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Fertility Regulation

John Cleland

Joseph E. Potter

INTRODUCTION

In the absence of any constraints from sexual abstinence, breastfeeding, contraception, abortion or disease, the average woman will bear about 15 children over her lifetime (Bongaarts 1982). No population has come close to this hypothetical maximum. In pre-modern societies, fertility was typically in the range of 4.5 to 6.5 births per woman, which was sufficient to offset high, fluctuating mortality, but not to allow sustained rapid population growth. Two factors, prolonged breastfeeding and restricted access to sexual intercourse, operating through marriage systems, were largely responsible for the huge gap between potential and realized childbearing.

Whether or not our ancestors exercised individual control over childbearing, beyond the social constraints of breastfeeding and marriage systems, is contested. Literary interest in birth control has a long pedigree. The first reference to methods to prevent births appeared in ancient Chinese medical texts, dating to around 2700 BC. It is known that during the period of classical Greece and the Roman Empire, philosophers debated the issue of birth control. Soranus (98-138

A.D.), the greatest gynecologist of antiquity, wrote about contraceptives and their difference from abortifacients, describing a number of occlusive pessaries, vaginal plugs, and the use of astringent solutions (Taylor 1976: 324-325). His writings influenced western medical gynecological practice until well into the Middle Ages.

An important barrier that impeded the spread of contraceptive knowledge and practice in Europe was the Catholic Church. St. Thomas Aquinas (1225-1274) declared contraception, including coitus interruptus, to be a vice against nature. This prohibition became doctrine and was re-affirmed several times, most recently by Pope Paul VI, in his now famous encyclical *Humanae Vitae*, issued in July 1968. Nor did the Reformation help. For Luther, coitus interruptus was "a most disgraceful crime" and for Calvin "an act of monstrosity" (Santow 1995). Needless to say, abortion was condemned and, in any case, was so hazardous to the health and survival of women before the advent of modern techniques, that its use must have been extremely limited.

Some analysts have suggested that couples in Europe were able to delay births when conditions were tough (Van Bavel 2004), but the balance of evidence for pre-modern societies suggests that volitional control of childbearing was absent, certainly in the form of limitation of family size. The earliest surveys in the more isolated countries of Asia and Africa showed widespread ignorance of any method of contraception, and much of the ethnographic evidence gave the same impression. In North India (Jeffery, Jeffery & Lyon 1989), Bangladesh (Maloney, Aziz & Sarkar 1981), Thailand (Knodel, Havavon & Pramualratana 1984), and Mali (Van de Walle & van de Walle 1991), to cite but a few examples, there is convincing testimony that the idea of fertility regulation was unthinkable and/or the means to achieve it unknown.

Postnatal adjustments of family size and composition, however, were probably ubiquitous in traditional societies, exercised by means of infanticide, adoption, fostering, child abandonment, and release of young children as apprentices or domestic labor (Mason 1997). Reproduction in the face of high mortality was a lottery; couples with an excess of surviving children were usually able to offload the surplus to couples with a dearth.

In the past two centuries, the proportion of couples using some form of conscious pregnancy-prevention has risen from close to zero to about two-thirds. Much of this profound change has occurred in the past 50 years. Since 1950, the global fertility rate has halved from 5.0 to 2.5 births per woman. The era of peak population growth has passed, and it is possible that world population, after a seven-fold increase in the past two centuries, will stabilize in the latter half of this century at around 10 billion. Mass adoption of contraception has been an indispensable step towards achieving a sustainable human future on this planet and has transformed the lives of women. The purpose of this chapter is to describe and analyze these changes in human reproductive behavior. It is a story encompassing religious, political, and economic controversy, huge bio-medical advances in contraceptive methods, and the advent of an entirely new form of social engineering, state-sponsored family planning programs.

EVOLUTION OF AN IDEA: EUROPEAN POPULATIONS 1870-1930

The perception that individual couples could modify their fertility behavior to suit their own personal goals first took root in France in the late 18th Century, and was followed 100 years later by other European populations and by the populations of European descent in Northern America and Oceania. “The [fertility] decline initiated in the 1870’s and 1880’s proceeded without interruption, except for the years immediately after World War I, and gathered momentum in the

1920s" (Glass 1969: 25). By 1930, fertility decline had swept across the whole of Christian Europe and its overseas populations in Oceania and America, encompassing such poor agrarian societies such as Hungary and Bulgaria. Eventually, the low levels of fertility experienced in many countries during the Great Depression began to worry many government leaders, so that the 1930s saw the first pronatalist policies adopted by France, Belgium, and Italy, and later by the Nazi regime in Germany.

While delayed marriage played an important role in some contexts, it was clear that couples were also resorting to contraception in order to achieve their family size goals. The initial methods of birth control were withdrawal, i.e., coitus interruptus, and abstinence (Coale 1969; Szreter, Nye & Van Poppel 2003). The use of withdrawal requires an escape from religious prohibitions, as well as an awareness of its effectiveness and mechanism combined with a flexible attitude toward sexual intercourse that permits the interruption of the act. A strong commitment by the couple, especially by the man, to avoid pregnancy is also essential (Santow 1993). This points to an important element in these early efforts to control fertility: the active role of the male in reproductive decisions and behavior. As its price fell, the condom, another male method, became more commonly used. Both methods require self-discipline and concentration. Women had only very rudimentary alternatives, such as the insertion of sponges, the use of diaphragms, or by douching after intercourse. In most settings, the male dominance of fertility regulation ended abruptly in the latter half of the twentieth century with the appearance of new and more technologically sophisticated methods of contraception designed for use by women.

The underlying causes of this first contraceptive revolution in European populations are still debated. Improved survival of children was probably a necessary condition because steep,

sustained falls in childbearing in the face of unchanging high death rates would have resulted in the extinction of the population. A recent analysis has shown that improvements in survival in childhood and early adulthood always preceded falls in marital fertility (Sanchez-Barricarte 2017). Other factors are no doubt implicated. By the late 19th Century, mass education had spread, and ideas about religious authority and the position of women were beginning to shift. Science and industry were progressing rapidly. Human mastery over such a central concern as reproduction was inevitable.

The initial expansion of the notion that fertility regulation was a feasible, positive measure, was helped by early pamphleteers and controversies about them that gave birth control a great deal of publicity. These initial efforts planted the seed from which emerged today's large-scale family planning organizations.

Pioneers

England was the birthplace of the first locally organized movement to make public the advantages of fertility regulation. In 1823, a series of publications known as "handbills," appeared with the intent of informing working people of the advantages of using coitus interruptus and sponges. Their authorship of these works has been attributed to Francis Place, founder of the birth control movement in England. Conservative groups immediately denounced them as "diabolical handbills" (Bogue 1969: 18). Half a century later, in 1876, also in England, Charles Bradlaugh and his friend, Annie Besant, re-published an American pamphlet innocuously titled "The Fruits of Philosophy." This pamphlet openly advocated birth control and provided explicit details on the use of methods then available. A trial ensued as Victorian morality was offended by the pamphleteers' open and explicit approach to the subject. The

indictment, “inciting and encouraging the subjects of the Queen to indecent, unnatural and immoral practices and bring them to a state of wickedness, lewdness and debauchery,” provides a vivid insight into the moral outrage caused by birth control. Amid great publicity, Bradlaugh and Besant were sentenced to six months imprisonment. Although the sentence was not carried out, this “cause célèbre” contributed to the dissemination of birth control information and to the launching of national movements in Belgium, Australia, India and the United States (Hodgson and Watkins 1997). The commotion resulting from the opposition to “The Fruits of Philosophy” served to successfully expand the information and public debate on birth control in Europe and the United States, a situation akin to the controversies that Vatican opposition to the pill would cause one hundred years later.

As was the situation in Europe, the discussion of fertility regulation in the United States was the effort of visionary individuals who advocated the advantages of smaller families. Among the first to achieve wide notoriety in the promotion of contraception was Margaret Sanger, the founder of the American birth control movement, and a leader in the intellectual battles about the implications of population growth in the modern world. As in England, legal opposition arose and in 1916, and she was taken to court for opening a birth control clinic in Brooklyn, though this failed to stifle her activities. She organized the first World Population Conference, held in Geneva in 1927. The following year, with Raymond Pearl as President, she launched the International Union for the Scientific Study of Population (IUSSP) with headquarters in Paris (Bogue 1969: 28). The IUSSP became instrumental in the promotion of academic research and also in the organization of world population conferences that attracted the attention of governments and international bodies. In the late 1940s and into the 1950s, Sanger worked with Katherine McCormick, Gregory Pincus, and John Rock in the development of the

oral contraceptive; see the discussion by Eig (2014) in his *The Birth of the Pill: How Four Crusaders Reinvented Sex and Launched a Revolution*.

Surprising as it may seem, the resulting development of private voluntary family planning programs and international organizations to support them, such as the International Planned Parenthood Federation, were the outcome of individual initiatives, initially supported by liberal and forward looking philanthropists. Though the prime motive of these early pioneers was to facilitate reproductive choice, many were also firm believers in the eugenic principle that population quality could and should be improved by discouraging breeding by the less talented. Mostly this took the form of bringing birth control to the poor, but there was also a darker side. Involuntary sterilization of the mentally disabled and criminals was practiced in some countries (Connelly 2008).

TECHNOLOGICAL ADVANCES

The late 1950s and 1960s saw transformations in birth control technology, with the development of a highly effective new type of intra-uterine device (IUD), the Lippes loop, which was to become the mainstay of early family planning efforts in Asia. The advent of the contraceptive pill was even more important in the West. These developments were quickly followed by advances in male and female sterilization, and later by such other new hormonal methods as injectables, sub-dermal implants and the levenogestral IUD. For the first time in history, the link between sexual intercourse and procreation was completely broken, and women had the choice of several highly effective methods to prevent conception.

Abortion technology also improved. Dilation and curettage was partly replaced by suction aspiration, made more feasible by the invention of a flexible plastic cannula and a cheap

manual suction device in the 1970s. An even more important and recent advance was medical abortion, two drugs, namely, mifepristone and misoprostol, taken orally that induce the expulsion of the fetus.

The review of the pill by the U.S. Food and Drug Administration (FDA) generated great publicity. John Rock, its inventor, was interviewed on every major television network in the early 1960s, and stories of his scientific breakthrough appeared in *Time* and *Newsweek*. During the FDA review, one of the panel members suggested that the Vatican would never approve the contraceptive pill. Rock, an ardent Catholic, quickly responded: "Young man don't you sell my Church short" (Gladwell 2000: 52).

At the Vatican, Paul VI was engrossed in an internal controversy as his Pontifical Commission on Birth Control was split in its views. Though a majority of its members advocated a liberal position, the Pope decided to take the side of the more conservative Vatican elements that opposed artificial contraception. As Gary Wills (2000: 87) has noted: "Paul VI's actions in the years leading to *Humanae Vitae* looked so contradictory as to seem perverse".

The Catholic Church is alone among major religions in its adamant and persistent opposition to most forms of birth control. The initial opposition of Protestant faiths abated before World War II, and the organized opposition from Islam, Hinduism and Buddhism was never apparent. Indeed highly effective family planning programs were initiated in several large Islamic populations, including Iran, Indonesia and Bangladesh. Abortion remains a highly divisive topic, not only in the U.S. Only about one-third of countries have liberal abortion laws that permit the procedure on demand or on socioeconomic grounds. Laws are most restrictive in Africa and Latin America, where typically the procedure is only lawful to save the woman's life. However, as we shall see below, legality has little effect on incidence.

POPULATION AND BIRTH CONTROL: 1960-2017

International agendas

After World War II, there was a substantial acceleration in the growth of the world's population that was mostly the result of steep declines in child death rates in the poor countries. By 1960, many populations in Asia and Latin America were expanding at a pace that implied a doubling in size every 25 years. As awareness of this change grew in the 1950s and 1960s, and population growth was increasingly portrayed as a serious threat to economic progress in the less developed regions of the world. However, then as now, the arguments in favor of government policies to reduce fertility and promote contraceptive practice have proven controversial. The remarkable aspect of this enduring discussion is that the challenges to neo-Malthusian logics have emerged from quite different quarters.

One of the earliest and most influential arguments for reducing fertility Coale and Hoover's *Population Growth and Economic Development in Low-Income Countries* that was published in 1958. Their analysis concluded that rapid population growth with its high child dependency ratio diminishes the amount of capital available for investment in industry and agricultural modernization. A decline in fertility, and thus in child dependency, would boost private and public savings, which, if prudently invested, would improve labor force productivity and living standards.

Coale and Hoover's measured message was accompanied by a number of more apocalyptic visions of mass starvation unless countries acted quickly to reduce population growth, notably Paul Ehrlich's *The Population Bomb,* published in 1968. Furthermore, other important analyses were coming out from major scientific and policy groups: the American

Assembly had issued *The Population Dilemma* (1963) and the Club of Rome was preparing its ambitious report, *The Limits to Growth* (Meadows et al. 1972).

The view that something had to done about population growth did not go unchallenged. Advocates of a New International Economic Order (NIEO) were reluctant to accept the notion that population was, by itself, an impending crisis, and rejected neo-Malthusian claims that portrayed family planning and the reduction of population growth as a panacea for intractable social ills. These critics argued for structural change as a solution to population issues in the developing world, and denounced international efforts supported by the United States to implement family planning programs in third world countries.

These conflicting points of view met head on at the World Population Conference (WPC) held in Bucharest, Romania in 1974. The WPC was the first major intergovernmental meeting on this topic organized by the United Nations. Three different views of the impact of population on development were presented: "Asian and European countries, along with the U.S., took the position that rapid population growth intensified problems of economic and social development and therefore merited urgent attention... [M]any Latin American and African countries … expressed the view that population was not an important variable in development, [while] another group of countries argued that population growth was desirable" (Singh 1998: 8). Remarkably, amidst these three very different positions coupled with concerns regarding the injustices in the world economic system, it was possible to forge a consensus document, the World Population Plan of Action (WPPA), which recognized that connections between population and development might vary across settings, but established the right of couples to decide freely and responsibly on the number of their offspring, and advocated the integration of population into social and economic planning (Finkle and Crane 1975).

The WPPA served as a legitimate basis for generating international support for family planning programs among rich countries, and for adopting population policies to address high fertility in many poor countries. International family planning enjoyed bi-partisan support in the Congress. Lyndon Johnson was the first U.S. president to endorse efforts to reduce population growth in poor countries, famously stating on June 25 1965 in an address at the 20th anniversary commemorative session of the UN that "less than five dollars invested in population control is worth a hundred dollars invested in economic growth." An equally influential convert was Robert McNamara, president of the World Bank from 1968 to 1981. In 1969, the UN Population Fund (UNFPA) was created, with the shrewd choice of a Catholic Filipino as its first director.

By the time of the next United Nations sponsored conference on population, held in Mexico City in 1984, the U.S. position on population growth and support for family planning programs had radically changed. The Reagan administration had moved away from the view that world population growth was an urgent issue, toward the position that it was a neutral phenomenon. This shift was consonant with the "revisionist" findings of a number of academic studies that would be incorporated in a publication by the U.S. National Academy of Sciences, *Population Growth and Economic Development: Policy Questions* (Committee on Population 1986). Nevertheless, the Mexico City conference basically served to reaffirm the WPPA adopted in Bucharest (Finkle and Crane 1985).

A decisive shift in the international agenda came 10 years after Mexico City at the International Conference on Population and Development (ICPD) held in Cairo in 1994. The cause of the shift was a powerful attack by women's groups focused on the high pressure target-driven approach of some Asian family planning programs that denied contraceptive choice and

totally ignored the wider health and welfare of women. Women were cast as the victims rather than the beneficiaries of demographic policy.

Together with a sense that the worst of the population growth crisis was over and a growing international emphasis on human rights, the feminist critique won the day. Consequently an entirely new way of conceptualizing family planning, based on health and reproductive rights, took hold. The name adopted for this approach was reproductive health, a term that had been used by the World Health Organization for some years, but which had never been formally approved by any UN body (Singh 1998). The reproductive health concept that was finally embodied in the ICPD program of action linked human rights, women's health and empowerment and family planning into one overarching paradigm.

Much has been made of the 1994 Cairo Conference. Haberland and Measham have noted that it "codified views long advocated by women's health activists the world over. Their humanistic and feminist goals became cornerstones of Cairo's landmark accord, which recognized the rights of all people to reproductive health, called for special attention to women's empowerment, and to clients' needs, and repudiated reliance on contraceptive services as the tool for achieving demographic targets" (Haberland and Measham 2002: 1; United Nations 1994; Finkle and McIntosh 1995).

Notwithstanding its many admirable features, ICPD had some malign consequences. The discarding of P (population) and D (development) led to an international neglect of problems arising from continued rapid population growth in sub-Saharan Africa and in a few other countries. The Millennium Development Goals omitted any mention of population or family planning, though, after much lobbying, universal access to reproductive health and unmet need for family planning were added in 2006 and 2007.

A new international crisis arose, the HIV/AIDS pandemic. Funding for family planning shrunk while that for HIV ballooned. In 2005, for instance, international support for family planning amounted to US$ 0.5 billion, while the equivalent sum for HIV was 4.9 billion (UNFPA nd). The AIDS community shrewdly moved into the territory vacated at ICPD by positioning the disease as a major threat to development, thus ensuring support from development agencies such as the World Bank. Hyperbole was rampant. The UK government, for instance, claimed that "HIV/AIDS is the greatest threat to development in the world today" (DFID 2003:1).

After more than a decade of neglect, the pendulum of international opinion started to swing back in favor of family planning; this occurred for several reasons. Environmental concerns intensified. Though affluence was the main driver, continued population growth in poor countries was also implicated. After all, today's poor people, it is hoped, become tomorrow's rich. New volatility of world grain prices heralded possible future problems of food security. The incidence of new HIV infections fell, and it became clear that most African populations would emerge relatively unscathed by the disease. Meanwhile, fertility and population growth in Africa remained high. New econometric evidence accumulated, showing that falls in the dependency ratio resulting from fertility decline had been partly responsible for the spectacular economic gains of the East Asian "tigers" (Bloom and Williamson 1998; Bloom, Canning and Melaney 2000). African countries might harvest similar gains (Karra, Canning & Wilde 2017; Bloom, Kuhn & Prettner 2017).

The renaissance of interest in family planning was led by the Bill and Melinda Gates Foundation which sponsored a series of international conferences on the topic, starting in Uganda in 2009. International commitment was consolidated at the 2012 London Summit, when

a substantial amount of extra funding was pledged by a wide range of donors and organizations, with the goal of meeting the contraceptive needs of 120 million women by 2020. Between 2003 and 2013, donor funding for family planning doubled, with 70 percent provided by the U.S. (Grollman et al. 2018). A secretariat, FP2020, was created to coordinate and evaluate efforts, with a focus on 69 priority countries. A follow-up summit was held in 2017. The ICPD emphasis on women's rights, freedom of choice, and empowerment was retained, but the promotion of contraception and the avoidance of unwanted pregnancy were now propelled by new funds, energy and urgency.

National policies and programs

The idea that governments should support contraception spread rapidly in the last four decades of the 20th century. By 1976, 94 countries were providing direct support to family planning services. Ten years later the number had increased to 116, with another 23 providing indirect support, mainly through nongovernmental agencies. By the end of the twentieth century the numbers had increased to 145 and 34 respectively, largely owing to policy changes in African countries (Seltzer 2002: 17).

Asia: the role of strong government programs

Most Asian governments readily accepted the economic arguments in favor of reduced fertility. In the city-states of Hong Kong and Singapore, and in the more advanced economies of Taiwan and South Korea, the introduction of contraceptive services and publicity had an almost immediate impact. In the poorer, predominantly rural and less educated populations of South Asia, the situation was different. No blueprint for mass promotion of contraception in such

societies existed, and rural health services were totally inadequate for the delivery of contraception. Some of the early efforts were inept and even counterproductive.

In Pakistan and Bangladesh, then a united country, President Ayub Khan initiated, in the mid-1960s, a crash program with the aim of preventing five to six million births within five years. It focused on the intrauterine device (IUD), with financial payments to doctors, patients and "recruiters" as a motivating lubricant. This arrangement spawned massive corruption, and the IUD became deeply unpopular because of the absence of any medical backup for women suffering side effects. The whole program collapsed within a few years, and the cause of family planning languished for the next two decades partly because of the lack of top level political support and poor organization (Robinson, Shah & Shah 1981; Khan 1996). Zulfikar Bhutto, Pakistan's leader from 1971-1977, was reluctant to support any program associated with his bitter opponent, Ayub Khan. His successor, Zia-ul-Haq, president from 1978 to 1988, drew much of his support from conservative Islamic strata. He introduced elements of Sharia law and banned family planning advertisements from television (Khan 1996). This legacy is still apparent. Pakistan has one of the lowest levels of contraceptive use in Asia; it was 35 percent among married women in 2012/13, and the country has one of the highest fertility rates, at 3.8 births per women.

As in Pakistan, early efforts to popularize contraception in India failed. The clinic-based approach of the 1950s was extended in the next decade by more forceful campaigns with centralized demographic and method-specific targets. In the early 1970s, attention focused on the promotion of vasectomy by means of financial incentives (Harkavy and Roy 2007). Many operations were performed in carnival-like settings, where thousands gathered for entertainment. These high pressure tactics descended into instances of outright coercion during 1975 and 1976

when Indira Ghandi suspended the Lok Sabha and ruled by emergency decree. A backlash saw Mrs. Ghandi lose the 1977 election, and it took many years for India's family planning program to re-gain credibility. For the past four decades, female sterilization has been the dominant method in India, and periodic attempts to promote reversible methods have failed. According to the 2015-16 National Family Health Survey, 36 percent of married women had been sterilized, and only 18 percent were using some other method. The same survey reported a total fertility rate for India of 2.2. Induced abortion has played an important role in fertility decline, particularly in the recent past. In 2015, it was estimated that a total of 15.6 million abortions occurred, and that one-third of all pregnancies were terminated (Singh et al. 2017a). Four-fifths of abortions were performed medically rather than surgically, typically with drugs purchased from medical stores.

Bangladesh now has a fertility rate almost identical to that in India and is acknowledged to be one of the great family planning success stories. In the 1970s and 1980s, many commentators were skeptical that contraception could flourish and fertility fall in such a desperately poor, largely illiterate, Moslem country (Cain 1978). The key to its success was top level political support, abundant international funding and, above all, a sociologically appropriate strategy for service delivery, namely, the recruitment and training of over 30,000 literate women in rudimentary family planning and child health. They were posted back to their own villages where they were ideal agents of change. Their literacy conferred high status, but they were also embedded in local rural life. Their duties included the distribution of pills and condoms, and they also accompanied women to health centers for clinical methods. A World Bank study concluded that, while improved child survival had given rise to a latent need for fertility regulation, the

family planning program was responsible for the initiation and speed of decline (Cleland et al. 1994).

Between 1975 and 2014, contraceptive prevalence in Bangladesh rose from 7 percent to 62 percent, with pills and injectables emerging as the main methods, and the total fertility rate fell from 6.3 to 2.3 births per woman. Abortion also contributed to fertility decline. Early abortion, under the label "menstrual regulation," was made legal in 1979. In 2014, it was estimated that about one million abortions, accounting for 28 percent of all pregnancies, were performed (Singh et al. 2017b).

While many Asian family planning programs had demographic targets and used high pressure methods to promote contraception, most adhered to the principle of volunteerism. A borderline exception is Vietnam, where a one-or-two-child policy was introduced in 1988 and enforced by fines or other penalties by local authorities in some localities (Goodkind 1995).

But by far the clearest exception is China. In this country the reproductive freedom of couples was explicitly subordinated to the needs of the state. In 1970, the total fertility rate of China was 5.75 children per woman. As China emerged from the disruption and chaos of the Cultural Revolution, its leadership began to consider the implications of continued rapid population growth for the future development of the nation. China's effort to reduce its population growth by lowering its fertility was set in motion in 1971 when the State Council issued its first comprehensive population policy (State Directive No.51), which soon became known by its slogan: *wan xi shao* (later [marriage/first birth], longer [intervals between births], and fewer [children]). Although voluntary, the campaign included strong material incentives for limiting family size and was vigorously promoted throughout the politico-organizational structure of China, from central committees to grassroots levels (Mundigo 1992).

Despite a sharp fall in fertility, the goals of the policy were drastically raised in 1979 when the government launched the “one-child family policy” to sharply limit fertility (Greenhalgh 1986, 1992). The policy evolved rapidly from a voluntary to a compulsory phase in which pregnancies that were not authorized had to be terminated resulting in a rapid increase in abortion rates (Mundigo 1992, 1999). This one-child policy became an integral component of China’s development plans, deemed essential to the achievement of the "four modernizations" of industry, agriculture, science/technology, and defence.

In 1982 and 1983 the birth planning policy was further strengthened. Women with one child were required to have an IUD inserted while sterilization became mandatory for families with two or more children. In 1983, despite widespread resistance (Greenhalgh 1992), a massive nationwide sterilization campaign was undertaken during which an estimated 20 million women and men were sterilized. Fines and losses of privileges were imposed on couples who did not comply with the policy. Still exempted from the policy at this time were ethnic minorities (Rigdom 1996), some rural community groups, and people living in harsh environments, such as the mountains.

Despite its power, the Communist Party was unable to enforce the one-child policy across all rural areas, and a degree of flexibility was thus introduced, allowing many rural couples to have a second child if the first born was a daughter (Gu et al. 2007).

Needless to say, China’s authoritarian, forceful, and demographically oriented approach to fertility planning was, by the early 1990s, completely out of step with the developments taking place in the international community during the preparations for the Cairo ICPD. The program was drawing increasing amounts of criticism, not only from feminists but also from conservatives who used the Chinese example to discredit international family planning efforts

and organizations. Within China, partly as a result of the substantial relaxation of government control of people's daily lives that came with the move towards a more open market oriented society, there was increasing concern for the difficulties that arose in administering the program, for the abuses it generated, and for the consequences that continued below-replacement level fertility would have for the age distribution (Kaufman 2003).

One problem stemming from the strict limitations on the number of births incorporated in the Chinese policy was the heavy toll on the treatment and survival of baby girls in areas where son preference was still strong. Moreover, thanks to the widespread availability of ultra-sound machines, the number of sex selective abortions rose in spite of regulations forbidding using the technology for this purpose. The sex ratio at birth rose steadily to peak in 2000 at about 120 (Attane 2009). Similar increases have been recorded elsewhere in Asia where small desired family sizes collide with a desire for a son (Guilmoto 2009).

Another type of abuse had to do with the collection of fines for excess births, which became an important source of revenue for local governments, with local officials sometimes encouraging excess births so that they could proceed to collect the corresponding fines. Despite the criticism, the Chinese leadership remained resolutely supportive of mandatory fertility control policies, despite the fact that the country's fertility has been well below replacement level at around 1.5 births per woman since the mid-1990s.

But, of course, the policy was never intended to last indefinitely and new problems arising from a shrinking labor force and rapid population ageing argued for a change. The first relaxation was to allow men and women both of whom were from one child families to have a second child. Finally, in 2015 the one-child policy was finally abandoned and all couples were allowed to have a second child. The response to this new freedom is uncertain but may be small.

Chinese populations in Taiwan, Hong Kong and Singapore who were never subjected to coercive fertility control measures all record extremely low fertility.

Latin American developments: the key role of non-government organizations

The evolution of family planning in Latin America took a very different form from that in Asia. Most governments were reluctant to take an initiative partly because of the influence of the Roman Catholic Church (Stycos 1971). While the rationale for action in Asia was the Coale-Hoover volume mentioned earlier in this chapter, the equivalent in Latin America was a paper that documented a steep rise in hospital admissions in Chile as a consequence of illegal and unsafe abortions resulting from lack of access to contraception (Armijo and Monreal 1966). This health problem provided a spur for the formation of voluntary organizations often led by radical medical doctors with the aim of providing contraceptive services (Bertrand, Ward & Santiso-Galvez 2015).

Brazil was ruled from 1964 to 1985 by military leaders who had no interest in curbing population growth. In 1985, contraceptives were made available in government health facilities, but supplies were erratic and only in 2007 was a comprehensive service introduced. In the absence of government involvement, growing demand for fertility regulation was met in a variety of ways. First, an affiliate of the International Planned Parenthood Federation, Bemfam, was created in 1964. With international funding, this organization formed agreements with many local authorities to provide contraceptive services. Second, pharmaceutical companies imported oral contraceptives and distributed them for sale in commercial outlets. Third, doctors working in public and private sector hospitals circumvented a law prohibiting tubal ligation by offering the procedure in conjunction with elective caesarean section, with fees charged ostensibly for the

caesarean section. Between 1960 and 1986, the total fertility rate fell from 6.2 to 3.5, a clear example of services arising in response to strong demand. But there were costs to this laisser-faire approach. The incidence of caesarean sections rose well above any medical justification (Potter et al. 2001). Sterilization was unaffordable for the poorest (Janowitz et al. 1982), and large fertility differentials arose between urban and rural, educated and uneducated, and rich and poor.

Brazil is an extreme example of a common sequence in Latin America whereby non-government organizations and compelling evidence of need persuaded initially reluctant governments to support family planning and make services available. The influence of the Catholic Church delayed government initiatives but had little lasting effect. Contraceptive use in the region is now high, and fertility is close to replacement level in most countries.

The clearest exception to this characterization is Mexico. In the early 1970s the population of this country was among the fastest growing in the world with a fertility rate of seven births per woman and a population growth rate of 3.5 percent per annum. Mexico's population in 1940 was twenty million, and by 1970 it had more than doubled to 50 million. During the intervening decades, optimism about the future, a growing industrial infrastructure, urbanization and gains in the amount of land under cultivation had sustained a pro-growth ideology that included demographic expansionism. A General Law of Population, adopted in 1947, encapsulated the government's pronatalist attitude advocating universal marriage and promoting large families. Moreover, the sale of contraceptives was illegal until 1973 and government family planning services were non-existent.

By the early 1970s, however, the economic model, upon which Mexico had so successfully relied since the 1930s, was showing clear signs of strain, and no longer seemed able

to accommodate the rapidly increasing population. Agricultural production had slowed, and for the first time Mexico had to import basic staple foods and grains. Urban marginality and rural unemployment or under-employment threatened existing social stability with the disadvantaged sectors growing rapidly (Alba and Potter 1986). Population projections based on the 1970 census convinced Victor Urquidi, the President of the Colegio de Mexico, that the problem needed to be addressed at official levels (Urquidi 1970, 1973). Urquidi assisted the government in putting together the official documentation that tied together the arguments for a population policy. President Luis Echeverría decided to take action after becoming convinced that controlling population growth was important, and in 1974 the General Law on Population was issued which would set the country on a path toward fertility planning.

The 1974 Law was a quintessential example of the Bucharest era logic for integrating population in development planning, establishing a National Population Council (CONAPO) to coordinate the efforts of a large number of ministries. It also established the government's responsibility for providing Mexicans with contraceptive services. Government family planning services were first provided through the existing clinic and hospital infrastructure of the main public health institutions, especially the Ministry of Health (SSA) and the Mexican Social Security Institute (IMSS), which were, for the most part, located in urban areas. These services were provided free of charge, and seemed to meet a well-established if somewhat latent demand for fertility limitation.

The approach to service provision in the next administration that began in 1976 with the inauguration of Jose Lopez Portillo as president was more ambitious. It involved the development of targets for the number of contraceptive acceptors to be recruited by the various

institutions, as well as extending the provision of services to rural areas beyond the reach of the existing infrastructure.

These efforts were remarkably successful. The use of modern methods among married women rose from 23 percent in 1976 to 45 percent in 1987, and further to 70 percent in 2003. The total fertility rate in 2017 was 2.2 children per woman (Population Reference Bureau 2018). On the other hand, concerns were also raised with regard to the extent to which the program was respecting its intended voluntary nature that had been carefully laid out in the original law. A particular concern was the program's emphasis on the IUD and sterilization that were highly effective but required little active involvement of the user as well as on promotion of these methods immediately postpartum (Potter, Mojarro, and Nuñez 1987).

Sub-Saharan Africa: slow progress

As illustrated above, the contraceptive revolution in Asia was typically initiated by strong government policies and programs often in the absence of evidence of a strong demand while in Latin America services were created in response to evidence of strong demand in the form of widespread illegal abortion. In most countries of sub-Saharan Africa (SSA), strong government actions and obvious evidence of widespread demand were both lacking, with the consequence of a widening gap in contraceptive prevalence and fertility between this region and the rest of the world.

John May, for many years one of very few demographers at the World Bank (see his chapter on population policy in this *Handbook of Population*), has noted that "today very few leaders and policymakers in SSA accept the idea that rapid population growth might be detrimental to the development prospects of their countries" (May 2017,313). The evolution of

population policies was also stifled by the shift away from concerns about rapid population growth at the 1994 Cairo conference and by the HIV pandemic which diverted funds and energy from family planning. The health rationale, however, is widely accepted, and the lure of a demographic dividend may be changing attitudes to fertility reduction in Ministries of Finance who wield much more power over policy than Ministries of Health.

The relative lack of demand for fertility regulation in SSA compared with other regions is best illustrated by survey data on desired family size. For instance, World Fertility Surveys, conducted in the late 1970s and early 1980s, showed that desired family size among young women in six African countries ranged from 5.2 in Ghana to 8.3 in Senegal. By contrast, in only one of 14 Asian and Pacific countries did mean desired size exceed five children, while in 13 Latin American and Caribbean surveys the highest desired size was 3.8 (Lightbourne 1987). The need for fertility regulation in Africa stems largely from the cultural emphasis on birth spacing rather from family size limitation.

As a consequence of the combination of lack of government initiatives and the strongly pronatalist cultures, together with a slow pace of development, the contraceptive revolution in SSA started later and has progressed more hesitantly than elsewhere in the world. In 2017, less than 30 percent of married women were using a modern method, and the total fertility rate was close to five births.

But there are historic and more recent exceptions to this generalization in SSA. In the Republic of South Africa and adjacent countries, contraceptive use has been high and fertility low for decades, partly because of vigorous family planning promotion by the Apartheid regime (Moultrie and Timaeus 2003). Kenya was one of the first countries to adopt a population policy and initiate a family planning program in 1967. Despite much foreign funding and technical

assistance, little progress was made in the next 15 years. The World Fertility Survey in 1977-8 found that only 12 percent of married women were using contraception and only 17 percent wanted to stop childbearing. With a TFR of close to eight births per woman, Kenya's population was growing at a rate that implied a doubling in size in less than 20 years. Most commentators were pessimistic about the prospects for a fertility transition (Frank and McNicholl 1987).

Yet Kenya's reproductive regime was transformed in the 1980s. By the time its first Demographic and Health Survey was conducted in 1989, contraceptive use had risen to 27 percent, the percent wanting no more children had increased to 50 percent, and the TFR had fallen to 6.7 births per woman. The cause of this sudden change was in part political. Jomo Kenyatta, Kenya's President since independence, was uninterested in population issues and never spoke publicly in support of family planning. He died in 1978, to be replaced by Daniel Arap Moi and Vice-President Mwai Kibaki. Moi and Kibaki grasped the urgency of the demographic situation and made family planning a top political priority. Services and publicity were greatly expanded (Robinson 1992; Heisel 2007). It appears that this political jolt was needed to change views of the population about family size and enhance willingness to restrain childbearing.

The prevalence of contraceptive use continued to rise until 1998 but then plateaued for the next five years and fertility rose slightly. One reason for the stall was the advent of HIV. Funds and political energy were diverted from family planning to this new disease. Contraceptive services deteriorated and the proportion of births reported by mothers as unwanted rose from 11 percent in 1998 to 21 percent in 2003 (Westoff and Cross 2006). Partly because of this unexpected development, the United Nations Population Division revised its 2002 projection of total population size in 2050 of 44 to 83 million. Contraceptive prevalence resumed its

upwards path after 2003, and the 2014 Demographic and Health Survey estimated a fertility rate of 3.9 with 58 percent of married women using contraception. The 2017 United Nations Population Prospects projects that Kenya's population will grow from 47 million in 2015 to 95 million by mid-century.

More recent examples of rapid increases in contraceptive practice are in Ethiopia, Malawi, Rwanda and Zambia. Ethiopia, the second most populous country in sub-Saharan Africa and one of the poorest countries in the world, is a particularly interesting case. For much of the past 50 years the fertility rate was above seven births per woman. The rate started to decline in the late 1990s, and the pace of change accelerated in the early years of this century. The Demographic and Health Surveys conducted in Ethiopia showed that use of a modern contraceptive method among married women rose from 6 percent in 2000 to 35 percent in 2016, with a 35 percent drop in the total fertility rate since the early 1990s, compared with a 18 percent decline in sub-Saharan Africa as a whole. At the same time, large gains in life expectancy and health have been achieved. Between 2000 and 2016 the under-five mortality rate fell from 166 to 67 deaths per thousand, and the percent of children who were stunted dropped from 58 percent to 38 percent.

Taking into account the very low levels of adult education in Ethiopia, with half of all women of reproductive having no schooling, it is most unlikely that this degree of demographic modernization would have occurred without strong policies and programs. The country's 1993 population policy set an unashamedly demographic goal of reducing fertility to four births by 2015. Over 30,000 community health and family workers were trained for a year and posted back to their localities to provide basic services, including the provision of injectable contraception, the most commonly used method (Halperin 2014). The lesson from Ethiopia, and

also from Rwanda, is that determined government initiatives can bring about rapid reproductive change as part of a wider agenda of health improvements, educational expansion and economic vibrancy.

While fertility decline, driven by increased contraceptive use and rising demand for family sixe limitation, is progressing fast in Eastern Africa, the pace of change in Western and Central Africa is slow. It is estimated that, in 2015, only 20 percent of married women in Western or Central Africa were using any method of contraception, compared with 40 percent in Eastern Africa. Nevertheless, fertility has declined in some countries more than would be expected from the levels of reported use. Ghana, for instance, has a similar level of fertility as Kenya, with a level contraceptive prevalence only half as great. What appears to be happening in Ghana is a rejection of hormonal methods by more educated women in favor of a "fertility awareness" approach in which condoms and withdrawal, with the back-up of emergency contraception, are used in mid-cycle. This is a subtle combination that typically goes undetected by the standard survey question on current use (Marston et al. 2017). It remains to be seen whether this type of pregnancy-avoidance behavior is widespread within the sub-region.

Family planning program impact

The impact on fertility of state-sponsored family planning programs has generated a large, divisive and generally unedifying literature. It is clear from the experience of European populations and most Latin American countries that government-sponsored programs are not a necessary condition for fertility transition. When the motive is strong, couples will find the means to control childbearing. The relative emphasis on motives versus means captures the divide in interpretation. Commentators who are skeptical that programs made more than a small

difference to fertility stress that the declining need or demand for children is the overridingly important driver of reproductive change (Demeny 1992; Pritchett 1994). Conversely, those who take a more positive view of program impact emphasize: (a) the costs of, or barriers to contraceptive use, defined broadly to include informational, social and psychological costs, are considerable but can be mitigated by programs with a strong communications component; (b) the fact that much fertility decline is due to better implementation of childbearing desires rather than changing desires; and (c) that availability and acceptability of the means to control fertility can influence family size desires (Bongaarts et al. 2012).

The view of authors of this chapter is that the distant origin of fertility decline is improving survival which creates a latent demand for fertility regulation, and that, moreover, government policies and programs can hasten and accelerate the behavioral expression of this latent demand. Rising education, urbanization, incomes and broadening opportunities are all conducive to reproductive change, but it is clear from Indonesia in the 1970s, Bangladesh in the 1980s, and Ethiopia in the 2000s, to cite but a few examples, that contraceptive use can increase and fertility can fall, at very low levels of development. The imprint of government policies and programs on reproduction in these countries seems clear-cut.

RESEARCH FINDINGS

The combination of increased concern for population growth, the growing availability of effective contraception, and the rapid implementation of service programs around the world have given rise to a massive and unusually well-coordinated international effort to collect survey data on fertility and contraceptive use. The first fertility surveys were conducted in the United States and Europe, but they were soon followed in the 1960s by surveys in developing countries to

assess both the use of and the demand for contraception. The early rounds of these surveys, often referred to as KAP, standing for knowledge, attitude and practice, surveys, were carried out by, or on behalf of, private family planning organizations, but often with support from international organizations such as the Population Council, and United Nations agencies such as the Latin American Demographic Center (CELADE).

In the mid-1970s, an ambitious effort to collect and analyze data on reproductive behavior, the World Fertility Survey (WFS), was launched under the auspices of the International Statistics Institute. Headquartered in London, the WFS was responsible for carrying out surveys in 61 countries between 1975 and 1986 (Cleland and Scott 1987). The idea for the program came from Reimert Ravenholt, the forceful head of USAID's Office of Population, who wanted evidence that family planning programs in poor countries were effective. These surveys all used a common core questionnaire that permitted comparative analysis. The WFS program was funded by USAID and the UNFPA, had a staff of 50-60 professionals led by Sir Maurice Kendall, and involved the participation of leading demographers from all around the world. The WFS was followed by other international survey projects that provided data on contraceptive behavior, including Contraceptive Prevalence Surveys, Reproductive Health Surveys conducted by the Centers for Disease Control, and UNICEF's Multiple Indicator Cluster Surveys (Anderson and Cleland 1984; Morris 2000; UNICEF 2015). A recent newcomer is Performance Monitoring and Accountability Surveys (PMAs), designed to provide quick feedback on indicators using mobile telephone technology.

However, the real successor to the WFS is the Demographic and Health Surveys (DHSs) funded by USAID. Between 1986 and early 2018, the DHS has sponsored 262 surveys in 90 countries. Moreover, the range of subject matter collected has steadily grown, with an increasing

emphasis on biological data. The DHS is now the single most important source of information in low and middle income countries, not only with respect to fertility and contraception, but also with regard to a wide range of maternal and child health topics.

While there has been some argument as to how much the data collected by these surveys have contributed to a better understanding of the determinants of fertility (Caldwell 1985; Davis 1987), there is no doubt they have provided an accurate and detailed accounting of three of the four main "proximate determinants" of fertility, namely, contraceptive practice, breastfeeding, and marriage, during the course of the fertility transitions that have taken place in the last three or four decades (Bongaarts 1982). The surveys have also collected comparable information on fertility desires and related indicators of huge polemical importance, such as the unmet need for contraception, and unwanted childbearing (Westoff 1988a and 1988b). Due to the vast amount of survey data collected since the 1970s, it is possible to examine trends over the last 50 years.

Trends in contraceptive use and unmet need

The level of current contraceptive use typically refers to use among married or cohabiting women aged 15-49 years. Except in Asia, extensive survey data on use are also available for sexually active unmarried women and, thanks to the DHS, data are increasingly available for men. One of the great unresolved problems of measurement of contraceptive use concerns divergent reporting between matched husbands and wives; men typically report higher use particularly of male methods (Becker and Costenbader 2001). In this chapter, we will focus mainly on the testimony of women.

Figure 1 shows trends since 1970 in the use of any modern method of contraception by major region of the world, based on UN Population Division estimates and models (UN

Population Division 2017). Globally, prevalence has risen from 24 percent in 1970 to 58 percent in 2015. In 1970, use among married women was already high in Northern America at 54 percent; it was around 25 percent in Europe, Asia and Latin America but lower in Africa. The period 1970-2015 saw large increases with modern method use. In 2015, over 60 percent of married women were using a modern method in all regions except Northern Africa (49%) and sub-Saharan Africa (25%).

An alternative way of representing contraceptive use is to include traditional methods, mainly withdrawal and most forms of periodic abstinence. Such inclusion would make little difference to recent prevalence estimates. Worldwide only 5 percent of couples were using a traditional method in 2015, though the figure was 17 percent in Western Asia, namely, Iran, Turkey, Saudi Arabia and nearby countries, and 14 percent in Southern Europe. However it would make a large difference for trends in Europe. In this region, 40 percent of users in 1970 were relying on a traditional method, but by 2015 the proportion had shrunk to 10 percent.

FIGURE 1 ABOUT HERE

While contraceptive use has always been the main indicator of change, the concept of unmet need has been of almost equal importance in terms of advocacy. In the face of skepticism, proponents of international family planning needed to demonstrate the existence of a need, or potential demand, for contraception in the poor nations of Africa, Asia and Latin America. The initial indicator of this need was termed the "KAP-Gap," denoting the existence of women who reported that they wanted no more children but were doing nothing to achieve this aim (Westoff 1988a). This term was replaced in 1978 by "unmet need for contraception" and has proven to be an invaluable bridge between a human rights approach to fertility control and the earlier demographic-economic rationale (Westoff 1978). Most countries with high fertility and

population growth also record high unmet need. The concept of unmet need remains simple; it refers to non-use by fecund women who want to avoid childbirth for at least two years. But its measurement is complicated by the need to include in the unmet need category those women who currently have an unintended pregnancy and those protected by lactational amenorrhea from an unintended birth (Bradley and Casterline 2014).

In 1970, the estimated levels of unmet need among married women in developing regions were high: 28-29 percent in Latin America, North Africa and sub-Saharan Africa, and 24 percent in Asia. Unmet need in sub-Saharan Africa stems primarily from women wishing to delay pregnancy, while in other regions it is due equally to delayers and limiters. By 2015, levels had declined to about 10 percent in Asia and Latin America, to 14.5 percent in North Africa, but they remained high at 24 percent in sub-Saharan Africa (UN Population Division 2017). Declines in unmet need parallel fertility declines. Contrary to the common view that falling demand for children has been the key driver of reproductive change, the increasing ability of couples to implement preferences and avoid unwanted or mistimed childbearing has been just as important, if not more so (Feyisetan and Casterline 2000; Casterline and El-Zeini 2014).

The level of unmet need among sexually active unmarried women was estimated in 2012 to be 22 percent, compared with 12 percent for married women in developing countries and accounted for 18 percent of total unmet need (Cleland, Harbison & Shah 2014). As unwanted pregnancies typically have more serious consequences for the unmarried than for the married, these estimates justify the emphasis on addressing the contraceptive needs of adolescents.

Use of specific methods

In 2015 around the world, female sterilization was by far the most commonly used contraceptive method, accounting for 30 percent of all users worldwide, followed by IUDs at 21 percent, oral contraceptives at 14 percent, and condoms at 12 percent. The popularity of IUDs is somewhat misleading because China's massive population and high IUD prevalence account for 60 percent of all users in the world.

The main changes in method-mix since 1994 have been a fall in vasectomy from 8 percent to 4 percent, and rises in injectable use from 2 percent to 7 percent, and in condom use from 8 percent to 12 percent (UN Population Division 2015).

Regional variation in method-mix is shown in Figure 2. The method with the most uniform contribution to overall protection is the pill, typically accounting for about 20 percent of use, except in Eastern Asia. Sterilization is a dominant method in Northern and South-Central America, in Eastern and South-Central Asia, and in Oceania, but it is rarely used in Africa. IUDs are most commonly used in North Africa, and in Eastern and Western Asia. Injectable use is concentrated in sub-Saharan Africa and South-eastern Asia.

FIGURE 2 ABOUT HERE

Within regions, the actual methods of contraception practiced in different countries vary widely. In many countries the method-mix is highly skewed. An examination of data from 109 national surveys found that 30 percent has a method-mix in which half of more of all users relied on a single method. Surprisingly, the degree of skewness was unrelated to the human development index, strength of family planning programs, or overall prevalence of use (Bertrand et al. 2014). Some examples will illustrate the idiosyncrasies of method-mix.

Contraception in Albania is still dominated by withdrawal while in Germany 70 percent of contracepting couples rely on only one method, the pill. In India, sterilization accounts for 70

percent of protection while, in neighbouring Bangladesh, the equivalent figure is 10 percent. In Egypt the IUD dominates, while in Morocco the pill is the most commonly used method.
Of course, each of these societies has a particular history, culture, medical system, and set of relations with other societies. Explanations for the individual patterns can be sought in those particularities. For example, Bulut and associates (1997) looked, albeit unsuccessfully, for an explanation of the high use of withdrawal in Turkey in terms of the reproductive morbidity experienced in the population. But perhaps the most intriguing is Coleman's (1981) study of the factors underlying the high use of condoms in Japan. He ends up suggesting that "a large proportion of Japanese married couples who are using condoms are not particularly pleased with the method" (1981: 36), and that "Japanese couples' extensive reliance on condoms results largely from the unavailability of other methods, in a cultural context of embarrassment and passivity toward contraception" (1981: 29).

In an era of globalization in which goods and ideas are thought to travel more freely than ever before, however, the variations in method-mix between and within regions seems anomalous. How could assessments of the convenience or effectiveness of the different methods vary so widely? The answer may be addressed by considering two factors: the early political history of family planning, and the power of social influence.

In the early days of family planning promotion, most governments or agencies had to focus their efforts on a narrow range of methods, because to promote all methods equally would have imposed an impossible strain on budgets, logistics and training. Once a method becomes established, it becomes increasingly favored by both providers and couples. The familiar becomes the desirable. The evidence is compelling that reproductive behavior, including contraceptive method-choice, is subject to strong social influences (Entwistle et al. 1996; Kohler

1997; Rutenberg and Watkins 1997). Individuals naturally prefer a method that has been used successfully by friends and neighbours over an alien method.

The enduring influence of early policy priorities can be clearly seen in China and Vietnam where IUD use was emphasized, in part because this method is so cost-effective. In many countries of the former Soviet Union, the IUD was one of few methods available, because of a deep distrust of hormonal methods by the Soviet medical establishment. In India, family planning targets, progress and incentives were almost exclusively framed in terms of sterilization. Policy priorities, however, can be derailed by poor implementation, as happened with the IUD in Pakistan and Morocco (Khan 1996; Brown 2007).

In such path-dependent systems, it is not clear that the best technologies will always win out, or that a potential user will really have much choice regarding which method to use in a given situation. Rather, the same learning through social networks that tends to speed the adoption of contraception in a community will also lead to a socially prescribed or influenced set of choices regarding method (Bongaarts and Watkins 1996; Potter 1999).

Contraceptive use dynamics

The emphasis in much of the contraceptive literature on current use and unmet need gives a misleadingly static impression of behavior. Except in societies where sterilization dominates, considerable turbulence underlies current status as couples move from use to non-use, and vice versa, or shift from one method to another. Discontinuation of modern methods makes a large contribution to unmet need (Jain et al. 2013).

The collection by the DHS program of month-by-month contraceptive calendars has greatly expanded our knowledge of use-dynamics. An analysis of 19 DHSs, published by WHO,

showed that, for most methods, the median percent who discontinued within 12 months of starting was close to 40 percent (Figure 3). The single exception was IUD adopters, among whom only 13 percent stopped (Ali, Cleland and Shah 2012).The WHO report did not include contraceptive implants, but a related analysis using pooled data from 21 DHSs estimated the 12 month discontinuation probability for this method to be 8.5 percent compared with 15 percent for IUDs and 32 percent for injectables (Staveteig, Mallick and Winter 2015). The huge difference between IUDs or implants and other reversible methods could reflect divergent characteristics of women who choose particular methods. However, a randomized trial suggests that method traits, not user traits, determine the difference in discontinuation (Hubacher et al. 2017). For a short-acting method, such as the pill, injectables and condoms, continued use requires conscious decisions and effort. For long-acting methods, such as IUDs and implants, the opposite holds true. Continuation is passive while discontinuation requires a conscious effort. That such seemingly trivial considerations can have large behavioral consequences will come as no surprise to those familiar with behavioral economics.

****Figure 3 about here****

The reasons for discontinuation vary by method. For withdrawal and periodic abstinence, accidental pregnancy is the major reason. For condoms, partner objections and desire for a more effective method are the two main reasons. And for pills, injectables, IUDs and implants, the major cause is side effects and/or health concerns. Less than 10 percent stop in the first 12 months because they want to become pregnant.

Discontinuation because of side effects, or for some other reason implying dissatisfaction, varies widely between countries. For the pill, the range at 12 months is from 5 percent in Zimbabwe to 54 percent in Peru. The reasons this variability are not well understood.

Similarly, switching to an alternative method within three months of method-related discontinuation ranges from 14 percent in Malawi to 82 percent in Turkey (Figure 4). Though common sense suggests that widening the range of contraceptive options and improvements in counselling and service quality should reduce discontinuation and should promote prompt switching, the evidence of effectiveness of such strategies is lacking.

****Figure 4 about here****

Unintended pregnancies and abortions

While the measurement of contraception is relatively straightforward, the measurement of unintended pregnancies taken to term, or spontaneously miscarried, and abortions is complex. Using DHS data, the measurement of the former has been approached in three main ways. First, births that are in excess of total desired family size may be classified as unwanted, with the results often expressed as wanted and unwanted fertility rates (Bongaarts 1997). Second, prospective questions on whether another child is wanted have been used to derive estimates of aggregate unwanted fertility (Casterline and El-Zeini 2007). The third and most commonly applied approach uses retrospective reports by mothers that allow a three-way classification for each recent birth into those wanted at that time, mistimed and unwanted. This third approach has the advantage of including mistimed as well as unwanted births, but it suffers from post-factum rationalization stemming from an understandable reluctance of mothers to classify babies as unwanted. The three approaches yield different results, and no consensus has been reached on how best to obtain valid estimates.

Induced abortion does not present the same conceptual complexities as unintended pregnancy, but measurement is nonetheless problematic because of the lack of registration data

and extreme underreporting in surveys. A variety of indirect methods of estimation have been applied, including surveys of abortion providers and extrapolation from hospital data on abortion complications (Singh, Remez and Tartaglione 2012).

Data on unintended pregnancies, measured by the retrospective method, as well as abortions, can be presented in many ways, some based on the justifiable assumption that the vast majority of terminations are performed on unintended pregnancies. Incidence measures include annual unintended pregnancy and abortion rates per thousand women of reproductive age. Prevalence measures include the proportion of all pregnancies that are unintended and/or terminated and the proportion of unintended pregnancies that are terminated.

Using empirical data for 105 countries on unintended pregnancies, published data on abortion, and Bayesian hierarchical modelling, Bearak and colleagues (2018) estimated that the global rate of unintended pregnancies fell from 74 per 1000 in 1990-1994 to 62 in 2010-2014, a drop of 17 percent. Declines were apparent in most regions, but they were particularly pronounced (48%) in Eastern Europe because of radically improved access to effective contraception since the collapse of the Soviet Union. In 2010-2014, 44 percent of all pregnancies were unintended with little difference between developed and developing countries (Singh et al. 2017c).

Figure 5 shows the unintended pregnancy rate, sub-divided into its two components, i.e., terminated or not terminated, for 2010-2014 by region. The unintended rate is higher in developing than in developed countries, and it is particularly high in Latin America and Africa. It was estimated that 59 percent and 55 percent of unintended pregnancies were terminated in developed and developing countries, respectively.

****Figure 5 about here****

Trends in rates of induced abortion are similar to trends in rates of unintended pregnancies, with steep falls in Europe, moderate falls in Northern America, but little convincing evidence of change since 1990-1994 in the other regions of the world (Sedgh et al. 2016). In 2010-2014, it was estimated that 25 percent of all pregnancies worldwide were terminated, with a slightly higher proportion in developed countries (28%) than in developing regions (24%). The lowest proportions were found in Eastern, Western, and Middle Africa (12%-14%) and the highest in the Caribbean and Eastern Europe (38-39%).

At first glance it seems counterintuitive that, in developed countries where use of effective contraceptive methods is so high, the proportion of pregnancies that are unintended and terminated should be so high. The explanation is that the exposure to the risk of an unintended pregnancy depends critically on the desired number and spacing of children. The smaller the desired number of children, the longer the exposure to the risk of an unintended pregnancy. Consider a country where sexual debut is 16 years, breastfeeding is of short duration, and a one-child family is the common reproductive aspiration. This scenario, by no means far-fetched, implies that women need to avoid pregnancy for about 32 of their 34 years of reproductive life, a daunting task. By comparison, in a society where the desired family size is four and breastfeeding is prolonged, the span of time during which pregnancy needs to be avoided by contraception drops to 25 years. Reductions in the rate of unintended pregnancy, and in abortion, an internationally agreed goal, can be achieved by increasing the use of highly effective long-acting or permanent contraceptive methods, but the rate can never be eliminated. Even in European countries where contraceptives are widely available and free of charge, and sex education compulsory, unintended pregnancies are common.

The legality of abortion ranges from a total ban to access without restrictions. A total of 65 countries have highly restrictive laws permitting abortion only to save a woman's life or not at all. At the other extreme, 74 countries permit abortion on socio-economic grounds or without restriction. However, the rate of abortion is just as high, if not higher, in the restrictive as in the liberal countries (Singh et al. 2017c). The pernicious effect of restrictive laws is to make abortion clandestine and dangerous: 31 percent of terminations were classified as least safe in highly restrictive countries compared with 1 percent in the most liberal countries.

Abortion technology has been radically changed and made safer with the advent of medical abortion. The recommended regimen is a combination of two drugs, mifepristone and misoprostol, which is 95 percent to 98 percent effective in the first trimester. However, mifepristone is expensive and often inaccessible, whereas misoprostol is cheap, has a range of medical uses and is widely accessible. Misoprostol alone has an effectiveness of 75 percent to 90 percent, and this is the option increasingly used by women in more restrictive settings, often by purchasing the drug from a commercial outlet (Footman et al. 2018).

CONCLUDING REFLECTIONS

As we have described in this chapter, contraceptive practice has swept across the world in the past 140 years bringing huge benefits to children, to women, to societies in terms of economic advance and to the planet in terms of alleviating pressures on resources and environmental damage. Yet much remains to be done to even approximate an ideal situation in which all individuals and couples can successfully implement their preferences for the number of offspring and the timing of births. Reproductive modernization has barely started in Western and Central Africa. Whether or not sub-Saharan Africa will pay a penalty for its slow and delayed

fertility transition remains to be seen. But a further doubling of its population between 2018 and 2050 will surely jeopardize food security and impose a severe strain on the creation of sufficient jobs and livelihoods to meet a rapidly expanding labor force. The prospects for countries in the Sahel, whose populations are projected to treble in the next few decades, are alarming. Given their fragile ecosystems, it is difficult to envisage an escape from poverty and hunger in the face of such huge demographic pressure. In the Sahel, there is a real possibility of a Malthusian crisis.

Even in countries where the use of effective contraception is high, and family sizes are small, the full potential of family planning is not realized. The range of methods in use in many societies is too narrow to meet diverse needs. Worldwide, over 40 percent of all pregnancies are unwanted or mistimed, and 25 percent of all pregnancies are terminated. Restrictions on abortion do nothing to deter resort to terminations, but they do put the health of women at risk.

While contraceptive technology has improved vastly, we still lack a perfect method. Hormonal methods have side effects that some women find unacceptable. Copper IUDs often increase menstrual bleeding. Condoms, the only method to offer protection against sexually transmitted infections, interfere with the spontaneity of sex and require constant vigilance for effective use. Sterilization is an inappropriate option for those who have any element of uncertainty about future reproduction. Much unmet need for contraception arises from these method-defects. Regrettably, no major advance in technology is likely in the near future.

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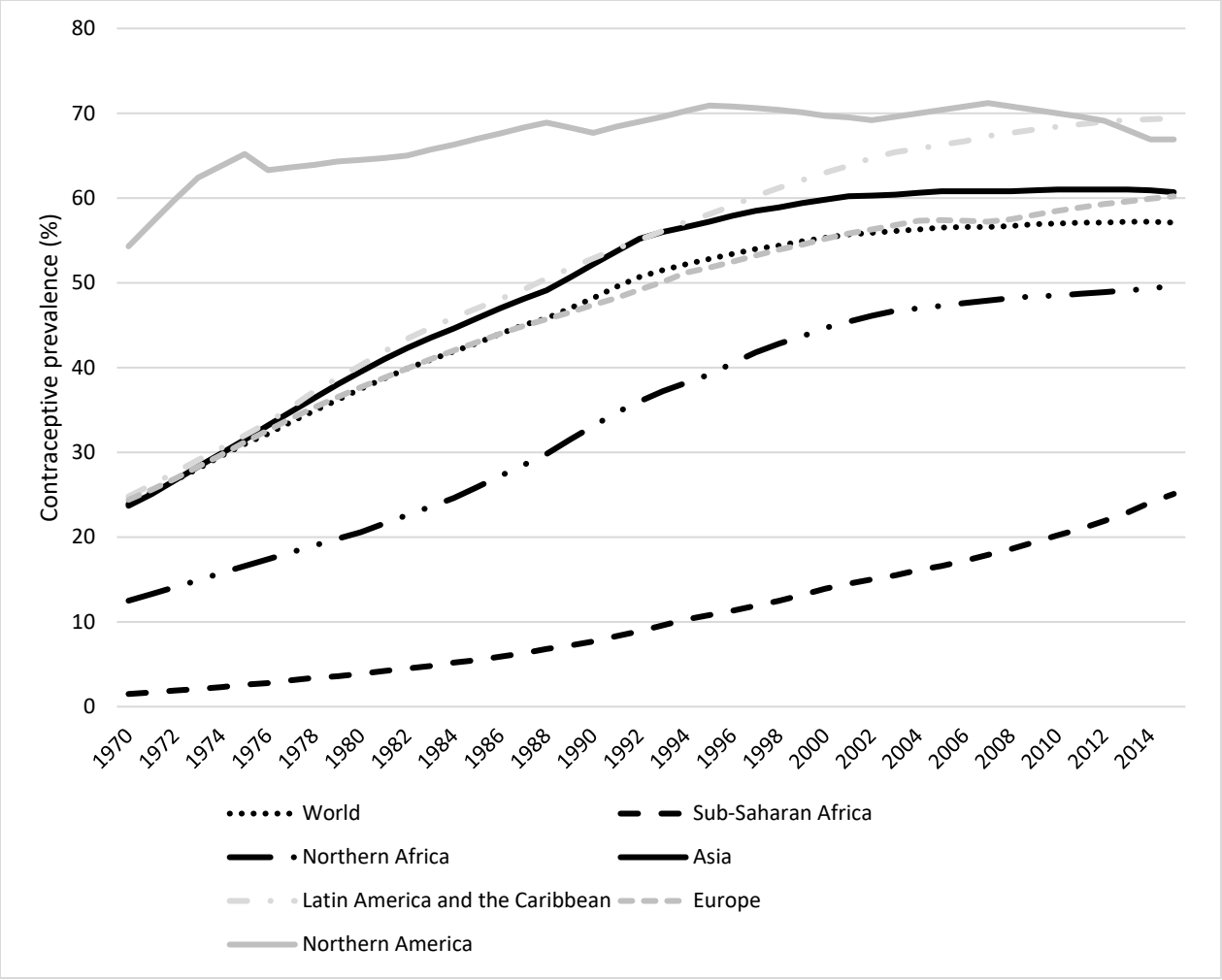

Figure 1 Trends in percent of married women using a modern method of contraception, major regions 1970-2105

Source: UN Population Division 2015

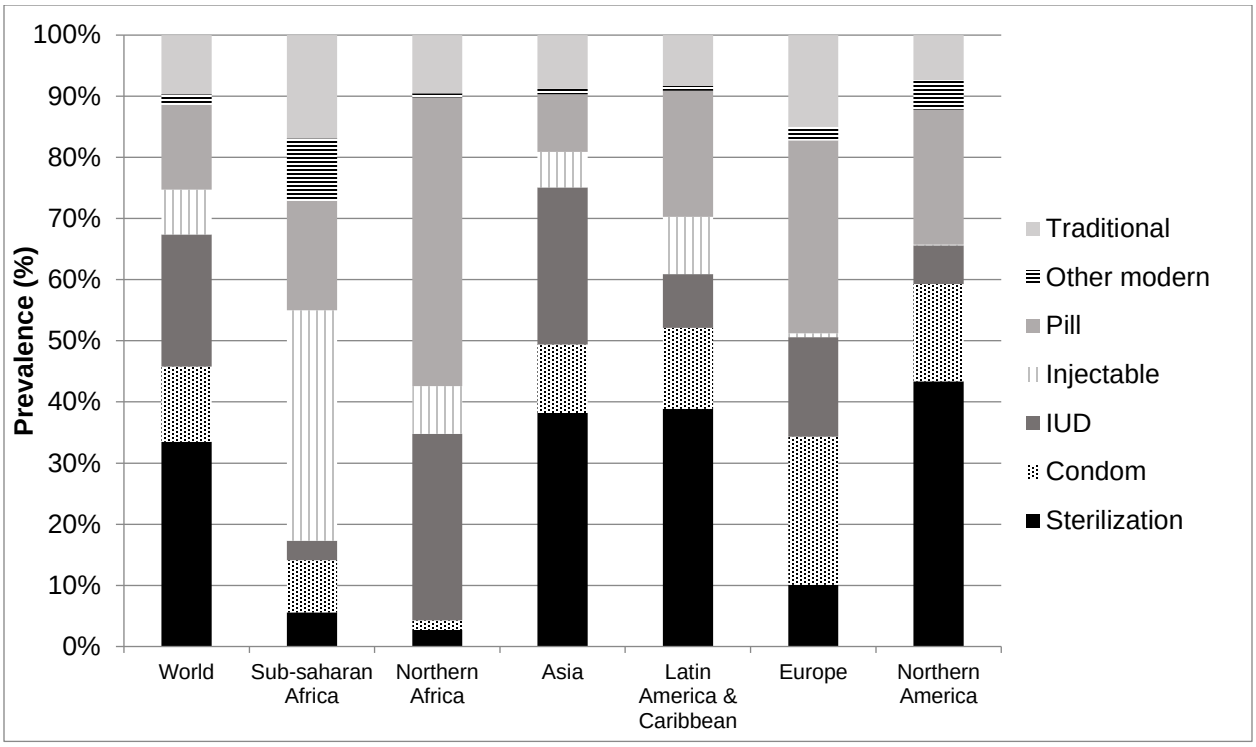

Figure 2 Percent distribution of married contraceptive users by method, major regions 2015

Source: UN Population Division 2017

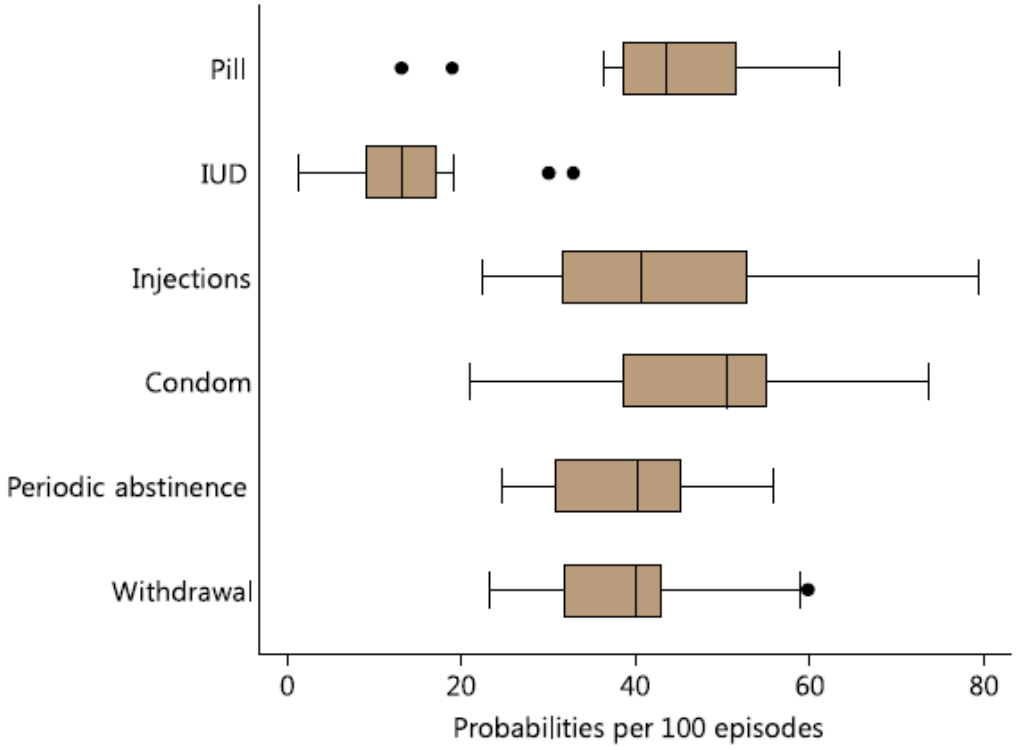

Figure 3 All-cause discontinuation probabilities per 100 episodes, by method: Box and whisker plots for 19 countries.

Source: Ali, Cleland & Shah 2012

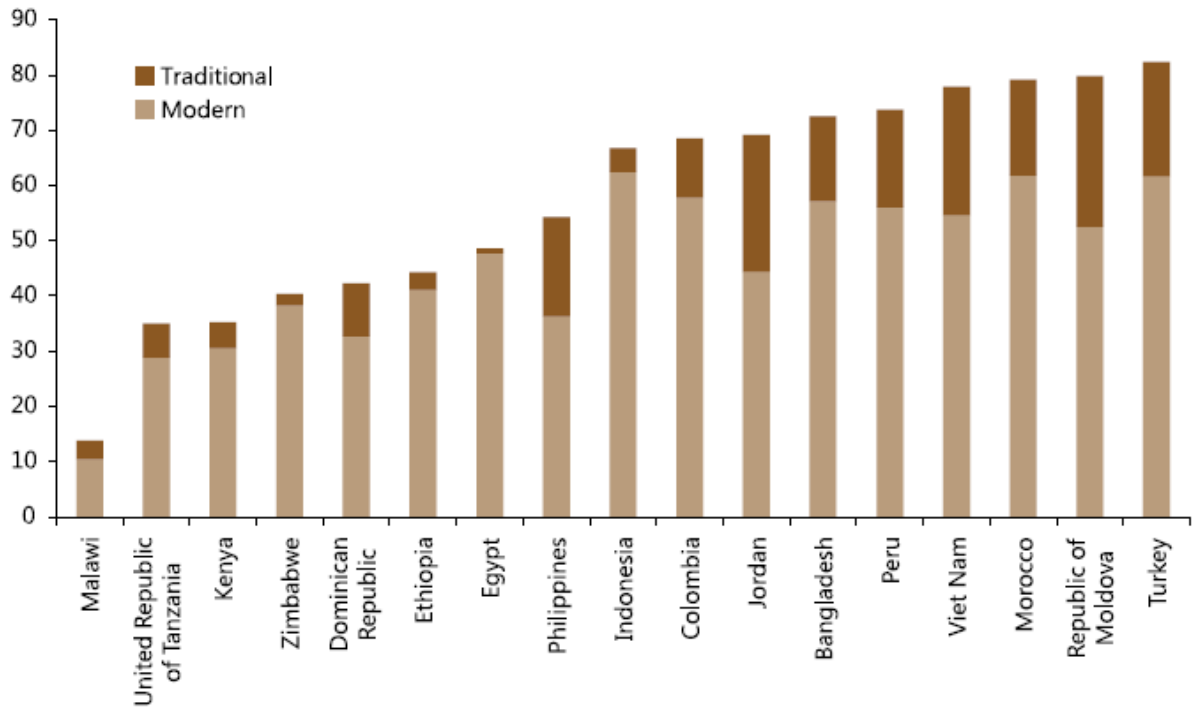

Figure 4 Percent who switched to a modern or traditional methods within three months of method-related discontinuation: 17 countries

Source: Ali, Cleland & Shah, 2012

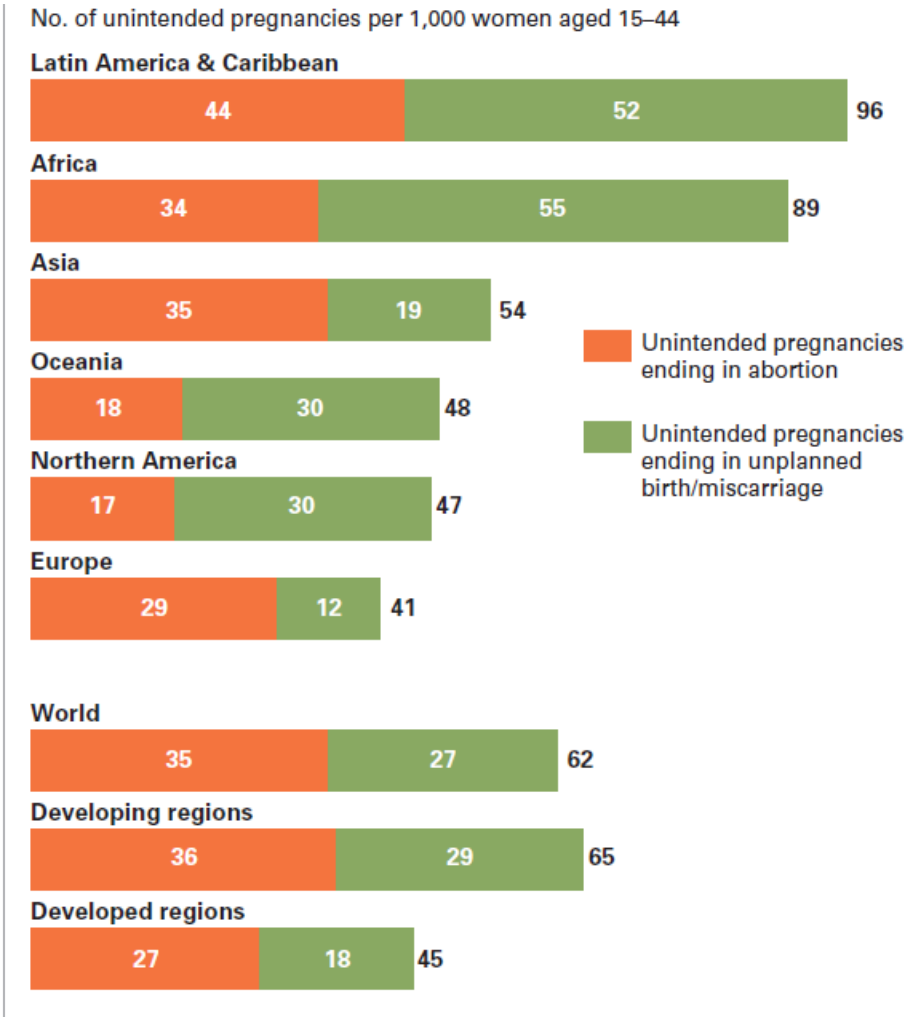

Figure 5. Annual number of unintended pregnancies per 1000 women, by outcome: major regions, 2010-2014

Source: Singh et al. 2017