Population Reports

Todd Shapera

Highlights

Contents

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Birth Spacing

Three to Five Saves Lives

Couples who space their births 3 to 5 years apart increase their children's chances of survival, and mothers are more likely to survive, too, according to new research. Many women want to space births longer than they currently do. Programs can do more to help them achieve the birth intervals they want.

Over the years research has consistently demonstrated that, when mothers space births at least 2 years apart, their children are more likely to survive and to be healthy. Many programs have recommended 2-year intervals, and the message is widely known: In surveys most women say that a birth interval of 2 years is best.

Now new studies show that longer intervals are even better for infant survival and health and for maternal survival and health as well. Children born 3 to 5 years after a previous birth are about 2.5 times more likely to survive than children born before 2 years.

New Evidence

A 2002 study by researchers at the Demographic and Health Surveys (DHS) program finds that children born 3 years or more after a previous birth are healthier at birth and more likely to survive at all stages of infancy and childhood through age five. The study uses DHS data from 18 countries in four regions and assesses outcomes of more than 430,000 pregnancies.

Among the findings: Compared with children born less than 2 years after a previous birth, children born 3 to 4 years after a previous birth are:

- 1.5 times more likely to survive the first week of life;
- 2.2 times more likely to survive the first 28 days of life;
- 2.3 times more likely to survive the first year of life; and
- 2.4 times more likely to survive to age five.

Mothers Benefit, Too

A 2000 study by the Latin American Center for Perinatology and Human Development reinforces the DHS findings about children, using data for over 450,000 women. It also provides some of the best evidence yet that spacing births further apart improves mothers' health. Among the findings: Compared with women who give birth at 9- to 14-month intervals, women who have their babies at 27- to 32-month birth intervals are:

- 1.3 times more likely to avoid anemia;
- 1.7 times more likely to avoid third-trimester bleeding; and
- 2.5 times more likely to survive childbirth.

While the biological and behavioral mechanisms that make shorter birth intervals riskier for infants and mothers are little understood, researchers suggest such factors as maternal depletion syndrome, premature delivery, milk diminution, and sibling rivalry. For instance, studies suggest that shorter birth intervals may not allow mothers enough time to restore nutritional reserves that provide for adequate fetal nutrition and growth. Fetal growth retardation and premature delivery can result in low birth weight and greater risk of death.

What Programs Can Do

Almost everywhere, women's birth intervals are shorter than they would prefer. If women could achieve their preferred intervals, child mortality would fall. For example, in Kenya under-five mortality would drop by 17%. In most countries substantial unmet need for spacing births remains. In fact, half of the total potential demand for contraception is for spacing. Addressing the unmet need for spacing would help millions of women to achieve their family planning goals.

Communication campaigns in several countries have already begun using a 3-year spacing message. Messages can emphasize that waiting 3 years between births clearly improves child survival, while waiting even longer is even better. Some have suggested a message that a woman should use contraception until her youngest child is two to four years of age. Emphasizing such social benefits as increased savings and time for the couple may be even more appealing than emphasizing the health benefits. Services can focus more on women who want to postpone their next pregnancy. They can ensure that women who want to space have continuity of care, a full range of methods, and a steady source of supply. Family planning and maternal and child health care providers can work together to help women achieve their preferred birth intervals.

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Exploring the New Evidence

New research shows that waiting 3 years between births is even better for children than 2-year intervals. Children born 3 to 5 years after a previous birth are about 1.5 times more likely to survive to age five than children born at 2- to 3-year intervals and about 2.5 times more likely to survive than children born at intervals shorter than 2 years. Women who space births 3 to 5 years apart not only have healthier babies but also are healthier themselves.

It has long been known that avoiding closely spaced births is advantageous to child health. Two-year spacing was widely identified and promoted as "the healthy interval." Many studies found that infants spaced at least 2 years apart are more likely to survive than infants spaced less than 2 years (53, 69, 70, 99, 100, 111, 112, 130, 175, 200). In addition, infants spaced at least 2 years apart are less likely to be premature (56, 94, 110, 213), less likely to suffer from low birth weight (61, 97, 109, 110), and less likely to be malnourished (110, 114). The survival chances of the next-to-youngest child improve, too, when births are at least 2 years apart (74, 90, 102, 115, 153).

Findings from the DHS Study

New findings in 2002 from researchers at the Demographic and Health Surveys (DHS) program show that children born 3 to 5 years after a previous birth are healthier at birth and more likely to survive at all stages of infancy and childhood through age five than children born before 3 years (see Figure 1). Analyzing over 430,000 pregnancies in 18 countries, the study compared children born at 3- to 4-year intervals with those born before 2 years, between 2 and 3 years, between 4 and 5 years, and 5 years or later (159, 161).

Many factors besides birth spacing affect infant survival and health, among them the mother's education and whether and how often she sought prenatal care. In the past, studies of birth intervals have been able to account statistically for some of these confounding factors but not all. The new DHS study statistically controlled—or accounted—for differences in demographic and socioeconomic variables, prenatal care differences, sex and survival of the previous child, and other factors that affect infant survival and health (159, 161).

Separately, the study also examined the confounding effects of breastfeeding on infant mortality and birth spacing. Whether and how long a mother breastfeeds influence her child's survival chances. Statistically controlling for the effects of breastfeeding allows researchers to be more certain that birth intervals themselves are associated with infant and child survival rather than breastfeeding. The analysis shows that children who stop breastfeeding are at greater risk of dying. Still, when breastfeeding is controlled for statistically, little to no change is observed in the link between birth intervals and child survival. Children born less than 3 years after a previous birth are still at higher risk of dying than children born at 3- to 4-year or 4- to 5-year intervals, after accounting for breastfeeding.

The DHS study found that, when a mother spaces her child's birth 3 to 5 years after the previous birth, rather than less than 3 years, her infant is more likely to survive in each stage of development—the perinatal period (from 28 weeks gestation through the first week of life), the early neonatal period (the first week of life), the neonatal period (the first 28 days of life), from birth through 12 months, and through age five (159, 161) (see Table 1).

Children born 3 to 5 years after a previous birth not only are more likely to survive but also are less likely to be malnourished during infancy and childhood through age five, the study found. Infants born 3 years or more after a previous birth suffer less from stunting (short height for age) and underweight (low weight for age) than infants born after intervals shorter than 3 years (161).

Worldwide, infant and under-five mortality is a serious problem (see Table 2). The DHS study estimates that in every country thousands more children could survive each year if all women spaced their births at least 3 years apart. In Nigeria, for instance, infant mortality could fall from 75 deaths per 1,000 births to 54 deaths—a 28% decline—if all women spaced their births at least 3 years apart. Under-five mortality could fall from 140 deaths per 1,000 births to 108 deaths—a 23% decline (162).

Liz Gilbert, Courtesy of the David and Lucile Packard Foundation

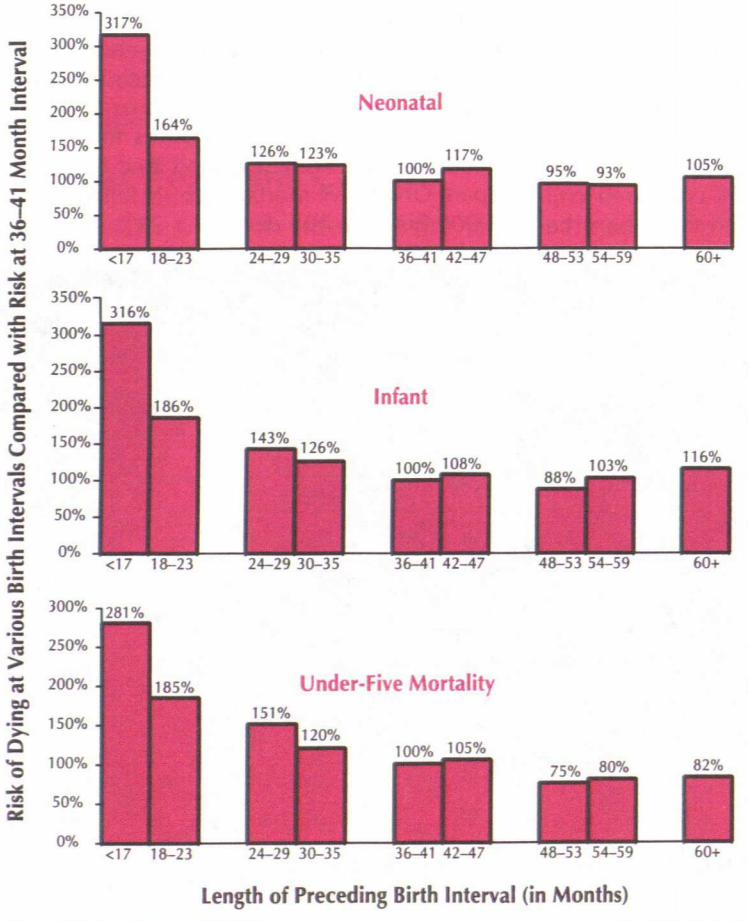
A mother rests with her newborn infant in a Nigerian clinic. New evidence shows that longer birth intervals are better for health. If all women in Nigeria spaced their births at least 3 years apart, infant mortality could fall from 75 deaths per 1,000 births to 54 deaths per 1,000 births.

Hugh Rigby for JHU/CCP

As with this family in Kenya, birth spacing can improve chances for survival and good health for the children and their mother, and result in more resources for the family.

Figure 1. Three- to Five-Year Birth Intervals Are Healthier

Risk of Dying During the Neonatal Period, Infancy, and Childhood Through Age Five by Length of the Preceding Birth Interval



Source: Data from Rutstein, 2002 (159)

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Similarly, in Pakistan infant mortality could fall from 90 deaths per 1,000 births to 55 deaths—a 39% decline—if all women spaced their births at least 3 years apart. The under-five mortality rate could fall from 117 deaths per 1,000 births to 63 deaths—a 46% decline (160).

Findings from the CLAP Study

New findings from a 2000 study in Latin America provide evidence that birth intervals of 3 to 5 years are healthier for mothers, too (38). The study by the Latin American Center for Perinatology and Human Development (Centro Latinoamericano de Perinatología y Desarrollo Humano) (CLAP) is the largest study to assess how birth spacing affects mothers' health, using data for more than 450,000 women. The study employs a variety of detailed maternal health indicators and accounts statistically for a large number of confounding factors. In previous research the health benefits for mothers of longer birth intervals have been less clear than the benefits for their children. Some studies found that intervals of less than 2 years risk mothers' health (44, 101, 167, 173). Other studies did not (55, 154).

The CLAP study pooled and analyzed data collected from hospital records between 1985 and 1997 in 19 countries of Latin America and the Caribbean. The data cover a variety of indicators, including mothers' sociodemographic characteristics, their reproductive history, the health care they received during pregnancy and delivery, and their health and survival after delivery. The study is hospital-based and represents less than 2% of all births in Latin America and the Car-

ibbean. Although data came from a variety of hospitals and were collected by numerous health care providers, data collection was standardized by a data clerk in each hospital who entered the data into a database and checked data problems immediately with the attendant physicians or nurses (38).

Another study by CLAP reinforces the findings of the DHS study about birth spacing and newborn health (36, 39). Using data on over 1 million pregnancies between 1985 and 2000 from the same hospital records, the study looked at how pregnancy intervals can affect health from 28 weeks gestation through the first week of life. The study accounted statistically for women's demographic and socioeconomic characteristics as well as the health and survival of their previous children.

The CLAP study reports data for interpregnancy intervals—the time between delivering a baby and becoming pregnant again—rather than for birth intervals, as in the DHS study. Since the CLAP study focuses on pregnancies rather than births, it accounts for pregnancies that end in miscarriage or induced abortion. Adding 9 months to an interpregnancy interval makes the data comparable to data on birth intervals. **Population Reports** has converted these interpregnancy intervals to birth intervals to be consistent throughout this report. The CLAP study also reported data in months, rather than years, a convention that is retained in this report. Both the study of mothers and the study of infants compared birth intervals of 27 to 32 months with shorter and longer intervals (36, 38).

Maternal survival and health. Women who have their babies 27 to 32 months after a previous birth are more likely to survive pregnancy and childbirth than women who give birth after either very short intervals (9 to 14 months) or very long inter-

Table 1. Infant and Child Survival and Health: Findings from the Demographic and Health Surveys Study, 1992–1997

*Risk of Death and Health Problems Relative to Risk for Children Born 3 to 4 Years After the Previous Birth, by Birth Intervals**

	Birth Intervals (in Months)								
	<24		24–35		36–47		48+		
Period of Child's Life									
Perinatal[1]	137%		105%		Comparison Group (100%)		140%		
Stillbirth[2]	131%		108%				179%		
Early neonatal[3]	152%		113%				119%		
	<17	18–23	24–29	30–35	36–41	42–47	48–53	54–59	60+
Neonatal[4]	317%	164%	126%	123%		117%	95%	93%	105%
Under age one[5]	316%	186%	143%	126%		108%	88%	103%	116%
Under age five[5]	281%	185%	151%	120%	Comparison Group (100%)	105%	75%	80%	82%
Indicators of Child Health									
Stunting	140%	122%	128%	120%		93%	97%	82%	79%
Underweight	146%	120%	129%	111%		112%	95%	92%	78%

*Perinatal mortality, stillbirths, and early neonatal mortality were analyzed by year rather than month. The analysis did not separate 4- to 5-year intervals from intervals of 5 years and more. Intervals of 4 to 5 years do not appear healthier than intervals of less than 3 years because a higher mortality for children born after 5 years inflates the risk.

Note: Confounding factors taken into account include the length of the preceding birth interval, sex of child, birth order, mother's age at birth, survival of the preceding child at time of current child's birth, type of provider of prenatal care, timing of prenatal care, number of prenatal tetanus vaccinations, urban/rural residence, mother's education, index of household wealth, type of person attending the delivery, whether the child was wanted, and whether birth resulted from contraceptive failure.

[1]From 28 weeks gestation through the first week of life. Data pooled from 18 countries.
[2]Data pooled from 18 countries.
[3]The first week of life. Data pooled from 18 countries.
[4]The first 28 days of life. Difference in risk of death and health problems is statistically significant in 14 of 17 countries studied, $p < .001$ in all countries except Tanzania ($p < .01$) and the Philippines ($p < .05$). A p value measures chance. A p value < .001 shows that there is less than a 0.1%, or 1/1000 likelihood that the difference in risk is due to chance alone.
[5]Difference in risk of death and health problems is statistically significant in all 17 countries studied ($p < .001$).

Source: Rutstein, 2002 (159, 161)

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Table 2. Infant and Under-Five Mortality, 1999–2001

Deaths per 1,000 Live Births

Region and Country	Infants	Ages 0–5	Region and Country	Infants	Ages 0–5
SUB-SAHARAN AFRICA			**EASTERN EUROPE & CENTRAL ASIA**		
Burkina Faso	105	219	Armenia	36	39
Ethiopia	97	166	Georgia	43	46
Gabon	57	89	Kazakhstan	62	71
Guinea	98	177	Romania	30	32
Malawi	104	189	Ukraine	14	14
Mali	113	229	**LATIN AMERICA & CARIBBEAN**		
Rwanda	107	196	Colombia	21	25
Tanzania	99	147	Ecuador	36	39
Uganda	88	152	Guatemala	40	59
Zimbabwe	65	102	Haiti	43	119
ASIA & PACIFIC			Peru	43	60
Bangladesh	66	94	**NEAR EAST & NORTH AFRICA**		
Cambodia	95	125	Egypt	44	54
India	68	95	Mauritania	74	116
Nepal	64	91			

Source: Demographic and Health Surveys

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Table 3. Maternal Survival and Health: Findings from the Latin American Center for Perinatology and Human Development Study, 1985–1997

Risk of Pregnancy-Related Death and Complications Relative to Risk for Mothers Who Give Birth 27 to 32 Months After Their Previous Child, by Birth Interval

	Birth Intervals (in Months)					
Indicators for Maternal Health	**9–14**	**15–20**	**21–26**	**27–32**	**33–68**	**69+**
Maternal death	250%*	110%	NC	Comparison Group (100%)	110%	110%
Third-trimester bleeding[1]	170%*	NC	NC		NC	110%
Premature rupture of membranes	170%*	NC	NC		110%	NC
Anemia	130%*	NC	NC		NC	NC
Puerperal endometritis	130%*	NC	110%		NC	NC
Pre-eclampsia	NC	NC	NC		110%	180%*
Eclampsia	110%	NC	NC		120%	180%*
Gestational diabetes mellitus	NC	NC	90%		NC	130%
Postpartum hemorrhage	90%	NC	NC		NC	90%

Note: Confounding factors taken into account include maternal age, parity, mother's education, marital status, cigarette smoking, prepregnancy body mass index, history of miscarriage, history of stillbirth, history of early neonatal death, history of low birth weight baby, gestational age at first prenatal care, number of prenatal visits, geographic area, hospital type, and year of delivery.

**Difference in risk of pregnancy-related death and complications is statistically significant ($p < .05$).*

NC=no change in risk

[1] Includes placenta previa and placental abruption

Source: Conde-Agudelo, 2000 (38)

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vals (69 months or longer). These women are also healthier during and just after pregnancy (see Table 3).

Women with birth intervals of 27 to 32 months are less likely than women who have their next birth just 9 to 14 months later to experience third-trimester bleeding, including placenta previa (when the placenta is in the lower uterus and bleeds) and placental abruption (when the placenta bleeds, regardless of location), premature rupture of the membranes (tearing of the amniotic sac surrounding the fetus), anemia, and puerperal endometritis (infection of the uterus after pregnancy). Also, women with birth intervals of 27 to 32 months are less likely than women with birth intervals of 69 months or longer to experience pre-eclampsia (pregnancy-induced hypertension and high levels of protein in urine), eclampsia (convulsions or seizures with pregnancy-induced hypertension and high levels of protein in urine), and gestational diabetes mellitus (high levels of glucose in the blood during pregnancy).

Although the difference is not statistically significant, women with birth intervals of 27 to 32 months appear less likely to experience eclampsia than women with 9- to 14-month intervals. They also may be less likely than women with intervals of 69 months or more to die during pregnancy or delivery, or to experience third-trimester bleeding and gestational diabetes mellitus. Women with birth intervals of 27 to 32 months seem more likely than women with 9- to 14-month intervals or women with intervals of 69 months or more to experience postpartum hemorrhage (bleeding after delivery) (38).

Perinatal survival and health. Children born 27 to 32 months after a previous birth are more likely to survive the perinatal period, defined as 28 weeks gestation through the first week of life, than children born at 9- to 14-month intervals. Although the difference is not statistically significant, they also appear more likely to survive the perinatal period than infants born at 15- to 20-month or 21- to 26-month intervals. Infants born 27 to 32

Table 4. Perinatal Survival and Health: Findings from the Latin American Center for Perinatology and Human Development Study, 1985–2000

Risk of Perinatal Death and Health Problems Relative to Risk for Infants Born 27 to 32 Months After the Previous Birth, by Birth Interval

	Birth Intervals (in Months)							
Indicators for Perinatal Health	**9–14**	**15–20**	**21–26**	**27–32**	**33–44**	**45–56**	**57–68**	**69+**
Very preterm delivery[1]	327%*	133%*	103%	Comparison Group (100%)	101%	NC	97%	116%*
Preterm delivery[2]	231%*	115%*	NC		NC	101%	104%	109%*
Fetal death[3]	240%*	124%*	107%		106%	109%	108%	121%*
Very low birth weight[4]	225%*	123%*	NC		107%	102%	104%	115%*
Low birth weight[5]	214%*	115%*	102%		102%	NC	103%	119%*
Early neonatal death[6]	202%*	127%*	108%		102%	103%	105%	118%*
Small for gestational age	125%*	117%*	101%		NC	101%	NC	101%
Low Apgar score at 5 minutes	118%	92%	109%		108%	107%	94%	105%

Note: Confounding factors taken into account include maternal age, parity, mother's education, marital status, cigarette smoking, prepregnancy body mass index, history of miscarriage, history of stillbirth, history of early neonatal death, history of low birth weight baby, gestational age at first prenatal care, number of prenatal visits, geographic area, hospital type, and year of delivery.

**Difference in risk of death and health problems is statistically significant ($p < .05$).*

NC=no change in risk

[1] Before 32 weeks gestation

[2] Before 37 weeks gestation

[3] During the last 28 weeks of gestation

[4] <1500 grams

[5] <2500 grams

[6] During the first week of life

Source: Conde-Agudelo, 2002 (36)

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months after a previous birth also are more likely to survive the perinatal period than infants born after 69 months or more (36, 39) (see Table 4).

The study estimates that, if women spaced their births a minimum of 27 to 32 months apart, perinatal mortality in Latin America could decline by as much as 14%—from 39 deaths per 1,000 births to roughly 34 deaths per 1,000 births. The total number of perinatal deaths could fall by 60,500 per year.

Newborns are also healthier at birth when born at 27- to 32-month intervals than when born either at 9- to 14-month or 15- to 20-month intervals. They are less likely to be low in weight (<2500 grams) or very low in weight (<1500 grams) at birth, to be born preterm (before 37 weeks gestation) or very preterm (before 32 weeks gestation), to be small for their gestational age, or to have a low Apgar score five minutes after birth. The Apgar score is a composite index of a newborn's status. It reflects respiration, heart rate, muscle tone, reflex response, and skin color at birth.

Also, newborns born after an interval of 27 to 32 months are healthier than those born after a longer interval, particularly those born after 69 months or more. They are less likely to be low or very low in weight at birth, premature, or very premature (36).

Why Are Longer Intervals Better?

Several biological and behavioral mechanisms are often cited to explain how short birth intervals affect infant and maternal mortality. The mechanisms that make longer birth intervals healthier for infants and mothers are difficult to identify. This is because many factors—such as the number of children a mother already has and her age at childbirth—influence birth intervals and affect child and maternal health independently. Also, a birth interval affects more than one child—the preceding child as well as the succeeding child—and either birth interval could be responsible for a child's death (10, 45, 134, 201).

- **Maternal depletion syndrome:** A long-standing hypothesis contends that short birth intervals do not allow a mother enough time to restore her nutritional reserves after childbirth and breastfeeding (80). Although the role—or even the existence—of maternal depletion syndrome is not yet settled (67, 202, 203), recent studies confirm that short intervals affect mothers' energy (107), weight (83, 171), and body mass index (83). A mother's poor nutrition in turn affects fetal nutrition and growth (19, 81, 121) and thus infant survival (32).
- **Premature delivery:** Some studies find that shorter intervals are associated with an increased risk of premature birth (36, 56, 110, 213), but others have found no such association (51, 81, 94, 169). Both premature delivery and fetal growth retardation can result in low-birth weight babies, who are at greater risk of dying in infancy (210).
- **Milk diminution:** If mothers have their next child while they are beastfeeding, they are often less able to produce breast milk for the previous child (2). When children are weaned too soon, their growth suffers, they are more likely to suffer from diarrhoeal disease and skin infections (26), and they are thus at greater risk of

Child Spacing: A Matter of Choice

For couples, child-spacing decisions can be even more complex than deciding when to start having children and when to end childbearing. Whether explicitly or implicitly, couples weigh the benefits of spacing births longer against their social and economic disadvantages. Although, on a national level, longer birth spacing improves children's and mothers' survival and health significantly, for many individuals, the disadvantages may outweigh the additional health benefits of another year or two of spacing.

Longer birth intervals are healthier for mothers and their children, enable parents to devote more of their time to each child in the early years, give parents more time for activities other than child-rearing, and often ease pressure on family finances. These are not the only factors that couples consider in making decisions about child spacing, however.

Many couples consider how birth intervals affect the mother's employment. For example, in Canada, Ethiopia, and Nigeria, research finds that women who work outside the home tend to space their children more closely to complete their families quickly and thus minimize their time out of the workforce, or to compress the economic and physical burdens of child-rearing (71, 126, 143). Other couples space their births based on whether or not childcare is available and affordable. In Taiwan, for instance, couples often space their children close together while they live with the husband's parents because the parents provide childcare (34).

In some countries, as women tend to marry at older ages, they may want to have children sooner rather than later (8, 197). In Ghana, for example, women who marry later tend to have their children in rapid succession (63, 123). Women may also speed up childbearing as they get older to have as many children as possible before menopause, as in India (132, 200).

Just as some couples space their births based on their own needs or desires, others prefer to leave childbearing unplanned, to fate, or up to God, as some women say in surveys (8).

Since couples' decisions about birth spacing are influenced by their individual situations and desires, and not just by the health benefits of longer intervals, new messages that inform couples that 3- to 5-year birth intervals are optimal need to be sensitive to their preferences. In particular, couples should not be blamed for choosing shorter intervals or made to feel they are bad parents.

Couples and individuals need to make their own spacing decisions based on accurate information and a range of contraceptive options (188). Health care providers and programs have a responsibility to help them. Regardless of how long couples choose to wait between births, programs and providers need to respect and support their decisions.

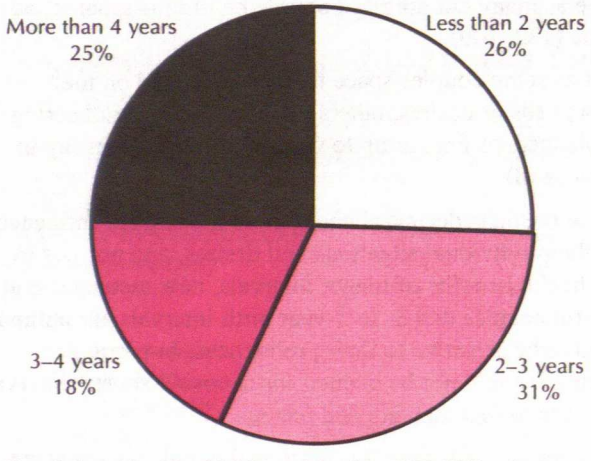
Harvey Nelson

In Zambia a woman breastfeeds her two children of different ages. Sibling rivalry begins at the nipple. When young children are close in age, they compete for maternal care and resources.

dying (186). Milk diminution is more likely to occur as women have more children and are undernourished (57). The benefits of longer birth spacing do not diminish significantly when the length of breastfeeding is accounted for statistically, suggesting that birth spacing benefits children through other mechanisms in addition to allowing longer breastfeeding (112, 159).

- **Sibling rivalry:** When children are close in age, they compete for resources and for maternal care (128). Mothers may not be able to breastfeed the older sibling properly, either because her milk flow slows or because her time is taken up by the newborn. Mothers also may not be able to breastfeed the newborn properly, placing the newborn at higher risk for nutritional deficiency, infectious diseases contracted from older siblings, and other health problems as immunity declines (23, 165). It is unclear whether siblings' competition for resources is important to explain the effects of short spacing, however. The risk of mortality for the older sibling remains the same when the newborn dies (42, 175), but the risk of mortality for the newborn declines when the older sibling dies (7) or when the older sibling is age five or older (159).

Figure 2. Birth Interval Lengths in 55 Countries Surveyed by DHS, 2002



Note: Estimates based on birth interval data from 1990–2001 and population estimates for 2002 from 55 countries in sub-Saharan Africa, Central Asia, Asia and the Pacific, Latin America and the Caribbean, and Near East and North Africa.
Interval data from Demographic and Health Surveys (DHS) (STATcompiler) and population data from United States Census Bureau International Data Base (IDB).

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Why intervals longer than 5 years are less healthy. Little is known about why birth intervals longer than five years are less healthy for mothers and their children. The DHS and CLAP researchers suggest that, after five or more years of not having children, mothers may lose the protective benefits of previous childbearing, such as a reduced risk of pre-eclampsia and eclampsia. Thus they may be just as likely to experience the health problems associated with pregnancy as first-time mothers. Their children also could be just as likely to experience health problems or a higher risk of death as first-born children.

Many women in developing countries suffer from reproductive health problems—such as pelvic inflammatory disease and uterine fibroids—and are thus less fertile. These women may become pregnant only at lengthy intervals (95, 140, 193), and their higher risk for pregnancy complications could be due to underlying reproductive health problems, not because of longer intervals (1, 13, 20).

Actual Versus Preferred Birth Intervals

On average, women in developing countries have much shorter birth intervals than they would prefer (15). Many women not only are unable to achieve their own reproductive goals but also are falling far short of the 3- to 5-year intervals that new evidence suggests are healthiest. If more women achieved their preferred birth intervals, fertility rates would fall further, since longer birth intervals typically mean that women have fewer children over the course of their reproductive lives (29).

Actual Birth Intervals

Birth intervals are growing longer, yet most are still short of the healthiest interval of 3 to 5 years. The median birth interval in developing countries is about 32 months, 4 months short of 3 years, based on **Population Reports** analysis of 55 countries with DHS data. While this statistic suggests that many women are close to reaching the healthiest birth interval, in fact, 57% of women in the countries included in the analysis space their births shorter than 3 years (see Figure 2).

Current birth intervals. Many more women need to space births longer to realize the health benefits. Even in Indonesia, where median birth intervals are longest at 45 months, 36% of women have birth intervals shorter than 3 years. In Zimbabwe, with the second-longest median birth interval at 40 months, 40% of women have birth

intervals shorter than 3 years. (The median is the exact "middle" birth interval of a country, with half of women having longer birth intervals and half having shorter intervals than the median. See box, p. 10).

In each region, the population-weighted proportions of women with birth intervals shorter than 2 years, 2 to 3 years, 3 to 4 years, and over 4 years are similar. The percentage of women with birth intervals shorter than 3 years ranges from 52% in Latin America to 60% in sub-Saharan Africa. Sub-Saharan Africa has fewer women with birth intervals shorter than 2 years than any other region. Only 22% of women have such short birth intervals, compared with 26% in Asia and the Pacific to 31% in Eastern Europe and Central Asia.

Perhaps surprisingly, of the 55 countries in the analysis, the largest proportions of women with intervals shorter than 3 years tend to be in some higher-income developing countries, such as Jordan, Turkmenistan, and Yemen. In higher-income developing countries, use of long-term contraceptive methods for limiting births is more common than use of short-term methods for spacing. Birth intervals are shorter in such countries because many women prefer to have their births in close succession and then to use contraception for limiting rather than spacing births (15).

Birth interval trends. Birth intervals are growing longer over time in most countries. Of 34 countries with multiple surveys since 1986, the proportion of women waiting at least 3 years between births has risen between the first and last survey in almost all countries. There are several reasons: Women may be more motivated to space their births because their opportunities for education and employment are expanding, and thus more may want to postpone the next pregnancy (17, 106, 147). Also, people have greater means to control their fertility as family planning services have expanded, particularly in urban areas (see p. 16). At the same time, in some countries economic or political instability may have led more couples to postpone having children (5, 199).

Birth intervals are lengthening faster in some countries, such as Indonesia and Zimbabwe, than in others. In Indonesia birth intervals are rising the fastest. Indonesia's median birth interval has increased from 34 months in 1987 to 45 months in 1997—an average increase of over 1 month every year. The percentage of women with birth intervals shorter than 3 years has dropped from 55% in 1987 to 36% in 1997, a reduction of almost two percentage points per year. Strong government support for family planning, increased access to services, changing reproductive intentions, and high levels of contraceptive use help explain Indonesia's rapid rise in birth intervals (182, 191). Birth intervals are also rising fast in Zimbabwe. The percentage of women with birth intervals shorter than 3 years has been dropping almost two percentage points per year between 1988 and 1999 (see Table 5). Zim-

Table 5. Trends in Birth Intervals

Percentage of Married Women of Reproductive Age Reporting Birth Intervals Under 3 Years, Multiple Surveys, 1986–2001

	Survey Period				Number of Years Between First and Last Surveys	Reduction Between First and Last Surveys*
	1986–1989	1990–1993	1994–1997	1998–2001		
SUB-SAHARAN AFRICA						
Burkina Faso		55		54	6	1
Cameroon		66		63	7	3
Côte d'Ivoire			59	51	4	8
Ghana	54	49		44	10	11
Kenya	68	66		58	9	11
Madagascar		69	67		5	2
Malawi		60		57	8	4
Mali	62		66		8	**
Niger		69		68	6	1
Nigeria		66		62	9	4
Senegal	67	62	60		11	7
Tanzania		59	58		4	1
Togo	56			50	10	6
Uganda	71		70	70	12	1
Zambia		64	64		4	<1
Zimbabwe	61		46	40	11	21
ASIA & PACIFIC						
Bangladesh		54	48	43	6	11
India		61		62	6	**
Indonesia	55	46	41/36[a]		10	19
Nepal			61	60	5	<1
Philippines		67		66	5	1
EASTERN EUROPE & CENTRAL ASIA						
Kazakhstan			57	51	10	6
LATIN AMERICA & CARIBBEAN						
Bolivia	63		64	61	9	2
Brazil	63		51		10	13
Colombia	62	55	54	49	14	13
Dominican Republic	68	64	63		10	6
Guatemala	69		68	68	11	1
Haiti			65	66	6	**
Peru	66	61	55	48	14	18
NEAR EAST & NORTH AFRICA						
Egypt	66	65	58	54	12	12
Jordan		80	74		7	6
Morocco	67	62			5	5
Turkey		54		48	5	6
Yemen		70	68		6	2

** Some displayed amounts are rounded from fractions and therefore do not appear to add properly. Numbers are correct based on actual calculations, however.*

*** In Mali, India, and Haiti, the percentage reporting intervals under 3 years has increased.*

[a] Indonesia had two surveys in this period, in 1994 and 1997.

Source: Demographic and Health Surveys (STATcompiler)

Population Reports

Measuring Birth Intervals

Estimating actual and preferred intervals is important because they serve as powerful tools in research, programming, and advocacy (24). The choice of measurement method depends on the intended use of the data. Researchers often compare actual and preferred birth intervals to estimate the potential demand for family planning services. Programs find it useful to measure the percentage of a population with intervals shorter than 3 years. Programs could measure clients' average actual and preferred birth intervals to assess periodically how well they are helping clients achieve their reproductive intentions. Finally, health advocates can show policy-makers that thousands of children's lives would be saved if women were able to achieve their preferred birth intervals.

Actual Intervals

Intervals can be measured in three ways, and different programs and researchers use different measurements:

- Birth-to-birth interval ("birth interval")—the period between two consecutive live births, from birthdate to birthdate.
- Birth-to-conception interval—the period between a live birth or stillbirth and the conception of the next pregnancy.
- Interpregnancy interval—the period from conception of the first child to conception of the next.

The interpregnancy interval is best used to study relationships with maternal health because it includes some pregnancies that end in induced or spontaneous abortion. This is important because fetuses conceived but not born also influence maternal and child health (38).

The birth-to-conception interval excludes any time spent in pregnancy and is often used by researchers because it is not affected if the second baby is born prematurely. A premature birth influences the relationship between intervals and child mortality; excluding prematurity ensures that any mortality found is due to shorter intervals and not to prematurity (109). The conception date, which is needed to calculate the birth-to-conception interval and the interpregnancy interval, is often difficult to estimate, however (111).

Birth-to-birth intervals, used in the DHS, are easy data to collect and calculate, but they miss spontaneous and induced abortions, thus making intervals seem longer on average than they actually are. Most calculations of birth intervals consider only the interval before the most recent birth in the five years before the survey, since women often cannot accurately recall details from longer ago (24).

Preferred Birth Intervals

Preferred birth intervals are more difficult to measure than actual birth intervals. Estimates usually are based on women's perspectives and do not incorporate their husbands' preferences, because the DHS do not ask men about preferred birth intervals (14, 155). Researchers can measure women's preferred birth intervals in three different ways: asking women what they think is the best interval; asking women about their preference for their next birth interval; and asking women their reaction to their most recent birth interval. There is little consensus on which approach is best (155).

Some DHS ask women, "What do you think is the best number of months or years between the birth of one child and the birth of the next child?" (15). This method requires only one survey question and no calculations. Some researchers, however, say that this question is too abstract and may not reflect an individual's situation or reality (142).

The second approach—asking women who want another child how soon they want to have their next birth—is more practical, and women can relate the question to their personal situations. It is useful for programs assessing their clients' individual situations and reproductive intentions. It may overestimate preferred birth intervals, however, because some women may have already waited longer than they would have preferred, and surveys do not usually record such responses to this question (15, 141).

The third measurement approach is similar to the one used to derive the estimates of preferred intervals in sub-Saharan Africa (see next page). The DHS questionnaire asks, "At the time you became pregnant with (name of child), did you want to become pregnant then, did you want to wait until later, or did you want no (more) children at all?" If a woman says she did want the birth then, the interval is considered her preferred length. If she says she wanted the birth later, her preferred birth interval is the actual interval plus the additional time that the woman reports she would have wanted to wait (141). A disadvantage to this method is that some women are unlikely to say that their child was unwanted or came too soon, thus yielding an estimate that is shorter than their actual preferred interval (27). Also, the question does not offer an option for women who wanted the birth sooner. Thus the resulting estimate is longer than these women actually preferred.

babwe's fast reduction in women with short intervals is largely due to increased access to and use of contraception among young and middle-aged women (116, 170).

In a few countries—Haiti, India, and Mali—birth intervals have not lengthened. The main reason appears to be the decline of traditional practices that contribute to longer birth intervals such as postpartum abstinence and prolonged breastfeeding (33, 125, 200) (see p. 17). Contraceptive use for spacing births is rising only minimally in some sub-Saharan African countries (3, 59).

Preferred Birth Intervals

In many countries women's preferred birth intervals also are getting longer. As contraception becomes widely available and social norms change, more people are choosing longer intervals. For example, one analysis found that between the mid-1980s and early 1990s, average preferred birth intervals rose in all 11 countries in four regions—by 9 months or more in 3 countries (15).

In a study of nine sub-Saharan African countries with repeat surveys, women's preferred birth intervals increased in length in all nine (142). Median preferred birth intervals rose by an average of 5 months between the first surveys, mostly in the 1980s, and the most recent surveys in the 1990s. Countries with the greatest increases in the length of preferred birth intervals were Senegal, at an increase of 9.2 months, and Mali, Uganda, and Zimbabwe, each with a 7.6 month increase.

Pathfinder/JHU/CCP

In rural Egypt a couple and their three children take a walk in the countryside. In Egypt, as in most countries, birth intervals are growing longer over time. The percentage of women with birth intervals shorter than 3 years has dropped from 66% in 1988 to 54% in 2000.

Comparing actual and preferred intervals. In most developing countries women's actual birth intervals are shorter than the intervals they would prefer (15). In several countries, such as in Egypt and Pakistan, however, women's actual intervals are close to their preferred intervals (160). Countries with the longest median preferred birth intervals have the largest gaps between their preferred and actual intervals.

Wide gaps between actual and preferred intervals signify that a transition from high to low fertility is underway: that is, reproductive goals are changing, but contraceptive behavior has yet to follow (141). In many sub-Saharan African countries, women are the furthest from achieving their preferred birth intervals—especially in Comoros, Rwanda, Kenya, Zimbabwe, and Ghana (in order of size of gap). In Comoros women need to lengthen their actual birth intervals the most, by just over half (17 months) to achieve their preferred spacing between births of 47 months (142) (see Table 6).

In almost all sub-Saharan African countries, women who prefer longer intervals are more likely to have a surviving previous child, to be older (until age 40, when the relationship plateaus), to have more surviving children, to know and to use contraception, to approve of family planning, and to be married to a man with more education (142).

If women in countries with the widest gaps between actual and preferred birth intervals achieved their spacing goals, child mortality would drop substantially. In Kenya neonatal mortality would decline by 11%; infant mortality would decline by 13%; and under-five mortality would decline by 17% (142).

Table 6. Actual and Preferred Intervals, Sub-Saharan Africa, 1990–1998

Median Lengths of Actual and Preferred Birth Intervals (in Months)

Country & Year of Survey	Actual Birth Interval	Preferred Birth Interval*	Increase in Interval if Preferred Interval Were Achieved**	% Increase in Interval if Preferred Interval Were Achieved**
Benin 1996	35	39	4	12
Burkina Faso 1992–93	36	40	4	12
Cameroon 1991	32	34	2	6
Central African Rep. 1994	32	36	4	12
Comoros 1996	31	47	17	53
Côte d'Ivoire 1994	32	39	6	13
Ghana 1998	39	52	13	33
Kenya 1998	35	49	14	41
Madagascar 1997	31	37	6	21
Malawi 1992	33	38	4	13
Mali 1996	32	37	5	16
Namibia 1992	35	36	1	2
Niger 1998	31	34	3	10
Nigeria 1990	32	32	<1	1
Rwanda 1992	33	47	15	45
Senegal 1997	34	40	6	17
Tanzania 1996	35	39	4	12
Uganda 1995	33	35	1	4
Zambia 1996	32	36	4	13
Zimbabwe 1994	40	53	13	34

**Estimates based on whether respondents were satisfied with their previous birth interval. If a woman says she wanted the birth when she had it, the interval is considered her preferred length. If she says she wanted the birth later, her preferred birth interval is the actual interval plus the additional time that the woman reports she would have wanted to wait.*

*** Some displayed amounts are rounded from fractions and therefore do not appear to add properly. Numbers are correct based on actual calculations, however.*

Source: Rafalimanana and Westoff, 2001 (142)

Population Reports

Contraception for Spacing Births

Around the world millions of women use temporary contraceptive methods to achieve their preferred birth intervals. All forms of contraception except for female sterilization and vasectomy are temporary and can be used to space births as well as to limit births—that is, to avoid having any more children.

Many other women, however, are not using contraception even though they would prefer to space their next birth. These women are considered to have an unmet need for family planning. Levels of unmet need for family planning among women who want to space births are even higher than among women who want to limit births, particularly in sub-Saharan Africa.

The number of women currently using contraception to space births plus the number with unmet need equals the total potential demand for contraception for spacing. While many women with an unmet need for spacing do not intend to use contraception, many others probably would use temporary contraceptive methods if various obstacles were overcome (151). Family planning programs can do more to overcome the obstacles.

Total Potential Demand for Spacing

In developing countries the total potential demand for contraception to space births is large—at about one-third of all women of reproductive age, based on **Population Reports** analysis of 54 countries with data from the DHS. Married women with few children account for most of the potential demand for birth spacing. Also, some married women with no children want to delay first births (16, 79).

Almost half of total potential demand for contraception worldwide is among people who want to have more children in the future. In other words, the level of potential demand for spacing births is about the same as for limiting births. In 45 of 54 countries, however, less of the potential demand for spacing is being satisfied. One implication is that family planning programs do not meet the contraceptive needs of younger women and others who want to space as effectively as they meet the needs of women who want to limit births. At the same time, however, women who want to space their next birth may be less motivated to use contraception than women who want no more births (195). The consequences of a wanted, but mistimed, pregnancy may be less than the consequences of an unwanted pregnancy, and thus women who wish to delay their next birth may be less likely to use contraception.

Contraceptive Use for Birth Spacing

Among 54 countries surveyed, fewer than one-third of married women of reproductive age are using contraception to space births. Contraceptive use for spacing births ranges from 2% of women in Pakistan to 29% in Zimbabwe.

In most developing countries aside from sub-Saharan Africa, contraception is used much more for limiting than for spacing. In sub-Saharan Africa, however, a majority of contraceptive use is for spacing, because many people want large families, and birth spacing is common in many African traditions (87). Among the 54 countries surveyed, at one extreme, in Niger 84% of the total contraceptive use rate of 8% is among women who want to delay their next birth rather than limit births. In contrast, in India, at the other extreme, contraceptive use for postponing births is just 7% of the total contraceptive use rate of 48%, largely because the national family planning program has traditionally emphasized limiting family size and not spacing (73, 84, 113) (see Figure 3).

The effect of a country's contraceptive use level on the median birth interval varies among countries but appears to be less influential where contraceptive use is lower. An analysis of DHS data from 1990 to 1995 in 27 countries, largely outside sub-Saharan Africa, demonstrates a threshold effect in the relation between temporary method use and the length of birth intervals (131). Where fewer than 30% of women use temporary methods, the specific level of contraceptive prevalence for spacing has no major effect on the country's average birth interval. Once use of temporary methods surpasses 30%, however, average birth intervals are longer.

One explanation is that, since women who want to limit births are more motivated to prevent pregnancy, they are usually the first users of temporary contraception in a country. Eventually, use of contraception becomes more acceptable, and women who want to space their births begin to use it as well. As the percentage using contraceptives for spacing grows, birth intervals begin to grow longer (131). This trend is reversed in sub-Saharan Africa, however, where most contraceptive users have been spacing births (196).

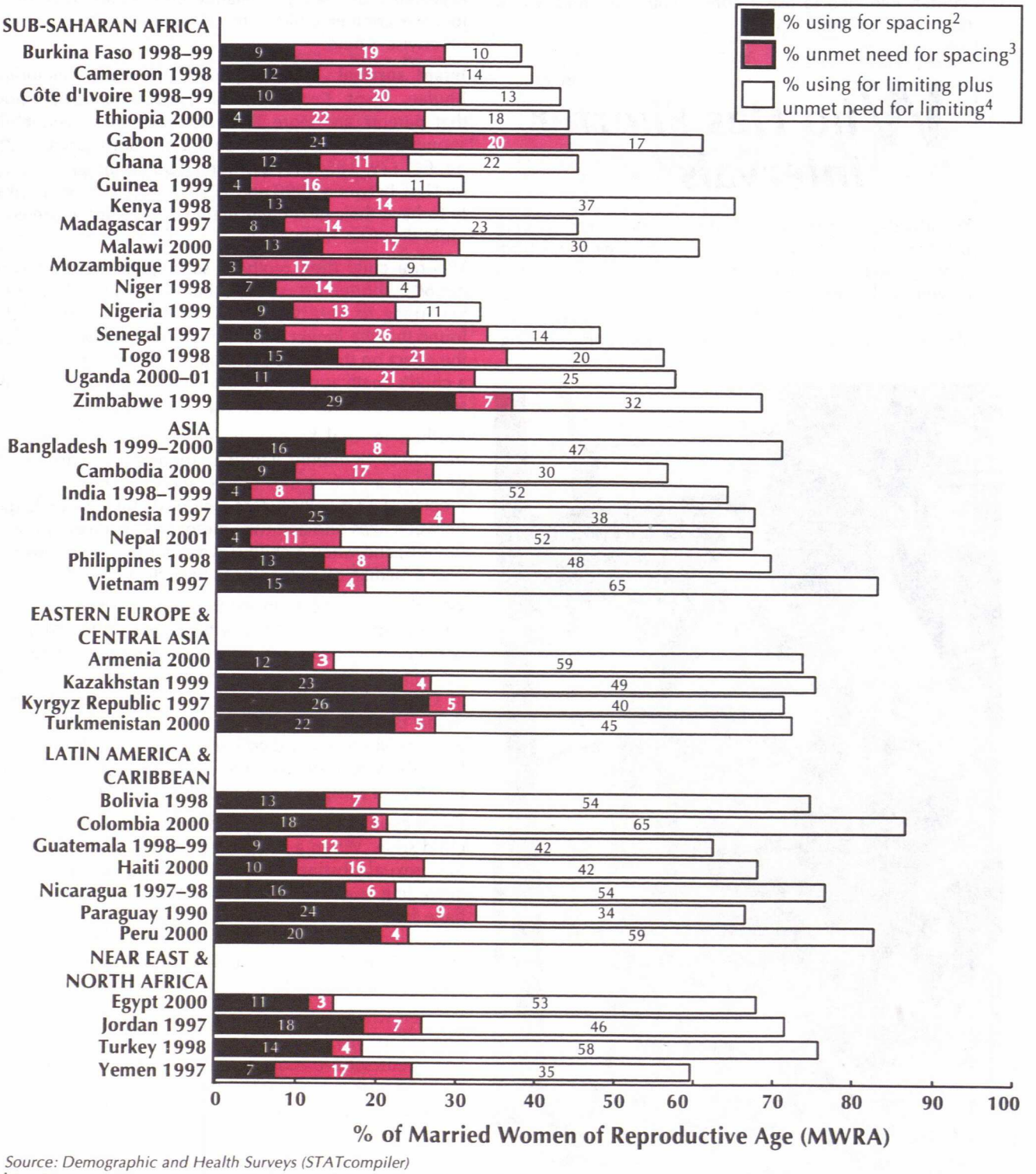
Unmet Need for Spacing

An estimated 17% of married women of reproductive age in developing countries have an unmet need for family planning, a new study has found (156). Among regions, the highest level of unmet need for spacing is found in sub-Saharan Africa, at 16% of married women. The highest proportion of unmet need for spacing births is also in sub-Saharan Africa, at 65% of all unmet need for family planning. Worldwide, more than half of the unmet need is for spacing births (156). Ambivalence, lack of information, and personal and family opposition explain the majority of unmet need among women who want to postpone their next birth. Lack of access to family planning services is also a major factor in many countries (151, 195).

The concept of unmet need for spacing births describes women who are not using family planning and say they want more children, but not for at least two or more years, or who are unsure whether they want to have another child, or who want to have another child but are unsure when. Pregnant women whose pregnancies were mistimed and nonmenstruating women whose last births were mistimed also are included in the definition (79, 198).

Young women and postpartum women have substantial unmet need for spacing. More than 23% of married women ages 15–24 have an unmet need for spacing.

Figure 3. Total Potential Demand[1] for Family Planning for Spacing and Limiting, 1997–2001



Source: Demographic and Health Surveys (STATcompiler)

[1]*Total Potential Demand = contraceptive use plus unmet need for family planning*

[2]*Use for spacing = percentage of MWRA who want more children but not for at least two years and are currently using contraception*

[3]*Unmet need for spacing = percentage of MWRA who want more children but not for at least two years and are not currently using contraception*

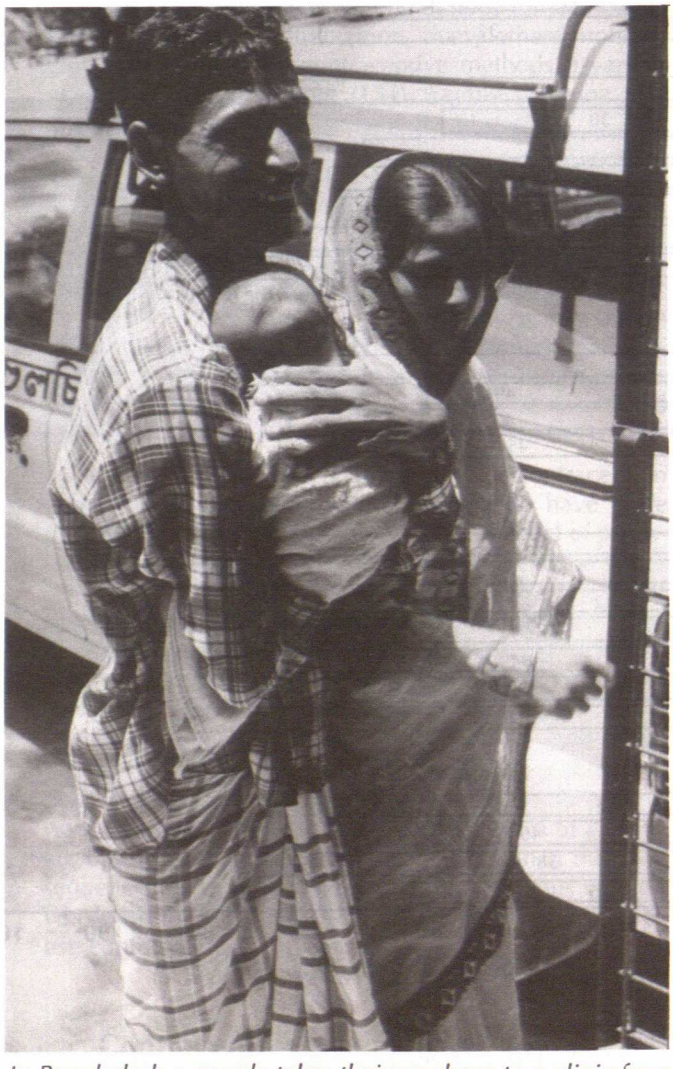
[4]*Use for limiting plus unmet need for limiting = percentage of MWRA not wanting any more children whether or not they are using contraception*

Population Reports

Young women account for one-third of all unmet need (156), most of it for spacing (6, 79). In addition, many postpartum women do not use contraception but intend to do so. A study of women within one year after their last birth, among 27 DHS conducted between 1993 and 1996, found that about two-thirds of them had an unmet need for family planning. Almost 40% of the postpartum women intended to use a contraceptive method within the next 12 months (157).

Who Has Shorter Intervals?

Worldwide, women differ widely in their birth spacing practices. A variety of factors influence a woman's birth spacing, including the health status of her previous child as well as her personal characteristics. Also, traditional practices—particularly breastfeeding and postpartum abstinence, as well as cultural norms—affect birth spacing.



Edson Whitney for JHU/CCP

In Bangladesh a couple takes their newborn to a clinic for a check-up. When an infant survives and is healthy, couples are less likely to have their next child very soon. Programs for child health and for family planning can work together to encourage couples to have longer, healthier birth intervals.

Survival and Health of the Previous Child

The health of a woman's previous child often affects the timing of her next birth. If a child dies, particularly within the first year of life, couples tend to have their next child sooner than if the child survives. Similarly, if a newborn is unhealthy in infancy, couples are more likely to have another child without waiting as long as they otherwise would.

Infant survival. Studies around the world, including Bhutan, Egypt, Kenya, Vietnam, and Zimbabwe, show that parents are more likely to have their next child sooner if a newborn dies than if a newborn survives (25, 64, 68, 139, 185, 211, 212). In all 55 countries surveyed by DHS between 1990 and 2001, women are more likely to have their next child within 3 years if the previous child dies (see Table 7).

When a child dies, mothers' subsequent birth intervals are 60% shorter, on average, than when a child survives, according to data from 46 DHS (62). This study also found that the longer the previous child survives, the less the effect on the subsequent birth interval. After age two a child's death appears not to influence the mother's subsequent birth interval at all (62).

Mothers in rural Senegal have their next birth within a median of 15 months if their infant dies in the first month of life. If an infant dies before age one, mothers wait a median of 22 months before their next child. If a child dies between ages one and two, mothers wait a median of 29 months; and when a child survives for two years, mothers wait a median of 33 months to have their next child (153).

Why does a child's death result in more rapid childbearing? Some couples unintentionally have their next child quickly because a child's early death ends breastfeeding, and women return to menses and resume ovulation sooner (62). In Ghana the median duration of postpartum amenorrhoea dropped from 12 months to 4 months among women whose child died early (123). Data from the 46 DHS show that, on average, child survival increases the duration of postpartum amenorrhea by 178% (62).

Other couples make a conscious effort to replace the lost child soon. When a child dies, the duration of postpartum sexual abstinence can fall by as much as 47%, according to data from the 46 DHS (62). Some studies have found, however, that resumption of sexual activity is less important than the early cessation of breastfeeding in explaining why the next child is born sooner when a previous child dies (129, 181).

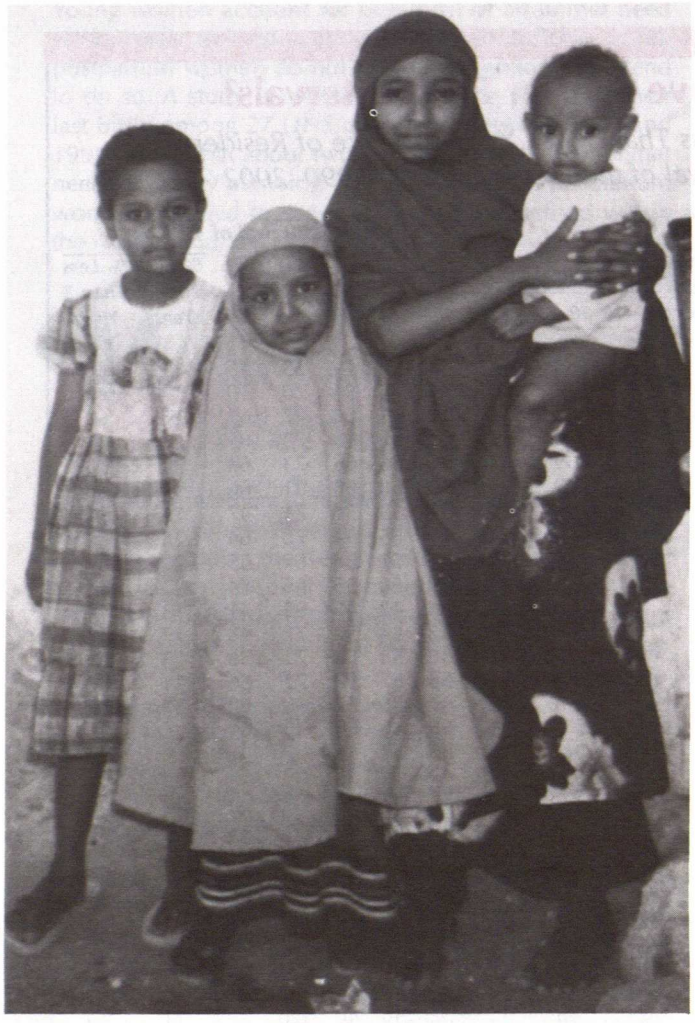
Women whose pregnancies end in miscarriage or abortion are usually more likely to have a next child quickly. Few studies have looked at this relationship, however, because miscarriages, stillbirths, and abortions are rarely recorded. A study by the Latin American Center for Perinatology and Human Development found that half of adolescents age 19 or younger whose pregnancies ended in abortion or miscarriage became pregnant again within 2 years, compared with about one-third of adolescents who had a previous live birth. Among women ages 20 to 24, 28% whose pregnancy ended in abortion or miscarriage became pregnant within 2 years, compared with 21% of those who had a previous live birth (37).

Table 7. Which Women Have Shorter Birth Intervals?

% of Women Who Have Birth Intervals Less Than Three Years by Place of Residence, Education Level, Age, Sex, and Survival of the Previous Child, 1990–2002

	Residence		Level of Education Completed			Maternal Age				Sex of Previous Child		Survival of Previous Child		Total	
	Urban	Rural	No Education	Primary	Secondary or Higher	15–19	20–29	30–39	40+	M	F	No	Yes	% Less Than 2 Years	% Less Than 3 Years
SUB-SAHARAN AFRICA															
Benin 1996	55	60	59	57	46	73	64	55	49	58	59	73	55	17	58
Burkina Faso 1998–99	42	55	54	56	36	77	61	49	44	55	54	70	50	17	54
Cameroon 1998	60	64	69	60	58	84	67	59	54	61	65	77	61	25	63
Central African Rep. 1994–95	65	67	66	68	61	88	72	62	50	67	66	73	65	26	66
Chad 1996–97	69	65	65	69	64	85	69	62	56	66	66	73	64	24	66
Comoros 1996	62	70	68	70	63	76	78	61	61	68	68	81	66	34	68
Côte d'Ivoire 1998–99	42	55	53	49	41	78	55	50	37	53	50	71	47	16	51
Eritrea 1995	61	66	65	63	61	80	70	61	61	65	64	70	64	26	65
Ethiopia 2000	54	58	57	60	60	84	65	53	46	57	58	67	55	20	57
Gabon 2000	53	61	63	57	52	87	60	49	49	56	55	66	54	22	55
Ghana 1998	35	46	46	44	41	71	50	40	38	42	45	65	41	13	44
Guinea 1999	48	54	53	55	42	78	56	51	42	54	52	72	48	17	53
Kenya 1998	53	59	55	59	56	81	64	52	38	58	58	71	56	23	58
Madagascar 1997	64	68	68	68	65	84	73	61	58	67	68	72	66	31	67
Malawi 2000	49	58	56	58	48	85	65	47	41	56	57	68	54	17	57
Mali 1995–96	62	68	67	65	59	80	70	64	56	66	66	75	63	26	66
Mozambique 1997	55	53	52	55	47	68	60	49	38	52	55	65	51	19	54
Namibia 1992	46	61	53	59	54	85	63	53	47	56	56	68	55	22	56
Niger 1998	62	69	69	66	53	83	74	63	57	67	69	79	63	25	68
Nigeria 1999	59	63	62	63	61	81	70	57	49	63	62	77	60	27	62
Rwanda 1992	62	66	65	66	66	78	76	63	54	64	67	78	63	21	66
Senegal 1997	57	62	61	60	56	79	66	57	50	60	60	67	59	18	60
Sudan 1990	66	68	66	68	69	85	74	63	54	67	67	75	66	29	67
Tanzania 1996	47	59	55	59	50	74	66	51	45	58	57	67	56	17	58
Togo 1998	40	52	53	45	40	69	55	47	46	52	48	64	47	14	50
Uganda 2000–01	61	71	65	73	65	88	77	63	53	69	71	75	69	28	70
Zambia 1996	64	64	61	66	60	89	71	57	45	62	65	72	62	19	64
Zimbabwe 1999	33	43	42	40	39	74	46	33	32	40	40	64	37	11	40
ASIA & PACIFIC															
Bangladesh 1999–2000	40	44	45	43	40	76	45	37	28	42	44	64	40	16	43
Cambodia 2000	55	55	55	55	50	89	61	53	46	56	53	73	52	21	55
India 1998–99	61	63	62	64	62	85	67	51	47	62	63	75	61	28	62
Indonesia 1997	35	37	37	34	41	81	44	31	29	37	35	57	34	15	36
Nepal 2001	58	60	60	63	63	97	67	53	38	60	61	71	59	23	60
Pakistan 1990–91	71	65	65	73	73	93	74	63	48	66	69	79	66	33	67
Philippines 1998	62	69	68	69	64	99	80	59	44	65	67	73	66	36	66
Vietnam 1997	37	53	64	50	50	NA	66	40	37	50	52	75	50	19	51
EASTERN EUROPE & CENTRAL ASIA															
Armenia 2000	48	63	NA	NA	56	93	70	32	18	54	58	77	55	34	56
Kazakhstan 1999	40	58	NA	NA	52	NA	69	36	24	48	55	75	49	32	51
Kyrgyz Republic 1997	52	60	NA	NA	58	NA	77	43	24	58	59	84	56	30	58
Turkmenistan 2000	59	75	61	62	69	NA	83	59	28	67	71	81	67	36	69
Uzbekistan 1996	59	64	NA	NA	63	NA	77	47	38	60	65	77	62	30	63
LATIN AMERICA & CARIBBEAN															
Bolivia 1998	54	69	62	68	51	96	72	55	45	62	61	75	60	28	61
Brazil 1996	47	60	60	54	45	95	62	37	36	51	50	75	49	29	51
Colombia 2000	45	56	55	53	44	93	60	39	26	49	49	56	49	27	49
Dominican Republic 1996	58	68	70	64	57	95	69	51	37	63	62	74	62	35	63
Guatemala 1998–99	60	72	72	68	54	97	76	59	51	65	71	76	67	32	68
Haiti 2000	57	69	68	66	54	96	71	65	50	64	67	74	64	27	66
Nicaragua 1997–98	55	66	68	63	48	86	67	52	48	59	61	74	59	32	60
Paraguay 1990	55	74	78	68	56	89	74	61	54	66	66	73	66	38	66
Peru 2000	38	58	56	56	38	85	61	42	33	47	49	64	47	20	48
NEAR EAST & NORTH AFRICA															
Egypt 2000	46	58	57	48	52	91	68	42	31	50	57	69	53	24	54
Jordan 1997	72	81	70	71	75	97	88	66	47	72	75	85	73	44	74
Morocco 1992	51	67	64	52	50	93	73	59	47	61	62	80	60	26	62
Turkey 1998	42	57	59	46	35	87	59	36	26	46	50	82	46	26	48
Yemen 1997	66	69	68	73	68	95	76	63	51	67	70	75	68	37	68
Number of countries where 60% or more of women have intervals less than 3 years	18	35	31	28	19	50	47	15	2	28	29	53	26		

NA=Data not available *Source: Demographic and Health Surveys (STATcompiler)* **Population Reports**



Sammy Ndwiga

In this family in Somalia three sisters care for their younger male sibling. Where a cultural preference for sons is strong, many couples have another child soon after the birth of a daughter and continue having children until the birth of a son.

An African study, however, found that women whose pregnancies end in miscarriage or stillbirths are less likely to have a next child quickly. In The Gambia women who had a miscarriage or stillbirth were more likely than other women to postpone childbearing by using contraception. Some 14% of women who miscarried or had stillbirths used contraception subsequently, far more than the percentage who used contraceptives during breastfeeding or after weaning. When asked why they used contraception after a miscarriage or stillbirth, women reported that they wanted to give their bodies time to rest, recover, and have a better chance of conceiving a healthy baby in the future (21).

Infant health. If a newborn survives but is sickly, women tend to have their next child sooner. One explanation is that sick newborns are less likely to breastfeed (112). If infants cannot breastfeed often and intensely, mothers resume ovulation more quickly and, without contraception or sexual abstinence, may soon become pregnant again (115). Also, if a woman is worried that her sick child will die in infancy, she may try to have a healthy child quickly. For this same reason, mothers whose newborns are low in weight at birth may have their next child quickly, too (18, 112).

Women's Characteristics

A variety of demographic and socioeconomic characteristics influence women's spacing practices. These include a woman's age at the birth of each child, the number of children she already has, and her educational attainment, social status, labor force participation, and place of residence.

Maternal age and number of children. Younger women are more likely than older women to have their next child within 3 years (see Table 7). In all 50 countries with DHS data, 60% or more of women ages 15 to 19 have birth intervals shorter than 3 years. In only 2 of 55 countries do 60% of women ages 40 and older have birth intervals shorter than 3 years. In a few countries, such as Botswana, Brazil, Ethiopia, and Togo, there is little or no difference after age 30.

In most countries women with fewer children have shorter birth intervals than women with more children, but in a few countries the reverse is true. In 21 of 28 countries studied with DHS data, women with one or two children had shorter birth intervals than women with four or five children. In 19 of the 28 countries, their birth intervals were shorter by 2 months or more, and in 4 countries intervals were shorter by 4 months or more. In five countries, however—Brazil, Colombia, Indonesia, Namibia, and Paraguay—women with four or five children had shorter birth intervals (105).

Education. In 38 of 51 countries with DHS data, women with no education were more likely than women with education to space births less than 3 years apart (see Table 7). In seven surveyed countries, however, women with secondary or higher education were more likely to have intervals shorter than 3 years. One explanation is that in these countries women with more education marry at older ages and then have children in quick succession (35, 118, 147). In seven other countries there is little or no difference in birth intervals between women with no education and with secondary or higher education.

Researchers have not explained why women's education levels affect their birth intervals differently from one place to another. Differences in childbearing preferences may account for some birth spacing differences (see box, p. 7). In some countries women with more education are more likely to use contraception to prolong their birth intervals (166, 184). Also, women with more education may work outside the home or live in urban regions, both of which can lead to longer birth spacing.

Social status and employment. Women with lower status, whether within the household or within society, and women who are not employed tend to have shorter birth intervals than women of higher status or who are employed. For example, in Turkey women with less reproductive and economic decision-making power, and who typically do not work outside the home, have birth intervals 5.4 months shorter than women with more decision-making power and who are usually employed (76). In India women of lower social and economic status have median birth intervals of 14 months compared with 21 months among women of higher status (118). In some countries labor force participation has little or no effect on when women have their first child but influences

when they have subsequent children (46, 127). Also, women who work outside the home, particularly urban women, may be more educated and more likely to use contraception to space their births (166).

Place of residence. In 51 of 55 countries surveyed by the DHS, women who live in rural areas are more likely than women in urban areas to have birth intervals shorter than 3 years. The greatest differences are in Latin America and the Caribbean, Eastern Europe, and Central Asia. In only three countries—Chad, Mozambique, and Pakistan—are urban women more likely than rural women to have birth intervals shorter than 3 years. In two countries there is little to no difference (see Table 7, p. 15). These findings are not surprising, as urban women have better access to education and employment opportunities.

Cultural Norms

Cultural norms and customs that influence women's birth spacing practices include social pressure for women to prove their fertility and breastfeeding and postpartum abstinence practices. Preferences for male children can also affect birth intervals.

Pressure to prove fertility. Couples who face pressure for childbearing from their families or society want to have their first child soon after marriage and continue to have children rapidly. In some societies having many children and having them quickly is a sign of male virility and female fertility. In traditional Indian society, for example, childbearing brings prestige to a new wife, and so couples have their first child quickly (118, 148). Social pressure to bear children quickly also is common in sub-Saharan Africa and the Near East and North Africa (49).

Breastfeeding practices. Whether women breastfeed at all, how frequently, and how long influence their birth spacing practices (54, 72, 119, 208, 209). In nearly all developing countries nearly all women breastfeed their newborn children (65, 93). Breastfeeding differs among cultures both in duration and frequency, however (93, 206). Among developing regions the duration of breastfeeding ranges from an average of 14 months in Latin America and the Caribbean to 21 months in sub-Saharan Africa (65).

Breastfeeding practices help determine how long women will remain amenorrheic—without menses and thus less likely to get pregnant—after giving birth (207). Women who fully or nearly fully breastfeed their infants remain amenorrheic longer (92). Among 55 countries with DHS data, women in sub-Saharan Africa have the longest median duration of postpartum amenorrhea, ranging from about 7 months in Comoros to 17 months in Rwanda. Women in the Near East and North Africa have the shortest duration, from 3 months in Turkey to 6 months in Yemen. Having more children and being poorly nourished also lengthen amenorrhea (207).

Postpartum abstinence. Couples who do not practice postpartum sexual abstinence—avoiding sex for several months after a birth—tend to have their next child quickly. Postpartum abstinence is common in many countries, however. When the length of such abstinence exceeds the length of postpartum ammenorhea, this practice can help women delay their next pregnancy.

Traditional beliefs often influence sexual activity after childbirth (149). In Lesotho, for example, mothers are separated from their husbands for as long as the mothers are breastfeeding because they believe that having sex with a lactating woman would spoil her milk (98).

While taboos against postpartum sexual activity are widespread, particularly in Africa, the duration of postpartum abstinence varies greatly both within and among countries (190). Among 55 countries surveyed by the DHS since 1990, the median duration of postpartum abstinence in sub-Saharan Africa ranges from 2 months in Uganda to 22 months in Guinea. Elsewhere, with few exceptions the period ranges from 1 month to 3 months. In countries where the period of postpartum abstinence is nearly the same or shorter than the period of amenorrhea—as in Chad, Guatemala, and Nepal—abstinence alone has little effect on birth intervals (62).

In many countries the effects of postpartum abstinence and amenorrhea combined—postpartum insusceptibility—account for birth spacing for up to 2 years (65, 179). In 26 of the 55 surveyed countries, the median duration of postpartum insusceptibility is 1 year or more, and nearly 2 years in Burkina Faso and Guinea. The median duration is less than 6 months in only nine countries surveyed.

Son preference. Couples who prefer sons tend to have their next child soon after the birth of a daughter. In China, for example, among women who had given birth to a girl most had their next child within 37 months. In contrast, among women who had a boy, most had their next child within 46 months (58). Among 55 countries with data, women are more likely to have a next child within 3 years after the birth of a daughter than after a son's birth in all regions except Latin America (see Table 7, p. 15).

The preference for sons is especially strong in South and East Asia, where people often value male children differently from female children. In Korea, for instance, sons continue the family lineage, perform prayers to ancestors, and can help support parents in their old age (96). Similarly, in India sons tend to have higher economic, social, and religious value to their parents (11), while girls may be considered an economic liability (88).

How Programs Can Help Couples Space Births

Although not always addressed specifically, promoting birth spacing has long been a central goal of family planning programs around the world (150). The new evidence for the benefits of spacing births 3 to 5 years apart argues for renewed emphasis on helping couples space births, especially young women who want to postpone their next pregnancy longer. Expanded access to good-quality family planning services through a variety of avenues will help women achieve their preferred intervals.

Program strategies will be different in communities where preferred birth intervals are shorter than 3 years than in those where preferred intervals are longer than 3 years.

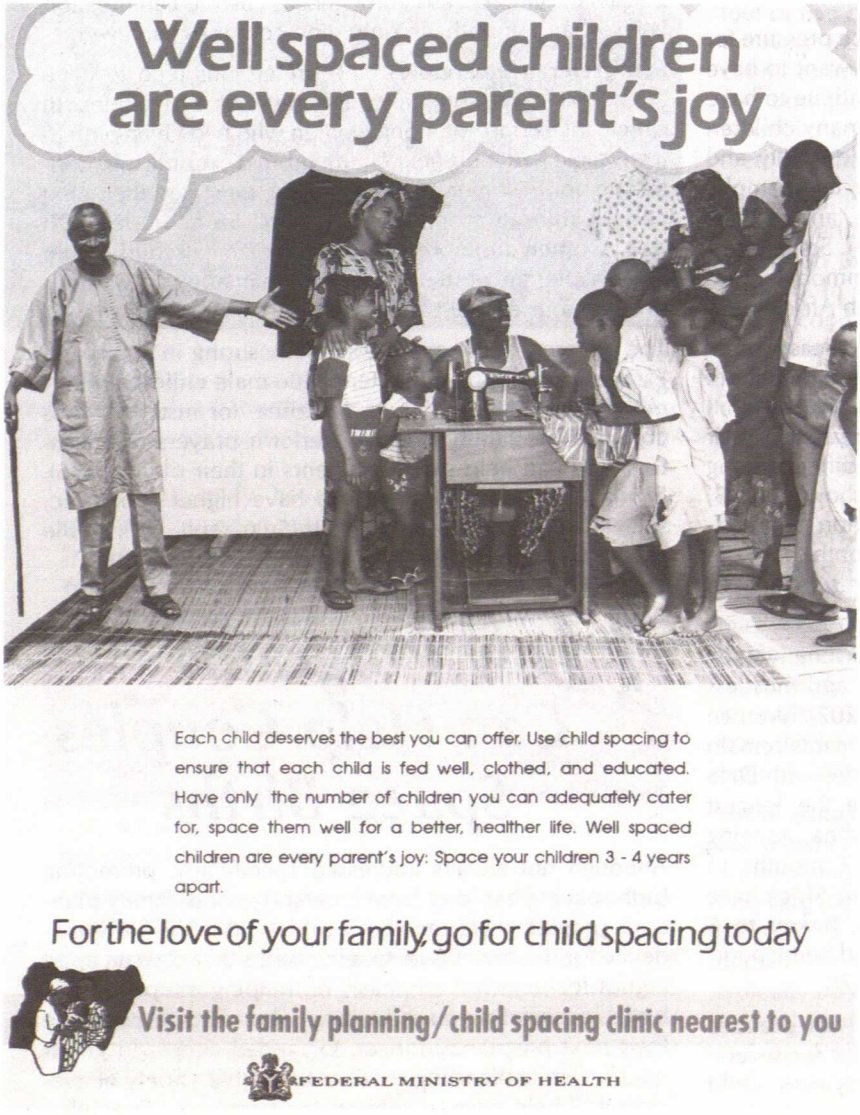
In the former, programs can focus more on developing messages that explain to all family members the benefits of spacing births by 3 to 5 years. Where women and couples already want longer birth intervals, programmatic efforts can focus on increasing access and successful continued use of contraceptive methods to help people achieve their spacing goals.

Developing an Effective Message

The mass media and communication programs could do more to raise awareness of the benefits of birth spacing. A better understanding is needed, however, of what messages elicit the best responses from different audiences. Programs need to test whether people respond to messages that emphasize the health benefits, and also whether they respond to messages that stress the social benefits of longer birth intervals, such as increased savings, time, and attention to the family. In a 1992 survey in Nigeria, for example, at least 85% of women and at least 68% of men agreed with the statements that spacing helps a mother to regain her strength before having her next baby, that child spacing protects the health of mothers, and that child spacing helps the health of children (86). At the same time, in Uganda, interviews in 1992 found that women who viewed birth spacing positively cited other benefits, including having older children to help raise their younger siblings. One woman said that birth spacing helps women look younger. "Delivery every year will make you look unhealthy and ugly," she told the interviewers (50).

Since most women do not make decisions about family planning by themselves, messages for husbands, mothers-in-law, and other family members also are useful. The benefits of spacing can appeal to all members of the household. For example, in a 1996 study in Jordan, one male respondent summarized the variety of benefits of longer birth intervals, saying that births that are spaced "give each child born his rightful level of caring and attention, and they give your wife the time to rest and regain her health. They give the husband the chance to weigh his financial situation and plan his family's future" (52).

Another area needing research is which messages are easiest to understand and remember for all women and couples. Birth to pregnancy intervals may be preferable because they explain when a woman can become pregnant again, rather than when she can have another birth. Some have suggested a message that explains that a woman should use contraception until her youngest child is two to four years of age. Remembering this message, a woman would not need to subtract nine months of pregnancy, as she would using a birth to birth interval, to calculate whether she has spaced sufficiently to receive the health benefits (178). The Nepali slogan, "When the first child goes to school, then only a second child," aired on radio stations across the country, illustrates how long couples should space (104).



Nigeria Federal Ministry of Health, Health Education Division

In Nigeria the Ministry of Health encourages families to space their births 3 to 4 years apart. Posters and other media can inform parents that spacing births improves health and can help families provide for their children better.

Communication campaigns in several countries have already begun using the 3-year message. Posters from the Planned Parenthood Association of Ghana, for example, encourage parents to space their births 2 to 3 years apart (137). Posters from India's State Innovations in Family Planning Services Agency urge couples to wait at least 3 years (176). Nigeria's State Ministry of Health encourages birth spacing of 3 to 4 years (122). In Bangladesh posters suggest that couples wait 5 years between births (158) (see photos, this page and opposite). Most of these communication campaigns point to the social and economic benefits of spacing for their audiences rather than to the health benefits.

Changing the message? Communication programs with the new message of 3 to 5 years may need to address the apparent conflict with the 2-year spacing message of the past. The 2-year message has enjoyed widespread recognition. For

example, when asked in surveys what is the best number of months between births, most women in most countries respond that an interval of 2 years or more is best (15). In Malawi 95% of women responded to a survey that an interval of 24 months is desirable and, 59% said that waiting 36 months is even more desirable (189).

Because so many people believe that 2 years is the preferred interval between births, moving away from so well-established a message should be handled carefully. If people start to hear that spacing 3 years is better than 2, they may get confused about why the preferred interval has "changed." The facts themselves have not changed, of course. Messages can communicate that waiting 2 years between births clearly improves child survival, while waiting 3 to 5 years is even better. Above all, messages should convey that the best intervals are those that women choose for themselves based on their individual circumstances.

Finding the right term for birth spacing or longer birth intervals—without confusing the term with family planning in general—is a good starting point for developing messages. In many places where family planning is not yet widely accepted, the phrase "birth spacing" is used as a substitute since it is more acceptable (194). For instance, in Jordan, where many people believe that God alone determines the number and timing of children, a major initiative of the national family planning program was named the Jordan Birth Spacing Project (12, 135, 174). Usually programs with names that include the phrase "birth spacing" focus on increasing contraceptive use rather than specifically on achieving longer birth intervals.

Some languages have no word for birth spacing, and birth spacing advocates may need to develop new terms based on audience research and testing. In Nepal before 1990, the generic Nepali term for family planning, "pariwar niyogen," was commonly used to mean sterilization. Family planning programs were concerned that villagers would interpret a health worker's advice to "use a family planning method" as "have a vasectomy or tubal ligation"—advice that would not be attractive to young couples (204).

In the early 1990s World Education, Inc./Nepal, in collaboration with the Ministry of Education and Culture and the Program for Appropriate Technology in Health, first conducted focus-group discussions to learn how villagers talk about birth spacing. Nepali farmers mentioned that they often leave yams, turmeric, ginger, and sugarcane to grow for 3 years before harvesting and therefore, an analogy to these crops would be meaningful in messages promoting 3- to 5-year birth intervals. A contest elicited several potential terms for birth spacing, and field testing determined that one term ("janma antar"—literally "birth gap") was better understood and more acceptable than other terms among both villagers and family planning administrators. Today, the Ministry of Health, the Nepal Contraceptive Retail Sales Project, and nongovernmental organizations throughout the country use the term "janma antar" in training and client communication materials (168). With more research and use of different birth spacing messages, the best ones will become apparent, making it easier for advocates to raise awareness of the benefits of longer birth intervals.

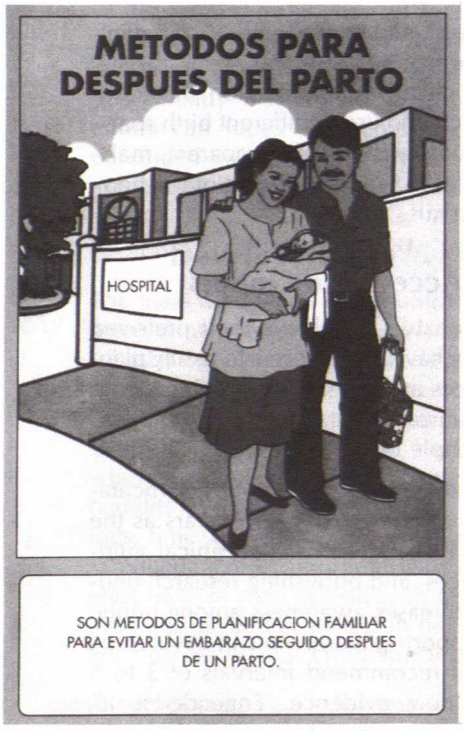
Expanding Access and Outlets

Many women will be unable to achieve their preferred birth intervals unless they have better access to family planning supplies and services appropriate for spacing. Some technical assistance organizations are focusing on expanding access to enable people to space their births further.

A major focus of the Catalyst Consortium <www.rhcatalyst.org> is to increase awareness of 3 to 5 years as the optimal birth interval (177). By offering technical guidance, holding conferences, and publishing research findings, the Consortium increases awareness among public health agencies and supports governments in developing medical guidelines that recommend intervals of 3 to 5 years, based on the new evidence. EngenderHealth <www.engenderhealth.org> provides technical assistance on birth spacing, particularly in clinic-based settings, so that women have better quality services to

State Innovations in Family Planning Services Agency (SIFPSA)

Left: Used in provider training and client educational materials, this Nepali logo illustrates that couples should wait until the older child is in school before having another birth. Right: A poster in India suggests that couples wait 3 years before having a second child.



PROFAMILIA

In Nicaragua a pamphlet discusses contraceptives that couples can use after the birth of their child. Both the prenatal and postpartum periods are crucial times to provide information about birth spacing.

achieve their spacing goals. It assists countries in updating their national service delivery guidelines and protocols to incorporate recommendations of intervals of 3 to 5 years (136).

Continuity of care. People who want to space births have special needs that family planning programs often do not meet adequately. The higher levels of unmet need for spacing than for limiting suggest this (see p. 12). Women who want to space their births need continuity of care to continue using contraception and achieve their preferred birth intervals (30, 77, 192), to stop use to become pregnant, and then after delivery to start a method that is appropriate during breastfeeding (82). Many studies have found that such good-quality services enable people to continue using contraception for many years (75, 91).

The PRIME II Project <www.prime2.org> uses Performance Improvement methods to identify how health care providers can improve the quality of family planning services they offer to women who want to space their births. Service providers may need new client-provider interaction skills to respond better to the birth spacing needs of younger, low-parity women. The PRIME II Project emphasizes self-directed learning and interactive instruction so that service providers do not need to leave the service delivery site to learn new skills (78).

Access to sources of supply. Access to good-quality contraceptive services and a range of methods helps people to space births. Sometimes having a nearby source is key to continuation of contraceptive use. Broadening the types of service delivery can provide more choices closer to home, especially for people whom conventional programs have difficulty serving, such as young women, people with low incomes, and women who cannot easily leave their homes (138). Programs can deliver methods through community-based distribution, private-sector sales including social marketing, and private providers, as well as through family planning clinics and hospitals.

A full range of methods. When more contraceptive methods are available, more couples who want to space births can find a method that suits them. All programs should offer at least several temporary methods, such as condoms, pills, injectables, implants, or IUDs, in addition to permanent ones. The options to switch from one method to another and to choose a different method after giving birth are central to continued satisfactory use of family planning (60). Providers should make clear that all clients have the option to switch methods whenever and as often as needed, and that they should return if they experience any problems (188).

Today, some women cannot always get the contraceptive methods that they prefer (157). In many programs stockouts and other problems in the supply chain prevent women who want longer birth intervals from obtaining a continuous supply of their preferred method (146, 163, 164). Offering a range of methods also helps ensure that at least some methods will always be available even when some shortages do occur (31). Other women do not want to use a supply method of family planning but do not know that they can control their birth intervals by using the Lactational Amenhorrea Method (LAM) or other fertility awareness-based methods (40). Offering a wide variety of contraceptive methods, along with accurate information about the benefits of spacing, will help women space their births longer.

Working with communities. Community norms help shape people's decisions and expectations about their birth intervals (see p. 17). Communication campaigns that speak to the needs of younger couples and new parents can help make 3- to 5-year birth intervals a social norm. Learning more about women's birth spacing practices and their needs can inform effective birth spacing messages. Also, providers can counsel women better if they understand cultural practices and traditional beliefs including taboos on breastfeeding during pregnancy and sexual relations during lactation (187).

The Catalyst Consortium is conducting focus-group discussions in five countries—Bolivia, Egypt, India, Pakistan, and Peru—to learn why women space their births. They hope to understand their ideal interval lengths and, for women who prefer intervals of 3 to 5 years, which benefits motivate them most. The Consortium plans to publish the results in 2002. The results will be used to develop training modules to improve counseling (177).

Prenatal and postpartum care. The prenatal and postpartum periods and up to a year after a woman gives birth are crucial times for information and counseling about birth spacing, since most women see health care providers more often during this period (48). Most of the time these contacts rarely include opportunities for discussion and counseling on birth spacing (157). During a woman's prenatal period, health care providers can discuss the health benefits of spacing pregnancies and can encourage women to continue receiving reproductive health care between pregnancies (89).

As part of postpartum care, providers can tell women about LAM, explaining that during the baby's first six months, fully or almost fully breastfeeding can prevent pregnancy, so long as the woman has not menstruated yet (66, 205). Providers can advise women that IUDs, condoms, and vaginal methods are appropriate methods during breastfeeding. Hormonal methods are not the first choice, but progestin-only pills, injectables, and implants can be used after six weeks postpartum (66, 82). Combined hormonal methods—combined oral contra-

ceptives and monthly injectables—should be avoided because they may reduce production of breast milk.

Child health programs. Because birth spacing helps protect child health, the 3-year message complements efforts of child health programs. Well-baby visits and immunization visits provide opportunities for health staff to counsel parents of young children about the benefits of waiting 3 to 5 years for the next child. Of course, spacing births 3 to 5 years in and of itself will not ensure child survival and good health. Parents can help safeguard their baby's health by ensuring skilled care at delivery, arranging for a clean sterile delivery, keeping the newborn warm, starting exclusive breastfeeding immediately and supplementing with appropriate and nutritious complementary foods after six months, maintaining hygiene during infancy and early childhood, and obtaining all the recommended childhood immunizations (41). Women who are HIV-positive can avoid breastfeeding and use formula instead if they have access to a clean, consistent, and affordable supply (120).

Improving women's status. Over the long term, improving women's status can contribute to longer birth intervals. For example, if parents can feel that their well-being is as secure with female children as with male children, they may want to wait longer before having another child (132). When women have more decision-making power in the household, they tend to have longer birth intervals (see p. 16). Women's status can be improved by raising age at marriage, increasing education, and expanding employment opportunities. Improving opportunities for women will enable them to make the healthiest choices about birth spacing and about childbearing in general.

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An asterisk (*) denotes an item that was particularly useful in the preparation of this issue of **Population Reports.**

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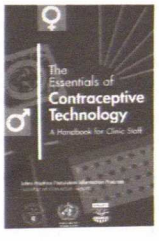

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