Available online at www.sciencedirect.com

ScienceDirect

www.nrjournal.com



CrossMark

Breast-, complementary and bottle-feeding practices in Kenya: stagnant trends were experienced from 1998 to 2009

Dennis J. Matanda^a, Maurice B. Mittelmark^{a,*}, Dorcus Mbithe D. Kigaru^b

^a Department of Health Promotion and Development, University of Bergen, Bergen, Norway ^b Department of Foods, Nutrition and Dietetics, Kenyatta University, Nairobi, Kenya

ARTICLEINFO

Article history: Received 11 February 2014 Revised 23 May 2014 Accepted 26 May 2014

Keywords: Breastfeeding Complementary feeding Bottle-feeding Kenya Demographic and Health Survey

ABSTRACT

The pattern of infant and young child feeding that provides the most benefit includes being put to the breast within an hour of birth, exclusive breastfeeding for 6 months, continued breastfeeding along with complementary foods up to 2 years of age or beyond, and avoidance of any bottlefeeding. However, since there are no published data from Kenya regarding trends in these feeding practices, this research undertook time trend estimation of these feeding practices using the 1998, 2003, and 2008-2009 Kenya Demographic and Health Survey and also examined the multivariate relationships between sociodemographic factors and feeding practices with data from 2008 to 2009. Logistic regression was used to test the significance of trends and to analyze sociodemographic characteristics associated with feeding practices. There was a significant decline in early initiation of breastfeeding among children in Central and Western provinces and those residing in urban areas. Trends in exclusive breastfeeding showed significant improvement in most sociodemographic segments, whereas trends in complementary feeding and breastfeeding remained stable. Bottle-feeding significantly decreased among children aged 12 to 23 months, as well as those living in Coast, Eastern, and Rift Valley provinces. In the multivariate analysis, the province was significantly associated with feeding practices, after controlling for child's size, birth order, and parity. The stagnant (and in some cases worsening) trends in early initiation of breastfeeding and complementary feeding with breastfeeding paint a worrisome picture of breastfeeding practices in Kenya; therefore, efforts to promote the most beneficial feeding practices should be intensified.

© 2014 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/3.0/).

1. Introduction

Over the years, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) have recognized breastfeeding as the most cost-effective, health-promoting, and disease-preventing strategy across the globe [1,2]. Given the overwhelming evidence of the importance of breastfeeding in reducing child mortality and morbidity, especially in developing countries, breastfeeding remains at the core of achieving millennium development goals 4 and 5 [3]. Unfortunately

http://dx.doi.org/10.1016/j.nutres.2014.05.004



Abbreviations: CI, 95% confidence interval; DHS, Demographic and Health Survey; KDHS, Kenya Demographic and Health Survey; OR, odds ratio; UNICEF, United Nations Children's Fund; WHO, World Health Organization.

^{*} Corresponding author. Department of Health Promotion and Development, University of Bergen, P.O. Box 7807, NO-5020, Christiesgt. 13, Bergen, Norway. Tel.: +47 55 58 32 51; fax: +47 55 58 98 87.

E-mail address: Maurice.Mittelmark@iuh.uib.no (M.B. Mittelmark).

^{0271-5317/© 2014} The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/3.0/).

though, 1.4 million child deaths and a further 44 million disability-adjusted life years experienced in low-income and middle-income countries are attributable to suboptimal breastfeeding [4].

The benefits of breastfeeding to the health and development of the child as well as the mother have been well documented [5-9]. Research reviews have highlighted various physical, motor, cognitive, and psychosocial advantages that breast milk offers to the child [7,9]. Breast milk boosts a child's immune system through protection from infection, it is a protective factor against obesity and other adult diseases such as diabetes and hypertension, and it saves money that might be used in buying breast milk substitutes. High child malnutrition rates and poor living environments characterized by unhygienic conditions and contaminated drinking water are common in developing countries. These conditions increase the risk of child infection, thus exacerbating the negative effects of not breastfeeding [3,7,10]. Breastfeeding enhances the bond between the child and mother, a prerequisite for normal child development. Furthermore, breastfeeding mothers enjoy benefits such as reduced postpartum bleeding, early uterine involution, delayed resumption of the menstrual cycle (and hence birth spacing), reduced risks of breast and endometrial cancer, and lessened risk of bone remineralization (which in turn reduces the risk of hip fractures in older age).

The global strategy for infant and young children feeding provides the roadmap toward achieving optimal child feeding practices [2]. The Kenyan government has adopted this strategy, and breastfeeding is among 11 prioritized high-impact nutrition interventions for child survival and development [11]. Among other guidelines, it is recommended that the newborn has skin-to-skin contact with the mother and start breastfeeding within 1 hour after birth [12]. This practice helps in bonding the dyad, stimulates production of colostrum milk that has high immunological benefit to the child, and also aids contraction of the mother's womb for faster expulsion of the placenta and reduced risk of heavy bleeding. Children are expected to be exclusively breastfed for 6 months and, thereafter, receive adequate complementary foods with continued breastfeeding for 2 years or beyond. Feeding a child using a bottle with a teat is highly discouraged because it endangers the baby's health and survival through contamination and interference with breastfeeding establishment [12].

Despite improvements in breastfeeding at the national level in developing countries, there are fears of decline in certain sociodemographic segments, especially among mothers in urban areas and of higher socioeconomic status [13,14]. It is also evident that breastfeeding practices in sub-Saharan Africa vary from country to country, and within countries [14,15]. Numerous cross-sectional studies have been undertaken on breastfeeding practices in Kenya [16-18], but long-term trends are not yet documented. To fill this gap, an aim of this study was to examine trends in early initiation of breastfeeding at 0 to 23 months of age, exclusive breastfeeding at 0 to 5 months of age, complementary feeding and breastfeeding at 6 to 23 months of age, and bottle-feeding at 0 to 23 months of age, using measures and definitions recommended by WHO [19]. To provide details at the levels of subgroups and subnational areas, the trends estimations were disaggregated by child's sex, child's age, province,

residence, maternal education, household wealth, maternal literacy, and media exposure.

A second aim was to examine multivariate relationships between sociodemographic factors and feeding practices with data from 2008 to 2009, the most recent available data. The health promotion conceptual model guiding this analysis is UNICEF's social-ecological model of child care, as further specified by Engle et al [20]. Child feeding practices are in focus in this analysis, as well as a critical part of a cluster of mother/child dyad care behaviors, including care for mother, child psychological and social stimulation, home hygiene practices, home health care practices, and food preparation and storage practices. To facilitate a manageable analysis, only the feeding practices "early initiation of breastfeeding," "exclusive breastfeeding the first 6 months," "complementary feeding and breastfeeding at 6 to 23 months," and "bottle feeding at 0 to 23 months" are included as endpoints. The relationships of these 4 feeding practices were examined with respect to 2 clusters of independent variables that are specified in the UNICEF model: resources for care (eg, maternal education) and contextual factors (eg, urban-rural setting). By specifying and focusing on resources for care, the analysis was guided by an unequivocal health promotion perspective, contra a disease promotion perspective, in which risk factors have a more prominent place than do protective factors.

2. Methods and materials

2.1. Data sources

The study used data from the Kenya Demographic and Health Survey (KDHS), which is publicly available [21]. The 1998, 2003, and 2008-2009 KDHS datasets used in this study are from nationally representative household surveys that collected data on maternal, paternal, and child demography, health, and nutrition. For each survey, the KDHS used a two-stage cluster sampling design whereby enumeration areas (clusters) were first drawn from a national master sample frame. Thereafter, a sample of households was drawn from the selected clusters using systematic sampling methods. Women aged 15 to 49 years and men aged 15 to 54 years from the sampled households were interviewed using specific questionnaires for women and men, following an enumeration of all household inhabitants. The interview questionnaires were based on model Demographic and Health Survey (DHS) questionnaires that underwent slight adjustments to reflect relevant issues in Kenya and conducted through a consultative process with technical institutions, government agencies, and local and international organizations. The number of households sampled were 8380 in 1998, 8561 in 2003, and 9057 in 2008 to 2009, with a response rate to the women's questionnaire (from which all the data used in this study were obtained) of greater than 96% in all surveys [22-24]. To enhance data quality, DHS conducted rigorous training for its data collection fieldworkers, and data management was closely supervised at all stages [25].

The 4 cross-sectional datasets from each survey year were merged into a single file to enable trend estimation. To compare the prevalence of breastfeeding practices, the study used identical questions asked across the 3 surveys. From each household with a child aged 0 to 23 months, the data from the mother and her youngest child were used. The unweighted sample sizes were 2235 mother-child pairs in 1998, 2141 mother-child pairs in 2003, and 2125 mother-child pairs in 2008 to 2009.

2.2. Variables

Using the WHO recommendations for assessing infant and young child feeding practices [19], 2 core indicators (early initiation of breastfeeding and exclusive breastfeeding) and 2 optional indicators (age-appropriate breastfeeding and bottle-feeding) were measured. Early initiation of breastfeeding refers to the proportion of children aged 0 to 23 months who were reported by mothers to have been put to the breast within 1 hour after birth. Exclusive breastfeeding refers to the proportion of infants aged 0 to 5 months who were reported by mothers to have been fed exclusively with breast milk. Age-appropriate breastfeeding is based on mothers' reports and refers to feeding only on breast milk at ages 0 to 5 months and feeding on breast milk as well as solid, semisolid, or soft foods at ages 6 to 23 months (these 2 groups of children are presented independently in this analysis). Bottle-feeding refers to the proportion of children aged 0 to 23 months who were fed with a bottle for at least part of their feeding, also according to mothers' reports [19]. There is evidence that a mother's recall is a valid and reliable method of collecting data on feeding practices, including breastfeeding [26-28].

The analyses of trends in feeding over the 3 surveys were stratified by child's sex and age; province; residence (urban/rural); wealth quintile; and maternal education, literacy, newspaper reading, television watching, and radio listening. Child age categories were 0 to 11 and 12 to 23 months for early initiation of breastfeeding, and 0 to 5, 6 to 11, and 12 to 23 months for bottlefeeding [19]. Provincial stratification was restricted to 7 provinces: Nairobi, Central, Coast, Eastern, Nyanza, Rift Valley, and Western. The North-Eastern province was not included because data were not collected in this province during the 1998 survey. Stratification by wealth was by quintiles (richest, richer, middle, poorer, and poorest) constructed using household asset data through principal component analysis [29]. Other variables were categorized as shown in the Tables. Some information was lost in some of the categorization decisions, for example, maternal occupation, which we group in 3 categories. The standard DHS occupational classification uses 7 categories, which we collapsed into 3 categories because of very low numbers in some of the 7 categories.

2.3. Statistical analyses

Analyses were conducted using SPSS for Windows version 19. Logistic regression was used to test for linear trends (slope) in the prevalence of early initiation of breastfeeding, exclusive breastfeeding, complementary feeding and breastfeeding, and bottle-feeding. The regression equation:

 $log(p/1-p) = \beta 0 + \beta \text{ survey year} \cdot \text{survey year}$

was used to test the significance of the slope (the null hypothesis was that the regression coefficient β for survey year was not significantly different from zero).

To study associations between breastfeeding practices and sociodemographic variables in the most recent data available (2008–2009), bivariate analyses were conducted using either χ^2 or Student's t test, depending on a sociodemographic variable's level of measurement. Logistic regression was then used, including sociodemographic variables having significant bivariate associations (P < .05) with the feeding variables. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. Because of the multistage sampling design used in the collection of data, all analyses were weighted with DHS sample weights, and the sampling design (clusters and strata) was accounted for [25].

3. Results

Characteristic of the 3 samples are shown in Table 1.

3.1. Trends in early initiation of breastfeeding, exclusive breastfeeding, complementary feeding and breastfeeding, and bottle-feeding

In the text below, the F tests are from the regression analyses for linear trend. In the analyses of early initiation of breastfeeding, there was little change for either girls or boys over the course of the study (Table 2). There was great variability between provinces in each survey year and between survey years within provinces. Beside posting the

Table 1 – Sample distr practices, and demogra	ibutio phic c	n by harac	surve teristi	ey yea cs	ır, fee	eding	
	KE 19	0HS 998	KE 20	0HS 003	KDHS 2008-09		
	%	n	%	n	%	n	
Feeding practices							
Early initiation of beastfeeding	54.5	1073	48.7	997	54.9	1156	
Exclusive breastfeeding	16.6	71	14.6	82	38.1	173	
Complementary feeding and breastfeeding	81.9	1248	83.7	1288	78.8	1245	
Bottle-feeding	22.3	446	22.4	468	19.7	427	
Sex							
Male	55.0	1220	62.7	1334	62.8	1342	
Female	45.0	1015	37.3	807	37.2	783	
Age							
0-5 mo	23.9	525	26.2	566	24.0	533	
6-11 mo	25.8	583	26.8	572	27.2	595	
12-23 mo	50.2	1127	47.0	1003	48.8	997	
Province							
Nairobi	7.2	86	6.1	190	5.8	160	
Central	9.2	188	10.7	278	7.2	166	
Coast	8.2	345	9.1	287	9.8	357	
Eastern	16.2	296	16.4	278	15.4	300	
Nyanza	20.8	370	15.4	288	20.1	432	
Rift Valley	25.4	650	29.0	495	30.2	414	
Western	12.9	300	13.2	325	11.5	296	
Residence							
Urban	19.9	356	18.5	533	19.9	554	
Rural	80.1	1879	81.5	1608	80.1	1571	
Total		2235		2141		2125	

lowest prevalence in all the survey years, the Western province also experienced a significant worsening trend ($F_{1,51} = 5.26$, P < .023). Only Nyanza province recorded a significant improving trend ($F_{1,149} = 25.57$, P < .000). There were limited changes in prevalence stratified by maternal education, maternal literacy, and maternal media exposure, with only children born to mothers who did not listen to the radio at least once a week posting a significant improving trend ($F_{1,663} = 4.50$, P < .034).

Trends in exclusive breastfeeding mostly improved (Table 3). Girls and boys posted significant improving trends ($F_{1,772}$ = 11.16, P < .001) and ($F_{1,772}$ = 15.35, P < .000), respectively. In addition, children in rural areas posted significant improvement ($F_{1,596}$ = 27.15, P < .000). Comparing the richest versus the

poorest groups, both quintiles posted significant improving trends, but the poorest performed better than the richest with its prevalence of exclusive breastfeeding tripling from 1998 to 2008-2009 ($F_{1,213} = 17.96$, P < .000).

There were almost no statistically significant changes in prevalence across the study period in complementary feeding and breastfeeding (Table 4). Only children born to mothers who could read with difficulty posted a significant worsening trend ($F_{1,663} = 4.50$, P < .034).

In the analyses of bottle-feeding (Table 5), the sociodemographic pattern had mostly stable trends and only 1 worsening trend in the Western province ($F_{1,151} = 4.54$, P < .035). Statistically significant improving trends (declines in bottlefeeding) were observed among children aged 12 to 23

Table 2 – Trends in early initiation of breastfeeding (within 1 hour) for children aged 0-23 months									
	KDHS 1998		KDHS 2003		KDHS 2008-2009				
	%	95% CI	%	95% CI	%	95% CI	Grand n	Р	Trend
Total	54.5	51.6-57.4	48.7	45.4-52.0	54.9	50.7-59.0	6253	.842	
Sex									
Female	53.5	49.8-57.2	52.2	48.1-56.3	53.9	48.5-59.3	2525	.924	
Male	55.4	51.6-59.1	46.6	42.9-50.2	55.5	50.9-60.0	3728	.783	
Age									
0-11 mo	54.5	50.7-58.2	47.7	43.8-51.5	53.9	49.3-58.3	3250	.909	
12-23 mo	54.6	50.7-58.4	49.8	45.8-53.9	56.0	50.3-61.5	3003	.671	
Province									
Nairobi	55.1	43.3-66.4	51.4	42.3-60.3	57.9	48.5-66.8	423	.745	
Central	69.3	61.7-76.0	59.6	53.3-65.7	46.3	39.0-53.7	621	.000	Я
Coast	45.4	37.7-53.2	18.9	12.0-28.4	31.8	21.6-44.0	934	.090	
Eastern	62.5	53.4-70.8	59.0	50.9-66.7	69.5	60.0-77.6	848	.261	
Nyanza	40.5	34.4-46.8	46.4	38.8-54.2	62.4	56.5-67.9	1055	.000	7
Rift Valley	65.1	59.2-70.6	60.1	53.5-66.3	61.0	51.4-69.8	1492	.494	
Western	40.3	33.1-48.0	23.7	18.3-30.1	29.3	23.8-35.6	880	.023	Я
Residence									
Urban	59.5	52.9-65.7	46.4	40.7-52.2	45.6	37.3-54.2	1385	.012	Я
Rural	53.3	50.0-56.6	49.2	45.2-53.2	57.2	52.5-61.8	4868	.165	
Wealth index									
Richest	59.0	52.9-64.8	46.9	41.9-51.9	50.9	44.8-56.9	1280	.071	
Richer	60.4	54.5-66.1	53.4	47.6-59.1	55.2	45.8-64.3	1109	.370	
Middle	58.7	53.0-64.1	48.2	42.3-54.1	55.8	47.6-63.7	1146	.567	
Poorer	48.6	43.2-54.0	49.1	42.9-55.3	56.8	48.8-64.5	1256	.090	
Poorest	48.3	41.9-54.7	46.7	39.0-54.6	55.6	48.0-63.0	1462	.138	
Maternal education									
Secondary +	61.9	55.5-67.8	54.6	48.3-60.8	59.9	53.1-66.3	953	.696	
Incomplete secondary	45.5	37.2-54.1	47.0	39.1-55.1	53.5	43.3-63.4	566	.245	
Complete primary	55.6	50.3-60.7	50.1	45.9-54.4	59.2	52.3-65.7	1701	.334	
Incomplete primary	53.0	48.5-57.5	43.4	38.8-48.1	49.2	43.7-54.8	2228	.273	
No education	55.1	46.2-63.7	56.3	43.9-67.9	53.3	41.0-65.3	805	.804	
Maternal literacy									
Reads easily	53.0	49.7-56.4	47.5	44.3-50.7	55.1	50.5-59.7	4049	.385	
Reads with difficulty	56.4	50.5-62.2	50.3	41.4-59.1	60.2	51.8-68.1	923	.554	
Cannot read	57.0	49.7-64.0	51.8	43.4-60.1	48.4	39.3-57.6	1250	.145	
Mother reads newspaper									
Yes	55.7	51.4-60.0	46.2	42.4-50.1	52.9	47.5-58.2	2107	.511	
No	53.9	50.4-57.4	49.9	45.4-54.4	56.0	50.7-61.0	4134	.511	
Mother watches television									
Yes	57.1	51.4-62.7	48.8	44.4-53.3	52.7	47.1-58.2	1786	.445	
No	53.9	50.6-57.3	48.7	44.7-52.7	56.2	51.2-61.0	4447	.525	
Mother listens to radio									
Yes	57.0	53.6-60.3	57.0	53.6-60.3	47.3	44.2-50.4	4633	.645	
No	51.1	46.9-55.3	55.5	47.1-63.6	60.0	52.4-67.2	1610	.034	7

Secondary +, complete secondary and/or higher education; >, significant decreasing trend; >, significant increasing trend based on logistic regression.

Table 3 – Trends in exclusive breastfeeding for children aged 0-5 months											
	KD	HS 1998	KD	HS 2003	KDHS	2008-2009					
	%	95% CI	%	95% CI	%	95% CI	Grand nN	Р	Trend		
Total	16.6	13.0-21.0	14.6	11.4-18.4	38.1	32.0-44.7	1,558	.000	7		
Sex											
Female	15.9	10.8-22.8	9.6	6.0-15.1	38.7	28.5-49.9	565	.001	7		
Male	17.1	12.0-23.7	17.3	13.2-22.3	37.9	29.7-46.8	993	.000	7		
Residence											
Urban	12.9	6.6-23.6	13.5	8.2-21.4	24.8	16.9-34.9	357	.071			
Rural	17.4	13.4-22.4	14.8	11.3-19.3	40.7	33.7-48.1	1,201	.000	7		
Wealth index											
Richest	13.4	7.2-23.8	12.9	7.6-21.0	29.1	20.5-39.7	338	.026	7		
Richer	13.5	6.4-26.5	14.2	8.5-22.8	36.2	25.8-48.0	286	.008	7		
Middle	18.0	10.7-28.7	10.2	5.1-19.4	33.0	22.1-46.2	287	.056			
Poorer	21.4	13.2-32.8	11.6	6.7-19.3	31.2	19.8-45.5	294	.164			
Poorest	17.3	11.1-26.0	23.5	15.3-34.3	53.9	40.2-67.1	353	.000	7		
Secondary +, o	complete se	condary and hig	her educatio	on; ↗, significant	increasing t	rend based on lo	gistic regression.				

months ($F_{1,986} = 8.29$, P < .004), children in Coast ($F_{1,164} = 8.91$, P < .003), Eastern ($F_{1,171} = 5.30$, P < .002), Rift Valley ($F_{1,233} = 8.87$, P < .003), children whose mothers could not read ($F_{1,484} = 5.24$, P < .023), and those whose mothers listened to radio weekly ($F_{1,1034} = 4.77$, P < .029).

3.2. Associations between sociodemographic variables and breastfeeding practices in 2008-2009

Bivariate analyses with 2008-2009 data were used to select independent variables for inclusion in logistic regression analyses (Table 6). Only province and area of residence had significant bivariate associations with all 4 feeding variables. Table 7 shows the results of logistic regression analyses with only variables that showed significant bivariate association with individual breastfeeding practices put in the regression models.

In model 1 (early initiation of breastfeeding), children born through cesarean delivery were almost 3 times more likely to be breastfed later than 1 hour after birth, compared to children having vaginal deliveries. Children in Western, Central, and Coast provinces had significantly higher odds of being breastfed later as compared to children in the Eastern province. Children born to mothers with incomplete primary education were more likely to be breastfed later than earlier, compared to those born to mothers who had completed secondary and/or higher education.

In model 2 (exclusive breastfeeding), children born through cesarean delivery were more likely to be exclusively breastfed compared to those with vaginal deliveries. Using the Eastern province as the reference category, children in the Coast and Nairobi were more likely to not be exclusively breastfed.

In model 3 (complementary feeding and breastfeeding), only the child's age was a significant predictor, with an increase in child's age increasing the odds of not receiving complementary food and breastfeeding.

In model 4 (bottle-feeding), the child's age and province were the only 2 variables that made significant contributions to the model. An increase in child's age was negatively correlated with bottle-feeding, whereas the odds of children in Nairobi being fed using a bottle was higher as compared to children in the Eastern province.

4. Discussion

This study set out to investigate trends in breastfeeding practices in Kenya using 3 surveys conducted in 1998, 2003, and 2008-2009. The study also conducted a multivariate analysis on the predictors of breastfeeding practices using the 2008-2009 survey. To summarize the main results, the trends in exclusive breastfeeding showed mostly significant improvement, although the starting point in 1998 was low (ranging from 13% to 21% in the various sociodemographic groups studied). The most dramatic improvement was for children in the poorest wealth quintile, with exclusive breastfeeding more than tripling at 54% in 2008-2009. We speculate that the breastfeeding health education efforts and campaigns in Kenya, referred to in the Introduction, may have had a real impact at all sociodemographic levels, but this cannot be confirmed by the limited data available in this study.

Conversely, the trends in early initiation of breastfeeding, complementary feeding and breastfeeding, and bottle-feeding were stagnant or slightly worsened in most of the sociodemographic groups studied. Although these trends are not encouraging, efforts to promote breastfeeding in Kenya may have averted what otherwise might have been strongly worsening trends. This is conjectural, however, since there is no way to know what might have happened in the absence of the breastfeeding education efforts that have been made.

Logistic regression models using the 2008-2009 data showed that accounting for other variables, the province where the mother resided was the most significant predictor of early initiation of breastfeeding, exclusive breastfeeding, and bottle-feeding. This raises the question, what is it about one's province of residence that might affect child feeding? Three factors may be important in this regard: governmental and nongovernmental health organizations that foster child health, regional living conditions, and culture with its myriad of local expressions [18,30–34].

Turning first to health organizations, the Kenyan government has undertaken a number of initiatives including implementation of the joint WHO/UNICEF principles on a global strategy for infant and young child feeding through the

Table 4 – Trends in complementary feeding and breastfeeding for children aged 6-23 months											
	KD	HS 1998	KD	HS 2003	KDHS	2008-2009					
	%	95% CI	%	95% CI	%	95% CI	Grand n	Р	Trend		
Total	81.9	79.8-83.8	83.7	81.3-85.9	78.8	75.7-81.5	4657	.075			
Sex											
Female	80.9	77.6-83.7	83.0	79.1-86.2	77.9	72.6-82.5	1952	.338			
Male	82.9	79.8-85.6	84.2	81.2-86.8	79.3	75.4-82.7	2705	.107			
Province											
Nairobi	70.2	63.1-76.4	75.2	65.3-83.0	63.1	53.1-72.1	302	.267			
Central	79.0	70.9-85.3	75.2	69.8-79.9	81.0	72.7-87.1	449	.745			
Coast	79.0	69.5-86.1	86.5	80.6-90.8	79.8	70.4-86.7	702	.998			
Eastern	89.4	84.5-92.8	94.2	90.7-96.5	86.5	79.9-91.1	630	.410			
Nyanza	82.9	78.0-86.8	83.9	76.1-89.5	77.0	71.9-81.4	774	.083			
Rift Valley	80.1	75.7-83.8	81.5	75.9-86.1	78.2	70.4-84.3	1142	.616			
Western	85.2	80.0-89.2	84.3	77.6-89.2	78.7	68.7-86.1	658	.176			
Residence											
Urban	74.3	68.6-79.3	78.1	71.3-83.6	70.5	66.3-74.3	1029	.232			
Rural	83.7	81.4-85.7	85.0	82.4-87.3	81.0	77.4-84.1	3628	.168			
Wealth index											
Richest	70.4	64.6-75.6	77.1	70.3-82.7	70.5	65.0-75.5	935	.911			
Richer	84.1	78.8-88.2	81.9	76.5-86.3	81.6	74.1-87.4	813	.558			
Middle	82.9	77.9-86.9	82.1	76.5-86.6	81.0	74.1-86.4	850	.629			
Poorer	83.5	78.6-87.4	87.1	82.0-90.9	79.5	72.8-84.9	960	.300			
Poorest	86.7	83.0-89.6	88.5	84.4-91.7	81.4	76.1-85.8	1099	.072			
Maternal education											
Secondary +	75.4	68.0-81.4	73.3	65.6-79.8	71.8	63.4-78.8	690	.494			
Incomplete secondary	77.5	69.9-83.7	78.9	70.7-85.4	77.0	67.0-84.7	419	.937			
Complete primary	84.8	80.5-88.3	87.0	83.1-90.1	81.2	76.2-85.4	1281	.200			
Incomplete primary	82.3	78.8-85.3	84.8	80.9-88.1	79.0	73.0-83.9	1665	.313			
No education	86.8	79.5-91.8	87.1	80.1-91.9	83.0	74.8-88.9	602	.418			
Maternal literacy											
Reads easily	79.9	77.0-82.6	83.2	80.3-85.7	78.2	74.8-81.3	2985	.361			
Reads with difficulty	83.8	79.2-87.7	81.6	73.2-87.9	74.6	67.1-80.8	715	.022	<u>\</u>		
Cannot read	86.6	81.0-90.8	86.2	81.0-90.1	85.3	79.0-89.9	934	.717			
Mother reads newspaper											
Yes	76.7	72.3-80.5	82.2	78.3-85.5	75.9	71.0-80.2	1548	.710			
No	84 5	81 9-86 7	84.6	81 7-87 1	80.4	76 6-83 6	3101	055			
Mother watches television	01.0	0110 0017	0110	010 0711	0011	, 010 0010	0101	1000			
Yes	72 7	67 3-77 6	80.4	75 9-84 2	76 5	72 0-80 6	1336	484			
No	84.4	82 2-86 4	85.0	82 3-87 4	80.1	75 7-83 9	3307	063			
Mother listens to radio	01.1	52.2 00.1	05.0	52.5 67.1	00.1	, 5., 65.5	550,	.005			
Yes	80.2	77 1-83 0	83.2	80 5-85 6	78 1	74 6-81 3	3415	213			
No	83.9	80.7-86.7	86.4	80.8-90.6	82.5	76.4-87.3	1236	.872			
	00.5		00.1	00.0 90.0	02.0	,,	1200	.072			

Secondary +, complete secondary and higher education; >, significant decreasing trend based on logistic regression.

Baby Friendly Hospital Initiative and recent passing of a law regulating breast milk substitutes [35,36]. The encouraging trends in exclusive breastfeeding with significant increases in most sociodemographic groups could be an indicator of the impact of such initiatives. Nonetheless, it also raises the question of whether a focus on exclusive breastfeeding has overshadowed messages about the importance of feeding colostrum within an hour after birth, continued breastfeeding after complementary foods are introduced, and avoiding feeding children using bottles and teats. With regard to health facility deliveries, 76% of mothers in Kenya who delivered at a health facility were successfully aided in breastfeeding their babies within an hour after birth, but such health facility deliveries account for just 43% of all deliveries [11]. Mothers delivering at a health facility are likely to get counseled by health workers on the importance of early initiation of breastfeeding, contrary to those giving birth at home [37].

Concerning the mode of delivery and consistent with other studies [38,39], children who were born through cesarean delivery instead of vaginal birth were not likely to be breastfed within an hour of birth, even though they were likely to be exclusively breastfed. Obstetric complications and the use of analgesics during cesarean deliveries are significant barriers to immediate initiation of breastfeeding [40].

The availability and use of health facilities for child birth play some role in early child care, including feeding practices. Yet incongruities exist, for example, in the Central province, which has relatively good health care facilities available, there are still worsening trends in early initiation of breastfeeding [41]. This leads to consideration of living conditions and culture.

Health behavior is influenced strongly by living conditions, cultural beliefs, and practices. Both living conditions and culture beliefs help explain, for example, why some mothers in developing countries opt to feed their newborn children

Table 5 – Trends in bottle-feeding for children aged 0-23 months											
	KD	HS 1998	KD	HS 2003	KDHS	2008-2009					
	%	95% CI	%	95% CI	%	95% CI	Grand n	Р	Trend		
Total	22.3	20.1-24.7	22.4	19.9-25.1	19.7	17.1-22.4	6268	.135			
Sex											
Girls	23.5	20.2-27.2	24.2	20.5-28.4	19.2	15.4-23.8	2531	.144			
Boys	21.3	18.5-24.3	21.3	18.5-24.3	21.3	18.5-24.5	3737	.513			
Age											
0-5 mo	25.3	21.2-29.8	27.4	23.2-32.1	25.3	20.6-30.7	1568	.997			
6-11 mo	27.1	22.4-32.4	28.4	24.3-33.0	28.1	23.5-33.1	1683	.794			
12-23 mo	18.5	15.6-21.8	16.2	13.4-19.4	12.1	9.5-15.3	3017	.004	У		
Province											
Nairobi	29.3	19.7-41.3	35.8	28.7-43.5	44.0	31.4-57.5	424	.103			
Central	25.8	18.9-34.2	24.3	19.4-29.9	28.5	21.1-37.3	622	.680			
Coast	37.9	32.2-44.0	12.8	8.4-19.0	21.3	15.6-28.4	944	.003	У		
Eastern	25.8	19.9-32.8	17.3	12.3-23.7	15.8	11.2-21.9	845	.022	У		
Nyanza	14.6	10.8-19.5	23.3	17.4-30.4	21.4	16.5-27.3	1056	.062			
Rift Valley	26.0	22.0-30.4	29.5	24.2-35.5	15.6	11.1-21.4	1497	.003	7		
Western	6.6	3.6-11.5	11.0	7.2-16.3	13.2	9.3-18.3	880	.035	7		
Residence											
Urban	30.9	24.9-37.6	31.8	26.5-37.6	27.8	20.2-36.9	1387	.552			
Rural	20.3	18.0-22.8	20.3	17.5-23.3	17.6	15.1-20.5	4881	.139			
Wealth index											
Richest	35.0	29.2-41.3	32.0	26.7-37.7	26.0	18.7-35.0	1280	.091			
Richer	26.8	21.1-33.3	27.0	21.6-33.2	22.4	17.7-27.9	1109	.260			
Middle	19.4	15.3-24.2	17.4	13.5-22.0	19.4	14.6-25.1	1151	.998			
Poorer	16.6	13.4-20.4	19.3	14.5-25.3	16.9	12.4-22.5	1258	.940			
Poorest	16.7	13.3-20.8	18.2	13.8-23.5	14.7	11.3-18.8	1470	.436			
Maternal education											
Secondary +	31.8	26.5-37.7	33.0	27.0-39.7	23.7	18.2-30.3	956	.056			
Incomplete secondary	25.7	18.6-34.3	23.7	16.9-32.1	27.1	18.6-37.5	566	.836			
Complete primary	17.6	14.3-21.5	22.6	18.5-27.2	19.1	15.3-23.5	1702	.714			
Incomplete primary	20.2	17.2-23.5	17.7	14.3-21.6	16.9	13.5-20.9	2236	.177			
No education	23.9	17.9-31.1	24.6	19.6-30.5	17.5	11.5-25.9	808	.189			
Maternal literacy											
Reads easily	23.8	20.9-26.9	23.7	20.8-26.9	20.8	17.6-24.4	4056	.187			
Reads with difficulty	18.7	14.9-23.3	13.3	8.1-21.2	20.1	14.8-26.6	926	.829			
Cannot read	22.5	17.6-28.4	21.9	17.9-26.6	14.0	9.6-20.0	1254	.023	х		
Mother reads newspaper											
Yes	27.4	23.5-31.7	27.0	23.0-31.3	22.7	18.0-28.3	2110	.162			
No	19.9	17.4-22.7	20.1	17.4-23.1	17.9	15.3-20.9	4146	.300			
Mother watches television											
Yes	29.6	24.7-35.0	30.0	25.9-34.5	23.9	19.4-29.2	1791	.084			
No	20.3	17.9-22.9	19.6	16.9-22.5	17.2	14.3-20.5	4457	.130			
Mother listens to radio											
Yes	24.9	21.9-28.2	23.2	20.5-26.2	20.2	17.5-23.3	4643	.029	У		
No	19.1	16.2-22.3	18.4	13.9-24.0	16.5	11.8-22.5	1615	.437			
Secondary + complete secon	ndary and	higher educati	on v sim	ificant decreasi	ng trend: a	significant inc	reasing trend				
secondary , complete secon	inary and		o, -, o.g.i		ing trend, ,	, organite and me	in cabing trend.				

water, sugar, and honey rather than the immediately and freely available colostrum [32]. In this study, living conditions and culture may be the most palpable explanation of barriers to feeding children as recommended by health experts [18,30,31]. Suggestions for this come from a highly informative qualitative assessment of beliefs and attitudes regarding infant and young child feeding undertaken in Kenya [42]. Among the key findings, women were generally aware of the benefits of breastfeeding but had to cope with maternal workload (including employment outside the home) and family demands, cultural beliefs about when and what to feed their children, worries about breastfeeding's effects on a woman's physical appearance, stigmas associating exclusive breastfeeding with the prevention of HIV transmission, and lack of social support for optimal breastfeeding practices.

This complex array of barriers to health-promoting child feeding practices has significance for understanding the most robust finding of this study. There exist important differences from region to region in feeding practices (Tables 2–5), and there are different regional patterns for the 4 feeding practices that were studied (Table 7). The aforementioned assessment of beliefs and attitudes [42] included an analysis that revealed regional differences in the significance of many feeding barriers, as perceived by mothers, fathers, grandmothers, community health workers, traditional birth attendants, nurses, women's leaders, and nongovernment organization

	Early ini of breast	tiation feeding	Exclu breastfe	isive eeding	Compler feedin breastfe	nentary g and eeding	Bottle-	feeding
Variable	χ^2	Р	χ^2	Р	χ^2	Р	χ^2	Р
Gender	0.50	.479	0.01	.905	0.42	.519	0.14	.704
Child's mode of delivery	29.58	.000	12.00	.001	1.07	.301	0.98	.323
Child's size at birth	20.74	.000	1.35	.510	3.08	.215	6.71	.035
Child's place of birth	2.71	.099	0.08	.779	5.95	.015	18.23	.000
Province	162.46	.000	22.66	.001	23.13	.001	71.25	.000
Residence	18.33	.000	6.99	.008	18.19	.000	22.14	.000
Wealth index	3.59	.464	20.33	.000	17.14	.002	22.65	.000
Maternal education	18.09	.001	7.95	.094	11.12	.025	14.98	.005
Maternal occupation	11.03	.004	1.07	.587	9.15	.010	0.40	.818
Maternal literacy	9.14	.010	2.38	.305	9.38	.009	8.54	.014
Maternal newspaper reading	1.87	.171	12.08	.001	4.45	.035	7.22	.007
Maternal television watching	2.41	.121	5.45	.020	2.88	.090	14.21	.000
Maternal radio listening	3.95	.047	1.81	.178	2.21	.137	2.29	.130
	F	Р	F	Р	F	Р	F	Р
Child's age	5.82	.199	0.05	.000	5.09	.000	61.24	.000
Mother's age	2.23	.000	0.03	.254	12.29	.018	14.45	.000
Birth order	1.51	.000	0.34	.758	7.62	.000	37.26	.000
No. children aged ≤5 years	11.62	.704	0.08	.406	1.49	.006	0.98	.147
Parity	0.08	.000	1.68	.566	10.07	.000	51.17	.000

Table 6 – Bivariate analysis between early initiation of breastfeeding, exclusive breastfeeding, complementary feeding and breastfeeding, and bottle-feeding with predictor variables, KDHS 2008-2009

representatives. In Nairobi, social support at social gatherings (eg, church), slum dwelling, and abandonment by the father were mentioned. In the Western province, family size, beliefs about the "evil eye," isolation of mothers with twins, and marital conflict were cited. In the Rift Valley, drought impacts and grandmothers' control were pointed out. In Nyanza, domestic abuse was mentioned. In the Eastern province, maternal promiscuity and the mother's age were of significance. In the Coast province, overburdening social roles and low literacy levels were named. In the Central province, a spillover effect of HIV and religious influence was cited. Some of these factors (among many others that were mentioned) were ubiquitous across the provinces, whereas others were more localized.

This analysis points to a limitation and a strength of a quantitative method such as used by the DHS, in which contextual factors are accounted for "merely" by gross proxy measures such as region of residence, urban/rural location, religion, or ethnicity. Although the limitation is obvious, perhaps less so is the advantage. The present analysis confirms that "something" about the regional contexts of Kenya is important in determining the feeding experiences of infants, and that "something" is likely an array of many factors whose expression varies from place to place. This reinforces the intuition that infant feeding is a "local" phenomenon, and that public health action to address feeding inadequacy requires local anchoring, which national campaigns do not necessarily achieve.

Several limitations deserve attention. To enable comparison of prevalence in exclusive breastfeeding and complementary feeding and breastfeeding, this study used a subset of DHS feeding questions that were the same across the 3 surveys. The later surveys included additional questions on feeding that were not used. It is also important to note that children excluded due to lack of feeding data are those who did not sleep in the household the night before the interview, who did not have valid dates of birth and valid measures of height and weight, and those whose mothers were not interviewed. For example the Child Record for the DHS 2008 survey lists 6079 children under five, of which 5706 had valid dates of birth, and of which 5450 had valid height and weight measurements (89.7%).

Also important is the issue of sample size and the effects that varying sample sizes have on statistical tests of linear trends, as reported in Tables 2 to 5. The sensitivity of statistical testing to sample size is such that 2 trends based on identical prevalence estimates may be statistically significant in the 1 case and not in the other. We know of no method to overcome this problem except to select samples of equal size, which was not a feature of the DHS sampling design. One may also question if the subgroup sample sizes are large enough. This is an important and relevant question when planning a study and when the magnitude of the effect one wishes to detect is specified. Then, sample size may be adjusted to achieve a certain level of statistical power, conventionally 0.80 or greater. However, the KDHS was not designed with such considerations in mind, and sample sizes were determined on the basis of the wish to produce nationally representative samples and with practical data collection limitations in mind. This points to an important limitation of this study, as it is now fairly well established that post-study (post hoc) power calculations to aid in the interpretation of results should be avoided [43-45]. The post hoc analyses in this article, also called *data* snooping[46], are perhaps best evaluated in terms of confidence intervals and not P values: "...the breadth of the interval tells us how confident we can be of the true state of nature being close to the null. Once we have constructed a confidence interval, power calculations yield no

Variables Significance of Wald OR 95% CI Sig. of Wald OR 95% CI Sig. of Wald OR 95% CI Child's age Made of Jailvery 000 2.88 1.79-4.64 0.20 0.00 1.00 1.00 1.00 0.0		Model 1: early initiation of breastfeeding			Model 2: exclusive breastfeeding			Model 3: complementary feeding and breastfeeding			Model 4: bottle-feeding		
Index of elivery Maginal (reference)0.000.001.501.501.501.501.41.200.000	Variables	Significance of Wald	OR	95% CI	Sig. of Wald	OR	95% CI	Sig. of Wald	OR	95% CI	Sig. of Wald	OR	95% CI
Mode of elivery Vaginal (reference) Ceasarean0.000.0120.0200.02.020.00.05.20.0310.031Child's size a birth Average (reference)0.090.000.020.00.05.20.0300.010.0310.01<	Child's age				0.000	1.50	1.27-1.77	0.000	1.20	1.14-1.26	0.000	0.93	0.91-0.95
Variant Variant <t< td=""><td>Mode of delivery</td><td>.000</td><td></td><td></td><td>0.001</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Mode of delivery	.000			0.001								
Clear entrine 2.88 1.9-4.94 0.022 0.09-0.2 Large (reference) - 0.391 - - 0.391 Average 0.75 0.56-1.00 - - 0.91 0.71.20 0.56-1.11 Snall 1.22 0.83.1.79 - - 0.96 0.90 0.73.135 Child's binc order 740 0.96 0.97 0.05 - 0.96 0.962 0.862 0.811 0.871 0.813 0.862-127 1.91 0.943 1.83 0.862 0.811 0.77 0.81 0.871 0.75 0.81 0.871 0.81 0.871 0.81 0.871 0.821 0.871	Vaginal (reference)		0.00	4 70 4 64		0.00	0.00.0.50						
Chine size at utility 0.09 USA 0.03 USA Average 0.75 0.56-1.00 VI 0.71 0.75 0.56-1.01 Small 1.22 0.331.79 VI 0.39 0.73-135 0.497 Child's birch order 740 0.59 0.74-123 0.870 1.03 0.70-152 0.980 0.73-135 Child's birch order 740 0.59 0.74-123 0.870 1.03 0.70-152 0.980 0.62-127 Child's birch order 740 0.59 0.006 0.197 0.497 1.48 0.67-132 0.843 0.73-135 0.497 Home - 0.006 0.197 0.59-148 0.83-41 0.57-142 0.497 1.44 0.57-142 0.843 1.44 0.57-142 0.497 1.44 0.57-142 0.83+14 0.57-142 0.81-143 0.83-13 0.83-13 0.82-33 1.30 0.83-243 0.47 0.55 1.33 0.83-13 0.82-33 1.30 0.82-343	Cesarean Child's size at hirth	000	2.88	1./9-4.64		0.22	0.09-0.52				0.201		
Average 0.75 0.56-1.00 0.76 0.56-1.10 0.79 0.56-1.11 Small 1.22 0.83-1.79 0.87 1.03 0.70-152 0.90 0.73-152 Child's birth order .740 0.96 0.74-12 0.870 1.03 0.70-152 0.90 0.73-152 Child's place of birth Health facility (reference) 0.81 0.57-142 0.88 0.81 0.57-142 Province 0.000 - 0.005 0.197 0.081 0.88 0.14 0.67-30 0.88 0.14 0.67-30 0.82-127 Province 0.000 - 1.05 0.82-22 0.205 0.82-41 0.67-30 0.83-41 0.70 0.82-141 0.70 0.82-142 0.70 0.82-142 0.70 0.82-142 0.71 0.82-142 0.83 0.83-41 0.70 0.82-142 0.71 0.82-142 0.71 0.81 0.82-142 Weathin Certral 2.47 1.44-25 2.00 0.82-147 0.81 0.	Large (reference)	.009									0.391		
Small 122 0.33 1.79 0.610 0.870 0.870 0.870 0.95 0.99 073 1.35 Child's birth order .740 0.96 0.71 1.23 0.870 0.870 0.870 0.497 Health facility (reference) Horne .000 0.006 0.997 0.810 0.501.32 0.880 0.521.32 Province .000 0.000 0.005 0.005 0.994.89 1.480 0.501.32 0.880 0.521.32 Province .000 0.605 3.60-10.20 1.70 0.594.489 1.44 0.67.49 1.60 0.372.93 0.114 0.87.49 1.00 0.757.422 Nairobi 1.50 0.66.7 4.91 1.318.06 3.22 1.37.3 0.81.369 0.10 0.27.123 Nairobi 1.50 0.62.7 4.91 1.31.40 0.32 1.31 0.82.41 0.42 0.43.12 0.42.14 0.43.12 0.43.12 0.43.12 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43 0.43	Average		0.75	0.56-1.00								0.79	0.56-1.11
child's birth order 740 0.96 0.74-123 0.870 1.03 0.70-125 0.892 0.99 0.73-135 Child's place of birth 0.00 0.70 0.80 0.910 0.71-125 0.802 0.802 0.71-125 0.802 0.805 0.910 0.80 0.82-127 Province 0.000 0.000 0.001 0.70 0.82-426 0.007 0.002 0.027 0.82-436 0.401 0.82-127 Nyanza 1.53 0.82-227 2.02 0.82-436 0.451 0.42-141 0.77 0.42-141 Central 1.53 0.82-277 4.91 1.331.80.9 0.130 0.81-329 0.63 0.73 0.81-369 0.83 0.70 0.81-369 0.81-369 0.83 0.83 0.83 0.83 0.83 0.83 0.83 0.83 0.83 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-35 0.81-3	Small		1.22	0.83-1.79								0.91	0.57-1.47
child:0,3960,4970,497Hadih Gdiity (reference)0,000,1970,2180,2130,82Province0,000,2070,2190,2180,2180,218Province0,000,0000,2000,2140,2150,2140,214Province0,600,0000,2010,82,4250,2050,82,410,3240,3240,324Rint Valley1,600,87,2250,2140,85,530,1340,31,630,1420,3140,314Nairobi1,350,62,770,811,318,030,31,630,31,630,31,730,324,13Residence0,920,62,320,62,570,3440,31,630,31,630,31,630,31,630,31,730,324,13Residence0,920,62,310,72,930,31,610,31,610,31,730,31,610,31,730,31,610,31,730,32,130,32,330,41,430,34,1430,34,1430,32,13 <td>Child's birth order</td> <td>.740</td> <td>0.96</td> <td>0.74-1.23</td> <td></td> <td></td> <td></td> <td>0.870</td> <td>1.03</td> <td>0.70-1.52</td> <td>0.962</td> <td>0.99</td> <td>0.73-1.35</td>	Child's birth order	.740	0.96	0.74-1.23				0.870	1.03	0.70-1.52	0.962	0.99	0.73-1.35
India 0.006 0.006 0.007 0.008 0.007 0.008 0.007 Eastern (reference) 1.36 0.82-225 2.02 0.82-496 1.05 0.55 0.82-216 Wanza 5.06 3.60-10.20 1.70 0.59-4.89 1.85 0.83-11 0.77 0.82-36 Western 1.60 3.67-2.92 2.14 0.85-5.39 1.73 0.81-36 0.80 0.37-1.82 Nairobi 1.53 0.66-2.77 4.91 1.33-16.09 3.22 1.31-33 0.80-2.13 0.81 0.81-2.14 0.41-14 0.41-13 0.41-13 0.80-2.13 0.81 0.73-2.15 0.81 0.73-2.15 0.81 0.73-2.15 0.81 0.73-2.15 0.82 0.42-13 0.60-2.13 0.59-2.13 0.80-2.13 0.59-2.15 0.81 0.73-2.15	Child's place of birth Health facility (reference)							0.396	0.91	0 50 1 22	0.497	0 00	0.62 1.27
Eastern (reference) Name Name Name Name Name Nyanza 1.36 0.82-225 2.02 0.82-489 1.05 0.83-411 0.77 0.42-141 Central 2.47 1.44-425 2.70 0.85-839 1.73 0.81-369 1.02 0.57-182 Nairobi 1.35 0.66-2.77 4.91 1.33-18.09 3.22 1.31-7.93 3.08 1.34 0.62 Residence .092 0.422 0.421 0.344 0.73 0.411 0.81 0.45-145 Wealth index .092 0.422 0.344 0.70 0.344 0.73 0.401 0.41 </td <td>Province</td> <td>000</td> <td></td> <td></td> <td>0.006</td> <td></td> <td></td> <td>0 197</td> <td>0.01</td> <td>0.50-1.52</td> <td>0.025</td> <td>0.00</td> <td>0.02-1.27</td>	Province	000			0.006			0 197	0.01	0.50-1.52	0.025	0.00	0.02-1.27
Name 1.36 0.82-225 2.02 0.82-46 2.05 1.05-02 1.03 0.78-216 Western 6.04 3.60-102 1.70 0.59-4.89 1.85 0.83-4.11 0.77 0.42-1.41 Central 2.47 1.44-425 2.70 0.86-8.49 1.40 0.57-3.52 0.81-36 0.83-35 1.02 0.57-1.82 Nairobi 1.63 0.67-23 2.14 0.85-3.30 0.82 1.31-93 0.80-243 0.34 1.73 0.83-35 1.02 0.57-1.82 Nairobi .44.3 2.29-859 6.52 4.24-15.71 1.84 0.33-35 0.80-243 0.30 0.92 0.471 0.81 0.571-82 Reidence .092 . 0.422 0.341 0.75 0.40-137 0.81 0.571-82 Richer quintile (reference) . 0.62 0.301-167 0.75 0.40-137 0.81 0.573-52 Richer quintile (reference) . 1.42 0.64-3.16 1.02 0.49-2.12 1.39 0.572-54 Maternal quintile (reference) . 1.42 <td>Eastern (reference)</td> <td></td> <td></td> <td></td> <td>0.000</td> <td></td> <td></td> <td>01107</td> <td></td> <td></td> <td>01025</td> <td></td> <td></td>	Eastern (reference)				0.000			01107			01025		
Western 6.06 3.00-100 1.70 0.59-4.39 1.88 0.83-4.11 0.70 0.42-1.41 Central 2.47 1.44-4.25 2.70 0.86-8.49 1.44 0.87-3.93 1.66 0.392-37 Nairobi 1.50 0.66-2.77 4.91 1.33-18.00 3.22 1.31-33 0.80 1.47-12 Coast .433 0.66-2.77 4.91 1.33-18.00 0.22 1.31-33 0.80 1.47-12 Coast .092 0.422 0.441 0.83-3.05 0.471 0.81 0.471 With (reference) .042 0.421 0.401 0.70 0.401.37 0.81 0.471 With (reference) .041 .041 .041.37 0.81 0.471.37 0.401.37 0.81 0.471.37 Richer quintile (reference) .041 .042 1.41 0.64-3.16 1.02 0.49-2.12 .041.30 0.592.37 1.33 0.592.37 1.33 0.592.37 1.43 0.592.57 0.492.12 .033 0.592.57 0.492.12 .0493 0.592.37 1.43 0.592.37	Nyanza		1.36	0.82-2.25		2.02	0.82-4.96		2.05	1.05-4.02		1.30	0.78-2.16
Central 247 1444.25 2.70 0.86.849 1.44 0.67-309 1.66 0.93-297 Rift Valley 1.50 0.67-122 2.13 1.35 0.60 2.77 4.91 1.33-18.09 3.22 1.31-59 3.08 1.947.12 Coast 4.43 2.29-859 6.625 2.49-15.71 1.81 0.83-395 1.90 0.0024.31 Residence .092 .021 0.422 0.344	Western		6.06	3.60-10.20		1.70	0.59-4.89		1.85	0.83-4.11		0.77	0.42-1.41
Ritt Valley 1.60 0.87-2.93 2.14 0.85-3.93 1.73 0.813.69 1.02 0.57-125 Nairobi 1.33 0.66-2.77 4.91 1.33-18.09 3.22 1.31-7.93 0.813.45 0.80 1.47.12 Coast 4.43 2.29-8.59 6.25 2.49-15.71 1.81 0.83-3.95 1.02 0.471 0.81 0.471 Urban (reference) 0.422 0.39 0.70 0.30-1.67 0.75 0.40-1.37 0.81 0.451.45 Wealth index 0.64 0.38-1.08 0.70 0.894 0.75 0.40-1.37 0.81 0.451.45 Wealth index 0.64 0.38-1.08 0.70 0.894 1.02 0.471 0.81 0.451.45 Wealth index 0.64 1.42 0.64-3.16 1.02 0.49-2.12 1.39 0.76-2.54 Richer quintile 1.54 0.44-2 0.31 0.65-2.33 1.80 0.58-3.0 1.00 0.47-2.13 Poorer quintile 0.74 2.52 0.94-6.73 1.33 0.58-3.0 1.00 0.72-2.52	Central		2.47	1.44-4.25		2.70	0.86-8.49		1.44	0.67-3.09		1.66	0.93-2.97
Narrobi 1.35 0.662-7/ 4.91 1.31.803 3.22 1.31-733 3.08 1.34-7.12 Coast 4.43 2.29-8.59 6.25 2.49-15.71 1.81 0.83-3.95 1.39 0.82-12 Weiden (reference)	Rift Valley		1.60	0.87-2.93		2.14	0.85-5.39		1.73	0.81-3.69		1.02	0.57-1.82
coast 4,43 2,59,23 6,23 2,491,511 1.11 0,503 2,491 1.01 0,503 2,491 Residence 0,92 0,422 0,344 0,34 0,75 0,401.3 0,81 0,471 Rural 0,64 0,891 0,70 0,301.67 0,75 0,401.37 0,81 0,451.45 Wealth index 0,64 0,631 1,42 0,643.16 1,02 0,49-2.12 1,30 0,76-2.54 Richest quintile (reference) 1,44 0,614.42 1,31 0,60-2.33 1,48 0,73.301 Poorer quintile 1,54 0,44-53 0,53 1,58 0,583 0,583.56 0,526 Poorest quintile 1,54 0,66-2.12 0,42-33 0,585 0,726 0,585 0,726 5 0,766 5 0,726 5 0,726 5 0,766 5 0,766 5 0,726 5 0,730 0,730 0,730 0,730 0,730 0,730 0,75 0,83 0,471.43 0,767.413 0,767.413 0,767.413 0,767.413 0,76	Nairobi		1.35	0.66-2.77		4.91	1.33-18.09		3.22	1.31-7.93		3.08	1.34-7.12
Number of the ference of the second ary (reference) Note of the second ary (reference) <t< td=""><td>Residence</td><td>092</td><td>4.45</td><td>2.29-0.39</td><td>0 422</td><td>0.25</td><td>2.49-15.71</td><td>0 344</td><td>1.01</td><td>0.65-5.95</td><td>0 471</td><td>1.59</td><td>0.60-2.45</td></t<>	Residence	092	4.45	2.29-0.39	0 422	0.25	2.49-15.71	0 344	1.01	0.65-5.95	0 471	1.59	0.60-2.45
Rural 0.64 0.38-1.08 0.70 0.30-1.67 0.75 0.40-1.37 0.81 0.45-1.45 Wealth index 0.039 0.643-1.67 0.894 0.273 0.273 Richer quintile (reference) Richer quintile 1.42 0.64-3.16 1.02 0.49-2.12 1.39 0.76-2.54 Middle quintile 1.64 0.61-4.42 1.31 0.60-2.83 1.48 0.73.01 Poorer quintile 0.04 2.52 0.94-6.73 1.38 0.58-3.30 1.00 0.47-2.13 Maternal education .004 0.04 0.72 0.252.09 1.32 0.53-16 1.00 0.47-2.31 Maternal education .004 0.72 0.72 0.25 0.726 1.72 0.72 Secondary + (reference) 1.19 0.66-2.12 0.72 0.32 0.43-13 1.00 0.78-37 Complete primary 1.29 0.80-2.08 0.72 0.82 0.72 1.12 0.63-161 Incomplete primary 1.29 0.80-2.08 0.77-3.75 1.63 0.45 1.43 0.50 1.74	Urban (reference)	.052			0.122			0.511			0.171		
Wealth index 0.039 0.894 0.73 Richest quintile (reference) 1.42 0.64.31 1.02 0.49.21 1.38 0.73.75 Richer quintile 1.64 0.61.42 1.31 0.60-2.83 1.48 0.73.30 Poorer quintile 2.52 0.94.673 1.38 0.60-2.83 1.60 0.75.75 Poorest quintile 0.04 2.52 0.94.673 0.58.55 0.72 0.72.93 Maternal education .004 0.67.12 0.72.02 0.58.55 0.72.93 0.75.75 Secondary + (reference) 1.79 0.66.212 0.82.08 0.77.375 0.77.375 0.78.35 0.78.35 0.78.35 Notechaldr (reference) 1.70 0.77.375 0.77.375 0.78 0.78.35 0.78.35 0.78.35 Muternal literacy .082 1.01.30 0.77.375 0.78.35 0.78.35 0.78.35 0.78.35 Muternal literacy .082 1.01.30 0.77.375 0.78.35 0.78.35 0.78.35 0.78.35 0.78.35 0.78.35 0.78.35 0.78.35 0.78.35 0.78.35<	Rural		0.64	0.38-1.08		0.70	0.30-1.67		0.75	0.40-1.37		0.81	0.45-1.45
Richest quintile 1.42 0.64-3.16 1.02 0.49-2.12 1.33 0.72-54 Middle quintile 1.64 0.614.42 1.31 0.60-2.83 1.48 0.73-01 Poorer quintile 2.52 0.94-6.73 1.38 0.58-3.0 1.30 0.59-2.68 Poorest quintile .004 2.52 0.94-6.73 0.38 0.78 1.30 0.59-2.68 Secondary + (reference) .004 .017 0.25-2.09 1.32 0.58-3.3 0.78 0.78-2.37 Complete secondary + (reference) .019 0.66-2.12 .025 0.82 0.47-1.43 1.02 0.58-1.37 No education .004 .077.375 .082 0.47-1.43 1.02 0.59-1.37 Maternal occupation .090 .073.375 .028 .046-5.07 1.42 0.59-1.37 Maternal occupation .090 .077.375 .028 .027 .028 .027 .028 .027 Mutte collar (reference) .155 1.012.36 .059 .028 .027 .027 .027 .027 .027 .027 <td< td=""><td>Wealth index</td><td></td><td></td><td></td><td>0.039</td><td></td><td></td><td>0.894</td><td></td><td></td><td>0.273</td><td></td><td></td></td<>	Wealth index				0.039			0.894			0.273		
Richer quintile 1.42 0.64-3.16 1.02 0.492.12 1.33 0.762.24 Middle quintile 1.64 0.61-4.42 1.31 0.60-2.83 1.30 0.592.25 Poorer quintile 2.52 0.94-6.73 1.38 0.58-3.30 1.30 0.592.25 Poorest quintile .004 0.726 1.38 0.58-3.30 1.00 0.47-2.13 Maternal education .004 0.725 0.585 0.726 1.00 0.47-2.13 Maternal education .004 0.66-2.12 0.585 0.782 0.726 1.00 0.47-2.13 Incomplete secondary + (reference) 1.09 0.66-2.12 0.585 0.782 1.01 0.66-2.19 No education .090 0.77.3.75 0.82 0.47-1.43 1.02 0.59-3.77 Maternal occupation .090 .077.3.75 0.283	Richest quintile (reference)												
India quintile 1.54 0.014.42 1.51 0.052.53 1.48 0.53-30 Poorer quintile 2.52 0.94-6.73 1.38 0.58-33 1.00 0.47-2.13 Maternal education .004 0.72 0.25-2.09 1.32 0.55 1.00 0.47-2.13 Maternal education .004 .004 0.72 0.25-2.09 1.38 0.58.33 1.38 0.726 Secondary + (reference) .004 .072 0.25-2.09 0.83 0.43-1.98 1.36 0.78-2.37 Complete primary 1.29 0.80-2.08 .082 0.47-1.43 1.00 0.65-1.61 Incomplete primary 1.29 0.80-2.08 .082 0.47-1.43 1.02 0.65-1.61 Incomplete primary 1.29 0.80-2.08 .023 .046-6.00 1.49 0.59-3.77 Maternal occupation .090 0.77-3.75 0.62 0.283 .047 1.49 0.59-3.77 Maternal literacy .090 0.62-1.48 .046 0.96 0.62-1.48 .149 0.59-3.77 Maternal literacy .082 <td>Richer quintile</td> <td></td> <td></td> <td></td> <td></td> <td>1.42</td> <td>0.64-3.16</td> <td></td> <td>1.02</td> <td>0.49-2.12</td> <td></td> <td>1.39</td> <td>0.76-2.54</td>	Richer quintile					1.42	0.64-3.16		1.02	0.49-2.12		1.39	0.76-2.54
Poorer quintile 2.32 0.54-0.73 1.38 0.56-3.30 1.30 0.597-283 Poorers quintile .004 0.25-2.09 1.32 0.55-3.16 1.00 0.47-2.13 Maternal education .004 0.25-2.09 1.32 0.55-3.16 1.00 0.47-2.13 Secondary + (reference)	Record quintile					1.64	0.61-4.42		1.31	0.50 2 20		1.48	0.73-3.01
Maternal education .004 0.585 0.726 0.726 Secondary + (reference) 1.19 0.66-2.12 0.585 0.726 0.726 Incomplete secondary 1.19 0.66-2.12 0.83 0.82 0.47-1.43 1.02 0.65-1.61 Incomplete primary 2.15 1.34-3.45 1.03 0.45-2.37 1.12 0.63-1.99 No education .070 0.77-3.75 1.67 0.46-6.00 1.49 0.59-3.77 Maternal occupation .090 0.77-3.75 0.67 0.62 0.62-1.48 0.63-1.99 White collar (reference) 1.03 0.37-3.35 0.283 0.62-1.48 0.585 0.58 0.59-3.77 Maternal literacy .090 0.77-3.75 0.67 0.62 0.62 0.67 0.63-1.99 Maternal literacy .090 0.77-3.75 0.76 0.283 0.62-1.48 0.78 0.72 1.24 0.72 Blue collar (reference) 1.54 1.03-2.31 0.50 0.273 1.24 0.72 0.72 1.24 0.72 0.73 0.73 0.73 <t< td=""><td>Poorest quintile</td><td></td><td></td><td></td><td></td><td>0.72</td><td>0.25-2.09</td><td></td><td>1.30</td><td>0.55-3.16</td><td></td><td>1.00</td><td>0.35-2.85</td></t<>	Poorest quintile					0.72	0.25-2.09		1.30	0.55-3.16		1.00	0.35-2.85
Secondary + (reference) 1.19 0.66-2.12 0.93 0.43-1.98 1.03 0.78-2.37 Complete primary 1.29 0.80-2.08 0.82 0.83 0.82 0.83 0.82 0.83 0.82	Maternal education	.004				0.72	0.25 2.05	0.585	1.52	0.55 5.10	0.726	1.00	0.17 2.15
Incomplete secondary 1.19 0.66-2.12 0.93 0.43-1.98 1.36 0.78-2.37 Complete primary 1.29 0.80-2.08 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.82 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 0.83 0.85 <td>Secondary + (reference)</td> <td></td>	Secondary + (reference)												
Complete primary 1.29 0.80-2.08 0.82 0.47-1.43 1.02 0.65-1.61 Incomplete primary 2.15 1.34-3.45 1.03 0.45-2.37 1.12 0.63-1.99 No education .090 0.77-3.75 0.82 0.87 0.46-0.00 1.49 0.59-3.77 Maternal occupation .090 0.77-3.75 0.283 - - 1.54 0.51 0.10 0.88 - - 1.54 0.59-3.77 Maternal occupation .090 - - 0.283 - - - 1.54 0.51 1.01 - 0.283 -	Incomplete secondary		1.19	0.66-2.12					0.93	0.43-1.98		1.36	0.78-2.37
Incomplete primary 2.15 1.34-3.45 1.03 0.45-2.37 1.12 0.63-1.99 No education 1.00 0.77-3.75 1.67 0.46-6.00 1.49 0.59-3.77 Maternal occupation .090 0.77-3.75 0.283 1.67 0.46-6.00 1.49 0.59-3.77 Maternal occupation .090 1.54 1.03-2.31 0.283 1.55 0.62-1.48 1.57 0.88-2.13 1.57 0.88-2.13 1.57 0.88-2.13 1.57 0.88-2.13 1.57 0.88-2.13 1.57 0.57 0.56 0.273 1.57 0.57 1.58 0.57 0.50 1.57 0.273 1.57 0.57 1.57 0.57 0.56 0.273 1.57 0.57	Complete primary		1.29	0.80-2.08					0.82	0.47-1.43		1.02	0.65-1.61
No education 1.70 0.77-3.75 1.67 0.46-6.00 1.49 0.59-3.77 Maternal occupation .090 0.283 0.283 0.283 0.283 0.283 0.283 0.283 0.283 0.283 0.273 0.88-2.13 0.88-2.13 0.88-2.13 0.88-2.13 0.273 <t< td=""><td>Incomplete primary</td><td></td><td>2.15</td><td>1.34-3.45</td><td></td><td></td><td></td><td></td><td>1.03</td><td>0.45-2.37</td><td></td><td>1.12</td><td>0.63-1.99</td></t<>	Incomplete primary		2.15	1.34-3.45					1.03	0.45-2.37		1.12	0.63-1.99
Maternal occupation .050 0.283 White collar (reference) 1.54 1.03-2.31 0.96 0.62-1.48 Blue collar 1.55 1.01-2.36 1.37 0.88-2.13 Maternal literacy .082 0.050 0.273 Reads easily (reference) 0.66 0.42-1.06 0.050 0.273 Reads with difficulty 0.66 0.42-1.06 1.24 0.76-2.03 1.24 0.72-2.11 Cannot read 1.18 0.74-1.88 0.447 0.22-1.03 0.73 0.40-1.32 No. children aged <5 y	No education	000	1.70	0.77-3.75				0.000	1.67	0.46-6.00		1.49	0.59-3.77
Blue collar 1.54 1.03-2.31 0.96 0.62-1.48 1.37 0.88-2.13 Maternal literacy .082 0.82 0.55 0.050 0.273 0.273 Reads easily (reference) 0.82 0.42-1.06 0.050 0.273 1.24 0.72-2.11 Cannot read 1.18 0.74-1.88 0.42 0.42 0.42 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.42 0.43 0.44 0.42 0.43 0.43 0.44 0.43 0.44	White collar (reference)	.090						0.283					
Not working 1.55 1.01-2.36 1.37 0.88-2.13 0.88-2.13 Maternal literacy .082 .082 0.550 0.273 0.273 Reads easily (reference) .086 0.42-1.06 0.420 0.262 1.24 0.72-2.11 Reads with difficulty 0.66 0.42-1.06 .047 0.42 0.42-1.02 0.473 0.473 Cannot read 1.18 0.74-1.88 0.74-1.88 0.42 0.47 0.47 0.473 0.401 No. children aged <5 y	Blue collar		1.54	1.03-2.31					0.96	0.62-1.48			
Maternal literacy .082 0.050 0.273 Reads easily (reference) 0.66 0.42-1.06 0.42-0.06 1.24 0.76-2.03 1.24 0.72-1.11 Cannot read 1.18 0.74-1.88 0.42 0.42-1.06 0.42-1.02 0.473 0.42-1.03 No. children aged <5 y	Not working		1.55	1.01-2.36					1.37	0.88-2.13			
Reads easily (reference) 0.66 0.42-1.06 1.24 0.76-2.03 1.24 0.72-2.11 Cannot read 1.18 0.74-1.88 0.47 0.22-1.03 0.72 0.40-1.32 No. children aged <5 y	Maternal literacy	.082						0.050			0.273		
Reads with difficulty 0.66 0.42-1.06 1.24 0.76-2.03 1.24 0.72-2.11 Cannot read 1.18 0.74-1.88 0.47 0.22-1.03 0.40-1.32 No. children aged <5 y	Reads easily (reference)												
Cannot read 1.18 0.74-1.88 0.47 0.22-1.03 0.73 0.40-1.32 No. children aged <5 y	Reads with difficulty		0.66	0.42-1.06					1.24	0.76-2.03		1.24	0.72-2.11
No. children aged <5 y	Cannot read		1.18	0.74-1.88					0.47	0.22-1.03		0.73	0.40-1.32
Mother sage .679 1.00 0.595-1.03 0.325 1.02 0.365-1.03 0.897 1.00 0.595-1.04 Parity .767 0.96 0.73-1.26 0.349 0.83 0.56-1.23 0.576 0.92 0.67-1.25 Mother reads newspaper weekly 0.042 0.813 0.943 0.943 0.943 0.943 Yes (reference) 0.54 0.30-0.98 1.05 0.71-1.54 1.01 0.70-1.46 Mother watches TV weekly 0.465 0.465 0.222 0.221 0.221	No. children aged <5 y	970	1 00	0.06 1.02				0.436	1.10	0.86-1.41	0 907	1 00	0.06 1.04
Marky 0.00 0.00 0.00 0.010 0.010 0.011 0.012 0.011 0.012 0.011 0.	Parity	.879 767	0.96	0.96-1.03				0.523	0.83	0.96-1.08	0.897	0.92	0.96-1.04
Yes (reference) 0.54 0.30-0.98 1.05 0.71-1.54 1.01 0.70-1.46 Mother watches TV weekly 0.465 0.222 0.222 0.222	Mother reads newspaper weekly		0.50	0.75-1.20	0.042			0.813	0.05	0.50-1.25	0.943	0.52	0.07-1.25
No 0.54 0.30-0.98 1.05 0.71-1.54 1.01 0.70-1.46 Mother watches TV weekly 0.465 0.222 0.222 0.222	Yes (reference)												
Mother watches TV weekly0.4650.222	No					0.54	0.30-0.98		1.05	0.71-1.54		1.01	0.70-1.46
	Mother watches TV weekly				0.465						0.222		
Yes (reference)	Yes (reference)												
No 0.80 0.44-1.45 0.78 0.52-1.16	No	000				0.80	0.44-1.45					0.78	0.52-1.16
Yes (reference)	Yes (reference)	.028											
No 0.65 0.44-0.96	No		0.65	0.44-0.96									

Table 7 – Logistic regression with initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding, complementary feeding and breastfeeding, and bottle-feeding as the dependent variables, KDHS 2008-2009

Secondary +, completed secondary and/or higher education; TV, television.

additional insights" [44]. Our position is that the sample sizes are what they are, our confidence in our interpretation of the data varies in part as a function of sample sizes, and our level of confidence is reflected in a conventional way, in the reported confidence intervals. A DHS study with larger or smaller samples sizes would have come to some different conclusions. Here, we are limited to reporting the findings with the data that are actually available.

In conclusion, long-term trends in exclusive breastfeeding are improving, whereas trends in early initiation of breastfeeding, complementary feeding and breastfeeding, and bottlefeeding are mostly stagnant. The province where the mother resided was a significant predictor of early initiation of breastfeeding, exclusive breastfeeding, and bottle-feeding. Since 2009, numerous child feeding education initiatives have been carried out in Kenya. The present findings suggest that such initiatives, which emphasize the importance of exclusive breastfeeding in the first half year of life, should not overlook education that focuses on the vital importance of feeding colostrum, continued breastfeeding up to 2 years of age or beyond, and the avoidance of bottle-feeding when stringent hygiene cannot be practiced due to lack of resources and unhygienic conditions. The results of this study also point to the importance of research to develop a better understanding of how local contexts influence child care and feeding practices. Large-scale survey research is definitely needed to continue to monitor national and regional trends, but in tandem with smallscale qualitative and mixed-methods research, to better inform interventions that are sensitive, respectful, and responsive to local living conditions and culture.

Acknowledgment

The authors acknowledge the subjects, researchers, sponsors, and the entire KDHS team that participated in the 1998, 2003, and 2008-2009 surveys. The authors declare that they have no competing interests.

REFERENCES

- WHO, UNICEF. Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding. World Alliance for Breastfeeding Action WHO/UNICEF Meeting. Florence, Italy. World Health Organization; 1990 [cited 2013 Nov 27].
- [2] WHO, UNICEF. Global strategy for infant and young child feeding. Geneva: World Health Organization; 2003 [cited 2013 Nov 27. Available from: http://www.who.int/nutrition/publications/ infantfeeding/9241562218/en/].
- [3] Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS. How many child deaths can we prevent this year? Lancet 2003;362(9377):65–71.
- [4] Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet 2008;371(9608):243–60.
- [5] Gupta A. Infant and young child feeding: an 'optimal' approach. Econ Polit Wkly 2006:3666–71.
- [6] Labbok M. Breastfeeding: a woman's reproductive right. Int J Gynecol Obstet 2006;94(3):277–86.

- [7] Hoddinott P, Tappin D, Wright C. Breast feeding. BMJ 2008;336(7649):881–7.
- [8] Imdad A, Yakoob MY, Bhutta ZA. Effect of breastfeeding promotion interventions on breastfeeding rates, with special focus on developing countries. BMC Public Health 2011;11 (Suppl 3):S24 [1-8].
- [9] Eidelman AI, Schanler RJ, Johnston M, Landers S, Noble L, Szucs K, et al. Breastfeeding and the use of human milk. Pediatrics 2012;129(3):e827–41.
- [10] Cattaneo A, Quintero-Romero S. Protection, promotion and support of breastfeeding in low-income countries. Seminars in Fetal and Neonatal Medicine; 2006 48–53.
- [11] Republic of Kenya, Ministry of Public Health and Sanitation. The World Breastfeeding Trends Initiative (WBTi), Kenya 2012. Nairobi: Ministry of Public Health and Sanitation; 2012.
- [12] UNICEF. Facts for Life. New York. [cited 2013 Nov 27]. Available from http://www.unicef.org/publications/index_ 53254.html; 2010.
- [13] Trussell J, Grummer-Strawn L, Rodriguez G, Vanlandingham M. Trends and differentials in breastfeeding behaviour: evidence from the WFS and DHS. Popul Stud 1992;46(2):285–307.
- [14] Walker AR, Adam FI. Breast-feeding in sub-Saharan Africa: outlook for 2000. Public Health Nutr 2000;3(3):285–92.
- [15] Wilmoth TA, Elder JP. An assessment of research on breastfeeding promotion strategies in developing countries. Soc Sci Med 1995;41(4):579–94.
- [16] Onyango AW, Esrey SA, Kramer MS. Continued breastfeeding and child growth in the second year of life: a prospective cohort study in western Kenya. Lancet 1999;354(9195):2041–5.
- [17] Lakati A, Binns C, Stevenson M. Breast-feeding and the working mother in Nairobi. Public Health Nutr 2002;5(6):715–8.
- [18] Kimani-Murage EW, Madise NJ, Fotso J-C, Kyobutungi C, Mutua MK, Gitau TM, et al. Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, Nairobi Kenya. BMC Public Health 2011;11(1):396.
- [19] WHO. Indicators for assessing infant and young child feeding practices: part II measurement. World Health Organization;
 2010 [cited 2013 Nov 27. Available from: http://www.who.int/ nutrition/publications/infantfeeding/9789241599290/en/].
- [20] Engle PL, Menon P, Haddad LJ. Care and nutrition: concepts and measurement. Intl Food Policy Res Inst 1997:1–50.
- [21] MEASURE DHS, ICF International, Calverton, Maryland. [cited 2013 Nov 8]. Available from http://www.measuredhs.com/ data/Access-Instructions.cfm.
- [22] National Council for Population and Development (NCPD), Central Bureau of Statistics (CBS) (Office of the Vice President and Ministry of Planning and National Development, Kenya), Macro International Inc. (MI). Kenya Demographic and Health Survey, 1998. Calverton, Maryland: NCPD, CBS, and MI; 1999.
- [23] Central Bureau of Statistics (CBS) Kenya, Ministry of Health (MOH) Kenya, Macro ORC. Kenya Demographic and Health Survey 2003. Calverton, Maryland: CBS, MOH, and ORC Macro; 2004.
- [24] Kenya National Bureau of Statistics (KNBS) and ICF Macro. Kenya Demographic and Health Survey, 2008-09. Calverton, Maryland: KNBS and ICF Macro; 2010.
- [25] Rutstein SO, Rojas G. Guide to DHS statistics. Demographic and Health Surveys ORC Macro Calverton, Maryland [cited 2013 Sep 28. Available from: http://www.measuredhs.com/ pubs/pdf/DHSG1/Guide_DHS_Statistics.pdf]; 2006.
- [26] Li R, Scanlon KS, Serdula MK. The validity and reliability of maternal recall of breastfeeding practice. Nutr Rev 2005;63(4):103–10.
- [27] Arimond M, Ruel MT. Progress in developing an infant and child feeding index: an example using the Ethiopia Demographic and Health Survey 2000. Food Consum Nutr Div Discuss Pap 2002;143:1–153.

- [28] Ruel MT. Operationalizing dietary diversity: a review of measurement issues and research priorities. J Nutr 2003;133 (11):3911S–26S.
- [29] Rutstein SO, Johnson K. The DHS wealth index (DHS Comparative Reports No. 6). Calverton ORC Macro; 2004.
- [30] Watson BM. Ethnicity and breastfeeding in Kenya. [cited 2013 Jul 11]; Available from http://trace.tennessee.edu/cgi/viewcontent. cgi?article=2628&context=utk_chanhonoproj; 2013.
- [31] Awumbila M. Social dynamics and infant feeding practices in Northern Ghana. Inst Afr Stud Res Rev 2003;19(2):86–9.
- [32] Huffman SL, Zehner ER, Victora C. Can improvements in breast-feeding practices reduce neonatal mortality in developing countries? Midwifery 2001;17(2):80–92.
- [33] Semega-Janneh IJ, Bøhler E, Holm H, Matheson I, Holmboe-Ottesen G. Promoting breastfeeding in rural Gambia: combining traditional and modern knowledge. Health Policy Plan 2001;16(2):199–205.
- [34] Howard CR, Howard FM, Lanphear B, Eberly S, Oakes D, Lawrence RA. Randomized clinical trial of pacifier use and bottle-feeding or cup feeding and their effect on breastfeeding. Pediatrics 2003;111(3):511–8.
- [35] Ministry of Public Health and Sanitation. National Strategy on Infant and Young Child Feeding 2007 to 2010. Nairobi: Ministry of Public Health and Sanitation, Kenya; 2007. [cited 2013 Nov 27. Available from: http://www.hennet.or. ke/index.php?option=com_jdownloads&Itemid=42&view= finish&cid=101&catid=31&m=0].
- [36] Parliament of Kenya. The Breast Milk Substitutes (Regulation and Control) Act). [cited 2013 Nov 27]. Available from http:// www.kenyalaw.org/klr/fileadmin/pdfdownloads/Acts/ BreastMilkSubstitutes_RegulationandControl_Act2012.pdf; 2012.

- [37] Duong DV, Binns CW, Lee AH. Breast-feeding initiation and exclusive breast-feeding in rural Vietnam. Pub Health Nutr CAB Int 2004;7(6):795–800.
- [38] Dewey KG, Nommsen-Rivers LA, Heinig MJ, Cohen RJ. Risk factors for suboptimal infant breastfeeding behavior, delayed onset of lactation, and excess neonatal weight loss. Pediatrics 2003;112(3):607–19.
- [39] Chapman DJ, Perez-Escamilla R. Identification of risk factors for delayed onset of lactation. J Am Diet Assoc 1999;99(4):450–4.
- [40] Nissen E, Lilja G, Matthiesen A-S, Ransjo-Arvidsson A-B, Uvnas-Moberg K, Widstrom A-M. Effects of maternal pethidine on infants' developing breast feeding behaviour. Acta Paediatr 1995;84(2):140–5.
- [41] Kenya Institute for Public Policy Research and Analysis. Kenya Economic Report 2009. Nairobi: Kenya Institute for Public Policy Research and Analysis; 2009 [cited 2013 Sep 29. Available from: http://www.marsgroupkenya.org/pdfs/2009/ 10/Kenya_Economic_Report_2009.pdf].
- [42] Government of Kenya. RAPID QUALITATIVE ASSESSMENT Beliefs and attitudes around infant and young child feeding in Kenya. Nairobi: Ministry of Health; 2011.
- [43] Goodman SN, Berlin JA. The use of predicted confidence intervals when planning experiments and the misuse of power when interpreting results. Ann Intern Med 1994;121(3):200–6.
- [44] Hoenig JM, Heisey DM. The abuse of power. Am Stat 2001;55(1).
- [45] Senn SJ. Power is indeed irrelevant in interpreting completed studies. BMJ 2002;325(7375):1304.
- [46] Tabachnick BG, Fidell LS. Using multivariate statistics. 5th ed. Boston: Pearson/Allyn & Bacon; 2007.