

Prolonged Breastfeeding as a Birth Spacing Method

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The majority of mothers in developing countries start nursing their babies after birth and continue for one to two years.¹ One reason that nursing in developing countries is common and prolonged is the widespread belief that it is effective in postponing the next conception (Association Algerienne, 1971; Jelliffe, 1967; Marzouk, 1972; Niehoff and Meister, 1972; Wyon and Gordon, 1971; and Yaukey, 1961). This paper summarizes findings of recent investigations on the fertility reducing effect of breastfeeding. These studies fall into two groups: those that determine the effect of lactation on pregnancy and birth intervals; and those that focus on the impact of lactation on the resumption of ovulation and menstruation.

Impact on Fertility

One way to measure the impact of lactation on fertility in noncontracepting populations is to compare birth (or pregnancy) intervals of women who initiated nursing after childbirth with those of women who did not nurse. Historical studies of European populations and more recent surveys in the rural Punjab, India, and Taiwan have found that birth or pregnancy intervals of women who nursed an average of one to two years and did not practice contraception were, on the average, five to ten months longer than those of women who had fetal or infant deaths and therefore did not nurse (Knodel, 1968; Potter et al., 1965; Jain, 1969b). Since birth intervals in noncontracepting populations where breastfeeding is common and prolonged range from approximately 30 to 33 months (Potter, 1963), the practice of nursing increases the length of intervals by an estimated 15–33 percent.²

Investigations among Indians in the Punjab and Eskimos in Alaska have compared pregnancy rates at various intervals after birth for those who continue to nurse with rates for those who are not nursing. Results of these studies, using life-table techniques, are presented in Table 1. In both studies, conception rates of women who were not using contraceptives and who continued to nurse remained low for nearly a year after birth. (For example, 98 percent of the Indian women who nursed seven months or more had not conceived at the end of six months.) However, the cumulative conception rate of nursing women increased to 13 percent after one year and continued to increase rapidly thereafter, even though women were still nursing at the time of conception. (It should be added that postpartum abstinence in the Indian population may have lowered the conception rate in the first half-year after birth since abstinence lasted four months on the average after birth.)

Although the pregnancy rates of the non-nursing women increased much faster than the rates of the nursing women, the

TABLE 1 Proportions of lactating and non-lactating women pregnant by months since last delivery

Months since delivery	Lactation		No Lactation	
	Punjab, India ^a	Eskimos, Alaska ^b	Punjab, India ^c	Eskimos, Alaska ^d
0	.00	.00	.00	.00
3	.004	.00	.07	.09
6	.02	.01	.40	.44
12	.13	.19	.55	(.82)
18	.44	.42	.62	u
24	.59	.53	(.70)	u
30	.74	(.78)	u	u
36	.80	u	u	u
Number of women	800	300	200	100

NOTE: Rates calculated using the life-table method.

() = Based on fewer than 25 women.

u = unavailable.

^a The group of Indian nursing women refers to all women aged 20–29 who initiated nursing after last delivery. It is possible that some of them stopped nursing shortly after birth and before conception took place. However, the large majority of the women nursed until or after they became pregnant. Contraceptives were rarely used by this group of women. Figures adapted from Potter et al., 1965, p. 392.

^b Adapted from Berman et al., 1972, p. 529.

^c The Indian women were not nursing because of fetal death. Adapted from Potter et al., 1965, p. 389, and Ross, 1970, p. 9.

^d No information is available on whether the non-nursing Alaskan women had experienced fetal death or were bottle feeders. Adapted from Berman et al., 1972, p. 529.

rates of the non-nursing women were still fairly low three months after delivery because of the temporary sterility associated with the puerperium and, in the Indian study, possibly because of abstinence. A comparison of the nursing and non-nursing groups makes it clear that the fertility reducing effect of lactation is substantial, but that this effect lasts a little less than a year.

These and other studies have also examined the extent to which fertility is reduced in the amenorrheic period and the extent to which it is reduced in the months following resumption of menstruation.

Lactation amenorrhea is defined as the postpartum amenorrheic period associated with breastfeeding. Conception can occur during this period whether or not the woman is still nursing. Table 2 presents percentages of nursing and formerly nursing women who conceived during lactation amenorrhea, and pregnancy rates standardized per 100 women per year of amenorrhea.³ Conceptions during lactation amenorrhea in the

³ It was not possible to calculate pregnancy rates by months after delivery with the life-table method since no data have been published on the timing of the conceptions in the amenorrheic period. The pregnancy rates of Table 2 should be interpreted with caution. The denominator of these pregnancy rates is the aggregate of all months of exposure contributed by all couples included in the investigation. We have used as an approximation of this denominator the average duration of amenorrhea of all couples, not the aggregate of months of exposure contributed by each of the couples separately. Moreover, there is no exposure to risk of conception during part of the amenorrheic period corresponding to the anovulatory period. No data are available on average duration of the anovulatory period and, therefore, we took the average duration of the whole amenorrheic period.

TABLE 2 Pregnancy rates during lactation amenorrhea: selected studies

Country	Source	Type of design (prospective/retrospective)	Number exposed to risk	Average duration of amenorrhea (months)	Percent conceptions	Pregnancy rate per 100 women per year of amenorrhea
Chile, Santiago	1	p	200	4	7	21
Germany	2	u	700	6	3.9	8
India, Punjab	3	p	1,400	9 ^a	7	9
Singur W Bengal	4	r	1,000	9 ^a	9.4	12
Rwanda, Rural	5	r	700	12	8	8
Urban	5	r	300	12	13	13
United States, Cincinnati	2	r	1,200	6	8.6	17
Spartanburg	2	r	1,500	6	2.9	6

NOTE: The amenorrheic period includes the period immediately following parturition (puerperium), estimated at one month, in which ovulation will not occur regardless of whether nursing was initiated.

u = unavailable.

^aThe figure of 9 months of exposure in the two Indian surveys was derived by subtracting 3 months of abstinence from the 12 months of estimated mean duration of amenorrhea. Three months of amenorrhea are subtracted instead of 4 to make them comparable with the other figures in the table. The periods of amenorrhea in the other figures include one month of exposure in the puerperium, and this month should also be included in the Indian surveys.

SOURCES: 1. Calculated from Perez et al., 1971, p. 502. 2. Calculated from Tietze, 1961, p. 132. 3. Calculated from Wyon and Gordon, 1971, p. 158. 4. Calculated from Rao and Mathen, 1970, p. 54. 5. Calculated from Ferin, 1971, p. 71.

absence of contraception vary from 3 to 13 percent with an average of 7 to 9 percent. Corresponding pregnancy rates standardized per 100 women per year of amenorrhea in most of these studies range from 8 to 17 with an average of 11 to 12.⁴ It is evident that the fertility reducing capacity of lactation during amenorrhea is substantial since pregnancy rates of 8 to 17 are much lower than the rates for fecund women who are not practicing contraception (on the order of 150 per 100 couple-years of exposure).

AFTER RESUMPTION OF MENSTRUATION

Table 3 compares cumulative pregnancy rates of nursing mothers who were not using contraceptives after onset of menses with corresponding rates of newly married women who were not using contraceptives. Pregnancy rates in the nursing group are lower than those in the newly married group for all intervals compared. This suggests that, in the period immediately following resumption of menstruation, fecundity is reduced to some extent as a consequence of nursing.

A more appropriate group for comparison than the newly married women would have been a group of women with one or more children who discontinued use of contraception in order to conceive. Unfortunately, data from developing countries on percentages conceiving after discontinuation of contraception are not available, but it is likely that this group would conceive even faster than newly married women and, therefore, such a comparison probably would also support the tentative conclusion.

Impact on Resumption of Ovulation and Menstruation

The preceding evidence shows that lactation limits fertility, but it does not explain how. In this section we summarize several important recent investigations that shed light on this

⁴Several other studies presenting pregnancy rates during lactation amenorrhea were not used because of the suspected use of contraception during amenorrhea or absence of information on duration of amenorrhea.

TABLE 3 Proportions pregnant among two groups of lactating women (by months since first menses postpartum) and for two groups of newly married women who did not use contraception (by months since marriage)

Months since first menses postpartum or marriage	Lactating women		Newly married women	
	Punjab, India ^a	Eskimos, Alaska ^b	Taichung, Taiwan ^c	Eskimos, Alaska ^b
0	.00	.00	.00	.00
1	.12	.03	.17	.15
3	.22	.19	.39	.48
6	.33	.42	.60	.69
12	.59	.60	.79	.83
18	.74		.88	
24	(.83)		.93	
Number of women	600	100	2,200	100

NOTE: Rates calculated using the life-table method except for Taichung, where rates are cumulative proportions of women pregnant by months after marriage. () = Based on fewer than 25 women.

^aAdapted from Potter et al., 1965, p. 393.

^bThe newly married Alaskan Eskimo group also contains a number of women conceiving in the interval after discontinuation of contraception. Adapted from Berman et al., 1972, p. 530.

^cExcludes those who never conceived up to time of interview. Adapted from Jain, 1969a, p. 74.

question by examining the impact of lactation on resumption of ovulation and menstruation.

LACTATION AND OVULATION

The most important work on the impact of lactation on ovulation and on the timing of ovulation relative to the timing of menstruation has been done in Santiago, Chile, by Perez et al. (1971; 1972) who followed a sample of 200 women prospectively for an average of four months after delivery. The basal body temperature technique and endometrial biopsies were the principal methods used to determine day of first ovulation after delivery. It was found that duration of lactation had a strong impact on onset of ovulation: the longer the period of lactation, the longer the anovulatory period lasted.

TABLE 4 Duration of postpartum amenorrhea by duration of nursing for IUD acceptors in the International Postpartum Program

<i>Duration of nursing</i>	<i>Colombia, Venezuela</i>	<i>Turkey</i>	<i>Thailand</i>	<i>All countries</i>
None	2.3	(4.4)	2.9	2.7
<2 months	2.3	(4.4)	3.2	3.0
2-4	2.7	2.8	3.8	3.1
5-7	3.7	3.6	4.6	4.0
8-10	5.6	4.0	5.4	5.3
11-13	5.9	5.5	7.4	6.7
14-16	6.8	8.0	7.6	7.6
17+	7.9	8.1	9.0	8.6
Mean	3.9	6.2	6.0	5.4
Number of women	1,100 ^a	400 ^a	1,600 ^a	3,100 ^a

NOTES: Most of the IUD acceptors in Latin America came from Venezuela and Colombia, with smaller proportions from Mexico and Puerto Rico. The Middle East IUD acceptors came almost exclusively from Turkey, while the large majority of the IUD acceptors in South and East Asia came from Thailand, with much smaller proportions from Indonesia and the Philippines. Women in amenorrhea at the interview date are excluded.

() = Based on less than 45 cases.

^a Rounded figures.

SOURCE: Sivin, 1974.

The Perez study also presents evidence that ovulation occurred before menstruation in an important percentage of cases. The data show that there was a tendency for the proportion of ovulatory first cycles to increase as the interval from birth increased. No ovulatory cycles were found in the first 30 days postpartum; about half of the first menstrual cycles that ended during days 30-59 were ovulatory; and a little more than 80 percent of the menstrual cycles ending after day 60 were ovulatory. Similar results were found by Elsner (cited by Perez et al., 1971). The results of these two studies differ from earlier findings by Topkins, Udesky, Davis, Lyon and Stamm, Grunberger, Cronin, and to some extent Sharman (all cited by Perez et al., 1971), who conclude that first menstrual cycles are anovulatory in the majority of cases. Perez et al. suggest that they and Elsner found a higher incidence of ovulatory first cycles than other investigators because their period of observation extended to menstrual cycles ending beyond day 60, whereas the other investigations were heavily weighted with first periods occurring before day 60. The finding that it is likely that first menstrual cycles ending more than two months after delivery are ovulatory in the majority of cases helps to explain, in part, one of the findings presented earlier, that 3 to 13 percent of women conceived before resumption of menstruation.

LACTATION AND MENSTRUATION

As Table 4 shows, lactation and postpartum amenorrhea were positively associated in the International Postpartum Program survey. The longer nursing lasted, the longer was the amenorrheic period. When nursing lasted one or two months, menstruation was likely to resume after suspension of nursing; however, as the nursing period became longer, menstruation was much more likely to resume before cessation of nursing. This relationship of lactation (LA) and postpartum amenorrhea (PA) can be expressed as approximately $PA = 2.7$ (months) + 0.3 LA. Similar relationships were found in Taiwan where $PA = 4.0 + 0.4$ LA (Jain and Sun, 1972; Jain et al.,

1970).⁵ The Taiwanese data also show that the relationship of lactation and amenorrhea ceased to exist when length of lactation exceeded 21 months and amenorrhea remained at a level of 12 to 13 months (Jain and Sun, 1972).

These equations imply that the amenorrheic period—the period in which a nursing woman is likely to be protected against the risk of conception—is fairly short even when the average nursing period is long. In the Postpartum Program survey, an average duration of nursing of 18 months led to a period of amenorrhea of about 8 months; in Taiwan it led to around 11 months of amenorrhea.

Lactation and amenorrhea are moderately related: the correlation coefficient in the Postpartum Program survey was .432, and KAP and IUD surveys in Taiwan found values of .455 and .475, respectively (Jain and Sun, 1972; Jain et al., 1970). An implication of this moderate correlation is that the variation around amenorrhea (and lactation) means is considerable. Information on variation in duration of amenorrhea in selected developing countries and in selected rural and urban areas of these countries is presented in Table 5, which shows proportions of women who began nursing and who resumed menses at specified intervals after birth. The data refer to all women who nursed, whether or not they were still nursing when first menses occurred.

As the table shows, in the rural Punjab, India, and in Taiwan, in spite of median lengths of amenorrhea of 10.6 and 10.1 months, 14 percent and 19 percent, respectively, of the women who nursed resumed menstruation less than four months after delivery. A similar variation around the median can be observed among urban women who delivered in hospitals in Thailand and Turkey. Although median duration of amenorrhea in these two populations was about four months, 12 and 13 percent, respectively, of the women who nursed were still in amenorrhea after more than a year. Nearly all women had resumed menstruation 18 to 24 months after birth.

FULL VERSUS PARTIAL BREASTFEEDING

Many women begin with full breastfeeding and later change to partial breastfeeding. (The infant is given supplementary nutrition besides breast milk.) Ovulation is likely to return earlier with partial breastfeeding than with full breastfeeding. Perez et al. found that the probability of ovulation occurring was higher during partial breastfeeding than during full breastfeeding. Jain et al. (1970), and Sharman and McKeown (cited by Salber et al., 1966) also found evidence that menstruation returns later in fully nursing women than in partially nursing women. The fact that many women change to partial breastfeeding, with the associated increased risk of ovulation, helps to explain the finding mentioned earlier that longer periods of nursing become increasingly less effective in delaying resumption of menstruation and ovulation.

In sum, prolonged lactation protects against pregnancy mainly because it delays the return of ovulation. It also delays the return of menstruation, but this is a less valid indicator of the return of fecundity. Full breastfeeding delays ovulation more than partial breastfeeding.

⁵ When there is no nursing, the period of amenorrhea lasts four months according to this equation. This value is in close agreement with the actual value. Mean duration of amenorrhea in Taiwan was reported to be 3.5 months; median duration was, however, 1.6 months (Jain et al., 1970).

TABLE 5 Proportions of nursing women resuming menstruation by months since last birth, selected countries

Months since birth	Punjab, India ^a (rural)	Taiwan ^b (national)	Eskimos, Alaska ^c	Egypt ^d (urban)	Thailand ^e (urban)	Turkey ^e (urban)	Colombia, Venezuela ^e (urban)
0	.00	.00	.00	.00	.00	.00	.00
3	.14	.19	.17	.37	.45	.49	.64
6	.26	.30	.40	.55	.63	.64	.81
12	.57	.59	.66	.81	.88	.87	.96
18	.83	.90	.90	u	.98	.95	.98
24	.93	.97	.96	u	u	u	u
Median ^f	10.6	10.1	8.3	5.2	4.3	3.7	2.9
Number of women	1,400	3,900	200	300	1,600	400	1,100

NOTES: The data include women who gave up nursing soon after birth as well as women who continued for a long time. The rates for Punjab, India, Taiwan, and Alaska were obtained with the life-table method and include the experiences of women with incomplete observations (still in amenorrhea) at date of last observation. The data from the other countries are cumulative proportions of women who resumed menstruation.

u = unavailable.

^a Adapted from Potter et al., 1965, p. 398

^b Adapted from Jain et al., 1970, p. 261.

^c Adapted from Berman et al., 1972, p. 532.

^d Adapted from Kamal et al., 1969, p. 320.

^e Sivin, 1973. The data from the International Postpartum Program do not refer to proportions of women who resumed menstruation between, for instance, 3.0 and 6.0 months after birth, but between, for instance, 3.5 and 6.5 months after birth.

^f Medians were calculated on the basis of the available data.

Implications for Family Planning Programs

Although prolonged lactation has an important fertility reducing effect, it is less adequate as a birth spacing method than modern contraceptives for two reasons. First, the effectiveness of lactation during amenorrhea in preventing pregnancy is lower than that of oral contraceptives and the IUD. Standardized pregnancy rates during lactation amenorrhea range from 8 to 17 per 100 woman-years of amenorrhea (see Table 2), whereas pregnancy rates of oral contraceptives and the IUD range from 1 to 5 per 100 women in the first year of use.⁶ Second, the period of protection against the risk of conception provided by lactation is shorter than that of oral contraceptives and the IUD. Lactation amenorrhea averages a little less than one year in most countries for which data are available and can be substantially shorter in urban areas (see appendix Table A), whereas the average period of use of oral contraceptives or the IUD is 18 months or more in most family planning programs. Moreover, the variation around the amenorrhea mean is considerable: for instance, one-fourth of the women who begin nursing in populations where amenorrhea lasts 10 to 11 months are likely to resume menstruation within six months after giving birth (see Table 5).

Although lactation is clearly less adequate as a birth spacing method than modern contraceptives, it is evident that this practice can provide considerable protection against pregnancy for about a year. Thus, in areas where prolonged breastfeeding is common and where no modern contraceptives are available, its use (and, in particular, the use of prolonged full breastfeeding) as a birth spacing method should be encouraged.

A related question is whether use of lactation as a birth

spacing method should be recommended for women who have access to postpartum family planning services. There are basically two strategies here: the postamenorrheic and the postpartum acceptance of contraception. Advocates of the first approach favor advising women to rely on lactation for birth spacing purposes until resumption of menstruation and recommend supplying contraceptives at that point. Advocates of the second approach favor providing nursing women with the IUD or injectable contraceptives immediately postpartum. The oral contraceptive is generally not recommended for most nursing women because it tends to decrease the volume of breast milk (see, for example, Koetsawang et al., 1972).

The postpartum approach is not advisable where—as in certain Muslim societies—there are very strong cultural beliefs in the pregnancy-preventing capacity of lactation during amenorrhea and where postpartum abstinence lasts for several months. In these societies, efforts to provide birth control methods to nursing women immediately after birth are likely to be perceived as meaningless and to be unsuccessful.

In most countries where family planning services are available, however, the postpartum strategy would seem to be preferable, for the following reasons. The effectiveness of lactation during amenorrhea is lower than that of modern contraceptive methods, and the period of protection is, on the average, shorter. Women are less likely to obtain contraceptives after resumption of menstruation than immediately after delivery. [A study conducted by Echeverry (1973), in Bogota, Colombia, found that 95 percent of those expressing a desire for immediate insertion of an IUD had an insertion prior to discharge from the hospital, whereas only 45 percent of those expressing the desire to return for insertion three months later actually did so.]

A final reason for providing contraceptives to nursing women immediately after delivery can be derived from a mathematical model simulating a number of situations that are likely to occur when the IUD is inserted immediately postpartum or after return of menstruation (Potter et al., 1973). The outcomes of postamenorrheic and postpartum strategies are predicted in terms of the lengths of pregnancy

intervals, and the model takes into account the influence on the pregnancy interval of six interacting variables, namely, length of anovulation, IUD continuation rates, the risk of not returning after menstruation, fecundability level, effectiveness of the IUD, and effectiveness of lactation amenorrhea.

The results of the model show that the postamenorrheic strategy leads to somewhat longer pregnancy intervals than the postpartum strategy for several fecundability levels, lengths of anovulation, and IUD continuation rates. However, this slight advantage presupposes perfect client cooperation. When women accept contraceptive methods on the average of one month or more after onset of menstruation, the advantage shifts to the postpartum strategy. Unless, therefore, women are effectively persuaded to visit clinics promptly after resumption of menstruation—and the chance of succeeding in this is not very high, as we saw above—the postpartum strategy is preferable to the postamenorrheic strategy.

Appendix: Incidence and Duration of Lactation

Lactation is nearly universal in rural areas of developing countries for which data are available (e.g., Association Algerienne, 1971; Jelliffe, 1967; Niehoff and Meister, 1972; Wyon and Gordon, 1971). The percentage of women who initiate nursing in urban areas is somewhat smaller than in rural areas: recent data from the International Postpartum Program survey show that 94 percent of the women who de-

livered in urban Postpartum Program hospitals in Iran and Turkey started nursing, 84 percent in Thailand, and 77 percent in Colombia and Venezuela (Sivin, 1974).

Mean durations of lactation and postpartum amenorrhea in selected countries are shown in Table A. The data are not always representative for women in a particular country because some are derived from hospital surveys, which exclude women who deliver without medical supervision. The data are also not completely comparable since several factors with an impact on lactation, in particular, age, urban-rural residence, and full versus partial lactation, are not controlled.

Table A shows that nursing lasts one to two years on the average in most countries for which data are available, with a tendency for women in rural areas to nurse longer than women in urban areas. Length of amenorrhea varies from 4 to 16.5 months. Duration of amenorrhea was much shorter for women who delivered in Postpartum Program hospitals than for other women. (The extent of malnutrition of the mother may have an influence on duration of postpartum amenorrhea. It is known that malnutrition delays the resumption of menstruation, but the available surveys did not give any information on this point.)

With increasing modernization, incidence and duration of breastfeeding are declining (Jelliffe, 1967; Niehoff and Meister, 1972). Those women in the population who no longer nurse are therefore exposed to longer periods of risk and may have higher fertility unless there is an increase in the practice of birth control.

TABLE A Mean duration of lactation and postpartum amenorrhea among nursing women, by region and country

<i>Region and country</i>	<i>Source</i>	<i>Residence (urban/rural)</i>	<i>Type of Survey (field/hospital)</i>	<i>Sample Size</i>	<i>Lactation (months)</i>	<i>Amenorrhea (months)</i>
Africa (Subsaharan)						
Rwanda ^a	1	u/r	h	900	18	11
Senegal	2	r	f	8,500	24.3	—
South America						
Colombia	3	u	h	1,400	6.0	—
Martinique	4	u/r	f	900	10.3	—
St. Vincent ^a	5	r	h	300	9.6	—
Venezuela, Colombia	6	u	h	1,100	7.6	3.9
North Africa and Middle East						
Algeria	7	u/r	f	8,000	17.6	—
Egypt	8	u	h	300	15.1	—
Turkey	6	u	h	400	13.0	6.2
South and East Asia						
Bangladesh, Matlab	13	r	f	200	25	16.5
India, Bombay	9	u	h	500	16.5	11.9
India, Bombay	9	r	f	—	—	13–14
India, Mysore	9	r	f	—	—	10–11
India, Punjab ^a	10	r	f	1,400	21	11
South Korea	11	u/r	f	4,900	24	15
Taiwan	12	u/r	f	3,900	15.7	10.6
Thailand	6	u	h	1,600	12.0	6.0

NOTES: The data collected in field surveys usually refer to both women who have had medically supervised deliveries and those who have not, whereas the data derived from hospital (or clinic) surveys are limited to women who delivered in hospitals. All surveys used a retrospective design, with the exception of the Matlab, Bangladesh, and Punjab, India, studies, which employed a prospective design. Most of the surveys were carried out between 1960 and 1970. Exceptions are the Indian surveys, which took place between 1950 and 1960.

— = unavailable.

^aThe data are medians instead of means.

SOURCES: 1. Ferin, 1971, pp.71, 72. 2. Cantrelle and Leridon, 1971, p.508. 3. Oberndorfer and Mejia, 1968, p.33. 4. Leridon et al., 1970, pp.109, 110. 5. Antrobus, 1972, p.188. 6. Sivin, 1974. 7. Association Algerienne, 1971, pp.128–130. 8. Kamal et al., 1969, pp.315, 320. 9. Tietze, 1961, p.130. 10. Potter et al., 1965, p.394. 11. Koh and Smith, 1970, pp.160, 161. 12. Jain et al., 1971, p.258. 13. Chen and Mosley, 1972.

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ACKNOWLEDGMENTS The author is indebted to Irving Sivin of the Population Council for valuable advice and for permission to use unpublished data from the follow-up survey of the International Postpartum Family Planning Program. He is also grateful for useful suggestions from Howard C. Taylor, Jr., M.D., Christopher Tietze, M.D., John Ross, Ph.D., and Robert Castadot, M.D., all of the Population Council.