

The Use of Breast Milk Substitutes in Developing Countries: The Impact of Women's Employment

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ABSTRACT

Objectives. This study quantified the influence of employment, specifically a mother's employment away from her infant, on the use of breast milk substitutes in developing countries.

Methods. Data from the Demographic and Health Surveys were used to calculate the population attributable risk percentage for use of breast milk substitutes among women employed away from their babies in 15 countries for which suitable data were available.

Results. The estimated proportion of breast milk substitute use attributable to employment away from the baby ranged from 0.74% to 20.9% in the various countries.

Conclusions. Employment is not the main determinant of breast milk substitute use. Efforts to improve breast-feeding can be safely targeted at the majority of women who are not employed away from their babies while nevertheless giving appropriate attention to the minority of new mothers who are employed away from their babies (*Am J Public Health*. 1996,86:1235-1240)

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Introduction

In both developed and developing countries, many health workers assume that breast milk substitutes are needed by women because of employment, and they sometimes promote the use of breast milk substitutes on this assumption.¹ Furthermore, professionals in the field of women in development have often been unenthusiastic about efforts to promote breast-feeding because they believe that the economic advancement of women requires labor force participation and that employment in the labor force and breast-feeding are in conflict with each other. Indeed, breast-feeding is not usually a part of the agenda for professionals in the field of women in development and is generally not discussed in the literature in this subject area.² However, Van Esterik and Greiner, in a previous study using survey research to analyze the determinants of infant feeding practices, have shown that it is not maternal employment itself but the more specific characteristics of employment that influence infant feeding practices.¹ Some particularly relevant conditions of employment are separation of the mother from the baby, inflexible shifts, lack of work-site child care, transportation, and maternity leave policies.

Recognizing that the vast majority of women work, it is necessary to clarify the operational definitions of employment that were of interest in this research. The focus at the first level was on women's income-generating activities, both formal and informal. At the second level, we analyzed specific attributes of work that influence the use of breast milk substitutes. These attributes included, but were not limited to, whether the employment or activity was carried out in the home or the mother traveled to another work site

and whether the mother took her infant with her if she worked outside the home. Also relevant for infant feeding were access to child care, location of child care, and time required to travel to the workplace.

The need for milk expression and storage or for appropriate breast milk substitutes for women who must work away from their infants cannot be disputed. However, the disadvantages of the use of breast milk substitutes are substantial, particularly for women in developing countries. These disadvantages include increased infant mortality and morbidity, hastened resumption of fertility, and loss of money for other necessities. The purpose of this analysis is to provide an empirical grounding for further consideration of the policy impact of employment on infant feeding and the use of breast

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Note. The views expressed here are the authors' and do not necessarily reflect those of the US Agency for International Development or Georgetown University.

milk substitutes The data used in this study also allowed for further analyses of dimensions of employment not undertaken here (e.g., occupation and child care) Future analyses of these data would benefit the advancement of women in both the countries studied here and similar countries

Background

Several researchers have investigated determinants of infant feeding practices using various modeling strategies A theoretical framework developed by Laukaran et al for the study of infant feeding practices in developing countries focused on a broad range of biological, social, and economic factors that may influence infant feeding practices in order to determine the nature and magnitude of their contribution to inappropriate infant feeding³ Some of the variables in this framework included women's employment status, education level, previous feeding behavior, and knowledge of and attitudes toward infant feeding decisions This model also showed that examining the factors on a one-dimensional level was erroneous because each variable has inherent characteristics that must be considered in order to influence policies and programs The authors pointed out that although women's employment is often used as a single variable in studies of determinants of infant feeding, the characteristics intrinsic to the labor market and labor force participation are multifaceted

Several approaches have been used to define the social and economic determinants of infant feeding in developing countries Winkoff et al analyzed data from four urban sample surveys in Nairobi, Bogota, Bangkok, and Semarang (Java) and concluded that "employment per se does not emerge consistently as a significant independent predictor of breastfeeding duration and use of infant formula"⁴ They also pointed out an important public health concern poorer women have a narrower range of options in life as a result of low income, poor nutrition, and the precarious state of their health and family welfare

It may be worthwhile to note some of the variables other than employment that are significant in models of determinants of breast milk substitute use Of particular relevance to employment are level of education of the mother, which is often a strong determinant of the use of breast milk substitutes, and attitudes and advice of health care professionals, which have

been shown to have a strong impact on infant feeding decisions and use of breast milk substitutes⁵

Sharma and Rutstein used a conceptual framework similar to the method just described to test the significance of a number of factors as determinants of infant feeding practices⁶ They analyzed these factors, in multiple regression analyses, using Demographic and Health Surveys data In their models, they used a single (0 vs 1) variable for employment and found it significant for only 5 of the 25 countries for which data were analyzed with respect to the continuation of breastfeeding for all children less than 12 months of age The results add credence to the possibility that a more refined employment variable involving specific attributes of employment, rather than employment alone, may have measurable impacts not detected in their analysis

In another study, Akin et al sought to determine, in four Near East countries, the patterns of breast-feeding and factors that influence them⁷ Employment was broken down into two separate variables whether the mother was currently working and whether the mother worked away from the infant The former variable was significant for only half of the countries, while the latter did not hold any significance in the model for any of the countries studied⁷

In the present study, the prevalence of employment away from the baby was estimated specifically for women with a child less than 6 months of age The analysis was limited to women with infants less than 6 months of age because the latest recommendation of the World Health Assembly is for exclusive breastfeeding for 6 months,⁸ the amount of time considered optimal to benefit both mother and child A policy-relevant assessment of the relative impact of maternal employment as a determinant of use of breast milk substitutes requires a different analytic approach than multivariate modeling The impact of employment on use of breast milk substitutes can be determined by using the concept of population attributable risk The significance of these findings in terms of policies to improve women's participation in the labor force, as well as their infant feeding practices while doing so, is also discussed further

The Demographic and Health Surveys, directed by the Institute for Resource Development/MACRO International and funded by the US Agency for International Development, provide an

abundant source of data for an analysis such as this The Demographic and Health Surveys program is a project to assist government and private agencies in developing countries to conduct national sample surveys of population health and maternal and child health⁹ In the first two phases of the program, from 1984 to 1993, 59 nationally representative surveys were conducted in developing countries in Africa, Asia, the Near East, Latin America, and the Caribbean Now in its third phase, the program, in collaboration with ministries from the host countries, is sponsoring another 20 surveys¹⁰ The main objectives of the program are to provide decisionmakers in the survey countries with data and analysis useful for informed policy choices, to expand the international population and health database, to develop, in participating countries, the technical skills and resources necessary to conduct demographic and health surveys, and to advance survey methodology¹⁰ By expanding the worldwide body of information on population and health, the Demographic and Health Surveys provide policymakers with a valuable resource for informed decision making at both the national and the international levels The surveys use the best obtainable nationally representative sampling frames and well-validated methodology suitable for national policy-making and international comparisons

Methods

The analyses described in this paper used data from nationally representative sample surveys of women in their child-bearing years that included, among other information, detailed questions on maternal work for pay and infant feeding practices Women were also asked whether their babies were with them at the work site usually, sometimes, or never Appropriate survey results are currently available for 15 countries

In the core survey, women were asked whether they did any work in addition to housework This question was followed by a probe "As you know, some women take up jobs for which they are paid in cash or kind Others sell things, have a small business or work for the family farm or in the family business Are you currently doing any of these things or any other work?"^{11,12} This probe was intended to avoid the difficulty of undercounting women's employment, a problem that frequently occurs in sample surveys Follow-up questions revealed

TABLE 1—Calculations for Population Attributable Risk (PAR) Percentage for Use of Breast Milk Substitutes among Women with an Infant Less Than 6 Months of Age

Country	Use of Substitutes among Employed Women Who Never Take Baby to Work	Use of Substitutes among Women Not Employed	Attributable Risk of Formula Use Due to Employment ^a	Women Employed Who Never Take Baby to Work (% Exposed)	Outcome Prevalences ^b	PAR % ^c
Brazil	92.3	71.0	21.3	11.6	73.5	3.4
Cameroon	35.9	23.8	12.1	10.3	25.0	5.0
Colombia	89.8	72.6	17.3	6.5	73.7	1.5
Dominican Republic	70.5	67.0	3.5	13.1	67.5	0.70
Egypt	41.3	31.3	10.1	9.3	32.2	2.9
Jordan	55.2	36.6	18.6	7.5	38.0	3.7
Morocco	57.6	35.6	22.0	6.2	37.0	3.7
Namibia	69.4	22.5	46.9	13.7	28.9	22.2
Niger	40.9	24.5	16.4	1.5	24.7	0.99
Nigeria	44.8	30.6	14.2	9.5	31.9	4.2
Pakistan	64.4	38.3	26.1	2.7	39.0	1.8
Paraguay	75.9	43.9	32.0	10.4	47.2	7.0
Peru	58.5	32.7	25.8	19.2	37.7	13.2
Rwanda	53.1	13.5	39.6	5.3	15.6	13.5
Zambia	51.4	15.2	36.1	8.0	18.1	16.0

^aColumn 1 minus column 2

^bDerived from the following (nos. represent the other columns) $\frac{(1)(4) + (2)[100 - (4)]}{100}$

^cColumn 3 multiplied by column 4 and the product divided by column 5

type of work or occupation, whether payment was received for the work, whether the work was for family or for a person or firm not related to the respondent, and whether the work was done at home or away from home. This series was followed by several items on child care including the following: "While you are working, do you usually have (youngest child) with you, sometimes have him/her with you or never have him/her with you?"^{11,12} Finally, the woman was asked, "Who usually takes care of (youngest child) while you are working?"^{11,12}

For this analysis the percentage of women employed was determined according to whether the mother worked with the baby or away from the baby. Women working with their babies were excluded from the main analysis since they were able to breast-feed while at their employment site and, thus, employment was not a deterrent to their breast-feeding practices. Although we recognize that all women "work," the dimension of interest to this analysis was paid employment, the aspect relevant to the economic advancement of women. The percentage of women using breast milk substitutes was then estimated for each of the following work patterns: not employed, employed and takes baby to work, employed and sometimes takes baby to work, and employed and never takes baby to work. The population attributable risk percentage was estimated as described later. Finally,

TABLE 2—Prevalence of Employment (%) among Women with an Infant Less Than 6 Months of Age, by Child Care Demographic and Health Surveys

Country	Not Employed	Employed		
		Usually Takes Baby to Work	Sometimes Takes Baby to Work	Never Takes Baby to Work
Brazil	75.3	7.8	5.4	11.6
Cameroon	47.0	34.8	7.8	10.3
Colombia	74.2	10.8	8.5	6.5
Dominican Republic	71.5	13.4	1.8	13.1
Egypt	81.6	6.3	2.8	9.3
Jordan	89.7	2.4	0.5	7.5
Morocco	81.6	10.4	1.9	6.2
Namibia	67.6	12.6	2.5	17.3
Niger	60.8	31.2	6.6	1.5
Nigeria	40.6	42.7	7.2	9.5
Pakistan	87.9	7.6	1.8	2.7
Paraguay	80.2	8.9	0.4	10.4
Peru	3.3	63.7	13.7	19.2
Rwanda	2.4	81.1	11.2	5.3
Zambia	49.2	35.9	7.0	8.0

demographic characteristics of those in the various employment/child care categories were determined.

Although levels of employment differed significantly for the urban and rural women in some countries, the samples for the Demographic and Health Surveys were drawn from nationally representative sampling frames with a known probability of selection for urban and rural women. For these analyses, the data were weighted to take into account differences

in sampling probability. Thus, it was not necessary to further stratify the analysis by urban or rural residence.

A standard epidemiological technique, the population attributable risk percentage, was used to determine the impact of employment on breast milk substitute use. This percentage is frequently used to estimate the proportion of patients in a population for whom a disease is attributable to their exposure. The percentage is estimated by multiply-

TABLE 3—Characteristics of Women with an Infant Less Than 6 Months of Age, by Employment and Child Care Demographic and Health Surveys

Country	No	Mean Age of Mother, y	Mean Parity, No	Primiparous, %	Secondary Education, %	Urban, %
Brazil						
Employed	42	27.4	3.3	19.0	34.9	69.2
Not employed	269	25.9	3.4	28.1	7.0	53.0
Cameroon						
Employed	37	28.2	4.6	7.1	32.7	40.9
Not employed	180	23.4	3.3	24.7	25.5	54.0
Colombia						
Employed	26	27.4	1.8	52.3	79.7	95.4
Not employed	183	25.0	2.7	34.2	39.4	63.9
Dominican Republic						
Employed	50	25.8	2.0	52.3	66.9	86.5
Not employed	269	24.1	2.7	31.9	32.5	57.6
Egypt						
Employed	169	29.2	3.4	22.0	60.5	41.4
Not employed	1356	26.7	3.6	23.4	28.1	38.6
Jordan						
Employed	65	28.7	3.6	22.4	90.8	75.4
Not employed	769	26.7	4.3	21.8	67.1	72.1
Morocco						
Employed	33	31.9	3.8	24.2	48.5	60.6
Not employed	418	29.0	4.2	18.4	6.2	28.7
Namibia						
Employed	64	29.8	3.5	21.5	70.6	60.2
Not employed	346	26.9	3.2	34.2	32.6	24.2
Niger						
Employed	14	27.7	4.8	6.1	23.5	38.0
Not employed	533	25.5	4.2	17.9	1.9	14.3
Nigeria						
Employed	90	29.7	4.5	8.3	34.8	27.7
Not employed	382	25.6	3.6	25.9	12.3	15.1
Pakistan						
Employed	22	30.6	5.3	11.6	26.7	30.6
Not employed	761	27.0	3.9	20.4	11.7	28.4
Paraguay						
Employed	48	28.6	3.2	28.8	59.7	78.0
Not employed	370	26.5	3.5	27.0	24.9	41.9
Peru						
Employed	76	28.6	2.7	37.5	82.5	88.8
Not employed	582	26.2	3.1	29.9	53.8	64.0
Rwanda						
Employed	28	31.0	5.0	12.7	40.6	23.6
Not employed	16	26.8	3.7	34.7	15.7	65.0
Zambia						
Employed	61	29.0	4.4	13.5	63.4	79.9
Not employed	373	25.4	3.7	27.0	14.9	49.6

Note. The employed group consists of those who never took their baby to the work site.

ing the attributable risk by the prevalence of exposure in the community (in this case, the prevalence of employment away from the baby). The population attributable risk is then divided by the incidence rate of outcome in the population to yield the proportion of cases in the population

for whom outcome is attributable to exposure. The attributable risk is the likelihood of an event occurring in those who are exposed to a risk factor as compared with those who are not similarly exposed. In epidemiological terms, the concept is generally applied to the

incidence of disease in exposed or unexposed groups. According to Hennekens and Buring, 'the risk difference or attributable risk is a measure of association that provides information about the absolute effect of the exposure or the excess risk of disease in those exposed compared with those non-exposed'.¹³ The attributable risk percentage was calculated by subtracting the rate of breast milk substitute use in unexposed (not employed) women from the rate of breast milk substitute use in exposed (employed) women and then multiplying by 100. The population attributable risk was calculated by multiplying the attributable risk percentage by the women's prevalence of employment away from their babies. The product was then divided by the outcome prevalence in the population to derive the population attributable risk percentage.

Computations for population attributable risk percentage are given in Table 1. For this analysis, the exposure variable was paid employment, specifically paid employment among women who never took their babies to the work site. The unexposed group was defined as women who were not employed, regardless of place of work or child care. Women who were employed and who sometimes or usually had their babies with them were excluded from the analysis in order to focus on refined categories. The exclusion of the women who sometimes took their babies to work from the analysis was an acceptable solution because the definition for 'sometimes' cannot be consistently verified across all countries, making comparisons difficult to interpret. Furthermore, the number of women who fell into this category was small in most countries.

As just mentioned, the attributable risk of breast milk substitute use due to employment was computed for each country by subtracting the proportion of use of breast milk substitutes among women not employed from the proportion among women employed away from their babies. Because survey respondents who were not breast-feeding were not asked about breast milk substitute use, all women not breast-feeding were assumed to be using breast milk substitutes rather than expressed breast milk. In addition, the analysis was limited to women with infants less than 6 months of age because the latest recommendation of the World Health Assembly is for exclusive breast-feeding for 6 months.¹⁴ It was also consid-

ered most reasonable to limit the analysis to 6 months postpartum because some infants who are not breast-fed are likely to be taken off breast milk substitutes after 6 months of age

Results

The prevalence of employment and the locus of child care for employed women with a baby under 6 months of age are given in Table 2. The proportion of women employed (i.e., working for wages or payment in-kind) ranged from 10% in Jordan to 98% in Rwanda. However, in many countries with a high level of employment, a significant proportion of employed women usually take their babies to work with them. Examples of this pattern are Rwanda, Peru, and Nigeria. Of greatest interest for infant feeding is the proportion of women with infants under 6 months of age who never take their babies to work (i.e., those who are generally unable to breast-feed during their work shift). The proportion in this group varied from 1% in Niger to 19% in Peru.

Table 1 provides the rates of use of breast milk substitutes for women with an infant less than 6 months of age. In order to determine the association of breast milk substitute use with employment and child care, the percentage use of breast milk substitutes was estimated for each category of employment and child care. Women who never took their babies to work were more likely to report that they used breast milk substitutes. As mentioned earlier, infants who were not breast-fed were classified as receiving breast milk substitutes. In the not employed category, only 2 countries exceeded 50% use of breast milk substitutes, in the category including women employed away from their babies, 10 countries exceeded 50% use of breast milk substitutes. These data show that there is an excess risk of use of breast milk substitutes among women working away from their babies. Women working with their babies generally reported levels of breast milk substitute use similar to those of women who were not employed, although in several cases use of substitutes was higher in women not employed than in those working with their babies.

The calculations for the population attributable risk percentage for use of breast milk substitutes according to employment are shown in Table 1. This percentage was calculated through use of

the risk difference (attributable risk) for use of breast milk substitutes between women employed away from their babies and those not employed. The percentage also took into account the prevalence of employment away from the baby in the country by taking the product of the prevalence of employment and the risk difference for use of substitutes in the exposed and unexposed groups. The population attributable risk percentage ranged from a low of 0.74% in the Dominican Republic to 20.9% in Namibia and was 5% or less in 10 of the 15 countries. Thus, for those 10 countries, employment was responsible for only 5% or less of breast milk substitute users, or 5% of the women who used breast milk substitutes.

For this analysis, all incremental use of breast milk substitutes among women employed away from their babies was attributed to their employment. Thus, if employed women were of higher social status, the model would produce an overestimation of the attributable risk. In order to test for the possibility of this type of bias, the characteristics of women were compared for the various work categories. The demographic characteristics of women with infants less than 6 months of age are given in Table 3 for those who were employed away from their children and for those not employed. This part of the analysis was undertaken in an effort to assess the possible bias due to differences in propensity to breast-feeding in employed women and unemployed women. The level of education of employed women was consistently higher than that of the not employed group. The parity of employed women was also higher in most countries but equal in several and lower in a few. The mean age for employed women was generally higher, markedly so in several countries, than the mean age for those who were not employed, and employed women were older, on average, in all but one country. In light of the differences in education by employment, the estimate of population attributable risk percentage given here probably overestimates the "true" effect of employment.

Discussion

The analyses reported here show that employment has a more limited impact on the use of breast milk substitutes in developing countries than has often been assumed. The great majority of women are either not employed or take

their young infants under 6 months of age with them to their workplace. Although women who are employed away from their babies are more likely to use breast milk substitutes, the percentage of formula users attributable to employment was less than 5% in all but 1 of the 15 countries. Although these data represent a wide variety of women in different employment settings with different economic, social, and cultural options and needs, they cannot be considered representative for women in other developing countries for which appropriate Demographic and Health Surveys data were not available. However, all countries for which Demographic and Health Surveys data were available are included, and the results probably reflect conditions of women's employment in other parts of the world.

Furthermore, alternative explanations must be considered for the use of breast milk substitutes by women who are at home with their babies. Recognizing that the prevalence of employment away from their babies is low among women with infants less than 6 months of age, efforts are needed to develop policies and programs to benefit women who are not working or who are employed and take their babies with them to work. Such women need programs designed to increase the likelihood that they will take advantage of the opportunity their work status affords them to exclusively breast-feed for 6 months as recommended. In the development of infant feeding policies and programs, consideration is needed of health system policies and marketing practices for breast milk substitutes (particularly through the health sector), two potent influences on women's decisions to use breast milk substitutes.

In the future, as more women with infants begin to enter the paid work force, policies and programs will be needed to permit mothers to have adequate paid maternity leave, acceptable infant care near their place of work, or facilities to express and store breast milk. If such policies are not adopted, there will be a considerable economic drain on families since the cost of breast milk substitutes constitutes a considerable proportion of the minimum wage in most countries. Furthermore, national economies are affected by failure to protect breast-feeding. Where milk products are imported, loss of foreign exchange has serious economic consequences at a national level. In addition, failure to maintain optimum infant feeding affects national economies.

through increased private and public expenditure due to treatment of illnesses in infants

Frequently, the demands of motherhood (or, broadly speaking, women's reproductive roles) and mothers' roles as income producers are seen as antithetical or contradictory. Policies to improve women's social welfare should give joint consideration to women's productive and reproductive roles (and their impact on national economies) and to the many ways in which these roles are complementary. □

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