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Correlates of Breastfeeding

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Contents

1 Introduction

International interest in changes in breastfeeding patterns has been growing rapidly in recent years, in part because of the modest link between breastfeeding and human fertility and in part because of its importance to early childhood nutrition and health. The WFS has been fortunate in having been able, at a critical point, to gather relatively accurate and complete breastfeeding information for a substantial number of populations. These data have already contributed to several reports (Knodel and Debavalya 1980; Page *et al* 1980; Akin *et al* 1981; Ferry 1981; Ferry and Smith 1983; Jain and Bongaarts 1981). For the most part, however, the analyses have had to be based on the durations of breastfeeding that women report for their open and closed birth intervals. The durations have tended to be rounded to the nearest 6 or 12 months in the survey reporting, and have displayed potentially serious biases. In closed intervals, data are restricted to women with at least two live births; in open intervals the observation times are necessarily proportional to the open interval length, favouring women whose birth intervals are long or who breastfed relatively briefly since these are the women whose breastfeeding experience is most completely reported. Even so, when the two intervals are combined (Ferry and Smith 1983), relatively accurate breastfeeding information can be derived by using life-table techniques.

Provided that women report the dates of their children's births with reasonable accuracy, it is possible to develop estimates of the duration of breastfeeding that are of higher quality by using women's breastfeeding status at the time of interview. The approach, whose origins lie in investigations by Lesthaeghe and Page (Page *et al* 1980), has been detailed by Smith (1981). Briefly, it consists of limiting our observations to births which occurred exactly y months before interview, and constructing an estimate of the proportion of women breastfeeding for duration y, $\hat{\ell}_y$, by dividing:

$$\hat{\ell}_y = \frac{\text{Number of women currently breastfeeding a child born y months before interview}}{\text{Number of women with births y months before interview}}$$

By ordering the proportions still breastfeeding at progressively longer durations, a complete life table of breastfeeding continuation is produced. The rates have been termed 'current status' rates to distinguish them from open and closed interval rates, which are calculated by standard life-table methods.

While much less prone to bias than open and closed interval rates, since dates of birth of young children are remembered better than breastfeeding durations, the current status rates have one major drawback in that they are a collection of independent $\hat{\ell}_y$ estimates for the different durations. At the sample sizes available to us, it is not uncommon for a particular value $\hat{\ell}_j$ to be higher than an earlier value $\hat{\ell}_i$. Either smoothing the rates or selecting wider interval units to increase sample sizes (for example, using quarterly rather than single-month intervals) might resolve anomalies of this sort, assuming that they are not the result of seasonal or other period variations in breastfeeding practices. The problem is illustrated in figure 1, which shows current status breastfeeding rates for the 1975 Sri Lanka Fertility Survey, calculated using time intervals of different widths.

The current status rates can be either child-weighted, by assigning unit weight to all births, or woman-weighted, by assigning each birth a weight equal to one over the number of the woman's births included in the table so that for each woman the sum of the weights for her births will be unity. The distinction only arises when reference periods longer than about a year are used since over shorter periods few women are likely to have had more than one birth. Because of their sensitivity to the reference period, if woman-weighted rates for different countries are being compared it is probably best to use a standard observation period for all. For child-weighted rates the problem does not arise, since births and $\hat{\ell}_y$ values for each interval y are not directly affected by births at other points. In the present analysis, child-weighted rates are used, although we will usually refer to 'mothers' attributes' when intending 'children's mothers' attributes'.

At least four methods of analysis for current status rates are presently in use. First, we may compare mean breastfeeding durations for selected subgroups of women, the mean being simply the sum of the individual $\hat{\ell}_y$ rates, plus about 1/2 month or, for slightly greater accuracy, $3/8 \times$ proportion initially breastfed $+ 1/8 \times \hat{\ell}_1$. This approach has been taken in Ferry and Smith (1983) and will constitute a part of the methodology of the present report. Other works have tested the simple technique, suggested by Mosley *et al* (1982), of estimating mean breastfeeding duration (in years) by simply dividing the number of women in a particular subgroup who are breastfeeding, regardless of the age of the child, by the number of births to women in the subgroup over the past year. The Mosley technique produces means comparable in quality to those found by summing over the $\hat{\ell}_y$ terms (cf Ferry and Smith 1983).

Finally, the shapes of $\hat{\ell}_y$ distributions for different subgroups may be compared, as by a logit regression (cf Brass and Coale 1968, pp 127–32; Page *et al* 1980), by use of proportional hazard models relating the proportions breastfeeding at various durations to selected background variables (Menken *et al* 1981; McDonald 1981), or by linear regression (Smith 1981). Because of its ease of interpretation, flexibility in handling large data sets,

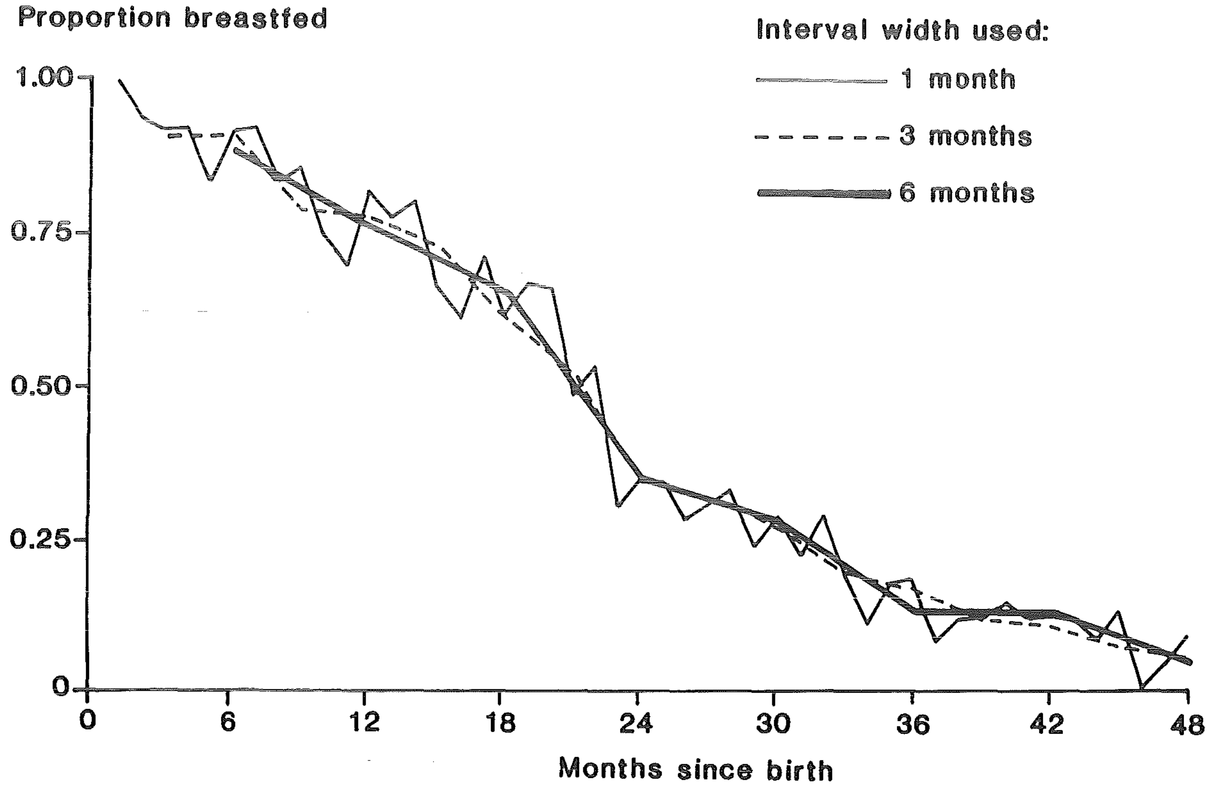

Figure 1 Proportion of children currently breastfed by duration since birth; Sri Lanka Fertility Survey, 1975

and agreement with findings from more elaborate approaches, a linear regression approach will be followed here. The linear model has two drawbacks of which the reader should be aware, however. The more important is that the error structure of the model is not correctly specified when some of the regressor variables are categorical, as will be the case in this analysis. The other is that linear models may produce estimated survival values that are greater than 1.0 or are negative. Tests of linear regression findings against proportional hazards models for two countries (Sri Lanka and Thailand) suggest that these limitations may not be serious (Smith 1981).

The aims of our investigation will be threefold. First, since we have at our disposal 28 of the WFS surveys, we believe it will be possible to offer readers an unusually broad and accurate perspective on breastfeeding patterns across nations and cultural regions. Secondly, through having produced a large number of regressions on each data set, we hope to be able to offer informed judgements on interactions between variables that can lead to misunderstandings if they are not recognized. Finally, in summarizing the findings we will try also to maintain a perspective on the limitations of the methodology and on the types of checks that may be prudent for other researchers following similar paths.

We will not be able to measure the extent of change in breastfeeding patterns that may be occurring worldwide, although at least four studies have been made in WFS participant countries that suggest rates of breastfeeding are declining (McCann *et al* 1981). One difficulty is that current status rates are necessarily just that, and cannot be used to infer past behaviour. It is hoped that as future surveys are conducted, and in some cases as past surveys are reanalysed, the crucial issue of time trends can be answered worldwide.

2 Methodology

When calculating $\hat{\ell}_y$ values representing the proportions of women breastfeeding at durations $y = 1, 2, 3, \ldots$ months after childbirth, we assign each individual a score

$$P_{y,j} = \begin{cases} 0, & k_j \leqslant y \\ 1, & k_j > y \end{cases}$$

where j identifies the individual, y represents the duration since childbirth and k is her duration of breastfeeding. A woman breastfeeding her child as of interview ($k > y$) is assigned the value 0. The estimate $\hat{\ell}_y$ is the sum of the $P_{y,j}$ scores divided by the sample size at y. The scores $P_{y,j}$ for each duration y can be regressed on sets of background characteristics (x) of respondents in discriminant models of the form

$$P_{y,j} = \sum_i b_i x_{i,j} + u_{y,j}$$

where the terms in b are the regression coefficients to be estimated and $u_{y,j}$ is a stochastic error term with mean and variance $(0, \sigma^2_{u_y})$.

The substitution of

$$P^*_{y,j} = P_{y,j} - \hat{\ell}_y$$

for $P_{y,j}$ produces a regression model of greater versatility by allowing experience at different durations since childbirth to be combined in a single regression. What is measured is no longer the individual's breastfeeding status, but her status relative to that of other women in her motherhood cohort. The term $P^*_{y,j}$ takes values between 1.0 (for an individual who breastfeeds at a time when virtually all other women have stopped) and -1.0 (for an individual who has stopped at a time when virtually all other women are still breastfeeding). The durations of breastfeeding themselves are not relevant, since they are essentially accounted for by inclusion of the $\hat{\ell}_y$ terms in the dependent variable, which makes the mean of the $P^*_{y,j}$ terms 0 for each duration j.

The model suggested is thus of the form

$$P^*_y = P_y - \hat{\ell}_y = \Sigma bx + u$$

with the dependent variable constructed by first calculating the $\hat{\ell}_y$ series and then subtracting the appropriate $\hat{\ell}_y$ value from each individual's breastfeeding status at interview (0 or 1). To correct for heteroscedasticity (unequal variances) across the $\hat{\ell}_y$ terms, the P^*_y values may be weighted by the inverse of the variances of the $\hat{\ell}_y$ terms, estimated as

$$\hat{\sigma}^2_{\ell_y} = \hat{\ell}_y(1 - \hat{\ell}_y)/N_y$$

where N_y is the sample size at duration y. Weighting increases the influence of differences in the outer quartile ranges $1.0 > \ell_x > 0.75$ and $0.25 > \ell_x > 0$ relative to unweighted regressions. The present report has used weighted least squares limited to the survival range $0.95 > \ell_x > 0.05$ to reduce the impact of extreme values. Most results agree closely with findings from unweighted regressions, with the principal differences occurring in age and parity coefficients. These have tended not to be stable in any case because of their high correlation, a point that will be developed in chapter 4.

We may also substitute $\hat{\ell}_{y,n}$ for $\hat{\ell}_y$ in the model, where $\hat{\ell}_{y,n}$ represents the proportion breastfeeding at duration y in a subgroup n of the population to which the individual belongs – eg, women of the respondent's own age or parity, women at the same educational level, and so forth. The distinction allows selected variables to be used as controls.

In addition, although the model allows all durations to be incorporated in a single regression, we expect that for most subgroups n and most durations:

$$x \neq y, \quad (\hat{\ell}_{x,n} - \hat{\ell}_x) \neq (\hat{\ell}_{y,n} - \hat{\ell}_y)$$

In particular, at very short intervals, when most women may be breastfeeding, and very long ones, when most are not, the different subgroups should display $\hat{\ell}_{y,n}$ values close to $\hat{\ell}_y$ while at intermediate durations the groups should become more distinct. Any single model spanning all durations may be biased if this is the case, and should ideally be replaced by a series of models fitted to different regions of the $\hat{\ell}_y$ curve. For example, separate models might be fitted to the part of the $\hat{\ell}_y$ distribution to the left of the point $\hat{\ell}_y = 2/3$, to the region between 2/3 and 1/3 and to the region right of the point $\hat{\ell}_y = 1/3$. The durations at which these values fall will differ from sample to sample.

For the present report both the general model combining all durations and models for the segments of the distribution suggested above were fitted. We also fitted a model using $\hat{\ell}_{y,n}$ rates, where n represents the respondent's parity, education and residence subgroup. To check the consistency of patterns in the general regressions, runs were made separately on residence and parity subgroups. The findings from the general model will comprise the major part of this report, with occasional notes on insights provided by the more specialized models.

The analysis cannot distinguish whether differences in proportions breastfeeding and in mean breastfeeding durations arise principally because of unequal proportions initially breastfed among subgroups of women or because among those who do breastfeed the lengths of breastfeeding differ, as initial breastfeeding status is known only for the last two births in most WFS samples. The distinction is relevant for countries where mean breastfeeding durations are relatively short, since it is in these countries that the proportions not breastfeeding tend to be highest. An earlier report (Ferry and Smith

1983) suggests that both factors are likely to be relevant in 11 of the 28 countries being investigated (Indonesia, Republic of Korea, Malaysia, Philippines, Thailand, Mexico, Panama, Paraguay, Peru, Venezuela and Dominican Republic). In all of these countries except Indonesia, Korea and Thailand durations of breastfeeding are of the order of one year or less. Among the remaining 17 countries, differences in breastfeeding are due mainly to unequal durations of breastfeeding among women in the different subgroups and not to differences in the proportions who do or do not breastfeed.

Because the analysis omits both women for whom some of the attribute categories are unknown and sporadic breastfeeding at very long durations, and because of differences between Standard Recode tapes used in this analysis and in Ferry and Smith (1983), mean durations of breastfeeding (shown in table 11) average about 0.3 month less than those in Ferry and Smith. Exceptions are Kenya, for which our estimate is one month greater, and Trinidad and Tobago, where it is lower by two months. For all countries the preferred estimates are those in Ferry and Smith.

3 Attributes Selected

The attributes that have been examined as possible correlates of breastfeeding include respondent's age at the birth of the child (15–24, 25–29, 30–34, 35–49), parity after the birth (1–2, 3–4, 5–6, 7+), residence at interview (rural, rural to urban migrants, and lifetime urban residents), education (no schooling, primary, and middle or above), most recent work experience since marriage (has not worked, worked at home, worked away from home), whether additional children were wanted following the birth (no or undecided, yes), whether family planning methods were used after the birth (no methods, traditional methods, modern methods), and the child's sex. The analysis is with respect to births rather than to women as noted earlier, and is restricted to children surviving as of the interview date. The restriction on mortality frees the analysis from confusion between breastfeeding termination due to infant death and termination due to other factors. In several of the WFS surveys women are coded as no longer breastfeeding if they report a subsequent pregnancy, regardless of their actual breastfeeding status. This assumption is made for all countries here.

There are conceptual problems with four of the variables. In the case of residence, status as of interview is used, though we would rather have known the respondent's status immediately after the birth, which was occasionally different. Likewise, work status following the birth is more informative than work experience in general. Third, a determining factor in contraceptive use is the duration since the birth. Hence, an overall regression coefficient for this variable is less informative than coefficients for different duration periods. There is also an interaction between contraceptive use, pregnancy and lactation, whereby contraception enables women to breastfeed longer if they so choose (though it does not follow that they will do so). Additionally, for both contraception and desire for additional children responses were not always available for the closed interval. In such cases, it has been assumed that contraception was not used and that additional children were wanted. These are conservative assumptions in that they are evidently true for most respondents in most of the countries under investigation.

Our findings may also be subject to bias to the extent that dates of recent births have been imputed more often for some subgroups of women than for others, since an expected effect of imputation is to deflate proportions breastfeeding at short durations and inflate proportions at longer durations. (For example, the breastfeeding rate at age one would be depressed if the sample were contaminated by inclusion of children whose true ages were closer to two years. Inclusion of two year olds in a sample intended to represent age three would inflate the ascribed three-year rate.) The degree to which this is a factor in our findings is unknown as the WFS data tapes do not make clear which birth dates have had to be imputed. For births in the last few years we assume the proportion is small. It is likely that imputation of date of birth and duration of breastfeeding are correlated, as both poorer recording of events and longer lactation characterize less-educated and rural mothers.

One variable of particular importance is not taken into account in our analysis: the distinction between terminations of breastfeeding due to reduced milk production or pregnancy, which are essentially involuntary, and those due to other factors. In the Caribbean and Latin America breastfeeding tends to be ended at relatively short durations (less than 12 months) and may largely be uncoerced, but elsewhere mean breastfeeding time is longer and the probability of an intervening pregnancy, in particular, may become quite high. To the extent that this is the case, the attributes that are found to most strongly influence breastfeeding will also be those most relevant to pregnancy risk. A number of our findings are consistent with this dual interpretation, the main exceptions being those concerned with contraception and, perhaps, residence.

The reader should be aware that the proportion of mothers having particular attributes varies greatly from country to country. For regression analysis one consequence of differences in prevalence is that attributes whose influences tend to be weak are unlikely to be found significant unless they are also relatively prevalent. We will try to take account of this effect, and will note which coefficients are highly significant in more than one country (coefficient value $\mu > 4\sigma$). We will not report findings for attribute groups that comprise less than 5 per cent of the sample. Even when highly statistically significant, the behaviour of rare attribute groups is seldom of more than anecdotal interest. (The proportion of each sample having selected attributes is shown in table 11 on page 21.)

The tables accompanying the report display the observed mean breastfeeding duration for the selected base category of each factor (eg ages 15–24) and the increments for remaining categories with sample sizes of 50 or more. Figures in light type indicate that differences between a particular category and the base were not significant at the 0.05 level in multiple regressions. Superscripts provide additional information. Since significance levels are a function of the point scatter, the values of the means may not always appear to be consistent with the significance levels found in the regressions.

The explained variances (r^2), which are not displayed, are necessarily small, of the order of a few per cent in most cases.

4 Findings

4.1 AGE, PARITY

Our regressions have used mother's age at the birth of each child, in the age groups 15–24, 25–29, 30–34, 35–49, and have grouped children's birth orders 1–2, 3–4, 5–6, 7+. Table 1 shows the proportions of births falling into these age and parity classifications averaged over the 28 countries under consideration. Wide variations exist from country to country, but the pattern of low parities being concentrated at the younger ages and high parities at the older ages is characteristic of all, as might be expected. The table also shows the average of differences between the mean duration of breastfeeding for all women and for women in the various age–parity subgroups, with the sample base in each cell limited to country subgroups having at least four births per month of observation. Again there are wide variations from country to country, but the overall pattern of shorter breastfeeding durations among young and low-parity women and longer durations among older and higher parity women appears representative.

The patterns suggest that either age or parity might serve as a measure of age–parity differences in breastfeeding durations, and also that assocation between the two measures may yield unstable regression coefficients in cases where both variables are introduced. Tables 2 and 3 indicate the countries in which interactions have been most powerful. A common pattern is the tendency for differences between parities 1–2 and 3–4 to be more significant than differences between ages 15–24 and 25–29. Controlling for the dominant variable, the secondary variable has tended not to be significant but rarely changes sign. The multiple regression significance levels indicated in the tables are for age and parity effects when both terms are in the regressions.

The principal finding of our age–parity analysis is that either age or parity is significant in most instances when the other variable is omitted, and that age is about as significant as parity when both are combined. Considering first the table by age (table 2), it will be seen that differences are rarely significant between ages 15–24 and 25–29 even in the single-factor age regressions, but usually become significant between 15–24 and 30–34, and remain so at 35–49.

By regions, age tends to be important when parity is controlled in countries with long breastfeeding durations (Kenya, Indonesia, Bangladesh and Pakistan). For three other Asian countries (Korea, Nepal, Thailand), one African (Lesotho) and four countries of the Americas (Colombia, Costa Rica, Panama and Venezuela), differences remain significant between the youngest and oldest age groups when parity is controlled, but not between the youngest and intermediate groups. Unusual age–parity distributions are not a factor in these results.

If significance levels are ignored, the signs of the age coefficients are usually positive for remaining countries.

Parity tends to be dominant in countries with shorter breastfeeding durations (table 3). With age controlled, parity is significant in four countries where age is also (Indonesia, Bangladesh, Jordan and Panama), and at least two parity groups differ significantly from the base in eight other countries where age is not significant.

Countries where differences in breastfeeding durations by parity are usually not significant include all four in Africa, four in Asia (Korea, Nepal, Pakistan and Syria), and five in the Americas (Colombia, Costa Rica, Venezuela, Haiti and Trinidad and Tobago). There does not appear to be a common pattern behind these exceptions. For an overlapping group of four countries (Senegal, Sudan (N), Haiti and Trinidad and Tobago) neither age nor parity evidently exerts a great influence on breastfeeding patterns. The list changes for unweighted regressions, which suggests that age and parity interactions may be complex.

There are no evident characteristics common to the countries where parity is significant. For some countries it is more relevant in urban areas than in rural, for others the opposite; and for some it is important relatively early after childbirth, for others later or at most durations. Nor is there a correlation between the significance of age or parity and the significance of others of the variables under consideration.

Table 1 Proportional distribution of sample by age and parity, and difference of subcategory mean durations of breastfeeding from the overall mean; average of 28 countries

Age	Parity			
	1–2	3–4	5–6	7+
A Proportional distribution of sample				
15–24	0.31	0.06	0.02	0.00
25–29	0.12	0.09	0.04	0.01
30–34	0.02	0.07	0.05	0.03
35–49	0.00	0.02	0.06	0.10
B Difference of subcategory means from the overall mean, in months				
15–24	−1.6	−2.6	–	–
25–29	+0.6	+0.4	–	–
30–34	–	+1.0	+2.2	–
35–49	–	–	+1.5	+3.3

Table 2 Mean duration of breastfeeding by mother's age at time of birth

Country	Mother's age 15–24 (base)	25–29	30–34 (increment)	35–39
AFRICA				
Kenya[a]	**17.8**	+0.4[b,c]	**+2.1**	**3.9**
Lesotho	**20.9**	−0.7[b,c]	+0.4[b,c]	**1.5**[b]
Senegal	19.9	−0.1[b,c]	−0.0[b,c]	+1.7[b,c]
Sudan (N)	16.4	−0.0[b,c]	+1.6[b,c]	+1.2[b,c]
ASIA				
Fiji				
Whole population[a]	8.6	+0.9[b,c]	+2.9[c]	+4.6[c]
Fijians	11.0	−1.3[b,c]	+1.0[b,c]	
Indians[a]	6.9	+2.2[c]	+6.0[c]	
Indonesia	**23.9**	+0.8[b,c]	**+2.5**	**+7.0**
Republic of Korea[a]	**16.4**	−1.3[b,c]	+0.3[b,c]	**+3.6**[b]
Malaysia				
Whole population[a]	5.7	−0.6[b,c]	**+0.4**[b]	+2.2[c]
Malays	7.8	−0.2[b,c]	+1.1[b,c]	+1.7[c]
Philippines	12.7	+0.5[b,c]	+1.4[c]	+2.9[c]
Thailand	**17.0**	+1.2[b,c]	+4.8[c]	**+7.3**
Bangladesh[a]	**30.8**	**+2.4**	**+4.7**	**+5.2**
Nepal	**27.9**	+1.1[b,c]	+3.7[c]	**+6.6**
Pakistan[a]	**19.8**	+0.1[b,c]	**+2.6**	**+4.9**
Sri Lanka[a]	20.6	**−0.4**[b]	+2.3[b,c]	+5.0[c]
Jordan[a]	**9.5**	+1.3[b,c]	+2.7[c]	**+5.4**
Syria[a]	**10.7**	+1.0[b,c]	**+1.3**	**+3.9**
AMERICAS				
Colombia	**8.9**	−0.2[b,c]	+0.8[b,c]	**+3.5**
Costa Rica[a]	**4.1**	+1.0[b,c]	+2.0[c]	**+3.8**
Mexico[a]	8.7	+0.3[b,c]	+1.5[b,c]	+2.5[c]
Panama[a]	**6.1**	+0.5[b,c]	+3.1[c]	**+5.0**
Paraguay[a]	9.8	+2.5[c]	+2.4[c]	+1.7[c]
Peru[a]	12.1	+1.3[b,c]	+1.9[c]	+5.2[c]
Venezuela[a]	6.5	−0.3[b,c]	**+2.4**[b]	**+5.5**
Dominican Republic[a]	7.7	+1.2[b,c]	**−0.0**[b]	+3.2[c]
Guyana				
Whole population[a]	6.5	+1.1[b,c]	+2.2[c]	+2.8[c]
Africans	6.5	+1.7[b,c]	+1.2[b,c]	
East Indians[a]	6.5	+1.5[b,c]	**+4.3**	
Haiti	15.7	+1.0[b,c]	+1.8[b,c]	+2.6[c]
Jamaica	7.9	+0.6[b,c]	(−0.6)[b,c]	(+1.6)[b,c]
Trinidad and Tobago[a]	6.1	−0.9[b,c]	+1.3[b,c]	

[a]Age–parity interaction significant.
[b]Coefficient is not significant in single attribute regression.
[c]Coefficient is not significant in multiple attribute regression.
NOTES: (i) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(ii) Bold face indicates that the coefficient is significant in multiple regression.

What remains clear in the findings is that either age or parity is usually significant, and that the mean duration of breastfeeding increases by several months from the lowest to the highest age or parity group.

In countries where the duration of breastfeeding is long, it is likely that the differences by age and parity in part reflect differences in fecundability or exposure to conception. What appears to happen is that younger women abandon breastfeeding earlier than older women because of intervening pregnancies rather than dif-

Table 3 Mean duration of breastfeeding by parity of child

Country	Parity 1–2 (base)	3–4	5–6 (increment)	7+
AFRICA				
Kenya[a]	16.2	+1.0[b,c]	+1.9[c]	+3.7[c]
Lesotho	21.1	−0.2[b,c]	+0.3[b,c]	+0.6[b,c]
Senegal	19.7	+0.3[b,c]	+1.1[b,c]	+1.1[b,c]
Sudan (N)	15.5	+1.4[b,c]	+2.1[b,c]	+2.4[c]
ASIA				
Fiji				
Whole population[a]	**8.1**	**+1.6**	**+3.6**	**+7.1**
Fijians	**9.9**	+1.0[b,c]	**+2.6**	
Indians[a]	**7.1**	+1.3[b,c]	**+6.8**	
Indonesia	**23.7**	+1.7[c]	+3.5[c]	**+6.5**
Republic of Korea[a]	14.6	+2.7	+4.2[c]	+7.5[c]
Malaysia				
Whole population[a]	**4.6**	**+1.6**	**+2.2**	**+3.4**
Malays	7.1	+1.7[c]	+1.7[b,c]	+2.0[c]
Philippines	**11.7**	**+2.1**	**+4.2**	**+4.4**
Thailand	16.4	+4.2[c]	+5.9[c]	+8.3[c]
Bangladesh[a]	**31.1**	+1.6[b,c]	+3.7[c]	**+3.6**
Nepal	28.8	+1.4[b,c]	+2.0[c]	+5.0[c]
Pakistan[a]	18.9	+2.3[c]	+3.3[c]	+4.5[c]
Sri Lanka[a]	**19.0**	+2.7[c]	**+6.1**	**+8.6**
Jordan[a]	**8.0**	**+3.1**	**+4.8**	**+5.6**
Syria[a]	10.5	+0.9[b,c]	+2.2[c]	+3.3[c]
AMERICAS				
Colombia	8.4	+0.9[b,c]	+1.8[b,c]	+3.7[c]
Costa Rica[a]	3.7	+2.0[b,c]	–	+4.9[c]
Mexico[a]	**7.3**	**+2.6**	**+3.6**	**+4.3**
Panama[a]	**4.2**	+3.7[c]	+5.6[c]	**+8.3**
Paraguay[a]	**8.9**	**+3.2**	**+5.9**	**+4.4**
Peru[a]	**10.7**	**+2.9**	**+5.9**	**+7.0**
Venezuela[a]	5.7	+1.5[b,c]	+3.5[c]	+5.8[c]
Dominican Republic[a]	**6.8**	**+2.1**	**+2.8**[b]	**+3.7**
Guyana				
Whole population[a]	**6.4**	+0.6[b,c]	+2.3[b,c]	**+3.5**
Africans	7.0	−0.1[b,c]	+0.9[b,c]	
East Indians[a]	**6.3**	+1.1[b,c]	**+4.5**	
Haiti	15.5	+1.9[b,c]	+2.1[b,c]	+3.8[c]
Jamaica	**6.9**	+2.1[b,c]	**(+2.7)**	**(+2.4)**
Trinidad and Tobago[a]	5.0	+1.5[b,c]	(+2.9)[c]	+9.4[c]

[a]Age–parity interaction significant.
[b]Coefficient is not significant in single attribute regression.
[c]Coefficient is not significant in multiple attribute regression.
NOTES: (i) – indicates that data are not available or that the sample is under 5 per cent of country total or that the sample is above 5 per cent but under 50 cases.
(ii) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(iii) Bold face indicates that the coefficient is significant in multiple regression.

ferences in normative breastfeeding durations. This aspect of lactation behaviour has not been tested. It is unlikely to be germane to the Americas, where breastfeeding durations are particularly short, but may be a factor in Africa and much of Asia. The competing explanation that norms have come to differ across age (or parity) groups may also hold in those of the WFS participant countries that are currently experiencing limited or greater social transformations, although the pervasiveness of the pattern of increasing lengths of breastfeeding with age or parity implies that this cannot be a complete explanation. Countries where there is evidence for such normative changes include Korea, Malaysia, Thailand and Mexico (McCann *et al* 1981). A third possibility is that norms are age- or parity-graded, and that the breastfeeding durations intended by younger women do not differ greatly from those of now older women when they were the same ages. Because breastfeeding patterns were not the central concern of the WFS, the survey instruments were not designed in such a way that these explanations could be tested.

The complexity of the age and parity patterns we have reviewed should inspire other researchers to be highly cautious in the conclusions they draw for individual countries. Findings that are contra-intuitive, such as the suggestion by Akin *et al* (1981) that breastfeeding durations increase with parity but decrease with age in Sri Lanka, demand rigorous testing. In Atkin's case this is probably not correct. The pattern of mean breastfeeding durations by age and parity in Sri Lanka is qualitatively rather similar to that displayed in panel B of table 1. While parity is dominant, neither the age nor the parity coefficients are stable with respect to sign, and all become negative if an age–parity interaction term is introduced into the model. Our findings in both the unweighted and weighted regressions likewise do not accord with those of Jain and Bongaarts (1981) for Indonesia, Bangladesh, Sri Lanka, Jordan, Panama and Peru, in which mean breastfeeding durations in the closed birth interval were regressed on respondent characteristics. Jain and Bongaarts found increasing age sometimes significant, but increasing parity always non-significant or negatively associated with breastfeeding durations. Their findings may reflect lack of sensitivity to small sample sizes in the regression model that was used, as findings with respect to education and residence, whose effects are more pronounced, are in agreement with ours. In any event, the colinearity of age and parity should inspire more caution than it seems to. Our own findings indicate a possible tendency toward age dominance in populations with long mean breastfeeding durations, but no other clearly identifiable patterns.

4.2 RESIDENCE

Because we do not have complete migration histories for WFS survey respondents, residence will always mean mother's residence at the time of the survey. We have distinguished urban migrants from lifetime urban residents on the basis of each respondent's childhood residence, which was asked in 25 of the WFS surveys (the exceptions are Guyana, Jamaica and Trinidad and Tobago). Mean breastfeeding durations for mothers in each category are displayed in table 4.

The use of current residence rather than residence during each child's early infancy means that the variable is very occasionally mis-specified.

Differences in national definitions of rural and urban areas, and sharper differences in the quality of rural and urban life between countries, also contribute to making the variable less precise than we would prefer. In consequence, differences between countries displayed in the table are not always comparable. Even so, the overall similarity among countries is pronounced.

In all countries with adequate urban samples (the exception is Nepal, where survey births were almost entirely rural), urban migrants and lifetime urban residents breastfeed for shorter durations than rural women. The absolute differences in length of breastfeeding appear roughly similar by regions, with the result that relative differences are sometimes striking. Thus, in a majority of countries where rural women breastfeed a year or less, urban migrants and lifetime urban residents may breastfeed only about half to two-thirds as long as the rural population.

The differences are virtually always significant when the single-factor regressions for residence are examined. In the multiple regressions only five countries (Lesotho, Sudan, Jordan, Jamaica and Trinidad and Tobago) display non-significant urban/rural differences, and migrant or lifetime resident distinctions were non-significant only slightly more often. In all but the five named countries the coefficient signs are consistent by parity and by time elapsed since the birth, though in the subsample regressions – particularly subsamples that include education controls – differences are less often significant than in the whole sample regressions. Findings were similar for weighted and unweighted regressions.

For 17 countries representing all regions, residence produced extremely high significance levels ($\mu > 4\sigma$). (This figure is nearly matched by education and use of modern contraception, both frequently correlated with residence. Other variables were less often as significant, see table 10, page 20.)

The strength of the residence/breastfeeding relationship does not simply reflect differences between rural and urban or farm and non-farm ways of life, if it did, differences in durations of breastfeeding among rural women would not be greater across countries than are the rural/urban differences within countries. What may instead be at issue are cultural norms that urban women rather consistently find more of a burden than rural women, or that in urban areas lack the social enforceability that maintains them in rural communities. (Even in the USA, where breastfeeding has been 'rediscovered', women are only breastfeeding for a few months following childbirth (McCann *et al* 1981).)

If these impressions reasonably explain the persistence of residential differences in breastfeeding durations when parity, education, work patterns and use of contraception are taken into account, they also suggest that durations of breastfeeding which are sufficient to influence fertility may become rare with increasing economic development and weakening normative controls.

4.3 WIFE'S EDUCATIONAL LEVEL

The analysis makes use of the educational groups: no school, primary (usually, grades 1–6), and the middle or higher (usually, grades 7+). Except in countries where primary schooling is universal, the base category used is no school. In several countries the category middle school or higher could not be used due to small sample sizes. As with other variables, the educational distribu-

Table 4 Mean duration of breastfeeding by residence

Country	Rural (base)	Urban		
		Migrants	Lifetime residents (increment)	Total
AFRICA				
Kenya	**18.4**	**−5.0**	–	**−4.9**
Lesotho	21.4	(−12.0)	–	−2.7[b]
Senegal	**21.7**	**−4.3**	−3.3	**−4.0**
Sudan (N)	17.2	−1.3[b]	−0.9[b]	−1.3[b]
ASIA				
Fiji				
Whole population	**11.6**	**−5.9**	**−4.0**	**−4.8**
Fijians	**12.0**	−4.2[b]	**(−3.4)**	**−3.8**
Indians	**10.8**	**−6.0**	**−3.9**	**−4.8**
Indonesia	**27.9**	**−12.1**	**−10.0**	**−11.4**
Republic of Korea	**19.7**	**−6.8**	**−4.2**	**−5.0**
Malaysia				
Whole population	**6.9**	**−3.8**	**−2.9**	**−3.4**
Malays	8.5	−2.3[a,b]	(−2.0)[b]	−2.0[b]
Philippines	**15.6**	**−7.1**	**−4.6**	**−6.0**
Thailand	**21.4**	**−14.2**	**−9.6**	**−11.8**
Bangladesh	**33.4**	**−7.6**	**(−4.5)**	**−4.9**
Nepal	**30.4**	–	–	–
Pakistan	**22.4**	**−5.5**	**−2.7**	**−4.5**
Sri Lanka	**23.1**	**−6.5**	**−4.6**	**−5.8**
Jordan	12.8	−2.6[b]	−1.0[b]	−2.1[b]
Syria	**12.8**	−2.4[b]	**−0.1**	**−1.9**
AMERICAS				
Colombia	**11.4**	**−2.3**	**−3.9**	**−3.5**
Costa Rica	**6.5**	**−2.8**	−2.2[b]	**−2.6**
Mexico	**12.1**	**−5.5**	**−3.3**	**−5.1**
Panama	**10.6**	**−7.0**	**−3.9**	**−6.2**
Paraguay	**12.6**	**(−4.4)**	**−4.8**	**−4.5**
Peru	**18.6**	**−8.8**	**−4.0**	**−7.5**
Venezuela	**11.0**	–	**−3.6**	**−4.7**
Dominican Republic	**10.2**	**−4.4**	**−3.5**	**−4.1**
Guyana				
Whole population	**8.2**	–	–	**−2.4**
Africans	**8.8**	–	–	**−2.7**
East Indians	**8.3**	–	–	**(−1.2)**
Haiti	**18.9**	**(−8.3)**	**−6.4**	**−8.2**
Jamaica	8.7	–	–	−1.2[a,b]
Trinidad and Tobago	7.2	–	–	−1.9[b]

[a]Coefficient is not significant in single attribute regression.
[b]Coefficient is not significant in multiple attribute regression.
NOTES: (i) – indicates that data are not available or that the sample is under 5 per cent of country total or that the sample is above 5 per cent but under 50 cases.
(ii) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(iii) Bold face indicates that the coefficient is significant in multiple regression.

tion is a profile of mothers of children born recently and not of women in general.

Examination of mean breastfeeding durations and the associated single-factor regression significance levels (table 5) lend clear support to the widely recognized association between increased education and shorter breastfeeding intervals. Between the least and the best educated the differentials are of the order of several months in most countries; the exceptions are mostly in the Americas, usually where mean durations of breastfeeding are short for every educational group.

Across countries the role of education is also seen to

Table 5 Mean duration of breastfeeding by mother's education

Country	Education level		
	None (base)	Primary (increment)	Middle +
AFRICA			
Kenya	**20.1**	**−4.2**	**−6.0**
Lesotho	23.6	−2.5[a,b]	–
Senegal	20.9	**−4.5**	–
Sudan (N)	17.2	−1.4[a,b]	–
ASIA			
Fiji			
Whole population	12.7	−1.5[a,b]	−4.4[b]
Fijians	–	**13.3**[c]	**−3.4**
Indians	**12.9**	**−3.3**	**−6.8**
Indonesia	**28.0**	−2.6[b]	**−14.6**
Republic of Korea	**20.7**	**−3.1**	**−7.3**
Malaysia			
Whole population	–	6.3[c]	−2.4[b]
Malays	–	8.6[c]	−2.6[a,b]
Philippines	–	**17.5**[c]	**−5.0**
Thailand	**22.0**	−1.7[a,b]	**−12.5**
Bangladesh	**34.1**	**−4.6**	–
Nepal	30.4	–	–
Pakistan	**21.7**	**−2.3**	–
Sri Lanka	**25.8**	−2.0[a,b]	**−6.9**
Jordan	**12.9**	**−3.6**	**−6.3**
Syria	**12.8**	−2.1[b]	−3.5
AMERICAS			
Colombia	**11.8**	−1.9[b]	**−6.4**
Costa Rica	–	5.7[c]	−2.4[b]
Mexico	**12.6**	**−2.9**	**−8.6**
Panama	–	**10.1**[c]	**−7.4**
Paraguay	**14.3**	−2.4[b]	**−8.3**
Peru	**18.9**	−2.2[b]	**−8.5**
Venezuela	**18.9**	**−8.6**[c]	**−5.1**
Dominican Republic	10.6	−1.8[a,b]	−5.5[b]
Guyana			
Whole population	–	8.0[c]	−1.4[b]
Africans	–	8.1[c]	−1.5[b]
East Indians	–	8.2[c]	−1.4[b]
Haiti	**18.7**	**−4.9**	(−12.0)
Jamaica	–	**8.7**[c]	**−2.7**
Trinidad and Tobago	–	**8.6**[c]	**−3.6**

[a]Coefficient is not significant in single attribute regression.
[b]Coefficient is not significant in multiple attribute regression.
[c]Primary used as base category.
NOTES: (i) – indicates that data are not available or that the sample is under 5 per cent of country total or that the sample is above 5 per cent but under 50 cases.
(ii) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(iii) Bold face indicates that the coefficient is significant in multiple regression.

be relative rather than absolute. Very striking differences between rare education groups (in some countries those with no education, in others those with middle school) and the remainder have consistently appeared in our regressions. Yet, as with residence, between countries with similar educational distributions the usual durations of breastfeeding can sometimes vary quite substantially.

Using multiple- rather than single-factor regressions, differences in mean breastfeeding durations by education of about three months or less tend not to be significant although in every case the signs of the regression coefficients remain stable. The countries where this is the case are mostly in the Americas (only four are not), and are countries where very low or very high proportions of women receive a middle school education.

Where differences in the means are large (five or more months), educational differences remain highly significant in the multiple-factor regressions. The differences are also significant for both rural and urban women, though in several countries middle schooling, rather than any schooling, is the relevant variable in urban areas. Significance levels are also high for all parity groups. By period, education becomes significant at breastfeeding durations near the country means in Bangladesh, Korea and Sri Lanka, at earlier durations in Lesotho and Paraguay, and at longer durations in Fiji. For other countries all periods display significant differences. The duration differences imply that in some countries, depending on the length of the observation period available, educational differences may not always appear to be important when they in fact are. (This point holds even more strongly for contraception, discussed below.)

In contrast to the 18 countries with strong educational effects, for those in which education is not significant overall, it is also not significant for any subgroups – the single exception being among low-parity women in Dominican Republic, the country with the largest mean difference not found significant in the overall regressions (5.5 months). Educational effects on breastfeeding thus appear either to be pervasive or to be absent. The countries where differences are not significant include four of the seven countries with mean durations of breastfeeding of less than 10 months among the least educated women, which admits the possibility that a historical convergence occurred that is now largely complete.

4.4 WORK STATUS SINCE MARRIAGE

Following Akin *et al* (1981) we have used the work categories: no work since marriage, work at home or in the family farm, and work away from home. Neither work at home nor work away from home can be assigned to the birth interval(s) in which it occurred, however, nor do we know the proportions of women who have worked both at home and away. The variable also has the central fault that, particularly among rural women, the distinction between work and non-work is frequently arbitrary.

To the extent that the employment variable is informative, it is as a status variable (work at home in particular being associated with farming or urban poverty), and as a determinant of breastfeeding opportunity (breastfeeding being more difficult for women working away from home than for those working at home or not working). The mean durations of breastfeeding for women in different work categories, displayed in table 6, are higher for women working at home than away in most countries and may reflect both of these aspects.

The association of breastfeeding with working at home is positive but relatively weak in most countries. In five, however (Indonesia, Thailand, Nepal, Sri Lanka and Peru), differences between mothers working at home and those not working are both large and highly significant ($\mu > 4\sigma$). The association is not significant in the Caribbean area, even in single-factor regressions, or in the rest of Latin America (apart from Peru) in multiple regressions. The pattern in Lesotho is the opposite of that of other countries, working at home being powerfully associated with shorter breastfeeding durations, but the numbers are small – about 6 per cent of the sample.

Working away from home is correlated with average, or better than average education, urban migration, and the use of modern contraception. It is associated with a relatively small diminution of breastfeeding in many countries, and with larger effects in four (Kenya, Philippines, Mexico and Panama). In Mexico and Venezuela the effect is sharp among low-parity and urban women. However, the non-significance of the variable in many single-factor regressions and in multiple regressions for all but two countries makes it doubtful whether working away from home does in fact have much direct impact on breastfeeding.

4.5 ADDITIONAL CHILDREN WANTED

The determination of whether additional children were wanted following recent births uses the WFS standard variables on wanted status of last pregnancy for the closed interval and for the open interval of women currently pregnant, and uses additional children wanted as of interview for the open interval of non-pregnant women. Earlier births and closed or open interval births when their wanted status was not reported are assumed to have been wanted. To some extent these conventions may narrow differences between the wanted/unwanted group means. Women who were undecided about additional births are included with those not wanting births.

Our interest in the influence of the wanted status of births for breastfeeding arises from the possibility that breastfeeding may be prolonged as a means of avoiding pregnancy. If so, the effect is expected to be seen principally in countries where breastfeeding durations are normally long enough to have fertility effects – which may exclude most of the countries of the Americas – and is likely to be restricted to rural and urban non-contracepting women in the higher parity groups.

Overall, the means and regression findings do not indicate that much of a breastfeeding effect actually occurs (table 7). Differences in mean breastfeeding duration for those wanting and undecided or not wanting children are usually modest, and are only statistically significant for about half the samples in the single-factor regressions for countries of Africa and Asia. The difference is above four months in only three countries. Changing the definition to include undecided with wanted births increases the differential to above one year in Bangladesh and Thailand, and to eight months in Pakistan. For two of these countries (Pakistan is the exception), Nepal and Peru, the variable is highly significant ($\mu > 4\sigma$), as coded in table 7. Apart from a correlation with high parity, we are not able to identify factors contributing to its high significance in these cases.

Table 6 Mean duration of breastfeeding by mother's work experience since first marriage

Country	Work experience		
	None (base)	Worked at home (increment)	Worked away from home
AFRICA			
Kenya	18.0	+0.1[a,b]	−3.4[b]
Lesotho	**21.7**	(−4.1)	**−2.2**
Senegal	**17.7**	**+4.2**	(+1.5)[a,b]
Sudan (N)	16.9	+0.3[a,b]	–
ASIA			
Fiji			
Whole population	10.3	+3.4[b]	−1.8[b]
Fijians	**11.9**	(+2.4)[a,b]	**−2.7**
Indians	9.4	–	−3.0[a,b]
Indonesia	**22.6**	**+6.6**	+1.3[b]
Republic of Korea	**15.1**	**+3.6**	−0.2[a,b]
Malaysia			
Whole population	5.4	+2.3[b]	−2.2[b]
Malays	7.0	**+3.1**	−1.4[a,b]
Philippines	**14.2**	**+2.9**	**−5.5**
Thailand	**13.3**	**+9.1**	−1.9[a,b]
Bangladesh	**32.5**	**(+4.2)**	+3.1[a,b]
Nepal	**26.9**	**+5.0**	–
Pakistan	21.0	+0.6[a,b]	−1.8[a,b]
Sri Lanka	**20.7**	**+6.6**	+1.1[a,b]
Jordan	11.4	+2.1[a,b]	–
Syria	11.6	+2.1[b]	–
AMERICAS			
Colombia	9.8	+0.2[a,b]	−1.6[b]
Costa Rica	**6.0**	–	**−2.2**
Mexico	9.8	+1.8[b]	−3.2[b]
Panama	9.2	–	−4.6[b]
Paraguay	10.9	+1.7[b]	−1.9[b]
Peru	**12.8**	**+4.5**	−2.2[b]
Venezuela	8.1	–	2.3[b]
Dominican Republic	9.0	(+0.3)[a,b]	−2.3[b]
Guyana			
Whole population	7.5	+2.0[a,b]	−0.9[a,b]
Africans	7.1	–	−0.7[a,b]
East Indians	7.8	(+1.8)[a,b]	(−0.5)[a,b]
Haiti	15.7	+3.0[b]	−1.0[a,b]
Jamaica	8.5	–	−0.3[a,b]
Trinidad and Tobago	**7.1**	(+0.9)[a,b]	**−2.4**

[a]Coefficient is not significant in single attribute regression.
[b]Coefficient is not significant in multiple attribute regression.
NOTES: (i) – indicates that data are not available or that the sample is under 5 per cent of country total or that the sample is above 5 per cent but under 50 cases.
(ii) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(iii) Bold face indicates that the coefficient is significant in multiple regression.

4.6 USE OF CONTRACEPTION FOLLOWING THE BIRTH

Contraceptive use is recorded for closed and open birth intervals in the WFS surveys but rarely for earlier intervals. We have assumed non-use in intervals before the closed interval. Where contraception has been used, we have distinguished between traditional methods (principally, rhythm or withdrawal) and modern methods (pill, condom, IUD, sterilization, injectables). If several

Table 7 Mean duration of breastfeeding by whether additional children were wanted following this birth

Country	Additional children	
	Wanted (base)	Not wanted or undecided (increment)
AFRICA		
Kenya	**17.5**	**+2.5**
Lesotho	21.3	−0.2[a,b]
Senegal	–	–
Sudan (N)	16.8	+0.5[a,b]
ASIA		
Fiji		
Whole population	**9.6**	**+1.1**[a]
Fijians	11.5	−0.7[a,b]
Indians	**8.0**	**+1.6**
Indonesia	24.4	+4.2[b]
Republic of Korea	15.8	+1.3[b]
Malaysia		
Whole population	5.9	+0.0[a,b,c]
Malays	8.2	−0.1[a,b]
Philippines	**13.9**	**+0.3**[a]
Thailand	**17.2**	**−6.2**
Bangladesh	**29.9**	**+5.5**
Nepal	**27.6**	**+12.4**
Pakistan	**20.1**	**+3.3**
Sri Lanka	**20.7**	**+2.9**
Jordan	11.2	+0.4[a,b]
Syria	11.8	+1.1[a,b]
AMERICAS		
Colombia	9.1	+0.7[a,b]
Costa Rica	4.8	+1.5[a,b]
Mexico	9.0	+1.4[b]
Panama	6.6	+1.8[b]
Paraguay	10.8	+1.4[a,b]
Peru	**12.1**	**+3.0**
Venezuela	7.3	+0.5[a,b]
Dominican Republic	8.0	+0.9[a,b]
Guyana		
Whole population	7.0	+0.9[b]
Africans	7.6	+1.2[a,b]
East Indians	6.7	−2.1[a,b]
Haiti	16.6	+1.1[a,b]
Jamaica	8.5	−0.7[a,b]
Trinidad and Tobago	6.0	+0.8[a,b]

[a]Coefficient is not significant in single attribute regression.
[b]Coefficient is not significant in multiple attribute regression.
[c]Sign changes and is significant in multiple regression.
NOTES: (i) – indicates that data are not available or that the sample is under 5 per cent of country total or that the sample is above 5 per cent but under 50 cases.
(ii) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(iii) Bold face indicates that the coefficient is significant in multiple regression.

methods have been used in an interval, the most recent is recorded. Biases in contraceptive status arise through both of these assumptions, as well as from non-reporting of contraceptive use, about which little is known. The effect of the biases is to reduce differences between users and non-users, but in the absence of prior expectations about the direction of influence between contraception and breastfeeding, it will not be obvious when blurring has occurred. With respect to the direction of its influence, contraception operates to increase birth intervals, which permits breastfeeding to be continued over extended periods. Contraception tends to be preferred by mothers in socio-economic groups that are less inclined toward breastfeeding, however, and may in some cases have its principal birth-averting effects at durations beyond the normal lactation intervals for the society. The interpretation of patterns is thus complex.

Table 8 presents the sample means for breastfeeding by contraceptive status, which show that in general the variable is correlated with sharply reduced breastfeeding durations. For 13 countries (Kenya, Indonesia, Malaysia, Philippines, Jordan, Syria, Colombia, Mexico, Panama, Paraguay, Peru, Venezuela and Dominican Republic) modern contraceptive use is of particularly high significance in the regressions ($\mu > 4\sigma$) and remains highly significant with parity, residence and education controlled. It is correlated with urban residence, better education, and a desire to avoid further births. Traditional methods have almost no impact in some countries and less impact than modern methods in the remainder.

The countries where the effects of contraception are least felt are principally those of the Caribbean basin. Most are countries where breastfeeding durations are short for all groups. By contrast, for the remainder of Latin America breastfeeding durations are shorter by as much as half among users of modern contraception. In other regions the absolute differences are sometimes as great but represent a smaller proportion of the interval.

In two countries, Indonesia and Sri Lanka, contraceptive use is associated with longer breastfeeding durations. The relationship continues to be significant when controlled for parity, residence and education, and implies that women in these countries are taking advantage of pregnancy avoidance to breastfeed longer than they otherwise could. The pattern is a rare one, however.

4.7 SEX OF CHILD

Like age and parity, child's sex is unambiguous. It may influence the duration of breastfeeding in one of two ways. Where sex preferences are strong, mothers may be more anxious to stop childbearing after reaching a target number of the more desired sex than after earlier births. Women might in this case use breastfeeding to avoid pregnancy, or, by avoiding pregnancy through other means, coincidentally breastfeed the desired 'final' child longer than earlier children. In countries where breastfeeding is normally short, deliberately longer breastfeeding of children of one sex is also a possibility.

Our findings (table 9) do not appear to support either of these possibilities, unless sex preferences are much more evenly balanced than is currently believed. In

Table 8 Mean duration of breatfeeding by whether contraception was used following this birth

Country	None used (base)	Used traditional method	Used modern method (increment)	Used any method
AFRICA				
Kenya	**18.1**	$-0.9^{a,b}$	**−5.8**	**−3.6**
Lesotho	21.5	$-1.9^{a,b}$	–	-2.5^{b}
Senegal	21.1	$+1.9^{a,b}$	–	$+1.0^{a,b}$
Sudan (N)	17.0	–	$(-2.6)^{a,b}$	$(-2.2)^{a,b}$
ASIA				
Fiji				
Whole population	**10.6**	$-0.1^{a,b}$	**−1.4**	**−1.1**
Fijians	**11.6**	$(-1.6)^{a,b}$	**−2.7**	**−1.8**
Indians	8.6	$(-0.3)^{a,b}$	$+1.2^{b}$	$+1.0^{a,b}$
Indonesia	**24.8**	$-3.1^{a,b}$	+3.2	+2.5
Republic of Korea	16.6	$-0.5^{a,b}$	$-0.5^{a,b}$	$-0.7^{a,b}$
Malaysia				
Whole population	**7.7**	**−3.7**	**−4.9**	**−4.5**
Malays	**9.3**	$-2.9^{a,b}$	**−4.9**	**−5.2**
Philippines	**15.7**	-2.7^{b}	**−5.3**	**−3.8**
Thailand	19.8	**+6.1**	$-0.7^{a,b}$	$+0.0^{a,b}$
Bangladesh	32.7	$(+5.1)^{a,b}$	$+3.9^{a,b}$	$+4.5^{a,b}$
Nepal	30.1	–	–	–
Pakistan	21.4	–	-2.8^{b}	-2.4^{b}
Sri Lanka	**21.4**	$+0.8^{a,b}$	**+3.1**	**+2.2**
Jordan	**12.6**	**−4.0**	**−5.1**	**−4.6**
Syria	**12.3**	–	**−2.6**	**−2.3**
AMERICAS				
Colombia	**11.2**	-2.6^{b}	**−5.2**	**−4.2**
Costa Rica	**6.4**	$-0.1^{a,b}$	**−2.1**	**−1.7**
Mexico	**10.9**	$-1.8^{a,b}$	**−5.5**	**−4.6**
Panama	**10.5**	**−3.1**	**−6.6**	**−5.6**
Paraguay	**13.0**	$\mathbf{-1.4}^{b}$	**−3.9**	**−3.0**
Peru	**15.7**	-3.9^{b}	**−9.6**	**−5.5**
Venezuela	**9.3**	**−3.2**	**−4.3**	**−3.9**
Dominican Republic	**10.1**	**(−3.6)**	**−5.0**	**−4.6**
Guyana				
Whole population	7.7	$(-0.7)^{a,b}$	$-1.2^{a,b}$	$-1.1^{a,b}$
Africans	7.5	–	$-1.4^{a,b}$	$-1.2^{a,b}$
East Indians	8.1	–	$-1.7^{a,b}$	$-1.4^{a,b}$
Haiti	16.9	$+1.8^{a,b}$	–	$+0.0^{a,b}$
Jamaica	**8.7**	–	**−1.3**	**−1.1**
Trinidad and Tobago	6.5	–	$-0.3^{a,b}$	$-0.1^{a,b}$

[a]Coefficient is not significant in single attribute regression.
[b]Coefficient is not significant in multiple attribute regression.
NOTES: (i) – indicates that data are not available or that the sample is under 5 per cent of country total or that the sample is above 5 per cent but under 50 cases.
(ii) Parentheses indicate that the sample is greater than 5 per cent of the country total but between 50 and 100 cases.
(iii) Bold face indicates that the coefficient is significant in multiple regression.

nearly all countries differences in duration of breastfeeding by sex are small, both absolutely (of the order of one month or less) and relative to differences observed for other variables. The signs of the differences are evenly mixed, with girls breastfed longer in 14 of the countries and boys in 14. In only three of the 28 countries are the values significant in single-factor regressions, and in only four are they significant in the multiple regressions. In no cases are the mean differences much beyond about two standard errors, and all have the appearance of being

Table 9 Mean duration of breastfeeding by sex of child

Country	Sex of child: Male (base)	Sex of child: Female (increment)
AFRICA		
Kenya	17.9	−0.3[a,b]
Lesotho	20.8	+0.9[a,b]
Senegal	20.0	+0.4[a,b]
Sudan (N)	16.8	+0.1[a,b]
ASIA		
Fiji		
Whole population	10.0	−0.1[a,b]
Fijians	10.7	+0.7[a,b]
Indians	9.6	−1.0[a,b]
Indonesia	**25.0**	**+1.6**
Republic of Korea	17.2	−1.2[a,b]
Malaysia		
Whole population	6.0	−0.1[a,b]
Malays	8.2	−0.1[a,b]
Philippines	**13.6**	**+0.7**[a]
Thailand	19.6	+0.2[a,b]
Bangladesh	32.6	+0.7[a,b]
Nepal	30.3	−0.3[a,b]
Pakistan	21.6	−0.9[a,b]
Sri Lanka	22.4	−0.6[a,b]
Jordan	**11.9**	**−1.1**
Syria	12.1	−0.3[a,b]
AMERICAS		
Colombia	9.1	+0.7[a,b]
Costa Rica	**4.4**	**+1.8**
Mexico	9.3	+0.5[a,b]
Panama	6.9	+1.3[a,b]
Paraguay	10.5	+1.4[a,b]
Peru	14.1	−0.4[a,b]
Venezuela	7.6	−0.5[a,b]
Dominican Republic	8.3	+0.3[a,b]
Guyana		
Whole population	7.8	−0.7[a,b]
Africans	7.4	−0.3[a,b]
East Indians	8.5	−1.5[a,b]
Haiti	16.6	+0.6[a,b]
Jamaica	8.6	−0.9[a,b]
Trinidad and Tobago	6.4	−0.4[a,b]

[a]Coefficient is not significant in single attribute regression.
[b]Coefficient is not significant in multiple attribute regression.

due to sampling effects. In unweighted regressions two of the four country differences noted are not significant (Philippines, Jordan) but four others are (Lesotho, Korea, Bangladesh, Paraguay).

Table 10 Variables displaying the highest levels of significance, by country

Variable	Countries in which coefficient mean exceeds four times its standard error[a]
Age	Indonesia, Malaysia, Nepal, Pakistan, Jordan, Colombia
Age–parity interaction	Fiji, Rep. of Korea, Malaysia, Pakistan, Sri Lanka, Jordan, Syria, Colombia, Costa Rica, Mexico, Panama, Guyana
Parity	Fiji, Philippines, Sri Lanka, Paraguay
Residence	Kenya, Senegal, Fiji, Indonesia, Rep. of Korea, Malaysia, Philippines, Thailand, Bangladesh, Pakistan, Sri Lanka, Costa Rica, Mexico, Peru, Venezuela, Dominican Republic, Haiti
Education	Kenya, Indonesia, Rep. of Korea, Philippines, Bangladesh, Pakistan, Sri Lanka, Jordan, Colombia, Mexico, Panama, Paraguay, Peru, Venezuela, Haiti, Trinidad and Tobago
Work (home)	Indonesia, Thailand, Nepal, Sri Lanka, Peru
Work (away)	Philippines
Additional children	Thailand, Bangladesh, Nepal, Sri Lanka, Peru
Contraception (modern)	Kenya, Indonesia, Philippines, Syria, Mexico, Peru, Malaysia, Jordan, Colombia, Panama, Paraguay, Venezuela, Dominican Republic

[a]No factors reached this level in Lesotho, Sudan (North) or Jamaica.

In general, the rarity of significance and the lack of a common pattern where it is found suggest that other surveys might not duplicate these results. The remaining countries include several that are culturally similar to those in which differences are significant but fail to show similar patterns. Indeed, within the Americas only one country besides Costa Rica and Paraguay (Panama) displays statistically significant differences for any period or subgroup. African and Asian cultures are more varied and preclude similar comparisons, but even so the absence of any general patterns across countries does not lend confidence to the reliability of findings in the few instances where statistical significance has appeared. Without disowning our findings outright, we caution that they should be confirmed by other investigations before being accepted. With the possible exception of wife's work status other variables have not presented similarly ambiguous patterns.

Table 11 Proportional distribution of sample by selected attributes; 28 countries

Region/ country	Sample size	Mean duration of breastfeeding (months)	Proportional distribution of sample: Age 15–24	25–29	30–34	35–49	Parity 1–2	3–4	5–6	7+	Residence: Rural	Urban migrant	Lifetime urban	Urban	Education: No school	Primary	Middle+	Work: None	Worked at home	Worked away	Additional children wanted: No or unsure	Yes	Use of family planning: No	Traditional method	Modern method	Traditional and modern methods
AFRICA																										
Kenya	4157	17.8	38	26	16	20	30	24	19	27	89	10	1	11	45	33	22	88	5	7	20	80	91	4	5	9
Lesotho	1760	21.2	38	25	17	20	43	27	17	13	94	5	1	6	7	93	0	81	6	13	13	87	90	7	3	10
Senegal	1146	20.2	41	25	17	17	36	21	21	22	65	10	25	35	86	14	0	36	58	8	–	–	91	8	1	9
Sudan (N)	1144	16.9	33	31	17	19	28	28	21	23	75	5	20	25	78	22	0	69	28	3	19	81	94	1	5	6
ASIA																										
Fiji																										
Whole population	1695[a]	10.0	40	28	19	13	44	27	16	13	66	20	14	34	12	34	54	63	8	29	75	25	51	8	41	49
Fijians	708	11.0	33	27	—40—		39	28	—33—		71	18	11	29	2	32	66	44	12	44	86	14	64	9	27	36
Indians	1326	9.1	43	34	—24—		48	29	—23—		64	23	13	36	26	37	37	87	2	11	72	28	45	7	48	55
Indonesia	5217	25.8	44	22	17	17	42	26	17	15	82	6	12	18	52	40	8	41	46	13	31	69	64	6	30	36
Korea, Rep. of	2514	16.6	18	42	25	15	48	31	14	7	41	39	20	59	14	52	34	49	39	12	61	39	63	8	29	37
Malaysia																										
Whole population	1818	5.9	37	29	18	16	40	27	17	16	72	14	14	28	1	84	15	52	37	11	36	64	60	12	28	40
Malays	1200	8.2	39	27	16	18	38	24	18	20	84	9	7	16	0	86	14	54	38	8	31	69	70	9	21	30
Philippines	4637	13.9	30	27	20	23	34	27	18	21	72	12	16	28	4	25	71	51	28	21	49	51	55	26	19	45
Thailand	2303	19.7	32	28	19	21	41	27	16	16	87	7	6	13	15	79	6	11	76	13	39	61	73	3	24	27
Bangladesh	4004	32.9	50	23	14	13	33	25	21	21	91	6	3	9	73	27	0	89	5	6	60	40	90	4	6	10
Nepal	4008		32	29	18	21	39	29	19	13	98	1	1	2	95	4	1	33	64	3	27	73	97	0	3	3
Pakistan	2060	21.2	35	28	19	18	32	26	20	22	63	8	19	27	88	8	4	84	8	8	41	59	92	1	7	8
Sri Lanka	4517	22.1	26	31	23	20	41	27	17	15	83	6	11	17	19	39	42	64	17	19	51	49	67	14	19	33
Jordan	1822	11.4	36	29	18	17	26	25	20	29	37	21	42	63	66	22	12	86	9	5	36	64	74	9	17	26
Syria	2540	12.0	39	25	16	20	31	26	19	24	57	10	33	43	69	19	12	76	21	3	24	76	82	5	13	18
AMERICAS																										
Colombia	1214	9.5	43	26	15	16	45	24	13	18	46	41	13	54	16	70	14	67	13	20	55	45	57	14	29	43
Costa Rica	811	5.0	42	26	17	15	54	22	11	13	53	15	32	47	7	66	27	60	8	32	41	59	34	14	52	66
Mexico	2556	9.5	41	25	17	17	38	24	16	22	47	12	41	53	21	67	12	75	10	15	47	53	71	7	22	29
Panama	962	7.5	36	31	19	14	40	30	15	15	51	13	36	49	7	56	37	57	6	37	55	45	42	17	41	58
Paraguay	1179	11.1	42	24	16	18	45	24	13	18	65	4	31	35	8	76	16	49	32	19	26	74	63	13	24	37
Peru	3099	13.9	34	26	17	23	36	26	17	21	37	17	46	63	29	17	54	43	36	21	60	40	65	24	11	35
Venezuela	1206	7.4	47	26	15	12	47	24	13	16	26	5	69	74	0	77	23	66	4	30	47	53	53	14	33	47
Dominican Rep.	857	8.4	50	22	14	14	39	25	16	20	62	19	19	38	15	71	14	64	8	28	50	50	63	11	26	37
Guyana																										
Whole population	1249	7.4	49	26	15	10	44	26	15	15	67	–	–	33	2	50	48	62	10	28	53	47	66	6	28	34
Africans	443	7.2	40	29	—31—		40	24	—36—		43	–	–	57	0	45	55	41	11	48	50	50	62	8	30	38
East Indians	727	7.8	54	21	—25—		45	26	—29—		87	–	–	13	3	58	39	77	10	13	55	45	71	3	26	29
Haiti	853	16.9	30	27	21	22	38	26	19	17	76	8	16	24	71	23	6	24	50	26	38	62	82	14	4	18
Jamaica	574	8.2	53	22	11	14	44	24	15	17	57	–	–	43	2	78	20	39	8	53	48	52	53	2	45	47
Trinidad and Tobago	879	6.2	48	25	—27—		53	25	11	11	45	–	–	55	2	33	65	53	7	40	38	62	49	4	47	51

[a]Total less than sum of subgroups due to differences in observation times for which $0.95 > \hat{\ell}_y > 0.05$.

5 Conclusion

The evidence from the 28 countries examined in this report suggests that age, parity and residence influence durations of breastfeeding rather strongly in most countries. Education is also usually highly significant, with better educated women breastfeeding for shorter periods than the less educated. Contraceptive use appears to have pronounced independent effects but they are mixed: in most countries users of modern methods tend to breastfeed for shorter durations than non-users, but in two (Indonesia and Sri Lanka) women appear to take advantage of pregnancy avoidance to breastfeed longer than they otherwise could.

In most countries the desire for additional children is associated with shorter breastfeeding durations, as is work away from home, while working at home is associated with longer durations. These factors, though they show up repeatedly, are only sometimes statistically significant. Other variables with which they correlate often absorb their effects in the multiple regression equations. A final variable, child's sex, seems to be essentially random in its effects.

An important implication of these findings is that breastfeeding durations can probably be expected to decrease in most or all of the survey countries in coming years. As educational levels rise and urban migration continues, increasing proportions of women will join the relatively short breastfeeding duration categories. There remains a greater variation across countries than within, however, when education, residence and other variables are controlled. That pattern suggests that not all countries need follow the postwar American pattern of virtual abandonment of breastfeeding, which has only been reversed in the last decade. With appropriate information programmes, it may be possible in most countries for reasonable balances to be struck. To do so probably requires campaigns directed toward the middle and upper classes as much as toward the least educated and least well off, since it is the better educated whose patterns the poor increasingly follow.

For researchers, it is hoped that these findings will provide a useful benchmark from which to compare future survey results for these and other countries. In cases where unexpected patterns are observed this report might also help investigators to avoid incautious statements about breastfeeding behaviour. Puzzling age–parity interactions and significant differences in breastfeeding durations by child's sex, for example, may be attributable to the limitations of analytical methods or to sampling effects more often than to actual characteristics of the population being investigated. An important contribution of the multicountry analysis may be the caution it suggests with respect to the significance of findings deriving from highly correlated variables. We also hope that other researchers will, as we have, avoid speculation about the significance and interpretation of findings with respect to attributes that are rare in a given population. Finally, although only occasionally noted in this report, the likelihood that some variables will be duration specific in their effects supports examination of coefficients at single or narrowly grouped durations (Smith 1981) as well as averaged across the complete distribution.

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