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BREAST-FEEDING PATTERNS AND DETERMINANTS IN JORDAN

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BREAST-FEEDING AND INFANT MORTALITY FACT SHEET: JORDAN
(WORLD FERTILITY SURVEY, 1976)

	BREAST-FEEDING			MORTALITY RATE/1000[3]		
	Percent of Sample[1]	Percent Ever Breast-Fed	Mean Duration in Months[2]	Neonatal	Postneonatal	Infant
TOTAL SAMPLE	100	90.4	11.0	30.7	39.9	70.6
1. AREA OF RESIDENCE						
Urban	45	89.3		28.0	35.9	63.9
Urban Migrant	21	90.7	11.8			
Always Urban	24	88.7	9.6			
Rural	55	91.9	12.4	36.4	48.9	85.3
2. REGION OF RESIDENCE						
Amman 1 & 2	33	88.9	9.6			68.9
Zarka	15	91.1	10.3			53.8
Towns	12	88.6	11.1			68.6
Villages	40	91.9	12.4			84.3
3. SEX OF CHILD						
Male	51	90.4	11.5	31.8	32.0	63.8
Female	49	90.3	10.5	29.5	48.4	77.9
4. WORK STATUS OF MOTHER[4]						
Does not work/ never worked	85	91.1	11.1	30.2	39.8	70.0
Works at home/worked	9	92.7	10.8			
Works away/worked	6	88.9	8.4	33.3	41.2	74.5
5. EDUCATION OF MOTHER[5] (in years)						
Zero	52	91.2	13.2	32.2	45.4	77.6
1 to 3/1 to 5	7	92.5	12.2	32.2	39.9	72.1
4 to 6/6 and over	20	90.8	9.9			
7 to 9	13	89.3	7.8			
10 and over	8	83.5	6.9			
6. FATHER'S OCCUPATION						
Modern	17	88.4	9.4	23.6	28.2	51.8
Transitional	40	90.5	11.8	30.0	46.4	76.4
Mixed	34	90.4	10.1	34.6	38.6	73.2
Traditional	8	93.4	13.7	30.2	34.2	64.5

[1]Based on sample of last 2 live births in 4 years preceding the interview.
[2]Based on current status technique.
[3]Based on births between 1966 and 1975.
[4]For mortality rate, work status is either never worked or worked.
[5]For mortality rate, education in years is either zero, 1-5 or 6 years and over.

SOURCES: Akin, J.S., Bilsborrow, R., Guilkey, D. and Popkin, B.M. (1983). "Breast-feeding Patterns and Determinants in Jordan."

Sullivan, J.M., Adlakha, A.L. and Suchindran, C.M. (1984). "Infant Mortality Levels, Time Trends and Determinants in Jordan: A Summary of Findings."

BREAST-FEEDING PATTERNS AND DETERMINANTS IN JORDAN

1. Introduction

Recent research has documented the benefits of breast-feeding not only for the health of the infant, but also as an inexpensive and appropriate source of nutrients and to stimulate strong emotional relationships between mother and child. Because breast-feeding suppresses ovulation it is a major source of protection against pregnancy in most low-income nations. The protection results not only from the direct hormonal effects, but also from taboos against sexual intercourse during breast-feeding in some cultures. Despite these major benefits attributed to breast-feeding, little in-depth research has been conducted on the patterns of breast-feeding in low-income countries or on the factors which influence these patterns.

In a recent paper, we developed and applied a methodology to the analysis of breast-feeding, using data for Sri Lanka from the World Fertility Survey (WFS) (Akin, et al., 1981a). In a second paper, an analysis of Jordan's breast-feeding, we extended that approach to show that the factors that affect the decisions to continue breast-feeding differ for women who breast-feed for different lengths of time (Akin, et al., 1981b). Testing for differences in behavior for women who feed for different durations is important because the results may suggest different policy approaches for women who tend to breast-feed their children different durations.

The purpose of this paper is to summarize the more detailed paper on Jordan with an emphasis on policy oriented results. The statistical techniques we use are contained in a technical appendix to this paper.

2. Sample Selection

The purpose of this paper is to analyze the patterns and determinants of the extent and duration of breast-feeding for children in Jordan. The source of data is a national sample of women surveyed by the government of Jordan in 1976 as part of the World Fertility Survey program. The WFS questionnaire focuses on fertility and collects background and breast-feeding information only for the last two births. Specifically, the woman is asked whether she breast-fed each of her last two children, and, if so, for how long (in months). Observations in our analysis are of children (n = 3412) born in the four-year period preceding the date of interview, i.e., in 1976-80. We constrain ourselves to a four-year period because we desire to examine those breast-feeding decisions occurring as near the interview date as possible so that the variables measured at the time of interview (e.g., women's labor force behavior and marital status) refer to a time as close as feasible to the actual breast-feeding decision. Moreover, the farther back respondents are asked to recall, the less accurate the information tends to be. It is most important, however, that we include both the last and next-to-last born so that the data will be reasonably representative of all children born in the study period. It would be preferable to include the third or fourth child born to a few mothers during the four year period, but the nature of the data precludes that alternative.

3. Patterns and differentials in breast-feeding in Jordan

As we and others have noted elsewhere, common techniques for calculating the mean duration of breast-feeding suffer serious selectivity

biases, and were therefore not used (see Akin et al., 1981 a, b for discussions). Children may cease to be breast-fed not only because of the mother's voluntary decision but also because of the child's death. The technique which can take into account not only the child's breast-feeding but also its survival status is the multiple decrement life table which is described in the technical appendix.

Table 1 and Figure 1 illustrate the percentages of surviving children breast-fed at various ages in Jordan. There was no difference in the percentage of children even breast-fed in urban and rural areas (93 percent). For the country as a whole the percentage appears to taper off rather quickly, to 79 percent at age three months, 70 percent at six, only 41 percent at one year, and less than four percent at the second birthday of the child. Significant rural-urban differences appear after the first month, with breast-feeding of urban children being at least 13 percent lower starting at four months, and falling abruptly to about one-third lower from 12 months onward. In rural areas over half the ever breast-fed children were breast-fed at least one year while the proportion in urban areas was only about one-third.

Table 1 and Figure 1 about here

In comparing Jordan with other countries (whether in the WFS program or not), we observe that the percentage of recent children breast-fed at all is slightly higher in Jordan than in most other countries, but the duration of breast-feeding is about average (see Popkin, Bilsborrow and Akin, 1982; Ferry, 1981; Kent, 1981).

Table 2 and Figures 2-4 illustrate some breast-feeding

differentials in women from Jordan using the current status method described in the appendix. We focus on the percentages of children breast-fed six months because six months is commonly used as a minimum desired duration of breast-feeding even in developed countries where potable water and infant formulae are readily available. Differences in breast-feeding exist not only between urban and rural areas and different regions in Jordan, but also according to the education of the woman (and her husband), whether the woman works or not, and the occupation of the woman's husband. Judging from the figures, the effect of woman's education appears to be the strongest factor of those illustrated: that is, women with some secondary education or more are only about two-thirds as likely to breast-feed their child six months as other women in Jordan. While we observe that women working away from home and women with husbands employed in the modern sector are also less likely to breast-feed, education appears to be more strongly associated with less breast-feeding. It is noteworthy that the urban-rural differences are quite small (as are the regional differences), in fact, smaller than those observed in most other countries at six months of age. Also, breast-feeding appears less strongly related to husband's education than to the woman's education. Finally, the fact that younger women were less likely to breast-feed than older women suggests (but not reliably) that breast-feeding may be declining somewhat over time in Jordan.

If one were to attempt to distinguish a profile of the "typical" breast-feeding woman and the typical nonbreast-feeding woman in Jordan, the nonbreast-feeder would appear to be more educated, urban, and with a husband in a modern occupation, while the breast-feeder would tend to have

little education and live in rural areas or have a husband employed in the low-skill, urban informal sector.

Table 2 and Figures 2-4 about here

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4. The need to analyze factors influencing breast-feeding together

Despite the evidence above, it is necessary to recognize that the associations observed for each of the factors discussed do not take into account any of the other factors, and therefore are only simple associations. For example, if women living in urban areas tended to be more educated, then both the urban-rural and education differentials observed would exist. But we cannot know which factor is more important unless we include both in the analysis at the same time. What is needed is multivariate analysis, wherein the effect of each factor is estimated while statistically controlling for the effects of all the other factors that might influence breast-feeding.

The discussion above has noted the extent to which breast-feeding in Jordan is associated with certain socioeconomic characteristics of the woman and her husband. Indeed, there is a growing literature on the factors influencing breast-feeding in various countries, which the authors have reviewed elsewhere (cf. Popkin, Bilsborrow, Akin and Yamamoto, 1983). In addition to the factors cited above (the age, area of residence, education, and employment status of the woman and her husband), a wide number of additional factors thought to influence breast-feeding have been discussed, including: income and assets of the household; the woman's health and attitudes and knowledge of infant feeding; informational and promotional activities of health personnel and infant food distributors in

the country; and family size and spacing of previous children. Many of these factors are influenced by circumstances in the community where the woman lives, such as labor market conditions, availability of community facilities such as health and family planning clinics, schools, and stores with infant formula products, and linkages between the community and the rest of the country via transportation networks and mass media. Finally, the characteristics of the child also influence breast-feeding (its health condition, suckling ability, and even sex in some cultures).

In our work reported on here we cannot investigate all of these possible influences since the World Fertility Survey program collected only fertility and related family planning data in depth. This needs to be borne in mind in interpreting our results below. If some of the factors not included in our analysis are important, their omission would bias our results somewhat. Nevertheless, information is available to us from WFS on a sufficiently broad range of factors that we feel our findings should be accepted as the best indicators of factors influencing breast-feeding in Jordan until a more detailed data set is available and analyzed.

Based on our earlier review and the data available from the WFS Jordan tape, we selected a set of characteristics of the mother, the child, and the household to investigate for their effects on breast-feeding in Jordan. Table A-2 lists and defines these variables, as well as providing brief justifications for each. We present the means and standard deviations of the variables in Table A-3. Whenever possible, the variables are designed to relate to the specific birth intervals of the mother during the last four years before the survey. For example, pill usage refers to whether the mother used the pill at all during the particular interval.

The family composition variables measure the number of children alive in each age-sex group. This information is not quite the same as parity of the child, the measure most often used by demographers in such analyses. However, the age-sex composition variables more directly relate to the child care situation in the household than does parity, and hence should be more closely related to breast-feeding.

Breast-feeding may be negatively influenced by the biological effects of contraceptive pills on the production of breast milk. Moreover, women who are both knowledgeable about the contraceptive value of breast-feeding and want to control their child-bearing have to choose between pills (and other modern, effective birth control methods) and breast-feeding.[1] Thus, contraceptive use has both motivational and biological effects which have been found to be associated with reduced breast-feeding (see Popkin et al., 1983 for a review of these studies). We expect the motivation effects of both pill use and contraceptive use to be at least similar and posit that any differences in the two effects may potentially indicate a negative lactation-suppressing effect of oral contraceptive pill use. Of course, it is possible that pill users who recognize the greater effectiveness of this method, are more educated than other modern effective contraceptive users and thus are less likely to breast-feed because of this confounding education association with pill use. Thus, we urge caution in the interpretation of our pill use results.

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[1]We recognize that this choice is a valid one only during the first 6-12 months after birth since ovulation is eventually resumed even as the woman breast-feeds for a long duration. Therefore the use of these methods would be expected to be negatively related to breast-feeding. This negative impact would be expected to be even more pronounced for the pill, given its assumed negative biological effects on lactation as well as its behavioral effects.

5. Empirical results for multivariate analysis of the determinants of breast-feeding.

The discussion here briefly summarizes the main empirical results showing the factors that influence (1) whether the child is ever breast-fed, and (2) if so, whether it is breast-fed at various ages. Other important measures of breast-feeding behavior--the frequency of feeding, whether the infant is fed separately or with others, the extent of use of breast milk relative to other foods (other milk, formula, solid food, etc.), and the age of weaning--cannot be addressed with WFS data because the necessary questions were not included in the questionnaire. The estimation technique that we use is described in the technical appendix. Its use alleviates both digit preference and simple censoring problems.

The results are summarized in Table 3. The actual numerical results can be found in the tables in the appendix. Regarding the ever/never decision, the women's level of education appears to have the expected negative impact on the decision to (ever) breast-feed the child or not, even when statistically controlling for many of the factors associated with her education, such as husband's education and place of residence. Having other children aged four to six in the home (who, like babies, are time-intensive and presumably compete with the new baby for the mother's attention) seems to reduce the probability of ever breast-feeding (see Appendix Tables A-4 and A-6). Users of birth control methods (especially the more effective ones) are less likely ever to breast-feed.

The other results summarized in the two right-hand columns of Table 3 allow us to compare the factors influencing the continuation and decisions of relatively short- and long-duration breast-feeders, i.e., to study

factors influencing the duration of breast-feeding (see Appendix Tables A-5 and A-7 for numerical results). First, we see that mother's education has the expected negative effect within both groups of women, but father's education has a significant impact only for the longer-duration breast-feeders. Working away from home seems to interfere with breast-feeding only at the longer durations, a reasonable result, but the effect is weaker than expected.[2]

The effects on breast-feeding of being an urban resident or in-migrant are generally negative, as expected. The migration effect is much greater on the short-duration continuation decisions, perhaps reflecting the impact of physical dislocation per se. The child's being male increases the likelihood of its being breast-fed only at longer durations. The use of the pill or other contraceptives has a large negative impact on the short-duration decision, but no significant effect on the long-duration choice. The fact that the effect of the pill is no greater than that of other modern effective contraceptives on the short-duration breast-feeders may suggest that the purely biological effect of the pill on Jordanian women may not be important. Moreover, the desire for another child has a significant positive effect on the probability of breast-feeding beyond 15 months among long-duration breast-feeders, but no effect on short-duration continuation decisions. Differences in the effects of the contraceptive use and desires for another child variables are the largest observed between the two groups of women.

Having female children 7 to 12 in the home is found to increase the

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[2]Our work in Sri Lanka found a larger negative effect of women's work, as has much other resesarch on this topic.

probability of breast-feeding beyond 4.5 months among the short-duration group, presumably because young daughters sometimes substitute for their mothers in doing household work, or assist in the care of younger siblings who would otherwise compete with the last born child for the mother's attention (see Table A-7). The male-child effect is large and significant only for the long-duration decision. Whether this means that male children are favored in infant nutrition depends on what other foods are administered, at what age, and how (e.g., with sterilized water or unsanitary water) to male and female children. At older ages, some supplementation is necessary anyway. Inadequate supplementation (beginning too late, low quality and quantity) is in fact often a key problem in the Near East region and elsewhere.

6. Policy implications

The fact that potentially important variables are not available in the WFS data must be borne in mind in recognizing the substantive limitations of the analysis reported here, and thereby in deriving policy inferences. Our discussion of policy implications will focus on factors influencing the decisions of breast-feeding women to continue from short to moderate durations. Greater knowledge of factors which influence extending breast-feeding from a very short to a moderate duration is particularly important because infants fed foods other than breast milk before 4-6 months of age probably have a higher risk of morbidity, growth retardation and even death. However, there are also immunological, nutritional, and other benefits of partial breast-feeding beyond six months. There are also benefits from family planning protection and economic savings (since

purchased milk is much more expensive) from at least partial breast-feeding for longer durations.

a. Education policies. Mothers with more education were systematically found to breast-feed less in Jordan, paralleling research in other countries. But leaping from these results to the conclusion that continued increases in female education in Jordan will itself reduce breast-feeding is fraught with risk: Women who have obtained more education are a self-selected sample who might have chosen to breast-feed less for other reasons. If policy-makers in Jordan believe that the health and other benefits of breast-feeding are important, government policies could be developed to inform women (especially educated women) about the benefits of breast-feeding. At the same time, it must be kept in mind that because educated women also have lower infant mortality, targeting toward educated women may not represent the best use of limited resources.

b. Labor force policies. Although associations between women's work and breast-feeding were observed (in Figure 3 and Table 2), the multivariate analysis found that the relationship was largely spurious and the result of other factors that influence both work and breast-feeding directly. We therefore conclude that in Jordan women's employment is associated with a small effect on (reducing) breast-feeding. This may be partly because relatively few women work (even in urban areas), and traditional home-focused roles continue in the society. Therefore, until more women enter the labor-force, new legislation, such as requiring larger employers to provide infant creches or work breaks for working women to breast-feed, probably would not have much of an effect on breast-feeding in Jordan.

c. Family planning policies. Levels of family planning are still relatively low in Jordan. Nevertheless, it is important to note that mothers who use oral contraceptive pills were significantly less likely to breast-feed their children in Jordan. This effect seems to be greatest for the important short vs. moderate duration decision, which, on the surface, could be inferred as supporting the belief that pill use suppresses milk production. This might lead some to jump to the conclusion that consideration should be given to altering types of contraceptive pills used in Jordan, or stressing alternative means of birth control (IUD, sterilization, etc.).

However, when it is recognized that the effects of the other (non-pill) modern effective contraceptive variables are identical, our interpretation shifts from a biological to a sociopsychological one: The use of the pill and the use of other modern effective contraceptives can be expected to be associated with similar personal motivations and socioeconomic characteristics since both groups are knowledgeable about contraceptives and implicitly interested in spacing and/or limiting their births. Moreover, the negative effect of desires for another child on the ever-never breast-feeding decision suggests that lactation may sometimes be viewed as an alternative to contraception. This provides further evidence for our concluding that we find no evidence that pill use suppresses lactation in Jordan based on our analysis of the Jordan WFS data.

d. Urban residence and migration policies. There appear to be strong effects of urban residence on reducing the duration of breast-feeding even after the other factors are controlled for. Moreover, among the group of women who breast-feed for short-durations, urban in-migrants

are less likely to extend breast-feeding from one to four months to five or more months than are rural residents. Young infants are especially vulnerable as urban in-migrants often simultaneously confront severe economic and social relocation problems in adapting to their new environment. Therefore, the expected continuation of rural-urban migration, especially to the (unknown) extent that women in urban in-migrant families work, may further reduce overall breast-feeding in Jordan for children of migrant mothers as compared to rural children. It appears desirable that any policies to assist migrant families in adapting to the urban environment include information and support to assist migrant women to continue breast-feeding their infants. At the same time, it should be pointed out that infant mortality in Jordan was significantly lower in urban areas than in rural areas (Adlakha and Suchindran, 1984); however, we were unable to perform this mortality analysis for urban residents in comparison to urban migrants. Given the evidence showing that increased breast-feeding results in reduced morbidity and mortality, it is our assumption that other factors related to urban residence, such as improved environmental sanitation and increased use of health services more than offset the effects of reduced breast-feeding for urban residents. Carrying this logic one step further would suggest that mortality and morbidity levels would be further reduced in urban areas if the extent and duration of breast-feeding were to increase.

Of course, there are other urban factors (such as greater prevalence of markets with alternative foods, electricity, mass media, promotions by infant food companies, and activities and attitudes of health professionals) that also influence breast-feeding continuation decisions in

urban areas. But to analyze these factors was not possible in this paper because of the data limitations indicated.[3]

Finally it is important to note that these results are similar to the ever-never breast-fed patterns study conducted in Jordan (Hijazi, 1977). Hijazi found that 6.4% never breast-fed; however, he found that only 9.7% of the remaining infants were breast-fed less than 6 months as contrasted with over 20% of the infants in this sample. Hijazi did not study the determinants of these feeding patterns in a manner comparable with this study.

[3]It is important to add that analysis was undertaken to see if various labor, education, and other factors varied in their effects on breast-feeding in urban and rural areas. This analysis found there were no significant differences in the effects of these factors in either area. That is, urban-living per se was important, but work, education, and other factors did not have a different impact in the rural and urban areas.

NOTES

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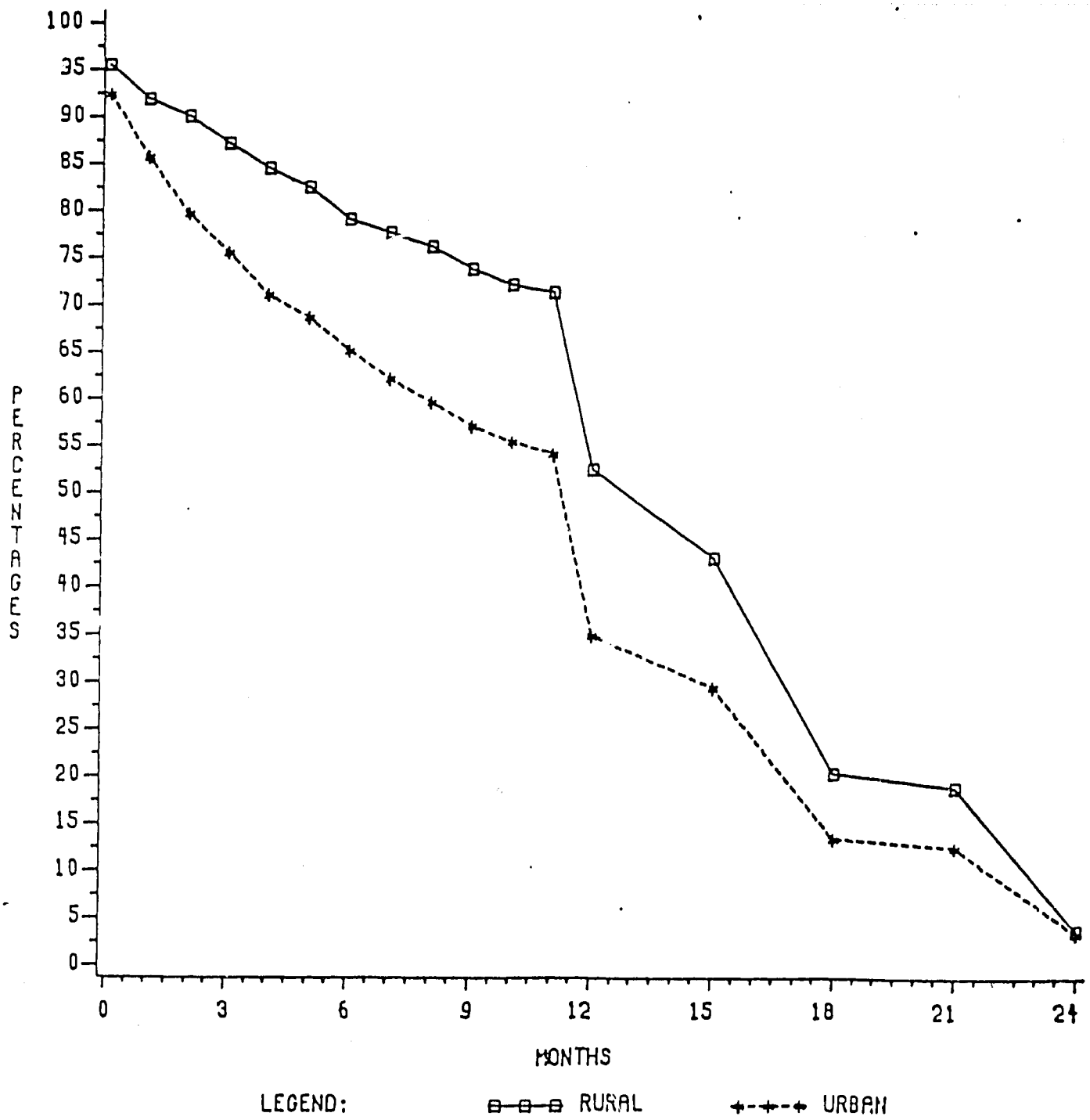
Figure 1. PERCENTAGES OF CHILDREN BREAST-FED



SOURCE: TABLE 1.

Figure 2. Jordan: Percentages of Children Breast-fed According to Place of Residence of Mother*

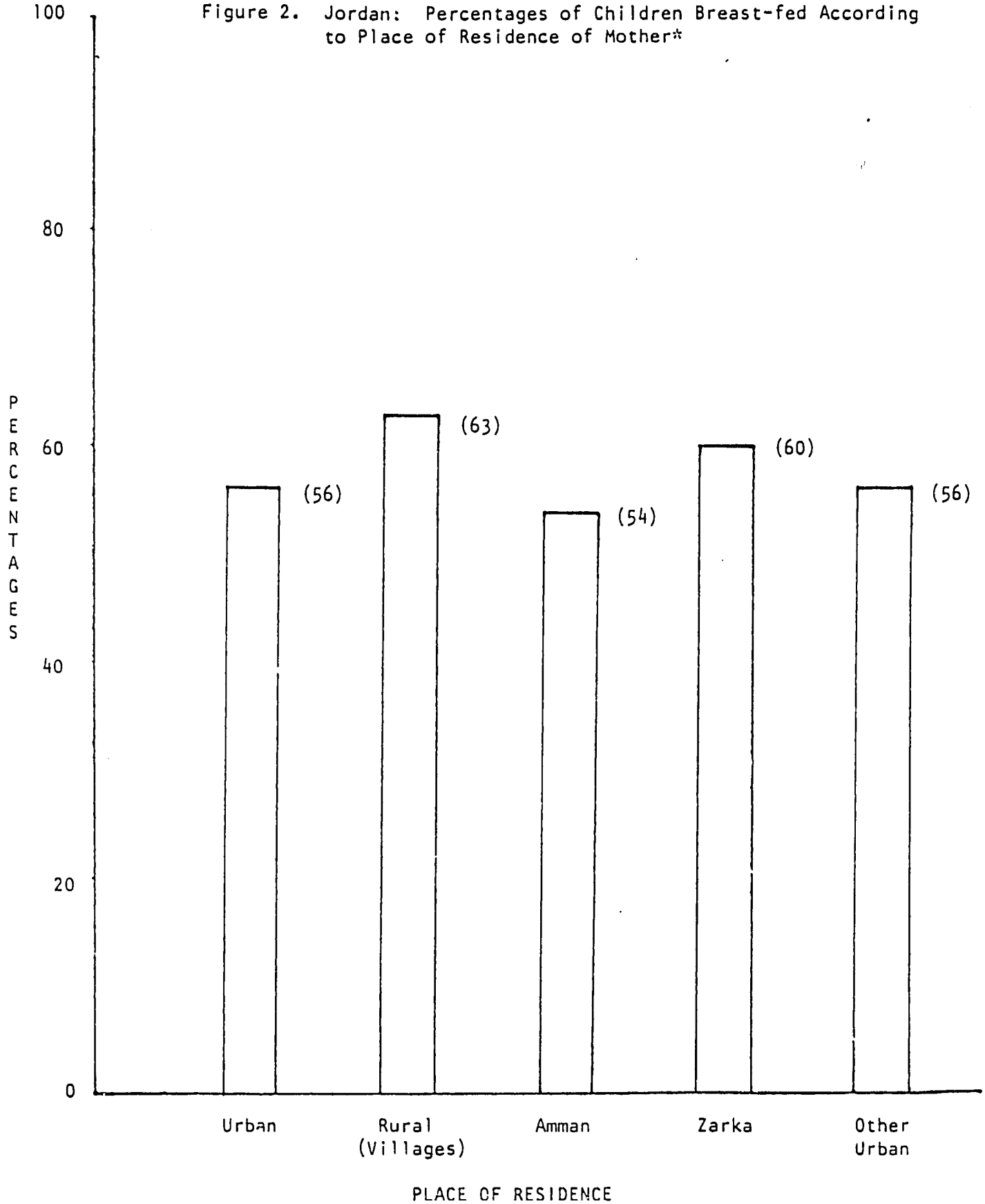


Figure 3. Jordan: Percentages of Children Breast-fed According to Education and Work Status of Mother*

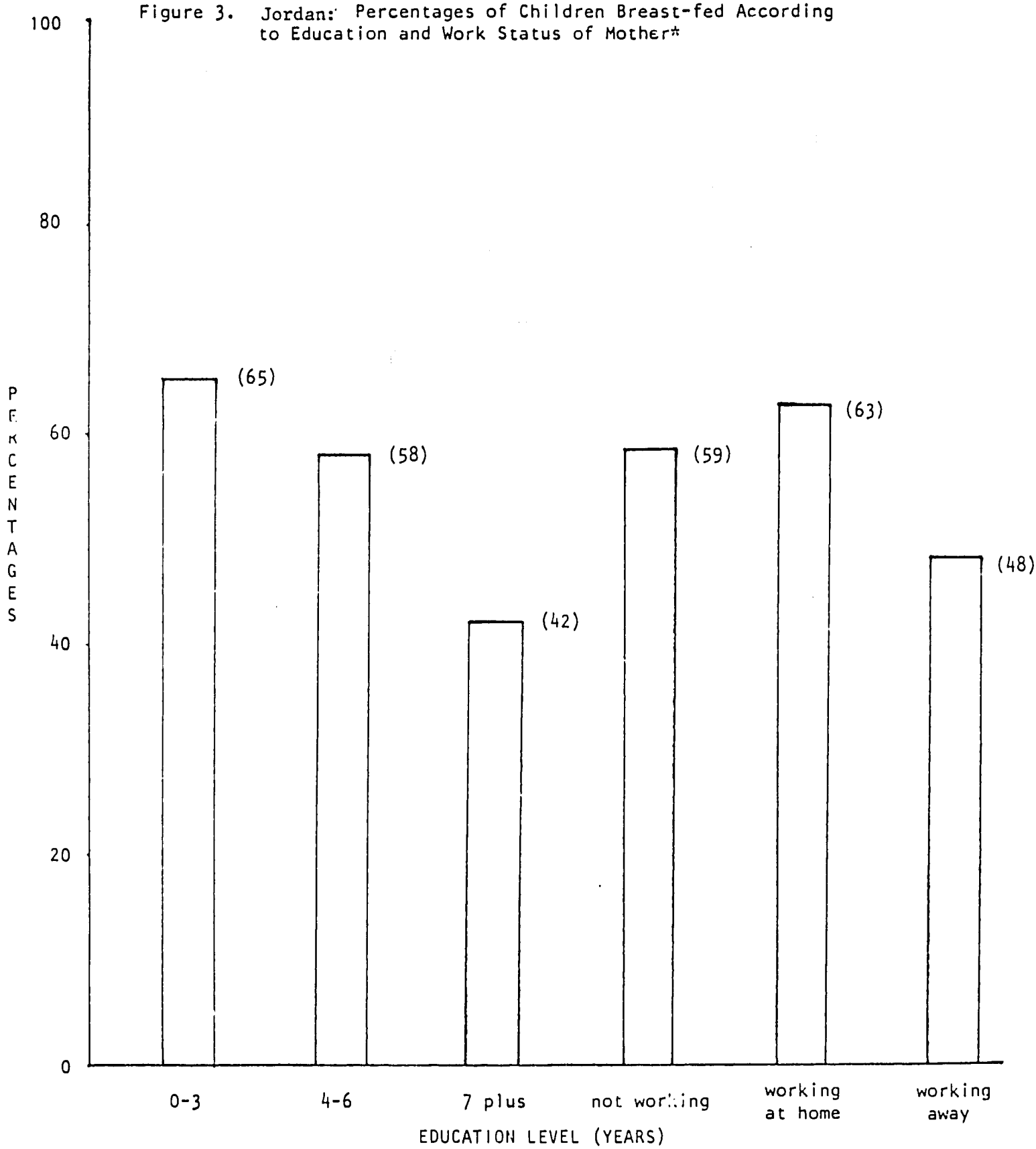


Figure 4. Jordan: Percentages of Children Breast-fed According to Occupation of Father*

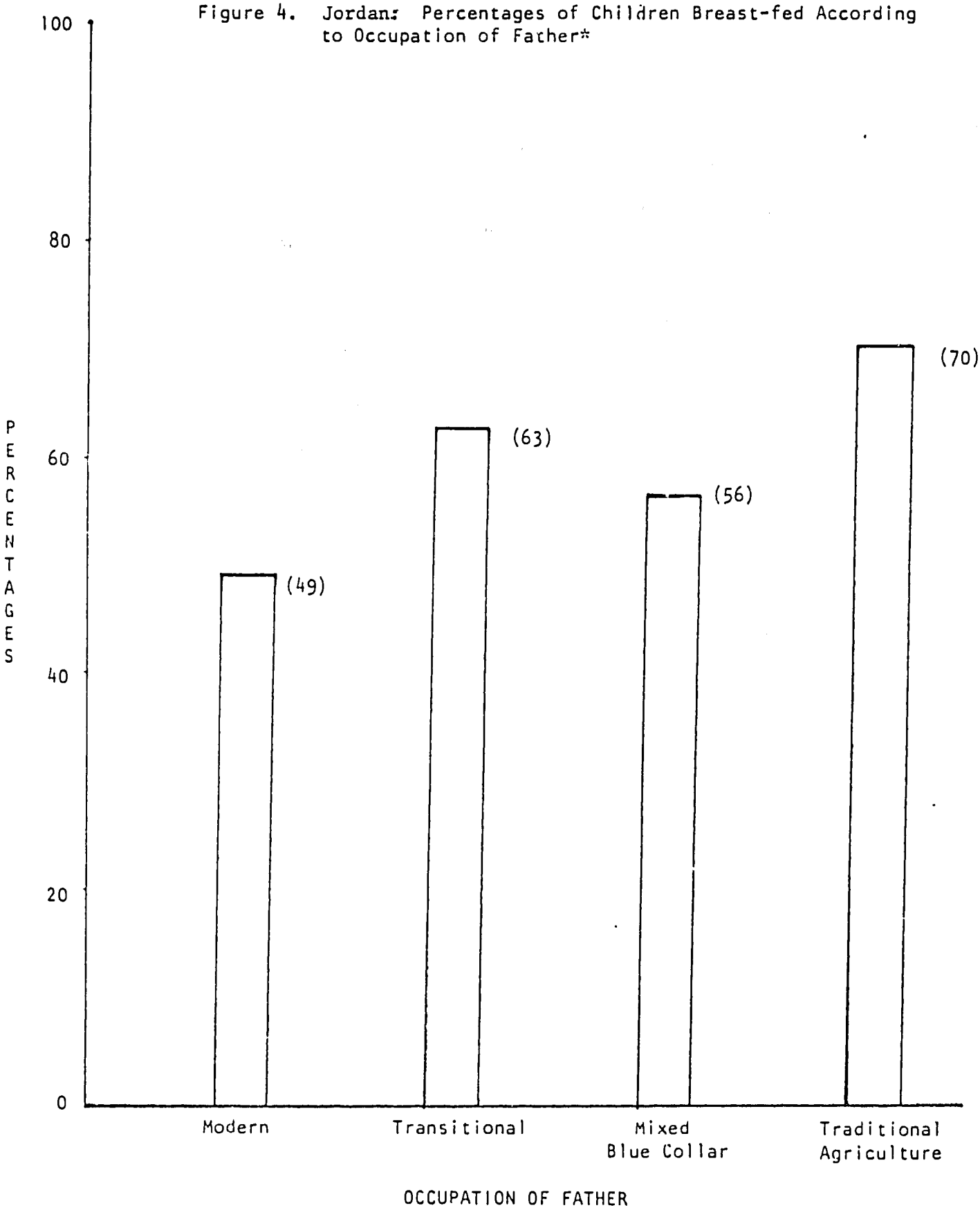


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Table 1. Jordan: Percentages of Children Breast-fed: Urban, Rural and Total[a]

Age of Child in Months	Urban	Rural	Total
0[b]	92.3	95.5	93.4
1	85.6	91.8	87.7
2	79.6	90.0	83.1
3	75.4	87.2	79.4
4	70.9	84.5	75.5
5	68.6	82.5	73.3
6	65.1	79.1	69.8
9	57.1	73.8	62.7
12	35.0	52.6	40.7
15	29.5	43.2	34.0
18	13.5	20.5	15.8
21	12.6	19.0	14.7
24	3.5	3.8	3.6
30	3.0	2.6	2.8
36	1.1	0.8	1.0
42	1.1	0.8	1.0
Number of Children	2246	1166	3412

[a] Based on life table analysis. The time period referred to is 1972-76.

[b] Children breast-fed 1-30 days (i.e., ever breast-fed).

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Table 2. Jordan: Differentials in Mean Duration of Breast-Feeding for Children[a]

Classification	Mean Duration in months	
1. Urban-Rural		
a. Always an urban resident	9.6	
b. Urban migrant	11.8	
c. Rural	12.4	
d. Total	11.0	
2. Education (yrs. of schooling)	Mother	Father
a. Zero	13.2	14.1
b. 1 to 3	12.2	10.0
c. 4 to 6	9.9	11.7
d. 7 to 9	7.8	10.0
e. Greater than 9	6.9	8.7
3. Occupation of Husband		
a. Modern	9.4	
b. Transitional	11.8	
c. Mixed Blue-Collar	10.1	
d. Traditional Agriculture	13.7	
4. Work Status		
a. Does not work	11.1	
b. Works at home	10.8	
c. Works Away	8.4	
5. Region of residence		
a. Amman 1 and 2	9.6	
b. Zarka	10.3	
c. Towns	11.1	
d. All Villages	12.4	

[a] Based on the current status technique (see text).

Table 3. Jordan: Summary of Empirical Results on Breast-Feeding Decisions

Variable whose effect is being investigated*	Ever-never Decision	Effect on the Decision to Continue or Not of: Short-duration breast-feeders	Long duration breast-feeders
1. Education	--	-	-
2. Work now	0	0	+
3. Work away	0	0	-
4. Always urban resident	0	--	-
5. Migrant to urban area	0	--	-
6. Desires another child	-	0	+
7. Not effective contraceptive	--	-	+
8. Pill	--	--	0
9. Other effective contraceptive	--	--	0
10. Mother's age	0	++	++
11. Male child	0	0	++
12. Father's education	0	0	--

0 Indicates no effect
+ Indicates t-statistic significant at .10 level
++ Indicates t-statistic significant at .05 level
- Indicates t-statistic significant at .10 level
-- Indicates t-statistic significant at .05 level

* Variable refers to the mother except as indicated. Variables omitted (see list in Table 3) had no significant effects, except a few family composition variables, which are discussed in the text.

Table A-1. Jordan: Observed Breast-Feeding Frequencies for Children Born in the Four Years Preceding the World Fertility Survey

No. of Months Completed	Combined Sample: Absolute Frequency	Combined Sample: Relative Frequency
0	413	12.2
1	206	6.1
2	234	6.9
3	203	6.0
4	180	5.3
5	140	4.1
6	174	5.1
7	109	3.2
8	101	3.0
9	98	2.9
10	91	2.7
11	50	1.5
12	349	10.3
13	74	2.2
14	115	3.4
15	89	2.6
16	84	2.5
17	40	1.2
18	294	8.7
19	30	0.9
20	31	0.9
21	11	0.3
22	15	0.4
23	7	0.2
24	153	4.5
25	1	0.1
26	9	0.3
27	1	0.1
28	1	0.1
29	5	0.1
30	11	0.3
31	1	0.1
32	1	0.1
33	4	0.1
34	1	0.1
35	1	0.1
36 or more	7	0.2

NOTE: Based on combining data for last open-interval and last closed-interval births that occurred within the four-year period.

Table A-2. Jordan: WFS Variables Selected for the Analysis of Breast-Feeding Determinants

Variable[a]	Definition
Education	In years completed. Reflects value of time, and household socioeconomic status.
Age of mother	In years. Older women have smaller volume of milk. Also, older women are more traditional in orientation.
Work Now	(1 = mother works in market; 0 = does not work). Mother works in a wage, farming, or other market-oriented occupation; in combination with work away, allows interpretation of impact of maternal working status on breast-feeding.
Work Away	(1 = mother works away from home; 0 = does not work away). Work away is more likely to be incompatible with breast-feeding.
Pill Use	(1 = use of contraceptive pill in interval; 0 = not used). Pill use has been associated with decreased breast-milk production.
Other Effective Contraceptives	(1 = use of IUD and male and female sterilization; 0 = all others). To control for persons who use the pill for contraception effects, and thus to distinguish the physiological effects of the pill per se.
Less Effective Contraceptives	(1 = use of douche, condom, rhythm, withdrawal, abstinence methods; 0 = others). A second control to distinguish persons using less effective methods of contraception to clarify the physiological effects of the pill on lactation.
Desires Another Child	(1 = an additional child is desired; 0 = no additional child desired). Measures whether women want more children. Relates to effectiveness of use of contraceptive methods.
Muslim	(1 = Muslim; 0 = other). Breast-feeding patterns of Muslims may differ from those of non-Muslims in Jordan.
Marital Status	(1 = married & living together; 0 = separated, widowed, or divorced). Indicates availability of spouse to provide economic and social support for child. Adjusted to refer to the woman's situation at the time of birth of the child under consideration.

Table A-2 (continued)

Variable[a]	Definition
Always Urban Resident	(1 = born and currently residing in urban areas; 0 = born in rural area or urban migrant). Measures influences of modern urban living conditions (media exposure, available breast milk substitutes, less social support for children, more exposure to modern health professionals, work situations for women less compatible with breast-feeding).
Migrant to Urban Area	(1 = born in rural area but now an urban resident; 0 = always urban resident, or always rural resident). Measures shorter-term influence of urban living for which less modernization effects are expected (and conversely a more traditional orientation is expected). Alternatively, measures migrant selectivity.
Male	(1 = male; 0 = female). Measures any sex bias against female children in breast-feeding.
Husband's Education	In years completed. A proxy for household socioeconomic status, husband's value of time.
No. of Other Children Aged 0-4	Number of siblings ages 0-47 months. Additional pre-schoolers can increase the value of mother's time at home and increase her likelihood of breast-feeding. On the other hand they also require attention and compete with the infant for the mother's time.
No. of Other Children Aged 4-6	Number of siblings aged 47 to 83 months. They are less time intensive than younger children but are less likely to act as mother-substitutes than older children. In many cultures, they are left alone while older family members work.
No. of Siblings Aged 7-11	Number of siblings (or brothers and sisters) aged 84 to 155 months. Potential mother substitutes for infant feeding (bottle, etc.) in many cultures.
No. of Siblings Ages $\geq$ 13	Number of siblings older (or brothers and sisters) than 156 months. Potential mother substitutes for either infant care or market production.
Occupation of Mother/Father:	
Modern	(1 = modern; 0 = other). Mother/father occupation is professional or clerical.

Table A-2 (continued)

Variable[a]	Definition
Transitional	(1 = transitional; 0 = other). Mother/father classifies occupation as household services (also in other as sales).
Traditional Agricultural	(1 = traditional agricultural; 0 = other). Mother/father classifies occupation as farmer or agricultural laborer.
Mixed Blue-Collar	(1 = mixed blue collar; 0 = other). Mother/father classifies occupation as skilled or unskilled (for father also sales).

[a] All variables refer to mother except as indicated.

Table A-3. Jordan: Means and Standard Deviations of Independent Variables

Variable	Average Household Mean[1]	Standard Deviation
Mother's education level (yrs.)	2.22	1.39
Father's education level (yrs.)	3.17	1.38
Mother: works now	0.09	0.29
Mother: works away	0.06	0.24
Mother's age (years)	27.55	6.62
Male	0.51	0.50
Always urban resident	0.45	0.50
Urban Migrant	0.21	0.41
Muslim	0.96	0.19
No. of children by age/sex		
0-3	0.91	0.70
4-6	0.69	0.69
7-12 male	0.58	0.87
7-12 female	0.54	0.81
13+ male	0.36	0.89
13+ female	0.33	0.82
Mother's occupation		
Modern	0.03	0.19
Transitional	0.00	0.06
Mixed blue collar	0.03	0.17
Agricultural	0.06	0.24
Father's occupation		
Modern	0.17	0.38
Transitional	0.40	0.49
Mixed Blue Collar	0.34	0.47
Agricultural	0.08	0.27
Desires Another Child	0.63	0.48
Pill Used	0.16	0.37
Modern effective contraceptives	0.03	0.16
Ineffective contraceptives	0.09	0.28

[1] The ever/never probit run sample was used for these calculations.

Table A-4. Jordan: The Determinants of Breast-Feeding Using Various Months for Cutoff Points[a]

	Cutoff Point						
	Ever Breast-Fed	3 Months	4.5 Months	6 Months	9 Months	12 Months	15 Months
1. Constant	1.3898* (4.781)	1.1972* (4.024)	0.6906* (2.468)	0.3809 (1.357)	0.1392 (0.496)	-0.2901 (-0.974)	-0.7057* (-2.093)
2. Mother's Education	-0.0323* (-2.892)	-0.0372* (-4.243)	-0.0482* (-4.466)	-0.0499* (-4.628)	-0.052* (-4.758)	-0.0553* (-4.854)	-0.0515* (-3.948)
3. Father's Education	0.0042 (0.496)	-0.0135 (-1.547)	-0.0107 (-1.303)	-0.0181* (-2.215)	-0.0196* (-2.428)	-0.0240* (-2.889)	-0.0303* (-3.292)
4. Work Now	0.1041 (0.774)	0.0804 (0.575)	-0.0192 (-0.152)	0.0351 (0.273)	-0.0550 (-0.446)	-0.0142 (-0.112)	0.1653 (1.188)
5. Work away	0.0670 (0.407)	0.0940 (0.555)	0.1368 (0.871)	0.0277 (0.180)	-0.0432 (-0.284)	-0.1944 (-1.199)	-0.1549 (-0.846)
6. Always urban resident	0.0006 (0.007)	-0.1806* (-2.103)	-0.1500* (-1.874)	-0.0864 (-1.091)	-0.1447* (-1.858)	-0.1345* (-1.698)	-0.1997* (-2.292)
7. Migrant to urban area	0.0243 (0.269)	-0.2281* (-2.417)	-0.1724* (-1.955)	-0.1118 (-1.288)	-0.1451* (-1.712)	-0.1746* (-2.056)	-0.1406 (-1.508)

Table A-4 (cont'd)

	Cutoff Point						
	Ever Breast-Fed	3 Months	4.5 Months	6 Months	9 Months	12 Months	15 Months
8. Desires another child	-0.1366* (-1.830)	-0.733 (-0.915)	-0.0042 (-0.056)	0.0588 (0.794)	0.0891 (1.219)	0.1334* (1.813)	0.1480* (1.801)
9. Pill use	-0.3292* (-3.922)	-0.5084* (-6.048)	-0.4844* (-6.023)	-0.4139* (-5.155)	-0.2379* (-2.884)	-0.0449 (-0.521)	-0.0818 (-0.847)
10. Effective modern contraceptive	-0.4031* (-2.288)	-0.147 (-3.259)	-0.2376* (-3.028)	-0.1359 (-2.642)	-0.1648 (-1.686)	-0.0038 (-1.465)	0.0541 (-1.215)
11. Not effective modern contraceptive	-0.2511* (-2.312)	-0.147 (-1.267)	-0.2376* (-2.222)	-0.1359 (-1.260)	-0.1648 (-1.484)	-0.0038 (-0.032)	0.0541 (0.420)
12. Number of children 0-3	-0.0233 (-0.521)	-0.1037* (-2.290)	-0.1305* (-3.043)	-0.1647* (-3.877)	-0.1774* (-4.105)	-0.1647* (-3.629)	-0.1950* (-3.797)
13. Number of children 4-6	-0.1011* (-2.017)	0.0103 (0.196)	0.0251 (0.508)	0.0551 (1.118)	0.0606 (1.243)	0.0054 (0.109)	0.0330 (0.612)
14. Number of sisters 7-12	-0.0128 (-0.282)	0.1282* (2.492)	0.1094* (2.326)	0.0931* (1.997)	0.0410 (0.912)	0.0824* (1.827)	0.0494 (1.031)

Table A-4 (cont'd)

	Cutoff Point						
	Ever Breast-Fed	3 Months	4.5 Months	6 Months	9 Months	12 Months	15 Months
15. Number of brothers 7-12	-0.0627 (-1.473)	0.0710 (1.465)	0.0887* (1.932)	0.0905* (2.007)	0.1270 (2.870)	0.0147 (0.339)	0.0614 (1.304)
16. Number of sisters 13+	-0.0473 (-1.034)	-0.0476 (-0.872)	-0.0676 (-1.343)	-0.1005* (-2.065)	-0.111* (-2.383)	-0.0663 (-1.431)	-0.0088 (-0.182)
17. Number of brothers 13+	-0.1160* (-2.764)	-0.0314 (-0.598)	0.0030 (0.058)	0.0348 (0.686)	0.0919* (1.870)	0.0385 (0.835)	0.0302 (0.634)
18. Male child	0.0143 (0.233)	0.0992 (1.559)	0.1051* (1.759)	0.1207* (2.038)	0.1151* (1.957)	0.1644* (2.735)	0.2340* (3.503)
19. Mother's age at birth of child	0.0093 (1.113)	0.0078 (0.884)	0.0153* (1.863)	0.0187* (2.289)	0.0147* (1.840)	0.0183* (2.271)	0.0217* (2.466)
20. Muslim	0.0973 (0.638)	0.1928 (1.281)	0.2159 (1.500)	0.2189* (1.502)	0.4111* (2.014)	0.3257* (1.830)	0.2209 (1.049)
Number of Observations	3258	2658	2558	2369	2155	1901	1591
X^2 Statistic[b]	15.40	142.52	231.72	267.03	281.25	217.34	221.76

[a]The estimation approach is a problt model using weighted data (see text). t-statistics are in parentheses, and are asymptotically normally distributed. * indicates significance at the 10% level.

[b]The X^2 statistic is used for a joint test of significance on all variables (except the constant term). The critical value for a 1% level test is 36.2.

Table A-5. Jordan: Determinants of Breast-Feeding When Structural Shift is Present[a]

	1-9 Month Duration with 4.5 month cutoff	10+ Month Duration with 15 month cutoff
1. Mother's education	-0.0245* (-1.793)	-0.0295* (-1.837)
2. Father's education	0.0034 (0.318)	-0.0259* (-2.312)
3. Work now	0.0774 (0.476)	0.2414 (1.451)
4. Work away	0.05723 (0.280)	-0.2484 (-1.148)
5. Always urban resident	-0.1922* (-1.857)	-0.1961* (-1.884)
6. Migrant to urban area	-0.2436* (-2.095)	-0.1776 (-1.613)
7. Desires another child	0.0046 (0.047)	0.1678* (1.698)
8. Pill use	-0.6363* (-5.887)	0.0640 (0.535)
9. Effective modern contraceptive	-0.6941* (-2.958)	-0.0264 (-0.094)
10. Not effective modern contraceptive	-0.2327* (-1.730)	0.2614 (1.611)
11. Number of children 0-3	-0.0785 (-1.442)	-0.1164* (-1.823)
12. Number of children 4-6	-0.0380 (-0.595)	0.0320 (0.486)
13. Number of sisters 7-12	0.1538* (2.561)	0.0389 (0.130)
14. Number of brothers 7-12	0.0387 (0.627)	0.0072 (0.130)

continued

Table A-5 continued

	1-9 Month Duration with 4.5 month cutoff	10+ Month Duration with 15 month cutoff
15. Number of sisters 13+	-0.02694 (-0.396)	0.0358 (0.609)
16. Number of brothers 13+	-0.0885 (-1.209)	-0.0155 (-0.276)
17. Male child	0.07570 (0.968)	0.2233* (2.783)
18. Mother's age at birth of child	0.0231* (2.166)	0.0267* (2.482)
19. Muslim	0.1447 (0.834)	0.226 (0.077)
20. Constant	-0.2287 (-0.645)	-0.3720 (-0.842)
Number of observations	1136	1087
X^2 statistic[b]	111.37	79.52

[a]The estimation approach is a probit model using weighted data (see text). t-statistics are in parentheses, and are asymptotically normally distributed. * indicates significance at the 10% level.

[b]The X^2 statistic is used for a joint test of significance on all variables (except the constant term). The critical value for a 1% level test is 36.2.

Table A-6. Jordan: Effects of Simulated Changes in Explanatory Variables on the Decision to Ever/Never Breast-Feed the Child[a]

	All Children
1. All explanatory variables at their means	.907
2. Changes in probability when explanatory variable changes	
a. From average mother's education to average plus one year	-.006*
b. From average father's education to average plus one year	.001
c. From do not work to work	.017
d. From work at home to work away from home	.026
e. From rural to always urban resident	.000
f. From rural to urban migrant	.004
g. From do not desire another to desire another child	-0.22*
h. From no contraception to ineffective modern	-.044*
i. From no contraception to effective modern	-.078*
j. From no contraception to pill use	-.061*
k. From average number of other children 0-3 to average plus one	-.004
l. From average number of other children 4-6 to average plus one	-.018*
m. From average number of sisters 7-12 to average plus one	-.003
n. From average number of brothers 7-12 to average plus one	-.011

continued

Table A-6 continued

		All Children
o.	From average number of sisters 13+ to average plus one	-.009
p.	From average number of brothers 13+ to average plus one	-.021*
q.	From not male child to male child	.002
r.	From average mother's age to average plus one	.001
s.	From not Muslim to Muslim	.017

Computed from results in Table A-4.

Table A-7. Jordan: Effects of Simulated Changes in Explanatory Variables on Breast-Feeding Continuation Decisions at Different Durations.[a]

	1-9 Month Duration With 4.5 Month Cut-Off	10+ Month Duration With 15 Month Cut-Off
1. All Variables at average	.551*	.621*
2. Changes in probability when explanatory variables change		
a. From average mother's education to average plus one.	-.010*	-.011*
b. From average father's education to average plus one.	.001	-.009*
c. From do not work to work	.030	.088
d. From work at home to work away from home.	.052	-.003
e. From rural to always urban resident.	-.075*	-.074*
f. From rural to urban migrant.	-.096*	-.066
g. From do not desire another child to desire another child	.002	.064*
h. From no contraception to ineffective modern.	-.091*	.096
i. From no contraception to effective modern.	-.271*	-.010
j. From no contraception to pill use.	-.250*	.024
k. From average number of other children 0-3 to average plus one.	-.031	-.045
l. From average number of other children 4-6 to average plus one.	-.015	.013
m. From average number of sisters 7-12 to average plus one.	.060*	.015
n. From average number of brothers to average plus one.	.015	.003
o. From average number of sisters 13+ to average plus one.	-.011	.014
p. From average number of brothers 13+ to average plus one.	-.035	-.006
q. From not male child to male child	.030	.085*
r. From average mother's age to	.009*	.010*
s. From not Muslim to Muslim	.058	.009

Computed from Table A-5 probit results. Variables with an asterisk (*) had coefficients significant at the 10% level.

Technical Appendix

There are three major statistical techniques used in this paper: the life table, the current status method, and the probit maximum likelihood procedure. We will discuss each estimation method and present rationales for their use.

Life Tables

Life tables have been used by demographers to study mortality for many decades. A life table provides a life history of a group or cohort of people, showing the extent to which it is diminished gradually by deaths. Three assumptions are implicit in its construction: (1) the cohort is closed to migration, so no changes occur except losses from death; (2) mortality conditions are constant over time; and (3) losses (e.g., deaths) are evenly distributed over the time period under consideration (usually a year). Two special terms used in life tables are also worth defining here: l_x is the number of survivors at exact age x (i.e., reaching their xth birthday); and ${}_nq_x$ is the conditional probability of dying during the interval from age x to age x + n.

Life tables are usually constructed from data on the population aged x in a year (i.e., at the midpoint of the year) and deaths during the year by age. These data are used to compute the (conditional) q_x and l_x values, with people exiting because of death only. Because exit is due to one cause only (death), they are called single decrement life tables. In the analysis of breast-feeding, however, there are two possible ways children exit or suffer "mortality" from the population of breast-fed children--by either (1) ceasing to be breast-fed or (2) dying. Therefore the

appropriate technique is a multiple decrement technique. (For an early and standard reference, see Sheps, 1965).

In applying this technique to breast-feeding, children who die are excluded from the denominator because they die prior to the computing of the probabilities of "surviving" (being breast-fed). Thus the life table parameters for breast-feeding are probabilities of breast-feeding surviving children.

Let us return to the three assumptions required in the construction of life tables. Assumption 2 is not strictly correct in most contemporary societies, where both mortality (especially infant) and breast-feeding are probably declining. These declines are almost universally ignored, and are of negligible importance for the short (four-year) period we use here. Assumption (3) about losses being evenly distributed over the time interval (month) requires our assuming that when the reported number of months breast-fed and the reported age at death of a child are the same, an average of one-half month should be assigned for breast-feeding (included in both the numerator and denominator). Finally, the most important assumption, that the cohort be closed (to migration, normally), has in a sense already been addressed. Deaths of children are treated as equivalent to out-migrations, and the dead children are excluded prior to computing the (conditional) probabilities of breast-feeding.

Current Status Method

The reported durations of breast-feeding obtained from retrospective questions to women in surveys are known to be characterized by very serious age heaping. The current status method overcomes this problem. All that

is required for the current status method is that women report reasonably accurately the dates of their children's births and whether or not the child is currently being breast-fed.

The proportion of children being breast-fed at various durations, y, is then computed. First the likelihood of each age child currently being breast-fed is calculated:

$$\hat{\ell}_y = \frac{\text{Number of women currently breast-feeding a child born } y \text{ months before interview}}{\text{Number of women with a birth } y \text{ months before the interview}}.$$

In practice, this statistic is usually calculated assuming all closed interval children are no longer being breast-fed, so that such children only appear in the denominator of $\hat{\ell}_y$. In addition, in our computations we exclude children that die within the first month after birth. The measure of mean duration is then calculated by summing the $\hat{\ell}_y$'s (see Smith, 1980, 1981).

In our application of the current status method, severe fluctuations from month-to-month led us to group the data in three-month intervals. The resultant current status figures are also not strictly comparable to the life table because current status figures are developed only for children <u>ever</u> breast-fed.

Statistical Issues for the Multivariate Analysis

The purpose of this section is to discuss briefly several statistical problems that must be resolved in an analysis of the determinants of breast-feeding. The analysis of the binary choice decision variable, to breast-feed or not to breast-feed, can be handled within a standard discrete dependent variable framework. The method we have chosen is the probit technique, a procedure widely applied in diverse disciplines (for a

textbook explanation, see Pindyck and Rubinfeld [1976], chap. 8). The computer program that we use to carry out the probit estimation method also allows us to use the sample weights provided in the WFS data. These weights were renormalized for each regression subsample. Thus, our estimated coefficients take into account potential sampling problems and assure us of a nationally representative sample.

The analysis of the factors that influence the duration of breast-feeding is a difficult problem. It would be statistically simple if we could investigate the determinants of the duration by employing a continuous dependent variable in a linear regression model; we shall now explain why such a simple model is not adequate.

The standard linear regression model is written as,

(1) $$Y_t^* = X_t\beta + \mu t$$

where Y_t^* is the observed number of months the child is breast-fed, X_t is a 1 by k vector of factors that influence the duration decision, β is a k by 1 vector of regression coefficients to be estimated, and μ_t is a random unobserved disturbance term. Under standard conditions in such a model, we assume the μ_t to be an independent, identially distributed random variable, with a mean of zero and a constant variance of ρ^2. If these assumptions hold and the μ_t and X_t are independent of each other, the ordinary least square method provides the best linear unbiased estimator for β.

Unfortunately, the data, for two reasons, do not behave in such an ideal manner. First, Y_t^* can be truncated by either pregnancy or the birth of another child (in the case of the closed-interval child) or by the date of interview (in the case of the last birth or open-interval child). This means that if we are dealing with a closed-interval child, we actually

observe the correct variable Y_t^*, the duration of breast-feeding, only when the mother stops breast-feeding before or exactly at the birth of another child.

A similar type of truncation occurs for open-interval children. In this case, we only observe Y_t^* when the mother stops breast-feeding the child before or exactly at the date of the interview. If at the time of the interview the child is still being breast-fed, we cannot know how much longer the child will continue to be breast-fed.

The effect of this truncation problem is that ordinary least squares estimation cannot be used to analyze the determinants of breast-feeding because (for a substantial portion of the data) the dependent variable is not observed. Moreover, even if the variable were observed over its entire range, the digit preference problem that is common among retrospective survey data would preclude the use of ordinary least squares as a viable estimation technique. The data used in our analysis reveals a strong tendency for respondents to round towards half-year digits (particularly at 12, 18, and 24 months). Statistically this digit preference problem means that X_t and μ_t are likely to be correlated. To see this, suppose the X_t characteristics of a woman were such that she would be expected to breast-feed for 11 months. But the respondent would instead tend to respond that she breast-fed the child 12 months. Thus, the error term μ_t would tend to be positive when X_t assumed the configuration that should lead to a prediction of eleven. By similar argument, if the X_t configuration were such that we would expect a response of 13 months, the corresponding μ_t would tend to be negative since 12 would often be reported instead. If we ignored the correlation between X_t and μ_t and used the ordinary least

squares regression method, the resulting estimates of β would be biased and inconsistent. The results of any analysis of the determinants of breast-feeding on the basis of such estimates would be highly suspect.

Our solution to these two statistical problems involves reformulating the continuous variable, duration of breast-feeding, as a discrete variable. For example, define the discrete variable Y_t as follows:

$$Y_t = \begin{cases} 0 \text{ if } Y_t^* < 9 \text{ months} \\ 1 \text{ if } Y_t^* > 9 \text{ months} \end{cases}$$

If Y_t^* were exactly equal to 9 months, then Y_t would be randomly assigned a value of 0 or 1 with equal probability. It is easy to see how this categorization solves the truncation problem since it is no longer necessary to observe Y_t^* through its entire range. Rather it is only necessary that the mother have the opportunity to breast-feed the child through the particular cut-off date chosen. The cut-off point chosen in defining the discrete variable is more or less arbitrary. However, it is clear that the higher the age cut-off chosen, the more observations will be lost due to truncation by date of interview (i.e., fewer children will be at least as old as the cut-off). Digit preference points can be used as the cut-off as long as there is no <u>systematic</u> rounding - either upward or downward - around the cut-off point by respondents. A small problem with this approach is that we assign children that fall on a digit preference point to the 0 or 1 category with equal probability when, in fact, attrition necessarily occurs as duration increases: fewer children are breast-fed at 10 than at 8 months. Because of this slight attrition problem we consider a fairly large number of cut-offs, some that are digit preference points and some that are not. The 2-, 6-, and 12-month cut-offs

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are chosen because they are typically considered important for health or population policy reasons. The 4, 5, 9, and 15 month cut-offs are chosen because they are not digit preference points; few observations have to be arbitrarily assigned to the 0 or 1 category. Once a cut-off is chosen, and the discrete variable Y_t defined, the probit technique is appropriate as the method of estimation.

The final statistical issue to be discussed is the stability of the coefficients of equation (1). As pointed out earlier, if there is a stable relationship between the determinants of breast-feeding and the duration of breast-feeding, then regardless of the cut-off chosen, we should obtain estimates of the coefficients that are invariant to the choice of cut-off. This may not be the case. For example, a variable may be of little importance in distinguishing short and medium duration breast-feeders, but quite important in identifying medium and long duration breast-feeders. The effects of certain variables may even be opposite in direction in the two cases. Thus, if all women with short and long duration of breast-feeding are grouped together, the effect of some variables may be obscured in the statistical results.

If we could use continuous data, this complication of different structures for different durations could be handled with a non-proportional hazards model. Unfortunately, the existence of the digit preference problem discussed above precludes the use of this model because it requires a continuous dependent variable. Thus, we use a discrete analogue to the hazards method using various shift points, based on what we consider to be reasonable time intervals, and divide each population into two subpopulations. Then we estimate separate equations for each

subpopulation.

Appendix on Methodology

Two problems typically occur in studies on breast-feeding. First, respondents have a preference for certain units (digits), which is manifest in a tendency to report their duration of breast-feeding in multiples of six-months (e.g., 6, 12, 18, etc.). Existing techniques of demographers for smoothing data which is artificially heaped on particular ages or digits are not appropriate for reducing the heaping in breast-feeding duration data when breast-feeding is to be the dependent variable in a functional relationship.

The statistical estimation technique we use to correct for the digit preference problem also eliminates the second problem, the fact that the reported duration of breast-feeding is truncated, either by the birth of another child (in the case of births before the last birth) or by the date of interview (in the case of the last birth). In the case of the former, the birth of the last child truncates the previous child's breast-feeding not due to actual cessation of breast-feeding because the methods of data collection and coding used by WFS censure the breast-feeding behavior of the many mothers in low-income countries who continue breast-feeding during the first or even the second trimester of pregnancy. Statistically, the truncation problem means that the actual duration of breast-feeding is not observed for a significant proportion of children in the sample.

In the technical paper on Jordan (which this summarizes) and in a previous paper on Sri Lanka (see References), we explain why the two data problems of digit preference and truncation by interview or pregnancy make it inappropriate to use the usual statistical estimation technique of ordinary least squares regression. It is necessary to reformulate the variable being investigated, duration of breast-feeding, as an either/or breast-feeding continuation decision variable; that is, at each age of the child in months, determine whether he/she is breast-fed (=Yes) or not (=No). Children whose reported duration is (usually incorrectly) given in multiples of six are randomly assigned to the month number on either side (i.e., if twelve is reported either eleven or thirteen is randomly designated). The statistical analysis examines the factors ("explanatory variables") that influence whether the woman continues breast-feeding the child beyond the chosen cut-off date or not. The estimation technique is called the probit procedure.

Various cut-off dates are used to check the stability of the results, and, in particular, whether the factors influencing breast-feeding continuation decision differ among women who tend to be relatively longer or shorter duration breast-feeders. The duration groups are identified by breaking the sample into two groups. We used 0 and 9 months (=short duration breast-feeders) and 10 months plus (=long duration), so that our empirical work amounts to testing what factors influence women who are short-breast-feeders to continue from 0 - 4 to 5-9 months, and what factors influence the long-duration

breast-feeders to continue from 10 to 14 to at least 15 months. Factors influencing the continuation decisions of short-duration and long-duration breast-feeders may well differ. For example, the major factors influencing the decision to extend a relatively short period of breast-feeding will tend to be psychological or biological in nature, while those important in determining the extent to which women who have already breast-fed their child a substantial number of months continue to breast-feed will more often tend to be social and economic. While the choice of the nine month break is arbitrary, of the several break points tried it seemed to give the most reasonable results.