CONTRACEPTIVE PREVALENCE SURVEYS

FURTHER ANALYSIS REPORT

POSTPARTUM AMENORRHEA IN SELECTED DEVELOPING COUNTRIES : ESTIMATES FROM CONTRACEPTIVE PREVALENCE SURVEYS

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INTRODUCTION

One of the most significant advancements in fertility analysis during the last several decades has been the identification of intermediate (or proximate) fertility determinants and the development of techniques to quantitatively assess their contribution to fertility levels, differentials and changes. In their pioneering article on the topic, Davis and Blake (1956) specified eleven variables through which --and only through--which all other fertility determinants must operate, be they socioeconomic, cultural, psychological or environmental. More recently, Bongaarts (1978) revised the original classification and provided a simple analytical accounting framework which permits a quantitative assessment of the contribution of different proximate determinants to given fertility levels or changes.

Empirically, Bongaarts (1980) found that four proximate determinants--marriage pattern, contraceptive use and effectiveness, prevalence of induced abortion, and the duration of the postpartum non-susceptible period (the period prior to the resumption of ovulation following a birth)--account for most variation in fertility levels among populations. The postpartum non-susceptible period varies considerably, not only among individuals, but between different populations or population subgroups. It is more or less coincident with the period of postpartum amenorrhea and is believed to be primarily determined by the duration and intensity of breastfeeding (Tyson and Perez, 1978).

One hindrance to the application of Bongaarts' accounting scheme has been the lack of information based on representative samples on the duration of the non-susceptible period for many populations. As a result, applications of the Bongaarts scheme have generally relied on estimating the duration of the non-susceptible period from information on the duration of breastfeeding. Given the variability in the relationship between these two, information specifically on the duration of the postpartum non-susceptible period would be extremely useful and would improve the accuracy with which the contribution of proximate determinants can be assessed. Moreover, the length of the postpartum non-susceptible period determines how soon after a birth a woman is at risk of conception, and hence in need of contraception if she wishes to delay or prevent the next pregnancy (McCann et al., 1981). Consequently, reliable information on the duration of the postpartum non-susceptible period is of considerable importance to family planning programs.

DATA AND METHODS

In a number of Contraceptive Prevalence Surveys administered by Westinghouse Health Systems during the last few years in developing countries, information was collected which makes it possible to indirectly estimate the duration of postpartum amenorrhea and hence the period of postpartum non-susceptibility. While the periods of postpartum amenorrhea and non-susceptibility are not strictly identical, they tend to be quite similar. Since ovulation generally precedes menstruation by two weeks, the period of non-susceptibility would end

two weeks prior to the resumption of menstruation or to when menstruation would have resumed (in cases where the woman conceives prior to first menstruation for those women whose first menstrual cycle following childbirth is ovulatory). For some women, however, the first one or two menstrual cycles are anovulatory and the period of non-susceptibility exceeds the period of amenorrhea (McCann et al., 1981). To some extent, these two groups of women balance each other out, and thus the average durations of postpartum amenorrhea and non-susceptibility should be quite similar at the aggregate level.

In the present study, we utilized two related techniques to estimate the duration of postpartum amenorrhea. One, referred to as the "monthly current status technique," is used to approximate the cumulative probabilities of postpartum amenorrhea terminating at successive monthly intervals following a birth, as well as to estimate the median duration of postpartum amenorrhea. The other, referred to as the "prevalence technique," is used only to estimate the mean duration of postpartum amenorrhea.

Each of the two techniques requires us to determine, for each woman who has had at least one live birth, whether or not, at the time of interview, she had experienced a termination of postpartum amenorrhea as indicated by either a return of menstruation or a new pregnancy since her last live birth. In the case of the monthly current status approach, a cross-tabulation of a woman's current status with respect to termination of amenorrhea and the number of months since her last live birth are treated as if they represent the experience of a cohort of women over time during successive months following a birth. The median duration of postpartum amenorrhea is estimated as the point at which the experience of this synthetic cohort indicates 50 percent of the women had terminated postpartum amenorrhea.

The prevalence technique provides an even simpler way for estimating the mean duration of postpartum amenorrhea. The mean is computed simply by dividing the number of women currently amenorrheic (in the present case, limited to those who had their last live birth within three years of the interview) by the average number of births per month (estimated in the present study by the average number of monthly births in the 12 months prior to interview). Implicit in this technique is the assumption of stability in postpartum amenorrhea duration and the annual flow of births over the recent past.

Both methods have been described elsewhere, although usually in connection with the estimation of the duration of breastfeeding for which the logic is quite similar (Page, 1982; Ferry and Smith, 1983). World Fertility Survey data show the prevalence technique to be surprisingly robust, given its simplicity, through comparisons made between different techniques (Ferry and Smith, 1983). A recent example of its use for estimating both breastfeeding and postpartum amenorrhea durations is available in a regional study of Brazil (Anderson et al., 1983).

Information from Contraceptive Prevalence Surveys on the number of months since last live birth is available either, from a direct question

or by comparing the reported month and year of the birth with the date of the interview. The woman's current status in terms of postpartum amenorrhea is determined in one of two ways. In one survey, responses to a question on current pregnancy status are combined with responses as to how long after the last live birth menstruation resumed. In other surveys, responses to a question on current pregnancy status are compared with responses as to how long ago her last menstrual period was experienced. It should be noted that some women who reported themselves as currently pregnant may have conceived prior to a return of menstruation. For convenience, however, we will refer to this combined proportion of women who either menstruated or became pregnant as the proportion who experienced termination of postpartum amenorrhea. This is done since, for pregnant women, ovulation must have resumed, and thus they have already terminated the non-susceptible period. In practice, the determination of a woman's current status with regard to the termination of postpartum amenorrhea (in the sense used here) is complicated, in some surveys, by the choice of coded response categories for the question on when menstruation was last experienced, as well as by ambiguity in the response pattern. Details of the actual determination of a woman's current status, for the surveys included in the present study, are provided in an appendix.

Monthly current status data typically display irregularities due to the limited number of respondents who had a birth each particular number of months prior to interview. For application of the monthly current status approach, these irregularities were smoothed by calculating three-month weighted moving averages of the proportions of women classified as having experienced the termination of postpartum amenorrhea. No smoothing was necessary for applications of the prevalence approach.

RESULTS

Results based on the monthly current status technique for all countries to date for which the requisite data were collected are presented in Table 1 for monthly intervals through the first year following the most recent birth.[2] Although the technique does not ensure that the proportions terminating postpartum amenorrhea will decline at each successive month since the most recent birth (as would be the case if a true cohort were being followed, or if standard life table methodology were applied), with only occasional exceptions, this turns out to be the case. Moreover, for all surveys, a median duration of postpartum amenorrhea (defined as the point at which 50 percent indicated either a return of menses or a pregnancy) can be unambiguously identified.

[Table 1 about here]

The total number of women included in the calculations are also presented. Since the results represent three-month moving averages, the number of women serving as the basis of the proportion terminating at any specific monthly interval is, of course, substantially less than the total number of women (averaging 3/13 of the total).[3] The number of

Table 1

Three month weighted moving averages of estimated propertions of women who experienced termination of postpartum amenorrhea by the number of months since last birth and estimated median duration of postpartum amenorrhea

Midpoint of monthly interval since last birth	Country and year of survey										
	Korea 1979	Sri Lanka 1982	Thailand 1978[a]	Thailand 1981	Barbados 1980	Colombia 1978	Colombia 1980	Costa Rica 1978	Costa Rica 1981	Honduras 1981	Peru 1981
1.0	.148	.459	.240	N.A.	.442	.301	.223	.500	.194	.160	.161
2.0	.153	.433	.274	.260	.533	.421	.336	.538	.346	.241	.270
3.0	.184	.427	.356	.351	.652	.538	.492	.728	.558	.315	.341
4.0	.238	.427	.413	.451	.726	.644	.642	.804	.737	.402	.420
5.0	.321	.507	.515	.524	.967	.714	.697	.849	.809	.446	.440
6.0	.376	.541	.526	.590	.961	.828	.740	.902	.867	.493	.475
7.0	.416	.607	.606	.619	.961	.838	.738	.901	.852	.526	.496
8.0	.415	.616	.619	.636	.966	.879	.783	.931	.908	.545	.559
9.0	.422	.633	.658	.657	1.000	.907	.810	.938	.882	.599	.586
10.0	.453	.657	.739	.687	1.000	.881	.862	.971	.916	.646	.576
11.0	.513	.671	.771	.730	1.000	.888	.878	.952	.883	.675	.627
12.0	.579	.719	.779	.765	1.000	.890	.918	.931	.921	.694	.661
Median duration (in months)	10.8	4.9	4.9	4.7	1.6	2.7	3.1	1.0	2.7	6.2	7.1
Number of women[b] reporting birth within 13 months prior to interview	1704	955	537	1391[b]	133	503	615	345	618	926	1168
serving as basis for calculation of median	491	283	138	420	57	156	165	52	190	290	315

Notes: In those surveys where a weighted sample design was used, the proportions shown in this table reflect the weighting. However, the number of respondents shown are based on the actual number before weighting. N.A. = not available.

a) Some interviews took place during the first weeks of 1979.

b) Number of women reporting a birth within thirteen and a half months prior to interview.

women serving as the basis of the calculation of the median is also given. For all but the 1978 survey in Costa Rica, interpolation between the three-month moving averages for two successive monthly intervals was necessary; thus, the number of women involved in the calculation of the median came from those who reported their most recent birth as occurring during some specific four-month period prior to the survey. For 1978 in Costa Rica, the median fell exactly on the midpoint of a monthly interval and thus involves women whose last birth occurred over a three-month period. It is evident that the medians are not based on large numbers of women. The fact that the overall results for each country closely approximate a monotonic increase in the proportions estimated as terminating postpartum amenorrhea, and that a unique median is evident in all cases, provides grounds for some confidence in the results. However, the median for Barbados and for the 1978 Costa Rican survey, both of which are based on substantially fewer women than is the case for the other surveys, should be treated with particular caution.

What is most striking about the results is how quickly postpartum amenorrhea appears to terminate in most of the countries. Only for Korean women is the median duration substantially above half a year. The estimated median durations of only one month for Costa Rica in 1978 and 1.6 months for Barbados both seem extraordinarily low and may well be less reliable due to the small number of cases on which they are based. It is noteworthy that the 1981 survey in Costa Rica, which is based on a much larger number of cases as well as a somewhat different question for determining the woman's current status, yields a longer and more plausible estimate of postpartum amenorrhea. While the estimate of 1.6 months in Barbados seems quite low, it is somewhat reassuring that results for subsequent month intervals also are consistent with a low duration of postpartum amenorrhea. In brief, the results suggest that at least for most of the limited number of developing countries for which Westinghouse Contraceptive Prevalence Survey data are available, postpartum non-susceptibility is providing protection against a new pregnancy for only a relatively brief period following a birth for the majority of women.

Although the median is calculated as the duration at which 50 percent of the synthetic cohort of women who recently gave birth either experience a return of menstruation or a pregnancy, it should be recognized that, for a small proportion of any real cohort of women giving birth at any particular time, postpartum amenorrhea will merge into menopause; for these women, there will be neither a return of menstruation nor a subsequent pregnancy. The proportion will depend on the duration of proportions amenorrheic, and the average age at birth is positively related to each. Under virtually any realistic circumstances, however, the proportion should be small since the average age at menopause is typically far higher than average age at last birth, even in natural fertility populations (Gray, 1979). The fact that postpartum amenorrhea rarely merges into menopause is confirmed in Table 2 which shows the proportion of women who reported neither a pregnancy nor a return of menstruation among those whose most recent birth occurred 19-24 months and 31-36 months prior to interview. As the results indicate (with only the exception of Honduras), this involved less than 10 percent of women in the former category, and in most cases,

an even smaller percentage of women in the latter category. Some of these women will probably still experience a return of menstruation and thus the percentage shown is an estimate of the maximum extent to which this complication occurs.

[Table 2 about here]

Estimates of the mean duration of postpartum amenorrhea obtained by the prevalence technique are presented in Table 3 at the national level as well as separately for the urban and rural segments of the population. Given that medians derived from the monthly current status technique are based on a far smaller number of cases than are means from the prevalence technique, only the latter are employed for obtaining separate urban and rural estimates. As with the calculation of the median, the means based on the prevalence technique also ignore the problem created by the fact that, in reality, the period of postpartum amenorrhea for some women would merge into menopause. This should not seriously distort our estimates, however, given the small proportion of women involved. Moreover, the fact that the prevalence technique is applied only to women who had a birth in the last three years further minimizes any problem created by menopausal women reporting themselves as still amenorrheic. Indeed, since a small number of women also might experience postpartum amenorrhea for more than three years, the exclusion of women whose birth occurred more than three years ago will act to cancel out the effect of amenorrhea merging into menopause for other women.

[Table 3 about here]

The rank ordering of the mean duration of postpartum amenorrhea (from the prevalence technique) on the national level is almost identical to that based on the median calculated from the monthly current status technique. For both the mean and the median, Korea is characterized by the longest average duration, and Costa Rica, in 1978, by the shortest. In every case except for Korea, the estimated mean is longer than the estimated median. A longer mean than median is generally to be expected for populations in which the median duration of amenorrhea is short as is apparently the case in most of the countries included in the present study (see Lesthaeghe, 1982; Figure 2). While there is undoubtedly a margin of error involved in estimates from either technique, it is encouraging that-- for Barbados and for Costa Rica in 1978, the two surveys which yielded median durations that appeared to be implausibly low--the means yielded by the prevalence technique fall within a more plausible range. Even if these measures are not precise, they do clearly point to short postpartum amenorrhea in both populations. Thus even if the estimates are not exact, they enable us to gain a fairly good sense of the orders of magnitude involved.

Given the virtually universal finding for developing countries that breastfeeding is less common and of shorter duration among urban women compared to rural women (McCann et al., 1981; Kent, 1981; Ferry and Smith, 1981), we would expect parallel urban-rural differences in postpartum amenorrhea to be evident. It is thus encouraging that the results indicate shorter average periods of postpartum amenorrhea among

Table 2

Percent of Women Who Had Not Yet Experienced a Return of Menstruation or Pregnancy Among Women Whose Last Birth Took Place 19-24 and 31-36 Months Prior to Interview

Country and Year of Survey	Number of Months Prior to Interview that Last Birth Occurred			
	19-24 Months		31-36 Months	
	Percent	Base N	Percent	Base N
Korea				
1979	7	703	3	539
Sri Lanka				
1982	9	292	1	178
Thailand				
1978[a]	8	174	6	139
1981	7[b]	429[b]	2[c]	320[c]
Barbados				
1980	4	45	7	30
Colombia				
1978	3	161	1	106
1980	2	172	4	143
Costa Rica				
1978	3	79	1	87
1981	1	190	0	135
Honduras				
1981	12	313	3	132
Peru				
1981	5	369	4	205

Notes: In those surveys where a weighted sample design was used, the percents shown in this table reflect the weighting. However, the number of respondents shown are based on the actual number before weighting.

a) Some of the interviews took place during the first weeks of 1979.

b) Refers to women reporting a last birth took place between 17 and a half months and 23 and a half months prior to interview.

c) Refers to women reporting their last birth took place between 30 and a half and 35 and a half months prior to interview.

Table 3

Mean Duration of Postpartum Amenorrhea as Estimated by the Prevalence Method by Place of Residence

Country and Year of Survey	National	Urban	Rural
Korea			
1979	10.5	9.6	11.8
Sri Lanka			
1982	7.2	5.0	7.8
Thailand			
1978[a]	7.7[b]	4.4[c]	8.5
1981	6.8	4.1	7.3
Barbados			
1980	3.4	n.a.	n.a.
Colombia			
1978	4.3	3.5	5.3
1980	4.8	4.5	5.3
Costa Rica			
1978	2.5	1.9	3.1
1981	3.7	3.1	4.2
Honduras			
1981	9.0	5.1	10.7
Peru			
1981	8.2	6.2	11.5

Notes: In those surveys where a weighted sample design was used, the estimates shown in this table reflect the weighting.

n.a. = not applicable

a) Some of the interviews took place during the first weeks of 1979.
b) Excluding the provincial urban population.
c) Bangkok metropolitan area only.

urban women in comparison to their rural counterparts for all of the surveys. The differences range from as much five months or more in Honduras and Peru to under two months for Colombia and Costa Rica. Thus there is some variation in the differences between rural and urban populations with respect to the amount of protection provided against pregnancy through postpartum amenorrhea.

It is of considerable interest to compare our estimates of the duration of postpartum amenorrhea with information on breastfeeding patterns. Of the surveys which serve as the basis for our estimates of postpartum amenorrhea, most did not include questions on infant feeding practices; of those that did, only results from the 1981 Thailand survey have been analyzed in detail. Fortunately, however, for countries covered in the present study (except Barbados and Honduras), data on breastfeeding patterns are available from the World Fertility Survey for years not far removed from the time of the Contraceptive Prevalence Surveys. In addition, unpublished tabulations on current status data regarding breastfeeding are available for Barbados from the Contraceptive Prevalence Survey, and they can be used to provide at least some relevant information. Thus, only for Honduras is no information available.

Analysis of breastfeeding patterns from survey data is a complex matter involving a number of methodological problems (Page, Lesthaeghe and Shah, 1982). There is no single measure that most accurately indicates the extent of breastfeeding in a population; so, whenever possible, several indices based on different approaches are presented in Table 4. In all the countries with available data except Costa Rica, breastfeeding is close to universal, involving at least 90 percent of all children; in Costa Rica, only about three quarters of children are ever breastfed. The average duration of breastfeeding is noticeably longer in the three Asian countries than in the Latin American ones. This is evident from the two alternative measures of the median duration, as well as from the estimated proportions of children still breastfeeding at six and twelve months of age. Particularly striking is the very low median duration of breastfeeding in Costa Rica (less than two months according to one estimate). Less than one in three children in Costa Rica is breastfed for at least six months, and less than one in ten for at least a year. In contrast, over 90 percent of Korean children are reported as breastfed for at least six months.

[Table 4 about here]

The extremely short duration of breastfeeding in Costa Rica, as well as the relatively high proportion who never initiate breastfeeding, is consistent with the short durations of postpartum amenorrhea indicated in the Costa Rican Contraceptive Prevalence Surveys (although not necessarily as low the as one-month estimate of the median for 1978). Likewise, the short duration of breastfeeding indicated in Barbados is more or less consistent with the short duration of postpartum amenorrhea indicated there. At the other end of the scale, Korea, Sri Lanka and Thailand are all characterized by durations of breastfeeding of close to a year and a half or more. Despite these apparently similar breastfeeding patterns, the Contraceptive Prevalence

Table 4

Selected Patterns of Breastfeeding Patterns

	Korea	Sri Lanka	Thailand		Barbados	Colombia	Costa Rica	Peru
	1974	1975	1975	1981	1980	1976	1979	1978
Percent never breastfed[a]	7	4	8	9	n.a.	10	26	7
Median duration of breast-feeding (in months)								
estimate 1[b]	17.6	14.9	16.7	n.a.	n.a.	7.5	3.4	11.9
estimate 2[c]	16.6	20.8	18.9	16.6	4.5	6.8	1.8	12.9
Percent still breastfeeding[d]								
at 6 months	92	82	n.a.	76	43	52	2[illegible]	69
at 12 months	62	60	n.a.	66	16	23	9	39

Notes: All results except for Thailand 1981 and Barbados are from the World Fertility Survey; the 1981 Thailand results are from the 1981 Contraceptive Prevalence Survey as presented in Knodel, Kamnuansilpa and Chamratrithirong (1982); the Barbados results are from unpublished tabulations from the 1980 Contraceptive Prevalence Survey; n.a. = not available.

a) Except for Thailand 1981, results are from Ferry (1981), text Table 2 and are based on women with births in the last 10 months prior to interview; the 1981 Thailand results are based on life table analysis of women with a birth in the 24 months prior to interview.

b) From Ferry (1981), Appendix Table 5E and based on the last closed interval to women whose penultimate birth survived at least 12 months.

c) Except for Thailand 1981 and Barbados, results are from Ferry and Smith (1983), Table 3. The 1981 Thailand results are based on life table analysis; the other estimates are based on monthly current status analysis.

d) Except for Thailand 1981 and Barbados, results are from Popkin, Bilsborrow, and Akin (1982), Table 2 and are based on the last two children born to each woman in the four years preceding interview. The 1981 Thailand results are based on the last born child to women in the two years preceding the survey. The Barbados results are based on three-month weighted moving averages of current status data. All other results are based on life table analysis.

Surveys have indicated considerably longer postpartum amenorrhea in Korea than in either Sri Lanka or Thailand. In the middle of the scale, Colombia is characterized both by a shorter median duration of postpartum amenorrhea and shorter breastfeeding than is Peru.

The lack of close correspondence between the estimates of postpartum amenorrhea and breastfeeding patterns evident in the comparison of Korea with Sri Lanka and Thailand may, of course, be due to errors in measurement of either or both phenomena. On the other hand, it may also reflect a lack of complete information on breastfeeding as well as the influence of other relevant but unmeasured variables. While precise knowledge of the determinants of the relationship between breastfeeding and postpartum amenorrhea is still lacking, there is considerable evidence that one important influence is the type of feeding regime followed. In particular, the impact of breastfeeding on prolonging postpartum amenorrhea is greater for mothers who exclusively breastfeed than for those who follow a mixed feeding pattern (Van Ginneken, 1974). Unfortunately, data permitting the distinction between full and partial breastfeeding were generally not collected in the World Fertility Survey, and it seems likely that responses generally refer to any form of breastfeeding (Page, Lesthaeghe and Shah, 1982). In the 1981 Thailand Contraceptive Prevalence Survey, however, information was collected on the age at which non-milk food was introduced into the child's diet and thus permits the calculation of the duration of "full" breastfeeding.[4] Analysis of these data indicated that supplemental food was commonly introduced at a very early age and thus the median duration of full breastfeeding was only 2.1 months, in sharp contrast to the much longer duration of any breastfeeding. This could account for the relatively short period of postpartum amenorrhea indicated for Thailand, despite the long duration of any breastfeeding. Whether similar differences between the extent of full and partial breastfeeding are behind the lack of a closer correspondence between the two estimates for the other countries is impossible to determine without more complete information on infant feeding practices than was collected in the World Fertility Survey. This must remain an unanswered question for the time being.

To some extent, the urban-rural differences in postpartum amenorrhea as estimated from the Contraceptive Prevalence Surveys conform with differences in the duration of breastfeeding indicated by the World Fertility Survey. World Fertility Survey results are available for all the same countries for which we provide urban-rural estimates of postpartum amenorrhea except Honduras. These results indicate longer breastfeeding on average in rural than in urban areas in all such countries (Ferry and Smith, 1983). Based on mean current status estimates for all births, the rural-urban difference in breastfeeding duration was only two months for Costa Rica and only three months for Colombia, while in both Peru and Korea, a difference of six months is indicated. World Fertility Survey estimates of rural-urban difference in breastfeeding duration are also available for Sri Lanka and Thailand where the indicated differences are five and eleven months, respectively.[5] The fact that a much larger rural-urban difference in breastfeeding than in postpartum amenorrhea is indicated for Thailand can probably be attributed, at least in part, to the early introduction

of supplementary foods by both rural and urban women, and thus to the lack of any significant rural-urban difference in "full" breastfeeding (Knodel et al., 1982).

CONCLUSIONS

Data collected in Contraceptive Prevalence Surveys for a number of developing countries on how long ago a woman experienced her last menstruation, or on how soon following birth menstruation returned, appear to yield reasonable national level estimates of the duration of postpartum amenorrhea. They provide important information on the non-susceptible period following birth, an important proximate determinant of fertility for which little previous data have been available. The monthly current status technique clearly is improved by the availability of substantial numbers of cases for reliable estimates to be obtained; it thus becomes less appropriate for estimating differentials among subgroups in the typical fertility survey sample, or even national level values for small-scale surveys. The prevalence technique, which yields less information, suffers less from this problem since it utilizes a larger proportion of the sample for the calculation of the mean duration. The present results suggest that there is considerable cross-national variation in the median and mean duration of postpartum amenorrhea, and that estimating it from information on breastfeeding alone might be misleading, especially if information on the pattern of breastfeeding (full versus partial) is not known. More direct estimates, such as those which can be made based on the types of data analyzed in the present study, add important information to our understanding of the proximate determinants of fertility as they operate in specific developing countries.

APPENDIX

Details of Determination of Women's Current Status with Regard to the Termination of Postpartum Amenorrhea

In the surveys which included a question on how long ago the respondent had her last menstrual period, responses were recorded in precoded categories. The categories, however, were not uniform across surveys. Only in the two Colombian surveys was a category specifically designated for "not since pregnancy." In each of the surveys, the coded categories distinguished between women whose last menstruation occurred within one month, between one and two months, and more than two months prior to interview. In several, a separate category was also included for women whose most recent menstrual period occurred more than nine months prior to interview. The one survey in which women were asked about how long after the most recent birth menstruation occurred also precoded responses, including an explicit category for women who had not experienced a return of menstruation at the time of the interview. Since, in all surveys, pregnancy status at the time of interview was asked, currently pregnant women could be identified and recoded into a separate category.

Theoretically, a woman who was amenorrheic during the postpartum period should report not having experienced menses for nine months or more (the duration of pregnancy plus the months since last birth). Examination of response patterns from the Peru, Sri Lanka and Thailand surveys, the three surveys which differentiate women reporting their last menstrual period occurring between three and nine months ago from those reporting it as occurring more than nine months ago, revealed that a sizable minority of women reported having experienced their last menstruation three to nine months ago but did not report themselves as pregnant. It seems likely that most of the women in this category whose last birth occurred only a few months prior to interview were still amenorrheic, and that rather than reporting the number of months since last menstruation, including the nine months of pregnancy, they were reporting the number of months since birth that they had not yet experienced menstruation. This is corroborated by the fact that the number of women who report their last menstruation as three to nine months ago drops off sharply for those whose last birth was more than nine months ago. In addition, some women in this category may have experienced some postpartum bleeding shortly following birth which they took to be a menstrual period but had not experienced any menstruation subsequently. Thus, for the purpose of computing Table 1, women who reported experiencing their last menstrual period within 60 days of interview or reported themselves as pregnant are considered to have experienced termination of postpartum amenorrhea. The exceptions are two Colombian surveys in which a special category of "not since pregnancy" was included and the 1981 Costa Rican survey in which a question was asked on how long after the last live birth menstruation resumed. All others were considered to still be in the postpartum amenorrheic stage with the exceptions as noted below. Also noted below

are several differences in the way termination of postpartum amenorrhea was defined for Table 2, which deals with women whose last birth occurred 19-24 and 31-36 months ago, and for Table 3 which deals with all women whose last birth occurred up to 36 months ago. The few cases which involved no response, a wild code, or indicated a hysterectomy subsequent to the last birth were dropped from the analysis.

Korea, Thailand 1978, Barbados, Costa Rica 1978 and Honduras

For these surveys, only three categories of time since last menses were coded: less than one month, 30-60 days ago and more than two months ago. Women in the first two categories, along with women who reported themselves as pregnant, were considered to have experienced termination of postpartum amenorrhea while those non-pregnant women reporting their last menstruation occurring more than two months ago were assumed to still be experiencing postpartum amenorrhea at the time of interview. Definitions were identical for computation of Tables 1, 2 and 3.

Colombia 1978 and 1980

In both surveys, a separate category for "not since pregnancy" was designated and only non-pregnant women in this category were assumed to still be experiencing postpartum amenorrhea at the time of interview with the exception of a few non-pregnant women whose last birth occurred up to two months ago and were coded as experiencing their last menstruation more than two months ago. These women were also considered to be still in the postpartum amenorrheic stage. All others were assumed to have terminated postpartum amenorrhea. Definitions were identical for Tables 1, 2 and 3.

Thailand 1981 and Sri Lanka 1981

In both of these surveys, women whose last menstrual period was stated as more than two months ago were separated into those who reported their last menses as occurring three to nine months ago and more than nine months ago. For computation of Table 1, all non-pregnant women who reported their last menses as more than two months ago were considered as still experiencing postpartum amenorrhea at the time of interview; for Table 2, only non-pregnant women who indicated their last menses occurred more than nine months ago were assumed as such; for Table 3, women who reported their last menses between two and nine months ago were treated as amenorrheic if their last birth occurred nine months ago or less but as having experienced the termination of postpartum amenorrhea if their last birth occurred more than nine months ago.

Peru

In addition to the same four categories used in the 1981 Thailand survey, the Peru survey also included codes designated as "postpartum" and "menopausal." While the former category apparently referred to women who had not yet experienced a return of menses following birth, it obviously did not include all such women. This was evident from the substantial number of women whose birth occurred between one and nine months ago but who were coded as having experienced no menstruation for more than nine months. Therefore, for the computation of Table 1, all women who reported their last menses as more than two months ago as well as women in both the "postpartum" or "menopausal" categories were considered as still experiencing postpartum amenorrhea. All others were assumed to have terminated that stage. For computation of Table 2, women who reported their last menses as three to nine months ago were considered to have terminated amenorrhea rather than to still be experiencing it at the time of interview. For Table 3, women who reported their last menses as three to nine months ago were considered to be amenorrheic if their last birth occurred nine months ago or less and as terminating amenorrhea if their last birth occurred more than nine months ago. Moreover, the small number of women who reported themselves as menopausal were excluded from the calculation of means presented in Table 3.

FOOTNOTES

1. Several other frameworks for relating the proximate determinants to fertility have also been developed: see Gaslonde and Bocaz, 1970; Mosley, Werner and Becker, 1982; and Hobcraft and Little, 1982. To date, however, the Bongaarts framework has received the most attention and application.

2. With the exception of the 1981 Thailand survey, the number of months since last birth was either asked directly or was calculated by subtracting the reported month and year of last birth from the month and year of interview. In the former case, respondents most likely gave "rounded" responses to the nearest completed number of months rather than strictly the last completed month. Thus, for example, women who reported a birth three months ago probably include women who had a birth between two and a half and three and a half months ago. Thus, women reporting having a birth x months ago are probably centered on the exact duration of x months (rather than x and a half months as would be the case if women were reporting in terms of strictly completed months). Similarly, subtraction of the month and year of last birth from the month and year of interview yields single month categories of duration of exposure (each formed of two monthly birth cohorts) that are also centered on the exact duration corresponding to the difference between the two dates (Page, Lesthaeghe and Shah, 1982). In the case of the 1981 Thailand survey, information on month of interview was not coded and thus the number of months since last birth had to be calculated by subracting the month and year of last birth from the date of the midpoint of the survey fieldwork. Because of the particular timing of the fieldwork, this calculation yields monthly duration categories centered on an exact duration about half a month prior to difference between the two dates (for differences of at least two months). Results for the 1981 Thailand survey have been adjusted for presentation in the present study so that they correspond to the exact duration of the monthly duration category and are thus directly comparable to the other surveys. For this reason, the results presented in Table 1 for the 1981 Thailand survey differ from those published previously (see Knodel, Kamnuansilpa and Chamratrithirong, 1982).

3. Since three-month weighted moving averages are used as the basis for each monthly figure, to obtain figures through the 12th month, data for the first 13 months must be used. The total number of women thus cover a 13-month period and the average number used for any single-month calculation is 3/13ths of the total.

4. Since the question referred only to non-milk foods and not to milk products other than breast milk, responses exaggerate somewhat the extent of full breastfeeding since mothers may have supplemented breastfeeding with formula or non-formula milk products before introducing other foods.

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