



## Determinants of breastfeeding: the case of a Philippine urban barangay

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This paper determines the factors that affect breastfeeding initiation and continuation in a low-income urban barangay in the Philippines based on a survey done in 2005. It incorporates the framework by Chatterji and Frick [2003] that considers how a mother maximizes her utility in each period. The odds ratios in this case show that family income, number of children, age, and the mother's educational attainment and her belief in the superiority of breast milk determine whether a mother initially feeds her child with breast milk or not. On the other hand, continuation of breastfeeding is also attributed to these factors (except education) plus the number of children, the age of the last-born, and whether the last-born was fed initially with breast milk or not. This paper concludes that breastfeeding measures should therefore be aimed at promoting awareness among mothers of the economic and health benefits of breastfeeding and at supporting its initiation right after delivery. This form of human capital investment should be viewed as more important than income-generating activities, especially for mothers of high-income families who can afford to take a leave from work to feed their babies.

*JEL classification:* D1, I10

*Keywords:* breastfeeding, human capital

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### 1. Introduction

Cow's milk is for cows, not for our babies.

Despite the efforts of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) to encourage exclusive breastfeeding

(EBF) in the country, the Supreme Court has just declared null and void the provisions in the Department of Health's (DOH) Revised Implementing Rules and Regulations of the Milk Code that appeal for an absolute ban on the promotion and advertisement of breast-milk substitutes. The Court believes that the national policy of protection, promotion, and support of breastfeeding cannot be automatically equated with a total ban on advertising for breast-milk substitutes. The Court does not see the influence of advertising on distorting the knowledge of mothers when it comes to breastfeeding. The saying "mother knows best" is probably taken as factual that we have underestimated the role of media and society in affecting maternal decisions, which in turn affect child nutrition.

It is very unfortunate that breast milk is viewed as an inferior good—that is, as income increases, consumers tend to avail less of it and choose its substitute: milk formula. Moreover, as the value of a mother's time increases, the tendency is to move away from breastfeeding toward other activities perceived as more contributory to family well-being.

Fildes [1986] identifies breastfeeding as a highly variable, culturally controlled, and learned behavior, with predictable health, nutrition, demographic, and economic outcomes. It responds to perceived needs of the family and what mother thinks is best for her baby, given the infant's age and her availability. It is also highly dependent on the mother's health and her capacity to produce breast milk.

In the past, everyone has been too concerned with child nutrition until it was discovered that thousands of children die every year due to improper practices in infant feeding. Health studies on breastfeeding were then concentrated on how it could affect the survival of a child and his or her physical and mental condition. Later, in the 1970s and 1980s, studies led by Popkin [1978] and Popkin et al. [1983] shifted to the determinants of infant-feeding practices in different countries. In previous studies, demographers and economists started relating breastfeeding with mother's age, health conditions, number of children, socioeconomic status, educational attainment, employment, and personal beliefs. Three decades have passed, but a universal model that applies to every country has yet to be developed. In a low-income country like the Philippines where urban population growth and poverty incidence are high, it would be interesting and beneficial to know the socioeconomic and demographic factors affecting breastfeeding.

Despite evidence on the importance of mother's milk, there remain unmasked factors that constrain breastfeeding practice in many low-income countries. This paper shall not only test the effect of socioeconomic factors, like maternal education, maternal employment, and family income on the likelihood of initiating and continuing breastfeeding among mothers in an urban barangay in the Philippines, but shall also explore demographic factors like

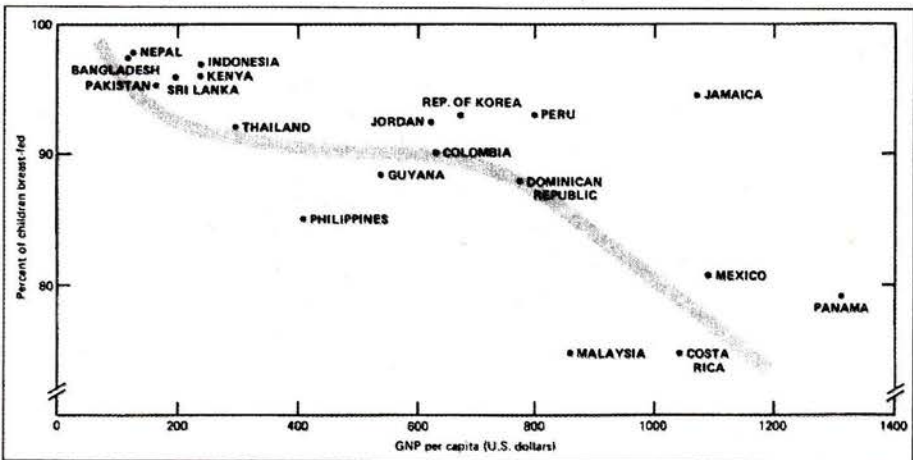
parity, maternal age, and age of infant plus the psychological factor of believing that breast milk is the best for their babies. It will be the first time that such psychological factor shall be included to represent awareness on correct infant feeding, which is affected by the media and other people in the society. We shall use a logit model that will simultaneously estimate these multiple variables and get their odds ratios. Thus, we can evaluate carefully the extent of their effect on breastfeeding and eventually find the most effective approach to counter the declining trend of breastfeeding in the country.

This paper continues with a background on breast milk and breast-milk substitutes in section 2. The existing literature on the extent and duration of breastfeeding are summarized in section 3. Section 4 discusses the theoretical framework while section 5 presents the empirical methodology and results. Finally, section 6 summarizes the major findings and provides recommendations for policies and further studies.

## 2. Background of the study

Figure 1 shows that the level of a country's socioeconomic development, as indicated by gross national product (GNP) per capita, is related to breastfeeding initiation. It can be seen that countries with higher GNP per capita generally have lower percentages of breastfed children and shorter durations of breastfeeding than countries with lower GNP per capita. However, the Philippines is a clear exception, with a lower percentage of breastfed children than countries with the same level of GNP per capita. Kent [1981] hypothesizes that this is because of the Philippines' cultural and economic history, having been colonized for about 400 years by western countries.

**Figure 1. Initiation of breastfeeding by GNP per capita**



Source: Kent 1981.

UNICEF Philippines identifies breast milk as a gift of life more than anything else. Even the WHO [2007] affirms that breastfeeding contributes to child survival, child health and nutrition, and child spacing; it states that breastfeeding reduces infant mortality and prevents malnutrition. Moreover, Thapa, Short, and Potts [1988] point out that breastfeeding can be tapped as an effective family planning method, since it delays the return of menstrual periods, providing one-third more protection than all of the technological contraceptives used in developing countries. Williamson [1990] also highlights that breastfeeding receives the least opposition from the Catholic Church among all the family planning methods.

Unfortunately, the result of the 2003 National Demographic and Health Survey (NDHS) reveals that the average duration of exclusive breastfeeding (i.e., breast milk is the only source of food for the first six months of age) has been down to only 24 days from 1.4 months in 1998. Supplementary foods are introduced too early, exposing infants to pathogens that increase risks of infection and diarrhea. Moreover, Azurin-Abaja [2003] points out that less frequent breastfeeding reduces production of breast milk and shortens the length of postpartum amenorrhea among mothers, which prevents the onset of pregnancy and gives the mother the opportunity to properly space births.

On October 11, 2006, Senate Bill 2490, known as "Breastfeeding Promotion Act of 2006", was approved to ensure proper care and nutrition among Filipino children through the promotion of breastfeeding. This is an indication that the government is now giving more emphasis on breastfeeding as an initial human capital investment for a healthier population.

Formula feeding, on the other hand, is expensive, especially for the poor households. The National Economic Development Authority (NEDA) declares that the country spent Php 20.5 million on milk imports in January–November 2004. Another cost of formula feeding, according to Azurin-Abaja [2003], is the risk of retardation of children's cognitive ability and educational achievement. In a survey conducted in different parts of the world, Grant [1984] concludes that child mortality is three times higher for mixed-fed infants and five times higher for exclusively bottle-fed infants as compared to exclusively breastfed infants. Breast-milk substitutes are described as artificial and may have nutritional quantities that are either too much or too little for the infant. Unfortunately, infant-formula manufacturers and advertisers have succeeded in misleading the public that only these products can best nourish our babies.

Formula milk is one of the top consumer commodities in the Philippines as of January 2005, alarming UNICEF of the "death sentence" being given to infants. Formula milk is not only expensive; it can also increase the probability of child infections, diarrhea, respiratory diseases, allergies, diabetes, and malnutrition [Llaneta 2007]. WHO has estimated that 16,000 children die every year due to improper feeding practices. This is more tragic than any natural

disaster. Unfortunately, we do not notice it because children cannot speak for themselves.

The superiority of breast milk to these substitutes is unquestionable. Breastfeeding saves the family thousands of pesos in food and health-care costs and contributes to a more productive workforce and healthier society. However, mothers who were also once children fed with formula milk have imbibed the formula-milk culture. Many mothers are being deceived by media advertisements that milk formulas are enough for babies. Much worse is the notion among poor women that if only they could afford it, they would feed their children with the commercial milk formula instead of breast milk.

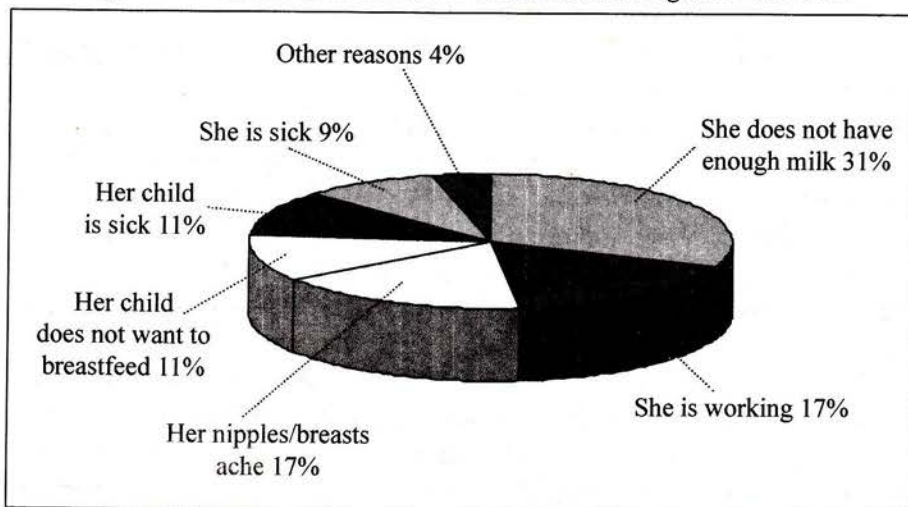
But even if mothers decide to breastfeed, if there is nobody to help them, they end up succumbing to social pressure. Unwritten rules in the formal workplace that prevent mothers to feed their babies during breaks can also be one of the links between socioeconomic factors and breastfeeding behavior.

UNICEF says that the top reason of Filipino mothers for not breastfeeding their children is insufficiency in breast milk (Figure 2). This is followed by aching nipples and work.

### 3. Review of related literature

This section provides a summary of the available studies that have given rise to different models for identifying the determinants of breastfeeding in different countries. Some papers use survival analysis to determine the effect of the estimated variables on the duration of breastfeeding while others employ multivariate logit models to identify which variables have influences on the practice of breastfeeding.

**Figure 2. Reasons of mothers for not breastfeeding their children**



Source: UNICEF Philippines [n.d.] "Breastfeeding data in the Philippines".

### 3.1. Extent of breastfeeding

A study conducted by Venancio and Monteiro [2006] involving 34,435 children under six months of age in Sao Paolo, Brazil. The sample is equiprobabilistically chosen from the population of all children below six months old who attended the vaccination clinics in 111 municipalities. The authors perform logistic regression to obtain the estimates of exclusive breastfeeding in relation to the child's age. For the other variables, they apply a multilevel analysis, which is based on the concept that individuals interact based on their social context and that social groups in turn are influenced by the individuals. The choice of the multilevel analysis over traditional regression models helps to solve analytical difficulties when data are organized hierarchically and there is intra-group correlation.

Explanatory variables are divided into two levels. Level 1 includes individual characteristics, while level 2 contains municipal characteristics. The authors apply hierarchical modeling strategy, employing backward selection within each level of the hierarchical model. Of the variables in level 1, maternal schooling is introduced in the first stage of modeling, being adjusted only for child's age (Block 1). In the next two stages, variables related to maternal attributes (Block 2) and child attributes (Block 3) are subsequently included. They employ a multilevel logistic regression model with generalized least-squares estimation where the final model includes maternal schooling, mother's age, parity, child sex, birth weight, outpatient follow-up, and total number of breastfeeding measures. They observe that the odds ratio of exclusive breastfeeding is increasing with mother's age until the 25-29 bracket where it levels out and decreases slightly afterward. There is also a greater chance of exclusive breastfeeding among multiparous (mothers with more than one child). The most important finding of the study is that the contextual variable—the total number of pro-breastfeeding measures—is significantly correlated with exclusive breastfeeding. Children living in municipalities of 4-5 measures are 2.5 times more likely to be breastfed than those in worse conditions. More pro-breastfeeding measures reduce the impact of maternal education and low birth weight on EBF.

On the other hand, Williamson [1990] notes that the incidence of breastfeeding in the Philippines decreases with an increase in educational attainment after a certain threshold (i.e., six years of schooling). A factor that may explain this is the increasing opportunity cost for a Filipino mother's time as her educational level increases. Moreover, urban mothers are less likely to breastfeed than their rural counterparts. As Williamson [1990] said, mothers with modern jobs breastfeed the least among employed and non-employed mothers. These three major findings might explain the decline in breastfeeding trend in the Philippines. Since more modern jobs are offered in the cities that require fixed number of work hours (e.g., eight hours) and more educated

women, Filipino mothers may find it “costly” to spend some of their time breastfeeding their children. Local beliefs are also influential on the Filipinos’ breastfeeding behavior. Williamson [1990] predicts that beliefs like colostrum is “dirty milk”, mothers should not breastfeed when they are too hot or too cold, and non-breast-milk supplements are necessary for better nutrition can also be the underlying factors for the decline in breastfeeding incidence in the Philippines.

Meanwhile, Stewart et al. [1991] develops a full structural model of behaviors to identify factors that affect prenatal breastfeeding intentions and the effects of these intentions and other events after birth that affect actual breastfeeding likelihood. Using the sample of 2,293 urban and 712 rural Cebu households, they have proven that better-educated women and women with higher socioeconomic status are less likely to breastfeed.

### *3.2. Duration of breastfeeding*

It will be more beneficial not only to feed the infant initially with breast milk but also to continue to breastfeed for two years or more. Hence, aside from the extent of breastfeeding among households, it is essential to examine the factors that affect the length of its continuation.

Perez-Escamilla et al. [1995] apply the Cox multivariate analysis to identify the determinants of exclusive breastfeeding duration in Brazil, Honduras, and Mexico. Individuals are recruited from selected hospitals that target low-income women. They start their regression by including all the variables they collect and use backward stepwise regression procedure to reduce the variables. Afterward, they specify a common model that is tested and compared among the three countries. Their Model 1 includes socioeconomic variables like maternal education, socioeconomic score, maternal employment, and presence of partner at home. It also includes planned exclusive breastfeeding duration of mother, birth weight, infant gender, and presence of maternity ward, and interaction terms of maternity ward and maternal education and maternity ward and birth weight. Their Models 2 and 3 drop planned EBF duration since it can mask the real impact of the other factors. Sample size is held constant in Model 2, but not in Model 3. Model 4 includes the residual of the planned breastfeeding duration. Only Models 1 and 3 are used because results of Models 1, 2, and 4 were equivalent. All independent variables are dichotomous, except for parity. The cutoff points for these dichotomous variables are based on the median. Parity and these dummy variables are regressed on the EBF duration to assess their significance. The authors find out that factors like the planned duration of EBF, socioeconomic status, infant gender, maternal employment outside the household, birth weight, and maternity ward are the determinants of EBF common to more than one country. As predicted, they discover that

women from lower socioeconomic backgrounds breastfeed their babies for a longer time.

In fact, most other studies like those of Millman [1981], Popkin [1978], Mohiuddin [1986], Mott [1984], and Othman [1985] prove that socioeconomic status is negatively correlated with breastfeeding duration. Perez-Escamilla et al. [1995] also realize that mothers who return to work soon after giving birth are less likely to breastfeed their children exclusively. This highlights the need for a legislation that would support working women to continue breastfeeding their children. The authors also observe that in all the three countries, women who are attended in hospitals with better breastfeeding campaigns are more successful with exclusive breastfeeding. This is a clear indicator of the importance of hospital-based breastfeeding policies on lactation performance. The study leads to some helpful recommendations on maternal motivations that could lengthen infant-feeding behavior. Since the mother's prenatal plan of EBF is proven a critical factor that affects actual practice, breastfeeding campaigns should be addressed to pregnant women.

On the other hand, O'Gara [1989] determines that in his study of 75 households in urban Honduras, there is almost no variation in breastfeeding duration between employed and unemployed women. However, housewives and employed women who have worked for greater number of hours daily during the postpartum period (the period immediately after childbirth) and have had a shorter postpartum leave terminate their breastfeeding earlier than their counterparts.

In Nepal, there is no significant correlation between demographic factors and breastfeeding duration as demonstrated by Tuladhar [1987]. He applies multiple classification analysis and multiple regression analysis with months of breastfeeding as the dependent variable in his study. He illustrates that the work status of a woman is not significantly correlated with breastfeeding duration and explains that this is probably because some traditional jobs can allow mothers to bring their children to the workplace, thus giving them the opportunity to breastfeed their babies during breaks.

Iskandar, Costello, and Nasution [1987] conduct a similar study among 14,411 households using the National Indonesian Contraceptive Prevalence Survey (NICPS) sample design that encompasses 20 out of 27 provinces in Indonesia. The 12 variables affecting breastfeeding initiation and duration that they used include household economic level, language, place of delivery, type of birth attendant, mother's education, mother's occupational experience, spouse's education, spouse's occupation, mother's age at the time of the child's birth, parity, sex of child, and "wantedness" of pregnancy. After they divide the sample into four regions (Urban Java-Bali, Rural Java-Bali, Urban Outer Islands, Rural Outer Islands), the authors use multivariate analysis using logistic regression to determine covariates and duration of breastfeeding. Four time-intervals (i.e., 0-6



months, 6-12 months, 12-18 months, and 18-24 months) are defined in which the probability of continuing breastfeeding beyond the interval is analysed. Their results show that higher economic level was correlated with lower frequency of breastfeeding in Indonesia. The mother's educational attainment is positively correlated with breastfeeding frequency in Java-Bali only. However, they find it alarming that the usage of modern health personnel and facilities for delivery is negatively associated with initiating breastfeeding. Moreover, lower-parity children have a lower chance of getting breastfed while other variables are not significant. Computing for the odds ratio, increasing parity, unwantedness of pregnancy, and age of mother at birth of child show consistent effects across areas, but are only significant in rural Java-Bali and urban Outer Islands. The authors also conclude that women of higher parity are more likely to continue breastfeeding in both first and second years.

In summary, previous studies have related breastfeeding with the mother's demographic and socioeconomic characteristics. Increasing age up to a certain threshold, higher parity, and presence of pro-breastfeeding measures generally have positive correlation with breastfeeding initiation and duration, but they are not consistently included in all studies. On the other hand, education and socioeconomic status have proven to be negatively associated with breastfeeding. Employment has no effect on initiation and duration of breastfeeding according to some literature.

#### 4. Theoretical framework

The model of time allocation by Becker [1965] postulates that households maximize a utility ( $U$ ) function

$$U = U(Z_1, \dots, Z_m) \equiv U(x_1, \dots, x_m; T_1, \dots, T_m; R) \quad (1)$$

where  $Z_1, \dots, Z_m$  are the commodities that ultimately produce utility,  $x_1, \dots, x_m$  are the market goods,  $T_1, \dots, T_m$  are the time inputs used to produce the  $i$ th commodity, and  $R$  is a vector of "environmental" variables such as age, education, ability, climate in which the household resides, etc. This function is subject to the budget constraint:

$$\sum_{t=0}^T U(H_t, h_t, \alpha_t, \beta_t). \quad (2)$$

where  $g$  is an expenditure function of  $Z_i$  and  $Z$  is the bound on resources. He later defines full income  $S$  through the equation

$$L(Z_1, \dots, Z_m) = S - I(Z_1, \dots, Z_m) \quad (3)$$

$L$  is the total earnings lost because of the desire to maximize utility rather than income while  $I$  is the money income. Hence, rich households can afford to sacrifice money income for additional utility that can be derived from activities like eating and sleeping. This framework can be translated into a mother's allocation of her time. Chatterji and Frick [2003] recognize that after childbirth, mothers maximize the following multi-period, discrete-time objective function

$$g(Z_1, \dots, Z_m) = Z \quad (4)$$

Utility in each period is a function of the mother's health ( $H$ ), the child's health ( $h$ ), the mother's consumption ( $\alpha$ ), and the mother's leisure ( $\beta$ ). This function is subject to the constraint

$$Z = \beta_t + \gamma_t + \delta_t + \eta_t. \quad (5)$$

The total time available in a period ( $Z$ ) is the sum of four choice variables: time spent investing in the mother's health ( $\beta$ ), time spent investing in the child's health ( $\gamma$ ), time spent in leisure ( $\delta$ ), and time spent working ( $\eta$ ). Furthermore,

$$\sum_{t=0}^T (E_t + \eta_t w) = \sum_{t=0}^T (p\alpha_t + q\varepsilon_t + r\varnothing_t) + K + M. \quad (6)$$

Simply put, the sum of endowments is equal to the sum of expenditures. The left-hand side represents resources available: the sum of endowments (or nonlabor income) plus the wage multiplied by the time spent working in each period. The right-hand side represents expenditures. The first three terms that are included in the summation over time are straightforward. The price of consumption goods is  $p$ , the price of medical care for the mother is  $q$ , and the price of medical care for the child is  $r$ .  $\varepsilon$  is the health-care expenditure a mother makes while  $\varnothing$  is the medical expenditures for the child.  $K$  refers to the discrete costs that are only incurred if the mother decides to breastfeed, and  $M$  refers to the cost incurred only if the mother decides to breastfeed while working.

To optimize her utility function, the mother will choose to breastfeed until the marginal costs (in terms of the opportunity cost of time) are just equal to the marginal benefits (in terms of the effects on the mother's health, the effect on the child's health, and savings on formula expenditures).

## 5. Empirical results

This section shows how estimation was done to determine the effects of several socioeconomic factors on breastfeeding. We start with the specification of our two general models and introduction of our variables, after which we describe our estimation procedure and data source. Lastly, we present our results in odd ratios and interpret the figures.

### 5.1. *Empirical models*

A lot of variables may be used to describe actual breastfeeding behavior. Some papers (e.g., Perez-Escamilla et al. [1995]) use duration of exclusive breastfeeding while others (e.g., Adair, Popkin, and Guilkey [1993]; O'Gara [1989]) use the probability of having breastfed exclusively for the last 24 hours.

In this study, the dependent variables in our two models are both dichotomous: (a) whether the child was initially breastfed after birth and (b) whether the mother breastfed her child within the last 24 hours. The first is an indicator of the initial intent of a mother and is very important because the kind of milk produced right after birth is colostrum, which contains antibodies to protect the infant from diseases. The second was selected as a dependent variable since it is the most reasonable representation of the current breastfeeding behavior that can be possibly affected by the economic status of the family and the age of the child at the time of the interview. It can also be tested as a function of the child's age and, unlike exclusive breastfeeding indicators, it does not necessarily mean that other fluids are not given to the child.

Age, education, and employment represent the opportunity cost of the mother's time. The prime of a woman's career life can fall possibly within the 24-35 years of age. It is the time wherein she would rather work than stay at home feeding her baby. Mother's education is expected to be negatively correlated with the likelihood to breastfeed since the more educated a mother is, the greater is the tendency for her to do things she deems more worth her time. Employment is also expected to have a negative effect: a mother who does not work or works but only for herself is more likely to feed her baby with her breast milk.

Higher parity, which is the number of children born to a woman, can represent more experience of a woman in childrearing. An earlier study by Popkin et al. [1983] shows a positive correlation between parity and breastfeeding. Increasing number of children born to a woman may increase her likelihood to breastfeed because of her previous experience that has allowed her to witness the benefits of breastfeeding. On the other hand, the age of the baby will most probably be negatively correlated with the likelihood of being breastfed since as babies grow old, mothers think it is necessary to introduce other liquids and solid food.

Believing that breast milk is the best for babies may largely affect the likelihood of breastfeeding since mothers will most probably give what they think is best for their babies. This belief usually comes from the awareness of the good benefits of breastfeeding as promoted by society. On the other hand, this belief can also be distorted because of the false advertisements that endorse infant formula as the superior source of food to enhance a child's mental and physical development.

After analysing the possible determinants of breastfeeding, we develop two logit models with multiple variables, one determining the log odds of initiation and the other determining the log odds of continuation of breastfeeding.

### 5.1.1. Initiation of breastfeeding

$$\log\left(\frac{P(I_i = 1)}{P(I_i = 0)}\right) = \beta_0 + \beta_1 \text{AGEATBIRTH} + \beta_2 \text{SALARYPERWEEK} \\ + \beta_3 \text{EDUCATION} + \beta_4 \text{MOTHERSELFEMPLOYED} \\ + \beta_5 \text{MOTHEREMPLOYEDFULLTIME} \\ + \beta_6 \text{MOTHEREMPLOYEDPARTTIME} \\ + \beta_7 \text{BREASTMILKISTHEBEST}$$

$I_i$  is the dependent variable that takes the value 1 if the  $i$ th mother initially fed her last child with breast milk

### 5.1.2. Continuation of breastfeeding

$$\log\left(\frac{P(Y_i = 1)}{P(Y_i = 0)}\right) = \beta_0 + \beta_1 \text{PARITY} + \beta_2 \text{PARITY}^2 \\ + \beta_3 \text{SALARYPERWEEK} + \beta_4 \text{AGE2435} \\ + \beta_5 \text{BREASTMILKISTHEBEST} \\ + \beta_6 \text{MONTHOLD} \\ + \beta_7 \text{MOTHERSELFEMPLOYED} \\ + \beta_8 \text{MOTHEREMPLOYEDFULLTIME} \\ + \beta_9 \text{MOTHEREMPLOYEDPARTTIME}$$

$Y_i$  is the dependent variable that takes the value 1 if the  $i$ th mother has breastfed her youngest child within the last 24 hours prior to the interview.

## 5.2. Variable definition and source of data

*Ageatbirth* = age of the mother at the time of giving birth

*Age2435* = 1 if the mother is 24 to 35 years old at the time of birth, and 0 otherwise

*Salaryperweek* = average family weekly income, expressed in thousand

*Education* = estimated number of years spent by the mother in school. It is derived by assigning six years for elementary, 10 years for high school, 12 years for vocational, and 14 years for college

*Parity* = number of children born to a woman

*Breastmilkisthebest* = 1 if the mother believes that breast milk is the best food for babies and 0 otherwise

*Monthold* = age of the child in months

Maternal Employment is encoded according to the following:

*Motherselfemployed* = 1 if mother works in a business of her own  
0 otherwise

*Motheremployedfulltime* = 1 if mother is working full time, 0 otherwise

*Motheremployedparttime* = 1 if mother is working part time, 0 otherwise

(Base category is motherunemployed)

Data come from the survey conducted on November 30 to December 7, 2005, by the Philippine Children's Medical Center Office of Research Development with the help of the Civic Welfare Training Service (CWTS) students of the UP School of Economics. The population includes mothers in Barangay Central, Quezon City, whose youngest children are four years old and below. Ninety-nine mothers were included in the sample.

Table 1 presents the characteristics of the sample. According to the table, 80.61 percent of the sample initially fed their children with breast milk while only 48 percent of the sample breastfed their children within the last 24 hours. This is a very low incidence for the sample with children up to four years of age. The most number of children among the sample is six, but the average is only two. There is also a wide range in the average salary per week. Of the mothers, 60.6 percent fall within the 24-35 age bracket. Some families only earn Php 200 a week while there is one that earns Php 10,000 a week. Only a few mothers are self-employed or work either full-time or part-time. Mothers have spent ten years in school, on average, which is equivalent to high school.

### 5.3. Estimation procedure

Because of the dichotomous nature of the dependent variable, we run a multivariate logit model. Since we define  $Y_i = 1$  if the mother breastfed her child within the last 24 hours and  $Y_i = 0$  if not, positive coefficients in the logit regression indicate higher probability of breastfeeding. By taking  $e$  to the power for both sides of the equation, we can present the results into odds ratios, which are the odds in favor of having breastfed in the last 24 hours. Models 1.1 and 2.1 are the original models. Model 1.2 adds parity into Model 1.1 while Model 2.2 drops breastmilkinitial in Model 2.1.

### 5.4. Results and analysis

Table 2 summarizes the coefficients of the tested variables across the four models. These coefficients determine the increase in the log odds of

breastfeeding for every unit increase in the independent variable. To make better interpretations, we derive the odds ratios, as presented in Table 3.

Table 3 shows that across all models, believing that breast milk is the best for babies has the greatest impact on the likelihood of the mothers in this sample to breastfeed. This only proves that the biggest factor determining the actual method of infant feeding is the knowledge of which method will effectively enhance the child's mental and physical development.

Parity is positively correlated with continuation of breastfeeding. Hence, in this sample, more children born to a woman means greater likelihood for the mother to breastfeed her last child. However, the likelihood of initial feeding with breast milk is reduced as parity increases as shown in Model 1.2. This is probably because higher parity can reduce some women's nutritional status, which may affect breast-milk production, as hypothesized by Hamilton, Popkin, and Spicer [1981].

Salary per week, which represents socioeconomic status, has inconsistent effects on initiation and continuation of breastfeeding. Controlling for other variables, a Php 1,000 increase in weekly salary increases the odds in favor of feeding the baby initially with breast milk by about 288.91 percent  $[(3.88905-1)*100]$  but reduces the odds in favor of having breastfed in the last 24 hours by about 52.86 percent  $[(0.47138-1)*100]$ . This reflects the awareness of better-earning families of the need to feed their children initially with breast milk. However, their high purchasing power can also lead them to introduce milk substitutes earlier, thus reducing breast-milk production and resulting in discontinuation of breastfeeding.

**Table 1. Summary of observations**

<i>Variable</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Min</i>	<i>Max</i>
Breastmilkinitial	98	.8061224	.3973667	0	1
breastfedinthelast24hours	98	.4795918	.5021519	0	1
Parity	99	2.10101	1.249448	1	6
parity2	99	5.959596	7.104065	1	36
salaryperweek	94	2.05984	1.58242	.2	10
age2435	99	.6060606	.4911083	0	1
ageatbirth	97	27.35309	5.471633	17.66667	42.25
monthold	98	14.68367	11.67657	1	49
breastmilkisthebest	97	.7628866	.4275218	0	1
motherselfemployed	99	.1010101	.3028757	0	1
motheremployedfulltime	98	.1122449	.3172905	0	1
motheremployedparttime	98	.0408163	.1988818	0	1
education	99	10.90909	2.478853	6	14

**Table 2. Logistic regression reporting coefficients**

<i>Variables</i>	<i>Model 1.1 Breast milk initial</i>	<i>Model 1.2 Breast milk initial</i>	<i>Model 2.1 Breastfed in the last 24 hours</i>	<i>Model 2.2 Breastfed in the last 24 hours</i>
ageatbirth	.2260712 (2.27)**	.3037565 (2.67)***		
salary perweek	1.358166 (2.39)**	1.492471 (2.44)**	-0.7520977 (-2.94)***	-0.5644517 (-2.59)***
education	-0.4962216 (-2.50)**	-.6550987 (-2.76)***		
motherself employed	.2859629 (0.19)	0.8359037 -0.52	2.523304 (1.96)**	2.311815 (2.04)**
mother employed fulltime	.286613 (0.22)	0.3912187 -0.29	.9641145 (0.88)	0.6544559 -0.61
mother employed parttime	-3.018453 (-2.09)**	-2.431016 (-1.69)*	-0.2020652 (-0.14)	-1.150424 (-0.87)
breastmilkis thebest	2.925401 (2.99)***	3.033537 (3.09)***	2.190759 (2.43)**	2.646052 (3.04)***
parity		-.7129792 (-1.68)*	1.689167 (1.76)*	1.399395 (1.57)**
parity2			-0.3245818 (-1.91)*	-0.2688726 (-1.70)*
age2435			-1.476751 (-2.21)**	-1.120721 (-1.89)*
monthold			-0.1042605 (-3.44)***	-0.0914313 (-3.14)***
breastmilk initial			2.159743 (2.31)**	
constant	-2.841423 (-0.87)	-1.907214 (-0.62)	-1.57837 -0.96	-0.5830595 (-0.39)

\* Significant at 10 percent level

\*\* Significant at 5 percent level

\*\*\* Significant at 1 percent level

Tables 3. Logistic regression reporting odds ratios

Variables	Model 1.1	Model 1.2	Model 2.1	Model 2.2
	Breast milk initial	Breast milk initial	Breastfed in the last 24 hours	Breastfed in the last 24 hours
ageatbirth	1.253665 (2.27)**	1.354939 (2.67)***		
salary perweek	3.889053 (2.39)**	4.448075 (2.44)**	0.4713767 (-2.94)***	0.5686719 (-2.59)***
education	0.6088267 (-2.50)**	0.5193908 (-2.76)***		
motherself employed	1.331043 -0.19	2.306898 -0.52	12.46973 (1.96)**	10.09272 (2.04)**
mother employed fulltime	1.331909 -0.22	1.478782 -0.29	2.622464 -0.88	1.924095 -0.61
mother employed parttime	0.0488768 (-2.09)**	0.0879474 (-1.69)*	0.8170417 (-0.14)	0.3165027 (-0.87)
breastmilk thebest	18.6417 (2.99)***	20.77056 (3.09)***	8.941993 (2.43)**	14.09827 (3.04)***
parity		0.4901817 (-1.68)*	5.414968 (1.76)*	4.052746 (1.57)**
parity2			0.7228296 (-1.91)*	0.7642406 (-1.70)*
age2435			0.2283786 (-2.21)**	0.3260446 (-1.89)*
monthold			0.9009905 (-3.44)***	0.912624 (-3.14)***
breastmilk initial			8.668907 (2.31)**	

\* Significant at 10 percent level.

\*\* Significant at 5 percent level.

\*\*\* Significant at 1 percent level.

Increasing age has a positive effect on the likelihood to initiate breastfeeding. On the other hand, mothers aged 24 to 35 are less likely to have breastfed their children within the last 24 hours by 77.16 percent  $[=(0.22838-1)*100]$  than mothers below 24 and mothers above 35 years old. This reflects the high opportunity cost of breastfeeding for mothers who are at the peak of their career and active life.



As expected, older babies have a lower likelihood of being breastfed than their younger counterparts. Controlling for other factors, a month increase in the age of the child decreases the chances of being breastfed by about 9.9 percent [ $=(0.90099-1)*100$ ].

Among the employment variables, part-time employment is the only term significantly correlated with breastfeeding initiation, reducing the odds by 95.11 percent [ $=(0.04888-1)*100$ ] from that of the unemployed mothers. On the other hand, it is interesting to know that being self-employed is associated with the greater likelihood of having breastfed within the last 24 hours. However, these employment variables show inconsistent results just like the previous studies that differ in their findings when it comes to determining the effect of employment.

Consistent with some existing literature, education has a negative effect on breastfeeding initiation. A one-year increase in the years spent in school decreases the odds in favor of initiating breastfeeding by 39.12 percent [ $=(0.60883-1)*100$ ].

Generally, our findings match those of the literature reviewed. Increasing levels of education negatively affect the initiation of breastfeeding while increasing levels of income negatively affect the continuation of breastfeeding. Mother's age and her belief that breast milk is best for babies significantly increase the likelihood of feeding the child initially with breast milk. Employment has little or no effect at all on both breastfeeding initiation and continuation. Parity has inconsistent results on initiating breastfeeding and continuing it, but the effects are marginal.

## **6. Conclusion**

This paper has attempted to show that the breastfeeding behavior of mothers in an urban barangay in the Philippines is affected significantly by income, maternal education, age of mother and child, number of children, and the mother's personal belief of whether breast milk is best for her baby. The odds in favor of continuing breastfeeding and the odds in favor of initiating breastfeeding increase the most when a mother believes that breast milk is best for her baby. It is therefore important that mothers become aware that breast milk should be their first choice. This calls for greater information dissemination about the incontestable advantages of breast milk over infant formula or any other liquid. If mothers will feed their infants with breast milk right after delivery, the chances of continuing this practice can increase. The problem with breast milk being viewed as an inferior good can be addressed by a more supportive society that will reveal the insufficiencies of commercial infant food and encourage breastfeeding even among higher-income families. This form of human capital investment should be viewed as more important

than income-generating activities, especially for mothers of high-income families who have the option to take a leave from work to breastfeed their babies for some time.

On the other hand, we cannot conclude that having a full-time job, having a part-time job, or being self-employed can really affect breastfeeding. It is therefore recommended for future studies to use work hours instead and also to measure the policies in the mother's workplace; these variables may be more reflective of the real effect of employment on the likelihood of breastfeeding. Future researches can also measure more directly the impact of milk formula advertisement on breastfeeding, as well as other variables like the mother's birthplace, her health conditions, and marital status.

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