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# Acculturation And Likelihood Of Exclusive Breastfeeding Among Liberian Refugees And Ghanaians Living In Buduburam Camp In Ghana: A Cross-Sectional Study

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Acculturation and Likelihood of Exclusive Breastfeeding  
in Liberian Refugees of Buduburam Camp in Ghana

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## Abstract

Poor breastfeeding practices can put children at increased risk of morbidity and mortality particularly due to diarrheal and respiratory diseases and impaired physical and mental development. It is therefore important to understand the determinants of exclusive breastfeeding, particularly among residents in refugee settlements who may not have access to key resources and health education. The purpose of this study was to explore if acculturation influenced exclusive breastfeeding practices among Liberian refugees living in the Buduburam refugee settlement. A cross-sectional survey was administered between July - August 2008 to Ghanaian and Liberian women, with at least one biological child between 6 months and five years of age, who lived at Buduburam Refugee Settlement in Ghana. The sample (n=480) consisted of 120 Liberians living in zones 1-10, 119 Liberians living in zones 11-12, 121 Ghanaians living in zone 11-12, and 120 Ghanaians living in urban, Awutu villages 5 kilometers from Buduburam. Liberian mothers who lived in Ghana at least eight years were significantly more likely to exclusively breastfeed (OR: 2.13, 95% CI: 1.25, 3.61) compared to Ghanaian mothers living in Awutu (outside the camp). After adjustment for confounders, Liberian mothers who lived in Ghana for at least 8 years were still more likely to exclusively breastfeed (OR: 1.78, 95% CI: 1.02, 3.09), compared to Ghanaian mothers who lived in Awutu. These findings suggest that increased time in the Ghanaian context of Buduburam improved the chances of relative success with EBF. Further research to understand the “mechanisms” explaining exclusive breastfeeding differences will be crucial for improving breastfeeding in refugee settlements and host communities in low income countries.

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## **Acculturation and Likelihood of Exclusive Breastfeeding among Liberian Refugees in Buduburam Camp in Ghana: a Cross-Sectional Study**

Several studies have shown the importance of exclusive breastfeeding for child health in low- and middle-income countries. Breastfeeding is known to be protective against gastrointestinal and respiratory infections (Aidam et al., 2005). Furthermore, increasing the duration of breastfeeding and specifically, exclusively breastfeeding, have shown to be even more protective against such morbidities (Kramer and Kakuma, 2007). An infant is considered to be exclusively breastfed if mothers solely provide breast milk for the first six months of life. This definition is based on the World Health Organization recommendation in the Global Strategy on Infant and Young Child Feeding Report (WHO, 2002). After six months, infants should continue receiving breast milk in addition to complementary foods until two years of age (Liberia Institute of Statistics and Geo-Information Services, 2014).

Global trends across 140 countries indicate that exclusive breastfeeding has increased from 33% in 1995 to 39% in 2010 with the largest improvements in exclusive breastfeeding rate seen in West and Central Africa (Cai, 2012). The Liberia Demographic Health Surveys (DHS) indicate that whereas only 29% of Liberian infants less than 6 months were exclusively breastfed in 2007, by 2013 this rate had increased to 55% (Liberia Institute of Statistics and Geo-Information Services, 2014). Similarly, in Ghana, exclusive breastfeeding rates among infants under 6 months of age increased from less than 5% in 1989 to 64% in 2008 (Tampah-Naah, 2013; GSS, 2009). This major progress is likely to be explained by several initiatives that were put in place in order to improve breastfeeding practices in Ghana such as the 1991 Baby-Friendly Hospital Initiative (BFHI) and the implementation of the WHO code for marketing of breast milk substitutes in 2000 (Tampah-Naah, 2013). Despite this significant increase in exclusive breastfeeding rates, there may be a disparity in optimal breastfeeding patterns across certain sub-groups in West African, like refugees.

There is a dearth of studies on breastfeeding practices among refugee or displaced populations (Labbok, 2007). Evidence has shown an increased risk of difficulty breastfeeding among displaced women in emergency situations in Sudan (UNFPA, 2010). However, the protective benefit of breastfeeding against infections in an emergency situation in Guinea-Bissau was even larger than in normal settings (Jakobsen et al., 2003). Another study found very high exclusive breastfeeding rates among Palestinian refugees living in three refugee camps in Palestine (Musmar, 2012). The majority of the literature on breastfeeding practices among refugee populations has been limited to developed countries, and very little focus has been placed on breastfeeding practices among African refugees (Issaka et al., 2014; Gallegos et al., 2013; Golin et al., 2003). Though refugees are a distinct population, they are often not differentiated from other immigrants, and assessed as a collective group in research. Most of the literature focusing on breastfeeding among immigrant populations in the U.S. has focused on majority racial/ethnic groups, especially Hispanics (Singh et al., 2007). Studies from the U.S. have reported greater breastfeeding initiation and longer duration of breastfeeding in newly

arrived immigrants of various racial/ethnic groups compared to U.S. born women (Singh et al., 2007).

Acculturation is defined as a complex process of sociocultural and psychological changes that can occur due contact with individuals or groups of different cultural backgrounds (Schwartz et al., 2010). Acculturation among Hispanic women in the U.S., in relation to health behaviors and outcomes, has been studied extensively (Zambrana et al., 1997). Gallegos (2013) has shown that greater acculturation to a new country has an inverse relationship with initiation and duration of breastfeeding. Literature on breastfeeding practices among non-Hispanic immigrants in the U. S. is limited, but has also shown higher breastfeeding initiation among immigrants of different ethnicities (Celi et al., 2005), and a decrease in likelihood of breastfeeding among foreign-born mothers by 4% with each year spent in the U.S. (Gibson-Davis, 2006). Though this same inverse relationship between acculturation and breastfeeding practices was found among other racial/ethnic groups, including immigrant black women, failure to distinguish country of origin limited making any conclusions that could be made specifically on West African refugees. Recently, more studies have focused on refugee women's beliefs towards breastfeeding in their new country and discovered a more complex relationship between acculturation and breastfeeding practices (Gallegos et al., 2013). One study indicated that young, single, low-income, and recently arriving migrant mothers were found to be more likely to have poor breastfeeding outcomes (Giles et al., 2007). This could be attributed to the challenges women face in relocating to a new country, and no longer having the support systems or cultural norms they are accustomed to (Gallegos et al., 2013).

A cross-cultural comparison of breastfeeding practices in Nigeria, Liberia, Sierra Leone, and Ghana identified several country-specific factors that influenced early introduction of solid or semi-solid foods, and consequently reduced the likelihood of exclusive breastfeeding (Issaka, 2014). For example, there were significant regional differences in early introduction of solid or semi-solid foods in Liberia. A study on immigration to Italy indicated that there was a strong correlation between greater education and duration of breastfeeding in immigrant women. However, exclusive breastfeeding rates when the infant was three months old were significantly lower in immigrant women compared to native Italian women (Golin, 2003). A qualitative study on West African migrants in Australia, revealed that exclusive breastfeeding was a result of lack of sufficient food and that early introduction of complementary foods would occur if this was not a barrier (Gallegos, 2013). Even though there is some literature on immigrants' breastfeeding practices, there is a significant gap in knowledge on how acculturation into the host culture may influence the infant feeding behaviors of refugees, particularly in the context of immigration happening within sub-Saharan Africa.

The main objective of this study is to understand the factors that predict exclusive breastfeeding practices among Liberian refugees in Buduburam with an emphasis on the role of acculturation in this unique refugee population in Ghana. As described in the section below, this settlement provides a unique setting for conducting this study. This study can have large implications for promoting the health of infants in refugee camps or settlements by shedding light onto how longer exposure to the host culture shapes exclusive breastfeeding behaviors.

### **Buduburam Refugee Settlement**



The Buduburam Refugee Settlement in Ghana is home to thousands of Liberians who fled their country during Liberia's civil war of 1990 and sought refuge in Ghana. The government of Ghana and the United Nations High Commissioner for Refugees (UNHCR) created a refugee camp in 1990 in the Gomoa Eastern District of the Central Region, intended for approximately 5,000 refugees. Over 7,000 Liberians moved to the camp in the 1990s and with increasing numbers of Liberians over the years, they moved into the adjacent Ghanaian village known as Buduburam. The second civil war in Liberia in 1999 caused a large influx of refugees to Buduburam leading to as many as 18,713 in 2000 and 40,000 in 2008 (Tanle, 2013). In 2012, Liberians lost refugee status, and Buduburam was no longer recognized as a refugee camp, but rather as a refugee settlement (N'Tow, 2004). Several Liberians have stayed in Buduburam for extended periods of time, in what is known as a "protracted refugee situation". According to the UNHCR, a protracted refugee situation is when at least 25,000 refugees originating from one country seek asylum in another country for at least five consecutive years often due to political problems in their home country. There are an estimated 7 million refugees in protracted refugee situations, and the average length of stay has increased from nine years in the 1990s to nearly 20 years in 2003 (Loescher and Milner, 2009). Buduburam received humanitarian assistance from the UNHCR and the World Food Program for many years. However, decreases in funding for protracted refugees in Africa, including in West Africa, resulted in less assistance and fewer available resources for refugees (Omata, 2012). Liberian refugees living in Buduburam lost support of food, water, education, and medicine, and consequently became limited in their ability to earn wages in the local economy and more likely to live in poverty (N'Tow, 2004).

The present study was undertaken to determine factors that influence exclusive breastfeeding practices among Liberian refugees living in Ghana. This study is unique in that it is the first study of its kind designed to compare breastfeeding practices among refugee populations living in a long-term camp in Sub-Saharan Africa. According to the UNHCR, as of 2013, approximately 51.2 million people world-wide were forcibly displaced, and 16.7 million were refugees (UNHCR, 2013). Despite this large number, little is known about the health of these vulnerable populations.

## **METHODS**

The data presented are drawn from a larger mixed methods study that focused on understanding changes in diet, food access and availability, and cultural beliefs among Iberian refugees in Buduburam. The Buduburam Refugee Settlement is nowadays divided into 12 zones, with zones one through ten being comprised mostly by Liberian refugees. With increasing numbers of Liberians over the years, they moved into the nearby village known as Buduburam. Over time, Buduburam became a part of the camp known as zones 11 and 12, where both Liberians and Ghanaians households coexist.

### **Participants**

The cross-sectional survey was administered in Buduburam and surrounding Awutu villages between July – August 2008 under the leadership of PI Amber Hromi-Fiedler. Before being administered to study participants, the survey was piloted with five Liberians and four Ghanaian target women, and revised accordingly. Liberians and Ghanaians living in Buduburam

and surrounding urban Awutu villages were recruited to participate in the study. Women were eligible for the study by meeting the following criteria: (a) Liberian or Ghanaian, (b) at least 16 years old, (c) having a biological child that was between 6 months and 59 months at the time of the survey, (d) not being pregnant, no health problems or conditions that would cause any changes in their diet, and (e) must have lived in either Buduburam camp or in an Awutu village less than 5km from Buduburam.

## **Procedure and Measures**

In order to obtain a sample with respondents from all settlement sectors, the survey was administered to women in all 12 zones following a convenient sampling approach. A group of women living in urban villages within 5 km of Buduburam was included as an “external” reference group. The survey was given to 480 women in four groups: 120 Liberians living in zones 1-10, 119 Liberians living in zones 11-12, 121 Ghanaians living in zone 11-12, and 120 Ghanaians living in urban, Awutu villages 5 kilometers from Buduburam. Twelve interviews were conducted in each zone except for zone two (13 interviews) and zone eight (11 interviews). Within each zone, a central location was selected and interview teams moved to different parts of the zone to recruit participants at every fifth house. For interviews conducted in Awutu, a local villager assisted interviewers in locating houses and introducing residents. The same sampling method was used of selecting every fifth house. Four interview teams, each comprised of one Ghanaian and one Liberian, conducted all interviews. Interviewers were from the local communities and received an intensive 3-day training prior to beginning data collection. The Liberian interviews were administered by Liberians in Liberian pigeon English and Ghanaian interviews were administered by Ghanaians in either English or a local Ghanaian language. Interviewers were supervised by study investigators and data collected was received daily to maintain quality control.

Prior to participating in the study, verbal consent was obtained from all participants. Participants were assured that all information obtained would be confidential and would only be used for research purposes. Participation would not affect their access to nutrition or food assistance programs in the camp, nor would be used for determining repatriation.

This study was a collaboration between the University of Connecticut, University of Ghana, Buduburam Refugee Settlement (including St. Gregory Medical Center), and subsequently Yale University. The study received IRB approval from the University of Connecticut and the University of Ghana. Additional approval for the data analysis came from Yale University. Permission to defer ethical approval to the collaborating Universities was provided by representatives of Buduburam Refugee Settlement. The project was funded by West African Research Association of Boston University (PI, Amber Hromi-Fiedler).

## ***Outcome variable***

The main outcome for analyses was whether or not mothers exclusively breastfed (EBF) the index child for the first 6 months of life. Mothers were asked if they breastfed the index child and when water or other liquids were first introduced to the index child. Similarly, mothers were asked when solids or semi-solid foods were first introduced to the index child. Responses for

both multiple choice questions ranged from less than one month to greater than seven months. Thus, if the mother indicated that either water and liquids or solids/semi solid foods were introduced before 6 months, then that child was classified as not EBF (coded as 0). If the mother indicated that both water and liquids and solid/semi solid foods were introduced at six months or later, then that child was classified as EBF (coded as 1).

### ***Independent variable and covariates***

The survey also asked questions relating to demographics, socio-economic status, household food security, infant feeding practices as well as maternal dietary intake, acculturation, and health status. Participants were asked what kinds of foods they ate and how often in the last six months through a pre-tested food frequency questionnaire. In addition, anthropometric measurements were taken of the mother and the index child including height or length, weight, mid-upper arm circumference, and head circumference (index child only).

Participants were asked to answer questions on their age, nationality, and their child's age. Nationality was defined by the mother's self-report of her nationality. The age of the index child was obtained by using the date that the survey was administered and the child's date of birth. All participants were asked how long they have lived in Ghana, and all participants except Ghanaians living in Awutu were asked to report how long they lived in the camp. The population variable referred to the four groups that Liberians and Ghanaians were recruited from to participate in the study: Liberians living in zones 1-10, Liberians living in zones 11-12, Ghanaians living in zone 11-12, and Ghanaians living in Awutu. The survey asked participants to indicate if they know how to read, write, if they have attended school, their highest level of education, primary occupation, marital status, daily household income, self-report of mother's health and child's health in the last six months. The survey included acculturation questions such as language ability, religious customs, if they have Liberia and Ghanaian friends, and if they have interest in Ghanaian and Liberian politics.

Parity was categorized into a binary variable (primiparous/multiparous) and coded as one if the mother only had one child and coded as zero if the mother had more than one child. Marital status was reclassified into three groups, single/never married, widowed, or divorced; married; and not married but has a partner. Daily income was classified into two groups (0-5.00 Ghanaian cedis per day, and greater than 5.00 Ghanaian cedis per day). Self-report of mother's health in last 6 months and child's health in last 6 months were collapsed into two groups (below average, and at or above average). Highest level of education was an open-ended question and was subsequently grouped into five categories (no education, 1-6 years, 7-11 years, high school graduate, and higher education). Due to the high correlation between reading ability and writing ability, a combined binary variable was created (knowing how to read or write (yes/no)).

The key independent variables were computed with data derived from various questions in the survey regarding mothers' nativity and time spent living in Ghana. Though the survey included questions on acculturation, we created a new variable using length of time in the host country to better capture the extent of acculturation among Liberians. Specifically, the population variable (which divides our sample into the four groups: Liberians in zones 1-10, Liberians in zones 11-12, Ghanaians in zones 11-12, and Ghanaians in Awutu) and the

continuous variable, years living in in Ghana, were combined to create an acculturation variable, combining nationality and time living in Ghana. This was achieved by using the median length of time Liberians lived in Ghana as a cutoff point to create two sub-groups: Liberians living in Ghana less than 8 years and Liberians living in Ghana at least 8 years. Ghanaians living in zones 11-12 and Ghanaians in Awutu were kept as separate groups in order to determine if there were any differences between those living in or out of the camp, thus giving us a 4-level acculturation proxy variable.

## Statistical Analyses

SAS 9.3 was used for statistical analysis. Chi-squared tests were used for bivariate analysis of categorical variables and t-tests were used for analysis of continuous variables. Differences were considered significant at  $p < 0.05$ . Unadjusted odds ratios and 95% confidence intervals were used to report the bivariate associations between predictors and exclusive breastfeeding. Variables with a p-value  $< 0.10$  were included in the full multivariate binomial logistic regression model to identify significant predictors of exclusive breastfeeding. Stepwise backward elimination was used to determine the final model. This involved manually removing a non-significant variable at each step and assessing the model likelihood ratio. After removing a non-significant variable, if a decrease in the likelihood ratio was observed, then the variable was eliminated with each step. Factors that are known to be associated with exclusive breastfeeding including age of the index child, parity, mother's BMI, and mother's age were kept in the final model (Perez-Escamilla, 1995). The final model included mother's BMI, mother's age (years), child age (months), primiparous, borrowed money from neighbor/family in last year, and the 4-level acculturation proxy variable combining nationality and time living in Ghana.

## RESULTS

Of the 480 mothers who completed the survey, approximately 98% ( $n=472$ ) breastfed their infant. Of those, 290 mothers (60.54%) exclusively breastfed and 189 (39.45%) did not exclusively breastfeed. The mean age of the participants was  $28.0 \pm 6.3$  years, and the average BMI was  $24.6 \pm 5.2$  kg/m<sup>2</sup>. Approximately half of women surveyed were Liberian (49.8%) and the other half were Ghanaian (50.2%). The highest level of formal education for most women was 7-11 years (44.9%), and 23.5% were high school graduates. However, nearly three quarters of the women surveyed (74.4%) knew how to read or write. The majority of women were self-employed and multiparous (62.0% and 68.1%, respectively). While the majority of mothers rated their child's health at or above average (73.5%), based on anthropometric measurements, nearly a quarter of children (24.4%) was classified as wasted (low weight-for-height score). Approximately half of all participants were married (49.8%) and 26.0% were either single or never married.

Table 1 shows bivariate associations between the likelihood of EBF for the first six months or more and the independent variables and covariates. Women who were exclusively breastfeeding had a significantly higher BMI on average compared to women who were not exclusively breastfeeding ( $p=0.039$ ). On average, women who were exclusively breastfeeding also lived in Ghana for a significantly less amount of time compared to women who did not exclusively breastfeed ( $p=0.045$ ). There was a significant association between population and

exclusive breastfeeding ( $p=0.0030$ ). Liberians living in zones 1-10 had the highest percentage of exclusive breastfeeding (70.6%), while Ghanaians living in zones 11-12 had the lowest.

Liberians were significantly more likely to exclusively breastfeed (68.5%) compared to Ghanaians (52.7%,  $p=0.0004$ ). There were also significant associations between country born in ( $p=0.001$ ), country grew up in ( $p=0.008$ ), and place of birth ( $p=0.003$ ) with exclusive breastfeeding. Mothers born in Liberia (68.6%) and mothers born in a city (67.5%) showed the highest percentage of exclusive breastfeeding ( $p=0.001$  and  $p=0.003$ , respectively). Children who were not classified as wasted were significantly more likely to be exclusive breastfed compared to children who were wasted ( $p=0.014$ ). Women who knew how to read or write were significantly more likely to exclusively breastfeed compared to women who did not know how to read or write ( $p=0.004$ ). There were significantly more women who exclusively breastfed among women who did not borrow money from neighbors or family members in the past year compared to women who did borrow money ( $p=0.028$ ). (Table 1)

Our combined acculturation proxy variable, time living in Ghana, was significantly associated with exclusive breastfeeding ( $p=0.001$ ). Liberians living in Ghana at least 8 years were the most likely to exclusively breastfeed (72.9%), compared to Liberians living in Ghana less than 8 years (63.3%), Ghanaians living in zones 11-12 (49.6%), and Ghanaians living in Awutu (55.8%) (Table 1).

Table 2 shows the results of the multivariate regression model and presents both unadjusted odds ratios (OR) and adjusted odds ratios (AOR) for each independent variable in relationship to exclusive breastfeeding. In unadjusted multivariate logistic regression analyses, participants who borrowed money from a neighbor or family member in the last year were significantly more likely to exclusively breastfeed (OR: 1.53, 95% CI: 1.05, 2.23) compared to those who did not borrow money. With respect to our main acculturation variable, time in Ghana, Liberians who lived in Ghana at least eight years were significantly more likely to exclusively breastfeed (OR: 2.13, 95% CI: 1.25, 3.61) compared to Ghanaians living in Awutu. The multivariate logistic regression analyses found that the odds of exclusive breastfeeding among Liberian mothers who lived in Ghana for at least 8 years were still higher (OR: 1.78, 95% CI: 1.02, 3.09), compared to Ghanaians who lived in Awutu. These findings are robust as they adjusted for mother's BMI, mother's age (years), child age (months), primiparous, and borrowed money from neighbor/family in last year.

## **DISCUSSION**

The present study identified a unique finding strongly suggesting that exposure to the local context matters for understanding breastfeeding behaviors among refugees moving from one country to another in close geographical proximity within Sub-Saharan Africa. The multivariate model revealed that Liberian refugees who had lived in Buduburam for at least 8 years, and as a result were likely to be more acculturated to Ghana's Buduburam settlement, had even better exclusive breastfeeding rates compared to local Ghanaians living outside the camp. Though this is contrary to existing literature on the inverse relationship between acculturation and optimal breastfeeding practices among immigrants who have moved into the U.S. (Singh et al., 2007), it is possible that this association is not maintained in the context of a developing

country. Musmar (2012) identified higher breastfeeding rates among internally displaced women in various refugee camps in Palestine. Studies involving migration of women from Vietnam and Turkey into Australia also support our findings that there is variation in breastfeeding practices among different racial/ethnic immigrants in a new country (McLachlan and Forster, 2006).

The prevalence of exclusive breastfeeding among Liberians and Ghanaians in Buduburam varied from the breastfeeding rates reported in the DHS surveys of both countries conducted at around the same time that the Buduburam study was implemented. While the prevalence of exclusive breastfeeding among Liberians in Buduburam (68.5%) was higher than the 2007 Liberian DHS rate (29%), the prevalence of exclusive breastfeeding among all Ghanaians in the study (52.7%) was lower than the 2008 Ghanaian DHS data (64%) (Tampah-Naah, 2013). These difference may be attributed to varying demographic characteristics of Liberians who fled as refugees versus those who remained in Liberia as well as characteristics of the Ghanaians living in Buduburam or in close proximity to the settlement. Regional differences in early introduction of solid foods have been found in Liberia, with rates as high as 51.3% in the capital, Monrovia, and as low as 4.3% in the North Western region (Issaka et al., 2014). Thus, it is possible that Liberians in our sample may have originated from regions of Liberia where exclusive breastfeeding may be more common. Interviews with Liberian refugees in Australia revealed that mothers practiced exclusive breastfeeding due to a lack of access to sufficient food (Gallegos et al., 2013). It is possible that this believe was held by Liberian mothers in Buduburam and that their higher rates of exclusive breastfeeding were due to financial barriers. Another potential explanation for greater exclusive breastfeeding practices among Liberians compared to Ghanaians may include the prevalence of misconceptions among Ghanaians. Reasons for early introduction of liquids or solids when the infant was 4-5 months old included, believing the infant was thirsty, that breast milk was not nutritionally enough, and that exclusive breastfeeding would make it harder for infants to eventually eat solid food (Aryeetey et al., 2013). Sub-group analyses indicate that approximately 42% of Liberians living in Buduburam for at least eight years completed high school compared to only 7.5% of Ghanaians in Awutu. Migrant mothers with greater education levels have been more likely to breastfeed in Italy (Golin et al., 2003). Similarly, previous studies have shown that early introduction of solid, semi-solid, or soft foods has been associated with mothers with no schooling (Issaka et al., 2014). Nevertheless our acculturation finding is robust as it remained significant after adjusting for key confounders.

There were several strengths in this study. As mentioned previously, as far as we know this is the first study to explore breastfeeding practices among refugees living in a long term camp or settlement in a country in close proximity from their country of origin. Moreover, it is the first study to specifically focus on exclusive breastfeeding practices among refugee populations and in West Africa. Studies on refugee health and acculturation have focused on dietary practices and health outcomes of migrants, but this study is unique in scope by focusing on the relationship between acculturation and the health of infants through breastfeeding practices. The close relationship and trust that was developed between the research team and members of the community enabled the successfulness of the study in a hard to reach environment. In addition, pilot testing the survey tool and using interviewers from both communities ensured that the survey was culturally appropriate and carefully tailored to the target community.

Though the sample size was large and included respondents from the four different populations in and outside the camp, there were some limitations to this study. First, as a cross-sectional study it is not possible to establish the temporal sequence of events although it is implausible to expect that exclusive breastfeeding led to how long immigrants decided to stay in Ghana. Rather, the acculturation proxy information was collected retrospectively and thus it is safe to assume that it is indeed the degree of exposure to Ghana that is associated with exclusive breastfeeding behaviors among Liberian refugees. Second, all measures were self-reported, thus introducing the potential for recall bias. This bias could have impacted the classification of exclusive breastfeeding, as mothers were asked to remember at what age liquids and semi-solid foods were introduced to the index child. Secondly, age of the child is known to be associated with exclusive breastfeeding, however, this was not the case in our study. The p-value was 0.88 and this may be attributed to the fact that only children between age 6 months and 5 years were included in the study, thus it was not expected for this association to be present in our study. Though the population in this study is unique, this may limit the generalizability of our results to similar refugee populations or only certain protracted refugee situations. Another limitation is that data that may have been useful for understanding “mechanisms” explaining exclusive breastfeeding differences were not collected. For example, in order to better understand the differences between the Liberians living in Buduburam for at least eight years and Liberians who arrived more recently, the survey could have included detailed questions regarding migration patterns and reasons why Liberians left their homes for the refugee camp. In addition, including questions regarding the utilization of the health clinic services could help us explain differences in exclusive breastfeeding rates. If Liberians living for longer in the settlement were more likely to use the health services available in the camp, such as health education and breastfeeding assistance, this could be a potential explanation for the increased exclusive breastfeeding rates compared to Ghanaians who do live in the camp and are less likely to use these services.

## **Conclusions and Recommendations**

Overall, this study demonstrates that exposure to the “new” context influences infant feeding behaviors among refugees. Further mixed-methods research designed to understand the “mechanisms” explaining exclusive breastfeeding differences will be crucial for improving breastfeeding in refugee settlements and host communities in low and middle income countries.

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Table 1. Participant Demographics<sup>1</sup>

Characteristic	Total n (%)	Exclusive Breastfeeding		p
		Yes (n = 290) Mean ± SD	No (n = 189) Mean ± SD	
Age of mother	28.0 ± 6.3	28.3 ± 6.3	27.7 ± 6.3	0.356
BMI of Mother	24.6 ± 5.2	24.9 ± 5.5	23.9 ± 4.6	0.039
Years living in Ghana	18.3 ± 11.2	17.5 ± 11.1	19.6 ± 11.3	0.045
Years living in Buduburam <sup>2</sup>	8.3 ± 6.3	8.4 ± 5.6	8.0 ± 7.3	0.612
Age of index child (months)	25.9 ± 13.9	25.8 ± 13.6	26.0 ± 14.2	0.879
		Exclusive Breastfeeding		
	n (%)	n (%)	n (%)	p
Population				0.003
Liberians in zone 1-10	120 (25.0)	84 (70.6)	35 (29.4)	
Liberians in zone 11-12	119 (24.8)	79 (66.4)	40 (33.6)	
Ghanaians in zones 11-12	121 (25.3)	60 (49.6)	61 (50.4)	
Ghanaians in Awutu village	120 (25.1)	67 (55.8)	53 (44.2)	
Nationality				0.0004
Liberian	239 (49.8)	163 (68.5)	75 (31.5)	
Ghanaian	241 (50.2)	127 (52.7)	114 (47.3)	
Country born in				0.001
Liberia	237 (49.4)	162 (68.6)	74 (31.4)	
Ghana	235 (49.0)	125 (53.2)	110 (46.8)	
Other	8 (1.7)	3 (37.5)	5 (62.5)	
Country grew up in				0.008
Liberia	177 (37.9)	118 (66.7)	59 (33.3)	
Ghana	250 (53.7)	136 (54.6)	113 (45.4)	
Liberia and Ghana	15 (3.2)	13 (86.7)	2 (13.3)	
Other	24 (5.2)	17 (70.8)	7 (29.2)	
Place of Birth				0.003
City	210 (44.2)	141 (67.5)	68 (32.5)	
Town	221 (46.5)	129 (58.4)	92 (41.6)	
Village	30 (6.3)	16 (53.3)	14 (46.7)	
Refugee camp	14 (3.0)	3 (21.4)	11 (78.6)	
Marital Status				0.665
Single/Never married, widowed or divorced	136 (28.3)	86 (63.7)	49 (36.3)	
Married	239 (49.8)	141 (59.0)	98 (41.0)	
Not married but has partner	105 (21.9)	63 (60.0)	42 (40.0)	
Primiparae				0.550
No	327 (68.1)	195 (59.6)	132 (40.4)	
Yes	153 (31.9)	95 (62.5)	57 (37.5)	

Primary Occupation				0.349
Employed by someone	9 (1.9)	7 (77.8)	2 (22.2)	
Self-employed	292 (61.0)	180 (61.9)	111 (38.1)	
Not employed	178 (37.2)	102 (57.3)	76 (42.7)	
Daily Income (GH cent)				0.037
0-5.00	281 (59.7)	183 (65.1)	98 (34.9)	
Greater than 5.00	190 (40.3)	105 (55.6)	84 (44.4)	
Self-report mother's health in last 6 months				0.506
Below Average	197 (41.1)	122 (62.2)	74 (37.8)	
At or above Average	282 (58.9)	167 (59.2)	115 (40.8)	
Attended school				0.561
Yes	412 (85.8)	251 (61.1)	160 (38.9)	
No	68 (14.2)	39 (57.4)	29 (42.7)	
Highest level of formal education				0.507
No education	62 (13.0)	36 (58.1)	23 (41.9)	
1-6 years (some or completed primary)	74 (15.5)	44 (59.5)	30 (40.5)	
7-11 years (some secondary)	224 (44.9)	123 (57.5)	91 (42.5)	
High school graduate	112 (23.5)	75 (67.6)	36 (32.4)	
Higher education (some college & college grad)	15 (3.1)	9 (60.0)	6 (40.0)	
Vocal training				0.686
Yes	155 (32.4)	193 (59.8)	130 (40.2)	
No	323 (67.6)	95 (61.7)	59 (38.3)	
Know how to read or write				0.004
Yes	351 (74.4)	229 (64.3)	127 (35.7)	
No	123 (26.6)	61 (49.6)	62 (50.4)	
Borrowed money from neighbors/family in past year				0.028
Yes	195 (40.6)	161 (56.5)	124 (43.5)	
No	285 (59.4)	129 (66.5)	65 (33.5)	
Lent money to neighbors/family in past year				0.243
Yes	155 (32.3)	88 (56.8)	67 (43.2)	
No	325 (67.7)	202 (62.4)	122 (37.7)	
Self- Report child's health in last 6 months				0.814
Below Average	127 (26.5)	78 (61.4)	49 (38.6)	
At or above Average	353 (73.5)	212 (60.2)	140 (39.8)	
<b>Acculturation</b>				
Time living in Ghana				0.001
Liberians living there less than 8 years	109 (22.8)	69 (63.3)	40 (36.7)	
Liberians living there at least 8 years	130 (27.2)	94 (72.9)	35 (27.1)	
Ghanaians in zones 11-12	119 (24.9)	59 (49.6)	60 (50.4)	
Ghanaians in Awutu	120 (25.1)	67 (55.8)	53 (44.2)	
<b>Child Anthropometric Measurements</b>				
Weight for height				0.769
< -2 SD	14 (2.9)	9 (64.3)	5 (35.7)	
> -2 SD	462 (97.1)	279 (60.4)	183 (39.6)	

Weight for height				0.711
< 1 SD	417 (2.9)	251 (60.2)	66 (39.8)	
> 1 SD	59 (12.4)	37 (62.7)	22 (37.3)	
Weight for age				0.924
< -2 SD	53 (11.3)	32 (60.4)	21 (39.6)	
> -2 SD	417 (88.7)	254 (61.1)	162 (38.9)	
Height for age				0.014
< -2 SD	353 (75.6)	228 (64.6)	125 (35.4)	
< - 2 SD	114 (24.4)	59 (51.8)	55 (48.3)	
BMI for age				0.253
< 1 SD	76 (16.2)	42 (55.3)	34 (44.7)	
> 1 SD	393 (83.8)	244 (62.2)	148 (37.7)	
BMI for age				0.424
< -2 SD	11 (2.4)	8 (72.7)	3 (27.3)	
> -2 SD	458 (97.7)	278 (60.8)	3 (39.2)	

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n (%): proportion per category

<sup>1</sup>numbers don't add up to 100% due to rounding

<sup>2</sup> does not include Ghanaians living in Awutu villages

Table 2. Logistic regression of determinants of exclusive breastfeeding

Characteristic	(n=290)	Unadjusted	Multivariate
	EBF (Mean $\pm$ SD)	OR (95% CI)	AOR (95% CI)
Age	28.3 $\pm$ 6.3	1.01 (0.98, 1.04)	1.02 (0.98, 1.06)
BMI of Mother	24.9 $\pm$ 5.5	1.04 (1.00, 1.08)	1.03 (0.99, 1.07)
Age of index child	25.9 $\pm$ 13.9	1.00 (0.99, 1.01)	0.99 (0.98, 1.01)
	n (% EBF)	OR (95% CI)	AOR (95% CI)
<b>Primiparae</b>			
No	195 (59.6)	1.00	1.00
Yes	95 (62.5)	1.13 (0.76, 1.68)	1.17 (0.73, 1.88)
<b>Borrowed money from neighbors/family in past year</b>			
No	129 (66.5)	1.00	1.00
Yes	161 (56.5)	1.53 (1.05, 2.23)	1.34 (0.89, 2.02)
<b>Acculturation</b>			
<b>Time living in Ghana</b>			
Ghanaians in Awutu	67 (55.8)	1.00	1.00
Liberians living there less than 8 years	69 (63.3)	1.37 (0.80, 2.32)	1.25 (0.71, 2.21)
Liberians living there at least 8 years	94 (72.9)	2.13 (1.25, 3.61)	1.78 (1.02, 3.09)
Ghanaians in zones 11-12	59 (49.6)	0.78 (0.47, 1.29)	0.72 (0.42, 1.23)

\*OR: Unadjusted odds ratio; AOR: Adjusted odds ratio; CI: 95% confidence interval

\*\*multivariate model includes: mother's BMI, mother's age (years), child age (months), primiparous, borrowed money from neighbor/family in last year, time living in Ghana