	DHS	71.8 (71.5; 72.1)	323291	75.5 (75.1; 75.8)	0.6 (0.5; 0.6)	220811
Maldives (2016)	DHS	29.5 (27.2; 32.0)	2915	29.7 (25.0; 35.0)	1.0 (0.3; 2.9)	849
Nepal (2016)	DHS	56.0 (54.3; 57.8)	7605	34.4 (31.8; 37.1)	12.8 (11.1; 14.8)	4258
Pakistan (2017)	DHS	48.2 (46.4; 50.1)	5996	35.3 (32.6; 38.1)	0.2 (0.1; 0.6)	2770
East Asia & the Pacific						
Cambodia (2014)	DHS	56.1 (54.3; 57.8)	7926	7.9 (6.8; 9.2)	0.2 (0.1; 0.4)	4506
Indonesia (2017)	DHS	77.1 (76.3; 77.8)	24981	6.6 (6.1; 7.1)	0.3 (0.2; 0.4)	18503
Kiribati (2018)	MICS	53.6 (50.1; 57.0)	1487	24.5 (21.3; 27.9)	0.8 (0.4; 1.8)	802
Lao (2017)	MICS	73.8 (72.5; 75.0)	13024	8.9 (8.0; 9.9)	0.0 (0.0; 0.1)	9619
Mongolia (2018)	MICS	64.0 (62.2; 65.8)	5633	6.3 (5.2; 7.6)	0.3 (0.1; 0.7)	3844
Myanmar (2015)	DHS	74.8 (73.1; 76.4)	5213	9.4 (8.2; 10.7)	0.5 (0.3; 0.8)	3748
Papua New Guinea (2016)	DHS	48.6 (46.3; 51.0)	6565	26.2 (23.3; 29.3)	2.7 (1.7; 4.2)	3285
Philippines (2017)	DHS	56.0 (54.4; 57.6)	10814	18.7 (17.3; 20.2)	0.1 (0.0; 0.3)	6241
Thailand (2015)	MICS	87.9 (86.5; 89.1)	14861	35.4 (33.4; 37.4)	0.5 (0.3; 0.8)	12971
Timor Leste (2016)	DHS	45.8 (43.4; 48.2)	3818	5.8 (4.5; 7.4)	0	1826

Tonga (2019)	MICS	51.3 (46.9; 55.8)	791	35.2 (30.1; 40.7)	0.4 (0.1; 1.3)	354
Vietnam (2013)	MICS	71.3 (69.8; 72.7)	5561	4.9 (4.2; 5.9)	0.2 (0.1; 0.4)	3944
Europe & Central Asia						
Albania (2017)	DHS	6.0 (5.1; 7.0)	4334	28.3 (22.6; 34.7)	0	300
Armenia (2015)	DHS	38.9 (36.8; 41.1)	2761	2.6 (1.7; 4.0)	0	977
Belarus (2012)	MICS	76.0 (73.9; 78.0)	3140	6.3 (4.9; 8.0)	0	2334
Bosnia and Herzegovina (2011)	MICS	23.0 (20.0; 26.2)	2013	1.6 (0.5; 4.6)	0	439
Georgia (2018)	MICS	55.7	2827	10.1 (8.3; 12.2)	2.7 (1.6; 4.5)	1567
Kazakhstan (2015)	MICS	81.8 (80.1; 83.3)	5358	3.3 (2.6; 4.1)	0.0 (0.0; 0.1)	4267
Kosovo (2013)	MICS	20.3 (18.6; 22.1)	2150	4.7 (3.1; 7.1)	0.4 (0.1; 1.7)	432
Kyrgyzstan (2018)	MICS	66.2 (63.7; 68.6)	2396	3.3 (2.3; 4.7)	0.6 (0.3; 1.2)	1601
Moldova (2012)	MICS	66.5 (64.3; 68.7)	2519	10.4 (8.8; 12.4)	0	1697
Montenegro (2018)	MICS	28.1 (22.3; 34.8)	761	5.7 (1.8; 16.8)	0	168
North Macedonia (2011)	MICS	21.7 (18.0; 25.8)	1589	9.7 (5.2; 17.5)	0	310
Serbia (2014)	MICS	32.3 (29.3; 35.5)	1825	2.8 (1.6; 4.9)	0.0 (0.0; 0.4)	546
Tajikistan (2017)	DHS	50.4 (48.0; 52.8)	3924	3.0 (2.2; 4.1)	0	2031
Turkey (2013)	DHS	59.6 (57.8; 61.4)	5369	19.9 (18.3; 21.7)	0.1 (0.0; 0.2)	3079
Turkmenistan (2015)	MICS	80.1 (78.2; 81.9)	2992	0.6 (0.4; 1.0)	0.1 (0.0; 0.5)	2381
Ukraine (2012)	MICS	69.4 (66.8; 71.9)	4036	2.0 (1.4; 3.0)	0	2627
Middle East & North Africa						
Algeria (2012)	MICS	80.7 (79.4; 82.0)	11033	1.1 (0.8; 1.4)	0.0	9069
Egypt (2014)	DHS	80.0 (79.0; 80.9)	14288	2.1 (1.8; 2.5)	0	11329
Iraq (2018)	MICS	54.8 (53.2; 56.4)	12362	8.4 (7.0; 10.0)	0.3 (0.2; 0.5)	6896
Jordan (2017)	DHS	55.0 (53.3; 56.7)	8882	4.2 (3.4; 5.1)	0.0	4760
Qatar (2012)	MICS	68.4 (63.7; 72.7)	1677	2.2 (1.3; 3.8)	3.3 (1.6; 6.6)	1115
State of Palestine (2014)	MICS	69.1 (67.6; 70.4)	4869	4.3 (3.7; 5.0)	0.0 (0.0; 0.1)	3368
Sudan (2014)	MICS	30.8 (28.4; 33.2)	4343	0	0	1247
Tunisia (2018)	MICS	82.2 (80.8; 83.5)	4357	2.3 (1.8; 2.9)	0.2 (0.1; 0.5)	3599
Yemen (2013)	DHS	40.5 (38.7; 42.2)	9623	9.0 (7.9; 10.2)	0.3 (0.1; 0.8)	3794
West & Central Africa						

Benin (2017)	DHS	24.9 (23.3; 26.4)	5350	1.4 (0.9; 2.3)	0	1334
Burkina Faso (2010)	DHS	36.6 (34.9; 38.5)	5445	1.2 (0.8; 1.9)	0	2058
CAR (2010)	MICS	23.8 (20.9; 27.1)	3339	1.8 (0.9; 3.6)	0.4 (0.1; 1.6)	559
Cameroon (2014)	MICS	33.4 (31.2; 35.6)	3323	2.0 (1.1; 3.5)	0.0 (0.0; 0.3)	1125
Chad (2014)	DHS	14.0 (12.3; 15.8)	3612	5.7 (2.7; 11.6)	0	406
Congo Brazzaville (2014)	MICS	35.6 (33.3; 38.0)	3415	1.2 (0.6; 2.5)	0.1 (0.0; 0.3)	1063
Congo Dem Rep (2017)	MICS	23.3 (20.9; 25.8)	6463	5.2 (3.3; 8.0)	0.3 (0.1; 0.9)	983
Cote dIvoire (2016)	MICS	30.6 (28.4; 33.0)	3283	1.4 (0.6; 3.0)	0.7 (0.1; 4.6)	929
Gabon (2012)	DHS	32.8 (30.0; 35.8)	2687	3.2 (1.8; 5.6)	0.1 (0.0; 0.5)	717
Gambia (2018)	MICS	37.5 (35.0; 40.0)	3976	1.6 (1.0; 2.6)	0.1 (0.0; 0.2)	1454
Ghana (2017)	MICS	39.6 (37.5; 41.7)	4745	7.0 (5.5; 9.0)	0.1 (0.0; 0.5)	1914
Guinea (2016)	MICS	19.7 (16.8; 22.9)	2510	2.4 (1.1; 5.0)	0	436
Guinea Bissau (2014)	MICS	40.0 (37.4; 42.7)	2551	0.1 (0.0; 0.5)	0.1 (0.0; 0.9)	1073
Liberia (2013)	DHS	37.0 (33.3; 40.8)	3057	1.4 (0.7; 2.9)	0	1088
Mali (2015)	MICS	39.5 (36.8; 42.3)	3186	2.3 (1.5; 3.4)	0	1235
Mauritania (2015)	MICS	29.3 (27.1; 31.6)	4672	0.9 (0.4; 1.9)	0	1325
Niger (2012)	DHS	27.7 (25.3; 30.3)	3113	1.6 (1.0; 2.7)	0	976
Nigeria (2016)	MICS	30.4 (29.1; 31.9)	10219	2.2 (1.7; 3.0)	0	3029
Sao Tome and Principe (2014)	MICS	50.2 (47.1; 53.4)	1238	1.5 (0.7; 3.4)	0.2 (0.0; 0.8)	641
Senegal (2017)	DHS	52.6 (50.3; 54.8)	5427	1.5 (0.9; 2.3)	0	2609
Sierra Leone (2017)	MICS	41.1 (39.1; 43.0)	5588	0.4 (0.2; 0.8)	0	2130
Togo (2017)	MICS	36.3 (33.6; 39.0)	2712	4.9 (3.6; 6.7)	0.4 (0.1; 1.9)	998
Eastern & Southern Africa						
Angola (2015)	DHS	23.8 (21.1; 26.7)	3849	0.4 (0.2; 1.1)	0	690
Burundi (2016)	DHS	38.3 (36.4; 40.1)	5572	2.3 (1.6; 3.1)	0.6 (0.3; 1.2)	2085
Comoros (2012)	DHS	25.8 (23.2; 28.6)	1723	6.2 (4.0; 9.6)	0	446
Eswatini (2014)	MICS	80.9 (78.7; 82.9)	1537	5.7 (3.9; 8.2)	0	1237
Ethiopia (2016)	DHS	60.2 (57.1; 63.2)	4894	1.2 (0.8; 1.8)	0	2874
Kenya (2014)	DHS	70.5 (68.9; 72.0)	6450	6.0 (5.4; 6.7)	0.0 (0.0; 0.2)	8977
Lesotho (2018)	MICS	79.6 (77.6; 81.5)	2807	2.6 (1.9; 3.7)	0.7 (0.3; 1.7)	2246

Madagascar (2018)	MICS	65.1 (63.3; 67.0)	6527	1.3 (0.9; 2.1)	0.2 (0.1; 0.8)	4186
Malawi (2015)	DHS	74.4 (73.3; 75.5)	12436	18.9 (17.6; 20.2)	0.2 (0.1; 0.3)	9216
Mozambique (2015)	DHS	48.0 (45.2; 50.9)	2311	1.0 (0.6; 1.8)	0.1 (0.0; 0.6)	1216
Namibia (2013)	DHS	74.7 (72.6; 76.7)	2510	11.6 (10.0; 13.5)	0.5 (0.2; 1.0)	1862
Rwanda (2014)	DHS	64.3 (62.7; 66.0)	4980	2.6 (2.1; 3.3)	0.5 (0.3; 0.9)	3206
South Africa (2016)	DHS	77.8 (75.4; 80.0)	1953	14.3 (12.0; 17.0)	1.1 (0.6; 2.0)	1516
South Sudan (2010)	MICS	84.5	620	4.4 (1.5; 12.1)	1.2 (0.3; 5.2)	82
Tanzania (2015)	DHS	52.1 (49.8; 54.3)	4802	10.7 (9.1; 12.5)	0.2 (0.0; 1.3)	2372
Uganda (2016)	DHS	49.7 (48.0; 51.4)	7556	8.2 (7.2; 9.3)	0.2 (0.1; 0.5)	3702
Zambia (2013)	DHS	67.0 (65.2; 68.8)	5211	3.3 (2.6; 4.2)	0.0 (0.0; 0.1)	3493
Zimbabwe (2015)	DHS	84.9 (83.4; 86.3)	4673	1.2 (0.9; 1.6)	0.1 (0.0; 0.2)	3977
Latin America & Caribbean						
Argentina (2011)	MICS	76.9	16655	6.0 (5.3; 6.8)	0.1 (0.0; 0.1)	10956
Barbados (2012)	MICS	70.7 (66.6; 74.5)	782	8.5 (6.2; 11.5)	0.2 (0.0; 1.7)	554
Belize (2015)	MICS	64.2 (61.5; 66.9)	2398	35.9 (32.7; 39.3)	0.3 (0.1; 0.8)	1540
Brazil (2013)	NSS	93.7	11657	27.5 (26.0; 29.1)	32.9 (31.2; 34.6)	9801
Colombia (2015)	DHS	86.5 (85.6; 87.3)	17268	46.1 (44.7; 47.6)	4.7 (4.1; 5.4)	14639
Costa Rica (2011)	MICS	82.3 (79.9; 84.4)	3572	31.7 (28.6; 35.0)	7.8 (6.3; 9.6)	2953
Cuba (2014)	MICS	88.0 (85.8; 89.9)	5198	34.0 (31.0; 37.1)	0.0 (0.0; 0.1)	4636
Dominican Republic (2014)	MICS	83.9 (83.0; 84.8)	14356	59.8 (58.3; 61.2)	0.2 (0.1/ 0.5)	11932
Ecuador (2012)	NSS	88.7	11094	36.8 (35.0; 38.6)	0.4 (0.3; 0.4)	8636
El Salvador (2014)	MICS	82.6 (81.3; 83.8)	6502	54.5 (52.7; 56.4)	0.4 (0.2; 0.7)	5306
Guatemala (2014)	DHS	65.3 (63.9; 66.6)	11116	43.1 (41.6; 44.7)	1.3 (1.0; 1.6)	7151
Guyana (2014)	MICS	49.2 (46.2; 52.1)	2744	10.0 (7.8; 12.7)	0.3 (0.0; 1.3)	1361
Haiti (2016)	DHS	43.1 (41.3; 44.9)	5511	3.9 (3.1; 5.0)	0.5 (0.2; 1.1)	2353
Honduras (2011)	DHS	76.0 (75.0; 77.0)	10925	35.0 (33.7; 36.3)	0.4 (0.3; 0.6)	8128
Mexico (2015)	MICS	81.9 (80.1; 83.7)	6584	50.5 (47.4; 53.6)	1.9 (1.0; 3.4)	5235
Panama (2013)	MICS	73.7 (71.0 76.3)	4951	41.6 (38.4; 44.9)	0.8 (0.4; 1.6)	3280
Paraguay (2016)	MICS	82.7 (80.8; 84.4)	3872	13.3 (11.7; 15.0)	0.1 (0.0; 0.5)	3210
Peru (2018)	DHS	64.9 (63.5; 66.2)	20787	17.4 (16.2; 18.7)	0.8 (0.5; 1.4)	13822

St Lucia (2012)	MICS	72.5 (68.2; 76.4)	523	13.7 (9.9; 18.6)	0	373
Suriname (2018)	MICS	55.9 (53.5; 58.3)	3689	10.7 (9.1; 12.6)	0.0 (0.0; 0.1)	2114
Trinidad and Tobago (2011)	MICS	64.3 (61.3; 67.1)	1196	21.1 (17.9; 24.8)	0.2 (0.0; 1.3)	764

DHS: Demographic and Health Survey; MICS: Multiple Indicator Cluster Survey; NSS: Non-Standard Survey.

[a] number of married/in union women in need of contraception; [b] number of women using modern contraception

Table 2. Demand for family planning satisfied by any modern method (mDFPS) and share of permanent methods by wealth quintiles.

Country		mDFPS		Female permanent contraception		Slope Index of Inequality
		% (95% CI)	N	% (95% CI)	N	
South Asia						
India (2015)	poorest	61.6 (61.0; 62.2)	57676	80.3 (79.5; 81.1)	34954	-16.2
	poorer	70.3 (69.8; 70.8)	68130	77.4 (76.7; 78.1)	45145	
	middle	74.6 (74.0; 75.0)	67752	80.2 (79.6; 80.7)	47502	
	wealthier	74.9 (74.4; 75.5)	64956	76.7 (76.0; 77.4)	46102	
	wealthiest	74.9 (74.3; 75.5)	64777	65.4 (64.6; 66.2)	47108	
Maldives (2016)	poorest	27.9 (24.4; 31.6)	797	30.9 (24.7; 37.9)	226	0.8
	poorer	31.6 (27.1; 36.5)	865	26.5 (20.7; 33.3)	265	
	middle	26.7 (23.0; 30.9)	787	33.6 (26.2; 42;0)	228	
	wealthier	24.0 (17.5; 31.9)	327	27.7 (15.0; 45.5)	78	
	wealthiest	38.3 (30.7; 46.5)	139	30.5 (17.8; 47.0)	52	
Nepal (2016)	poorest	54.9 (50.7; 59.0)	1606	14.2 (11.0; 18.3)	866	12.7
	poorer	58.1 (54.7; 61.3)	1628	35.2 (30.7; 40.0)	944	
	middle	57.7 (54.5; 60.8)	1546	49.5 (44.5; 54.4)	911	
	wealthier	56.4 (53.4; 59.4)	1464	41.1 (36.1; 46.2)	814	
	wealthiest	53.2 (50.0; 56.5)	1361	27.7 (23.6; 32.2)	723	
Pakistan (2017)	poorest	39.6 (34.8; 44.6)	912	42.9 (36.2; 49.9)	314	-14.7
	poorer	46.6 (42.5; 50.8)	1071	40.8 (34.2; 47.8)	442	
	middle	49.1 (45.2; 53.0)	1194	34.1 (29.1; 39.4)	568	
	wealthier	51.8 (48.2; 55.4)	1266	33.1 (28.3; 38.3)	630	
	wealthiest	50.9 (47.5; 54.2)	1553	30.7 (26.4; 35.4)	816	
East Asia & the Pacific						
Papua New Guinea (2016)	poorest	33.5 (29.6; 37.6)	865	19.1 (14.1; 25.5)	302	20.7
	poorer	44.0 (39.5; 48.7)	976	15.2 (11.4; 20.1)	421	
	middle	48.6 (44.6; 52.7)	1198	26.6 (22.0; 31.7)	579	
	wealthier	54.9 (50.9; 58.8)	1689	29.8 (25.2; 34.8)	923	
	wealthiest	57.8 (53.1; 62.4)	1837	32.6 (26.3; 39.7)	1060	
Thailand (2019)	poorest	87.9 (84.8; 90.4)	3159	30.9 (27.0; 35.1)	2793	13.3
	poorer	89.2 (86.3; 91.5)	3300	33.0 (29.3; 36.8)	2891	
	middle	89.4 (86.9; 91.5)	3174	32.7 (29.0; 36.6)	2785	
	wealthier	87.6 (84.5; 90.1)	2899	36.7 (32.8; 40.6)	2516	
	wealthiest	85.3 (81.8; 88.3)	2329	43.3 (38.5; 48.2)	1986	
Tonga (2019)	poorest	45.7 (37.1; 54.6)	218	36.1 (25.7; 48.0)	78	11.3
	poorer	49.9 (40.0; 59.8)	167	29.8 (17.9; 45.1)	75	
	middle	55.3 (46.6; 63.6)	150	32.3 (21.3; 45.6)	78	

	wealthier	55.3 (46.5; 63.9)	144	35.2 (23.2; 49.4)	72	
	wealthiest	50.6 (41.6; 59.5)	112	46.6 (30.9; 63.0)	51	
Europe & Central Asia						
	poorest	6.3 (4.6; 8.6)	1220	40.3 (26.4; 55.9)	77	
	poorer	6.0 (4.5; 8.0)	1057	33.6 (22.8; 46.6)	71	
Albania	middle	4.6 (3.3; 6.5)	803	27.1 (14.9; 44.2)	50	-25.3486
(2017)	wealthier	6.2 (4.4; 8.6)	729	16.4 (8.7; 28.8)	52	
	wealthiest	6.5 (4.4; 9.8)	525	23.6 (13.0; 39.1)	50	
Latin America & Caribbean						
	poorest	50.9 (44.8; 57.0)	432	28.4 (22.0; 35.9)	219	
	poorer	62.6 (57.3; 67.7)	483	35.9 (29.3; 43.1)	317	
Belize (2015)	middle	66.2 (60.6; 71.4)	524	39.2 (33.3; 45.4)	346	4.18238
	wealthier	68.2 (62.8; 73.2)	511	37.8 (31.7; 44.4)	346	
	wealthiest	69.9 (64.1; 75.1)	448	34.7 (28.0; 42.0)	312	
	poorest	93.0	2843	37.9 (34.7; 41.2)	2382	
	poorer	93.2	2590	33.6 (30.2; 37.2)	2201	
Brazil (2013)	middle	94.9	2357	27.7 (24.3; 31.4)	1986	-24.6
	wealthier	93.4	2061	23.0 (20.0; 26.3)	1743	
	wealthiest	93.7	1794	16.9 (14.1; 20.1)	1489	
	poorest	82.1 (80.4; 83.6)	5118	42.7 (40.6; 44.8)	4077	
	poorer	86.3 (84.8; 87.6)	5027	48.2 (45.8; 50.5)	4300	
Colombia (2015)	middle	87.1 (85.5; 88.5)	3354	44.8 (42.5; 47.2)	2900	4.5
	wealthier	89.4 (87.5; 91.0)	2337	47.9 (44.6; 51.3)	2080	
	wealthiest	88.0 (84.8; 90.6)	1432	47.1 (41.2; 53.1)	1282	
	poorest	82.6 (78.6; 85.9)	947	32.4 (27.1; 38.3)	776	
	poorer	83.9 (79.3; 87.7)	802	33.6 (28.4; 39.3)	669	
Costa Rica (2011)	middle	77.6 (72.0; 82.4)	749	31.6 (25.9; 37.9)	610	-5.1
	wealthier	81.7 (75.0; 87.0)	596	33.6 (26.6; 41.4)	501	
	wealthiest	85.9 (80.5; 90.1)	478	27.2 (21.3; 34.0)	397	
	poorest	78.9 (76.7; 80.9)	3895	54.9 (52.3; 57.4)	3097	
Dominican	poorer	85.3 (83.4; 87.1)	3216	59.1 (56.3; 61.9)	2750	
Republic	middle	84.3 (82.2; 86.2)	2719	60.2 (57.1; 63.1)	2283	9.4
(2014)	wealthier	83.7 (81.3; 85.9)	2354	59.4 (56.0; 62.7)	1975	
	wealthiest	86.8 (84.6; 88.7)	2172	64.5 (61.0; 67.9)	1827	
	poorest	87.2	2699	32.7 (30.6; 34.9)	1873	
	poorer	89.6	2602	32.3 (30.2; 34.3)	2039	
Ecuador (2012)	middle	89.8	2311	36.3 (34.1; 38.5)	1836	8.7
	wealthier	91.8	1981	39.4 (37.0; 41.8)	1595	
	wealthiest	90.3	1606	47.3 (44.5; 50.0)	1293	
	poorest	80.0 (76.9; 82.7)	1359	45.8 (41.9; 49.8)	1074	18.3

El Salvador (2014)	poorer	81.7 (79.0; 84.2)	1354	52.1 (48.3; 56.0)	1108	
	middle	83.0 (80.1; 85.6)	1354	54.1 (50.3; 57.8)	1114	
	wealthier	84.7 (81.9; 87.1)	1250	57.0 (52.7; 61.3)	1032	
	wealthiest	83.3 (80.0; 86.2)	1185	62.6 (58.3; 66.7)	978	
Guatemala (2014)	poorest	47.9 (44.7; 51.2)	1976	28.5 (25.0; 32.2)	952	
	poorer	57.5 (54.6; 60.3)	2128	35.8 (32.3; 39.4)	1202	
	middle	66.8 (64.2; 69.3)	2315	43.7 (40.5; 47.1)	1526	24.5
	wealthier	72.5 (70.3; 74.6)	2451	46.9 (44.2; 49.7)	1759	
	wealthiest	77.2 (75.1; 79.2)	2246	51.0 (48.1; 53.9)	1712	
Honduras (2011)	poorest	68.0 (65.8; 70.1)	2725	25.5 (23.2; 27.8)	1792	
	poorer	75.4 (73.2; 77.4)	2535	33.3 (30.8; 35.9)	1901	
	middle	77.9 (75.7; 80.0)	2141	35.0 (32.3; 37.7)	1652	17.0
	wealthier	79.2 (77.0; 81.3)	1895	36.6 (33.9; 39.5)	1480	
	wealthiest	78.6 (76.2; 80.8)	1629	42.0 (38.8; 45.3)	1303	
Mexico (2015)	poorest	77.6 (73.7; 81.0)	1826	52.7 (47.5; 57.8)	1387	
	poorer	79.0 (75.5; 82.1)	1565	51.5 (46.6; 56.3)	1247	
	middle	81.8 (77.8; 85.3)	1276	52.4 (45.7; 58.9)	1021	-7.2
	wealthier	84.0 (80.1; 87.3)	1167	50.4 (44.0; 56.9)	960	
	wealthiest	87.2 (82.3; 90.9)	750	46.0 (37.6; 54.7)	620	
Panama (2013)	poorest	55.8 (50.2; 61.2)	2033	33.5 (28.0; 39.6)	971	
	poorer	75.2 (70.0; 79.8)	969	42.8 (37.0; 48.8)	715	
	middle	74.0 (67.6; 79.5)	745	47.7 (42.1; 53.3)	573	4.8
	wealthier	80.5 (74.5; 85.4)	675	38.7 (32.4; 45.4)	564	
	wealthiest	82.7 (75.5; 88.0)	529	43.2 (34.6; 52.3)	457	

*Note: there is no 95% Confidence Interval in the surveys that we estimated mDFPS based on modern contraceptive use.

[a] number of married/in union women in need of contraception; [b] number of women using modern contraception

Table 3. Demand for family planning satisfied by any modern method (mDFPS) and share of permanent methods by women's age.

Country		mDFPS		Female permanent contraception	
		% (95% CI)	N	% (95% CI)	N
South Asia					
India (2015)	15-19 yrs	26.4 (24.7; 28.2)	6183	8.8 (6.9; 11.1)	1440
	20-24 yrs	45.6 (44.8; 46.4)	38774	39.2 (38.0; 40.4)	16082
	25-29 yrs	62.6 (62.0; 63.2)	65306	61.7 (60.9; 62.5)	38659
	30-34 yrs	74.5 (74.0; 75.0)	66014	72.9 (72.1; 73.6)	46635
	35-39 yrs	80.0 (79.5; 80.5)	61494	81.6 (81.0; 82.1)	47035
	40-49 yrs	86.2 (85.8; 86.6)	85520	90.9 (90.5; 91.2)	70960
Maldives (2016)	15-19 yrs	9.5 (3.2; 25.2)	28	0	4
	20-24 yrs	18.3 (13.4; 24.5)	372	1.0 (0.1; 6.8)	69
	25-29 yrs	21.2 (17.4; 25.5)	675	6.0 (2.5; 13.8)	136
	30-34 yrs	30.5 (26.2; 35.0)	653	17.3 (10.9; 26.4)	186
	35-39 yrs	34.5 (29;0; 40.5)	501	32.2 (22.3; 43.9)	176
	40-49 yrs	39.3 (34.3; 44.4)	686	57.7 (48.4; 66.4)	278
Nepal (2016)	15-19 yrs	24.9 (20.0; 30.6)	454	0	112
	20-24 yrs	37.0 (33.5; 40.7)	1135	8.9 (6.1; 12.7)	433
	25-29 yrs	48.7 (45.6; 51.9)	1464	20.8 (16.7; 25.6)	720
	30-34 yrs	57.0 (53.3; 60.7)	1442	32.3 (27.7; 37.2)	832
	35-39 yrs	67.1 (63.7; 70.3)	1306	42.7 (38.2; 47.3)	872
	40-49 yrs	71.6 (68.7; 74.4)	1804	48.2 (44.5; 51.9)	1289
Pakistan (2017)	15-19 yrs	23.3 (16.1; 32.6)	179	0	38
	20-24 yrs	35.3 (30.1; 40.8)	686	1.9 (0.6; 6.0)	230
	25-29 yrs	42.6 (38.8; 46.6)	1234	16.3 (11.9; 21.9)	512
	30-34 yrs	47.9 (44.2; 51.5)	1356	28.0 (23.5; 33.1)	632
	35-39 yrs	53.1 (49.4; 56.8)	1258	39.3 (34.2; 44.6)	645
	40-49 yrs	58.6 (55.2; 62.0)	1283	62.9 (57.6; 68.0)	713
East Asia & the Pacific					
Papua New Guinea (2016)	15-19 yrs	32.6 (22.3; 45.0)	197	0.3 (0.1; 1.8)	60
	20-24 yrs	39.3 (33.7; 45.1)	1016	2.2 (1.1; 4.3)	450
	25-29 yrs	49.8 (45.2; 54.3)	1374	9.6 (6.2; 14.7)	681
	30-34 yrs	50.9 (47.3; 54.6)	1334	20.9 (16.4; 26.3)	696
	35-39 yrs	52.7 (47.6; 57.8)	1222	37.6 (28.7; 47.4)	644
	40-49 yrs	51.4 (47.0; 55.7)	1422	54.2 (48.4; 59.9)	754
Thailand (2019)	15-19 yrs	80.8 (69.9; 88.4)	385	1.1 (0.4; 2.9)	327
	20-24 yrs	86.8 (82.7; 90.1)	1503	7.6 (5.3; 10.8)	1285
	25-29 yrs	86.2 (82.3; 89.3)	2199	15.5 (12.3; 19.3)	1898

	30-34 yrs	89.3 (86.0; 91.9)	2569	27.5 (23.1; 32.3)	2220
	35-39 yrs	89.8 (87.3; 91.9)	2840	35.5 (31.5; 39.6)	2499
	40-49 yrs	87.5 (85.3; 89.4)	5365	48.9 (45.7; 52.1)	4742
Tonga (2019)	15-19 yrs	8.0 (1.0; 42.3)	11	0	1
	20-24 yrs	44.5 (31.0; 58.8)	63	10.0 (1.4; 47.1)	20
	25-29 yrs	44.8 (33.5; 56.6)	146	23.3 (12.4; 39.3)	61
	30-34 yrs	52.1 (42.6; 61.5)	154	18.8 (8.7; 36.0)	68
	35-39 yrs	59.1 (50.9; 66.7)	175	37.2 (25.9; 50.0)	89
	40-49 yrs	53.0 (43.9; 61.8)	242	54.5 (44.7; 63.9)	115
Europe & Central Asia					
Albania (2017)	15-19 yrs	5.5 (1.8; 15.3)	73	0	4
	20-24 yrs	5.1 (2.9; 8.7)	422	0	24
	25-29 yrs	3.7 (2.5; 5.5)	765	14.4 (6.3; 29.9)	38
	30-34 yrs	7.5 (5.4; 10.3)	810	16.5 (8.5; 29.5)	56
	35-39 yrs	8.8 (6.6; 11.7)	774	34.6 (24.2; 46.7)	75
	40-49 yrs	5.1 (3.9; 6.7)	1490	44.5 (32.9; 56.8)	103
Latin America & Caribbean					
Belize (2015)	15-19 yrs	46.8 (38.2; 55.6)	170	5.7 (1.4; 21.1)	77
	20-24 yrs	57.5 (51.8; 63.1)	495	5.0 (2.9; 8.6)	302
	25-29 yrs	64.6 (58.4; 70.3)	501	23.4 (18.3; 29.5)	335
	30-34 yrs	67.4 (61.9; 72.4)	473	34.2 (27.8; 41.2)	315
	35-39 yrs	66.6 (60.1; 72.5)	332	50.3 (42.6; 58.0)	218
	40-49 yrs	71.1 (65.5; 76.1)	427	66.5 (59.0; 73.2)	293
Brazil (2013)	15-19 yrs	91.9	308	0.3 (0.1; 1.2)	241
	20-24 yrs	92.8	1416	3.4 (2.0; 5.6)	1138
	25-29 yrs	92.2	2152	11.2 (9.2; 13.5)	1800
	30-34 yrs	94.0	2670	22.7 (20.0; 25.6)	2272
	35-39 yrs	93.6	2259	35.8 (32.4; 39.4)	1942
	40-49 yrs	94.9	2834	47.3 (44.1; 50.5)	2408
Colombia (2015)	15-19 yrs	71.8 (67.9; 75.5)	886	2.5 (1.2; 5.0)	605
	20-24 yrs	82.1 (79.8; 84.1)	2332	12.7 (10.6; 15.1)	1860
	25-29 yrs	87.2 (85.3; 88.9)	2902	26.6 (23.9; 29.6)	2497
	30-34 yrs	88.5 (86.2; 90.4)	3134	45.0 (41.9; 48.1)	2750
	35-39 yrs	88.7 (86.2; 90.8)	2940	57.5 (52.6; 62.2)	2582
	40-49 yrs	87.4 (85.8; 88.9)	5074	70.1 (67.6; 72.5)	4345
Costa Rica (2011)	15-19 yrs	77.8 (64.6; 87.1)	104	0	74
	20-24 yrs	75.9 (67.2; 82.9)	463	5.5 (3.1; 9.4)	369
	25-29 yrs	79.6 (73.8; 84.4)	708	12.2 (8.6; 17.0)	578
	30-34 yrs	86.8 (82.7; 90.0)	818	26.2 (20.0; 33.5)	697
	35-39 yrs	84.3 (79.0; 88.5)	638	41.0 (34.3; 48.2)	540

	40-49 yrs	81.7 (77.4; 85.4)	841	49.6 (43.8; 55.5)	695
Cuba (2014)	15-19 yrs	72.8 (54.7; 85.6)	172	0.8 (0.3; 2.1)	151
	20-24 yrs	85.1 (76.7; 90.9)	856	3.1 (1.9; 5.2)	769
	25-29 yrs	90.8 (86.8; 93.6)	1188	9.5 (6.3; 14.1)	1070
	30-34 yrs	90.8 (85.1; 94.5)	948	31.1 (23.9; 39.3)	859
	35-39 yrs	90.9 (85.8; 94.3)	728	45.0 (37.3; 52.8)	651
	40-49 yrs	86.9 (83.2; 89.8)	1306	45.3 (40.4; 50.3)	1136
Dominican Republic (2014)	15-19 yrs	67.7 (63.3; 71.8)	1057	1.6 (0.9; 2.8)	758
	20-24 yrs	73.8 (71.2; 76.3)	2692	9.0 (7.5; 10.8)	2028
	25-29 yrs	80.4 (78.2; 82.4)	3043	31.5 (28.5; 34.6)	2457
	30-34 yrs	85.4 (83.2; 87.3)	2635	58.4 (55.1; 61.5)	2243
	35-39 yrs	89.7 (87.4; 91.6)	2061	82.2 (79.4; 84.7)	1840
	40-49 yrs	90.2 (88.4; 91.7)	2868	93.8 (92.1; 95.1)	2606
Ecuador (2012)	15-19 yrs	85.0	519	0.0	396
	20-24 yrs	88.2	1679	4.2 (3.1; 5.3)	1317
	25-29 yrs	89.9	2221	14.1 (12.4; 15.7)	1749
	30-34 yrs	91.3	2291	37.2 (35.0; 39.4)	1798
	35-39 yrs	91.7	1918	55.6 (53.0; 58.1)	1476
	40-49 yrs	88.8	25957	73.0 (71.0; 75.0)	1900
El Salvador (2014)	15-19 yrs	71.1 (65.3; 76.3)	447	2.3 (1.1; 4.5)	335
	20-24 yrs	76.3 (72.7; 79.5)	1211	9.5 (7.3; 12.3)	943
	25-29 yrs	82.5 (79.6; 85.1)	1247	32.3 (28.5; 36.3)	1013
	30-34 yrs	83.4 (80.6; 85.9)	1212	52.5 (48.2; 56.8)	998
	35-39 yrs	84.5 (81.3; 87.3)	1059	70.3 (66.0; 74.3)	886
	40-49 yrs	86.6 (84.0; 88.8)	1326	86.6 (84.0; 88.8)	1131
Guatemala (2014)	15-19 yrs	50.1 (45.5; 54.8)	726	0.6 (0.2; 2.0)	359
	20-24 yrs	58.3 (55.2; 61.4)	1811	7.6 (6.0; 9.5)	1040
	25-29 yrs	62.3 (59.8; 64.8)	2118	25.5 (22.7; 28.4)	1306
	30-34 yrs	67.2 (64.8; 69.6)	2218	46.1 (43.1; 49.1)	1470
	35-39 yrs	69.2 (66.6; 71.7)	1901	60.0 (56.7; 63.3)	1308
	40-49 yrs	73.2 (70.8; 75.4)	2342	72.8 (70.2; 75.2)	1668
Honduras (2011)	15-19 yrs	67.4 (63.4; 71.1)	889	0.5 (0.2; 1.4)	585
	20-24 yrs	74.5 (72.1; 76.7)	1795	5.0 (3.7; 6.6)	1312
	25-29 yrs	74.9 (72.6; 77.2)	2067	19.5 (17.3; 21.9)	1533
	30-34 yrs	79.1 (76.9; 81.2)	2009	35.7 (32.9; 38.6)	1552
	35-39 yrs	79.0 (76.6; 81.3)	1788	50.3 (47.3; 53.3)	1378
	40-49 yrs	76.4 (74.3; 78.4)	2377	67.2 (64.5; 69.8)	1768
Mexico (2015)	15-19 yrs	63.1 (54.6; 70.9)	359	1.6 (0.5; 4.7)	247
	20-24 yrs	77.5 (73.0; 81.5)	1193	12.5 (7.9; 19.1)	906
	25-29 yrs	77.0 (72.6; 80.8)	1389	33.1 (27.7; 38.9)	1067

	30-34 yrs	83.9 (79.0; 87.8)	1241	48.1 (36.5; 60.0)	999
	35-39 yrs	85.7 (81.7; 88.9)	1017	62.3 (55.0; 69.0)	855
	40-49 yrs	85.3 (81.9; 88.1)	1385	72.5 (67.1; 77.3)	1161
Panama (2013)	15-19 yrs	36.0 (26.8; 46.4)	332	0	130
	20-24 yrs	63.3 (56.3; 69.7)	800	4.6 (2.5; 8.5)	483
	25-29 yrs	71.3 (64.6; 77.2)	885	14.6 (10.5; 19.8)	583
	30-34 yrs	75.2 (69.2; 80.3)	923	30.4 (24.9; 36.5)	645
	35-39 yrs	79.2 (74.2; 83.4)	800	53.3 (46.9; 59.7)	547
	40-49 yrs	80.5 (76.4; 84.0)	1211	69.9 (63.2; 75.8)	892

*Note: there is no 95% Confidence Interval in the surveys that we estimated mDFPS based on modern contraceptive use.

[a] number of married/in union women in need of contraception; [b] number of women using modern contraception

Table 4. Demand for family planning satisfied by any modern method (mDFPS) and share of permanent methods by number of living children.

Country		mDFPS		Female permanent contraception	
		% (95% CI)	N	% (95% CI)	N
South Asia					
India (2015)	0 or 1 living child	45.6 (44.9; 46.3)	60951	26.5 (25.5; 27.4)	25954
	2 living children	78.4 (78.0; 78.8)	120483	79.3 (78.8; 79.7)	88748
	3 or + living children	77.8 (77.5; 78.2)	141857	85.5 (85.1; 85.9)	106109
Maldives (2016)	0 or 1 living child	23.4 (19.4; 28.1)	813	0.6 (0.1; 2.5)	159
	2 living children	21.3 (18.1; 24.9)	868	11.9 (6.4; 21.0)	193
	3 or + living children	40.6 (36.7; 44.6)	1234	50.2 (42.5; 57.8)	497
Nepal (2016)	0 or 1 living child	33.3 (30.2; 36.4)	1852	4.0 (2.5; 6.3)	625
	2 living children	57.5 (54.7; 60.3)	2428	28.4 (25.1; 32.0)	1388
	3 or + living children	67.9 (65.7; 70.0)	3325	46.8 (43.3; 50.3)	2245
Pakistan (2017)	0 or 1 living child	26.2 (21.6; 31.5)	673	2.0 (0.7; 5.8)	176
	2 living children	43.4 (38.9; 48.1)	1041	10.9 (7.6; 15.4)	442
	3 or + living children	52.6 (50.4; 54.9)	4282	42.5 (39.3; 45.7)	2152
East Asia & the Pacific					

Papua New Guinea (2016)	0 or 1 living child	36.7 (32.8; 40.7)	1328	2.8 (1.6; 4.8)	477
	2 living children	47.3 (43.0; 51.6)	1244	12.9 (9.6; 17.0)	625
	3 or + living children	53.0 (50.3; 55.7)	3993	34.9 (31.0; 39.1)	2183
Thailand (2019)	0 or 1 living child	83.1 (80.7; 85.2)	5326	7.1 (5.6; 9.0)	4400
	2 living children	92.0 (90.3; 93.3)	6765	50.7 (47.7; 53.7)	6161
	3 or + living children	89.6 (86.5; 92.1)	2770	65.3 (61.3; 69.0)	2410
Tonga (2019)	0 or 1 living child	28.9 (20.6; 39.1)	105	22.2 (7.5; 50.1)	25
	2 living children	52.8 (42.7; 62.7)	137	29.9 (17.6; 45.9)	60
	3 or + living children	55.0 (48.9; 60.9)	549	37.9 (32.3; 43.9)	269
Europe & Central Asia					
Albania (2017)	0 or 1 living child	4.5 (3.2; 6.3)	1042	5.3 (1.9; 13.6)	61
	2 living children	4.6 (3.6; 6.0)	1978	21.7 (14.5; 31.2)	110
	3 or + living children	9.9 (7.7; 12.6)	1314	44.2 (32.3; 56.8)	129
Latin America & Caribbean					
Belize (2015)	0 or 1 living child	54.5 (49.9; 59.0)	776	4.0 (2.1; 7.5)	433
	2 living children	70.7 (65.7; 75.3)	581	35.2 (29.0; 41.9)	403

	3 or + living children	68.2 (64.4; 71.8)	1041	56.1 (51.5; 60.7)	704
Brazil (2013)	0 or 1 living child	91.3	3516	7.4 (6.1; 8.9)	2912
	2 living children	96.1	3390	34.1 (31.2; 37.0)	3023
	3 or + living children	95.8	2744	57.4 (53.9; 60.8)	2434
Colombia (2015)	0 or 1 living child	79.3 (77.2; 81.2)	4975	8.2 (7.0; 9.7)	3876
	2 living children	89.5 (88.0; 90.9)	5610	51.9 (49.1; 54.8)	4961
	3 or + living children	89.9 (88.8; 90.9)	6683	70.9 (69.0; 72.7)	5802
Costa Rica (2011)	0 or 1 living child	78.9 (74.0; 83.1)	1196	5.6 (3.8; 8.2)	965
	2 living children	82.3 (78.9; 85.3)	1275	43.1 (37.7; 48.6)	1050
	3 or + living children	87.2 (84.3; 89.7)	1101	51.5 (46.3; 56.7)	938
Cuba (2014)	0 or 1 living child	87.3 (84.3; 89.8)	2448	11.1 (8.3; 14.8)	2178
	2 living children	89.1 (85.4; 92.0)	2159	55.0 (50.3; 59.6)	1936
	3 or + living children	86.3 (78.8; 91.5)	591	53.4 (44.2; 62.3)	522
Dominican Republic (2014)	0 or 1 living child	72.7 (70.4; 74.9)	3547	6.0 (4.6; 7.8)	2622
	2 living children	81.6 (79.7; 83.4)	4168	48.2 (45.5; 51.0)	3377

	3 or + living children	90.3 (89.2; 91.3)	6641	85.6 (84.2; 86.9)	5933
Ecuador (2012)	0 or 1 living child	83.2	2081	1.9 (1.2; 2.6)	1561
	2 living children	89.7	3235	22.9 (21.3; 24.5)	2558
	3 or + living children	92.9	5646	57.8 (56.3; 59.2)	4432
El Salvador (2014)	0 or 1 living child	73.6 (70.9; 76.1)	1999	5.7 (4.1; 8.0)	1499
	2 living children	84.6 (82.3; 86.6)	2010	60.6 (57.4; 63.8)	1682
	3 or + living children	87.3 (85.4; 88.9)	2493	78.3 (75.9; 80.4)	2125
Guatemala (2014)	0 or 1 living child	55.0 (52.3; 57.6)	2496	1.9 (1.2; 3.0)	1347
	2 living children	67.6 (65.2; 69.9)	2732	33.3 (30.7; 36.1)	1828
	3 or + living children	68.5 (66.8; 70.2)	5888	61.5 (59.4; 63.6)	3976
Honduras (2011)	0 or 1 living child	69.5 (67.4; 71.5)	2707	1.4 (0.9; 2.2)	1870
	2 living children	79.0 (77.1; 80.8)	2562	25.3 (22.8; 28.0)	1977
	3 or + living children	77.9 (76.5; 79.3)	5656	55.1 (53.3; 56.9)	4281
Mexico (2015)	0 or 1 living child	72.1 (67.9; 75.9)	1588	6.3 (4.0; 10.0)	1122
	2 living children	82.7 (79.0; 85.8)	2095	43.0 (37.1; 49.1)	1692

	3 or + living children	86.4 (84.2; 88.3)	2901	75.2 (71.7; 78.3)	2421

*Note: there is no 95% Confidence Interval in the surveys that we estimated mDFPS based on modern contraceptive use.

[a] number of married/in union women in need of contraception; [b] number of women using modern contraception

Table 5. Demand for family planning satisfied by any modern method (mDFPS) and share of permanent methods by women's age and number of living children.

Country	Age	Number of living children	mDFPS		Female permanent contraception	
			% (95% CI)	N[a]	% (95% CI)	N[b]
South Asia						
India (2015)	15-19 yrs	0 or 1	24.5 (22.7; 26.4)	5812	1.0 (0.5; 2.0)	1290
		2	54.0 (46.8; 61.0)	354	59.7 (48.5; 70.0)	145
		3 or more	37.7 (12.4; 72.2)	17	81.1 (37.2; 96.9)	5
	20-24 yrs	0 or 1	35.5 (34.5; 36.5)	22442	3.0 (2.5; 3.7)	7446
		2	58.5 (57.2; 59.7)	13232	65.7 (63.9; 67.4)	6982
		3 or more	58.5 (56.2; 60.8)	3100	74.8 (71.6; 77.6)	1654
	25-29 yrs	0 or 1	45.0 (43.8; 46.3)	16194	9.9 (8.9; 11.0)	7147
		2	70.4 (69.7; 71.2)	30649	71.5 (70.5; 72.4)	20180
		3 or more	64.2 (63.3; 65.2)	18463	75.5 (74.3; 76.7)	11332
	30-34 yrs	0 or 1	57.0 (55.1; 58.9)	7465	26.7 (24.4; 29.2)	3942
		2	80.3 (79.6; 81.0)	28163	76.2 (75.3; 77.0)	21342
		3 or more	73.0 (72.3; 73.7)	30386	79.1 (78.0; 80.1)	21351
	35-39 yrs	0 or 1	61.7 (59.3; 64.2)	4191	55.4 (52.4; 58.3)	2530
		2	85.3 (84.6; 86.0)	22766	82.3 (81.5; 83.2)	18405
		3 or more	78.3 (77.7; 78.9)	34537	84.1 (83.4; 84.8)	26100
	40-49 yrs	0 or 1	77.1 (75.1; 79.1)	4847	80.5 (78.4; 82.4)	3599
		2	89.1 (88.5; 89.7)	25319	90.8 (90.2; 91.3)	21694
		3 or more	85.6 (85.2; 86.0)	55354	92.1 (91.7; 92.4)	45667
Maldives (2016)	15-19 yrs	0 or 1	9.5 (3.2; 25.2)	28	0	4
		2	0	0	0	0
		3 or more	0	0	0	0
	20-24 yrs	0 or 1	18.2 (13.0; 25.1)	314	0	56
		2	16.4 (8.5; 29.1)	53	9.3 (1.3; 45.1)	10
		3 or more	53.3 (15.6; 87.6)	5	0	3
	25-29 yrs	0 or 1	20.5 (15.7; 26.3)	340	0	57
		2	20.1 (14.1; 27.7)	265	10.5 (2.5; 35.2)	54
		3 or more	30.9 (18.4; 46.9)	70	20.5 (8.3; 42.4)	25
	30-34 yrs	0 or 1	34.1 (23.7; 46.2)	87	0	25
		2	21.4 (15.9; 28.0)	319	1.0 (0.1; 7.1)	72
		3 or more	39.4 (30.5; 49.0)	247	34.9 (21.8; 50.9)	89
	35-39 yrs	0 or 1	59.3 (35.1; 79.7)	30	3.8 (0.8; 16.9)	14
		2	21.8 (14.5; 31.4)	137	11.3 (4.6; 25.0)	33
		3 or more	37.5 (31.2; 44.3)	334	47.0 (34.9; 59.5)	129
	40-49 yrs	0 or 1	10.9 (2.4; 37.4)	14	0	3

		2	24.3 (14.3; 38.3)	94	37.5 (15.4; 66.5)	24
		3 or more	43.9 (38.5; 49.4)	578	60.9 (51.4; 69.6)	251
		0 or 1	26.2 (21.1; 32.0)	420	0	106
	15-19 yrs	2	11.9 (4.5; 28.1)	30	0	5
		3 or more	16.2 (1.9; 66.5)	4	0	1
		0 or 1	32.2 (27.9; 36.7)	750	0.3 (0.0; 2.2)	248
	20-24 yrs	2	44.2 (38.4; 50.1)	313	14.5 (8.6; 23.4)	145
		3 or more	53.5 (40.6; 66.0)	72	37.1 (21.9; 55.3)	40
		0 or 1	37.3 (32.0; 43.0)	401	2.7 (0.9; 8.1)	151
	25-29 yrs	2	52.9 (48.5; 57.2)	663	19.0 (14.1; 25.0)	348
		3 or more	54.9 (49.1; 60.5)	400	37.5 (29.3; 46.5)	221
Nepal (2016)		0 or 1	37.6 (29.3; 46.8)	155	6.5 (1.8; 20.5)	65
	30-34 yrs	2	59.0 (54..0; 63.9)	626	28.3 (23.2; 34.1)	377
		3 or more	60.4 (55.6; 64.9)	661	40.7 (34.0; 47.7)	390
		0 or 1	37.3 (25.6; 50.6)	79	32.4 (16.4; 53.8)	32
	35-39 yrs	2	61.9 (56.4; 67.2)	421	35.2 (28.5; 42.5)	258
		3 or more	73.1 (69.1; 76.8)	806	46.8 (41.3; 52.4)	582
		0 or 1	43.7 (27.0; 61.9)	47	22.4 (9.3; 44.9)	23
	40-49 yrs	2	69.7 (61.8; 76.7)	375	39.2 (31.9; 47.0)	255
		3 or more	73.3 (70.2; 76.2)	1382	51.6 (47.6; 55.7)	1011
		0 or 1	17.5 (10.6; 27.6)	144	0	24
	15-19 yrs	2	55.9 (32.8; 76.7)	29	0	13
		3 or more	16.0 (2.1; 62.6)	6	0	1
		0 or 1	25.0 (18.4; 33.1)	275	0	63
	20-24 yrs	2	43.3 (35.0; 51.9)	278	1.0 (0.1; 7.0)	114
		3 or more	40.5 (30.3; 51.6)	133	5.9 (1.4; 22.1)	53
		0 or 1	29.1 (21.5; 38.1)	175	1.9 (0.4; 9.0)	57
	25-29 yrs	2	40.5 (34.0; 47.3)	358	0.6 (0.1; 4.0)	145
Pakistan		3 or more	47.5 (42.3; 52.7)	701	25.9 (19.1; 34.1)	310
(2017)		0 or 1	39.2 (22.9; 58.3)	55	6.6 (0.9; 34.7)	22
	30-34 yrs	2	42.7 (33.7; 52.3)	209	12.5 (5.7; 25.4)	91
		3 or more	49.2 (45.1; 53.3)	1092	31.2 (26.0; 37.0)	519
		0 or 1	27.7 (9.1; 59.6)	18	0	5
	35-39 yrs	2	54.6 (41.5; 67.1)	105	34.7 (20.1; 52.8)	56
		3 or more	53.4 (49.2; 57.4)	1135	40.1 (34.8; 45.7)	584
		0 or 1	89.7 (48.4; 98.8)	6	36.1 (5.4; 84.9)	5
	40-49 yrs	2	38.5 (23.8; 55.6)	62	67.4 (42.0; 85.5)	23
		3 or more	59.4 (55.9; 62.9)	1215	62.9 (57.5; 68.0)	685
East Asia & the Pacific						
	15-19 yrs	0 or 1	27.5 (17.3; 40.8)	168	0.4 (0.0; 2.8)	40

		2	69.3 (40.4; 88.3)	28	0.3 (0.0; 2.0)	19
		3 or more	100	1	0	1
		0 or 1	37.3 (30.4; 44.7)	579	0.1 (0.0; 1.0)	228
	20-24 yrs	2	44.0 (36.0; 52.4)	305	1.7 (0.4; 7.1)	158
		3 or more	37.4 (25.5; 51.1)	132	10.0 (4.6; 20.6)	64
		0 or 1	44.9 (34.3; 56.0)	335	1.7 (0.5; 5.4)	133
	25-29 yrs	2	49.5 (41.5; 57.4)	433	7.8 (3.8; 15.4)	217
		3 or more	52.6 (47.1; 57.9)	606	14.2 (9.2; 21.5)	331
Papua New Guinea (2016)		0 or 1	29.9 (21.5; 39.9)	142	9.6 (3.0; 27.1)	44
	30-34 yrs	2	52.3 (44.1; 60.3)	250	12.0 (6.7; 20.8)	132
		3 or more	53.6 (49.3; 57.9)	942	23.8 (18.3; 30.4)	520
		0 or 1	36.4 (20.3; 56.4)	56	7.8 (2.3; 23.5)	19
	35-39 yrs	2	38.8 (28.1; 50.8)	123	29.6 (15.0; 50.0)	54
		3 or more	55.1 (49.5; 60.6)	1043	39.4 (29.9; 49.9)	571
		0 or 1	22.3 (10.9; 40.2)	48	60.2 (25.9; 86.7)	13
	40-49 yrs	2	39.9 (29.2; 51.7)	105	71.3 (52.6; 84.7)	45
		3 or more	53.1 (48.4; 57.8)	1269	53.1 (47.0; 59.2)	696
		0 or 1	81.3 (70.2; 89.0)	358	0.4 (0.1; 2.3)	302
	15-19 yrs	2	65.9 (19.9; 93.8)	27	26.2 (8.3; 58.0)	25
		3 or more	0	0	0	0
		0 or 1	85.3 (80.3; 89.2)	1070	0.8 (0.3; 1.7)	896
	20-24 yrs	2	92.9 (87.6; 96.0)	376	30.5 (20.8; 42.3)	336
		3 or more	97.2 (90.6; 99.2)	57	61.7 (37.2; 81.5)	53
		0 or 1	84.6 (79.0; 88.8)	1098	1.4 (0.4; 4.4)	913
	25-29 yrs	2	88.4 (83.1; 92.2)	874	37.1 (29.3; 45.7)	777
Thailand (2019)		3 or more	92.8 (85.4; 96.6)	227	57.6 (44.8; 69.4)	208
		0 or 1	84.1 (78.0; 88.8)	883	1.7 (0.6; 4.7)	714
	30-34 yrs	2	93.9 (91.3; 95.8)	1241	43.8 (36.8; 50.9)	1126
		3 or more	92.9 (89.6; 95.1)	445	58.2 (46.8; 68.8)	380
		0 or 1	83.6 (77.8; 88.2)	782	5.5 (2.6; 11.3)	640
	35-39 yrs	2	93.5 (90.7; 95.5)	1403	48.8 (42.8; 54.8)	1286
		3 or more	93.4 (90.6; 95.4)	655	61.2 (51.7; 70.0)	573
		0 or 1	80.5 (75.6; 84.6)	1135	18.9 (14.6; 24.1)	935
	40-49 yrs	2	91.4 (88.7; 93.5)	2844	56.3 (52.2; 60.3)	2611
		3 or more	87.3 (82.6; 90.9)	1386	69.0 (63.4; 74.1)	1196
		0 or 1	10.8 (1.4; 50.6)	10	0	1
	15-19 yrs	2	0	1	0	0
Tonga (2019)		3 or more	0	0	0	0
	20-24 yrs	0 or 1	46.5 (26.3; 67.9)	33	17.2 (2.4; 64.0)	11
		2	47.1 (22.7; 73.0)	22	0	7

		3 or more	25.4 (6.2; 63.9)	8	0	2
		0 or 1	18.4 (6.3; 42.9)	32	40.7 (5.9; 88.3)	4
	25-29 yrs	2	51.2 (33.4; 68.7)	55	26.2 (9.1; 55.8)	25
		3 or more	51.7 (36.1; 67.1)	59	17.6 (6.2; 41.0)	32
		0 or 1	34.4 (11.9; 67.0)	18	0,0	6
	30-34 yrs	2	48.0 (24.6; 72.3)	23	33.7 (8.8; 72.9)	10
		3 or more	55.8 (44.9; 66.3)	113	17.2 (7.7; 34.1)	52
		0 or 1	0	4	0	0
	35-39 yrs	2	63.0 (36.2; 83.6)	19	19.6 (4.2; 57.4)	9
		3 or more	59.5 (50.5; 67.9)	152	40.5 (27.9; 54.5)	80
		0 or 1	16.2 (3.8; 48.7)	8	100	3
	40-49 yrs	2	63.6 (32.5; 86.4)	17	67.8 (25.0; 93.0)	9
		3 or more	53.4 (43.7; 63.0)	217	52.5 (42.8; 61.9)	103
Europe & Central Asia						
		0 or 1	5.7 (1.9; 15.9)	69	0	4
	15-19 yrs	2	0	4	0	0
		3 or more	0	0	0	0
		0 or 1	5.6 (3.1; 9.8)	340	0	22
	20-24 yrs	2	3.1 (0.7; 11.9)	71	0	2
		3 or more	0	11	0	0
		0 or 1	3.7 (2.2; 6.0)	330	0	19
	25-29 yrs	2	2.6 (1.3; 5.3)	337	7.9 (1.0; 41.4)	11
Albania (2017)		3 or more	8.5 (3.8; 18.0)	98	50.4 (17.2; 83.2)	8
		0 or 1	5.1 (1.6; 15.1)	134	0	6
	30-34 yrs	2	4.6 (2.9; 7.1)	443	6.3 (1.4; 23.7)	25
		3 or more	16.9 (10.7; 25.7)	233	28.0 (12.9; 50.5)	25
		0 or 1	7.0 (2.7; 17.3)	57	28.0 (5.7; 71.3)	5
	35-39 yrs	2	6.7 (3.9; 11.3)	387	11.9 (4.4; 28.3)	24
		3 or more	12.8 (9.3; 17.3)	330	55.3 (40.0; 69.6)	46
		0 or 1	1.5 (0.6; 4.1)	112	56.8 (17.1; 89.4)	5
	40-49 yrs	2	4.4 (3.1; 6.4)	736	41.9 (27.1; 58.3)	48
		3 or more	6.9 (4.7; 10.0)	642	46.4 (28.6; 65.1)	50
Latin America & Caribbean						
		0 or 1	45.1 (36.2; 54.2)	155	1.0 (0.1; 6.7)	67
	15-19 yrs	2	59.5 (28.9; 84.2)	14	13.4 (1.8; 56.5)	9
		3 or more	100	1	100	1
Belize (2015)		0 or 1	57.3 (50.1; 64.2)	315	0.4 (0.1; 2.9)	189
	20-24 yrs	2	60.5 (50.8; 69.4)	130	13.8 (7.2; 24.8)	83
		3 or more	52.2 (33.3; 70.5)	50	18.9 (8.5; 36.7)	30
	25-29 yrs	0 or 1	55.3 (45.3; 64.9)	174	3.0 (0.8; 10.8)	105

		2	74.1 (65.0; 81.5)	160	24.8 (16.5; 35.4)	116
		3 or more	66.1 (56.6; 74.4)	167	42.9 (32.4; 54.1)	114
		0 or 1	63.6 (49.9; 75.5)	75	10.0 (3.1; 28.1)	45
	30-34 yrs	2	68.9 (58.2; 77.9)	144	31.5 (21.1; 44.2)	98
		3 or more	67.8 (59.8; 74.8)	254	44.6 (35.8; 53.8)	172
		0 or 1	48.1 (26.9; 70.0)	29	14.1 (2.0; 56.8)	14
	35-39 yrs	2	76.3 (64.1; 85.3)	75	58.8 (42.5; 73.3)	53
		3 or more	65.8 (58.2; 72.7)	228	50.7 (40.5; 60.9)	151
		0 or 1	52.7 (30.9; 73.4)	28	26.9 (7.2; 63.5)	13
	40-49 yrs	2	76.0 (56.7; 88.4)	58	56.6 (37.9; 73.6)	44
		3 or more	71.8 (66.0; 77.0)	341	71.4 (64.0; 77.8)	236
Brazil (2013)		0 or 1	93.3	1	0.7 (0.2; 2.8)	117
	15-19 yrs	2	94.1	0	0	27
		3 or more	98.5	0	0	4
		0 or 1	95.6	6	0.7 (0.2; 2.0)	496
	20-24 yrs	2	95.4	3	12.2 (6.0; 23.4)	214
		3 or more	89.2	1	15.7 (6.9; 31.6)	77
		0 or 1	92.3	8	3.3 (2.0; 5.5)	665
	25-29 yrs	2	95.0	5	19.0 (13.6; 25.9)	478
		3 or more	93.8	4	34.4 (26.7; 43.1)	311
		0 or 1	92.4	8	2.8 (1.6; 4.9)	670
	30-34 yrs	2	96.1	8	31.6 (26.1; 37.6)	729
		3 or more	96.3	7	50.1 (43.4; 56.9)	582
		0 or 1	91.8	6	11.0 (7.3; 16.2)	450
	35-39 yrs	2	95.8	8	36.6 (31.3; 42.3)	733
		3 or more	95.6	7	60.3 (53.7; 66.5)	604
		0 or 1	93.0	6	21.8 (16.9; 27.6)	514
	40-49 yrs	2	96.9	9	45.8 (40.4; 51.3)	842
		3 or more	96.3	10	66.0 (60.6; 71.0)	856
Colombia (2015)		0 or 1	70.3 (66.0; 74.2)	775	0.3 (0.0; 1.8)	521
	15-19 yrs	2	81.8 (69.9; 89.7)	99	12.5 (4.9; 28.2)	74
		3 or more	87.5 (58.5; 97.2)	12	41.4 (13.0; 76.9)	10
		0 or 1	81.1 (78.2; 83.7)	1509	1.6 (0.9; 2.9)	1192
	20-24 yrs	2	85.0 (80.5; 88.5)	600	30.7 (24.8; 37.3)	498
		3 or more	81.3 (74.3; 86.7)	223	42.1 (32.5; 52.4)	170
		0 or 1	83.9 (80.7; 86.6)	1163	3.6 (2.4; 5.5)	962
	25-29 yrs	2	91.7 (89.2; 93.6)	1064	37.4 (31.6; 43.5)	959
		3 or more	86.1 (81.6; 89.6)	675	53.2 (47.5; 58.9)	576
	30-34 yrs	0 or 1	78.3 (70.2; 84.6)	700	8.9 (6.1; 12.6)	571
		2	93.4 (90.8; 95.3)	1238	46.7 (41.4; 52.1)	1141

		3 or more	90.5 (87.9; 92.6)	1196	69.4 (65.2; 73.4)	1038
		0 or 1	83.6 (74.8; 89.8)	394	16.2 (9.7; 25.7)	319
	35-39 yrs	2	88.9 (83.8; 92.5)	1090	59.7 (53.7; 65.4)	978
		3 or more	90.9 (88.7; 92.7)	1456	72.9 (69.3; 76.3)	1285
		0 or 1	70.8 (63.7; 76.9)	434	38.7 (30.9; 47.3)	311
	40-49 yrs	2	87.5 (84.2; 90.2)	1519	68.5 (64.1; 72.6)	1311
		3 or more	90.7 (89.3; 92.0)	3121	76.1 (73.4; 78.6)	2723
		0 or 1	78.6 (64.8; 88.0)	94	0	68
	15-19 yrs	2	59.6 (21.3; 88.9)	9	0	5
		3 or more	100	1	0	1
		0 or 1	73.0 (61.7; 81.9)	307	1.6 (0.4; 6.5)	240
	20-24 yrs	2	83.1 (72.0; 90.4)	116	11.9 (5.2; 25.1)	94
		3 or more	89.8 (76.9; 95.9)	40	27.0 (12.3; 49.5)	35
		0 or 1	80.4 (70.8; 87.4)	294	0.7 (0.1; 4.2)	245
	25-29 yrs	2	78.9 (69.5; 86.1)	286	23.3 (15.1; 34.2)	235
Costa Rica (2011)		3 or more	78.0 (67.8; 85.6)	128	36.3 (24.3; 50.3)	98
		0 or 1	84.5 (76.0; 90.3)	259	4.8 (2.2; 9.9)	218
	30-34 yrs	2	87.8 (81.9; 92.0)	323	40.6 (30.3; 51.8)	276
		3 or more	89.2 (81.4; 93.9)	236	40.5 (27.6; 54.7)	203
		0 or 1	83.1 (70.6; 91.0)	137	8.2 (3.7; 17.5)	111
	35-39 yrs	2	83.4 (74.3; 89.8)	243	52.9 (42.6; 63.0)	205
		3 or more	86.9 (80.1; 91.6)	258	56.7 (47.6; 65.3)	224
		0 or 1	70.8 (54.5; 83.0)	105	22.2 (12.8; 35.8)	83
	40-49 yrs	2	80.1 (73.8; 85.3)	298	51.2 (41.2; 61.1)	235
		3 or more	87.9 (83.4; 91.3)	438	57.0 (48.7; 65.0)	377
		0 or 1	72.7 (54.2; 85.7)	161	0.7 (0.2; 2.0)	141
	15-19 yrs	2	80.2 (33.5; 97.0)	11	6.4 (0.8; 35.7)	10
		3 or more	0	0	0	0
		0 or 1	85.8 (76.5; 91.8)	674	1.2 (0.3; 3.9)	612
	20-24 yrs	2	78.8 (55.1; 91.8)	162	25.0 (17.0; 35.1)	142
		3 or more	77.1 (52.6; 91.1)	20	33.2 (13.2; 62.0)	15
		0 or 1	91.1 (86.0; 94.4)	694	0.5 (0.2; 1.1)	622
Cuba (2014)	25-29 yrs	2	94.5 (91.2; 96.6)	417	29.7 (18.6; 43.8)	380
		3 or more	67.9 (37.7; 88.1)	77	44.1 (25.7; 64.4)	68
		0 or 1	92.0 (81.8; 96.7)	354	3.6 (1.1; 11.1)	322
	30-34 yrs	2	91.5 (82.8; 96.0)	474	53.6 (41.5; 65.2)	429
		3 or more	81.4 (54.3; 94.2)	120	50.9 (32.7; 68.8)	108
		0 or 1	89.4 (80.1; 94.6)	200	14.8 (8.2; 25.3)	176
	35-39 yrs	2	90.6 (82.0; 95.3)	396	58.6 (47.4; 69.0)	356
		3 or more	96.9 (93.8; 98.5)	132	66.5 (46.2; 82.1)	119

	40-49 yrs	0 or 1	86.0 (79.5; 90.6)	365	24.6 (17.6; 33.3)	305
		2	87.7 (82.2; 91.7)	699	58.3 (52.3; 64.1)	619
		3 or more	85.9 (75.2; 92.5)	242	50.2 (37.7; 62.7)	212
Dominican Republic (2014)	15-19 yrs	0 or 1	66.8 (61.9; 71.4)	859	0.5 (0.2; 1.6)	606
		2	74.6 (64.6; 82.6)	176	3.4 (1.3; 9.0)	135
		3 or more	66.0 (34.4; 87.8)	22	38.4 (16.8; 65.8)	17
	20-24 yrs	0 or 1	75.0 (71.3; 78.4)	1391	0.8 (0.3; 1.7)	1061
		2	69.8 (65.3; 73.9)	957	8.0 (5.6; 11.3)	695
		3 or more	79.7 (72.9; 85.1)	344	48.6 (40.6; 56.6)	272
	25-29 yrs	0 or 1	74.4 (69.7; 78.6)	760	2.1 (0.8; 5.6)	568
		2	80.5 (77.1; 83.6)	1078	16.5 (13.2; 20.5)	852
		3 or more	85.2 (81.7; 88.2)	1205	66.1 (61.6; 70.4)	1037
	30-34 yrs	0 or 1	77.1 (69.4; 83.4)	300	2.4 (0.7; 7.5)	220
		2	87.2 (83.9; 89.8)	800	39.1 (33.4; 45.1)	677
		3 or more	86.1 (83.0; 88.8)	1535	79.0 (75.4; 82.2)	1346
	35-39 yrs	0 or 1	77.6 (66.1; 86.1)	107	29.1 (15.4; 48.0)	73
		2	82.5 (75.8; 87.5)	529	72.0 (65.2; 77.9)	463
		3 or more	93.6 (91.8; 95.0)	1425	88.9 (86.1; 91.2)	1304
	40-49 yrs	0 or 1	65.0 (52.4; 75.8)	130	70.9 (57.4; 81.5)	94
		2	86.3 (81.8; 89.8)	628	91.0 (86.4; 94.2)	555
		3 or more	93.4 (91.7; 94.7)	2110	95.8 (94.2; 97.0)	1957
Ecuador (2012)	15-19 yrs	0 or 1	89.8		0	285
		2	92.2		0	72
		3 or more	93.0		0	9
	20-24 yrs	0 or 1	88.5		0	618
		2	90.0		2.5 (1.1; 3.9)	482
		3 or more	91.0		22.9 (16.9; 28.9)	188
	25-29 yrs	0 or 1	87.2		1.0 (0.0; 2.0)	401
		2	90.0		7.4 (5.4; 9.3)	691
		3 or more	93.9		29.8 (26.3; 33.3)	641
	30-34 yrs	0 or 1	67.8		1.9 (0.0; 4.1)	156
		2	92.2		21.6 (18.3; 25.0)	573
		3 or more	94.5		51.0 (48.0; 54.0)	1063
	35-39 yrs	0 or 1	66.1		14.5 (5.7; 23.4)	62
		2	90.5		44.9 (39.9; 50.0)	376
		3 or more	93.9		62.0 (59.1; 65.0)	1035
	40-49 yrs	0 or 1	47.1		35.9 (20.6; 51.2)	39
		2	85.2		63.2 (74.2; 78.5)	364
		3 or more	91.3		76.3 (74.2; 78.5)	1496
	15-19 yrs	0 or 1	70.7 (64.6; 76.1)	403	0.2 (0.0; 1.7)	297

		2	75.5 (51.0; 90.1)	42	23.9 (11.4; 43.5)	36
		3 or more	100	2	0	2
		0 or 1	75.7 (71.3; 79.6)	819	0.5 (0.2; 1.3)	634
	20-24 yrs	2	75.7 (67.8; 82.1)	327	24.6 (18.6; 31.7)	257
		3 or more	86.8 (76.6; 92.9)	65	54.0 (35.9; 71.1)	52
		0 or 1	78.7 (73.3; 83.2)	451	2.1 (0.9; 5.2)	348
	25-29 yrs	2	86.1 (82.3; 89.2)	524	43.4 (37.2; 49.9)	441
		3 or more	82.7 (75.4; 88.1)	272	64.7 (56.3; 72.2)	224
El Salvador (2014)		0 or 1	73.1 (63.9; 80.7)	190	10.0 (4.6; 20.5)	136
	30-34 yrs	2	86.1 (81.4; 89.8)	463	54.4 (47.4; 61.3)	398
		3 or more	84.9 (80.9; 88.2)	559	64.1 (58.2; 69.6)	464
		0 or 1	69.2 (50.8; 83.1)	65	19.7 (7.4; 43.0)	44
	35-39 yrs	2	82.6 (76.9; 87.2)	327	70.7 (62.9; 77.4)	266
		3 or more	87.5 (84.0; 90.2)	667	74.9 (70.0; 79.2)	576
		0 or 1	59.4 (45.0; 72.4)	71	55.1 (36.9; 72.1)	40
	40-49 yrs	2	87.9 (82.8; 91.7)	327	87.3 (81.7; 91.3)	284
		3 or more	88.8 (86.1; 91.1)	928	88.5 (85.7; 90.8)	807
		0 or 1	50.9 (45.9; 55.9)	640	0	320
	15-19 yrs	2	41.4 (28.7; 55.4)	71	3.9 (1.0; 14.7)	30
		3 or more	57.7 (30.7; 80.8)	15	10.9 (1.5; 50.0)	9
		0 or 1	57.2 (53.2; 61.1)	988	0	557
	20-24 yrs	2	62.1 (56.8; 67.0)	603	10.7 (7.8; 14.6)	367
		3 or more	52.6 (45.2; 59.9)	220	34.4 (25.3; 44.9)	116
		0 or 1	57.3 (52.2; 62.2)	520	0.6 (0.2; 2.5)	297
	25-29 yrs	2	66.7 (62.5; 70.7)	774	23.7 (19.5; 28.4)	511
Guatemala (2014)		3 or more	61.1 (56.9; 65.2)	824	41.3 (36.3; 46.6)	498
		0 or 1	50.1 (41.8; 58.4)	223	5.6 (2.3; 13.1)	109
	30-34 yrs	2	72.8 (68.5; 76.7)	626	40.1 (34.8; 45.7)	448
		3 or more	67.5 (64.3; 70.5)	1369	54.0 (50.0; 57.9)	913
		0 or 1	49.0 (33.9; 64.2)	65	12.9 (4.6; 31.2)	28
	35-39 yrs	2	68.8 (62.4; 74.6)	353	51.2 (43.4; 59.0)	246
		3 or more	70.1 (67.1; 72.9)	1483	63.3 (59.6; 66.8)	1034
		0 or 1	66.7 (54.6; 77.0)	60	36.3 (21.1; 55.0)	36
	40-49 yrs	2	75.7 (69.8; 80.8)	305	67.4 (59.4; 74.5)	226
		3 or more	73.0 (70.3; 75.4)	1977	74.6 (71.9; 77.2)	1406
		0 or 1	67.7 (63.6; 71.5)	795	0	530
	15-19 yrs	2	64.9 (53.6; 74.7)	87	3.0 (0.6; 13.6)	51
Honduras (2011)		3 or more	49.7 (16.6; 83.0)	7	68.8 (18.5; 95.6)	4
	20-24 yrs	0 or 1	72.9 (69.6; 76.0)	1045	0.4 (0.1; 1.9)	758
		2	79.0 (74.8; 82.7)	560	8.3 (5.4; 12.4)	434

		3 or more	70.4 (62.4; 77.4)	190	22.2 (14.7; 32.0)	120
		0 or 1	67.6 (62.6; 72.3)	533	0.6 (0.2; 2.2)	367
	25-29 yrs	2	78.5 (74.9; 81.8)	747	16.9 (13.5; 20.9)	571
		3 or more	76.8 (73.1; 80.2)	787	35.4 (30.8; 40.2)	595
		0 or 1	71.5 (63.8; 78.1)	205	5.2 (2.4; 10.9)	137
	30-34 yrs	2	79.5 (75.4; 83.0)	583	26.1 (21.7; 31.1)	454
		3 or more	80.5 (77.7; 83.0)	1221	46.3 (42.5; 50.2)	961
		0 or 1	61.8 (49.2; 73.1)	67	6.2 (2.3; 15.9)	42
	35-39 yrs	2	83.5 (78.1; 87.7)	318	39.3 (30.7; 48.7)	259
		3 or more	78.7 (76.1; 81.1)	1403	55.8 (52.3; 59.2)	1077
		0 or 1	56.0 (40.9; 70.0)	62	27.0 (13.7; 46.1)	36
	40-49 yrs	2	77.2 (71.1; 82.4)	267	59.2 (50.4; 67.4)	208
		3 or more	77.0 (74.8; 79.0)	2048	69.5 (66.6; 72.2)	1524
Mexico (2015)		0 or 1	61.9 (52.8; 70.3)	301	0	204
	15-19 yrs	2	70.8 (48.6; 86.2)	53	3.6 (0.8; 14.8)	40
		3 or more	77.3 (25.1; 97.2)	5	73.5 (20.0; 96.9)	3
		0 or 1	77.2 (70.9; 82.5)	637	0.1 (0.0; 0.5)	470
	20-24 yrs	2	76.3 (67.8; 83.0)	424	13.3 (8.9; 19.4)	325
		3 or more	82.6 (64.0; 92.6)	132	68.3 (50.0; 82.3)	111
		0 or 1	71.5 (62.9; 78.8)	341	0.4 (0.1; 1.3)	233
	25-29 yrs	2	77.5 (71.1; 82.8)	566	35.6 (27.6; 44.6)	446
		3 or more	81.5 (72.7; 87.9)	482	57.4 (45.9; 68.2)	388
		0 or 1	65.4 (49.9; 78.2)	138	1.9 (0.6; 5.8)	89
	30-34 yrs	2	88.3 (80.4; 93.3)	424	31.0 (17.4; 48.9)	350
		3 or more	84.5 (79.2; 88.6)	679	73.5 (66.9; 79.2)	560
		0 or 1	66.7 (49.7; 80.4)	85	27.3 (14.4; 45.6)	65
	35-39 yrs	2	87.6 (79.9; 92.6)	290	51.9 (39.6; 64.1)	257
		3 or more	87.9 (83.2; 91.5)	642	72.5 (64.6; 79.1)	533
		0 or 1	80.0 (65.6; 89.4)	86	29.8 (15.2; 50.1)	61
	40-49 yrs	2	81.6 (73.9; 87.5)	338	63.9 (52.6; 73.9)	274
		3 or more	88.2 (84.5; 91.1)	961	83.1 (78.6; 86.7)	826

[a] number of married/in union women in need of contraception; [b] number of women using modern contraception

Article 2

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Research topic: Adolescent Sexual and Reproductive Health Challenges in Low-Income Settings

What are the sources of contraceptives for married and unmarried adolescents: health services or friends? Analysis of 59 low- and middle-income countries

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Abstract

Background

Despite the efforts to promote universal coverage for family planning, including harder-to-reach subgroups, inequalities in coverage are still high in several countries. Our aim was to identify which sources of contraceptive methods women mostly rely on in low- and middle-income countries (LMICs). We also explored the different sources according to age and marital status.

Methods

We used data from Demographic and Health Surveys carried out in 59 LMICs between 2010 and 2021. Among all sexually active women at reproductive age, we explored inequalities in demand for family planning satisfied by modern methods (mDFPS) and in the source of modern contraceptives according to women's age, classified as 15-19, 20-34, or 35-49 years of age. Among adolescents, mDFPS and source of method were explored by marital status, classified as married or in union and not married nor in a union.

Results

mDFPS was statistically significantly lower among adolescents than among adult women in 28 of the 59 countries included. The lowest levels of mDFPS among adolescents were identified in Albania (6.1%) and in Chad (8.2%). According to adolescents' marital status, the pattern of inequalities in mDFPS varied widely between regions, with married and unmarried adolescents showing similar levels of coverage in Latin America & the Caribbean, higher coverage among unmarried adolescents in Africa, and lower coverage among unmarried adolescents in Asia. Public and private health services were the main sources of contraceptive methods, with a lower share of the public sector among adolescents in almost all countries. The proportion of adolescents who obtained their modern contraceptives in the public sector was lower among unmarried girls than married ones in 31 of the 38 countries with data. Friends or relatives were a more frequent source of contraceptives among unmarried compared to married adolescents in all regions.

Conclusions

Our findings indicate that lower levels of mDFPS and lower use of the public sector by adolescents, especially unmarried girls. More attention is needed to provide high-quality and affordable family planning services for adolescents, especially for those who are not married.

Keywords

Family planning, source of method, private sector, public sector, contraceptives, low- and middle-income countries, national health surveys

Introduction

Over the past decades, most of the low- and middle-income countries (LMICs) presented an increase in their levels of demand for family planning satisfied with modern methods (mDFPS) (ALKEMA; KANTOROVA; MENOZZI; BIDDLECOM, 2013; BLUMENBERG; HELLWIG; EWERLING; BARROS, 2020; CREANGA; GILLESPIE; KARKLINS; TSUI, 2011; HELLWIG; COLL; EWERLING; BARROS, 2019). Along with these improvements in utilization, more emphasis has been directed to the quality of services (ELEWONIBI; SATO; MANONGI; MSUYA et al., 2020; SLATER; ESTRADA; SUAREZ-LOPEZ; DE LA VARA-SALAZAR et al., 2018). However, large inequalities within countries are still being reported in terms of wealth, area of residence, women's education, and especially between adolescents and older women (BLUMENBERG; HELLWIG; EWERLING; BARROS, 2020; COLL; EWERLING; HELLWIG; DE BARROS, 2019; CREANGA; GILLESPIE; KARKLINS; TSUI, 2011; EWERLING; VICTORA; RAJ; COLL et al., 2018; HELLWIG; COLL; BLUMENBERG; EWERLING et al., 2021; ORTAYLI; MALARCHER, 2010).

To satisfy the women's demand for family planning, it is essential to offer effective and respectful care, providing comprehensive family planning information and a wide choice of methods (SLATER; ESTRADA; SUAREZ-LOPEZ; DE LA VARA-SALAZAR et al., 2018). A key aspect of universal health coverage is equitable access to high-quality services without discrimination or undue financial hardship. Although some countries have based their strategies to increase modern contraceptive use on the public sector, several others have argued that it would be necessary to involve private and non-governmental organizations to achieve universal access (BONGAARTS; HARDEE, 2017; CAMPBELL; BENOVA; MACLEOD; GOODMAN et al., 2015; ELEWONIBI; SATO; MANONGI; MSUYA et al., 2020). The chosen approach for family planning supply influences more than only the cost of the services. Public and private facilities vary on a range of characteristics that may influence women's decisions on whether to use a contraceptive method and if so, which. Other relevant characteristics are the geographical access of the health service, its reputation, level of privacy, provision of knowledge about family planning, and its suitability to meet the needs of specific subgroups (ELEWONIBI; SATO; MANONGI; MSUYA et al., 2020; FRUHAUF, T.; ZIMMERMAN, L.; KIBIRA, S. P. S.; MAKUMBI, F. et al., 2018; KALYESUBULA; PARDO; YEH; MUNANA et al., 2021; SHAH, N. M.; WANG, W.; BISHAI, D. M., 2011). These characteristics are highly variable between public and private facilities, which is especially important for unmarried adolescents who are more often underserved by family planning policies and subject to unfavorable attitudes by health providers and community leaders in several countries (COLL; EWERLING; HELLWIG; DE BARROS, 2019; DENNIS; BENOVA; OWOLABI; CAMPBELL, 2018; GANCHIMEG; OTA; MORISAKI; LAOPAIBOON et al., 2014;

KALYESUBULA; PARDO; YEH; MUNANA et al., 2021; KANANURA; WAISWA; MELESSE; FAYE et al., 2021; RADOVICH; DENNIS; WONG; ALI et al., 2018).

The literature investigating patterns of family planning provision in low- and middle-income countries largely presents average estimates by world regions, indicating that the private sector is the main source of short-acting methods which are usually preferred by younger, wealthier, more educated, and urban women (CAMPBELL; BENOVA; MACLEOD; GOODMAN et al., 2015; CHAKRABORTY; SPROCKETT, 2018). On the other hand, the public sector tends to be the main source of long-acting and permanent methods (CAMPBELL; BENOVA; MACLEOD; GOODMAN et al., 2015; CHAKRABORTY; SPROCKETT, 2018). Fewer studies presented results at country level. Most of them investigated only one country or a limited number of countries. Comparing their findings, a huge variability across countries is observed (CHAKRABORTY; SPROCKETT, 2018; RADOVICH; DENNIS; WONG; ALI et al., 2018).

In this article, we used survey data from LMICs covering all world regions to investigate within- and between-country inequalities in levels of mDFPS and in the source of the contraceptives among adolescents. We compared adolescents with older women at the start to set the stage for the analyses. Next, we explored differences according to adolescents' marital status.

Materials and methods

We used publicly available data from the Demographic and Health Surveys (DHS), which are nationally representative, cross-sectional household surveys conducted in LMICs. We selected the most recent survey for each country, carried out since 2010 that collected information on family planning and method source, with 59 surveys included in the analyses. The surveys included information on all sexually active women, except for Afghanistan, Bangladesh, Pakistan, Turkey, Egypt, Jordan, and Yemen, where information was collected only for ever-married women. Women were considered sexually active if they were married or living with a partner, or if they reported having had sexual intercourse in the month preceding the interview.

Demand for family planning satisfied and sector of provision

Our main outcome is demand for family planning satisfied with modern methods (mDFPS), defined as the proportion of sexually active women in need of contraception who were using (or whose partners were using) a modern contraceptive method. A woman was considered in need of contraception if she was fecund and did not want to become pregnant within the next 2 years, or if she was unsure about whether or when she wanted to become pregnant. Pregnant women with a mistimed or unintended pregnancy were also considered in need of

contraception. Methods were classified as modern if they were medical procedures or technological products (HUBACHER; TRUSSELL, 2015), including oral contraceptive pills, injections, male and female condoms, diaphragms, spermicidal agents, emergency contraception, intrauterine devices (IUD), implants, and sterilization (female or male).

Current contraceptive users were asked where they last obtained their contraceptive method. We classified it into five groups: (I) public, including all governmental medical facilities, public community health workers, public pharmacies, and government distributions; (II) private, considering private hospitals, clinics, doctors, pharmacies, drug stores, market/shops, and vending machines; (III) non-profit, including facilities of non-governmental organization and faith-based facilities; (IV) friends or relatives; and (V) other sources (missing or unclassified source). Mixed facilities were classified as public providers, following the DHS definition.

Stratifiers

mDFPS and source of method were explored considering women's age, classified into three groups: 15 to 19 years (adolescents), 20 to 34 years, and 35 to 49 years. Adolescents were further classified as currently married (or in a union) or not.

Statistical analyses

The proportions of women with mDFPS by age group and by method source were calculated taking into account the complex survey design, including sample weights, clusters, and strata. Countries were grouped according to UNICEF world regions (Eastern & Southern Africa, West & Central Africa, Middle East & North Africa, Eastern Europe & Central Asia, South Asia, East Asia & the Pacific, Latin America & the Caribbean).

The percentages of mDFPS with 95% confidence intervals were presented in bar graphs while 95% confidence intervals of the estimates on the share of the source of method by women's age and adolescents' marital status were presented in the supplementary material.

All analyses were performed using Stata (StataCorp. 2021. Stata Statistical Software: Release 17. College Station, TX: StataCorp LLC.) using publicly available anonymized databases. Institutions and national agencies that were responsible for the data collection in each country obtained ethics approval for the surveys.

Results

Our study sample included data from 59 LMICs comprising 784,996 sexually active women of reproductive age of which 59,531 were adolescents. The proportions of countries studied in each world region were 76% in West & Central African countries, 71% in Eastern & Southern

Africa, 20% in Middle East & North Africa, 26% in Eastern Europe & Central Asia, 50% in South Asia, 40% in East Asia & Pacific, and 22% in Latin America & the Caribbean. mDFPS ranged from 6.1% in Albania to 85.6% in Colombia. The percentage of sexually active adolescents in each country varied from 0.9% to 33.7% of all sexually active women (Table 1).

mDFPS varied greatly across regions and groups of age. The lowest level of coverage was observed in West & Central Africa, where mDFPS was on average 28.9% among adolescents, and 35.7% and 32.8% among women aged 20-34 and 35-49 years, respectively. Latin America & the Caribbean was the region with the highest level of mDFPS, with average levels of coverage of 56.5%, 69.2%, and 72.3% among women aged 15-19, 20-34, and 35-49 years, respectively (Table 2). Public services were the main source of family planning in all regions, but they were less used by adolescents than adult women in most of the regions. The largest gap was identified in West & Central Africa, where 44.2% of the adolescents get their current method in public facilities while it was the source of family planning of 60.2% of the modern contraceptive users aged 20-34 and 69.4% of those between the ages of 35 and 49. Similar patterns of method source among women of different groups of age were observed in the Middle East & North Africa, East Asia & the Pacific, and Latin America & the Caribbean (Table 2).

Demand for family planning satisfied and method source by women's age

The country levels of mDFPS by age groups are presented in Figures 1 to 4. Our results indicated four patterns of inequality. The highest level of mDFPS was observed among young adults in 26 countries, among which larger gaps were usually observed in relation to adolescents with smaller gaps in comparison with older women. A monotonic increase with age was observed in 22 countries and a monotonic decrease with the increase of age in 5 countries. In Congo DR, Côte d'Ivoire, and Albania the difference by women's age was virtually null (Figures 1-4). For Armenia, Tajikistan, and Kyrgyzstan estimates on adolescents were suppressed due to insufficient sample size.

Adolescents presented much lower mDFPS than older women in a few countries from West & Central Africa, especially in Gambia and in Senegal, where mDFPS was 30 percentage points (p.p.) lower than among the older women. In Eastern & Southern Africa, the largest gaps were observed in Zambia, Malawi, Lesotho, and Tanzania. All three countries in the Middle East & North Africa presented large gaps according to women's age. Although we could not present estimates for adolescents for most of the countries from Eastern Europe & Central Asia, a very low level of coverage was observed among Albanian women from all age groups and a gap of more than 30 p.p. was identified between Turkish adolescents and women aged 35-49. In the

other two Asian regions, adolescents presented lower mDFPS in 8 of the 11 countries, especially in India and Nepal, where their mDFPS was more than 40 p.p. lower than the coverage among the older women. Lower coverage among adolescents was identified in all countries in Latin America & the Caribbean, with larger gaps in the Dominican Republic (30 p.p.) and Haiti (16 p.p.) (Figures 1-4).

Regarding the source of method, our results indicated important differences across countries. A few countries stood out with a larger proportion of contraceptives obtained from friends or relatives. In all cases, adolescents relied more on this source than older women. Friends and relatives were a common source in six countries from West & Central Africa, where Gabon stood out with 35.0% of adolescents obtaining their contraceptives this way, followed by Cameroon (20.6%) and Congo Brazzaville (18.8%). It was also the case of three countries from Eastern & Southern Africa: Lesotho (17.6%), Mozambique (16.1%), and Comoros (14.2%). The adolescents' dependency on friends and relatives was also high in Haiti (18.1%) and India (19.4%) (Figures 1-4).

Significantly lower shares of the public sector among adolescents than among adult women were identified in 32 out of the 59 countries. The largest gaps were identified in Burkina Faso (where the public sector was the source of contraceptives of 31.1%, 79.6%, and 85.4%, of the contraceptive users aged 15-19, 20-34, and 35-49, respectively), in Togo (16.8%, 54.3%, and 76.9%), and Chad (35.9%, 75.4%, and 83.9%). In all of them, the private sector played a major role among adolescents. The public sector was highly used by women of all ages in some countries, such as Zambia, Senegal, Niger, and Mauritania, where it was the source of family planning for more than 80% of women. On the other hand, it was a less common source with the private sector playing a major role among women from all age groups in Côte d'Ivoire, Congo DR, Congo Brazzaville, and Gabon. In all these countries the public sector was the source of family planning for less than 10% of adolescents and less than 50% of adult women (Figures 1-4).

Non-profit services were relatively more used in Latin America and the Caribbean, especially among older women. The only exception was Peru, where the share of non-profit services was virtually null. In other regions, we did not observe a clear pattern of use of non-profit services by women's age (Figures 1-4).

Differences in the level of mDFPS and method source among married and unmarried adolescents

Inequalities in mDFPS and source of method by marital status of adolescents are shown in Figures 5-8. For 21 of the 59 countries, information on unmarried adolescents was either not available or the sample size was too small. This was especially true for Asian countries, where we were able to explore inequalities by marital status in only three out of 16 countries. Among the 38 countries with information, the patterns varied between and within regions. Unmarried adolescents presented significantly higher levels of mDFPS than married girls in 10 of the 38 countries with information. The largest differences between unmarried and married adolescents were found in Gabon (55.5% vs. 23.5%, respectively), Cameroon (52.5% vs. 21.5%), and Burkina Faso (50.5% vs. 21.8%). Married adolescents presented significantly higher mDFPS in five countries. The largest gaps were identified in Rwanda (23.7% vs. 87.4%) and Zambia (33.6% vs. 62.4%).

Regarding the share of method source, a clear pattern emerged about the use of friends or relatives as source of contraception. Although it was highly used by both married and unmarried adolescents in Gabon (43.1% vs. 33.7%, respectively), it was much more used among unmarried adolescents in almost all countries. The countries with the largest proportions of unmarried adolescents depending on friends or relatives were Lesotho (49.4%), Papua New Guinea (32.8%), and Haiti (27.1%). Large gaps were also identified in these three countries, being friends/relatives not used by married adolescents from Papua New Guinea and being it the source of contraceptives for only 2% of married adolescents from Lesotho and Haiti (Figures 5-8).

The share of the public sector was higher among married than among unmarried adolescents in 31 of 38 countries, among which we observed three different scenarios. In Gabon and Congo Brazzaville, our results indicate similar patterns of share of source regardless adolescents' marital status, with the public sector accounting for less than 20% of the mDFPS of both married and unmarried adolescents. In Ethiopia, Liberia, Mali, and Zambia the pattern of market share was also similar between married and unmarried adolescents, but with the public sector playing a major role as family planning provider. The last scenario was the more common, with higher use of the public sector only by married adolescents while unmarried adolescents relied mostly on the private sector and friends or relatives to get contraceptives (Figures 5-8).

Non-profit services were generally not used often and were a more important source in Haiti and Mozambique only. They were the source of contraceptives for 23.2% of unmarried

adolescents in Mozambique (compared to only 2.0% of married ones), while in Haiti 31.2% of married adolescents relied on non-profit services compared to 1.3% of the unmarried ones (Figures 5-8).

Source of family planning not classified or not reported

The proportion of women who did not specify the source of the current contraceptive method used was negligible in most study countries (< 2% overall in our sample). However, some countries presented a substantial proportion of "other" as the source. This was especially the case of Peru, where the proportion of "other" ranged between 11.5% among adolescents and 29.3% among women aged 35 to 49. In Comoros and Chad, the frequency of "other" among adolescents was 11.9% and 9.1%, respectively. When considering marital status, 27.0% of unmarried adolescents from Papua New Guinea, 26.7% of married adolescents from Peru, 14.8% of married adolescents from Comoros, and 11.7% of unmarried adolescents from Chad did not specify their last source of modern contraceptives.

Discussion

We used data from 59 low- and middle-income countries, analyzing a sample of 784,996 reproductive-age women to provide up-to-date estimates of mDFPS among women from different ranges of age, exploring differences in their source of family planning services and how level of mDFPS and source of method differ among married and unmarried adolescents. Our findings indicated that adolescents presented lower levels of mDFPS with relatively higher use of private facilities for family planning services compared to older women. We also found that mDFPS was higher among unmarried adolescents in most of the countries, but public facilities were much less used by them than by married adolescents. In some countries, unmarried adolescents relied in large part on private facilities and friends or relatives as source of contraceptives.

The lowest mDFPS among adolescents was found in West & Central Africa. Other studies have also documented lower levels of coverage in the region (CAMPBELL; BENOVA; MACLEOD; GOODMAN et al., 2015; EWERLING; VICTORA; RAJ; COLL et al., 2018; HELLWIG; COLL; EWERLING; BARROS, 2019). Our findings indicated that, in addition to the large gap between adolescents and older women, mDFPS among married adolescents from West & Central Africa was half of the mDFPS among unmarried adolescents. This finding may be partly explained by the fact that the contraceptive method more used among unmarried adolescents is the male condom, which is almost not used by married girls (UNFPA WCARO, 2018). In addition, the region is marked by cultural norms of early age of sexual debut, early marriage, large spousal

age gaps, and high adolescent birth rates (UNFPA WCARO, 2018; UNICEF, 2019). Larger gaps between age groups were also found in the Asian region, especially in India and Nepal, countries where contraceptive use among adolescents is low and almost unchanged in the last years, where there is societal pressure to conceive soon after marriage, and where female permanent contraception is the method most used (HELLWIG; EWERLING; COLL; BARROS, 2022; SINGH; SHUKLA; THULASEEDHARAN; SINGH, 2021; SUBEDI; JAHAN; BAATSEN, 2018).

Looking at inequalities in mDFPS at the country level, we were able to identify the most extreme cases. Among the countries studied, the largest gap between married and unmarried adolescents was found in Rwanda, where mDFPS among married girls was almost 90% while it was lower than 25% among unmarried adolescents. This finding was surprising since the literature places Rwanda with high levels of family planning coverage, with a faster increase even among women from more vulnerable groups. Most of these results, however, consider only married women (COREY; SCHWANDT; BOULWARE; HERRERA et al., 2022; HELLWIG; BARROS, 2022; HELLWIG; COLL; EWERLING; BARROS, 2019; HELLWIG; COLL; BLUMENBERG; EWERLING et al., 2021; MUTUA; WADO; MALATA; KABIRU et al., 2021). Although the government has launched youth-friendly policies, premarital sex is uncommon in the country (GUPTA; UMWIZA; DOYLE; NIZEYIMANA et al., 2021; KAWUKI; GATASI; SSERWANJA; MUKUNYA et al., 2022; NDAYISHIMIYE; UWASE; KUBWIMANA; NIYONZIMA et al., 2020; NTIRENGANYA, 2022). It is a taboo covering up complex couples' dynamics and a decision-making process that can lead unmarried adolescents to risky sexual behavior (GUPTA; UMWIZA; DOYLE; NIZEYIMANA et al., 2021). In a context of increasing rates of unwanted adolescent pregnancies and HIV infection, there is evidence that being unmarried is the more common reason for non-use of contraceptives among unmarried sexually active Rwandan adolescents (KAWUKI; GATASI; SSERWANJA; MUKUNYA et al., 2022; NDAYISHIMIYE; UWASE; KUBWIMANA; NIYONZIMA et al., 2020).

Regarding the inequalities in the source of method by women's age, our findings are consistent with previous studies that identified an overall lower share of the public sector among adolescents and young adults than among older women (RADOVICH; DENNIS; WONG; ALI et al., 2018). However, we found similar shares of public and private sectors across groups of women's age in West & Central Africa, Middle East & North Africa, and in Latin America & the Caribbean. In these regions, the inequalities stood out when looking at adolescents' marital status, with a much lower share of the public sector among unmarried girls.

Looking at the country-level estimates, we were also able to identify important differences between countries. The countries included in our analysis vary greatly in terms of socioeconomic development, cultural norms, national willingness to invest in public health, health sector structure, and financing schemes. In almost all regions, the private sector was the main provider in some countries while it represented a minor proportion of the mDFPS in others. West & Central Africa presents huge heterogeneity between countries in terms of source of method. While there were countries with a higher share of the private sector among all women, such as Congo Brazzaville and Gabon, the private sector was a less representative source of family planning services in others, such as Mauritania, Niger, Senegal, and Sierra Leone. The same patterns were observed in terms of adolescents' marital status. Among countries with low use of the private sector for family planning services, it was previously documented in relation to other health needs (CHAKRABORTY; SPROCKETT, 2018), while among countries where the private services were largely used there is evidence of low satisfaction of users with government health services, with lack of technical competence being identified by the women (NDZIESSI; BINTSENE-MPIKA; BILECKOT, 2017). In addition, HIV/AIDS is still a major public health problem in several African countries. The higher share of the private sector may be also related to the higher share of male condoms, easily distributed in private pharmacies and markets (SANOGO; YAYA, 2020; UNITED NATIONS, 2019). Among the countries in Latin America & the Caribbean, although the differences in terms of share of public and private sectors by women's age were virtually null, large gaps were found looking at adolescents' marital status, with lower use of the public sector by unmarried adolescents in all countries. Haiti stood out as the country where friends or relatives were a more significant source, accounting for nearly 30% of the mDFPS among unmarried adolescents. This dependency on others to have access to family planning is unsurprising given there is evidence that half of the population has no access to healthcare and more than 70% of Haitian women still have limited availability of family planning services in both urban and rural areas (BOUILLY; GATICA-DOMÍNGUEZ; MESENBURG; CÁCERES UREÑA et al., 2020; WANG; MALLICK, 2019). The hundreds of NGOs working in the country do not seem to be able to offer enough services (USAID; HEALTH POLICY PLUS, 2016).

In the Middle East & North Africa, the pattern of market share was also similar between and within countries, except for the higher use of non-profit services in Jordan. International organizations have been working in Jordan for several decades through partnerships with the government and direct provision of a full range of modern contraceptives in reproductive health clinics across the country (BAKER, 2018; SPINDLER; BITAR; SOLO; MENSTELL et al., 2017; USAID, 2022). Although our findings are consistent with other studies that documented an overall low

share of non-profit services (CAMPBELL; BENOVA; MACLEOD; GOODMAN et al., 2015), we found differences at regional and country levels. In addition to Jordan, this type of service was relatively more used in some Eastern & Southern African countries and in most of the countries in Latin America & the Caribbean, especially in Haiti.

One of the methods more frequently used by adolescents is the male condom (MUNAKAMPE; ZULU; MICHELO, 2018). Although the high share of friends or relatives as source of contraceptives may be a result of the higher use of the male condom and the higher role of the partner in the purchase of it, the inequality in the share of this source that we found in terms of marital status may partly result from lower accessibility of unmarried girls to family planning services. It is documented that boys find it easier to get condoms than girls (MUNAKAMPE; ZULU; MICHELO, 2018), and that important reasons for the non-use of contraceptives by girls are related to provider attitudes, stigma, and shame (CHANDRA-MOULI; MCCARRAHER; PHILLIPS; WILLIAMSON et al., 2014; LOWE; SAGNIA; AWOLARAN; MONGBO, 2021). In addition, although there is evidence that adolescents see their partners as people they could discuss family planning with, unreliable sources of family planning and sexual information, such as their peers and the internet, especially pornography websites, are highly declared by adolescents, since they considered it as more accessible (CHANDRA-MOULI; MCCARRAHER; PHILLIPS; WILLIAMSON et al., 2014; MUNAKAMPE; ZULU; MICHELO, 2018). These sources are, however, associated with misconceptions and incorrect information (MUNAKAMPE; ZULU; MICHELO, 2018).Among the health institutions, despite the higher use of the private sector by adolescents, especially pharmacies and drug sellers which easily provide short-acting reversible methods, adolescents usually recognize public facilities as those of higher quality in terms of counseling and screening procedures (KEESARA; JUMA; HARPER, 2015; RADOVICH; DENNIS; WONG; ALI et al., 2018). Another study exploring factors related to the source of family planning services in 40 countries identified that differences in the source of method according to women's marital status vary according to the method chosen and to the marital status of the women (CARTWRIGHT; OTAI; MAYTAN-JONEYDI; MCGUIRE et al., 2019). Similar source of contraceptives among married and unmarried women between the ages of 18 and 35 was identified among those using methods that require stronger training and are more frequently provided in hospitals and clinics, such as injectables and long-acting methods, and among the users of methods that can be easily obtained in shops in an accessible business transaction, such as male and female condoms. On the other hand, inequalities by marital status were observed concerning more expensive and self-administrated contraceptives, among which unmarried adolescents look for a discrete and no judgmental service while their married peers prefer public

facilities that provide a free service and among whom the judgment barrier is nonexistent or much less expressive (CARTWRIGHT; OTAI; MAYTAN-JONEYDI; MCGUIRE et al., 2019).

Although pharmacies and shops are a valuable source of short-acting contraceptives, they offer no provision of family planning counseling and knowledge on women's sexual and reproductive health, which are as important as the provision of contraceptives itself. Poor sexual and reproductive health education is associated with higher risks of sexual coercion, unintended pregnancies, induced abortions, and sexually transmitted infections (FUBAM; TENDONGFOR; OLAYEMI; ODUKOGBE, 2022; HAMDANIEH; FTOUNI; AL JARDALI; FTOUNI et al., 2021). In this sense, it is fundamental to consider the potential impact of the high use of these commercial sources by women at the beginning of their sexual and reproductive life.

Sexual and reproductive health strategies aiming to reach adolescents have been designed in the past years, resulting in an overall increase in demand for family planning satisfied among adolescents. However, unmarried adolescents are still under restrictive policies or cultural norms in several countries and public health services have not been provided to them or have not been properly provided (CHANDRA-MOULI; MCCARRAHER; PHILLIPS; WILLIAMSON et al., 2014). In addition, sex education is also scarce (CHANDRA-MOULI; MCCARRAHER; PHILLIPS; WILLIAMSON et al., 2014). To increase access and use of family planning services and reduce inequalities between married and unmarried adolescents, adolescent-friendly strategies must consider a provision of a wide range of free contraceptives or at reduced costs and the provision of reliable information on family planning knowledge, sexual and reproductive health, and girls' sexual empowerment. Means of family planning education that have been used successfully are communication through pamphlets and mobile phone technology and family planning integration with other health services used by adolescents (CHANDRA-MOULI; MCCARRAHER; PHILLIPS; WILLIAMSON et al., 2014).

Our study has some limitations. Information on source of method is available only in DHS surveys, therefore we have a low representation of some regions. In addition, we also have a low representation of countries where data on unmarried women was not collected or sexual activity among unmarried adolescents was rare or underreported. We were not able to evaluate inequalities by marital status in any of the countries from the Middle East & North Africa nor in most of those from Asia. Regarding the classification of the providers, although DHS has standardized the terminology in the more recent surveys, unclassified sources still occur. Women may be unsure how to classify unconventional health providers that may be public or non-profit. In addition, misclassification of the type of source still may occur when non-profit

organizations work in partnership with the government or franchising private providers. Also, we were not able to identify potential impacts of public-private partnerships among which women may access family planning services in private facilities with reduced or no cost due to governmental subsidies. The other limitation in relation to the DHS methodology is that we were not able to access who was the friend/relative that provided the method. While some women who classified it as their source may receive their contraceptive from their boyfriend or husband, other women may depend on their peers or relatives. Another limitation is related to the lack of information on the quality of each type of provider since the only related information available in DHS is on side effects advice. Further research is needed to access the level of development of each sector in each country, the affordability of family planning services, and if the women choose that specific provider after suffering or to avoid suffering any kind of discrimination in the service she would prefer. We also have limitations related to the scope of our study. Since our main outcome is the share of method source, we opted to restrict demand for family planning satisfied to modern methods only. This restriction limits our interpretation on the role of traditional methods in satisfying the demand for family planning. There are also differences in the type of service that goes beyond our scope. Inequalities may exist in relation to the use of health services from different levels of quality, such as public hospitals and public health clinics. In addition, all the countries included have different ways on how the health system is organized, strategies to provide contraceptives, gender norms, and levels of economic development. The potential reasons for the differences we found were also not assessed.

Conclusion

Affordable access to high-quality health services is a fundamental human right. Our study brings light to the differences in mDFPS and share of method source by women's age and marital status in 59 low- and middle-income countries from all world regions. The inequalities identified suggest that the public sector of most of the countries included is still not reaching adolescents, especially adolescent girls who are not married. Our findings also highlight the importance of improving the services offered by the different health providers with specialized training of health workers, offering of a full range of methods, and providing good and understandable information on women's health and family planning.

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Figures

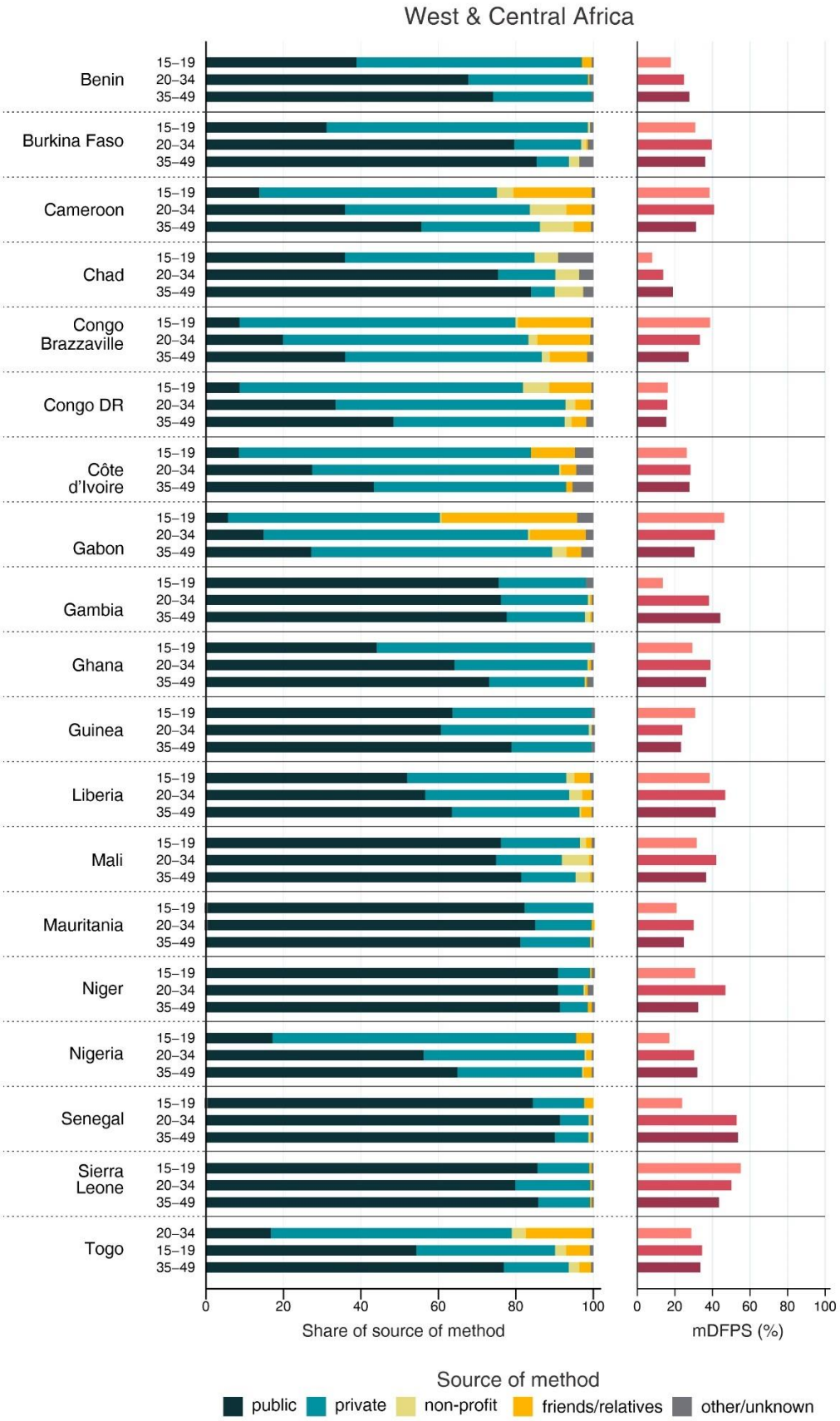

Figure 1. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by women's age in West & Central Africa. Source: DHS, 2010-2021.

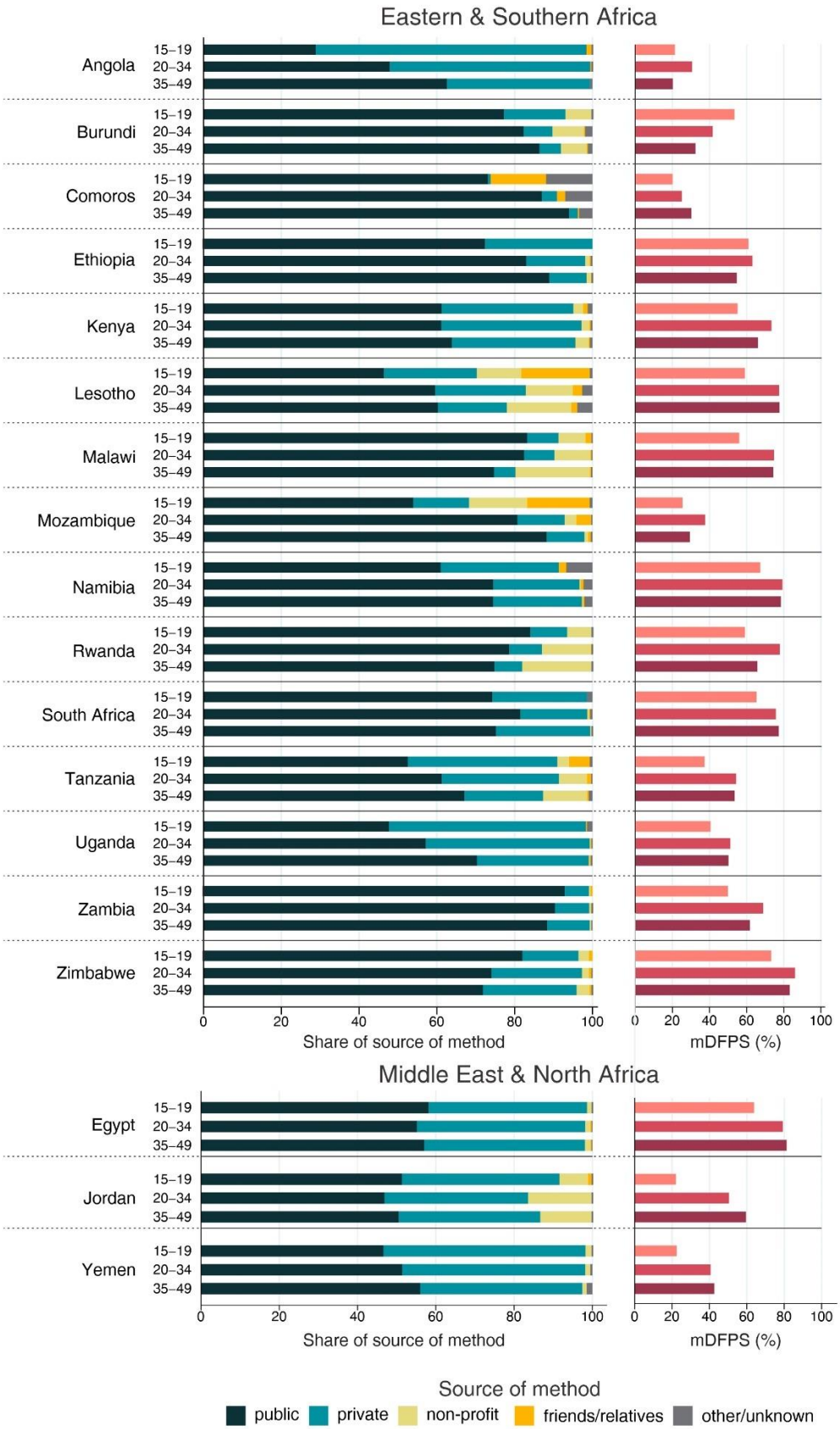

Figure 2. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by women's age in Eastern & Southern Africa and Middle East & North Africa. Source: DHS, 2010-2021.

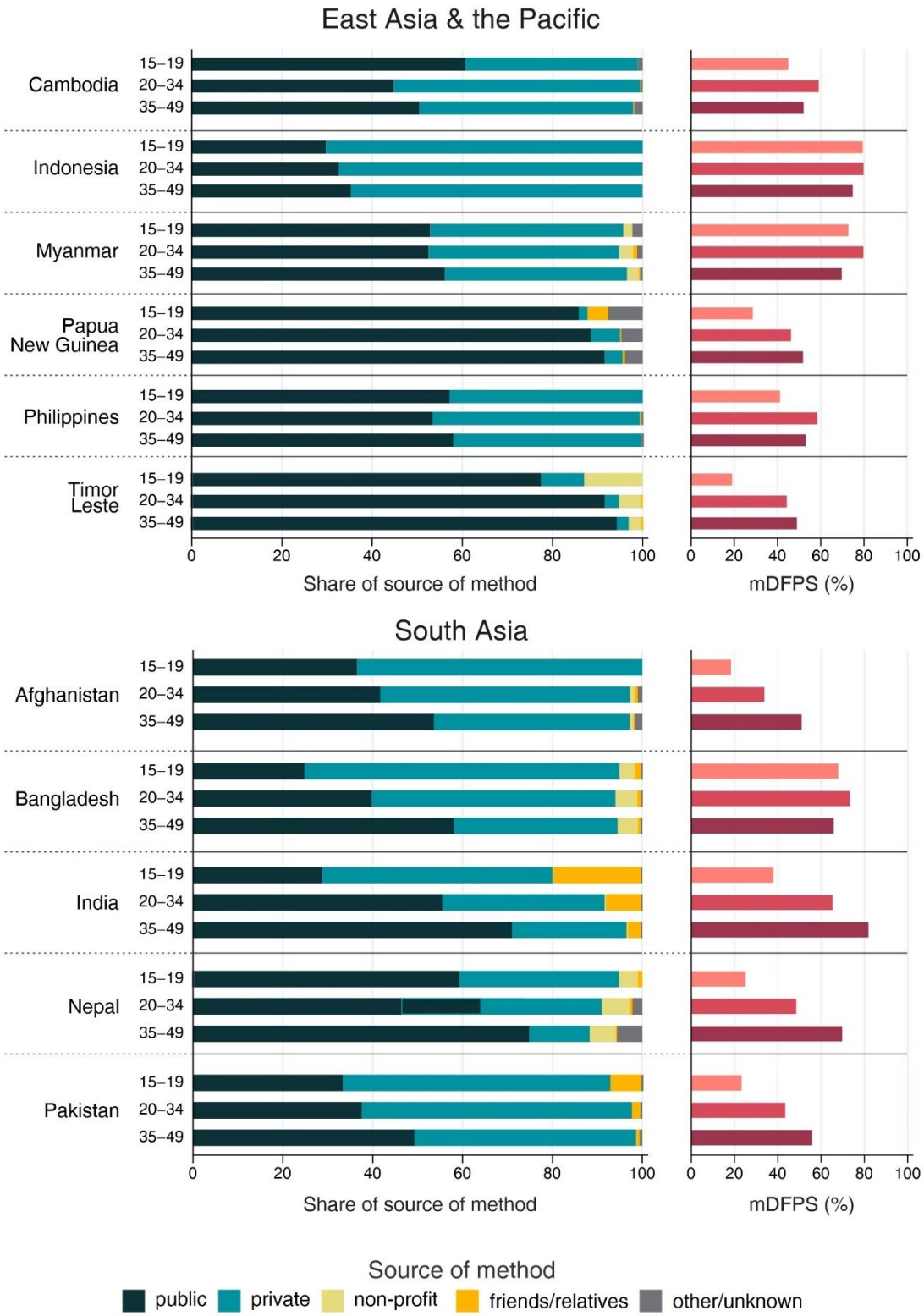

Figure 3. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by women's age in East Asia & the Pacific and South Asia. Source: DHS, 2010-2021.

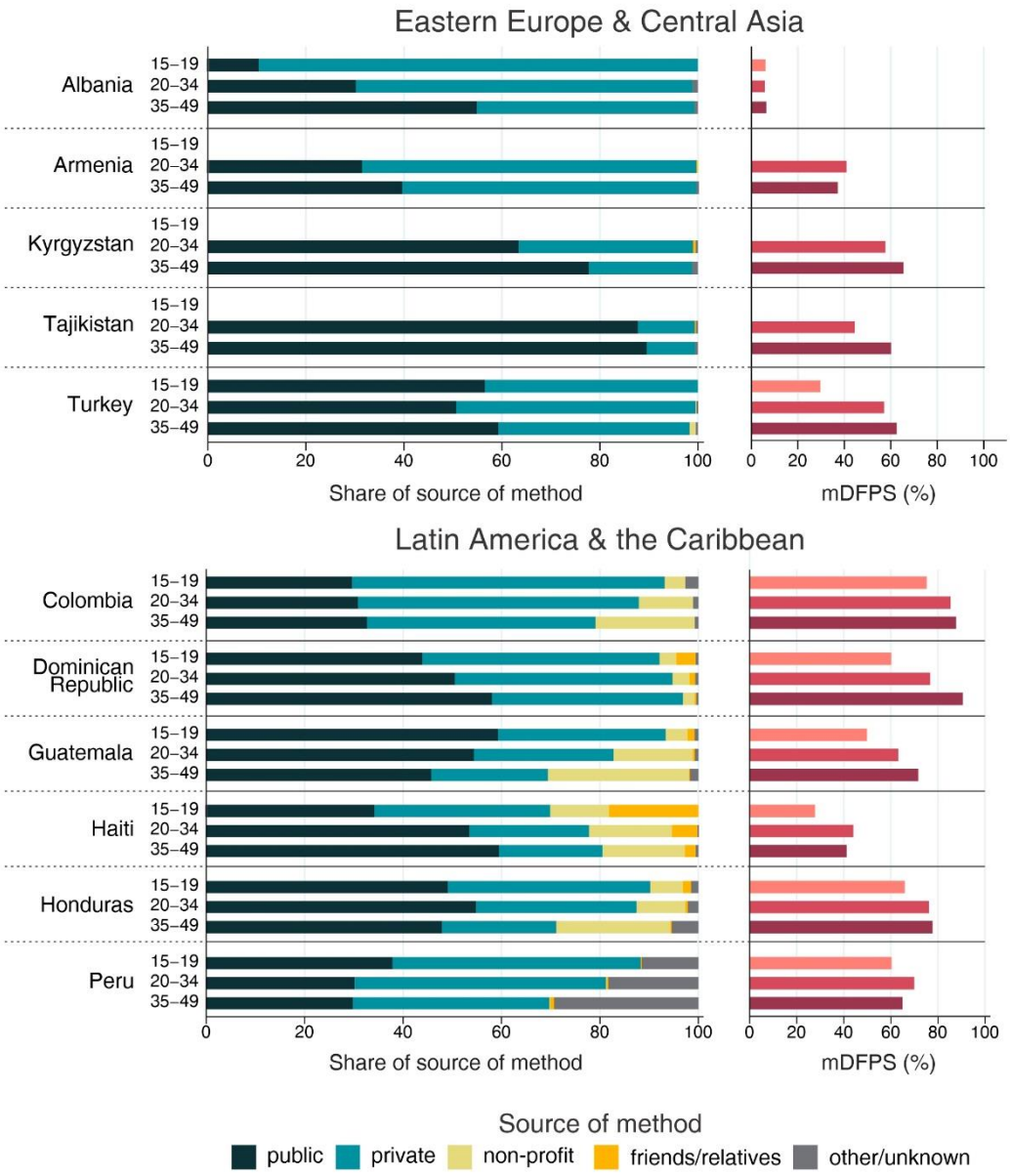

Figure 4. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by women's age in Eastern Europe & Central Asia and in Latin America & the Caribbean. Source: DHS, 2010-2021.

Note: bars of groups with fewer than 25 cases have been suppressed.

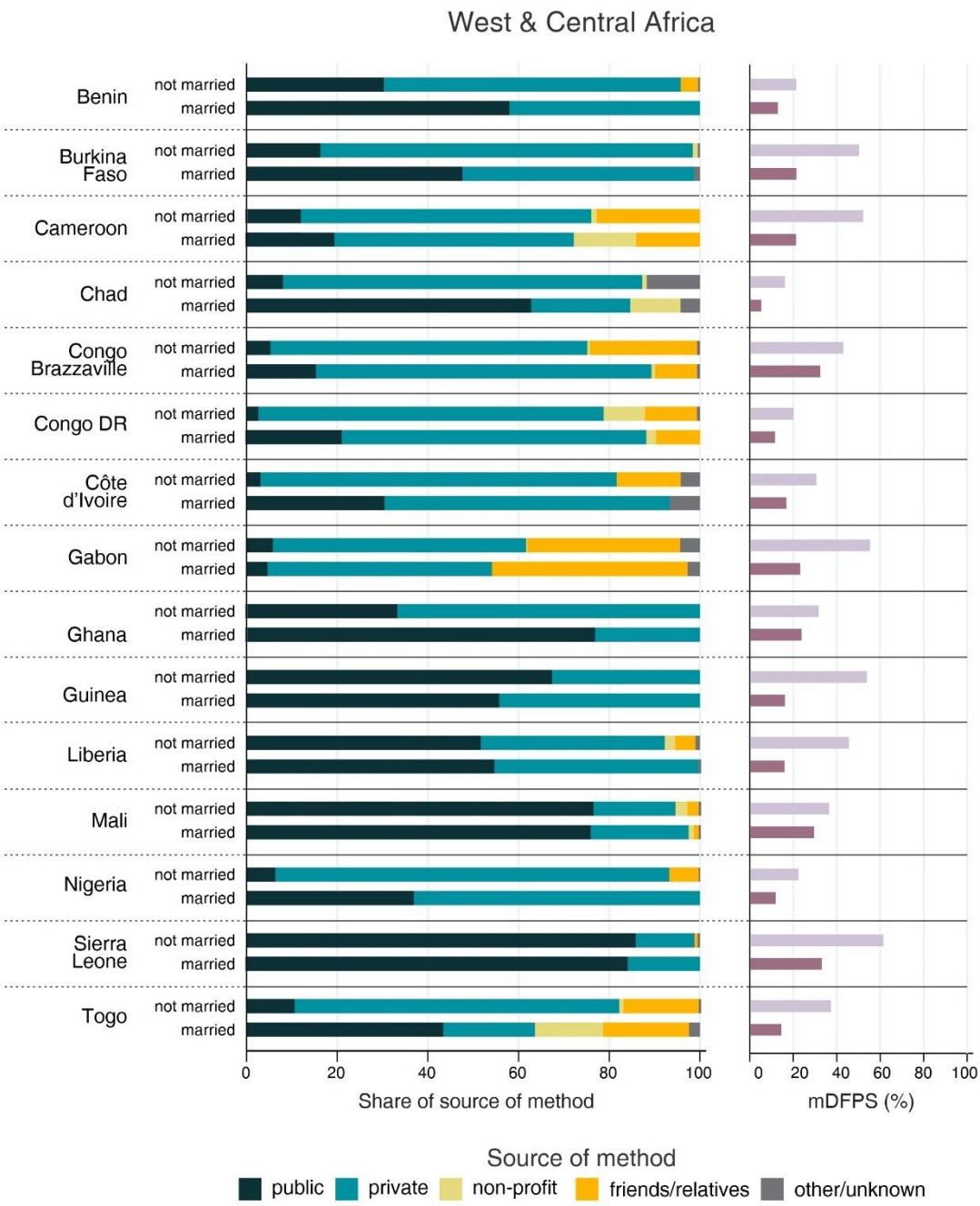

Figure 5. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by adolescents' marital status in West & Central Africa. Source: DHS, 2010-2021.
Note: countries missing information on never married women or with fewer than 25 cases have been suppressed.

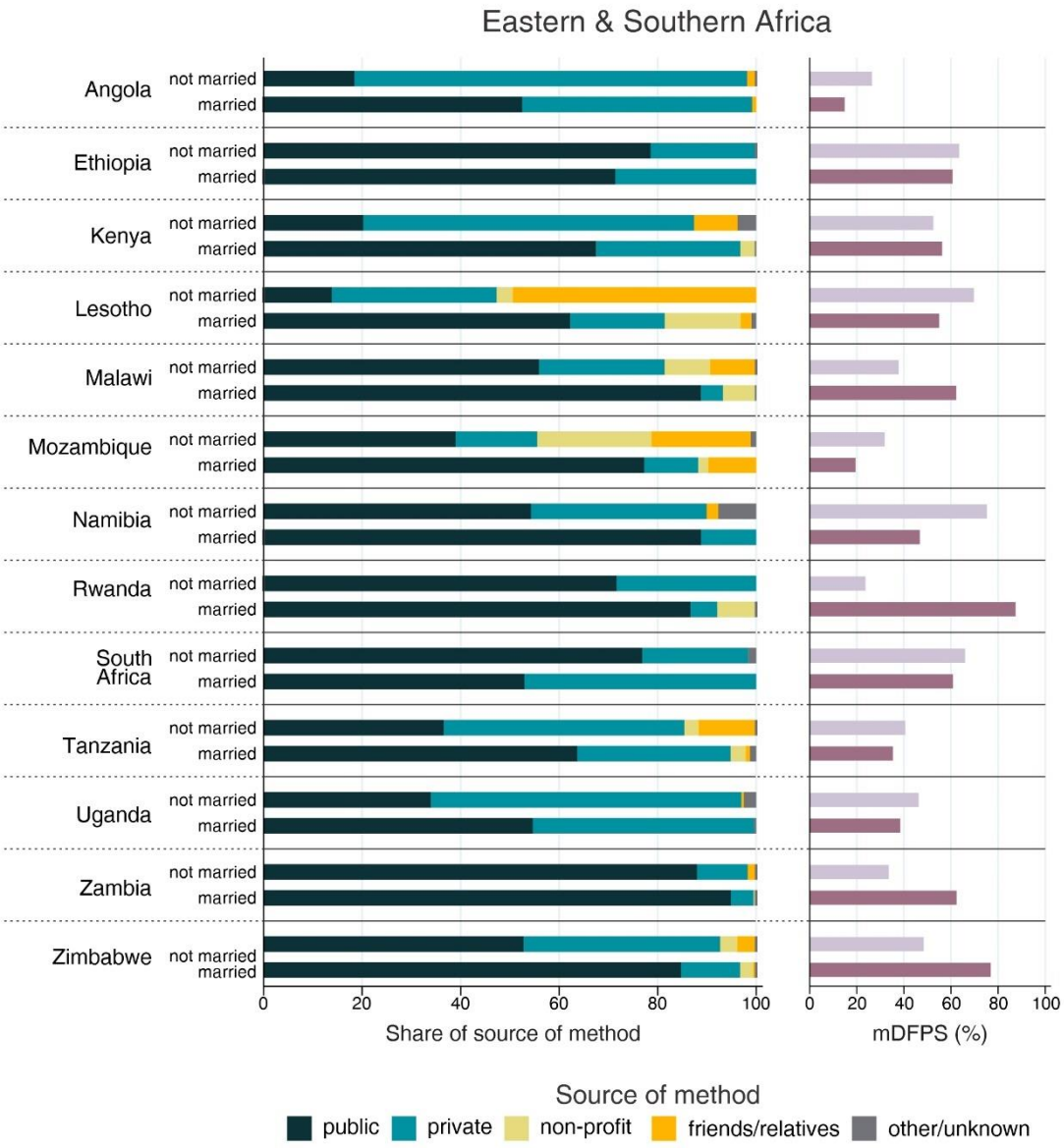

Figure 6. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by adolescent's marital status in Eastern & Southern Africa. Source: DHS, 2010-2021. Note: countries missing information on never married women or with fewer than 25 cases have been suppressed.

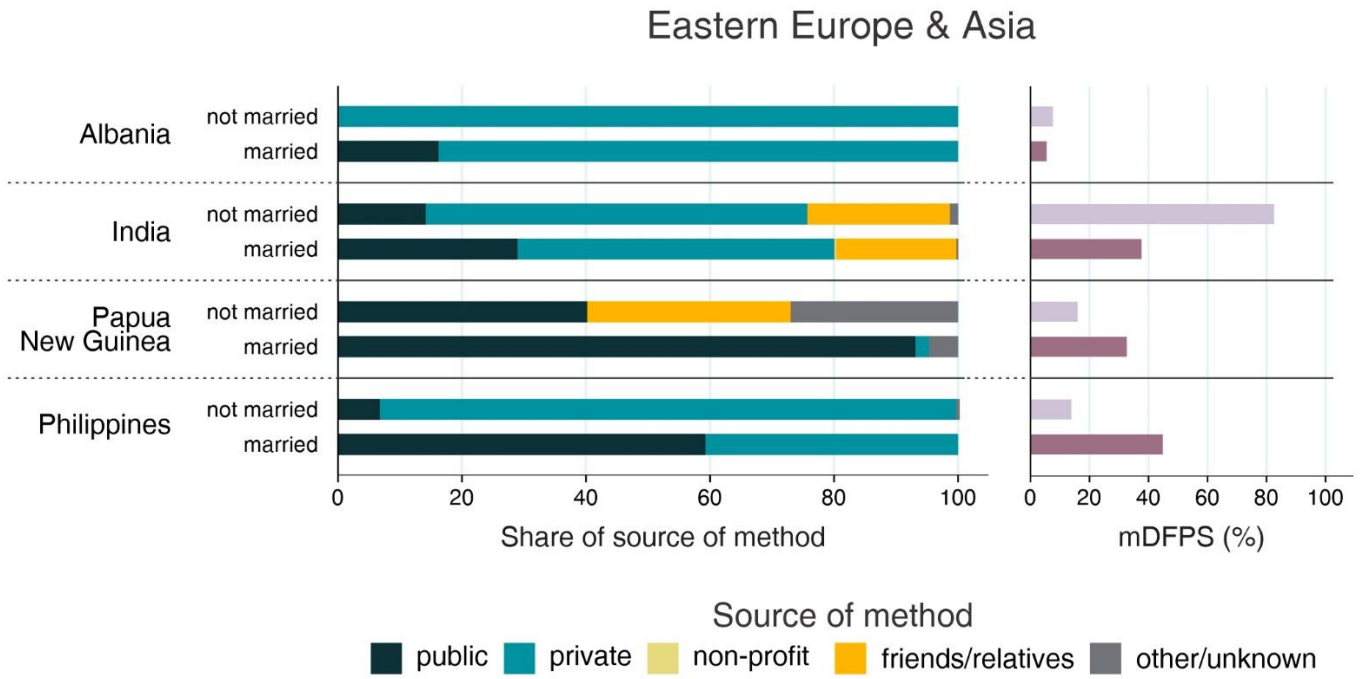

Figure 7. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by adolescents' marital status in Eastern Europe & Asia. Source: DHS, 2010-2021.Note: countries missing information on never married women or with fewer than 25 cases have been suppressed.

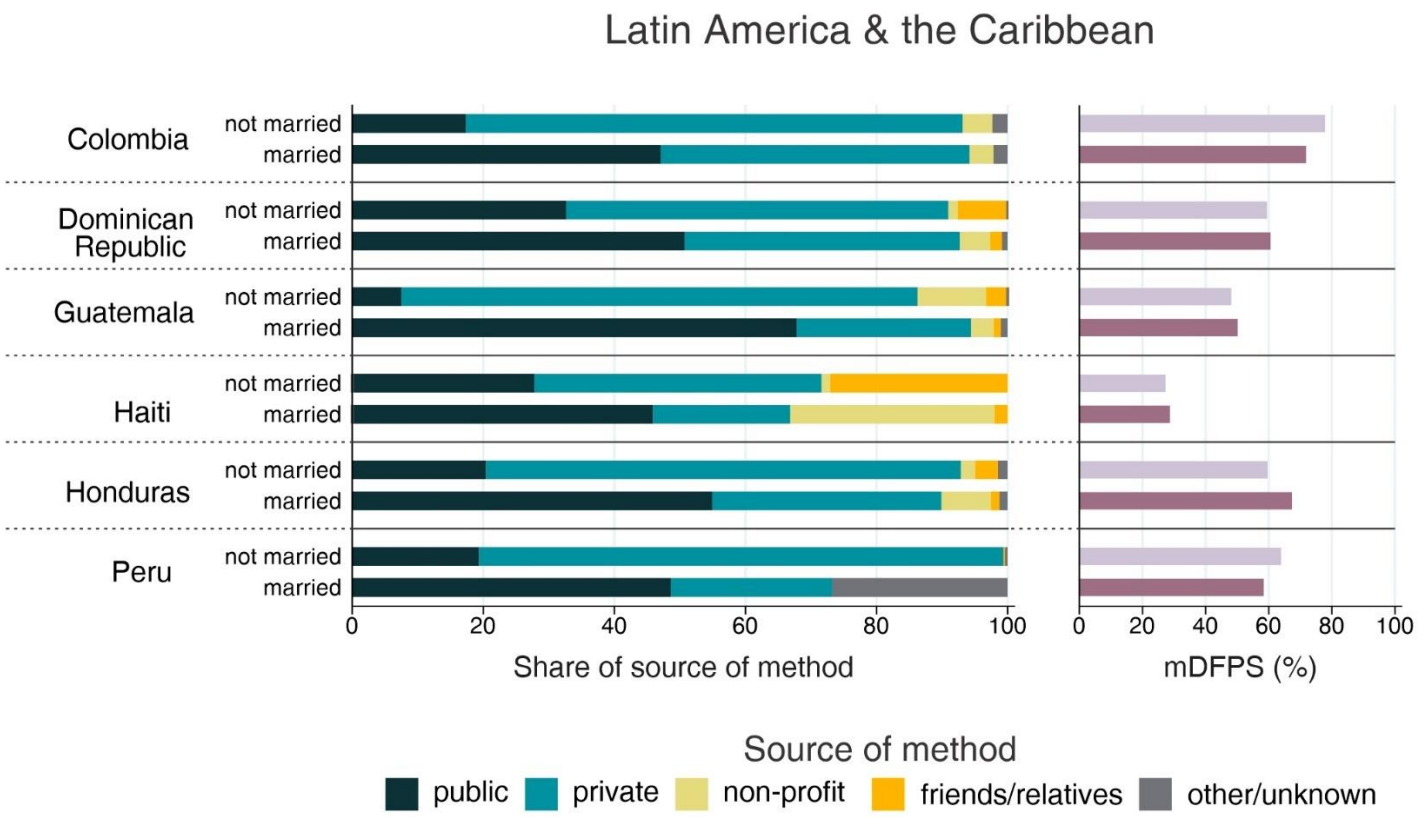

Figure 8. Demand for family planning satisfied by modern methods (mDFPS) and share of source of method by adolescent's marital status in Latin America & the Caribbean. Source: DHS, 2010-2021.

Note: countries missing information on never married women or with fewer than 25 cases have been suppressed.

Tables

Table 1. Sample size and demand for family planning satisfied by modern methods (mDFPS) among women of reproductive age from 59 low- and middle-income countries. Source: DHS 2010-2021.

Country	sample (unweighted)	Percentage of adolescents	mDFPS (95% CI)
West & Central Africa			
Benin (2017)	6055	8.8	25.3 (23.9; 26.8)
Burkina Faso (2010)	5800	8.5	38.1 (36.3; 40.0)
Cameroon (2018)	4479	12.7	38.2 (36.1; 40.3)
Chad (2014)	3854	12.3	14.7 (13.1; 16.4)
Congo Brazzaville (2011)	5335	13.9	32.9 (30.9; 35.0)
Congo DR (2013)	6685	11.6	16.2 (14.5; 17.9)
Côte d'Ivoire (2011)	3755	12.2	28.2 (26.1; 30.4)
Gabon (2012)	3696	14.9	39.6 (36.6; 42.8)
Gambia (2019)	3456	8.3	39.5 (37.1; 41.9)
Ghana (2014)	3561	5.5	37.7 (35.2; 40.2)
Guinea (2018)	2916	11.1	24.9 (22.0; 28.0)
Liberia (2019)	3896	15.2	44.6 (41.5; 47.7)
Mali (2018)	3414	12.2	39.6 (36.9; 42.2)
Mauritania (2019)	4498	9.7	27.7 (25.8; 29.6)
Niger (2021)	2041	12.9	41.2 (37.0; 45.4)
Nigeria (2018)	11538	7.4	30.6 (29.3; 31.9)
Senegal (2019)	2811	7.9	52.1 (49.2; 55.1)
Sierra Leone (2019)	6087	12.4	49.1 (47.3; 51.0)
Togo (2013)	3863	6.9	34.1 (32.0; 36.2)
Eastern & Southern Africa			
Angola (2015)	4953	15.5	26.8 (23.9; 29.9)
Burundi (2016)	5688	2.5	38.5 (36.7; 40.3)
Comoros (2012)	1807	7.6	26.2 (23.5; 29.1)
Ethiopia (2016)	5053	7.1	60.4 (57.3; 63.3)
Kenya (2014)	6915	4.5	70.2 (68.7; 71.7)
Lesotho (2014)	3207	9.1	76.3 (74.3; 78.2)
Malawi (2015)	13140	9.2	73.2 (72.1; 74.2)
Mozambique (2015)	4422	33.7	50.3 (47.6; 53.0)
Namibia (2013)	3761	9.3	78.1 (76.4; 79.8)
Rwanda (2019)	6009	1.6	71.9 (70.5; 73.2)
South Africa (2016)	3557	8.6	75.7 (73.7; 77.5)
Tanzania (2015)	5437	9.6	52.9 (50.8; 54.9)
Uganda (2016)	8283	9.6	50.3 (48.8; 51.9)
Zambia (2018)	5926	9.2	65.0 (63.3; 66.7)
Zimbabwe (2015)	5019	7.2	84.4 (82.9; 85.7)
Middle East & North Africa			
Egypt (2014)	14288	3.5	80.0 (79; 80.9)
Jordan (2017)	8882	3.0	55.0 (53.3; 56.7)

Yemen (2013)	9623	6.9	40.5 (38.7; 42.2)
Eastern Europe & Central Asia			
Albania (2017)	4517	1.9	6.1 (5.2; 7.1)
Armenia (2015)	2771	0.9	39.1 (37; 41.3)
Kyrgyzstan (2012)	3078	3.0	61.0 (58.6; 63.3)
Tajikistan (2017)	3934	2.9	50.4 (48.0; 52.7)
Turkey (2013)	5369	1.9	59.6 (57.8; 61.4)
South Asia			
Afghanistan (2015)	13144	6.3	39.4 (37.4; 41.5)
Bangladesh (2017)	13986	10.0	70.3 (69.1; 71.4)
India (2019)	386549	2.7	72.9 (72.7; 73.2)
Nepal (2016)	7609	7.5	56.0 (54.3; 57.8)
Pakistan (2017)	5996	5.5	48.2 (46.4; 50.1)
East Asia & Pacific			
Cambodia (2014)	7970	4.1	56.0 (54.3; 57.8)
Indonesia (2017)	25039	2.0	77.0 (76.2; 77.7)
Myanmar (2015)	5228	3.0	74.7 (73.1; 76.3)
Papua New Guinea (2016)	6806	4.5	47.7 (45.4; 50.0)
Philippines (2017)	10998	3.1	55.3 (53.7; 56.9)
Timor Leste (2016)	3849	3.1	45.4 (43.1; 47.7)
Latin America & Caribbean			
Colombia (2015)	21535	10.3	85.6 (84.9; 86.3)
Dominican Republic (2013)	5153	11.6	80.5 (78.7; 82.2)
Guatemala (2014)	11716	8.7	65.4 (64.0; 66.6)
Haiti (2016)	6516	7.9	41.8 (40.2; 43.5)
Honduras (2011)	11765	11.0	75.9 (74.9; 76.9)
Peru (2020)	17758	3.6	67.2 (65.9; 68.4)

Table 2. Average demand for family planning satisfied by modern methods (mDFPS) and share of source of method according to women's age in low- and middle-income countries. Source: DHS 2010-2021.

Region	Women's age	mDFPS (%)	Source of method (%)				
			Public	Private	Non-profit	Friends/relatives	Other/unknown
West & Central Africa	15-19	28.9	44.2	46.4	1.4	6.8	1.3
	20-34	35.7	60.2	33.8	2.0	3.0	1.0
	35-49	32.8	69.4	25.7	1.9	1.8	1.2
Eastern & Southern Africa	15-19	49.7	66.0	24.6	3.7	4.1	1.7
	20-34	61.2	73.4	20.7	3.9	0.8	1.1
	35-49	57.0	76.1	17.2	5.5	0.3	1.0
Middle East & North Africa	15-19	36.2	52.0	44.1	3.5	0.4	0.0
	20-34	56.8	51.2	42.2	6.3	0.1	0.2
	35-49	61.2	54.6	39.5	5.3	0.1	0.6
Eastern Europe & Central Asia	15-19	22.2	37.0	63.0	0.0	0.0	0.0
	20-34	41.2	52.7	46.7	0.1	0.2	0.4
	35-49	46.4	64.2	35.0	0.3	0.0	0.5
South Asia	15-19	34.5	36.5	56.0	1.5	5.8	0.1
	20-34	52.9	47.7	46.6	2.5	2.4	0.8
	35-49	64.9	61.4	33.7	2.3	0.9	1.7
East Asia & the Pacific	15-19	47.7	60.6	34.3	2.5	0.8	1.8
	20-34	61.3	60.6	36.6	1.4	0.3	1.1
	35-49	58.4	64.3	33.5	0.9	0.2	1.1
Latin America & the Caribbean	15-19	56.5	42.3	45.5	5.1	4.2	2.8
	20-34	69.2	45.7	39.6	9.6	1.3	3.8
	35-49	72.3	45.6	32.2	15.2	0.6	6.3

Supplementary material

Supplementary Table 1. Demand for family planning satisfied by modern methods (mDFPS), unweighted sample size, and source of family planning among modern contraceptive users according to women's age in 59 low- and middle-income countries.

Country	Age	mDFPS % (95% CI)	Share of source of family planning % (95%CI)				
			Public	Private for-profit	Private non-profit	Friends/relatives	Other/unknown
West & Central Africa							
Benin (2017)	15-19	18.1 (15.0; 21.7)	38.9 (30.0; 48.6)	58.2 (48.4; 67.4)	0.0	2.6 (0.8; 8.2)	0.3 (0.0; 1.7)
	20-34	25.2 (23.4; 27.1)	67.7 (63.9; 71.4)	31.1 (27.5; 34.9)	0.0	0.2 (0.0; 0.8)	1.0 (0.2; 1.8)
	35-49	27.9 (25.6; 30.4)	74.2 (69.3; 78.4)	25.6 (21.3; 30.3)	0.0	0.0	0.3 (0.0; 0.8)
Burkina Faso (2010)	15-19	31.1 (25.8; 37.0)	31.1 (22.5; 41.2)	67.5 (57.1; 76.4)	0.6 (0.1; 4.0)	0.0	0.8 (0.0; 3.5)
	20-34	39.9 (37.8; 42.1)	79.6 (76.4; 82.4)	17.3 (14.6; 20.4)	1.3 (0.7; 2.6)	0.4 (0.2; 0.9)	1.4 (0.6; 2.2)
	35-49	36.4 (33.7; 39.3)	85.4 (81.9; 88.3)	8.4 (6.1; 11.3)	2.7 (1.3; 5.4)	0.0	3.6 (2.1; 5.1)
Cameroon (2018)	15-19	38.7 (33.1; 44.6)	13.8 (8.5; 21.6)	61.3 (50.7; 71.0)	4.3 (1.8; 9.8)	20.6 (13.9; 29.5)	0.0
	20-34	41.2 (38.5; 43.9)	35.9 (32.7; 39.3)	47.7 (44.1; 51.4)	9.4 (7.1; 12.4)	6.9 (5.1; 9.1)	0.1 (0.0; 0.3)
	35-49	31.5 (28.3; 34.9)	55.6 (49.7; 61.4)	30.7 (25.6; 36.2)	8.7 (6.1; 12.3)	4.5 (2.2; 8.9)	0.6 (0.0; 1.5)
Chad (2014)	15-19	8.2 (5.7; 11.7)	35.9 (20.3; 55.1)	49.0 (28.7; 69.6)	6.1 (1.0; 29.8)	0.0	9.1 (0.0; 19.2)
	20-34	14.1 (12.1; 16.3)	75.4 (69.2; 80.7)	14.8 (10.8; 19.9)	6.1 (3.8; 9.7)	0.0	3.7 (1.2; 6.2)
	35-49	19.2 (15.7; 23.3)	83.9 (74.6; 90.3)	6.1 (2.9; 12.2)	7.4 (3.7; 14.3)	0.0	2.6 (0.0; 5.3)
Congo Brazzaville (2011)	15-19	39.0 (34.5; 43.8)	8.6 (4.0; 17.8)	71.3 (61.0; 79.8)	0.6 (0.2; 2.4)	18.8 (12.2; 27.9)	0.6 (0.0; 2.7)
	20-34	33.6 (30.9; 36.4)	19.9 (16.6; 23.5)	63.4 (58.1; 68.4)	2.3 (1.3; 3.9)	13.6 (10.4; 17.7)	0.8 (0.0; 2.1)
	35-49	27.6 (23.9; 31.7)	35.9 (28.1; 44.6)	50.8 (42.4; 59.2)	2.1 (0.8; 5.1)	9.6 (6.2; 14.6)	1.6 (0.0; 4.0)
Congo Democratic Rep (2013)	15-19	16.5 (12.7; 21.1)	8.7 (4.1; 17.2)	73.2 (58.5; 84.0)	6.8 (1.2; 30.7)	10.9 (5.5; 20.5)	0.5 (0.0; 3.1)
	20-34	16.3 (14.4; 18.4)	33.5 (26.7; 40.9)	59.4 (51.9; 66.4)	2.5 (1.2; 5.2)	3.9 (2.5; 6.2)	0.7 (0.0; 1.8)
	35-49	15.7 (13.2; 18.7)	48.4 (38.9; 58.0)	44.2 (35.4; 53.5)	1.8 (0.7; 4.7)	3.8 (1.8; 7.6)	1.8 (0.0; 6.5)
Côte d'Ivoire (2011)	15-19	26.7 (22.2; 31.7)	8.5 (4.4; 15.9)	75.4 (64.5; 83.8)	0.0	11.3 (6.1; 20.0)	4.8 (0.0; 13.6)
	20-34	28.6 (26.2; 31.2)	27.4 (23.4; 31.8)	63.9 (58.9; 68.6)	0.3 (0.1; 1.1)	3.9 (2.3; 6.7)	4.4 (1.5; 7.3)
	35-49	28.0 (24.1; 32.3)	43.3 (35.9; 51.1)	49.7 (41.8; 57.5)	0.0	1.6 (0.6; 4.4)	5.4 (1.0; 9.8)

Gabon (2012)	15-19	46.6 (38.3; 55.0)	5.7 (2.8; 11.0)	55.0 (45.3; 64.5)	0.1 (0.0; 0.7)	35.0 (25.8; 45.5)	4.2 (0.0; 12.0)
	20-34	41.5 (38.4; 44.7)	14.8 (11.0; 19.7)	68.3 (62.3; 73.8)	0.5 (0.1; 1.5)	14.4 (10.2; 20.0)	1.9 (1.2; 5.0)
	35-49	30.7 (26.2; 35.6)	27.2 (18.8; 37.6)	62.2 (52.7; 70.9)	3.7 (1.3; 9.8)	3.8 (2.0; 7.2)	3.1 (0.0; 10.8)
Gambia (2019)	15-19	13.9 (8.7; 21.4)	75.6 (49.2; 90.8)	22.6 (7.8; 50.1)	0.0	0.0	1.8 (0.0; 6.5)
	20-34	38.5 (35.6; 41.4)	76.2 (71.0; 80.7)	22.5 (18.0; 27.6)	0.6 (0.1; 2.5)	0.5 (0.1; 1.7)	0.3 (0.0; 0.8)
	35-49	44.4 (40.8; 48.1)	77.6 (72.4; 82.1)	20.2 (16.0; 25.2)	1.4 (0.6; 3.2)	0.4 (0.1; 1.7)	0.4 (0.0; 1.2)
Ghana (2014)	15-19	29.5 (21.9; 38.6)	44.1 (30.1; 59.0)	55.9 (41.0; 69.9)	0.0	0.0	0.0
	20-34	39.2 (36.3; 42.2)	64.2 (59.2; 68.8)	34.6 (30.2; 39.3)	0.1 (0.0; 1.0)	0.5 (0.2; 1.7)	0.5 (0.0; 1.5)
	35-49	36.7 (32.8; 40.8)	73.1 (68.5; 77.2)	24.7 (20.7; 29.2)	0.6 (0.2; 1.7)	0.0 (0.0; 0.3)	1.6 (0.0; 3.3)
Guinea (2018)	15-19	31.0 (25.4; 37.3)	63.6 (52.7; 73.3)	36.4 (26.7; 47.3)	0.0	0.0	0.0
	20-34	24.3 (21.1; 27.7)	60.7 (54.9; 66.1)	38.2 (32.9; 43.8)	1.1 (0.4; 2.9)	0.0	0.0
	35-49	23.6 (19.3; 28.6)	78.9 (72.4; 84.2)	20.9 (15.6; 27.5)	0.2 (0.0; 1.3)	0.0	0.0
Liberia (2019)	15-19	38.8 (33.4; 44.4)	52.0 (41.2; 62.5)	41.1 (31.6; 51.2)	2.1 (0.5; 8.6)	4.0 (1.2; 12.9)	0.9 (0.0; 3.2)
	20-34	47.1 (42.7; 51.5)	56.6 (51.8; 61.3)	37.2 (32.2; 42.5)	3.4 (1.8; 6.1)	2.5 (1.3; 4.9)	0.3 (0.0; 0.9)
	35-49	42.0 (38.2; 46.0)	63.5 (56.4; 70.1)	33.2 (27.0; 40.1)	0.1 (0.0; 0.5)	2.7 (1.1; 6.8)	0.4 (0.0; 1.2)
Mali (2018)	15-19	31.9 (26.7; 37.6)	76.1 (67.1; 83.3)	20.4 (13.6; 29.3)	1.6 (0.5; 5.6)	1.8 (0.4; 7.0)	0.1 (0.0; 0.2)
	20-34	42.3 (39.2; 45.4)	74.9 (70.3; 79.1)	17.0 (14.0; 20.5)	7.0 (4.6; 10.6)	0.7 (0.3; 1.6)	0.4 (0.0; 0.9)
	35-49	37.0 (33.3; 40.9)	81.4 (77.0; 85.1)	14.1 (10.8; 18.1)	3.7 (2.2; 6.3)	0.6 (0.2; 2.1)	0.2 (0.0; 0.7)
Mauritania (2019)	15-19	21.2 (16.4; 26.9)	82.3 (69.8; 90.3)	17.7 (9.7; 30.2)	0.0	0.0	0.0
	20-34	30.3 (27.9; 32.8)	85.0 (81.8; 87.7)	14.9 (12.2; 18.1)	0.0	0.1 (0.0; 0.7)	0.0
	35-49	25.1 (22.3; 28.2)	81.2 (75.5; 85.8)	18.1 (13.5; 23.7)	0.0	0.5 (0.1; 2.1)	0.3 (0.0; 1.0)
Niger (2021)	15-19	31.0 (22.6; 40.9)	90.9 (71.9; 97.5)	8.3 (2.0; 28.4)	0.0	0.8 (0.1; 5.5)	0 (0; 0)
	20-34	47.2 (42.6; 51.9)	90.9 (83.4; 95.2)	6.9 (3.2; 14.6)	0.1 (0.0; 0.5)	0.7 (0.2; 1.9)	1.5 (0.2; 2.8)
	35-49	32.4 (27.5; 37.7)	91.4 (86.2; 94.7)	7.2 (4.3; 12.0)	0.0	1.4 (0.3; 6.0)	0.0
Nigeria (2018)	15-19	17.4 (14.1; 21.3)	17.2 (10.6; 26.5)	78.4 (68.4; 85.9)	0.0	4.2 (1.6; 10.6)	0.2 (0.0; 2.2)
	20-34	30.5 (28.7; 32.4)	56.2 (52.9; 59.5)	41.7 (38.6; 44.9)	0.2 (0.1; 0.5)	1.5 (0.9; 2.4)	0.4 (0.0; 1.1)
	35-49	32.3 (30.7; 33.9)	64.9 (60.4; 69.2)	32.4 (28.2; 36.9)	0.2 (0.1; 0.5)	2.2 (1.4; 3.5)	0.3 (0.0; 0.7)
Senegal (2019)	15-19	24.2 (17.5; 32.4)	84.4 (61.5; 94.8)	13.3 (3.8; 37.5)	0.0	2.3 (0.3; 15.1)	0.0
	20-34	53.1 (48.9; 57.3)	91.4 (88.0; 93.9)	7.6 (5.2; 11.0)	0.1 (0.0; 0.9)	0.4 (0.2; 0.8)	0.5 (0.0; 1.3)
	35-49	53.9 (49.7; 58.1)	90.1 (85.0; 93.6)	9.0 (5.7; 13.8)	0.1 (0.0; 0.7)	0.3 (0.1; 1.1)	0.5 (0.0; 1.4)

Sierra Leone (2019)	15-19	55.3 (50.9; 59.7)	85.6 (81.3; 89.0)	13.4 (10.1; 17.6)	0.0	0.5 (0.2; 1.4)	0.4 (0.0; 1.1)
	20-34	50.4 (48.0; 52.8)	79.9 (77.0; 82.5)	19.4 (16.8; 22.3)	0.0	0.5 (0.3; 1.0)	0.2 (0.0; 0.5)
	35-49	43.8 (41.0; 46.6)	85.8 (82.2; 88.7)	13.4 (10.6; 16.9)	0.0	0.5 (0.2; 1.4)	0.3 (0.0; 0.7)
Togo (2013)	15-19	29.1 (23.9; 34.8)	16.8 (9.8; 27.2)	62.2 (51.3; 72.0)	3.6 (1.1; 11.3)	17.2 (10.0; 28,0)	0.2 (0.0; 1.3)
	20-34	34.8 (32.2; 37.4)	54.3 (50.0; 58.5)	35.9 (31.9; 40.1)	2.8 (1.8; 4.4)	6.1 (4.4; 8.4)	0.9 (0; 1.8)
	35-49	33.9 (30.9; 37.1)	76.9 (72.4; 80.8)	16.8 (13.4; 20.8)	2.7 (1.4; 5.2)	3.0 (1.5; 6.2)	0.6 (0.0; 1.6)
Eastern & Southern Africa							
Angola (2015)	15-19	21.4 (17.3; 26.1)	28.9 (20.4; 39.2)	69.6 (59.4; 78.3)	0.0	1.4 (0.4; 5.1)	0.1 (0.0; 0.5)
	20-34	30.6 (27.3; 34.2)	47.9 (42.3; 53.4)	51.7 (46.1; 57.2)	0.0	0.4 (0.1; 1.1)	0.1 (0.0; 0.4)
	35-49	20.2 (16.5; 24.4)	62.6 (53.8; 70.6)	36.8 (28.7; 45.7)	0.0	0.0	0.6 (0.0; 1.8)
Burundi (2016)	15-19	53.4 (42.7; 63.9)	77.2 (63.1; 87.1)	15.9 (8.3; 28.3)	6.9 (2.1; 20.2)	0.0	0.0
	20-34	41.8 (39.6; 43.9)	82.3 (78.5; 85.6)	7.5 (5.7; 9.8)	8.3 (6.1; 11.1)	0.1 (0.0; 0.7)	1.9 (0.8; 3)
	35-49	32.4 (29.9; 35.0)	86.4 (82.9; 89.2)	5.5 (3.8; 8.0)	6.7 (4.8; 9.4)	0.2 (0.0; 1.2)	1.2 (0.4; 2)
Comoros (2012)	15-19	20.1 (13.0; 29.8)	73.2 (52.1; 87.2)	0.7 (0.1; 5.2)	0.0	14.2 (4.1; 39.0)	11.9 (0.5; 23.3)
	20-34	25.1 (22.1; 28.5)	87.0 (81.5; 91.0)	3.9 (1.9; 7.8)	0.0	2.1 (0.7; 5.7)	7.0 (3.7; 10.3)
	35-49	30.2 (25.0; 36.0)	94.0 (88.3; 97.0)	2.3 (0.7; 7.6)	0.0	0.3 (0.0; 1.9)	3.4 (0.4; 6.4)
Ethiopia (2016)	15-19	61.0 (53.1; 68.4)	72.4 (60.6; 81.7)	27.6 (18.3; 39.4)	0.0	0.0	0.0
	20-34	63.1 (59.5; 66.6)	83.0 (80.0; 85.6)	15.2 (12.7; 18.0)	1.4 (0.8; 2.3)	0.0 (0.0; 0.1)	0.4 (0.0; 0.8)
	35-49	54.7 (50.6; 58.8)	88.9 (85.4; 91.6)	9.6 (7.0; 13.0)	1.1 (0.5; 2.4)	0.3 (0.0; 2.0)	0.1 (0.0; 0.2)
Kenya (2014)	15-19	55.1 (47.1; 62.9)	61.2 (52.8; 69.0)	33.9 (26.5; 42.2)	2.5 (0.6; 9.9)	1.2 (0.3; 4.6)	1.2 (0.0; 4.2)
	20-34	73.4 (71.5; 75.1)	61.1 (59.2; 63.1)	36.1 (34.1; 38.1)	2.0 (1.4; 2.7)	0.3 (0.2; 0.6)	0.5 (0.2; 0.8)
	35-49	66.1 (63.6; 68.5)	63.8 (61.4; 66.1)	31.8 (29.6; 34.1)	3.5 (2.7; 4.7)	0.2 (0.1; 0.5)	0.7 (0.3; 1.1)
Lesotho (2014)	15-19	59.1 (51.8; 66.0)	46.4 (35.4; 57.8)	23.9 (16.8; 32.9)	11.4 (6.4; 19.5)	17.6 (10.9; 27.3)	0.6 (0.0; 1.4)
	20-34	77.5 (75.2; 79.8)	59.6 (56.0; 63.1)	23.3 (20.5; 26.2)	12.1 (9.9; 14.7)	2.4 (1.6; 3.6)	2.6 (1.6; 3.6)
	35-49	77.7 (74.3; 80.8)	60.3 (55.5; 64.9)	17.7 (14.6; 21.3)	16.6 (13.3; 20.5)	1.5 (0.8; 2.9)	3.9 (2.3; 5.5)
Malawi (2015)	15-19	56.0 (52.3; 59.6)	83.2 (78.9; 86.8)	8.0 (5.7; 11.3)	7.0 (4.6; 10.3)	1.6 (0.7; 3.5)	0.2 (0.0; 0.6)
	20-34	74.7 (73.4; 76.0)	82.5 (80.8; 84.0)	7.8 (6.8; 9.0)	9.3 (8.1; 10.7)	0.2 (0.1; 0.3)	0.2 (0.0; 0.4)
	35-49	74.3 (72.5; 76.0)	74.7 (72.1; 77.2)	5.5 (4.2; 7.2)	19.4 (17.3; 21.7)	0.0 (0.0; 0.3)	0.4 (0.1; 0.7)
Mozambique (2011)	15-19	25.6 (21.7; 29.9)	53.9 (45.6; 62.1)	14.4 (9.8; 20.7)	14.9 (10.5; 20.8)	16.1 (11.3; 22.4)	0.7 (0.0; 1.8)
	20-34	37.7 (35.2; 40.3)	80.7 (77.3; 83.7)	12.2 (9.9; 14.9)	3.0 (2.0; 4.4)	3.8 (2.7; 5.3)	0.3 (0.0; 0.6)

	35-49	29.4 (26.2; 32.8)	88.3 (84.3; 91.3)	9.7 (6.9; 13.4)	1.0 (0.4; 2.3)	0.7 (0.2; 2.1)	0.4 (0.0; 1.0)
Namibia (2013)	15-19	67.3 (60.2; 73.8)	61.0 (52.3; 68.9)	30.4 (22.9; 39.2)	0.0	1.9 (0.7; 5.3)	6.7 (1.5; 11.9)
	20-34	79.3 (76.9; 81.4)	74.5 (71.3; 77.5)	22.4 (19.5; 25.6)	0.0 (0.0; 0.3)	0.7 (0.4; 1.4)	2.3 (0.9; 3.7)
	35-49	78.5 (75.9; 80.9)	74.5 (70.3; 78.2)	22.9 (19.1; 27.2)	0.2 (0.0; 1.3)	0.4 (0.1; 1.3)	2.1 (0.9; 3.3)
Rwanda (2019)	15-19	59.1 (47.3; 69.9)	84.0 (68.6; 92.7)	9.5 (3.8; 22.0)	6.5 (1.6; 23.1)	0.0	0.0
	20-34	77.9 (76.1; 79.5)	78.6 (76.7; 80.4)	8.4 (7.1; 10.0)	12.6 (11.2; 14.1)	0.3 (0.1; 0.6)	0.1 (0.0; 0.2)
	35-49	65.8 (63.7; 67.8)	74.8 (72.4; 77.1)	7.2 (5.9; 8.6)	18.0 (16.0; 20.2)	0.0	0.0
South Africa (2016)	15-19	65.4 (57.2; 72.7)	74.3 (63.0; 83.1)	24.4 (15.7; 35.8)	0.0	0.0	1.4 (0.0; 3.9)
	20-34	75.7 (72.9; 78.4)	81.4 (78.2; 84.3)	17.2 (14.5; 20.3)	0.7 (0.3; 1.6)	0.1 (0.0; 0.4)	0.6 (0.0; 1.3)
	35-49	77.3 (74.2; 80.1)	75.2 (70.9; 79.0)	24.3 (20.4; 28.6)	0.4 (0.1; 2.1)	0.0	0.1 (0.0; 0.3)
Tanzania (2015)	15-19	37.3 (31.7; 43.3)	52.5 (42.8; 62.0)	38.5 (29.3; 48.7)	3.0 (1.1; 8.3)	5.3 (2.2; 12.3)	0.7 (0.0; 2.8)
	20-34	54.4 (51.9; 56.8)	61.3 (57.9; 64.6)	30.2 (27.0; 33.5)	7.2 (5.6; 9.2)	1.1 (0.5; 2.1)	0.3 (0.0; 0.7)
	35-49	53.5 (50.7; 56.3)	67.1 (62.9; 71.0)	20.3 (17.2; 23.7)	11.3 (8.8; 14.4)	0.4 (0.1; 1.3)	0.9 (0.0; 2.1)
Uganda (2016)	15-19	40.8 (36.4; 45.4)	47.7 (40.2; 55.2)	50.8 (43.1; 58.5)	0.0	0.1 (0.0; 1.0)	1.4 (0.0; 3.6)
	20-34	51.5 (49.5; 53.4)	57.1 (54.1; 60.1)	42.2 (39.3; 45.3)	0.2 (0.1; 0.6)	0.2 (0.1; 0.4)	0.2 (0.0; 0.5)
	35-49	50.5 (48.1; 52.8)	70.3 (67.3; 73.2)	29.0 (26.1; 32.0)	0.1 (0.0; 0.4)	0.2 (0.1; 1.0)	0.4 (0.0; 0.8)
Zambia (2018)	15-19	49.9 (44.6; 55.3)	92.9 (87.5; 96.1)	6.3 (3.3; 11.6)	0.3 (0.0; 2.4)	0.5 (0.1; 3.4)	0.0
	20-34	69.0 (66.8; 71.1)	90.4 (88.5; 92.0)	8.8 (7.3; 10.6)	0.6 (0.3; 1.4)	0.1 (0.0; 0.3)	0.1 (0.0; 0.2)
	35-49	61.7 (59.0; 64.3)	88.3 (85.7; 90.5)	11.0 (8.8; 13.6)	0.4 (0.1; 1.3)	0.0	0.3 (0.0; 0.6)
Zimbabwe (2015)	15-19	73.2 (67.0; 78.6)	82.0 (75.3; 87.2)	14.4 (9.8; 20.7)	2.7 (1.0; 7.4)	0.9 (0.2; 3.5)	0.0
	20-34	86.1 (84.3; 87.6)	74.0 (71.2; 76.7)	23.3 (20.7; 26.0)	1.8 (1.2; 2.8)	0.7 (0.4; 1.1)	0.2 (0.0; 0.5)
	35-49	83.2 (81.0; 85.2)	71.9 (68.3; 75.3)	24.1 (20.9; 27.6)	3.3 (1.9; 5.6)	0.7 (0.3; 1.4)	0.1 (0.0; 0.2)
Middle East & North Africa							
Egypt (2014)	15-19	63.9 (56.2; 70.9)	58.2 (47.8; 67.9)	40.5 (31.0; 50.8)	1.3 (0.2; 8.9)	0.0	0.0
	20-34	79.3 (78.0; 80.5)	55.2 (53.5; 56.9)	43.0 (41.3; 44.8)	1.3 (1.0; 1.7)	0.3 (0.2; 0.6)	0.2 (0.0; 0.4)
	35-49	81.4 (80.2; 82.5)	57.1 (55.1; 59.0)	41.0 (39.2; 42.9)	1.5 (1.2; 2.0)	0.2 (0.1; 0.4)	0.2 (0.0; 0.4)
Jordan (2017)	15-19	22.1 (13.0; 35.1)	51.3 (25.2; 76.7)	40.3 (16.3; 70.0)	7.3 (2.0; 23.7)	1.1 (0.1; 7.9)	0.0
	20-34	50.5 (47.9; 53.0)	46.9 (43.4; 50.4)	36.7 (33.5; 40.0)	16.4 (13.8; 19.4)	0.0	0.0
	35-49	59.5 (57.3; 61.7)	50.6 (47.3; 53.8)	36.2 (33.1; 39.3)	13.3 (11.1; 15.8)	0.0	0.0
Yemen (2013)	15-19	22.5 (18.2; 27.4)	46.7 (35.1; 58.6)	51.6 (40.0; 63.1)	1.7 (0.4; 6.9)	0.0	0.0

	20-34	40.6 (38.6; 42.7)	51.4 (48.4; 54.5)	46.8 (43.8; 49.9)	1.2 (0.8; 2.0)	0.0	0.5 (0.1; 0.9)
	35-49	42.6 (40.3; 45.0)	56.0 (52.8; 59.3)	41.5 (38.1; 44.9)	1.1 (0.6; 2.0)	0.0	1.4 (0.5; 2.3)
Europe & Central Asia							
Albania (2017)	15-19	6.1 (2.6; 13.6)	10.4 (1.3; 50.3)	89.6 (49.7; 98.7)	0.0	0.0	0.0
	20-34	5.8 (4.6; 7.2)	30.2 (20.8; 41.6)	68.7 (57.0; 78.5)	0.0	0.0	1.0 (0.0; 4.3)
	35-49	6.4 (5.2; 7.9)	54.9 (44.9; 64.4)	44.5 (34.9; 54.5)	0.0	0.0	0.6 (0.0; 2.4)
Armenia (2015)	15-19	33.7 (13.4; 62.7)	0.0	100.0	0.0	0.0	0.0
	20-34	41.0 (38.2; 43.9)	31.5 (26.6; 36.8)	68.3 (63.0; 73.2)	0.0	0.2 (0.0; 1.7)	0.0
	35-49	37.2 (34.1; 40.4)	39.6 (34.9; 44.6)	60.2 (55.3; 65.0)	0.0	0.1 (0.0; 0.8)	0.0
Kyrgyzstan (2012)	15-19	33.2 (17.0; 54.7)	51.9 (19.9; 82.4)	48.1 (17.6; 80.1)	0.0	0.0	0.0
	20-34	57.6 (54.5; 60.8)	63.4 (59.5; 67.2)	35.7 (31.9; 39.7)	0.0	0.5 (0.1; 1.9)	0.4 (0.0; 1.0)
	35-49	65.5 (62.2; 68.6)	77.7 (74.0; 81.0)	21.2 (17.9; 24.8)	0.0	0.0	1.1 (0.3; 1.9)
Tajikistan (2017)	15-19	8.1 (1.9; 28.3)	66.2 (10.8; 96.9)	33.8 (3.1; 89.2)	0.0	0.0	0.0
	20-34	44.5 (41.9; 47.1)	87.8 (85.1; 90.0)	11.7 (9.5; 14.3)	0.0	0.1 (0.0; 0.9)	0.4 (0.0; 0.8)
	35-49	60.2 (56.7; 63.5)	89.6 (87.1; 91.6)	9.9 (7.9; 12.4)	0.0	0.0	0.5 (0.0; 1.0)
Turkey (2013)	15-19	29.7 (19.1; 43.1)	56.5 (31.2; 78.9)	43.5 (21.1; 68.9)	0.0	0.0	0.0
	20-34	57.1 (54.3; 59.9)	50.7 (47.8; 53.6)	48.9 (45.9; 51.8)	0.3 (0.1; 0.8)	0.0	0.2 (0.0; 0.6)
	35-49	62.6 (60.3; 64.8)	59.3 (56.1; 62.4)	39.0 (36.0; 42.1)	1.3 (0.8; 2.1)	0.0	0.4 (0.0; 0.9)
South Asia							
Afghanistan (2015)	15-19	18.4 (13.7; 24.4)	36.5 (22.4; 53.4)	63.5 (46.6; 77.6)	0.0	0.0	0.0
	20-34	33.8 (31.5; 36.2)	41.7 (37.2; 46.3)	55.6 (51.0; 60.1)	1.0 (0.5; 2.2)	0.7 (0.4; 1.5)	1.0 (0.3; 1.7)
	35-49	51.0 (48.3; 53.8)	53.7 (49.7; 57.6)	43.6 (39.7; 47.5)	0.8 (0.3; 1.7)	0.3 (0.1; 0.8)	1.7 (0.8; 2.6)
Bangladesh (2017)	15-19	67.9 (64.6; 71.0)	24.8 (21.7; 28.3)	70.1 (66.6; 73.5)	3.4 (2.3; 5.0)	1.5 (0.8; 2.7)	0.1 (0.0; 0.7)
	20-34	73.4 (72.0; 74.7)	39.8 (38.0; 41.7)	54.2 (52.4; 56.1)	4.9 (4.1; 5.8)	0.9 (0.7; 1.3)	0.2 (0.0; 0.4)
	35-49	65.8 (64.2; 67.4)	58.1 (55.8; 60.4)	36.4 (34.3; 38.6)	4.5 (3.7; 5.5)	0.6 (0.3; 1.0)	0.4 (0.1; 0.7)
India (2019)	15-19	37.9 (36.2; 39.6)	28.8 (25.8; 31.9)	51.5 (48.3; 54.6)	0.1 (0.1; 0.3)	19.4 (17.3; 21.8)	0.3 (0.1; 1.2)
	20-34	65.4 (64.9; 65.7)	55.5 (55.0; 56.0)	36.2 (35.7; 36.7)	2.6 (2.2; 3.1)	7.9 (7.6; 8.1)	0.2 (0.1; 0.3)
	35-49	81.9 (81.6; 82.2)	71.0 (70.6; 71.5)	25.5 (25.1; 25.9)	2.9 (2.5; 3.5)	2.9 (2.8; 3.0)	0.3 (0.2; 0.4)
Nepal (2016)	15-19	25.1 (20.2; 30.8)	59.3 (46.7; 70.8)	35.5 (23.8; 49.3)	4.2 (1.4; 12.4)	0.9 (0.1; 6.2)	0.0
	20-34	48.5 (46.3; 50.8)	64.0 (60.7; 67.1)	27.1 (24.2; 30.2)	6.1 (4.6; 8.2)	0.6 (0.2; 1.9)	2.2 (1.1; 3.3)

	35-49	69.7 (67.5; 71.9)	74.8 (70.6; 78.6)	13.5 (11.4; 16.0)	5.9 (4.2; 8.4)	0.1 (0.0; 0.4)	5.6 (3.9; 7.3)
Pakistan (2017)	15-19	23.3 (16.1; 32.6)	33.3 (16.5; 55.8)	59.6 (38.4; 77.7)	0.0	7.0 (1.7; 25.3)	0.0
	20-34	43.4 (40.8; 46.0)	37.6 (33.6; 41.7)	60.2 (56.0; 64.2)	0.0	1.9 (1.1; 3.3)	0.4 (0.0; 1.1)
	35-49	56.0 (53.4; 58.5)	49.3 (45.0; 53.6)	49.4 (45.1; 53.7)	0.0	0.8 (0.4; 1.3)	0.6 (0.0; 1.4)
East Asia & the Pacific							
Cambodia (2014)	15-19	45.0 (36.6; 53.7)	60.7 (47.2; 72.8)	38.2 (26.1; 51.9)	0.0	0.0	1.1 (0.0; 4.0)
	20-34	59.1 (56.8; 61.3)	44.9 (42.0; 47.8)	54.6 (51.7; 57.4)	0.0	0.2 (0.1; 0.6)	0.3 (0.0; 0.7)
	35-49	52.1 (49.7; 54.4)	50.5 (47.1; 53.9)	47.4 (44.0; 50.9)	0.0	0.2 (0.1; 0.7)	1.9 (0.7; 3.1)
Indonesia (2017)	15-19	79.5 (74.2; 83.9)	29.8 (24.0; 36.3)	70.2 (63.7; 76.0)	0.0	0.0	0.0
	20-34	79.8 (78.8; 80.8)	32.6 (31.1; 34.2)	67.3 (65.7; 68.8)	0.0	0.0	0.1 (0.0; 0.3)
	35-49	74.8 (73.8; 75.7)	35.3 (33.8; 36.8)	64.6 (63.0; 66.1)	0.0	0.0	0.1 (0.0; 0.2)
Myanmar (2015)	15-19	72.8 (64.7; 79.6)	52.9 (42.0; 63.5)	42.9 (32.5; 54.0)	2.0 (0.5; 7.6)	0.0	2.3 (0.0; 5.6)
	20-34	79.7 (77.6; 81.7)	52.6 (49.6; 55.5)	42.3 (39.3; 45.3)	3.0 (2.2; 4.2)	0.9 (0.5; 1.5)	1.3 (0.5; 2.1)
	35-49	69.7 (67.5; 71.9)	56.1 (53.0; 59.2)	40.4 (37.4; 43.6)	2.5 (1.7; 3.7)	0.3 (0.1; 0.8)	0.6 (0.1; 1.1)
Papua New Guinea (2016)	15-19	28.5 (20.3; 38.6)	85.8 (70.0; 94.0)	2.0 (0.3; 13.1)	0.0	4.5 (1.1; 17.1)	7.7 (0.0; 16.7)
	20-34	46.3 (43.6; 49.0)	88.5 (85.9; 90.7)	6.6 (4.9; 8.8)	0.0	0.2 (0.1; 0.6)	4.7 (3.4; 6)
	35-49	51.8 (48.4; 55.2)	91.6 (89.4; 93.3)	4.0 (2.9; 5.6)	0.0	0.5 (0.1; 1.6)	3.9 (2.7; 5.1)
Philippines (2017)	15-19	41.1 (34.2; 48.4)	57.2 (45.6; 68.0)	42.8 (32.0; 54.4)	0.0	0.0	0.0
	20-34	58.4 (56.2; 60.6)	53.4 (50.3; 56.5)	46.0 (42.8; 49.1)	0.3 (0.1; 1.0)	0.2 (0.1; 0.6)	0.1 (0.0; 0.3)
	35-49	53.1 (50.4; 55.7)	58.0 (54.9; 61.0)	41.8 (38.8; 44.9)	0.1 (0.1; 0.3)	0.0 (0.0; 0.2)	0.0
Timor Leste (2016)	15-19	19.1 (11.1; 30.7)	77.4 (42.6; 94.1)	9.6 (1.4; 45.3)	12.9 (1.9; 53.7)	0.0	0.0
	20-34	44.3 (41.2; 47.4)	91.6 (88.5; 93.9)	3.2 (2.0; 4.9)	4.8 (3.2; 7.3)	0.4 (0.1; 1.1)	0.0
	35-49	48.9 (45.8; 52.1)	94.3 (90.4; 96.6)	2.6 (1.1; 6.4)	3.0 (1.5; 5.7)	0.1 (0.0; 0.9)	0.0
Latin America & the Caribbean							
Colombia (2015)	15-19	75.3 (72.6; 77.8)	29.7 (26.5; 33.1)	63.5 (59.6; 67.2)	4.2 (3.0; 5.8)	0.0	2.7 (0.6; 4.8)
	20-34	85.4 (84.3; 86.4)	30.8 (29.2; 32.4)	57.2 (55.5; 58.8)	11.0 (9.9; 12.2)	0.0	1.0 (0.6; 1.4)
	35-49	87.7 (86.5; 88.9)	32.7 (30.6; 34.8)	46.5 (44.1; 48.9)	20.2 (18.5; 21.9)	0.0	0.7 (0.3; 1.1)
Dominican Republic (2013)	15-19	60.2 (54.3; 65.7)	43.9 (36.8; 51.3)	48.2 (40.7; 55.8)	3.4 (1.5; 7.7)	3.9 (1.7; 8.7)	0.5 (0.0; 1.5)
	20-34	76.7 (74.2; 79.0)	50.6 (46.7; 54.4)	44.2 (40.6; 47.9)	3.5 (2.5; 4.7)	1.2 (0.7; 1.9)	0.6 (0.0; 1.3)
	35-49	90.6 (88.4; 92.4)	58.1 (54.1; 61.9)	38.8 (35.1; 42.7)	2.3 (1.4; 3.7)	0.3 (0.1; 1.4)	0.4 (0.0; 1.0)

Guatemala (2014)	15-19	49.8 (45.6; 54.1)	59.3 (53.3; 65.1)	34.0 (28.6; 40.0)	4.5 (2.7; 7.2)	1.4 (0.5; 3.7)	0.8 (0.0; 2.3)
	20-34	63.2 (61.6; 64.7)	54.4 (52.5; 56.3)	28.4 (26.7; 30.1)	16.1 (14.6; 17.8)	0.4 (0.2; 0.8)	0.7 (0.4; 1.0)
	35-49	71.7 (69.8; 73.5)	45.7 (43.5; 48.0)	23.7 (21.8; 25.8)	28.7 (26.6; 30.9)	0.1 (0.0; 0.3)	1.7 (1.1; 2.3)
Haiti (2016)	15-19	27.8 (23.6; 32.3)	34.2 (25.8; 43.7)	35.7 (27.0; 45.4)	12.0 (7.4; 18.7)	18.1 (12.1; 26.2)	0.0
	20-34	44.1 (41.9; 46.2)	53.5 (49.7; 57.3)	24.3 (21.3; 27.5)	16.9 (14.5; 19.6)	5.2 (3.9; 7.0)	0.1 (0.0; 0.3)
	35-49	41.2 (38.7; 43.8)	59.5 (54.9; 63.8)	21.1 (17.3; 25.4)	16.7 (13.8; 20.1)	2.2 (1.1; 4.2)	0.5 (0.0; 0.1)
Honduras (2011)	15-19	65.9 (62.3; 69.3)	49.1 (44.6; 53.5)	41.2 (36.9; 45.6)	6.6 (4.6; 9.5)	1.7 (0.9; 3.0)	1.5 (0.0; 3.1)
	20-34	76.2 (74.9; 77.5)	54.8 (53.0; 56.7)	32.6 (30.9; 34.4)	9.9 (8.7; 11.2)	0.5 (0.3; 0.8)	2.1 (1.4; 2.8)
	35-49	77.7 (76.1; 79.3)	47.9 (45.9; 50.0)	23.2 (21.4; 25.1)	23.2 (21.4; 25.1)	0.2 (0.1; 0.6)	5.4 (4.3; 6.5)
Peru (2020)	15-19	60.3 (53.3; 66.9)	37.9 (31.3; 44.9)	50.6 (41.4; 59.7)	0.0	0.1 (0.0; 0.5)	11.5 (5.9; 17.1)
	20-34	69.9 (68.2; 71.6)	30.2 (28.1; 32.4)	51.2 (48.3; 54.1)	0.0	0.3 (0.1; 0.5)	18.3 (15.4; 21.2)
	35-49	65.0 (63.1; 66.8)	29.8 (27.4; 32.3)	40.1 (36.8; 43.6)	0.0	0.8 (0.3; 2.0)	29.3 (25.9; 32.7)

Supplementary Table 2. Demand for family planning satisfied by modern methods (mDFPS), unweighted sample size, and source of family planning among modern contraceptive users according to women's marital status in 59 low- and middle-income countries.

Country	Marital status	mDFPS % (95% CI)	Share of source of family planning % (95%CI)				
			Public	Private for-profit	Private non-profit	Friends/relatives	Other/unknown
West & Central Africa							
Benin (2017)	Married	13.2 (9.5; 18.0)	58.0 (39.1; 74.8)	42.0 (25.2; 60.9)	0.0	0.0	0.0
	Not married	21.7 (17.3; 26.8)	30.3 (21.0; 41.6)	65.5 (54.0; 75.5)	0.0	3.8 (1.2; 11.7)	0.4 (0.3; 0.4)
Burkina Faso (2010)	Married	21.8 (16.2; 28.7)	47.7 (32.2; 63.6)	51.1 (34.8; 67.1)	0.0	0.0	1.2 (1.2; 1.2)
	Not married	50.5 (40.4; 60.6)	16.3 (8.5; 29.1)	82.2 (69.3; 90.4)	1.1 (0.2; 7.4)	0.0	0.4 (0.4; 0.4)
Cameroon (2018)	Married	21.5 (16.1; 28.1)	19.3 (9.6; 35.1)	52.9 (36.2; 68.9)	13.7 (4.9; 32.8)	14.0 (4.8; 34.7)	0.0
	Not married	52.5 (45.6; 59.3)	12.0 (6.5; 21.1)	64.1 (52.2; 74.5)	1.2 (0.3; 5.0)	22.8 (14.9; 33.2)	0.0
Chad (2014)	Married	5.6 (3.3; 9.1)	62.8 (35.7; 83.7)	21.9 (6.8; 51.9)	11.1 (1.6; 48.8)	0.0	4.3 (4.2; 4.3)
	Not married	16.4 (9.5; 26.7)	8.1 (1.1; 41.1)	79.2 (45.4; 94.6)	1.0 (0.1; 7.1)	0.0	11.7 (11.5; 11.7)
Congo Brazzaville (2011)	Married	32.7 (26.4; 39.6)	15.3 (5.6; 35.2)	74.1 (56.6; 86.2)	0.8 (0.2; 3.9)	9.2 (4.0; 20.0)	0.6 (0.6; 0.6)
	Not married	43.3 (36.9; 50.0)	5.3 (1.5; 16.7)	69.9 (57.1; 80.2)	0.5 (0.1; 3.9)	23.6 (14.7; 35.8)	0.6 (0.6; 0.6)
Congo Dem Rep (2013)	Married	11.8 (8.1; 17.1)	21.0 (9.2; 41.0)	67.2 (45.7; 83.3)	2.1 (0.3; 14.2)	9.7 (2.1; 34.8)	0.0
	Not married	20.4 (14.5; 27.9)	2.6 (0.8; 8.7)	76.2 (54.6; 89.4)	9.1 (1.3; 42.5)	11.5 (4.9; 24.5)	0.6 (0.6; 0.6)
Côte d'Ivoire (2011)	Married	17.1 (11.0; 25.6)	30.4 (13.7; 54.5)	63.0 (36.9; 83.2)	0.0	0.0	6.6 (6.4; 6.6)
	Not married	30.9 (25.2; 37.2)	3.1 (1.0; 9.2)	78.6 (66.3; 87.2)	0.0	14.1 (7.6; 24.7)	4.2 (4.1; 4.2)
Gabon (2012)	Married	23.5 (15.9; 33.3)	4.6 (1.8; 11.5)	49.6 (29.9; 69.4)	0.0	43.1 (24.6; 63.8)	2.7 (2.6; 2.7)
	Not married	55.5 (45.0; 65.6)	5.8 (2.7; 12.2)	56.0 (45.4; 66.1)	0.1 (0; 0.9)	33.7 (24.0; 45.1)	4.4 (4.3; 4.4)
Gambia (2019)	Married	13.0 (7.8; 20.8)	83.7 (62.0; 94.2)	14.0 (4.5; 36.4)	0.0	0.0	2.3 (2.2; 2.3)
	Not married	33.3 (11.9; 64.8)	8.7 (0.6; 60.6)	91.3 (39.4; 99.4)	0.0	0.0	0.0
Ghana (2014)	Married	24.1 (14.4; 37.5)	76.9 (53.1; 90.7)	23.1 (9.3; 46.9)	0.0	0.0	0.0
	Not married	31.9 (22.9; 42.5)	33.3 (18.3; 52.6)	66.7 (47.4; 81.7)	0.0	0.0	0.0
Guinea (2018)	Married	16.4 (10.1; 25.4)	55.8 (30.8; 78.1)	44.2 (21.9; 69.2)	0.0	0.0	0.0
	Not married	54.2 (44.7; 63.4)	67.4 (57.2; 76.1)	32.6 (23.9; 42.8)	0.0	0.0	0.0
Liberia (2019)	Married	16.3 (9.8; 25.7)	54.7 (30.5; 76.8)	45.3 (23.2; 69.5)	0.0	0.0	0.0
	Not married	45.9 (39.0; 52.9)	51.7 (40.1; 63.1)	40.6 (30.6; 51.4)	2.3 (0.5; 9.5)	4.5 (1.3; 14.2)	1.0 (0.9; 1.0)
Mali (2018)	Married	29.8 (23.6; 36.9)	75.9 (64.7; 84.4)	21.6 (13.5; 32.8)	1.1 (0.3; 4.3)	1.3 (0.2; 8.7)	0.1 (0.1; 0.1)
	Not married	36.8 (26.6; 48.3)	76.6 (58.3; 88.5)	18.0 (7.8; 36.3)	2.6 (0.4; 16.9)	2.8 (0.4; 17.7)	0
Mauritania (2019)	Married	21.6 (16.7; 27.4)	82.3 (69.8; 90.3)	17.7 (9.7; 30.2)	0.0	0.0	0.0
	Not married	0.0	0.0	0.0	0.0	0.0	0.0

Niger (2021)	Married	29.8 (21.8; 39.1)	97.2 (82.3; 99.6)	2.8 (0.4; 17.7)	0.0	0.0	0.0
	Not married	81.5 (30.6; 97.8)	0.0	88.0 (31.0; 99.2)	0.0	12 (0.8; 69)	0.0
Nigeria (2018)	Married	12.2 (8.6; 17.1)	36.9 (21.5; 55.6)	63.1 (44.4; 78.5)	0.0	0.0	0.0
	Not married	22.7 (17.3; 29.2)	6.4 (2.7; 14.3)	86.9 (76.5; 93.2)	0.0	6.5 (2.5; 16.1)	0.2 (0.2; 0.2)
Senegal (2019)	Married	24.6 (17.8; 33.0)	84.1 (61.0; 94.7)	13.5 (3.8; 38.0)	0.0	2.4 (0.3; 15.3)	0.0
	Not married	11.2 (0.9; 64.5)	100	0.0	0.0	0.0	0.0
Sierra Leone (2019)	Married	33.5 (26.0; 41.8)	84.1 (72.5; 91.3)	15.9 (8.7; 27.5)	0.0	0.0	0.0
	Not married	61.7 (56.7; 66.5)	85.9 (81.3; 89.4)	13.0 (9.6; 17.5)	0.0	0.6 (0.2; 1.7)	0.5 (0.5; 0.5)
Togo (2013)	Married	14.7 (8.9; 23.3)	43.4 (22.7; 66.7)	20.2 (7.9; 43.0)	15.0 (3.6; 45.6)	19 (4.9; 51.8)	2.4 (2.3; 2.4)
	Not married	37.6 (30.4; 45.4)	10.6 (4.7; 22.1)	71.7 (59.6; 81.3)	0.9 (0.1; 6.1)	16.8 (9.3; 28.6)	0
Eastern & Southern Africa							
Angola (2015)	Married	14.9 (9.9; 21.7)	52.5 (32.6; 71.6)	46.7 (27.8; 66.7)	0.0	0.8 (0.1; 5.6)	0.0
	Not married	26.4 (21.0; 32.7)	18.5 (10.6; 30.3)	79.7 (67.9; 88.0)	0.0	1.7 (0.4; 7.3)	0.1 (0.1; 0.1)
Burundi (2016)	Married	54.6 (42.8; 66.0)	83.8 (68.4; 92.6)	8.3 (3.1; 20.5)	7.8 (2.3; 23.7)	0.0	0.0
	Not married	48.6 (27.0; 70.7)	47.3 (20.3; 75.9)	50.2 (22.1; 78.2)	2.5 (0.3; 16.4)	0.0	0.0
Comoros (2012)	Married	18.0 (11.4; 27.2)	76.2 (57.1; 88.5)	0.9 (0.1; 6.7)	0.0	8.0 (1.7; 31.1)	14.8 (14.7; 14.8)
	Not married	39.2 (12.5; 74.5)	60.9 (9.6; 95.8)	0.0	0.0	39.1 (4.2; 90.4)	0.0
Ethiopia (2016)	Married	60.7 (52.0; 68.6)	71.4 (58.9; 81.4)	28.6 (18.6; 41.1)	0.0	0.0	0.0
	Not married	63.5 (41.6; 80.9)	78.6 (47.1; 93.8)	21.4 (6.2; 52.9)	0.0	0.0	0.0
Kenya (2014)	Married	56.2 (46.5; 65.5)	67.5 (58.5; 75.3)	29.3 (21.9; 38.1)	2.9 (0.7; 11.3)	0.0	0.3 (0.3; 0.3)
	Not married	52.5 (37.4; 67.2)	20.3 (9.6; 37.8)	67.2 (45.9; 83.1)	0.0	8.8 (2.2; 29.7)	3.8 (3.6; 3.8)
Lesotho (2014)	Married	55.0 (46.2; 63.5)	62.2 (49.0; 73.9)	19.2 (11.5; 30.4)	15.4 (8.4; 26.5)	2.1 (0.5; 8.2)	1.0 (1.0; 1.0)
	Not married	69.7 (56.5; 80.3)	13.9 (6.1; 28.4)	33.4 (21.5; 47.9)	3.3 (0.5; 20.1)	49.4 (33.0; 66.0)	0.0
Malawi (2015)	Married	62.2 (57.9; 66.3)	88.8 (84.5; 92.1)	4.5 (2.6; 7.6)	6.5 (4.1; 10.1)	0.0	0.2 (0.2; 0.2)
	Not married	37.7 (30.5; 45.6)	55.9 (43.4; 67.7)	25.5 (16.3; 37.6)	9.3 (4.3; 18.8)	9.3 (4.3; 19.2)	0.0
Mozambique (2011)	Married	19.5 (14.8; 25.4)	77.3 (64.9; 86.2)	11.0 (4.9; 22.9)	2 (0.4; 9.0)	9.7 (5.2; 17.6)	0.0
	Not married	31.9 (25.6; 39.0)	39.0 (29.4; 49.6)	16.6 (10.6; 24.9)	23.2 (16.6; 31.4)	20.2 (13.4; 29.2)	1.1 (1.1; 1.1)
Namibia (2013)	Married	46.7 (33.8; 60.1)	88.9 (68.8; 96.6)	11.1 (3.4; 31.2)	0.0	0.0	0.0
	Not married	75.2 (68.1; 81.2)	54.3 (44.7; 63.6)	35.7 (26.7; 45.8)	0.0	2.4 (0.8; 6.5)	7.7 (7.6; 7.7)
Rwanda (2019)	Married	87.4 (70.6; 95.3)	86.7 (68.2; 95.2)	5.5 (1.3; 20.5)	7.9 (1.9; 27.3)	0.0	0.0
	Not married	23.7 (12.8; 39.7)	71.7 (38.1; 91.2)	28.3 (8.8; 61.9)	0.0	0.0	0.0
South Africa (2016)	Married	60.9 (33.0; 83.1)	52.9 (23.5; 80.5)	47.1 (19.5; 76.5)	0.0	0.0	0.0
	Not married	66.0 (57.5; 73.6)	76.9 (65.2; 85.5)	21.6 (13.1; 33.4)	0.0	0.0	1.6 (1.5; 1.6)
Tanzania (2015)	Married	35.3 (28.8; 42.5)	63.7 (50.5; 75.1)	31.1 (20.1; 44.9)	3.1 (1.0; 9.2)	0.8 (0.1; 5.8)	1.3 (1.2; 1.3)
	Not married	40.6 (31.5; 50.3)	36.6 (22.9; 52.9)	48.8 (34.2; 63.6)	2.9 (0.4; 18.2)	11.7 (4.5; 27.0)	0.0

Uganda (2016)	Married	38.5 (33.4; 43.8)	54.7 (45.5; 63.6)	44.9 (36.0; 54.2)	0.0	0.0	0.4 (0.4; 0.4)
	Not married	46.3 (37.8; 55.0)	34 (24.2; 45.3)	63.1 (50.9; 73.8)	0.0	0.4 (0.1; 3.0)	2.5 (2.5; 2.5)
Zambia (2018)	Married	62.4 (54.7; 69.4)	94.9 (89; 97.7)	4.6 (2.0; 10.6)	0.5 (0.1; 3.4)	0.0	0.0
	Not married	33.6 (26.8; 41.1)	88 (73.8; 95)	10.3 (3.9; 24.7)	0.0	1.7 (0.2; 11.0)	0.0
Zimbabwe (2015)	Married	76.8 (70.3; 82.3)	84.7 (77.6; 89.9)	12.0 (7.5; 18.7)	2.6 (0.9; 7.9)	0.6 (0.1; 4.0)	0.0
	Not married	48.4 (32.2; 64.9)	52.8 (31.8; 72.9)	39.9 (20.9; 62.5)	3.5 (0.5; 21.4)	3.8 (0.5; 23.0)	0.0
Middle East & North Africa							
Egypt (2014)	Married	63.9 (56.2; 70.9)	58.2 (47.8; 67.9)	40.5 (31.0; 50.8)	1.3 (0.2; 8.9)	1.1 (0.1; 7.9)	0.0
	Not married	NA	NA	NA	NA	NA	NA
Jordan (2017)	Married	22.1 (13.0; 35.1)	51.3 (25.2; 76.7)	40.3 (16.3; 70.0)	7.3 (2.0; 23.7)	0.0	0.0
	Not married	NA	NA	NA	NA	NA	NA
Yemen (2013)	Married	22.5 (18.2; 27.4)	46.7 (35.1; 58.6)	51.6 (40.0; 63.1)	1.7 (0.4; 6.9)	0.0	0.0
	Not married	NA	NA	NA	NA	NA	NA
Europe & Central Asia							
Albania (2017)	Married	5.5 (1.8; 15.3)	16.2 (1.8; 66.6)	83.8 (33.4; 98.2)	0.0	0.0	0.0
	Not married	7.6 (2.0; 24.8)	0.0	100	0.0	0.0	0.0
Armenia (2015)	Married	33.7 (12.4; 62.7)	0.0	100	0.0	0.0	0.0
	Not married	0.0	0.0	0.0	0.0	0.0	0.0
Kyrgyzstan (2012)	Married	29.8 (14.4; 51.7)	66.1 (28.1; 90.6)	33.9 (9.4; 71.9)	0.0	0.0	0.0
	Not married	58.0 (7.9; 95.7)	0.0	100	0.0	0.0	0.0
Tajikistan (2017)	Married	8.1 (1.9; 28.3)	66.2 (10.8; 96.9)	33.8 (3.1; 89.2)	0.0	0.0	0.0
	Not married	0.0	0.0	0.0	0.0	0.0	0.0
Turkey (2013)	Married	29.7 (19.1; 43.1)	56.5 (31.2; 78.9)	43.5 (21.1; 68.9)	0.0	0.0	0.0
	Not married	NA	NA	NA	NA	NA	NA
South Asia							
Afghanistan (2015)	Married	18.4 (13.7; 24.4)	36.5 (22.4; 53.4)	63.5 (46.6; 77.6)	0.0	0.0	0.0
	Not married	NA	NA	NA	NA	NA	NA
Bangladesh (2017)	Married	67.9 (64.6; 71.0)	24.8 (21.7; 28.3)	70.1 (66.6; 73.5)	3.4 (2.3; 5.0)	1.5 (0.8; 2.7)	0.1 (0.1; 0.1)
	Not married	NA	NA	NA	NA	NA	NA
India (2015)	Married	37.6 (36.0; 39.3)	28.9 (26.0; 32.1)	51.3 (48.2; 77.2)	0.1 (0.0; 0.3)	19.4 (17.2; 21.8)	0.3 (0.1; 1.2)
	Not married	82.6 (67.1; 91.7)	14.2 (6.5; 28.2)	61.6 (43.1; 77.2)	0 (0; 0)	23.0 (10.2; 43.9)	1.3 (0.4; 20.9)
Nepal (2016)	Married	24.9 (20.0; 30.6)	59.9 (47.1; 71.5)	34.9 (23.1; 48.8)	4.3 (1.4; 12.5)	0.9 (0.1; 6.3)	0.0
	Not married	100.0	0.0	100	0.0	0.0	0.0
Pakistan (2017)	Married	23.3 (16.1; 32.6)	33.3 (16.5; 55.8)	59.6 (38.4; 77.7)	0.0	7 (1.7; 25.3)	0.0
	Not married	NA	NA	NA	NA	NA	NA

East Asia & the Pacific							
Cambodia (2014)	Married	45.8 (37.2; 54.7)	60.9 (47.2; 73.1)	38.0 (25.8; 51.9)	0.0	0.0	1.1 (1.1; 1.1)
	Not married	17.0 (3.6; 53.1)	45.2 (4.9; 93)	54.8 (7.0; 95.1)	0.0	0.0	0.0
Indonesia (2017)	Married	81.7 (76.5; 86.0)	30 (24.2; 36.5)	70.0 (63.5; 75.8)	0.0	0.0	0.0
	Not married	12.9 (3.1; 40.9)	0	100	0.0	0	0.0
Myanmar (2015)	Married	73.0 (64.9; 79.8)	52.9 (42; 63.5)	42.9 (32.5; 54.0)	2.0 (0.5; 7.6)	0	2.3 (2.3; 2.3)
	Not married	0.0	0.0	0.0	0.0	0	0
Papua New Guinea (2016)	Married	32.6 (22.3; 45.0)	93.1 (73.8; 98.5)	2.2 (0.3; 14.7)	0.0	0	4.6 (4.6; 4.6)
	Not married	16.0 (8.3; 28.7)	40.2 (13.2; 74.9)	0.0	0.0	32.8 (8.6; 71.6)	27.0 (26.7; 27.0)
Philippines (2017)	Married	44.8 (37.3; 52.5)	59.3 (47.2; 70.2)	40.7 (29.8; 52.8)	0.0	0.0	0.0
	Not married	13.8 (5.7; 30.0)	6.8 (0.8; 39.8)	93.2 (60.2; 99.2)	0.0	0.0	0.0
Timor Leste (2016)	Married	19.8 (11.6; 31.7)	77.4 (42.6; 94.1)	9.6 (1.4; 45.3)	12.9 (1.9; 53.7)	0.0	0.0
	Not married	0.0	0.0	0.0	0.0	0.0	0.0
Latin America & the Caribbean							
Colombia (2015)	Married	71.8 (67.9; 75.5)	47.0 (41.6; 52.6)	47.1 (41.6; 52.8)	3.7 (2.2; 6.2)	0.0	2.1 (2.1; 2.1)
	Not married	77.9 (74.2; 81.2)	17.3 (14.0; 21.2)	75.8 (71.1; 80.0)	4.5 (3.0; 6.9)	0.0	2.3 (2.3; 2.3)
Dominican Republic (2013)	Married	60.6 (53.0; 67.7)	50.7 (41.9; 59.5)	42.0 (32.8; 51.9)	4.6 (1.8; 11.2)	1.8 (0.4; 7.3)	0.9 (0.8; 0.9)
	Not married	59.5 (49.2; 69.0)	32.7 (20.5; 47.7)	58.3 (43.3; 71.9)	1.4 (0.3; 6.0)	7.5 (2.7; 19.1)	0.1 (0.1; 0.1)
Guatemala (2014)	Married	50.1 (45.5; 54.8)	67.8 (61.3; 73.6)	26.6 (21.3; 32.8)	3.5 (2.1; 5.9)	1.1 (0.3; 4.2)	1.0 (1.0; 1.0)
	Not married	48.1 (37.8; 58.6)	7.5 (3.2; 16.5)	78.8 (64.3; 88.4)	10.5 (3.7; 26.2)	3.3 (1.0; 10.2)	0.0
Haiti (2016)	Married	28.7 (22.7; 35.6)	45.9 (32.2; 60.1)	21.0 (11.4; 35.5)	31.2 (19.5; 45.8)	2.0 (0.5; 8.2)	0.0
	Not married	27.3 (22.2; 33.0)	27.8 (17.9; 40.5)	43.9 (31.8; 56.7)	1.3 (0.3; 5.6)	27.1 (18.0; 38.6)	0.0
Honduras (2011)	Married	67.4 (63.4; 71.1)	54.9 (50; 59.7)	35.0 (30.7; 39.6)	7.5 (5.2; 10.9)	1.3 (0.6; 2.8)	1.2 (1.2; 1.2)
	Not married	59.6 (51.9; 66.9)	20.4 (13.2; 30.2)	72.5 (61.9; 81.0)	2.2 (0.6; 8.3)	3.4 (1.4; 8.2)	1.5 (1.4; 1.5)
Peru (2020)	Married	58.4 (50.8; 65.7)	48.6 (41.3; 55.9)	24.7 (17.5; 33.7)	0.0	0.0	26.7 (26.6; 26.7)
	Not married	63.9 (49.5; 76.2)	19.3 (11.5; 30.7)	80.1 (68.4; 88.2)	0.0	0.2 (0; 1.4)	0.4 (0.4; 0.4)

Article 3

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Learning from success cases: ecological analysis of potential pathways to universal access to family planning care in low- and middle-income countries

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Abstract

Background

Universal access to family planning services is a well-recognized human right and several countries and organizations are committed to this goal. Our objective was to identify countries who improved family planning coverage in the last 40 years and investigate which contexts enabled those advances.

Methods

Analyses were based on data from publicly available national health surveys carried out since 1986 in Egypt, Ethiopia, Rwanda, Afghanistan, Brazil, and Ecuador, selected based on previous evidence. We estimated demand for family planning satisfied with modern methods (mDFPS) for each country and explored inequalities in terms of wealth, women's education, and women's age. We also explored contextual differences in terms of women's empowerment, percentage of population living in extreme poverty, and share of each type of contraceptive. To better understand political and sociocultural contexts, country case studies were included, based on literature review.

Results

Patterns of mDFPS increase were distinct in the selected countries. Current level of mDFPS coverage ranged between 94% in Brazil and 38% in Afghanistan. All countries experienced an important reduction in both gender inequality and extreme poverty. According to the share of each type of contraceptive, most countries presented higher use of short-acting reversible methods. Exceptions were Ecuador, where the most used method is sterilization, and Egypt, which presented higher use of long-acting reversible methods. In the first years analyzed, all countries presented huge gaps in coverage according to wealth, women's education, and women's age. All countries managed to increase coverage over recent years, especially among women from the more disadvantaged groups.

Conclusions

Family planning coverage increased along with reductions in poverty and gender inequality, with substantial increases in coverage among the most disadvantaged in recent years. Policies involving primary health care services, provision of various methods, and high-quality training of health providers are crucial to increase coverage.

Keywords

Family planning, contraception, gender inequality, universal access, low- and middle-income countries

Background

Universal access to family planning has been recognized as fundamental to promote gender equality, good health, and well-being (CHOI; FABIC; HOUNTON; KOROMA, 2015; FAGAN; DUTTA; ROSEN; OLIVETTI *et al.*, 2017; USAID; HEALTH POLICY PLUS, 2018). Family planning can be defined as the capability of women, men, and couples to determine the number and spacing of their children, without any form of discrimination or coercion (STARBIRD; NORTON; MARCUS, 2016). More than provide knowledge and means to fertility control, family planning policies are efficient to promote women's and child's health (BONGAARTS J; CLELAND J; TOWNSEND JW; BERTRAND JT *et al.*, 2012).

Since the 20th century, several family planning programs have been launched worldwide, increasing the prevalence of modern contraceptive use and reducing total fertility rate in several countries (AHMED; CHOI; RIMON; ALZOUMA *et al.*, 2019). Among developing regions, higher increases in family planning coverage were found first for Latin America and the Caribbean region, followed by Asia and the Pacific, and Eastern Europe and Central Asia (UNFPA, 2016). In several of these countries, more recent trends are related to the reduction of inequalities in coverage, with public policies reaching women from more disadvantaged groups, such as the poorer, less educated, who were living in rural areas, and adolescents (HELLWIG; COLL; EWERLING; BARROS, 2019). While the more industrialized countries started their fertility transition in the second half of the 20th century and rapidly increased their prevalence of contraceptive use, this has been much slower in most African countries. However, some countries have managed to rapidly increase modern contraceptive use, such as Ethiopia and Rwanda, especially since the 2010s, after the 2012 London Family Planning Summit, where commitment with family planning funding and programs was reinforced (AHMED; CHOI; RIMON; ALZOUMA *et al.*, 2019; FP2030, 2017; HELLWIG; COLL; EWERLING; BARROS, 2019; MAY JF, 2017; UNFPA, 2016).

Several strategies for effective and sustainable family planning policies are already known, such as political commitment, adequate funding, availability of a range of methods, and involvement of community leaders (CLELAND; BERNSTEIN; EZEH; FAUNDES *et al.*, 2006). Based on those, several approaches to address the barriers to increase family planning coverage have been implemented in low- and middle-income countries in the past years, including the promotion of self-administered injection and implants among women living in remote areas, and through peer education to reduce contraception stigma among adolescents (HAIDER; SHARMA, 2012; VON MISES, 2049). Currently, both

lack of knowledge on family planning practices and access to contraceptive methods do not seem to be the main barriers to contraception, even in the world's poorest countries (HAIDER; SHARMA, 2012). Instead, family planning is strongly dependent on beliefs and practices based on local social and cultural norms which vary widely across contexts (HAIDER; SHARMA, 2012; VON MISES, 2049). Low national coverage and larger gaps have been identified in countries with higher levels of extreme poverty and lower women's empowerment, where women may face stronger barriers to accessing contraceptives and may be exposed to risky sexual activity (AMONGIN; KAHARUZA; HANSON; NAKIMULI *et al.*, 2021; RIOS-ZERTUCHE; BLANCO; ZÚÑIGA-BRENES; PALMISANO *et al.*, 2017). In addition, in contexts of extreme poverty and limited method mix or untrained health providers, women may prefer sterilization to reversible contraceptives (VERKUYL, 2016).

In Africa, especially the West and Central region, the prevalence of contraceptive use is low in most countries. These regions are still strongly affected by social norms of early marriage, desire for large families, and low levels of women's empowerment (EWERLING; VICTORA; RAJ; COLL *et al.*, 2018). In addition, most African countries have not provided sufficient resources for family planning in the past decades, resulting in a high level of unmet need for family planning (BONGAARTS, 2011), especially in Sub-Saharan Africa, where almost 30% of women do not have their need for family planning satisfied (BULTO; ZEWDIE; BEYEN, 2014; FRUHAUF; ZIMMERMAN; KIBIRA; MAKUMBI *et al.*, 2018). Coverage of family planning services is even lower among harder-to-reach subgroups, such as young women, women who live in rural areas and who are poor and less educated (EWERLING; VICTORA; RAJ; COLL *et al.*, 2018). Some countries in Asia also have persistent low levels of family planning coverage (EWERLING; VICTORA; RAJ; COLL *et al.*, 2018). Low women's empowerment, social norms, and health system barriers have been recognized as the main obstacles to modern contraception in Asian countries (NAJAFI-SHARJABAD; ZAINIYAH SYED YAHYA; ABDUL RAHMAN; HANAFIAH JUNI *et al.*, 2013). Limited knowledge and misconceptions are also important barriers in the region, especially among adolescents (NAJAFI-SHARJABAD; ZAINIYAH SYED YAHYA; ABDUL RAHMAN; HANAFIAH JUNI *et al.*, 2013; REGMI; VAN TEIJLINGEN; SIMKHADA; ACHARYA, 2010). In Latin America and the Caribbean, high levels of contraceptive use have already been achieved in several countries but remain low in others. In addition, in Brazil, Mexico, Colombia, Dominican Republic, and El Salvador, a large share of demand for family planning is satisfied by permanent methods (PONCE DE LEON; EWERLING; SERRUYA; SILVEIRA *et al.*, 2019), an approach that is increasingly less desirable in terms of sociological aspects

now that several long-acting contraceptives are available (AOG, 2017). Inequalities in contraceptive use according to socioeconomic and demographic characteristics persist in the region, with the poorer, the less educated, and indigenous women being the most disadvantaged (FAGAN; DUTTA; ROSEN; OLIVETTI *et al.*, 2017).

Despite the improvements of the past decades, there is much more to be done. Progress has been much faster in some settings than in others (ALKEMA; KANTOROVA; MENOZZI; BIDDLECOM, 2013; HELLWIG; COLL; EWERLING; BARROS, 2019; UNFPA, 2016; UNITED NATIONS, 2015) and important socioeconomic and demographic inequalities in family planning are still being identified in several low- and middle-income countries (BLUMENBERG; HELLWIG; EWERLING; BARROS, 2020; HELLWIG; COLL; EWERLING; BARROS, 2019). Our aim was to identify countries who managed to improve family planning coverage since 1980 and investigate which were the contexts that made those advances possible.

Methods

Selected geographies

Based on previously published literature (ALKEMA; KANTOROVA; MENOZZI; BIDDLECOM, 2013; HELLWIG; COLL; EWERLING; BARROS, 2019; UNFPA, 2016; UNITED NATIONS, 2015) and data availability, we sought countries from each of the UNICEF world regions with a successful story of increasing contraceptive use and reducing inequalities. Within each region, we looked up for the countries that presented the largest progress in increasing coverage or the ones that managed to rapidly increase it in the last years. We also considered countries that managed to increase coverage among vulnerable women, such as the youngest, poorest, least educated, and rural residents. To present a broader picture while limiting the total number of countries in study, we did not include more than two countries per region. We selected one country from Middle East & North Africa (Egypt), two from Eastern & Southern Africa (Ethiopia and Rwanda), one from Asia (Afghanistan), and two countries from Latin America & the Caribbean (Brazil and Ecuador).

Study design and data collection

We used data from publicly available national health surveys, including Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and Reproductive and Health Surveys (RHS) carried out since 1986. These surveys are: Afghanistan 2010, 2015; Brazil 1986, 1996, 2006, 2013;

Ecuador 1994, 1999, 2004, 2012; Egypt 1995, 2000, 2005, 2008, 2014; Ethiopia 2000, 2005, 2011, 2016, 2019; Rwanda 2000, 2005, 2010, 2014. All surveys included use standardized data collection procedures (HELLWIG; BARROS, 2022).

To increase the amount of information for each selected country we also used estimates provided by the World Bank (https://data.worldbank.org/) based on other sources of data. To check the consistency of these estimates with the ones based on surveys, we compared existing survey estimates with those published by the World Bank and found no difference in most cases. The comparisons are presented in the supplementary material. A complete list of surveys used in the analyses is presented in Table 1 and underlying data is published at Harvard Dataverse (HELLWIG; BARROS, 2022).

Study Population

We evaluated demand for family planning satisfied by modern methods (mDFPS) among women who were married or in a relationship. mDFPS is defined as the proportion of women in need of contraception that were using (or whose partner was using) a modern contraceptive method. Women were considered in need of contraception if they were fecund and did not want to become pregnant within two years or were unsure if or when they wanted to become pregnant. Those who were pregnant at the time of the survey and declared the pregnancy was unintended were also considered in need of contraception. Women were classified as infecund if they were menopausal; had had a hysterectomy; had never menstruated; had had their last period more than six months ago and were not postpartum amenorrhoeic; said they cannot get pregnant; or if they had been married for at least five years, had never used contraception and not become pregnant in the previous five years (BRADLEY; CASTERLINE, 2014).

Different definitions of modern contraceptives have been proposed in the last years (HUBACHER; TRUSSELL, 2015; UN, 2022). In this analysis, modern contraceptive methods were defined as medical procedures or technological products (HUBACHER; TRUSSELL, 2015) and included short-acting reversible methods (oral contraceptive pills, injections, spermicides, and male and female condoms); long-acting reversible contraceptives (intrauterine devices (IUD) and implants); and permanent methods (female and male sterilization). This definition does not consider lactational amenorrhea nor any calendar-based method as modern. Although they can be as effective as the methods we are

considering as modern, they were not included here since they require couples avoid sex or a recent pregnancy (HUBACHER; TRUSSELL, 2015).

Ethical approval

Ethical clearance was responsibility of the institutions that conducted the surveys, all of them were approved by the national committee of each country. All survey data are anonymized.

Data analysis

For some surveys, information to identify women in need of contraception was not available. Given the high correlation between demand for family planning satisfied and contraceptive use prevalence, we estimated mDFPS using the following predictive equation (BARROS; BOERMA; HOSSEINPOOR; RESTREPO-MÉNDEZ *et al.*, 2015):

$$logit(mDFPS)=0.61+0.68log(CPMO)+3.57CPMO^2$$

where mDFPS is demand for family planning satisfied by modern methods and CPMO is the modern contraceptive use prevalence.

CPMO was estimated for all countries without information to estimate mDFPS, considering it as the proportion of women 15-49 years of age currently using a modern contraceptive method. As mDFPS, CPMO was restricted to women who were married or in a union.

The bulk of this study consists of a descriptive analysis of changes in family planning coverage and contextual factors. We used scatter plots to explore changes over time in mDFPS along with changes in the proportion of total population living in extreme poverty (less than US$ 1.90 a day), and in levels of gender inequality. This was measured by the Gender Inequality Index (GII), a composite measure reflecting inequality in achievement between women and men in three dimensions: reproductive health, empowerment, and labor market. A complete description of the index is available elsewhere (30). Using survey data, we also evaluated changes over time in mDFPS against changes in the mix of contraceptive methods used in each country and inequalities according to wealth, women's age, and women's education. Visual representation of absolute inequalities by each factor was accessed using equiplot graphs (equidade.org/equiplot) while changes in method mix were presented in stacked bar charts.

Wealth was measured based on an asset index obtained from information on household assets, presence of electricity, water supply, sanitary facilities, and building materials of the dwelling, among other variables (FILMER; PRITCHETT, 2001; RUTSTEIN, 2008). The wealth score was obtained through principal component analyses, estimated separately according to area of residence, since relevant assets may vary in each area, and were later combined into a single score using a regression-based scaling procedure (RUTSTEIN, 2008). The scores assigned to the households were then used to divide them, weighted by the number of residents, into five equally sized groups. Women's age was categorized in three groups: 15–17 years, 18–19 years, and 20–49 years. Women's education was classified according to the highest level achieved (none, primary, or secondary/higher).

All analyses were conducted in Stata 16.0 (StataCorp, College Station, TX, USA), always considering the multi-stage survey design, including sampling weights and clustering.

Results

In all countries, according to the selection criteria, we observed important increases in mDFPS with time (Figure 1). The patterns, however, are very distinct. Brazil and Ecuador, from LAC, presented the highest current levels of mDFPS, around 90%. Brazil, Egypt and Afghanistan did not present important changes in the past decade. Brazil has over 90% mDFPS, while Egypt stabilized around 80%. Afghanistan, however, presented a steep increase in mDFPS between 2000 and 2010, but since then coverage stagnated around 40%, with no further progress. Rwanda and Ethiopia presented increasing coverage during the whole study period, finishing with levels slightly over 60%.

Along with the increase in mDFPS coverage, we observed important reductions over time in both gender inequality and the proportion of the population living in extreme poverty in our selected countries. Figure 1 shows that, starting at different levels of gender inequality, all countries had important reductions over time. Interestingly, in Afghanistan the Gender Inequality Index (GII) was stable over the period when mDFPS was increasing and declined after 2010 when mDFPS did not increase any more. Figure 1 presents a similar picture for the proportion of the population living in extreme poverty. Unfortunately, we have no data on the proportion of the population living in extreme poverty in Afghanistan.

The patterns and change in contraceptive method mix were not similar across the study countries (Figure 2, Table 1). Egypt presented the highest reliance on long-acting contraceptives, while for

Ecuador it was permanent contraception. The other countries had a predominance of short-acting methods. Along with Ecuador, Brazil relied heavily on permanent contraception. However, this reliance was reduced over time, a trend that was also observed in Rwanda and to a lesser degree in Ethiopia. The use of long-acting methods increased in Ethiopia and Rwanda, and very discreetly in Brazil. Egypt, Afghanistan, and Ecuador, on the other hand, reduced the share of long-acting reversible methods.

In Egypt, along with a slight reduction in the use of long-acting reversible methods and an increase of short-acting contraceptives between 2008 and 2014 (Figure 2, Table 1), there was an important reduction in wealth inequalities. Coverage of family planning was already high among the wealthiest in 1995, with a huge gap between the poorest and the wealthiest quintiles. In the last time point, mDFPS was still lower among the poorest than among the wealthiest, but the gap was much reduced (Figure 3, Table 2). Large gaps in terms of women's education were also identified in the first surveys, with much lower mDFPS coverage among those with no education. Currently, inequalities in terms of education are virtually null (Figure 4, Table 3). In terms of women's age, we observed an important improvement among adolescents, especially in the 15–17 years age group. mDFPS among adolescents is still much lower than among women 20 years or more. However, mDFPS among girls aged 15–17 was less than 30% until 2008 and, in 2014, it presented very important progress, being it 62.7% and nearly matching the coverage for older adolescents (64.2% among girls aged 18–19) (Figure 5, Table 4).

Between 2000 and 2016, mDFPS in Ethiopia increased from 14.3% to 63.3% (Figure 1, Table 1), with an increase in the use of long-acting reversible contraceptives and a reduction in permanent contraception (Figure 2, Table 1). Examining how wealth inequalities changed over time, we observed reduction in the gap between the poorest and the richest, but a large gap still persists (Figure 3, Table 2). Among the poorest, mDFPS coverage increased from 13.8% in 2000 to 47.9% in 2019. Over time we also observed an important change in the patterns of inequality 34 – from a very clear top inequality situation in 2000, to a linear pattern in 2019. A large reduction in the gap between levels of education was also observed (Figure 4, Table 3). In terms of age, the gap actually increased, with the youngest women now significantly trailing behind the others (Figure 5, Table 4).

Rwanda made impressive progress in mDFPS, despite some decrease in coverage in the 1990s, which may be partly due to the use of different data sources in our analysis. From 2000 to 2014, mDFPS

increased 3.6 times, from 17.9% to 64.3% (Figure 1, Table 1). The increase in coverage was accompanied by an increase in long-acting reversible contraceptives and a decrease in sterilization (Figure 2, Table 1). The change in wealth inequalities was most impressive, with a large gap and a top inequality pattern in 2000 being replaced by essentially no wealth inequality in 2014 (Figure 3, Table 2). In terms of women's education, the gap also reduced, with increased mDFPS coverage in all groups. However, mDFPS is still lower among those with no education, with 57.2% mDFPS, while women with secondary or higher education are at 66.8% (Figure 4, Table 3). In terms of age, the gap actually increased, but remarkably mDFPS started higher for women 20+ years, but from 2010 this pattern flipped and in 2014 adolescents 18–19 years presented a much higher coverage of 85.6% (Figure 5, Table 4).

Despite its weak track record in gender equality, Afghanistan succeeded in increasing family planning for a period. Even before its commitment with the Family Planning 2020 initiative in 2016, its mDFPS coverage increased from 16.2% to 38.4% between 2000 and 2018, but most progress was achieved between 2000 and 2005 (Figure 1, Table 1). With only two available time points to assess the method mix, it is clear that short-acting reversible methods are by far the most used. There was some increase in permanent methods (4.1% to 10.2%), while long-acting contraceptives decreased (Figure 2, Table 1). Large inequalities in mDFPS coverage still exist in terms of wealth, education, and age (Figure 3– Figure 5). Most notably, younger women are far behind in mDFPS compared to those 20 years and over.

In 1986, Brazil already had a high mDFPS coverage of 79.6%, with permanent contraception being the most common type. Large inequalities were present then, according to wealth, women's age and women's education (Figure 3– Figure 5). Over time, impressive progress was achieved, with inequalities in all these dimensions decreasing to virtually null, while overall mDFPS reached 93.7% in 2013. The share of sterilization decreased and was just over 30% in the last time point.

In Ecuador, mDFPS coverage increased from 56.0% % in 1982 to 89.8% in 2012 (Figure 1, Table 1). Permanent contraception are currently the most used methods with 45.9% of the share, having increased in the last period (Figure 2, Table 1). Ecuador had huge and persistent inequalities in mDFPS in terms of wealth, education, and women's age up to 2004 (Figure 3– Figure 5). In 2012 these inequalities nearly disappeared for all dimensions with younger adolescents presenting 81.3% of mDFPS coverage, up from 53.4% in 2004 (Figure 5, Table 4).

Discussion

The objective of this paper was to identify characteristics, actions and programs in successful countries that may contribute to increasing family planning coverage in other settings. Our findings suggest a concomitant improvement in mDFPS coverage, gender equality, and reduction in poverty, with the more recent data indicating faster increases in coverage among the more disadvantaged women.

In agreement with our findings, several previous studies have identified a positive association between women's empowerment and family planning coverage (NKHOMA; LIN; KATENGEZA; SOKO *et al.*, 2020; PRATA; FRASER; HUCHKO; GIPSON *et al.*, 2017; UPADHYAY; GIPSON; WITHERS; LEWIS *et al.*, 2014). Gender equality is a sexual and reproductive health determinant at the individual, family, and social levels, influencing women's decision-making power, mobility, financial autonomy, spousal communication, freedom from control by partner or family, exposition to intimate-partner violence, their aspirations, level of education, and their participation in the labor market (NKHOMA; LIN; KATENGEZA; SOKO *et al.*, 2020; PRATA; FRASER; HUCHKO; GIPSON *et al.*, 2017; UPADHYAY; GIPSON; WITHERS; LEWIS *et al.*, 2014). At the same time, family planning has also been recognized as a relevant strategy to empower women and engage them in economic activities (MBIZVO; PHILLIPS, 2014). A cyclic relationship is also experienced in terms of economic development, in which ensuring access to family planning services has been recognized as a relevant strategy to alleviating poverty (MBIZVO; PHILLIPS, 2014). Lower levels of family planning coverage are persistently identified among poorer women, with lower availability of contraceptive methods, less trained providers, and higher perceived costs often identified in lower-income settings (BARON, 2008; NGO; NUCCIO; PEREIRA; FOOTMAN *et al.*, 2017). The reduction in the proportion of the population living in extreme poverty that we identified along with the increases in the levels of mDFPS, illustrates this long-term effect of the improvement in living conditions and increase access to family planning services.

To evaluate pathways to success in family planning, we faced several limitations regarding the availability of information, especially related to family planning funding. It is known that several countries and international organizations have made financial commitments to increase family planning coverage, especially since the early 2010s (AHMED; CHOI; RIMON; ALZOUMA *et al.*, 2019). Unfortunately, information on health expenditure specifically on reproductive health is not available for most of the countries included in our analysis (WHO). Another limitation is related to women's

empowerment. Although a measure of women's empowerment using national health surveys was already developed (EWERLING; LYNCH; VICTORA; VAN EERDEWIJK *et al.*, 2017; EWERLING; RAJ; VICTORA; HELLWIG *et al.*, 2020), all the required information to estimate it is not available in most of the surveys included in our study. For this reason, we chose to use the Gender Inequality Index as an indicator of empowerment. Our study was also limited because information for longer periods is not available for all selected geographies and there are other countries that managed to increase family planning coverage but there is no available data to explore the context of these changes, especially those in Asia. Some of the aspects related to successes in family planning coverage which we could not measure in our article were already discussed in previous studies. Major policies and contributors in each setting are presented below, according to each country case.

Country cases

Egypt

Egypt, an Arab country with historical cultural norms regarding early marriage and large families, began its commitment with family planning practices aiming to control population growth due to the narrative of its negative effects on availability of resources and national development (BARON, 2008). Egypt started to limit its population growth in the 1930s and in the 1950s the government started its endorsement of birth control and modern contraceptives were increasingly available (BARON, 2008; ZOHRY, 1997). With a high level of coverage since the 1980s, part of the Egyptian success in increasing contraceptive use was due to an early agreement between Western donors, national health professionals and female activists who managed to increase public trust and women's demand for family planning (BARON, 2008). The involvement of different leaders led to the promotion of family planning in community contexts and health facilities, integrating family planning with both health and social services (BARON, 2008). Another differential of Egyptian family planning policies was that family planning messages were not designed in favor of couples' choices regarding family size, but were in favor of smaller families (RASHAD; ZAKY, 2013).

Egypt decreased its total fertility rate of 5.6 births per women in 1976 to 2.8 in 2007 (BARON, 2008; MORELAND, 2006). Between the 1970s and the early 2000s, in a context of political instability, the number of health facilities have increased over 50 percent and the resources allocated by national government to family planning services have increased by 400 percent, contributing to an increase in

the contraceptive use prevalence from 19% in 1976 to 59% in 2005 (MAHRAN M; EL-ZANATY F; A, 1995; MORELAND, 2006). The reduction in fertility rate was largely credited to the increased use of contraception, and in a smaller measure to the increase in the number of induced abortions and the increase in the age of marriage (MORELAND, 2006; RASHAD; ZAKY, 2013).

In the family context, factors identified as the important determinants of contraceptive use were the desire for less children, the number of living children, place of residence, woman's work after marriage, and the level of education of the woman and her husband (MAHRAN M; EL-ZANATY F; A, 1995). Although we found a high level of gender inequality until the 2010s, previous studies also indicated that Egyptian families have been built upon more equitable standards. In 1992, men and women already had similar fertility preferences, with an ideal family size of 3 children on average (MAHRAN M; EL-ZANATY F; A, 1995). While in 1992 only 29% of Egyptians declared that there was an agreement in fertility preferences (MAHRAN M; EL-ZANATY F; A, 1995), in 2008, already more than 85% of women using modern contraceptives have declared that this decision was made jointly with their husbands (RASHAD; ZAKY, 2013). Despite the progress in women's education, female employment and wife's opportunity cost did not lead to a significant lower number of wanted children during the peak of increase in modern contraception (RASHAD; ZAKY, 2013). More recent studies have found a significant effect among women with secondary level or higher (RASHAD; ZAKY, 2012), however, the early adoption of family planning policies seems to be a stronger factor to the desire of smaller families and modern contraceptive use by women of all socioeconomic groups in Egypt (RASHAD; ZAKY, 2013).

Ethiopia

Ethiopia is one of the most populous countries in Africa, which had been exposed to huge political instability in the second half of the 20th century, with the abolishment of the parliament, domain of an authoritarian revolutionary regime, suspension of the constitution, and land expropriation (CLAPHAM, 1990; VISENTINI, 2020). Since the 1980s, Ethiopians have been facing water scarcity and repeated famine episodes. The critical scenario naturally affected the desired family size in Ethiopia. Following this increased demand for contraceptives and in partnership with international donors, Ethiopia managed to increase provision of contraceptive methods and, consequently, the national coverage raised. Modern contraceptive use prevalence increased from 2.9% in 1990 to 27.3% in 2011, and total fertility rate declined from 7 children per woman to 4.8, respectively (OLSON; PILLER, 2013).

The first movement related to family planning policies in Ethiopia occurred in 1966, with the foundation of the Family Guidance Association of Ethiopia, affiliated with the International Planned Parenthood Federation. The first national policy was implemented in the early 1990s and, as in Egypt, its primary concern was to reduce the population growth to promote socioeconomic development. Aspects addressed in this policy were the elimination of legal barriers to socioeconomic rights for women and family planning propaganda advising in favor of smaller families. The following policies expanded the sources of contraceptives and proposed new plans to end poverty and expand the number of health providers and sources of contraceptives (ETHIOPIA, 2011; OLSON; PILLER, 2013). Structural factors such as the number of modern contraceptive methods available and distance to health facilities have been identified as significant factors associated with increased use of contraception among Ethiopian women (HRUSA; SPIGT; DEJENE; SHIFERAW, 2020). Family planning was also included in HIV, postabortion and postpartum services (46, 49). Later on, in the early 2000s, the national government launched the Health Extension Plan, which delivers primary health care and family planning services in the more vulnerable settings, and has removed import taxes to contraceptive methods (OLSON; PILLER, 2013; ZIMMERMAN; YI; YIHDEGO; ABRHA *et al.*, 2019). Since 2009, health extension workers were allowed to provide implants and midwives to insert IUDs (ASSEBE; BELETE; ALEMAYEHU; ASFAW *et al.*, 2021; TILAHUN; LEW; BELAYIHUN; LULU HAGOS *et al.*, 2017). It was a successful strategy, which was fundamental for the increase of long-acting reversible methods. In the 2012 London Family Planning Summit, Ethiopia put family planning in the core of its health system, aiming to address aspects related to supply of contraceptives, increase of the family planning budget, reduce early marriage, and improve its strategy to meet the needs of adolescents (MCCLENDON; MCDOUGAL; AYYALURU; BELAYNEH *et al.*, 2018; OLSON; PILLER, 2013). Complementary to the health extension workers, school-based family planning programs have being providing sexual and reproductive education to girls and reinforcing the importance to use contraception and continue education (MCCLENDON; MCDOUGAL; AYYALURU; BELAYNEH *et al.*, 2018).

Among the selected countries, Ethiopia was the leading country in reductions in the proportion of the population living in extreme poverty and managed to increase mDFPS among women from all groups of age, wealth, and education. The progress made in Ethiopia was also made possible by the international donor support and by the support provided by nongovernmental organizations, improving service delivery and promoting behavior-change campaigns. Because of its delicate situation

and the national government commitment with family planning, Ethiopia was the African country that received most international funding for family planning. In addition to monetary resources, Ethiopia has been receiving technical and management resources from the Global Health Initiative (OLSON; PILLER, 2013).

Rwanda

Between 2005 and 2015, Rwanda increased its modern contraceptive use from 17% to 53% (SCHWANDT; FEINBERG; AKOTIAH; DOUVILLE *et al.*, 2018) and decreased its total fertility rate from 6.1 to 4.6 births per woman (MUHOZA DN; RUTAYISIRE PC; A, 2013). The major factor that possibly contributed to its success was the government commitment, who increased the family planning budget and made family planning services available (MUHOZA DN; RUTAYISIRE PC; A, 2013; OLSON; PILLER, 2013; SCHWANDT; FEINBERG; AKOTIAH; DOUVILLE *et al.*, 2018; SOLO, 2008). Family planning services in Rwanda are still being mostly funded by international organizations (SCHWANDT; FEINBERG; AKOTIAH; DOUVILLE *et al.*, 2018), but the national government made them a national priority and, with collaboration of different sectors, innovation and evidence-based strategies, have been implementing and supporting family planning policies (NDARUHUYE; BROEKHUIS; HOOIMEIJER, 2009; SOLO, 2008).

The discussion on promotion of contraception started in Rwanda much later than in Egypt and Ethiopia, in the early 1980s, with the creation of the National Office of Population (NDARUHUYE; BROEKHUIS; HOOIMEIJER, 2009). National family planning policies in Rwanda have been built upon strong campaigns with training of providers, increase of the range of methods available, and mass media campaigns (MUHOZA DN; RUTAYISIRE PC; A, 2013). Aiming to improve reproductive health outcomes and endeavor national development, the creation of the National Reproductive Health Policy in 2003 addressed issues related to women's, adolescent's and child's health, prevention of sexually transmitted infections, family planning, and women's decision-making power (LÖWDIN, 2017; SOLO, 2008). With the 2005 National Policy for Family Planning and the 5-year strategy, other important aspects were addressed to increase family planning coverage, such as the encouragement of the participation of men and the whole community in family planning discussions, increased efficiency in the provision of family planning services, construction of more health posts, facilitated distribution of short-acting reversible methods by community health workers, and the promotion of training to insertion of long-acting reversible methods and male permanent contraception (MUHOZA DN;

RUTAYISIRE PC; A, 2013; SCHWANDT; FEINBERG; AKOTIAH; DOUVILLE *et al.*, 2018). These policies are aligned with our findings that between 2005 and 2010 Rwanda achieved not only important increases in mDFPS, but also reductions in gaps in coverage and a more balanced mix of methods, with a reduction in the role of sterilization and an increase in the share of long-acting methods. Another potential contributor for this improvement was the decentralization of health services, with increased access to health services for those living in rural areas (SCHWANDT; FEINBERG; AKOTIAH; DOUVILLE *et al.*, 2018; SOLO, 2008).

The increased number of women in the parliament has suggested that part of Rwanda's success in family planning programs is related to gender-equality issues at a macro level (LÖWDIN, 2017). However, since the start, the main aim of family planning policies in Rwanda has been to reduce population growth, not to tackle gender equality (LÖWDIN, 2017; MUHOZA DN; RUTAYISIRE PC; A, 2013; SOLO, 2008). Pursing the government aim to transform Rwanda into a middle-income country by 2020, family planning messages have been putting smaller families not only as contributive but as imperative to reduce poverty and promote development (LÖWDIN, 2017; MUHOZA DN; RUTAYISIRE PC; A, 2013; SOLO, 2008). On the other hand, along with the provision of family planning services, education, job opportunities, and empowerment of women were promoted by national policies in order to support behavior changes regarding fertility preferences (NDARUHUYE; BROEKHUIS; HOOIMEIJER, 2009).

Previous studies indicate that individual factors associated with greater use of contraception among Rwandese women were their level of education, place of residence, agreement with their husband regarding the desired number of children, experience of child mortality, and exposition to family planning information (MUHOZA DN; RUTAYISIRE PC; A, 2013).

Afghanistan

The impressive progress observed for the other selected countries was not observed for Afghanistan. Even so, it was the country with the fastest increase among the Asian countries with available data. The Islamic Republic of Afghanistan is a country with strong religious and strict social norms, and it has been ravaged by war and plagued by political instability for a long time (MERITS; SILDVER; BARTELS; TAMME, 2019; SPOORENBERG, 2013). Despite the damage in its health and education system, the

country managed to rapidly increase family planning coverage after the deposition of the Taliban regime, in 2001, with the US-led invasion of the country and the implementation of important strategies (MERITS; SILDVER; BARTELS; TAMME, 2019; SPOORENBERG, 2013). Main factors associated with this success were the engagement of different members of the community in family planning discussions, the focus on the benefits of birth spacing to the health of children and mothers, literacy programs for women, and the increase in the number of female community health workers (SATO, 2007).

In the late 1990s, Afghanistan had a total fertility of 7.5 children per woman and one of the highest rates of maternal mortality in the world (MERITS; SILDVER; BARTELS; TAMME, 2019). With the family planning messages focusing on the importance of larger birth spacing, parity started to decline and the age of first childbearing started to increase in the early 2000s (SPOORENBERG, 2013). The first national health policy was implemented in 2003, the Basic Package of Health Services, which aimed to deliver a variety of health services, including family planning (SPOORENBERG, 2013). The higher acceptance of family planning among Afghan families is probably due to its specific approach, that was more sensitive to the health benefits of larger birth spacing than to the potential economic benefits of smaller families (SATO, 2007).

Differences in acceptance of contraception between different ethnic groups in Afghanistan has been documented (MERITS; SILDVER; BARTELS; TAMME, 2019). Despite the huge heterogeneity, increase in contraceptive use has been documented in regions where religious leaders supported it (SATO, 2007; USAID; UNFPA, 2017). In some settings, they were also providing family planning knowledge to men. This represents a very important advance, since Islam is not only the predominant religion, but the foundation of their culture and their lives (SATO, 2007). Despite the religious concerns regarding family planning, Islam allows it when pursuing the common good or when the family is very poor (SATO, 2007; USAID; UNFPA, 2017).

Strong cultural gender inequalities are another barrier to contraceptive use, due to the preference of a male child, which tends to increase the number of children, and due to power imbalance between husband and wife (SATO, 2007; USAID; UNFPA, 2017). Another barrier to contraception is the influence of other family members in the desired family size. Life experiences of older family members tend to be passed on to current generations (USAID; UNFPA, 2017).

Important strategies to deal with these barriers were the promotion of basic education to women, the support from non-government organizations, family planning services working with both men and women, the integration of family planning with other health services, and the implementation of community health workers (SATO, 2007).

Despite the improvement in family planning coverage starting in 2000 with the end of the Taliban rule, there was much space to increase coverage which stalled after 2008. Several basic aspects were not addressed, such as the lack of male involvement in family planning counseling, limited method mix offered in public facilities, limitation of health providers to offer specific methods, such as IUD and injectables, and religious prohibition of some contraceptive methods (USAID; UNFPA, 2017). Unfortunately, the progress that was achieved in the previous decades is now being lost after the Taliban regained power in 2021 (UN WOMEN, 2022). Notwithstanding, we opted to keep Afghanistan in our study since our analysis was in an advanced stage in 2021. It is important to note, however, that the country can no longer be considered a success story.

Brazil

Public policies related to population growth started in Brazil in the 1950s, in a context of high fertility rate and fears of a demographic explosion (DE OLIVEIRA, 1997; RODRIGUES, 1968). Only at the end of the 20th century was the impact of family planning on women's health included in the official discourse (DE OLIVEIRA, 1997). Contrary to the other countries selected and despite the international pressure for population control, the Brazilian government was not directly involved in the first family planning programs (MARTINE, 1996; MERRICK, 1983). The first reproductive health policy from the government, the Program of Integrated Assistance to Women's Health, was only launched in 1986 (CAVENAGHI; ALVES, 2019; MARTINE, 1996).

During the 1960s, in addition to the rapid population growth and in a time when contraception was considered a taboo in the country, Brazil had a high rate of induced abortions. In a context where promotion of contraception was out of the law, the high occurrence of abortion was a powerful motivator to private health providers to offer contraceptives (MARTINE, 1996; RODRIGUES, 1968). Despite the prohibition of contraception according to the 1941 Act, condoms were allowed to prevent diseases and contraceptive pills were allowed for ovulation control and regularization of the menstrual cycle (RODRIGUES, 1968). In a context of industrialization and increasing female insertion in the labor

market, the *Sociedade Civil Bem-estar Familiar no Brasil* (BEMFAM, Society for Family Wellfare) was founded in 1965, with support from the International Planned Parenthood Federation, aiming to open the discussion on reproductive health, increase the provision of family planning services, and provide training to health professionals (RODRIGUES, 1968). The press, through news and analysis articles on family planning, the TV generally, and especially through the popular soap operas showing wealthier families with small families may also had a role in behavior change and promotion of family planning in Brazil (LA FERRARA; CHONG; DURYEA, 2012; RODRIGUES, 1968).

During the second half of the 20th century, socioeconomic conditions had improved, social mobility had increased, consumption expectations had raised, and national public health started to migrate from control of diseases to hospital-based curative care, leading to a growing demand for female sterilization, which was mostly performed after a cesarian section and paid out-of-pocket. In the more vulnerable regions, sterilizations were paid by politicians, in exchange for votes (GOLDANI, 2000; MERRICK, 1983). Between 1978 and 1986, use of sterilization increased more than 100 percent in the Southeast region and almost 80 percent in the Northeast region (MARTINE, 1996). In 1986, more than half of the married women were already using a modern contraceptive method, mostly female sterilization or the contraceptive pill (MARTINE, 1996). Use of sterilization continued to increase over the 1990s, when it became subsidized by the Brazilian Unified Health System created by the new 1988 constitution (MARTINE, 1996). Up to 2013, Brazil managed to increase family planning coverage to 94% and reached all population subgroups. As our initial analysis indicated, there was a reduction in the share of permanent in favor of short-acting methods, but long-acting contraceptives are still little used in the country (BERTRAND; SULLIVAN; KNOWLES; ZEESHAN *et al.*, 2014; CAVENAGHI; ALVES, 2019).

Ecuador

Aiming to improve maternal and child health and guarantee families' rights to plan their family size, family planning was made one the highest priorities in Ecuador since the 1970s. Between 1970 and 2015, modern contraceptive prevalence increased from 15% to 61% (USAID, 2001). The national commitment with the human right of families to choose their family size and space births is demonstrated in the 1998 Ecuadorian constitution and in the National Population Policy of 1987 (CURRY; LAFEBRE, 2001). The USAID played a major role in the initial years of the Ecuadorian

reproductive health programs, between 1970 and 1999, working with public and private institutions and getting support from other international organizations. The aim of the policies was to increase use of family planning services and improve maternal and child health with sustainability, aiming to increase the financial sustainability and independence of major local nongovernmental organizations, the *Associación Pro-bienestar de la Familia and the Centro Médico de Orientación y Planificación Familiar* (CURRY; LAFEBRE, 2001).

Despite the efforts made in the first decades of family planning policies in Ecuador, more disadvantaged women were not reached. Although mDFPS was already high among the more advantaged groups in 1994, until 2004 coverage was low among the poorest, less educated, and younger women. The scenario changed with the health reform, in 2007, when the supply of modern contraceptive methods increased in primary health care facilities and offer of female sterilization increased, especially after childbirth (QUIZHPE; SEBASTIAN; TERAN; PULKKI-BRÄNNSTRÖM, 2020). Trying to reach adolescents, health services for adolescents were first differentiated, with health providers being trained to be more sensitive to adolescents' needs and language. Because it was not resolute, in a second stage, the Intersectoral Policy for the Prevention of Pregnancy in Girls and Adolescents was created, aiming to address social and contextual barriers to contraceptive use (HERRÁN; PALACIOS, 2020).

Despite the increase in coverage among those who were poorer and who lived in more remote areas (RIOS QUITUIZACA; GATICA-DOMÍNGUEZ; NAMBIAR; FERREIRA SANTOS *et al.*, 2021), there is evidence of the insufficient effect of this increase in the supply of contraceptives on modern contraceptive use, especially among indigenous women, due to lack of cultural sensitivity (MESENBURG; RESTREPO-MENDEZ; AMIGO; BALANDRÁN *et al.*, 2018; QUIZHPE; SEBASTIAN; TERAN; PULKKI-BRÄNNSTRÖM, 2020). Other persistent barriers to increase coverage among more disadvantaged populations are the gender-based violence and absence of economic opportunity (QUIZHPE; SEBASTIAN; TERAN; PULKKI-BRÄNNSTRÖM, 2020).

Conclusions

Over the 20th century several countries managed to increase modern contraceptive use and decrease their fertility rates based on the ideas of avoiding a demographic explosion and promoting national development and economic growth. In the 21th century, there was wide perception that the ideal number of children for a family is not a decision for international or governmental organizations to

make. Family planning involving the number and timing of children should be decided by the woman and the couple, according to their needs and desires. Society is not a unique agent with a unique aspiration, but an aggregate of different individuals and different aspirations.

Despite the improvements made in the selected countries, in most of them there is space for more improvement, especially among the more disadvantaged groups. Aspects highlighted are the natural expansion of coverage with the expansion in the proportion of the population living in urban areas, and the better integration of family planning services in other health services (HRUSA; SPIGT; DEJENE; SHIFERAW, 2020; OLSON; PILLER, 2013).

Obviously, we cannot replicate the same strategies to different cultural and socioeconomic contexts. However, some basic aspects were fundamental to increase coverage in the geographies analyzed and could be beneficial to other settings. Crucial factors to increase coverage were governmental commitment with well-designed policies and the involvement of primary health services. It is also essential that trained health providers are equipped to offer precise and clear information on family planning and on all the available methods. Also, a wide mix of methods must be available to match the needs and preferences of both women and men (SOLO, 2008). Policies and approaches should also be culturally adapted to offer acceptable alternatives to different groups, be them religious or ethnic. Finally, a strong commitment of all society stakeholders must be made in order to make family planning available to all, so that no one is left behind (SCHWANDT; FEINBERG; AKOTIAH; DOUVILLE *et al.*, 2018).

Data availability

Data used in this study are from:

The women's dataset of Afghanistan 2015; Brazil 1986, 1996; Egypt 1995, 2000, 2005, 2008, 2014, Ethiopia 2000, 2005, 2011, 2016, 2019; and Rwanda 2000, 2005, 2010, 2014, available from the Demographic and Health Survey (DHS) website. Access to the dataset requires registration and is granted only for legitimate research purposes. A guide for how to apply for dataset access is available at: https://dhsprogram.com/data/Access-Instructions.cfm

The women's dataset of the Afghanistan 2010 Multiple Cluster Indicator Survey (MICS), available from the MICS website. Access to the dataset requires registration and is granted only for legitimate research purposes. Questions about data access can be directed to mics@unicef.org

The women's dataset of Ecuador 1994, 1999, 2004 Reproductive Health Survey (RHS), available from the CDC website. Access to the dataset requires registration and is granted only for legitimate research purposes.

The women's dataset of Brazil 2006, 2013, available from the *Pesquisa Nacional de Saúde* website. Access to the dataset requires registration and is granted only for legitimate research purposes.

The women's dataset of Ecuador 2012, available from the *Encuesta Nacional de Salud y Nutrición* website. Access to the dataset requires registration and is granted only for legitimate research purposes.

Data on the family planning coverage were obtained from the World Bank for Afghanistan 2000, 2003, 2005, 2006, 2008, 2012, 2016, 2018; Ecuador 1982, 1987, 1989; Egypt 1980, 1984, 1988, 1989, 1991, 1992, 1996, 1997, 1998, 2003; Ethiopia 1990, 1997, 2014, 2016, and Rwanda 1983, 1992, 2008. World Bank data is available for open access. Demand for family planning satisfied by modern methods coverage is available at: https://data.worldbank.org/indicator/SH.FPL.SATM.ZS

Underlying data

Harvard Dataverse: Demand for family planning satisfied in successful countries. https://doi.org/10.7910/DVN/HKZLOS [74]. This project contains the following underlying data:

- raw data.csv (all estimates generated from the above listed sources)

Extended data

This project contains the following extended data:

- raw data - supp material.tab (Comparison between International Center for Equity in Health estimates for modern contraceptive use and data from World Bank)

Demand for family planning satisfied by modern methods in selected countries

Data from publicly available health surveys, standardized by the International Center for Equity in Health/Pelotas, Brazil

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Tables and Figures

Figure 1 – Trends in demand for family planning satisfied by modern methods, Gender Inequality Index, and proportion of total population leaving behind poverty headcount ratio.

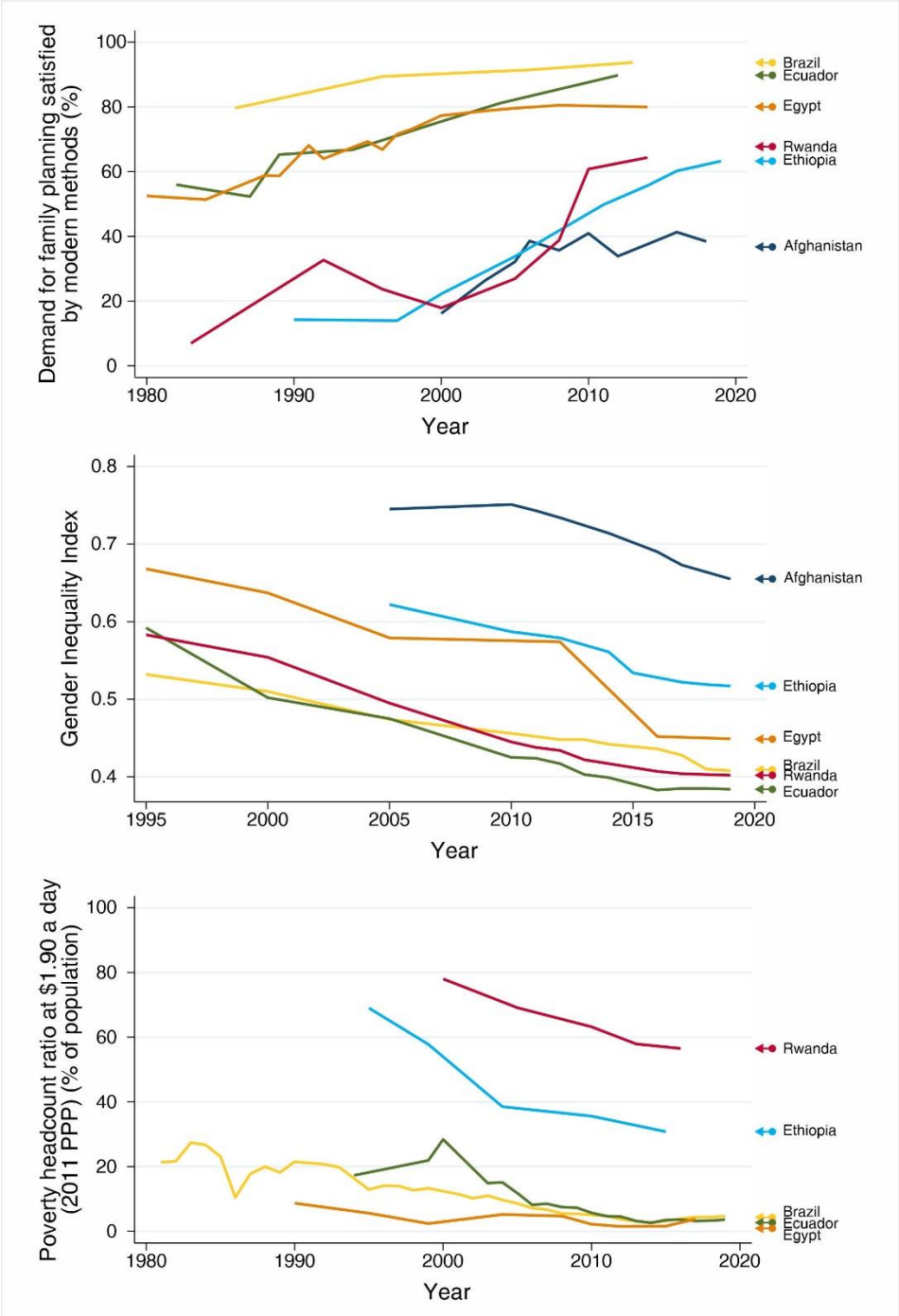

Figure 2 – Share of modern contraceptive use according to world region.

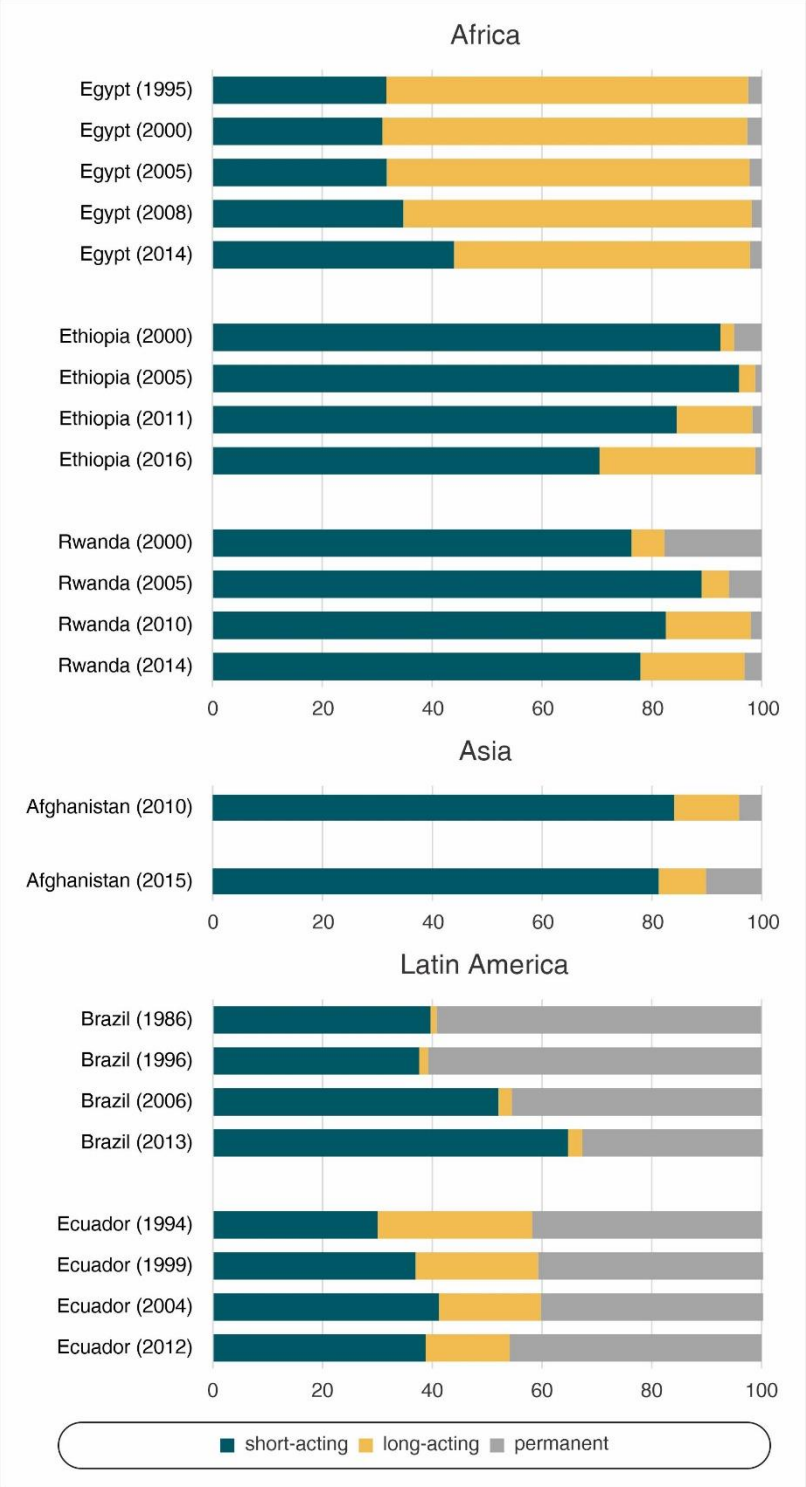

Figure 3 – Demand for family planning satisfied by modern methods according to wealth quintiles.

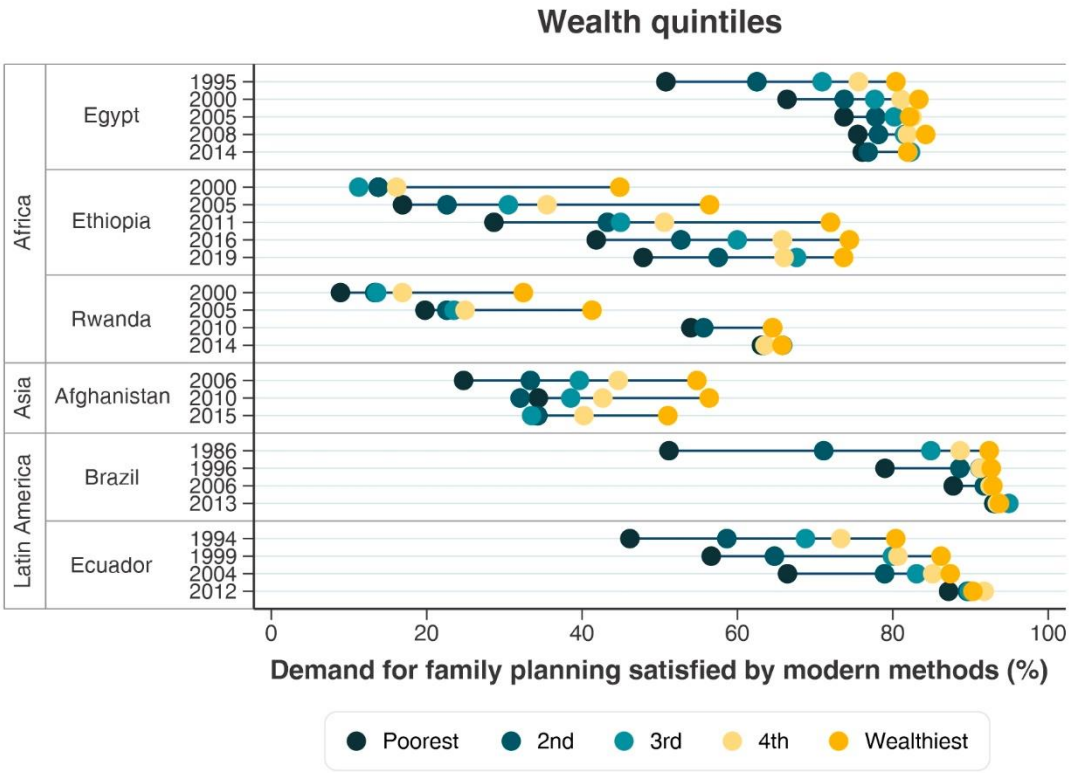

Figure 4 – Demand for family planning satisfied by modern methods according to women's education.

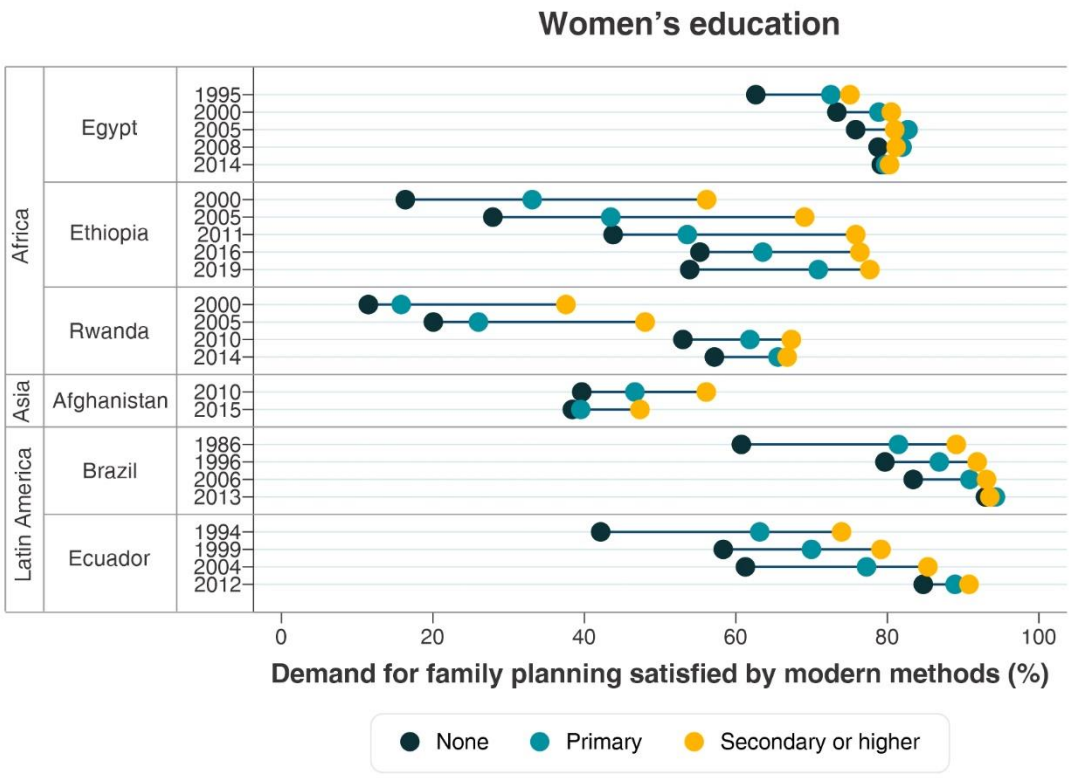

Figure 5 – Demand for family planning satisfied by modern methods according to women's age.

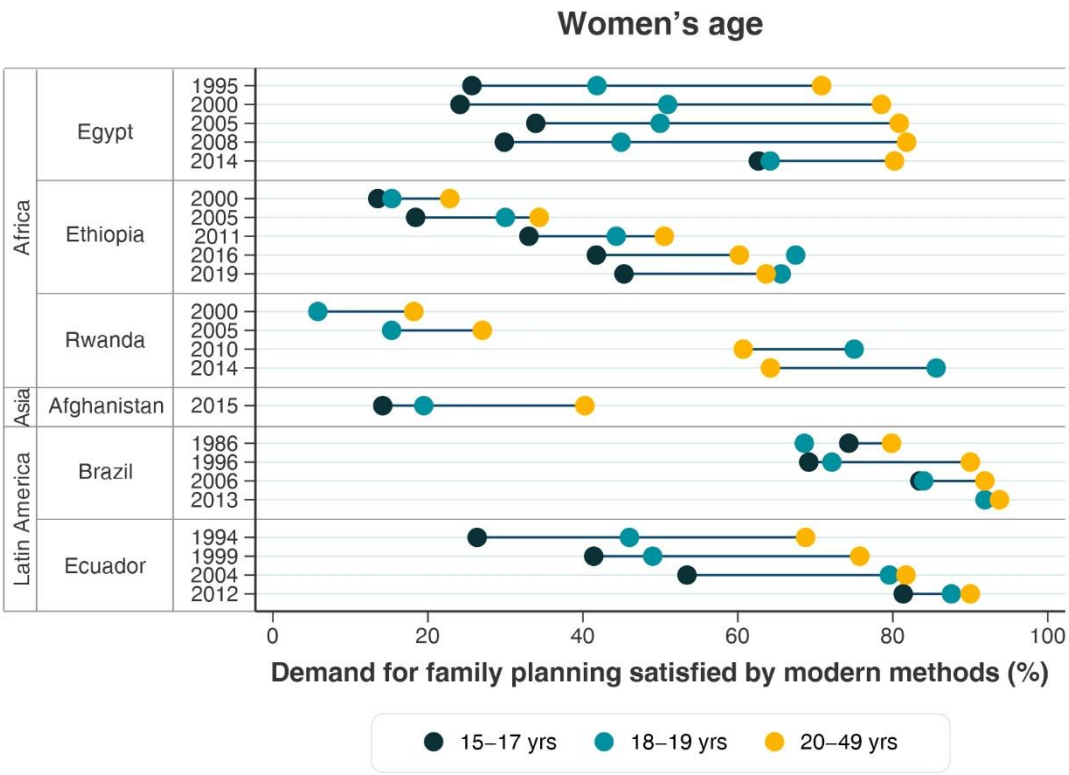

Table 1 – Demand for family planning satisfied by modern methods in the selected countries and share of modern contraceptive use according to type of method.

Country	Year	Source	mDFPS (%)	short-acting	long-acting	permanent
Afghanistan	2000	WB	16.2	NA	NA	NA
	2003	WB	26.4	NA	NA	NA
	2005	WB	32.1	NA	NA	NA
	2006	WB	38.6	NA	NA	NA
	2008	WB	35.7	NA	NA	NA
	2010	MICS	40.9	84.2	11.7	4.1
	2012	WB	33.9	NA	NA	NA
	2015	DHS	39.4	81.3	8.6	10.2
	2016	WB	41.3	NA	NA	NA
	2018	WB	38.4	NA	NA	NA
Brazil	1986	DHS	79.6	39.7	1.1	59.2
	1996	DHS	89.4	37.6	1.6	60.8
	2006	NSS	91.5	52.1	2.4	45.6
	2013	NSS	93.7	64.7	2.6	32.9
Ecuador	1982	WB	56.0	NA	NA	NA
	1987	WB	52.3	NA	NA	NA
	1989	WB	65.3	NA	NA	NA
	1994	RHS	66.8	30.0	28.1	42.0
	1999	RHS	74.1	37.0	22.3	41.4
	2004	RHS	81.2	41.2	18.6	415
	2012	NSS	89.8	38.8	15.3	45.9
Egypt	1980	WB	52.5	NA	NA	NA
	1984	WB	51.4	NA	NA	NA
	1988	WB	58.8	NA	NA	NA
	1989	WB	58.7	NA	NA	NA
	1991	WB	68.1	NA	NA	NA
	1992	WB	64.0	NA	NA	NA
	1995	DHS	69.3	31.6	65.9	2.5
	1996	WB	66.8	NA	NA	NA
	1997	WB	71.6	NA	NA	NA
	1998	WB	73.2	NA	NA	NA
	2000	DHS	77.3	31.0	66.4	2.6
	2003	WB	78.8	NA	NA	NA
	2005	DHS	79.6	31.8	66.0	2.2
	2008	DHS	80.5	34.8	63.4	1.8
	2014	DHS	80.0	44.0	53.9	2.1
Ethiopia	1990	WB	14.3	NA	NA	NA

	1997	WB	14.0	NA	NA	NA
	2000	DHS	22.2	92.5	2.5	5.0
	2005	DHS	33.8	95.9	2.9	1.2
	2011	DHS	49.7	84.5	13.8	1.7
	2014	WB	55.7	NA	NA	NA
	2016	DHS	60.2	70.5	28.3	1.2
	2019	DHS	63.3	74.0	25.1	0.9
Rwanda	1983	WB	7.0	NA	NA	NA
	1992	WB	32.7	NA	NA	NA
	1996	WB	23.7	NA	NA	NA
	2000	DHS	17.9	76.3	6.0	17.7
	2005	DHS	26.9	89.1	4.9	6.0
	2008	WB	38.8	NA	NA	NA
	2010	DHS	60.8	82.5	15.4	2.0
	2014	DHS	64.3	77.9	18.9	3.1

DHS: Demographic and Health Survey, MICS: Multiple Indicator Cluster Survey, RHS: Reproductive Health Survey, NSS: Non-standard Survey, WB: World Bank data.

Table 2 – Demand for family planning satisfied by modern methods according to wealth quintiles.

Country	Year	mDPFS (%)				
		Poorest	2nd	3rd	4th	Wealthiest
Afghanistan	2006	24.7	33.3	39.6	44.7	54.8
Afghanistan	2010	34.4	32.0	38.5	42.7	56.4
Afghanistan	2015	34.3	34.3	33.5	40.2	51.0
Brazil	1986	51.2	71.1	84.9	88.7	92.4
Brazil	1996	79.0	88.6	91.2	91.3	92.7
Brazil	2006	87.8	91.8	92.7	92.5	92.9
Brazil	2013	93.0	93.2	94.9	93.4	93.7
Ecuador	1994	46.2	58.6	68.8	73.3	80.4
Ecuador	1999	56.6	64.8	79.9	80.7	86.2
Ecuador	2004	66.4	78.9	83.1	85.1	87.4
Ecuador	2012	87.2	89.6	89.8	91.8	90.3
Egypt	1995	50.8	62.5	70.9	75.6	80.4
Egypt	2000	66.4	73.7	77.7	81.1	83.3
Egypt	2005	73.7	77.8	80.2	82.5	82.2
Egypt	2008	75.5	78.1	81.5	81.9	84.2
Egypt	2014	76.1	76.8	82.3	81.9	81.9
Ethiopia	2000	13.8	13.8	11.3	16.1	44.9
Ethiopia	2005	16.9	22.6	30.5	35.5	56.4
Ethiopia	2011	28.7	43.3	45.0	50.6	72.0
Ethiopia	2016	41.8	52.7	60.0	65.8	74.4
Ethiopia	2019	47.9	57.5	67.6	66.0	73.7
Rwanda	2000	8.9	13.3	13.6	16.9	32.4
Rwanda	2005	19.8	22.6	23.5	24.9	41.3
Rwanda	2010	54.0	55.7	64.5	64.5	64.5
Rwanda	2014	63.1	63.4	65.8	63.5	65.7

Table 3 - Demand for family planning satisfied by modern methods according to women's education.

Country	Year	mDFPS (%)		
		None	Primary	Secondary +
Afghanistan	2010	39.6	46.7	56.1
Afghanistan	2015	38.4	39.5	47.3
Brazil	1986	60.7	81.5	89.1
Brazil	1996	79.7	86.8	91.9
Brazil	2006	83.4	90.9	93.1
Brazil	2013	93.0	94.3	93.5
Ecuador	1994	42.1	63.2	74.0
Ecuador	1999	58.3	70.0	79.2
Ecuador	2004	61.3	77.2	85.4
Ecuador	2012	84.7	88.9	90.8
Egypt	1995	62.6	72.5	75.1
Egypt	2000	73.3	78.9	80.5
Egypt	2005	75.8	82.7	81.0
Egypt	2008	78.8	81.9	81.1
Egypt	2014	79.2	79.8	80.3
Ethiopia	2000	16.4	33.1	56.1
Ethiopia	2005	27.9	43.5	69.1
Ethiopia	2011	43.8	53.6	75.8
Ethiopia	2016	55.3	63.5	76.4
Ethiopia	2019	53.9	70.9	77.7
Rwanda	2000	11.5	15.8	37.6
Rwanda	2005	20.1	26.0	48.0
Rwanda	2010	53.0	61.9	67.3
Rwanda	2014	57.2	65.6	66.8

Table 4 - Demand for family planning satisfied by modern methods according to women's age.

Country	Year	mDFPS (%)		
		15-17 yrs	18-19 yrs	20-49 yrs
Afghanistan	2015	14.2	19.5	40.3
Brazil	1986	74.3	68.6	79.8
Brazil	1996	69.2	72.1	90.0
Brazil	2006	83.5	84.0	91.9
Brazil	2013		91.9	93.8
Ecuador	1994	26.4	46.0	68.8
Ecuador	1999	41.4	49.0	75.7
Ecuador	2004	53.4	79.6	81.7
Ecuador	2012	81.3	87.6	90.0
Egypt	1995	25.7	41.8	70.8
Egypt	2000	24.1	50.9	78.5
Egypt	2005	33.9	50.0	80.8
Egypt	2008	29.9	44.9	81.8
Egypt	2014	62.7	64.2	80.2
Ethiopia	2000	13.5	15.3	22.8
Ethiopia	2005	18.4	30.0	34.4
Ethiopia	2011	33.0	44.3	50.5
Ethiopia	2016	41.7	67.5	60.2
Ethiopia	2019	45.3	65.6	63.6
Rwanda	2000		5.8	18.2
Rwanda	2005		15.3	27.0
Rwanda	2010		75.0	60.7
Rwanda	2014		85.6	64.2

Learning from success cases: ecological analysis of pathways to universal access to family planning care in low- and middle-income countries

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Supplementary material

Supplementary Table 1 - Comparison between International Center for Equity in Health (ICEH) estimates for modern contraceptive use (among married women aged 15-49) and data from World Bank (WB) (considering all women aged 15-49).

Country	Year		ICEH			WB
			%	95% CI		%
Afghanistan	2010	MICS	19.5	18.2	20.8	19.9
Afghanistan	2015	DHS	18.5	17.2	19.8	16.3
Brazil	1986	DHS	56.6	55.5	57.6	56.5
Brazil	1996	DHS	70.3	69.0	71.5	70.3
Brazil	2006	NSS	77.8	76.6	79.0	77.1
Brazil	2013	NSS	79.4	78.2	80.6	77.7
Ecuador	1994	RHS	43.1	41.3	44.8	45.9
Ecuador	1999	RHS	50.4	48.5	52.3	51.4
Ecuador	2004	RHS	58.4	56.5	60.3	58.7
Ecuador	2012	NSS	70.9	69.3	72.5	71.7
Egypt	1995	DHS	45.5	44.4	46.6	45.5
Egypt	2000	DHS	53.9	52.8	55.0	53.9
Egypt	2005	DHS	56.5	54.3	58.6	56.5
Egypt	2008	DHS	57.6	56.6	58.6	57.6
Egypt	2014	DHS	56.9	55.8	57.9	56.9
Ethiopia	2000	DHS	6.3	5.5	7.2	6.3
Ethiopia	2005	DHS	13.7	12.5	15.0	13.9
Ethiopia	2011	DHS	27.3	25.2	29.6	27.3
Ethiopia	2016	DHS	35.0	32.6	37.5	35.1
Ethiopia	2019	DHS	39.7	36.3	43.2	40.5
Rwanda	2000	DHS	4.3	3.6	5.2	5.7
Rwanda	2005	DHS	9.0	8.2	9.9	9.7
Rwanda	2010	DHS	44.0	42.6	45.4	45.1
Rwanda	2014	DHS	46.5	44.9	48.0	47.5

Press Release

National and international organizations are committed to increasing family planning coverage, but the quality of services needs to be improved

Satisfying the demand for family planning is fundamental to a better quality of life and it is declared a basic human right. Universal access to sexual and reproductive health is included in two of the Sustainable Development Goals, related to good health, well-being, and gender equality. Although many efforts have been made by governments and international organizations to increase family planning coverage, several low-income countries still present a high unmet need for contraception and several aspects related to the quality of the services provided have not been highly investigated.

A study developed at the International Center for Equity in Health and published in a PhD thesis from the Postgraduate Program of Epidemiology at the Federal University of Pelotas (Brazil), evaluated barriers, limitations, and helpers to universal coverage of family planning services among 105 low- and middle-income countries and revealed that countries that managed to rapidly increase demand for family planning satisfied and reduce inequalities in coverage also experienced reductions in both poverty and gender inequality. “We noticed that along with these economic and cultural improvements, these successful countries included family planning in primary healthcare and made strong efforts to provide a full range of methods and to improve the training of the health providers”, continues the researcher Franciele Hellwig.

The study also identified important remaining issues. “Besides the national level of coverage, it is crucial that health services are provided in a high quality and affordable way. Our findings that adolescents are still left behind in most of the countries analyzed, especially the unmarried sexually active girls who highly depend on private services or friends to get contraceptives, and that an invasive and irreversible method such as tubal ligation is still a major responsible for the demand satisfied, even among young women with few children, highlight the need for new strategies related to the quality of family planning services”, emphasizes the author. The authors hope that the study will help the development of the policies and strategies to provide equitable family planning services to women from low- and middle-income countries.

Visual abstract for social media