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Time trends in the prevalence and determinants of age-appropriate breast feeding among children aged 0–23 months in Ghana: a pooled analysis of population-based surveys, 2003–2017

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ABSTRACT

Objective We assessed the sociodemographic and maternal–child characteristics associated with age-appropriate breast feeding among children aged 0–23 months in Ghana.

Methods We pooled data on 12 743 children aged 0–23 months from three Demographic and Health Surveys (2003, 2008 and 2014) and three Multiple Indicator Cluster Surveys (2006, 2011 and 2017–2018). The outcome was age-appropriate breast feeding from birth to 23 months, with age-appropriate breast feeding defined as exclusive breast feeding at 0–5 months (ie, at less than 6 months) and breastfeeding alongside appropriate complementary feeding at 6–23 months. Potential determinants were maternal–child sociodemographic, obstetric and healthcare factors. Logistic regression was used to determine the factors associated with age-appropriate breast feeding. We accounted for the complex sampling design of the cross-sectional surveys in the analysis.

Results Most children aged 0–3 months were exclusively breastfed. Among children aged 4–5 months, the most common feeding pattern was breastfeeding alongside water and/or solid foods. Exclusive breastfeeding prevalence in children less than 6 months peaked in 2008 at 62.8% and declined to 42.9% in 2017. For 6–11 month olds, the percentage experiencing age-appropriate breast feeding has been stable over the last four surveys, ranging from 79.3% in 2008 to 81.1% in 2017. Age-appropriate breast feeding in 12–23 month olds declined from 77.8% in 2003 to 61.2% in 2017. Rural residence, younger age, non-facility births and multiple births were associated with decreased odds of exclusively breast feeding. For 6–11 month olds, age-appropriate breast feeding was less likely if the woman did not receive postnatal care. Younger age, being unmarried, high income, wanting a child later and earlier birth order were associated with decreased odds of age-appropriate breast feeding in 12–23 month olds.

Conclusion Ghanaian children are now less likely to be exclusively breastfed than they were a decade ago. To succeed, breastfeeding promotion programmes should adopt approaches that address the predictors of suboptimal breast feeding at each age, as identified in this study.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study used a series of large nationally representative samples of woman–child dyads from rural and urban areas of Ghana.
⇒ Information was available on a wide range of sociodemographic and maternal–child characteristics.
⇒ WHO recommended definitions and cut-offs were used to categorise the age-appropriate breastfeeding indicators.
⇒ The study's main limitation is the reliance on maternal recall of breastfeeding practices to measure age-appropriate breast feeding.

BACKGROUND

Exclusive breast feeding for the first 6 months of life and continued breast feeding with appropriate complementary foods from 6 months to at least 2 years is recommended by the WHO and UNICEF as the best approach to feeding infants aged 0–23 months.[1 2] Breast feeding, particularly exclusive breast feeding for the first 6 months, confers several benefits for the infant.[3] For instance, breastmilk contains antibodies and immune cells that confer passive immunity on the suckling infant and play a critical role in the immune tolerance of the infant in early life.[4 5] Despite the proven benefits of breast feeding, women in Ghana have reported introducing other foods and stopping breast feeding earlier than recommended.[6]

Historically, Ghana's exclusive breastfeeding rate has been low (2.2% in 1988, 7.4% in 1993, 31.5% in 1998),[7] though it increased to a peak of 63% in 2008.[8] Recent reports from the 2017–2018 Ghana Multiple Indicator Cluster Survey (MICS) showed that

the rate has since declined to 42%.[9] The trend over the last decade demonstrates that unless effective efforts are taken to reverse the downward trend in the exclusive breastfeeding rate, Ghana is on track to miss the WHO's 2025 target of exclusively breast feeding 50% of newborns during their first 6 months of life.[10]

A range of factors, including sociodemographic (maternal education, maternal age, urban–rural residence, marital status, maternal employment and income level) and obstetric characteristics (mode of delivery, place of delivery, parity, antenatal visits, postnatal care and preterm birth) of mothers and their immediate family influence breastfeeding decisions and practices in Africa and other low-income settings.[11–15] However, the range of determinants and the magnitude of the effect vary both between countries and within countries between different regions. For instance, in Ghana, no association was found between maternal education and exclusive breast feeding in a population-based study in 2013.[16] However, women with tertiary education were less likely than those with no education to practice exclusive breast feeding in a study in child welfare clinics in 2018.[17] Adolescent women were less likely than older women to practise exclusive breast feeding in studies in 2018 and 2020,[17 18] though no evidence of association was found with age in a study in 2013.[16]

Understanding the factors that hinder age-appropriate breast feeding could help inform the design of interventions to improve the number of age-appropriately breastfed children and reverse the current declines in the duration of breast feeding in Ghana. Using data from six nationally representative population-based surveys, we investigated the sociodemographic and maternal obstetric factors and child characteristics associated with age-appropriate breast feeding among Ghanaian children aged 0–23 months.

METHODS

Data sources

Our study is a secondary analysis of data from the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS). The three rounds of DHS data included in this analysis were collected in 2003, 2008 and 2014 while the MICS data were collected in 2006, 2011 and 2017–2018. Both DHS and MICS are nationally representative, repeated cross-sectional, population-based household surveys that use a comparable methodology to collect, analyse and disseminate information on population health and demographic trends of women, children and men of selected households using a multistage stratified cluster sampling approach. For the surveys analysed in this study, Ghana's former 10 administrative regions were stratified into urban and rural areas and further divided into clusters (enumeration areas) using the probability proportional to size method based on the number of households. Households in each cluster were listed, and systematic methods were used to select a fixed number of households from each cluster for interviews. Both DHS and MICS oversampled rural enumeration areas in Ghana's middle and northern regions.

MICS and DHS work closely together and use interagency processes to ensure that survey instruments are as comparable as possible.[19] In addition, both surveys were carried out by the Ghana Statistical Services, in collaboration with other public institutions and ministries, using the same sampling frame, similar procedures and processes, permitting the pooling of data across the surveys. A detailed description of the sample design, questionnaires used, and methodology of the surveys is published elsewhere.[9 20–24]

Study population

This study included only children born in the 2 years before the survey who were alive and living with their mothers at the time of the survey. Only the last-born child was included in the analysis for women who delivered more than one child in the 2 years preceding the survey. Children older than 23 months were excluded.

Definitions of indicators

Outcome variable

In both DHS and MICS, women were asked about their children's feeding practices 24 hours preceding the interview. Women were asked if they ever breastfed the child, were still breastfeeding the child, how long after birth they first put the child to the breast and if the child was given anything to drink other than breastmilk in the first 3 days after delivery. In addition, the surveys asked women about (1) other types of milk (powder/tinned milk, formula or fresh milk), (2) plain water, (3) non-milk liquids (juice drinks, tea, flour water (zomkom) or coffee) and (4) solid, semisolid or soft foods the child had the day or night before the interview. This information was used together with the child's current age to estimate the child's current breastfeeding status.

For the analysis reported here, the outcome of interest was age-appropriate breast feeding, defined as the feeding of infants 0–5 months (ie, less than 6 months old) with only breastmilk and no other liquids or solids except for oral rehydration salt, drops and syrups (vitamins, mineral supplements or medicines) in the 24 hours preceding the interview; and the feeding of children aged 6–23 months with breastmilk as well as solid, semisolid or soft foods in the 24 hours preceding the interview. These indicators are recommended for use with a cross-sectional sample by the WHO.[25]

Potential determinants

We examined three groups of explanatory variables for the determinants of age-appropriate breast feeding. The variables were chosen after a careful evaluation of relevant studies, including systematic reviews.[26–29]

Maternal sociodemographic factors

The maternal sociodemographic factors assessed for association with age-appropriate breast feeding were age, marital status, place of residence (urban vs rural),

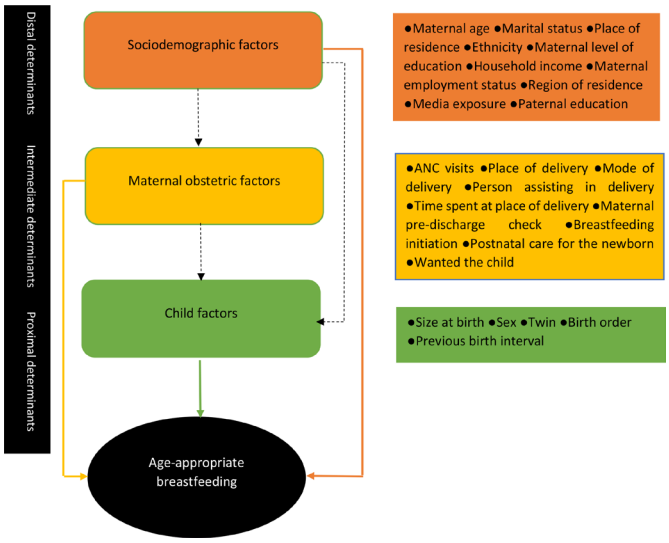

Figure 1 Conceptual framework of the determinants of age-appropriate breast feeding based on the hierarchical approach proposed by Victora *et al*.[32] ANC, antenatal care.

ethnicity, level of education, household income, employment, region, media exposure and paternal education. Media exposure was unavailable for MICS 2006, and employment was only available in the three DHSs.

Maternal obstetric and healthcare factors

The maternal obstetric and healthcare factors assessed were the number of antenatal visits, place of delivery, mode of delivery, person assisting in delivery, time spent at place of delivery, maternal pre-discharge check (this was asked to women who delivered in a health facility), breastfeeding initiation, postnatal care and wantedness of the child (wanted then, wanted later and wanted no more). For the 2003 DHS and 2006 MICS, data on 'postnatal care for the newborn' were not collected. 'Time spent at place of delivery' and 'maternal pre-discharge check' were unavailable for MICS 2006.

Child characteristics

The child characteristics assessed were sex, multiple births, maternal report of child size at birth, birth order and previous birth interval.

Conceptual framework

To guide the analysis, we developed a conceptual framework. The UNICEF conceptual framework on child undernutrition[30 31] was considered, but Victora *et al*,[32] hierarchical framework was better suited to the study's objectives since evidence suggests that breastfeeding determinants are hierarchical,[26–28] extending from distal to proximate determinants. Furthermore, the hierarchical framework structure allows for the systematic adjustment for any distal influence on proximal determinants while avoiding mediating factor adjustment. On the other hand, the UNICEF framework is cyclical, making it unsuitable for guiding the analysis and interpretation of our study. As a result, the hierarchical conceptual framework was used to clarify the relationship among the explanatory factors, their relationship with the outcome of interest and to demonstrate how the hierarchical interrelationships between the factors were controlled in the analysis (figure 1).

Data analysis

Stata V.16 (Stata Corp) was used. The six surveys were pooled to improve power and examine any time trends. Clustering, stratification and survey weight variables from the DHS and MICS were applied.[8 9 22 33–35] As per DHS guidelines, we de-normalised the weights to account for pooling the data from separate surveys.[36]

As age-appropriate breast feeding varies depending on the child's age, we analysed the data in three groups according to the child's age at the time of the survey: 0–5 months, 6–11 months and 12–23 months. Anything other than exclusive breast feeding is classified as inappropriate in the youngest group. Inappropriate breast feeding in the older age groups can result from the delayed introduction of semisolid and solid foods or stopping breast feeding too early, the latter of which is more common with increasing age.

Multivariable logistic regression was used to examine the independent association of the potential determinants with exclusive breast feeding 0–5 months and age-appropriate breast feeding at 6–11 and 12–23 months. All potential determinants were included in the multivariable model at each level, but only determinants associated with the outcomes at $p<0.10$ were retained as confounders for the more proximate levels. In line with the hierarchical approach, sociodemographic factors were first introduced into the multivariable model and factors associated with the outcome were retained in a core model. Then, maternal obstetric factors were added one at a time to the retained sociodemographic factors (sociodemographic factors+maternal obstetric factors), and we kept maternal obstetric factors that showed evidence of association with the outcomes in the adjusted model. Finally, child factors were added one at a time to the retained sociodemographic and maternal obstetric factors (sociodemographic factors+maternal obstetric factors+child factors), and we retained only child factors that were independently associated with the outcomes.

The main multivariable model omitted potential determinants that were not available in all the surveys. Estimates for the omitted variables were produced from a separate model using the hierarchical modelling approach described. We adjusted all of the models for the years in which the surveys were conducted and separately examined the association between survey year and odds of age-appropriate breast feeding, having adjusted for the sociodemographic, maternal and child factors associated with age-appropriate breast feeding.

Sensitivity analyses were conducted using the same analytical approach to explore the major types of age-inappropriate breast feeding. In children aged 6–11 months, we examined the introduction of solid food by

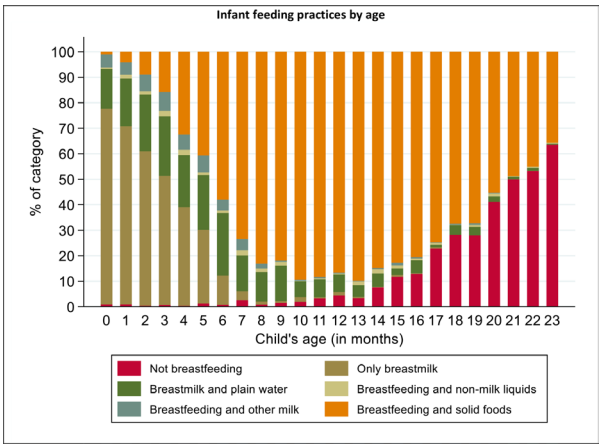

Figure 2 Distribution of infant feeding practices by child's age.

excluding the (few) children who were not breastfed. The second analysis examined continued breast feeding in children aged 12–23 months by excluding the (few) children who did not receive solid food.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research

RESULTS

Trends in prevalence of age-appropriate breast feeding, 2003–2017

All the surveys had response rates higher than 90%, and we included a total of 12 743 (unweighted) children aged 0–23 months in the analysis (online supplemental material table 1), with 3329 children aged 0–5 months, 3241 aged 6–11 months and 6173 aged 12–23 months. Overall, the pooled data showed that 51.6% of infants aged 0-5 months were exclusively breastfed, and 77.9% and 69.4% of women reported feeding infants breastmilk as well as solid, semisolid or soft foods at ages 6–11 months and 12–23 months, respectively. Figure 2 indicates that while some infants aged less than 1 month were given water (15.7%) or other forms of milk (5.1%) alongside breastmilk, the majority of infants aged 0–3 months were exclusively breastfed. Beyond age 3 months, most children were given solid foods or water, alongside breast feeding. The percentage of children receiving breastmilk and solid food increased until it peaked at 10–13 months. Cessation of breast feeding gradually increased from the first month after birth, and more than half of the children aged 22 months were not fed any breastmilk.

As illustrated in figure 3A, all surveys showed a similar pattern in age-appropriate breast feeding from birth to 23 months. After the initial high rate of exclusive breast feeding at birth in all the surveys, there was a rapid decline in exclusive breast feeding to age 5 months. The percentage of children age-appropriately breastfed (breast feeding with solid foods) gradually increased after this until around 12 months, after which it steadily declined.

The prevalence of exclusive breast feeding in children younger than 6 months peaked in 2008 and then declined (figure 3B). In the 6–11 month age group, the prevalence of age-appropriate breast feeding rose initially and has remained steady throughout the last four surveys, whereas the prevalence of age-appropriate breast feeding in children aged 12–23 months has declined.

Determinants of age-appropriate breast feeding in children aged 0–23 months

Table 1 summarises the factors associated with exclusive breast feeding in children aged 0–5 months, with the results for all potential determinants provided in online supplemental material 2 (online supplemental material tables 2–4). Maternal age, place of residence, ethnicity, region, place of delivery and multiple births were the factors associated with exclusive breast feeding in children

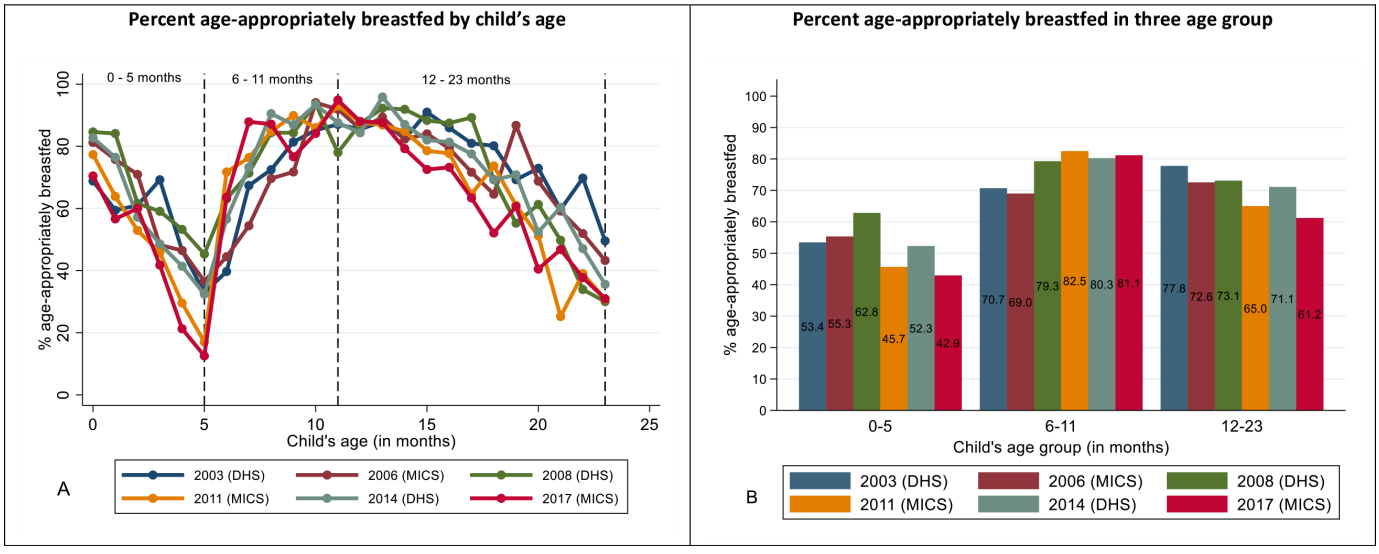

Figure 3 Percent age-appropriately breastfed by (A) child's age (in months) and (B) by child's age group. DHS, Demographic and Health Survey; MICS, Multiple Indicator Cluster Survey.

Table 1 Summary of pooled unadjusted and adjusted estimates of the factors associated with exclusive breast feeding in children aged 0–5 months in Ghana, 2003–2017

	Number exclusively breastfed*	% exclusively breastfed†	Unadjusted OR (95% CI)	Wald test P value	Adjusted OR (95% CI)	Adjusted Wald test P value
Sociodemographic factors						
Maternal age (in years)‡						
<20	123	40.6	0.62 (0.46 to 0.84)	0.006	0.62 (0.45 to 0.85)	0.01
20–34	1264	52.5	1.00		1.00	
35–49	429	53.2	1.03 (0.82 to 1.29)		1.01 (0.80 to 1.28)	
Place of residence‡						
Urban	608	54.8	1.24 (1.02 to 1.50)	0.03	1.54 (1.25 to 1.91)	<0.001
Rural	1220	49.5	1.00		1.00	
Ethnicity‡						
Akan	446	41.7	0.48 (0.38 to 0.61)	<0.001	0.69 (0.47 to 1.00)	0.001
Ga/dangme	87	45.6	0.56 (0.38 to 0.84)		0.76 (0.45 to 1.27)	
Ewe	215	63.2	1.15 (0.83 to 1.60)		1.49 (0.93 to 2.39)	
Mole-dagomba	622	59.9	1.00		1.00	
Grusi	106	60.1	1.01 (0.57 to 1.77)		1.02 (0.59 to 1.76)	
Gurma	137	64.0	1.19 (0.78 to 1.82)		1.46 (0.91 to 2.32)	
Other	214	60.2	1.01 (0.72 to 1.42)		1.22 (0.82 to 1.81)	
Region (ordered by poverty levels)‡						
Upper West region	281	72.7	1.69 (1.10 to 2.61)	<0.001	2.02 (1.26 to 3.25)	
Northern region	344	61.1	1.00		1.00	
Upper East region	238	68.9	1.41 (0.98 to 2.03)		1.61 (1.08 to 2.40)	
Volta region	152	61.4	1.01 (0.69 to 1.49)		0.86 (0.52 to 1.42)	
Brong Ahafo region	166	61.7	1.03 (0.70 to 1.50)		1.30 (0.83 to 2.05)	
Western region	112	38.7	0.40 (0.28 to 0.57)		0.59 (0.38 to 0.91)	<0.001
Central region	127	42.2	0.46 (0.33 to 0.65)		0.69 (0.44 to 1.09)	
Eastern region	130	51.6	0.68 (0.47 to 0.97)		0.92 (0.58 to 1.45)	
Ashanti region	140	39.1	0.41 (0.29 to 0.57)		0.57 (0.37 to 0.89)	
Greater Accra region	138	52.2	0.70 (0.48 to 1.02)		0.72 (0.44 to 1.17)	
Maternal/healthcare factors						
Place of delivery§						
Elsewhere	660	48.9	0.84 (0.70 to 1.01)	0.06	0.68 (0.54 to 0.84)	0.001
Health facility	1149	53.3	1.00		1.00	
Child factors						
Multiple birth¶						
Yes	40	41.7	0.68 (0.36 to 1.28)	0.24	0.56 (0.31 to 1.02)	0.06
No	1544	51.2	1.00		1.00	

Region is ordered based on the 2017 regional poverty incidence from poorest to least poor.[42]
*Unweighted count.
†Weighted percentage.
‡Adjusted for maternal age, marital status, place of residence, ethnicity, maternal educational level, household income, region, father's education and survey year (number of unweighted observations=3306).
§Adjusted for maternal age, place of residence, ethnicity, region, survey year, number of antenatal visits, place of delivery, person assisting in delivery, breastfeeding initiation and wanted last child (number of unweighted observations=3290).
¶Adjusted for maternal age, place of residence, ethnicity, region, survey year, place of delivery, sex of child, birth order, child size at birth, multiple births and previous birth interval (number of unweighted observations=2651).

younger than 6 months. Adolescent women were less likely to exclusively breastfeed than older women, and those in urban areas were more likely to breastfeed exclusively than those in rural areas. Births outside healthcare facilities were associated with lower odds of exclusive breast feeding than births in healthcare facilities. Women who had multiple births were less likely to breastfeed exclusively than those with singleton births. The odds of exclusive breast feeding in the first 6 months after birth varied by ethnicity and region.

A summary of the determinants of age-appropriate breast feeding at 6–11 months is presented in table 2, with the crude and adjusted estimates for all potential determinants provided in online supplemental material 2 (online supplemental material tables 5–7). Postnatal care, ethnicity and region were the factors associated with age-appropriate breast feeding at 6–11 months. Women who did not receive postnatal care were less likely to age-appropriately breastfeed at 6–11 months compared with those who received postnatal care. The odds of age-appropriate breast feeding at 6–11 months varied by ethnicity and region. In a sensitivity analysis that included only children who were still breast feeding at age 6–11 months (online supplemental material tables 11–13), the determinants were slightly different for the introduction of solid foods. Women were more likely to introduce solid foods to twins or higher-order multiples at 6–11 months compared with single-born infants. A higher paternal educational level was associated with increased odds of solid food introduction at 6–11 months compared with no paternal education. Postnatal care was not associated with the introduction of solid food at 6–11 months.

The determinants of age-appropriate breast feeding at 12–23 months are summarised in table 3, with crude and adjusted estimates for all potential determinants presented in online supplemental material 2 (online supplemental material tables 8–10). Maternal age, marital status, ethnicity, region, household income, wantedness of the child and birth order were associated with age-appropriate breast feeding at 12–23 months. Older women were more likely than women aged 20–34 years to appropriately breastfeed children aged 12–23 months, and unmarried women were less likely to appropriately breastfeed children aged 12–23 months than married women. There were regional and ethnic variations in the odds of age-appropriate breast feeding. Women in high-income households were less likely than women in low-income households to appropriately breastfeed children aged 12–23 months. Women who wanted a child later or not at all were less likely to appropriately breastfeed children aged 12–23 months than women who reported they had wanted a child. Lower-order births were less likely to be appropriately breastfed at age 12–23 months than higher-order births. In a sensitivity analysis that included only children receiving solid foods at 12–23 months (online supplemental material tables 14–16), the determinants of continued breast feeding at 12–23 months were slightly different. Non-facility delivery was associated with higher odds of continued breast feeding than facility deliveries, and women in urban areas were less likely than women in rural areas to continue breast feeding at 12–23 months. The CI for wantedness of a child was slightly wider and not associated with continued breast feeding.

Trends in the odds of age-appropriate breast feeding from 2003–2017

After adjusting for the sociodemographic, maternal and child factors associated with age-appropriate breast feeding, the odds of age-appropriate breast feeding decreased over time for children younger than 6 months and those aged 12–23 months (figure 4). In the 6–11 month age group, the odds of age-appropriate breast feeding were lower in the first two surveys and then stable.

DISCUSSION

We found that some women gave water and other forms of milk to children during the first month after birth, and among those aged 4 months, half of the children were receiving solid foods and water. The trends over time in the prevalence of age-appropriate breast feeding varied by child's age group. Exclusive breast feeding of children under 6 months increased from 53.4% in 2003 to a peak of 62.8% in 2008 before falling to 42.9% in 2017. Age-appropriate breast feeding for children aged 6–11 months rose over time and then remained steady, whereas it gradually decreased for children aged 12–23 months. Our findings showed that the factors influencing age-appropriate breast feeding in children under 2 years also varied with age. Younger women were less likely to appropriately breastfeed at 0–5 months and 12–23 months. Non-facility delivery and twins or higher-order multiple births were associated with lower odds of appropriate breast feeding at 0–5 months, with no evidence of association in the other age groups. Postnatal care was only a determinant in the 6–11 months group, with non-attendance associated with lower odds of appropriate breast feeding. Maternal marital status, household income, wantedness of the child and the child's birth order were only determinants in the 12–23 months group, where unmarried women, women in high-income households, women who wanted a child later or not at all and earlier birth order were associated with lower odds of appropriate breast feeding. Across the three age groups, appropriate breast feeding varied by ethnicity and region.

In agreement with our finding, several previous studies have reported lower odds of exclusive breast feeding in adolescents.[17 18 37] Prior studies in Ghana have revealed that adolescents introduce complementary feeding earlier than recommended to avoid undesired breast changes or public breast feeding.[38 39] Moreover, young women may be more likely to lack the confidence to breastfeed effectively and are more likely to introduce other foods to compensate for perceived breastmilk insufficiency.[39–41] Perceived insufficient breastmilk may also explain why

Table 2 Summary of pooled unadjusted and adjusted estimates of the factors associated with age-appropriate breast feeding in children aged 6–11 months in Ghana, 2003–2017

	Number age-appropriately breastfed*	% age-appropriately breastfed†	Unadjusted OR (95% CI)	Wald test P value	Adjusted OR (95% CI)	Adjusted Wald test P value
Sociodemographic factors						
Ethnicity‡						
Akan	874	82.4	2.26 (1.69 to 3.02)	<0.001	1.30 (0.86 to 1.98)	0.06
Ga/dangme	163	87.7	3.44 (2.03 to 5.85)		2.17 (1.16 to 4.07)	
Ewe	299	83.5	2.45 (1.66 to 3.60)		1.80 (1.06 to 3.06)	
Mole-dagomba	667	67.5	1.00		1.00	
Grusi	110	81.1	2.07 (1.09 to 3.92)		1.55 (0.83 to 2.91)	
Gurma	130	68.5	1.05 (0.68 to 1.62)		1.17 (0.74 to 1.85)	
Other	225	65.7	0.92 (0.65 to 1.31)		0.91 (0.63 to 1.32)	
Region (ordered by poverty levels)‡						
Upper West region	259	69.9	1.65 (1.13 to 2.42)		1.69 (1.14 to 2.49)	
Northern region	364	58.5	1.00		1.00	
Upper East region	220	69.3	1.61 (1.07 to 2.40)		1.50 (0.98 to 2.31)	
Volta region	202	77.1	2.39 (1.57 to 3.63)		1.62 (0.95 to 2.75)	
Brong Ahafo region	206	75.3	2.17 (1.45 to 3.22)		1.76 (1.09 to 2.85)	
Western region	233	83.5	3.60 (2.29 to 5.67)	<0.001	2.71 (1.61 to 4.55)	<0.001
Central region	271	80.6	2.96 (1.87 to 4.67)		2.18 (1.25 to 3.80)	
Eastern region	239	86.6	4.61 (3.00 to 7.07)		3.22 (1.93 to 5.36)	
Ashanti region	284	86.1	4.40 (2.97 to 6.51)		3.49 (2.18 to 5.58)	
Greater Accra region	194	80.2	2.87 (1.81 to 4.56)		1.90 (1.13 to 3.20)	
Maternal/healthcare factors						
Postnatal care for the newborn§						
Yes	877	82.5	1.00	0.40	1.00	0.09
No	580	80.4	0.87 (0.64 to 1.20)		0.74 (0.53 to 1.04)	

Region is ordered based on the 2017 regional poverty incidence from poorest to least poor.[42]
*Unweighted count.
†Weighted percentage.
‡Adjusted for maternal age, marital status, place of residence, ethnicity, maternal educational level, household income, region, father's education and survey year (number of unweighted observations=3210).
§Adjusted for ethnicity, region, survey year, number of antenatal visits, place of delivery, person assisting in delivery, breastfeeding initiation, wanted last child, maternal pre-discharge check, caesarean delivery, time spent at place of delivery and Postnatal care for the newborn (number of unweighted observations=1715).

Table 3 Summary of pooled unadjusted and adjusted estimates of the factors associated with age-appropriate breast feeding in children aged 12–23 months in Ghana, 2003–2017

	Number age-appropriately breastfed*	% age-appropriately breastfed†	Unadjusted OR (95% CI)	Wald test P value	Adjusted OR (95% CI)	Adjusted Wald test P value
Sociodemographic factors						
Maternal age (in years)‡						
<20	210	69.5	1.05 (0.74 to 1.48)	0.01	1.21 (0.83 to 1.77)	0.04
20–34	2928	68.5	1.00		1.00	
35–49	1278	74.1	1.31 (1.10 to 1.57)		1.26 (1.04 to 1.52)	
Maternal marital status‡						
Not married	449	60.6	0.56 (0.46 to 0.69)	<0.001	0.67 (0.53 to 0.84)	0.003
married	3265	73.2	1.00		1.00	
Living with partner	702	65.5	0.69 (0.57 to 0.84)		0.91 (0.74 to 1.11)	
Ethnicity‡						
Akan	1252	60.8	0.31 (0.25 to 0.39)	<0.001	0.54 (0.38 to 0.75)	0.001
Ga/dangme	197	61.9	0.33 (0.24 to 0.46)		0.74 (0.47 to 1.15)	
Ewe	431	69.1	0.45 (0.35 to 0.59)		0.60 (0.40 to 0.90)	
Mole-dagomba	1473	83.2	1.00		1.00	
Grusi	223	79.8	0.80 (0.46 to 1.40)		0.92 (0.53 to 1.62)	
Gurma	384	80.8	0.85 (0.60 to 1.22)		0.75 (0.50 to 1.12)	
Other	493	79.5	0.78 (0.57 to 1.08)		0.95 (0.65 to 1.40)	
Household income‡						
Low income	2794	77.6	1.00	<0.001	1.00	<0.001
Middle income	691	70.2	0.68 (0.55 to 0.84)		0.95 (0.76 to 1.19)	
High income	970	58.7	0.41 (0.35 to 0.49)		0.61 (0.50 to 0.75)	
Region (ordered by poverty levels)‡						
Upper West region	559	86.9	0.98 (0.69 to 1.40)		0.83 (0.56 to 1.25)	
Northern region	965	87.1	1.00		1.00	
Upper East region	496	85.0	0.84 (0.60 to 1.19)		0.77 (0.52 to 1.14)	
Volta region	353	79.9	0.59 (0.40 to 0.85)		0.90 (0.57 to 1.42)	
Brong Ahafo region	399	73.4	0.41 (0.29 to 0.57)		0.65 (0.44 to 0.96)	
Western region	320	65.9	0.29 (0.21 to 0.40)	<0.001	0.53 (0.35 to 0.81)	<0.001
Central region	361	62.7	0.25 (0.19 to 0.33)		0.48 (0.33 to 0.72)	
Eastern region	306	60.7	0.23 (0.17 to 0.31)		0.41 (0.27 to 0.60)	

Continued

Table 3 Continued

	Number age-appropriately breastfed*	% age-appropriately breastfed†	Unadjusted OR (95% CI)	Wald test P value	Adjusted OR (95% CI)	Adjusted Wald test P value
Ashanti region	428	63.8	0.26 (0.19 to 0.36)		0.49 (0.33 to 0.71)	
Greater Accra region	268	55.5	0.18 (0.14 to 0.25)		0.38 (0.25 to 0.58)	
Maternal/healthcare factors						
Wanted last child§						
Wanted then	2767	73.1	1.00		1.00	0.09
Wanted later	1205	66.5	0.73 (0.62 to 0.86)	0.001	0.83 (0.69 to 1.00)	
Wanted no more	393	68.2	0.79 (0.61 to 1.01)		0.81 (0.61 to 1.07)	
Child factors						
Birth order¶						
1	738	62.2	0.53 (0.43 to 0.65)	<0.001	0.65 (0.50 to 0.86)	0.009
2–3	1365	67.8	0.68 (0.56 to 0.82)		0.78 (0.62 to 0.98)	
4+	1768	75.6	1.00		1.00	

Region is ordered based on the 2017 regional poverty incidence from poorest to least poor.[42]
*Unweighted count.
†Weighted percentage.
‡Adjusted for maternal age, marital status, place of residence, ethnicity, maternal educational level, household income, region, paternal education and survey year (number of unweighted observations=6057).
§Adjusted for maternal age, marital status, ethnicity, household income, region, survey year, number of antenatal visits, place of delivery, person assisting in delivery, breastfeeding initiation and wanted last child (number of unweighted observations=5867).
¶Adjusted for maternal age, place of residence, ethnicity, region, survey year, place of delivery, sex of child, birth order, child size at birth, multiple births and previous birth interval (number of unweighted observations=5260).

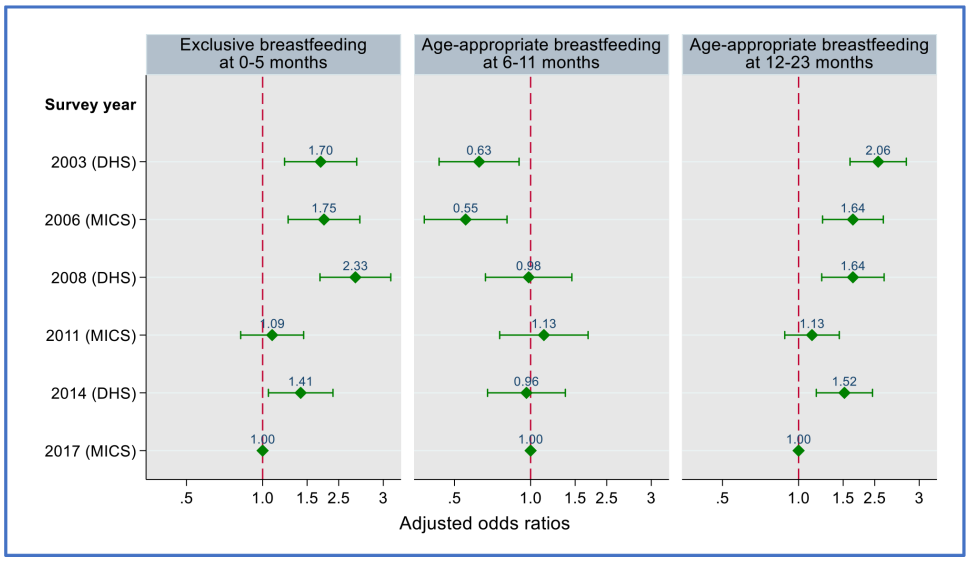

Figure 4 Trends in the odds of age-appropriate breast feeding in Ghana by survey year (adjusted for maternal age, marital status, place of residence, ethnicity, maternal educational level, household income, region, paternal education, media exposure and maternal employment). The reference category is 2017 MICS. DHS, Demographic and Health Survey; MICS. MICS, Multiple Indicator Cluster Survey.

women with multiple births were less likely to breastfeed exclusively. This could also be the consequence of the higher demand of care that comes with multiple births, compelling women to introduce other foods in the first 6 months without adequate support.

Ethnicity and region of residence were associated with exclusive breast feeding in the first 6 months after birth and age-appropriate breast feeding at 6–11 and 12–23 months. The variations in the odds of exclusive breast feeding across ethnic groups and administrative regions highlight the influence of traditional and cultural practices and regional socioeconomic disparities on breast feeding infants and young children. For instance, women in Ghana's poorest regions were more likely to practice exclusive breast feeding than those in other regions. However, it is possible that because of the higher poverty level in these regions,[42] women cannot afford infant formula, increasing their reliance on breastmilk.[38 41] Women from the Volta region, one of the country's poorest regions, were less likely to breastfeed exclusively, though the results suggested that women of the region's predominant ethnic group were more likely to breastfeed exclusively. There was only a slight variation in age-appropriate breast feeding among the regions and ethnic groups in the older age groups. It is possible that women with higher income levels were less likely to appropriately breastfeed children aged 12–23 months because they can afford complementary foods and the need for them to terminate breast feeding to return to work. Additionally, in many Ghanaian cultures, childbirth out of wedlock is frowned on,[43] and unmarried women may not receive adequate support from their families compared with those in a union. The lack of support may explain why unmarried women were less likely to appropriately breastfeed children 12–23 months than married women in our study. Even at healthcare centres, unmarried pregnant women are sometimes mistreated,[44] denying them the opportunity to learn appropriate feeding practices during antenatal and postnatal visits.

In contrast to our results, Ganle *et al*[45] found that women in rural areas were more likely to breastfeed exclusively than those in urban areas. The discrepancy between Ganle *et al*'s findings and ours could be attributed to their study's smaller sample size (n=322) and the fact that their study sample was not nationally representative. Urban women are more likely to give birth in a hospital under the supervision of trained professionals, which exposes them to expert guidance and education on exclusive breast feeding, and this may explain why, in this study, women who delivered in a health facility were more likely to breastfeed exclusively than those who delivered elsewhere. Additionally, women who deliver in healthcare facilities are likely to have used other healthcare services such as postnatal care. Indeed, our results showed that women who received postnatal care were more likely to appropriately breastfeed children aged 6–11 months than those who did not.

It is not surprising that women who wanted a child when they got pregnant were more likely to appropriately breastfeed children aged 12–23 months than those whose child was less wanted. It is reasonable to assume that women who want a child are highly likely to plan their pregnancy, seek antenatal care services, deliver in a healthcare facility, attend postnatal care and adopt other health-promoting activities, including a positive attitude towards breast feeding.

Given the vital importance of exclusive breast feeding in the early months of a child's life, it is worrying that women introduce complementary foods earlier than recommended. Efforts should be made to scale up

exclusive breast feeding beyond the first 3 months after birth. For instance, adolescents and women in rural areas should be educated on the benefits of exclusive breast feeding to the child and the woman and efforts made to address any misperceptions about the practice. Any prejudice towards unmarried women needs to be addressed. Support from family and healthcare professionals could help unmarried women to appropriately breastfeed their children.

An important strength of this study is the use of a nationally representative sample of woman–child dyad from rural and urban areas of Ghana and the fact that we considered a wide range of potential determinants, adjusted for potential confounders and had a large sample size, making our findings generalisable to infants and young children under 2 years and relevant to policies on breast feeding. Also, using a hierarchical approach to the data analysis ensured the potential confounders were systematically controlled to prevent adjusting for factors on the causal pathway. The study's main limitation is the reliance on maternal recall of breastfeeding practices to measure age-appropriate breast feeding. Notably, social desirability bias has the potential to distort the associations. Women may have reported breastfeeding practices and healthcare behaviours in a manner considered acceptable or desirable. In addition, there was a slight difference in persons responding to breastfeeding questions between the surveys as the 2006 and 2011 MICSs collected information from caregivers where biological mothers were unavailable. The categorisation or regrouping of explanatory variables may have resulted in residual confounding in the adjusted analysis. The three age-appropriate breastfeeding indicators presented in this study were estimated using a cross-section of children in a given age range, as recommended by the WHO.[46] They should not be interpreted as representing the proportion of newborns who were breastfed until the upper age limits of the age-appropriate breastfeeding categories.

CONCLUSION

Our results show that in the first 3 month after birth, many women introduced other foods and liquids to children and among infants aged 4 months, more than half are no longer exclusively breastfed. However, some women delayed the introduction of solid foods. Termination of breast feeding before the recommended 2 years was common after the seventh month after birth. Exclusive breast feeding in the first 6 months and appropriate breast feeding of children 12–23 months have decreased over time. There has been no substantial change in the appropriate breast feeding of children 6–11 months in recent surveys. Our findings revealed that the determinants of age-appropriate breast feeding in Ghana are multifaceted and age-dependent. Maternal sociodemographic factors had a greater influence on age-appropriate breast feeding than obstetric or healthcare factors. Breastfeeding interventions in Ghana have been known to focus on exclusive breast feeding[47]; we recommend the extension of breastfeeding interventions throughout the first 2 years after birth, focusing on the higher-risk groups identified in this study.

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