

January 2012

# Determinants Of Exclusive Breast-Feeding (ebf) Among 0- To 6-Months Old Infants In Haiti: An Analysis Of The 2005/2006 Standard Demographic Health Survey For Haiti

Emily Intermont Dally

Yale University, emilyidally@gmail.com

Follow this and additional works at: <http://elischolar.library.yale.edu/ysphtdl>

---

## Recommended Citation

Dally, Emily Intermont, "Determinants Of Exclusive Breast-Feeding (ebf) Among 0- To 6-Months Old Infants In Haiti: An Analysis Of The 2005/2006 Standard Demographic Health Survey For Haiti" (2012). *Public Health Theses*. 1056.  
<http://elischolar.library.yale.edu/ysphtdl/1056>

This Open Access Thesis is brought to you for free and open access by the School of Public Health at EliScholar – A Digital Platform for Scholarly Publishing at Yale. It has been accepted for inclusion in Public Health Theses by an authorized administrator of EliScholar – A Digital Platform for Scholarly Publishing at Yale. For more information, please contact [elischolar@yale.edu](mailto:elischolar@yale.edu).

**Determinants of Exclusive Breast-Feeding (EBF) among Infants 0- to 6-months old in Haiti:**  
*An analysis of the 2005/2006 Standard Demographic Health Survey for Haiti*

Emily Intermont Dally  
Yale School of Public Health  
Master's Thesis  
MPH Candidate 2012  
Social & Behavioral Sciences, Global Health  
May 1, 2012

## **ABSTRACT**

The 2005/2006 Standard Demographic and Health Survey (DHS) from Haiti was used to examine associations between sociodemographic, anthropometric, and early feeding characteristics, with exclusive breast-feeding (EBF) outcomes among 0- to 6-month old infants. The 2005/2006 Standard DHS Survey is a nationally-representative survey that included 9,998 households. Multivariate logistic regression was used to identify factors associated with EBF in the study sample of mother/infant pairs (n=306). Significant associations were found between EBF and infant age (0- through 6-months), prelacteal feeds (none, water-based, and milk-based), place of delivery (home and public/private facility) and maternal marital status (married, cohabitational, and unmarried) and an association was found between EBF and maternal BMI (underweight, normal weight, overweight, and obese). These findings should be used to inform policy decisions to promote EBF among mothers of infants 0- to 6-months old in Haiti.

## TABLE OF CONTENTS

---

ABSTRACT	Page 2
LIST OF TABLES & FIGURES	4
ACKNOWLEDGEMENTS	5
BACKGROUND	6
METHODS	10
RESULTS	17
DISCUSSION	22
REFERENCES	27
APPENDICES	29

## LIST OF TABLES

---

Table 1: Household and Maternal Sociodemographic Characteristics	Page 13
Table 2: Infant Sociodemographic, Birth, and Early Feeding Characteristics	14
Table 3: Association of Maternal, Infant, Birth and Early Feeding Characteristics with EBF	18

## LIST OF FIGURES

---

Figure 1: EBF among Infants 0- to 6-months old by Survey Year	8
Figure 2: Selection of Study Sample	10
Figure 3: Infant Fluid and Food Intake Variables for 24-hour Recall	11
Figure 4: Criteria for Inclusion in Infant Feeding Categories	11
Figure 5: Breast-feeding Status among Infants 0- to 6-months old	12
Figure 6: EBF and Non-EBF among Infants 0- to 6-months old	12
Figure 7: EBF by Infant Age (mos)	19
Figure 8: Infant Age (mos)	20
Figure 9: Place of Delivery	20
Figure 10: Prelacteal Feeds	21
Figure 11: Maternal Marital Status	21
Figure 12: Maternal BMI (kg/m <sup>2</sup> ) Classification	21
Figure 13: Breast-feeding status between Age Intervals (mos)	24

## **ACKNOWLEDGEMENTS**

I am indebted to my academic advisor and thesis reader, Rafael Pérez-Escamilla, for his guidance and support throughout this process, from sharing tricks in SPSS, to the final edits. I am thankful for the continued encouragement and feedback that I received from my second thesis reader, Gary Desir. This thesis would not have been possible without your unwavering commitment to the project. Last but not least, thank you to my family and friends for their love and support.

## BACKGROUND

The Standard Demographic and Health Surveys (DHS) are nationally-representative household surveys that provide data for a wide range of indicators including population, health, and nutrition, about the country in which they are implemented (DHS 2012). The Haitian 2005/2006 Standard DHS Survey was implemented by the *Institut Haitien de L'Enfance* (Haitian Childhood Institute) from October 2005 to November 2006. The survey sampled 9,998 households and includes data from 10,757 women (15-49 years) and 4,958 men (15-59 years). It is important to note that the data analyzed for the purpose of this paper were collected prior to the 7.0 magnitude earthquake that hit Haiti on January 10, 2010. The earthquake left 250,000 dead, 300,000 wounded, and 1.6 million displaced. Economic and physical losses totaled 120% of Haiti's Gross Domestic Product (GDP) (OCHA 2012). Data collection for the 2011/2012 Standard DHS Survey for Haiti was ongoing at the writing of this paper and thus could not be used for these analyses (DHS 2012).<sup>1</sup>

Haiti is the poorest country in the Western hemisphere. The population is approximately 9.8 million (52% urban, 48% rural) with an estimated annual urban growth rate of 3.9% (CIA World Fact Book 2012). Haiti lags behind its fellow countries in the WHO Region of the Americas on various health and mortality indicators.<sup>2</sup> The life expectancy at birth in Haiti is 60 years for men and 63 years for women, compared to the regional averages of 73 years for men and 79 years

---

<sup>1</sup> Data collection for the 2011/2012 Standard DHS survey is being conducted between January and June 2012.

<sup>2</sup> The WHO Region of the Americas includes the following countries: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, and Venezuela (Bolivarian Republic of).

for women. Haiti suffers a disproportionate burden from communicable disease. The nutrition transition describes shifting patterns of consumption that occur parallel to such factors as increasing urbanization, economic growth, technological changes, food processing, and mass media. Unlike many developing countries in the region (e.g., Mexico and Brazil) that have entered the nutrition-related non-communicable disease (NR-NCD) stage of the transition in recent years, Haiti is still in the receding malnutrition period, defined by diets of “starchy, low variety, low fat, high fiber” foods and “labor-intensive work and leisure” (Popkin & Gordon-Larsen 2004).

The distribution of years of life lost by communicable disease (72%) versus non-communicable diseases (22%) in Haiti differs greatly from the regional averages of 20% and 59%, respectively. Haiti also lags behind the regional averages for maternal and child health indicators. The under-five mortality rate is 87 deaths per 1,000 live births, while the regional average is only 18 deaths per 1,000 live births. Diarrhea and pneumonia are the leading causes of death among children, each accounting for 22% of all deaths of children under-five in Haiti. The maternal mortality rate in Haiti is also alarmingly high, with 300 maternal deaths per 100,000 live births, compared to a regional average of 66 maternal deaths per 100,000 live births (WHO 2011).<sup>3</sup>

Breast-feeding protects infants against both gastrointestinal and respiratory infection, and its protective effects are enhanced with greater duration and exclusivity of breast-feeding (Kramer & Kakuma 2002). The World Health Organization (WHO) infant feeding recommendation states

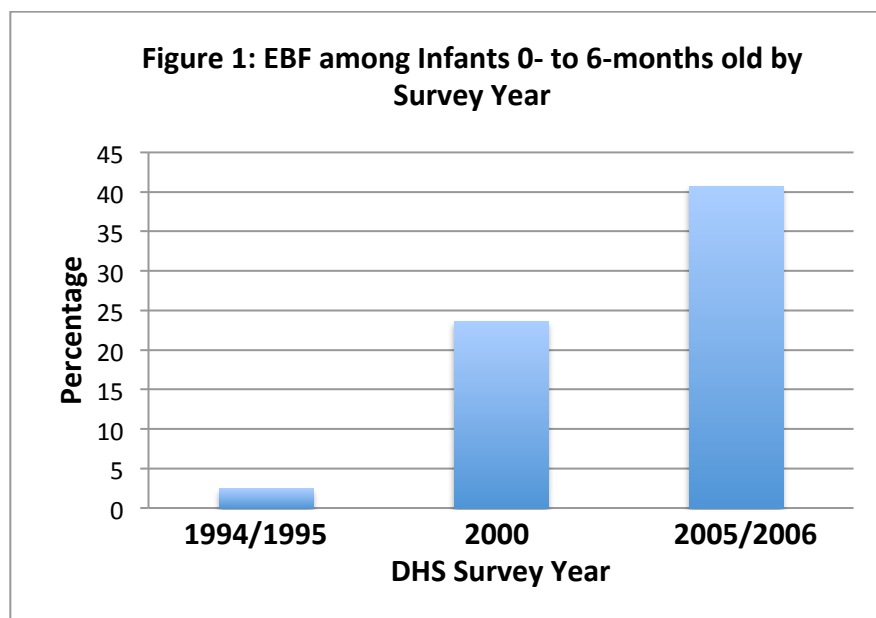
---

<sup>3</sup> Child and maternal mortality statistics refer WHO data from 2008.



that infants should be “exclusively breastfed for the first six months of life to achieve optimal growth, development and health” (WHO 2002). Continued breast-feeding along with appropriate complementary foods is recommended for children up to two years of age or beyond. For the purpose of this paper, analyses will be limited to exclusive breast-feeding (EBF) determinants among the sample population of 0- to 6-month old infants.

EBF rates among 0- to 6- month old infants are on the rise in Haiti (Figure 1). Results of the DHS 1994/1995 survey indicate that only 2.5% of infants in this age group were exclusively breastfed; DHS 2000 results indicate that the proportion of EBF infants increased nearly ten-fold to 23.6% in less than a decade. Most recent data from the 2005/2006 survey reports EBF rates of 40.7%, which is on par with the global average (DHS StatCompiler 2012). Worldwide, about 40% of infants 0- to 6-months old are exclusively breastfed (WHO 2012). While these statistics confirm that the status of EBF in Haiti is increasing, there is room for improvement.



In October 2010, the Haitian Ministry of Health (*Ministère de la santé publique et de la population - MSPP*) along with the Centers for Disease Control and Prevention (CDC), reported the first cases of what would quickly become a national cholera epidemic. Since the outbreak began, there have been over 47,000 cholera cases and 6,631 attributable deaths (CDC 2012). Poor sanitation and limited access to potable water have contributed to the current cholera epidemic. Before the 2010 earthquake, 63% of the population has access to improved drinking water sources (71% urban; 55% rural), and it is likely that access has worsened in the post-disaster context (WHO 2011).

EBF is an important cholera prevention strategy for infants 0- to 6-months old (PAHO 2010). According to the Pan American Health Organization (PAHO), breast-feeding should be advocated as an integral part of cholera prevention efforts. Immune factors against cholera are present in the breast milk of mothers who have contracted the disease, and breast-feeding can enhance infants' immune systems. There are also benefits among mothers who have not contracted the disease, as EBF eliminates the risks associated with consuming contaminated water, either directly or mixed with baby formula (PAHO 2010).

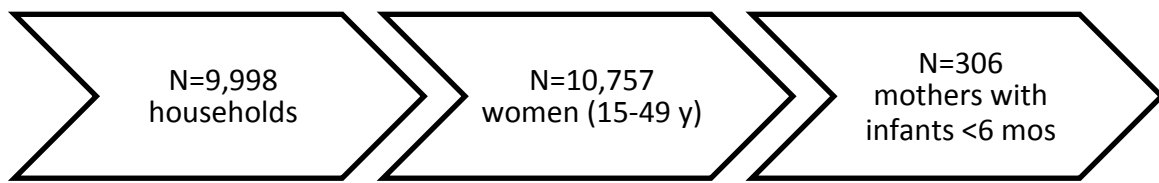
The aim of this study is to analyze the data collected by the Haitian 2005/2006 DHS Survey to examine determinants of EBF among 0- to 6-month old infants in Haiti. There is a scarcity of studies examining EBF determinants in Haiti. In order to effectively promote EBF in the Haitian context, we must understand the determinants associated with and barriers to the practice. In

the current context of the cholera epidemic in Haiti, strategies to promote EBF will be increasingly important.

## **METHODS**

The Haitian 2005/2006 Standard DHS Survey included 9,998 households, with data from 10,747 women of reproductive age (15-49 years). For the purpose of this paper, the sample was limited to respondents who were mothers of 0- to 6-month old infants (n=306) (Figure 2).

**Figure 2: Selection of Study Sample**



### ***Infant feeding practices***

EBF status was determined based on a 24-hour food intake recall of 22 fluids and foods commonly given to infants (Figure 3). Women were asked if, during the 24 hours preceding the interview, they gave breast milk and/or a number of fluids and foods commonly consumed by infants. Food intake data were available for 304 infants. Exclusively breastfed infants (n=122) were defined as those who received breast milk as the sole food source in the 24 hours preceding the interview.

**Figure 3: Infant Fluid and Food Intake Variables for 24-hour Recall**

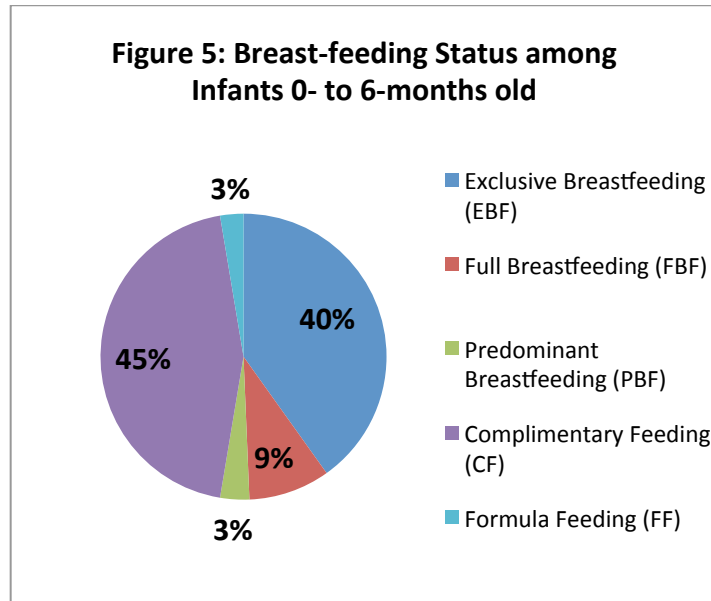
Gave child plain water
Gave child bread, noodles, other made from grains
Gave child potatoes, cassava, or other tubers
Gave child juice
Gave child eggs
Gave child coffee
Gave child meat (beef, pork, lamb, chicken, etc.)
Gave child tinned/powder or fresh milk
Gave child pumpkin, carrots, squash (yellow or orange inside)
Gave child baby formula
Gave child any dark green leafy vegetables
Gave child mangoes, papayas, other vitamin A fruits
Gave child baby cereal
Gave child any other fruits
Gave child other porridge/gruel
Gave child liver, heart, other organs
Gave child other liquid
Gave child fish or shellfish
Gave child Tea/ infusion
Gave child food made from beans, peas, lentils, nuts
Gave child soup
Gave child cheese, yogurt, other milk products

Figure 4 summarizes the criteria for inclusion in the five infant feeding categories, adapted from the WHO criteria to defining infant feeding practices (WHO 2007).

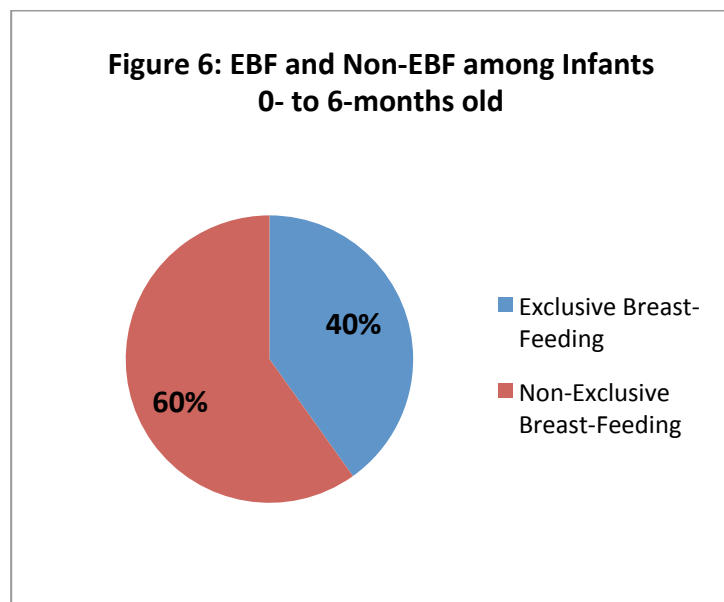
**Figure 4: Criteria for Inclusion in Infant Feeding Categories**

<b>Infant Feeding Category</b>	<b>Definition</b>
Exclusive breast-feeding	Child was given nothing but breast milk in the 24 hours preceding the interview.
Full breast-feeding	Child was given either breast milk alone or breast milk and plain water in the 24 hours preceding the interview.
Predominant breast-feeding	Child was given breast milk, with optionally plain water, water-based liquids (e.g., soft drinks), and/or juices in the 24 hours before the survey. Children given non-breast milk are excluded.
Complementary feeding	Child who were breastfed and given solid or semi-solid foods in the 24 hours before the survey. Children may also be given non-breast milk.
Formula feeding	Child was given formula in the 24 hours before the survey.

Infants who were not EBF were categorized as being fully breastfed (n=28), predominantly breastfed (n=10), complementary-fed, (n=136) or formula-fed (n=8) (Figure 5).



Because of the small sample sizes within the infant feeding categories, EBF infants (n=122) were compared to non-EBF infants (n=182) (Figure 6). Non-EBF status included 0- to 6-month old infants with any breast-feeding (i.e., predominant breast-feeding, full breast-feeding and complimentary-feeding) (n=174) and formula feeding (n=8).



### ***Socioeconomic and demographic characteristics***

Table 1 summarizes household and maternal sociodemographic characteristics. A majority of households were rural (67.2%). Household wealth index was represented by a three-level categorical variable (poorest/poor, middle, and rich/richest). A majority of mothers were categorized as having a wealth index of “poor” or “poorest” (55.6%) with 26.3% of mothers in the middle wealth index and 18.2% in the “rich” or “richest” wealth index. Over one-third of respondents reported that they went hungry in the past 7 days (39%).

A majority of mothers were in the youngest (15-24 years) age category (41.8%), followed by 25-34 years (37.9%) and 35-49 years (20.3%). A majority of mothers also had some primary education (40.5%), however, 31% had no formal education, and only 28.1% had completed primary schooling. A great majority of women were primiparas (63.3%) and married (73.4%). 46.2% of women indicated that the youngest child (i.e., the study child) was a wanted pregnancy. A majority of respondents were not currently working (64.4%) and of those who were currently working or had worked, a great majority indicated that this work was away from the home (73.9%).

**Table 1: Household and Maternal Sociodemographic Characteristics**

	<b>All</b>		<b>EBF</b>		<b>P-Value</b>
	<b>N</b>	<b>%</b>	<b>n</b>	<b>%</b>	
<b>Mother/Infant pairs</b>	305	100	122	100	
<b>Mother</b>					
Age, y					0.112
15-24	128	41.8	46	36.2	
25-34	116	37.9	55	47.4	
35-49	62	20.3	21	33.9	

Education					0.722
None	96	31.4	39	40.6	
Some primary	124	40.5	52	41.9	
Completed primary	86	28.1	31	36.5	
Wealth Index					<b>0.03</b>
Poor/Poorest	165	55.6	75	45.5	
Middle	78	26.3	28	35.9	
Rich/Richest	54	18.2	14	25.9	
Place of Residence					0.455
Urban	100	32.8	43	43	
Rural	205	67.2	79	38.5	
Parity					0.592
1 infant	193	63.3	75	38.9	
>1	112	36.7	47	42	
Respondent went hungry in past 7 days					0.924
Yes	119	39	48	40.3	
No	186	61	74	39.8	
Wanted last child (study child)					0.59
Wanted then	141	46.2	56	45.9	
Wanted later	79	25.9	35	28.7	
Wanted no more	85	27.9	31	25.4	
Respondent currently working					0.097
Yes	108	35.6	36	33.3	
No	195	64.4	84	43.1	
Works at home or away					0.6
Home	42	26.1	16	33.6	
Away	119	73.9	40	38.1	
Marital Status					0.071
Married	224	73.4	81	36.2	
Cohabitational	56	18.4	29	51.8	
Not married	25	8.2	12	48	
Maternal BMI, kg/m <sup>2</sup>					<b>0.037</b>
Underweight (<20)	75	24.5	34	45.3	
Normal weight (20 to <25)	176	57.9	67	38.1	
Overweight (25 to <30)	40	13.1	20	50	
Obese (≥30)	13	4.2	1	7.7	

<sup>a</sup>T-Test for equality of means

<sup>b</sup>Missing data for 242 infant observations (n=64)

Table 2 summarizes the sociodemographic, birth and early feeding characteristics of the household and maternal population. The mean infant age was  $2.77 \pm 1.62$  months. EBF infants were significantly younger than non-exclusively breastfed infants ( $p < .001$ ). A great majority of infants were delivered in the home (75.2%) and were vaginal births (97.4%). Regarding infant feeding characteristics, 54.3% of infants received timely initiation of breast-feeding (TIBF), i.e., breast-feeding was initiated within 1 hour post-delivery. Prelacteal feeds were given to 30.7% of infants, the majority of which were milk-based (20.9%) versus water-based (9.8%).

**Table 2: Infant Sociodemographic, Birth, and Early Feeding Characteristics**

	<b>N</b>	<b>All</b> <b>%</b>	<b>n</b>	<b>EBF</b> <b>%</b>	<b>P-Value</b>
<b>Mother/Infant pairs</b>	305		122		
<b>Infant</b>					
Age <sup>a</sup>	305	2.77 ± 1.612			<b>&lt;.001</b>
EBF			122	2.2±1.65	
Non-EBF			183	3.15±1.48	
Sex					0.135
Male	156	51.1	51	35.9	
Female	149	48.9	66	44.3	
Birthweight, kg <sup>b</sup>					0.279
<2.5	13	79.7	20	39.2	
≥2.5	51	20.3	3	23.1	
Place of delivery					<b>0.018</b>
Home	230	75.2	101	43.9	
Public/Private facility	72	23.5	20	28.2	
Caesarian birth					
Yes	8	2.6	6	3.3	0.38
No	297	97.4	2	25	
Prelacteal feeds					<b>&lt;.001</b>
Nothing	207	67.6	108	52.2	
Water-based	30	9.8	8	26.7	
Milk-based	64	20.9	6	9.5	
Breast feeding initiation					<b>0.04</b>
Ref: ≤1 hour	163	54.3	75	46	
>1 hour	137	45.7	47	34.4	



Infant weight <sup>a</sup>	305	5.46±1.55			<b>0.008</b>
EBF			121	5.17±1.57	
Non-EBF			183	5.66±1.52	
Infant height <sup>a</sup>	303	58.12 ± 5.89			<b>&lt;.001</b>
EBF			121	56.25±5.84	
Non-EBF			181	59.42±5.58	

<sup>a</sup>T-Test for equality of means

<sup>b</sup>Missing data for 242 infant observations (n=64)

### ***Maternal and infant anthropometry***

While a majority of mothers were normal weight (57.9%), an alarming 24.5% were underweight, while only a small proportion were overweight (13.1%) and obese (4.2%). The mean infant weight (kg) was  $5.46 \pm 1.55$  and height (cm) was  $58.12 \pm 5.89$ . EBF infants weighed significantly less ( $p=.008$ ) and were significantly shorter ( $p<.001$ ) than non-EBF infants. Birth weight data was available for 64 infants out of the entire sample population ( $n=306$ ). Of those infants with available birth weight data, 20.3% of were classified as low birth weight (LBW) ( $<2.5\text{kg}$ ).

### ***Statistical analysis***

The Statistical Package for the Social Sciences (SPSS) was used for all univariate, bivariate, and multivariate analyses. Bivariate chi-square test analysis examined the association of socioeconomic and demographic categorical covariates, and maternal anthropometric categorical covariates with EBF (yes, no). The t-test for equality of means was used to analyze infant anthropometric covariates for continuous variables. Backward stepwise multivariate logistic regression was conducted to examine the independent association of maternal and infant covariates with EBF. Covariates associated with EBF at a level of  $p \leq 0.20$  were included in

the multivariate analyses. Results of the logistic regression analysis from the reduced model are expressed as adjusted odds ratios (ORs) with respective 95% Confidence Intervals (CIs) and were deemed significant if the 95% CI excluded 1. The Hosmer and Lemeshow test was used to determine model fit. Results reported in this paper were conducted using un-weighted data. All statistical analyses performed in this study were conducted with both un-weighted data and weighted data and compared to verify consistency of results.

## **RESULTS**

### ***Population characteristics***

Eight independent variables, including wealth index, maternal BMI, infant age, place of delivery, prelacteal feeds, breast-feeding initiation, infant weight and infant height, were significantly associated with EBF ( $p < 0.05$ ). Non-significant associations were observed for four independent variables, including maternal age, maternal employment status, maternal marital status and infant sex ( $p \leq 0.20$ ). Ten of the twelve independent variables were included in the multivariate model. Infant height and infant weight were excluded as they are usually considered outcome variables rather than predictive variables.

### ***Factors associated with EBF***

After adjusting for sociodemographic covariates, five variables were included in the reduced model. Prelacteal feeds ( $p < .001$ ), infant age ( $p < .001$ ), place of delivery ( $p = .002$ ), and marital status ( $p = .038$ ) were significantly associated with EBF among 0- to 6- month old infants (Table

3). The association between maternal BMI and EBF did not reach statistical significance (p=.119).

**Table 3: Association of Maternal, Infant, Birth and Early Feeding Characteristics with EBF**

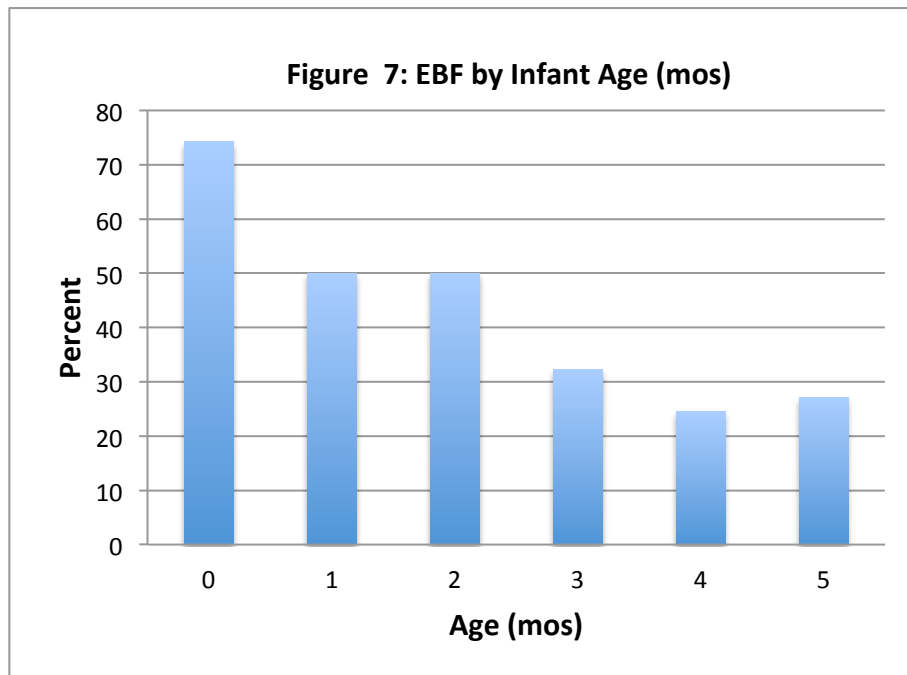
Variable	n	Full Model <sup>a</sup>		Reduced Model <sup>b</sup>	
		Crude OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Wealth Index					
Ref: Poor/Poorest	165		0.129		
Middle	78	0.55 (.27, 1.13)	0.105		
Rich/Richest	54	0.46 (.18, 1.16)	0.098		
Age, mother					
Ref: 15-24	128		0.107		
25-34	116	2.07 (1.01, 4.22)	<b>0.047</b>		
35-49	62	1.2 (.50, 2.87)	0.683		
Breast feeding initiation					
Ref: ≤1 hour	163				
>1 hour	137	0.74 (.41, 1.36)	0.333		
Marital Status					
Ref: Married	224		<b>0.043</b>		<b>0.038</b>
Cohabitational	56	2.82 (1.23, 6.45)	<b>0.014</b>	2.47 (1.16, 5.23)	<b>0.019</b>
Not married	25	1.86 (.61, 5.63)	0.274	2.12 (.75, 5.96)	0.157
Maternal BMI, kg/m <sup>2</sup>					
Underweight (<20)	75	2 (.96, 4.16)	0.065	1.87 (.93, 3.77)	0.078
Ref: Normal weight (20 to <25)	177		0.144		0.119
Overweight (25 to <30)	40	1.69 (.70, 4.09)	0.244	1.89 (.81, 4.41)	0.143
Obese (≥30)	13	0.33 (.03, 3.316)	0.343	0.33 (.04, 2.95)	0.322
Respondent currently working					
Ref: No	196				
Yes	108	0.67 (.36, 1.28)	0.228		
Sex, infant					
Ref: Male	156				
Female	150	1.7 (.92, 3.11)	0.089		
Place of delivery					
Ref: Home	230				
Public/Private facility	72	0.47 (.21, 1.05)	0.065	0.33 (.16, .67)	<b>0.002</b>
Prelacteal feeds					
Ref: Nothing	207		<b>&lt;.001</b>		<b>&lt;.001</b>
Water-based	30	0.31 (.12, .81)	<b>0.016</b>	0.32 (.23, .82)	<b>0.017</b>
Milk-based	64	0.08 (.03, .22)	<b>&lt;.001</b>	0.08 (.03, .21)	<b>&lt;.001</b>

Age, infant					
Ref: 0 months	31		<b>&lt;.001</b>		<b>&lt;.001</b>
1 mo	46	0.42 (.13, 1.38)	0.151	0.38 (.12, 1.24)	0.109
2 mos	54	0.44 (1.35, 1.42)	0.168	0.45 (.14, 1.42)	0.171
3 mos	66	0.22 (.07, .70)	<b>0.01</b>	0.22 (.07, .69)	<b>0.009</b>
4 mos	49	0.13 (.04, .45)	<b>0.001</b>	0.13 (.04, .44)	<b>0.001</b>
5 mos	60	0.11 (.33, .36)	<b>&lt;.001</b>	0.1 (.03, .32)	<b>&lt;.001</b>

<sup>a</sup> Hosmer and Lemeshow Test p=.553 (chi-square=6.849, df=8)

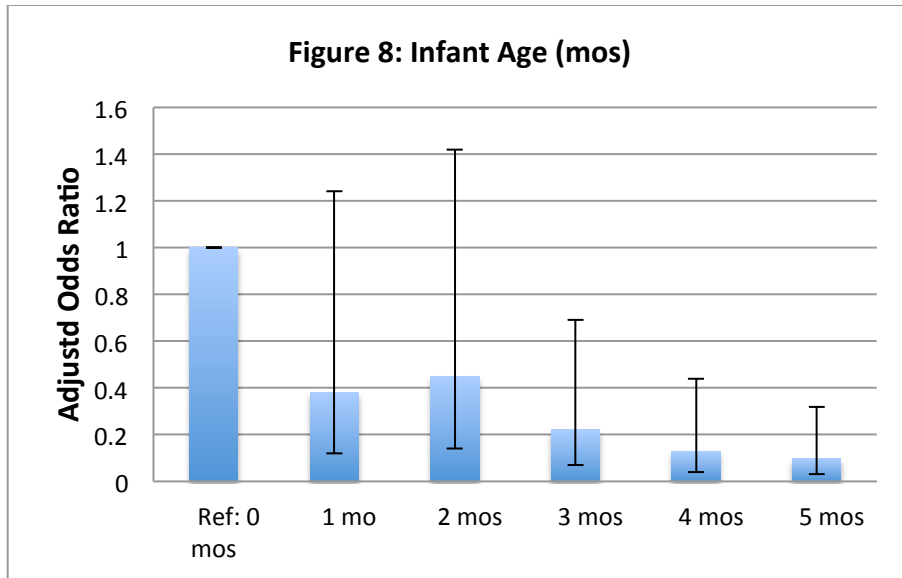
<sup>b</sup> Hosmer and Lemeshow Test p=1.000 (chi-square=.656, df=8)

Infant age was inversely associated with EBF. The rate of EBF ranged from 74.19% at 0 months to 27.12% at 5 months (Figure 7).

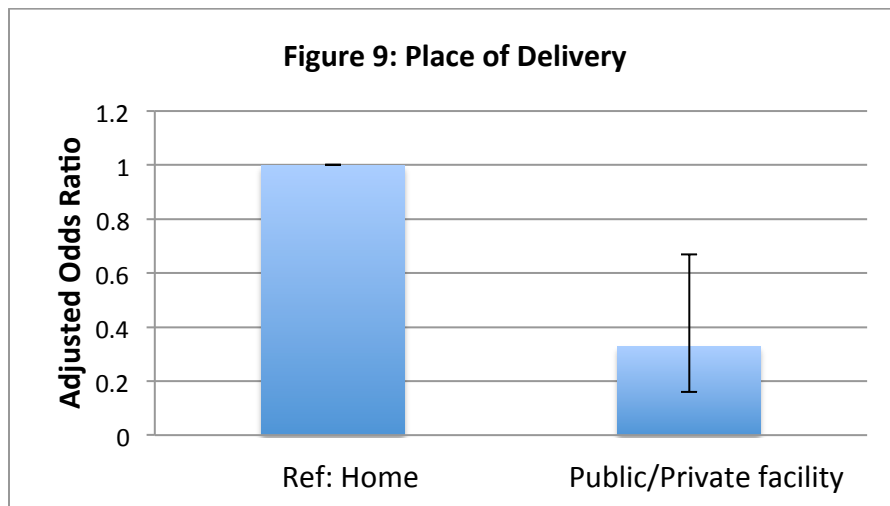


Figures 8 through 12 depict the adjusted odds ratios (ORs) of the five variables included in the reduced model. Error bars represent the 95% confidence intervals (CI) around the adjusted ORs.

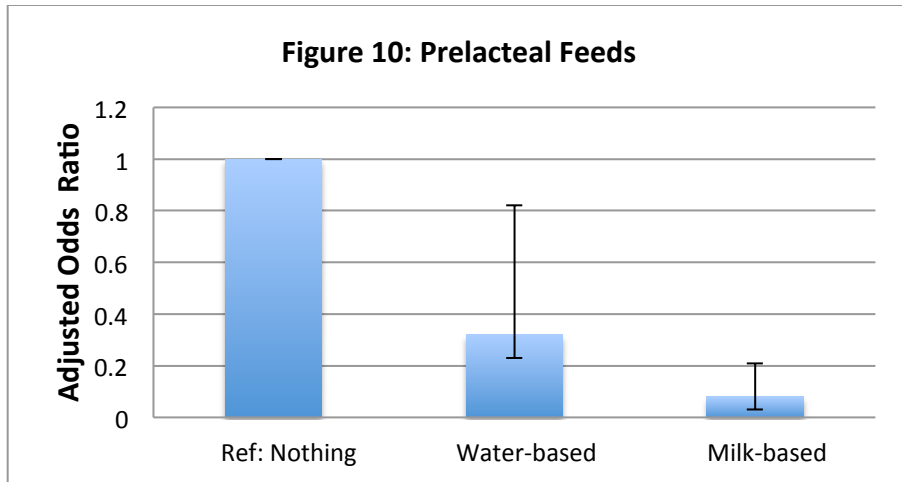
Figure 8 compares the adjusted ORs of EBF stratified by infant age in months. Using the zero months age category as the reference group, infants at who were one, two, three, four and five months all had a decreased odds of EBF.



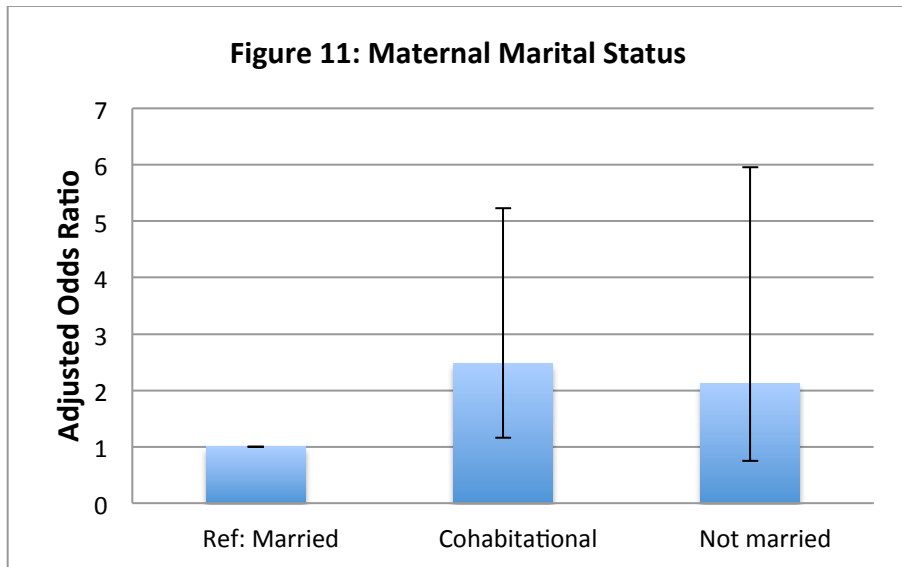
Infants delivered in a public or private facility were 67% less likely to be exclusively breast-fed than infants delivered in the home ( $p=.002$ ) (Figure 9).



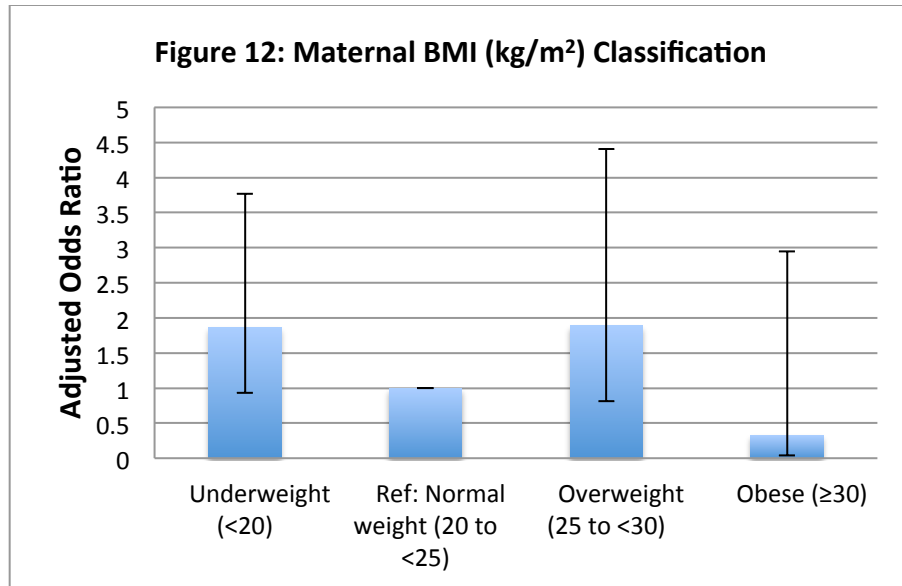
Prelacteal feeds (water-based and milk-based) were inversely associated with exclusive breastfeeding (Figure 10). Compared to infants who were given no prelacteal feeds, infants given water-based prelacteal feeds were 68% less likely to be exclusively breastfed (OR=0.32;  $p=0.017$ ). Infants given milk-based prelacteal feeds were 92% less likely to be exclusively breastfed than infants who were given no prelacteal feeds (OR=0.08;  $p<001$ ).



Maternal marital status was found to be associated with exclusive breast-feeding. Compared to mothers who report being married, mothers who were cohabitational with their partners and mothers who were not married were more than twice as likely to have EBF infants (OR=2.47; OR=2.12) (Figure 11).



Our findings indicate that Maternal BMI may play a role in mothers' likelihood to breast-feed exclusively, however the findings were not significant at the  $p=.05$  level ( $p=.138$ ) (Figure 12).



A majority of mothers in our sample were normal weight (BMI 20 to <25 kg/m<sup>2</sup>) (58.03%). Both underweight (BMI <20 kg/m<sup>2</sup>) and overweight mothers (BMI 25 to <30 kg/m<sup>2</sup>) were more likely to exclusively breast-feed their infants than normal weight women (OR=1.87; OR=1.89) (Figure 11). Obese women (BMI ≥30 kg/m<sup>2</sup>), however, were 67% less likely to practice exclusive breast-feeding than normal weight women (OR=0.33). Because of the small samples size of obese women (n=13; 4.2%) the lack of a statistical association should be interpreted with caution. However, this finding is consistent with the literature indicating an association between maternal obesity and lower rates of both EBF and any breast-feeding rates (Amir 2007).

## DISCUSSION

The finding that prelacteal feeds are negatively associated with breast-feeding outcomes is consistent with previous literature (Pérez-Escamilla et al. 1996). This finding suggests that women who initiate the practice of giving prelacteal foods are likely to continue this practice and end up with poor breast-feeding practices. The timing of milk arrival plays an important

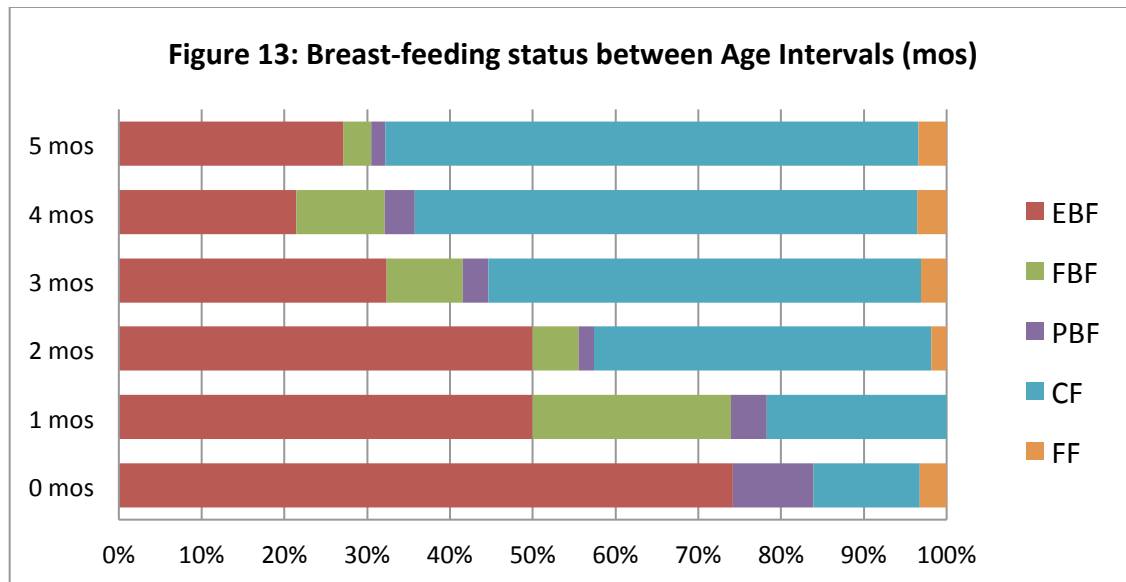
role in women’s likelihood to give prelacteal feeds. Causes of delayed onset of lactation should be considered when promoting TIBF (i.e., within one hour of birth) and discouraging the practice of giving prelacteal feeds.

Our finding that infants delivered in a public or private facility are less likely to be exclusively breast-feed than infants born at home can be explained within the Haitian context. A majority of infants in our sample were homebirths (75.2%). In 1991, the United Nations Children’s Fund (UNICEF) and WHO launched the Baby-Friendly Hospital Initiative (BFHI) in an effort to ensure that all maternity facilities become centers of breast-feeding support (UNICEF 2002). A maternity facility can be designated “baby-friendly” when it does not accept free or low-cost breast-milk substitutes, feeding bottles or teats, and has implemented 10 specific steps to support successful breast-feeding (Appendix A). Most recent statistics indicate that Haiti had only five facilities designated as “baby-friendly” (UNICEF 2002). According to PAHO (2000), there were 49 functional hospitals in Haiti as of the year 2000; therefore only about 10% of hospitals in Haiti were designated as baby-friendly facilities (Appendix B). Lower rates of EBF among infants born in public and private facilities could be explained by the lack of infrastructure and commitment to providing a baby-friendly environment for mothers and infants in Haitian hospitals. In addition, it is possible that women with higher risk pregnancies are more likely to give birth in a public or private facility than in the home. High-risk pregnancies may be a potential confounder in the relationship between hospital births and exclusive breast-feeding.



In our sample, obese women were more than two-thirds less likely to EBF than normal weight women (OR=.33). Our findings emphasize the potential for rising global obesity rates to negatively impact rates of EBF among Haitian women. The obesity rate in Haiti is low compared to both regional and global averages. Among adults (>20 years), there is an 8.4% obesity rate among both men and women (WHO 2012). The regional average is 23.5% (men) and 29.7% (women) (WHO 2012). However, lower rates of exclusive breast-feeding will continue to be a growing concern as the nutritional transition reaches Haiti and obesity rates increase.

Our finding of a significant association between infant age and exclusive breast-feeding is consistent with the literature. Older infants in our sample were less likely to be EBF than younger infants. Figure 13 depicts the proportion of EBF, predominant breast-feeding, full breast-feeding, complementary feeding and formula feeding within each infant age category. Rates of complementary feeding rose significantly between months, with a particularly drastic increase between months 1 and 2(Figure 13). This data suggests that breast-feeding education should be included in post-natal visits to encourage exclusive breast-feeding beyond the first months of life.



The statistically significant inverse association between being married and EBF was unexpected. Our findings suggest that women who are cohabitational with their partners and women who are unmarried are more than twice as likely to exclusively breast-feed than married women (OR=2.12 and OR=2.47, respectively). Previous literature shows that being a single mother was a risk factor for premature termination of exclusive breast-feeding (Pérez-Escamilla et al. 1996). More research is needed to examine the role of intimate partner, family and social support in improving rates of exclusive breast-feeding in Haiti.

**Limitations**

The DHS Survey collects cross-sectional data, providing information for a specific point in time. The data can give no indication of sequence of events and therefore cannot account for maternal infant feeding intentions. An additional limitation is that the survey relies on maternal report, and can therefore be subject to response bias as previously suggested by Pérez-Escamilla et al. (1996) based on data from a sample of women from Honduras. Furthermore,

despite being a nationally-representative survey, the sample size of mother-infant pairs was small (n=306). This study only considers the youngest child in the household, and does not include recall data about children who are older than 6-months. This study only considers infants 0- to 6-months old and does not look at older study children.

### ***Conclusion***

This study concludes that infant age, prelacteal infant feeding, place of delivery, maternal marital status, and maternal BMI are important factors to consider when developing policies and programs to promote EBF among mothers of 0- to 6-month old infants in Haiti. Resources should be directed toward developing more effective policies to increase rates of EBF in Haiti. More research is needed to establish best practices for the promotion of EBF among infants 0- to 6-months old in Haiti.

## REFERENCES

- Amir, L.H. & Donath, S. (2007). A systematic review of maternal obesity and breast-feeding intention, initiation and duration. *BMC Pregnancy Childbirth*, January 1, 2007; 7: 9.
- CIA World Factbook (2012) Haiti Cholera Outbreak. Retrieved April 3, 2012 from CDC website: <https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html>
- CDC (2012) Haiti. Retrieved January 30, 2012 from CIA website: <http://www.cdc.gov/haiticholera/>
- DHS (2012). DHS Overview. Retrieved March 3, 2012 from DHS website: <http://www.measuredhs.com/What-We-Do/Survey-Types/DHS.cfm>.
- Kramer, M.S. & Kakuma, R. (21 January 2009). Optimal duration of exclusive breast-feeding. Retrieved January 30, 2012 from WHO website: [http://whqlibdoc.who.int/hq/2001/WHO\\_NHD\\_01.08.pdf](http://whqlibdoc.who.int/hq/2001/WHO_NHD_01.08.pdf).
- Monteiro CA, Conde WL, Lu B, and Popkin BM (2004). Obesity and inequities in health in the developing world. *International Journal of Obesity* 28:1181–1186.
- PAHO (18 November 2010). Breast-feeding Helps Protect Babies from Cholera. Retrieved January 30, 2012 from PAHO website: <http://new.paho.org/blogs/haiti/?p=1240>.
- PAHO (2000). Number of Hospitals by Department, Haiti. Retrieved April 14, 2012 from PAHO website: [www.paho.org/english/dd/ped/Health\\_institutions.ppt](http://www.paho.org/english/dd/ped/Health_institutions.ppt)
- Pérez -Escamilla, R., Segura-Millan, S., Pillitt, E. & Dewey, K.G. (1993). Determinants of lactation performance across time in an urban population from Mexico. *Soc. Sci. & Med.* 37: 1069-1078.
- Pérez-Escamilla, R., Lutter, C., Segall, A.M., Treviño-Siller, S., Rivera, and Sanghvi, T. (1995). Exclusive breast-feeding duration is associated with attitudinal, socioeconomic and biocultural determinants in three Latin American countries. *J Nutr* 125:2972-2984
- Pérez-Escamilla, R., Segura-Millán, S., Canahuati, J. and Allen, H. (1996). Prelacteal feeds are negatively associated with breastfeeding outcomes in Honduras. *J Nutr* 126:2765-2773
- Popkin, B.M, Bllsborrow, R.E., Akin, S.A., & Yamamoto, M.E. (1983) Breastfeeding determinants in low-income countries. *Med. Anthropol.* 7: 1-31.
- Popkin BM (2002). An overview on the nutrition transition and its health implications: the Bellagio meeting. *Public Health Nutrition* 5(1A):93–103.

Popkin BM (2004). The nutrition transition: an overview of world patterns of change. *Nutrition Reviews* 62(7 Pt 2): S140–143. view PDF version

Popkin BM and Gordon-Larsen P (2004). The nutrition transition: worldwide obesity dynamics and their determinants. *International Journal of Obesity* 28 Suppl 3: S2–9. view PDF version

StatCompiler (2012). Retrieved March 3, 2012 from MeasureDHS website:  
<http://www.statcompiler.com/>

UNICEF (2002). The Baby Friendly Hospital Initiative (BFHI). Retrieved April 1, 2012 from UNICEF website: <http://www.unicef.org/programme/breastfeeding/baby.htm>.

United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (2012). Haiti: Two years after the devastating earthquake. Retrieved April 1, 2012 from the OCHA website: <http://www.unocha.org/top-stories/all-stories/haiti-two-years-after-devastating-earthquake>.

WHO (2002). Infant and young child nutrition: Global strategy on infant and young child feeding. WORLD HEALTH ORGANIZATION FIFTY-FIFTH WORLD HEALTH ASSEMBLY A55/15 Provisional agenda item 13.10. Retrieved March 3, 2012 from WHO website: [http://apps.who.int/gb/archive/pdf\\_files/WHA55/ea5515.pdf](http://apps.who.int/gb/archive/pdf_files/WHA55/ea5515.pdf).

WHO (February 2012). 10 Facts about Breast-Feeding. Retrieved March 3, 2012 from WHO website: <http://www.who.int/features/factfiles/breast-feeding/en/index.html>.

WHO (4 April 2011). Haiti Health Profile. Retrieved March 3, 2012 from WHO website: <http://www.who.int/gho/countries/hti.pdf>

WHO (2007) Indicators for assessing infant and young child feeding practices. Retrieved March 3, 2012 from WHO website: [http://whqlibdoc.who.int/publications/2008/9789241596664\\_eng.pdf](http://whqlibdoc.who.int/publications/2008/9789241596664_eng.pdf)

## APPENDICES

### Appendix A: Ten Steps to Successful Breast-Feeding (UNICEF 2002)

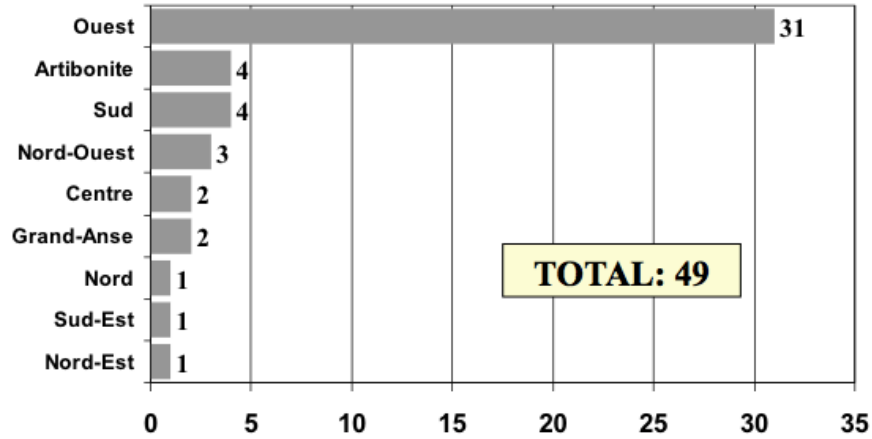
#### Ten steps to successful breastfeeding

- Have a written breastfeeding policy that is routinely communicated to all health care staff.
- Train all health care staff in skills necessary to implement this policy.
- Inform all pregnant women about the benefits and management of breastfeeding.
- Help mothers initiate breastfeeding within one half-hour of birth.
- Show mothers how to breastfeed and maintain lactation, even if they should be separated from their infants.
- Give newborn infants no food or drink other than breastmilk, unless medically indicated.
- Practice rooming in - that is, allow mothers and infants to remain together 24 hours a day.
- Encourage breastfeeding on demand.
- Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
- Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Appendix B: Number of Hospitals by Department, Haiti (PAHO 2000)



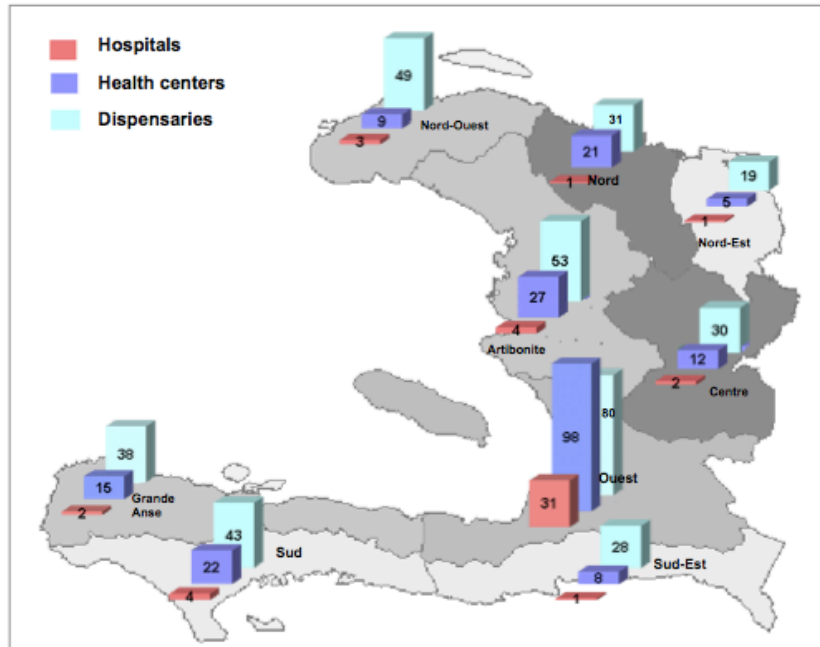
Number of hospitals by department, Haiti



Analyse de la Situation Sanitaire. Haïti 1998 MSPP-OPS/OMS



Number of health institutions by department, Haiti, 2000



PAHO/WHO 2000