Assessment of Promotion of Foods Consumed by Infants and Young Children in Dar es Salaam: Assessment and Research on Child Feeding (ARCH) – Tanzania Country Report

Table of contents

i. List of tables

ii. List of figures

iii. List of abbreviations

ANC	antenatal care
ARCH	Assessment and Research on Child Feeding
BFHI	Baby-Friendly Hospital Initiative
BMS	breast-milk substitute(s)
CPCF	commercially produced complementary food(s)
DHS	Demographic and Health Survey
HKI	Helen Keller International
IYC	infant and young child
IYCF	infant and young child feeding
mo	month(s)
ORS	oral rehydration solution
SES	socioeconomic status
WHO	World Health Organization

iv. Definitions

Exclusive breastfeeding	• Infant fed breast-milk and nothing else, except for oral rehydration solutions, medicines and vitamins and minerals
Health professional	• Doctor/Clinical officer • Nurse/Midwife • Auxiliary midwife • Dietitian
Health worker	• All of the health professionals listed above plus • Traditional birth attendant • Community health worker
Predominant breastfeeding	• Infant may have received bottled, plain, sugar, or gripe waters or oral rehydration solutions in addition to breast-milk
Savory snack foods	• Commercially produced savory snack foods such a chips, crisps, savory biscuits
Soft drinks	• Commercially produced sodas or fizzy/carbonated beverages that are sweetened
Sugary snack foods	• Commercially produced sugar snack foods such as sweetened biscuits, cookies, cakes, doughnuts, candy, sweets, chocolate

v. Acknowledgments

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vi. Summary

Though the last decade has brought improvements to child survival in Tanzania, childhood malnutrition remains a serious concern. In 2011, 42% of children under five years of age were stunted (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). Exclusive breastfeeding for the first 6 months of life followed by timely and safe introduction of micronutrient-rich complementary foods with continued breastfeeding until two years of age is essential to improve infant and young child nutrition status. Commercially produced complementary foods can help improve the nutritional status of young children under two years of age if they are fortified and of optimal nutrient composition. However, other commercially produced foods, particularly snack foods, may be detrimental to child nutrition by increasing salt or sugar intake and displacing consumption of other more nutritious options (Moodie et al., 2013). Breast-milk substitutes, including infant formula and other commercially produced milks, are also detrimental when they displace breastfeeding.

The updated *Tanzania Food, Drugs and Cosmetics (Marketing of foods and designated products for infants and young children) Regulations, 2013* prohibits the promotion of commercially produced infant and young child foods within Tanzania, including breast-milk substitutes and complementary foods marketed as suitable for children under 2 years (Government of Tanzania, 2013). Additionally, the Ministry of Health and Social Welfare in Tanzania along with its partners developed a National Nutritional Strategy to be implemented from July 2011 to June 2016 which includes measures to prevent unethical marketing of breast-milk substitutes (Ministry of Health and Social Welfare and United Republic of Tanzania, 2011). Helen Keller International implemented a study as part of their Assessment and Research on Child Feeding (ARCH) Project to assess the levels of promotion and consumption of commercially produced breast-milk substitutes, commercially produced complementary foods, commercially produced snack foods, and other foods in Dar es Salaam, Tanzania by children <24 months of age. Promotion within the health system (i.e., recommendations from health professionals and advertisements in health facilities) as well as outside of the health system (i.e., recommendations from non-health professionals and commercial advertisements outside of health facilities) was assessed. A health facility-based, cross-sectional survey was conducted among 295 mothers being discharged after delivery and 305 mothers of children <24 months of age who were utilizing child health services.

The study results indicated that the consumption of breast-milk substitutes was not highly prevalent in Dar es Salaam: only 3.9% of infants less than 6 months of age were fed formula on the day preceding the interview. Nearly 5% (4.8%) of 6-23-month-olds were reported to have consumed a breast-milk substitute on the day prior to the interview.

Promotion of breast-milk substitutes was also minimal. A low prevalence of mothers at discharge and mothers of children <24 months of age reported receiving a recommendation from a health professional to use a breast-milk substitute (6.1% and 9.2%, respectively) or being exposed to commercial advertisements for breast-milk substitutes in the health facility (2.0% and 2.6%, respectively). No mothers reported receiving free breast-milk substitute samples or any gifts with breast-milk substitute brands/logos on them from health professionals during or after pregnancy.

Promotion of breast-milk substitutes outside of the health system was more prevalent than inside of the health system, but still relatively low. Outside of the health system, 5.4% of mothers at discharge and 18.0% of mothers of children <24 months of age reported receiving a recommendation to use a breast-milk substitute (primarily from friends, neighbors, and/or relatives), and 14.9% of mothers discharged after delivery and 7.9% of mothers of children <24 months of age reported exposure to commercial promotions of breast-milk substitutes outside of the health system (primarily from television). No mothers discharged after delivery reported receiving free samples, discounts, or coupons for breast-milk substitutes outside of the health system, and only 2 mothers of children <24 months of age reported receiving discounts.

Promotion and consumption of commercially produced complementary foods were also not highly prevalent in Dar es Salaam. Only 3.1% of 6-23-month-olds were reported to have consumed commercially produced infant cereal on the day preceding the interview. A very low prevalence of mothers at discharge and mothers of children <24 months of age reported hearing, reading, or seeing a commercial advertisement for commercially produced complementary foods in the health facility (1.0% and 0.0%, respectively) or reported observing an infant and young child food product brand/logo on an item in the health facility (4.1% and 3.3%, respectively). Among mothers of 6-23-month-olds, 15.3 % reported receiving a recommendation from a health worker to feed their child a commercially produced complementary food. Outside of the health system, 1.4% of mothers at discharge and 1.0% of mothers of children <24 months of age reported exposure to commercial promotions of commercially produced complementary foods. No mothers reported receiving free samples, discounts, or coupons for commercially produced complementary foods.

Promotion and consumption of commercially produced snack foods were more prevalent than of breast-milk substitutes and commercially produced complementary foods. Commercially produced snack foods were reported to have been consumed by 23.1% of 6-23-month-olds on the day prior to the interview. Mothers of 6-23-month-olds very rarely reported receiving a recommendation from a health worker to feed their child a commercially produced snack food (<1.5%). However, 49.8% of mothers at discharge and 45.9% of mothers of children <24 months of age reported exposure to commercial promotions of commercially produced snack foods.

Maternal exposure to infant and young child feeding messaging was low. Only 44.7% of mothers discharged at delivery reported exposure to any infant and young child feeding message during pregnancy or since the birth of the newborn, and 55.7% of mothers of children <24 months of age reported exposure to any infant and young child feeding message since the child was born. While the rate of prelacteal feeding was low (4.7%) and the rate of early initiation of breastfeeding moderate (68.1%), other infant and young child feeding indicators were sub-optimal and included low rates of 1) exclusive breastfeeding among children <6 months of age (40.8%), 2) continued breastfeeding at 2 years among 20-23-month-olds (33.3%), and 3) 6-23-month-olds consuming a minimum acceptable diet (38.4%). Among children <6 months of age, 1.3% had consumed fresh animal milk and 38.2% had consumed a semi-solid food on the day prior to the interview. The homemade complementary foods consumed by the majority of 6-23-month-olds (85.2%) were cereal-dominated and infrequently contained micronutrient-rich ingredients.

Strategies to improve maternal knowledge of optimal infant and young child feeding practices are needed, particularly with regard to exclusive and continued breastfeeding, feeding children micronutrient-rich and diversified foods, and avoidance of feeding commercially produced snack foods. When affordable, the feeding of fortified commercially produced infant cereals may be an effective alternative for helping mothers meet the nutrient needs of their children.

1. Introduction

Exclusive breastfeeding for the first six months of life followed by timely and safe introduction of complementary foods with continued breastfeeding until two years is the optimal course for infant and young child feeding (WHO & UNICEF, 2003). A child's nutritional needs increase at six months of age, and adequate complementary feeding practices are then necessary to reduce the risk of undernutrition, as well as diseases where undernutrition is linked as an underlying cause (Marriott et al., 2011). Commercially produced complementary foods can help improve the nutritional status of young children under two years of age if they are fortified and of optimal nutrient composition. However, other commercially produced foods, such as commercial snack food products, may be detrimental to child nutrition by potentially increasing consumption of foods high in salt or sugar and displacing consumption of other more nutritious options. Breast-milk substitutes, including infant formula and other commercial milks, are also detrimental when they displace breastfeeding.

Though the last decade has brought improvements to child survival in Tanzania, childhood malnutrition remains a serious concern. Significant progress has been made in reducing infant mortality rates which have decreased from 96 deaths per 1000 live births in 1996-2000 to 51 deaths per 1000 births in 2010. However, many indicators show that there is room for further improvement in infant and young child nutrition in the country. In 2011, 42% of children under five years of age were stunted and 5% were wasted, compared to 38% and 3%, respectively, in 2004-2005 (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). Anemia rates for children have declined in the last decade, but remain high at 59% (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011).

Infant and young child feeding practices in Tanzania are suboptimal. Though 97% of Tanzanian children are ever breastfed, rates of early initiation of breastfeeding are low, with only 49% of children being breastfed within the first hour of birth. The mean duration of breastfeeding is 20.4 months, but the mean duration of exclusive breastfeeding is 4.1 months (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). This short duration of exclusive breastfeeding corresponds with high rates of early introduction of solid foods. Fourteen percent of Tanzanian children age 2 to 3 months receive liquids other than breast-milk, and one-third receive soft/semi-soft/solid foods (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). Slightly over a fifth (21.3%) of 6-23-month-olds consumed a diet that met minimum standards of feeding practices (an outcome similar to a minimum acceptable diet) (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). The proportion of children age 6-23 months fed in accordance with these practices was found to increase with mothers' education and wealth quintile. Inappropriate or suboptimal complementary feeding practices in Tanzania have also been found to correlate with lower levels of paternal/maternal education, limited access to mass media, lack of post-natal check-ups, and poor economic status (Victor et al., 2013).

According to a 24-hour dietary recall assessment conducted in the Tanzanian district of Kilosa in 2005, *uji* (porridge made from maize flour) is commonly used as a complementary food, but was found to be insufficient in bioavailable iron and energy density (Mamiro et al., 2005). Breast-milk substitutes and fortified complementary foods are not commonly used in Tanzania: 0.6% of breastfed and 0.7% of non-breastfed children consumed infant formula in the previous day, and 2.6% breastfed and 1.9% of non-

breastfed children consumed fortified solid or semi-solid baby foods in the previous day (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). Based on a 2007 report by Save the Children using the cost of diet modeling approach, a 'healthy diet', defined as that which meets minimum micro- and macronutrient requirements for a family of five, may be prohibitively expensive for up to 70% of the Tanzanian population (Chastre et al., 2007).

To our knowledge, no data have been published on rates of consumption of commercially produced snack foods among infants and young children in Tanzania. Evidence from other low- and middle-income countries indicates that consumption of sugary snack foods is a problem, often occurring more often than consumption of infant cereals, eggs, or fruit; a review of Demographic and Health Survey data showed that 46% of African children 12-23 months of age consumed sugary snack foods(Huffman et al., 2014).

In response to unethical marketing activities by breast-milk substitute companies, the World Health Organization (WHO) developed the 1981 *International Code of Marketing of Breast-milk Substitutes* (WHO, 1981). In 1994, Tanzania adopted the *Code* and instituted *The National Regulations for Marketing of Breast-milk Substitutes and Designated Products (Government of Tanzania, 1994)*. The updated *Tanzania Food, Drugs and Cosmetics (Marketing of foods and designated products for infants and young children) Regulations, 2013* prohibits the promotion of infant formula, follow-up formula, growing-up milks, and "any product marketed, or otherwise represented or commonly used for feeding of infants…or beverages, milks and other foods intended for use by infants and young children" (Government of Tanzania, 2013). This legislation covers products marketed for children up to 5 years of age in its definition of 'young children' and therefore has prohibitive marketing implications for numerous commercial food products. The wide and somewhat ambiguous scope of this legislation prohibits point-of-sale promotion of all breast-milk substitutes and commercially produced complementary foods, but may be interpreted to apply to other commercial products that target children in their promotions and/or labeling.

Additionally, in order to promote and encourage good nutrition across the country, the Ministry of Health and Social Welfare in Tanzania along with its partners developed a National Nutritional Strategy to be implemented from July 2011 to June 2016. Infant and young child feeding is a priority area for this program, and measures to prevent unethical marketing of breast-milk substitutes are listed among the strategies to be implemented (Ministry of Health and Social Welfare and United Republic of Tanzania, 2011).

Understanding what messages mothers in Dar es Salaam receive from the health system and from the commercial sector about infant and young child feeding is needed in order to reinforce positive messages and discourage inappropriate promotion of commercially produced foods for infants and young children, including breast-milk substitutes, commercially produced complementary foods that are nutrient poor, and commercially produced snack foods. It is also important to ensure that breast-milk substitutes and commercial complementary foods are not being promoted, as this would be a contravention of national legislation.

Helen Keller International (HKI) is implementing a project titled "Assessment and Research on Child Feeding (ARCH)" to gather information on the promotion of foods consumed by infants and young children in four countries (Cambodia, Nepal, Senegal and Tanzania). As part of the ARCH project, a study, 'Assessment of promotion of foods consumed by infants and young children in Tanzania,' was conducted in collaboration with the Ministry of Health. This study sought to build the understanding around mothers' exposure to promotional practices for infant and young child food products in Dar es Salaam and their utilization of these products. Findings from this study are detailed in this report.

2. Materials and methods

2.1 Research objectives

The ARCH 'Assessment of promotion of foods consumed by infants and young children in Tanzania' study sought to assess exposure to promotional practices pertaining to infant and young child foods among mothers utilizing the health system in Dar es Salaam, Tanzania, as well as to assess their current infant and young child feeding practices, including utilization of commercially produced foods for child feeding.

The primary objectives of the study were to:

- Estimate the prevalence of promotional practices occurring within the health system for breast-milk substitutes (including infant formula, follow-up formula, and growing-up/toddler milks)
- Estimate the prevalence of promotional practices occurring within the health system for complementary foods and supplements for infants and young children
- Document breastfeeding support and complementary feeding guidance provided in health facilities

The secondary objectives of the study were to:

- Document consumption by infants and young children of breast-milk, breast-milk substitutes, complementary foods (both home-prepared and commercially produced complementary foods), supplements, and commercially produced snack foods
- Document mothers' exposure to promotion of commercially produced foods (including commercially produced infant and young child feeding products and commercially produced snack foods) occurring outside the health system

2.2 Food category definitions

This study used the following definitions for the categories of food under observation:

- **Breast-milk substitutes:**
  The *International Code of Marketing of Breast-milk Substitutes* defines a breast-milk substitute as, "any food being marketed or otherwise represented as a partial or total replacement for breast-milk, whether or not suitable for that purpose" (WHO, 1981). The ARCH Project defined breast-milk substitutes to include infant/starter formula (to be used from birth up to six months of age), follow-up formula (to be used from 6 to 12 months), and other milk or milk-like products (in liquid or powder form) marketed or otherwise represented as suitable for feeding

children younger than two years of age, including growing-up milk and toddler milks, but excluding other beverages and foods marketed or otherwise represented as a partial or total replacement for breast-milk.

- **Commercially produced complementary foods:**
  Any commercially produced food or beverage product, excluding breast-milk substitutes, that contains a label indicating the product is intended for children younger than two years of age, by:
  - Making use of the words baby/babe/infant/toddler/young child to refer to a child's age (e.g., "baby food" denoting food for babies) and not the size/maturity of the product (e.g., "baby potato" denoting a young potato)
  - Recommending an age of introduction less than two years on the label, or
  - Using an image of a child appearing younger than 2 years of age or an image/text of infant feeding (which could include a bottle)

  Types of commercially produced complementary foods included cereal/porridge, homogenized/pureed food, snacks/finger food, gravy/soup, tea/water/juice, etc.

- **Commercially produced infant and young child foods:**
  A term that grouped breast-milk substitutes and commercially produced complementary foods together

- **Commercially produced snack foods:**
  Commercially produced foods typically eaten between meals and for consumption among the general population. Savory snacks included fried chips, crisps, or salted biscuits. Sugary snacks included chocolates, sweets, candies pastries, cakes, or sweet biscuits.

2.3 Research design and study population

This study utilized a cross-sectional, multi-stage cluster randomized design. Because variables of interest included breastfeeding practices, the study was limited to only mothers and did not include other caregivers of children. Data were collected through structured interviews using two questionnaires for two separate study populations: 1) mothers who had just been discharged from a maternity ward after delivery and 2) mothers of children less than 24 months of age who were utilizing child health clinics at a facility. The former study population was interviewed regarding experiences and practices during their pregnancy or since the recent delivery of their newborn, while the latter study population was asked to recall experiences and practices since the birth of their youngest child less than 24 months of age.

The study populations included in this survey were limited to mothers currently living in and utilizing health facilities within the geographical limits of Dar es Salaam. Mothers living outside of Dar es Salaam, but utilizing delivery or child health services in the city were excluded from participation in the survey. Additionally, in order to obtain a sample of mothers who held equal opportunity to successfully breastfeed, mothers with any of the following characteristics were excluded:

1. Mothers of infants/young children with congenital diseases or who were in the neonatal intensive care unit;
2. Mothers who experienced severe delivery complications during the birth of their newborn/youngest child;
3. Mothers whose newborn/youngest child was a twin or from a multiple birth;
4. Women who were not mothers of the child less than 24 months present with them at the health facility;
5. Mothers with children who were too ill for interview.

2.4 Sample size calculation

Previous studies with similar objectives to this study's first two primary objectives (i.e., estimating mothers' exposure to promotion practices pertaining to IYCF products within the health system) were reviewed and used to inform this study's sample size calculations. Studies that aimed to estimate the prevalence of the promotion of breast-milk substitutes and complementary foods in the health system and thus estimate violations of the *International Code of Marketing of Breast-milk Substitutes*, include studies conducted by Taylor (Taylor, 1998), IGBM/UNICEF(Interagency Group on Breastfeeding Monitoring (IGBM) & United Nations Children's Fund (UNICEF) (2005)) , and Save the Children and Gallup Pakistan (Save the Children UK and Galllup Pakistan, 2013) in which about 800 women (400 pregnant and 400 with children less than 6 months of age) in each site (often in capital cities) were interviewed. Other studies that also assessed compliance with the *Code* had much smaller sample sizes ranging from 50 to about 300 caregivers (Aguayo et al., 2003, Babak et al., 2004, Haiek, 2011, Hamilton, 2002, Perez-Escamilla, 2004, Sobel et al., 2012).

Additionally, documents describing procedures to assess *Code* compliance were also reviewed to inform this study's sample size calculation approach. The Baby-Friendly Hospital Initiative (BFHI) self-assessment tool to help health systems assess BFHI compliance (which includes giving infants only breast-milk in the hospital, and like *the Code*, prohibits promotion of any other foods) suggests collecting 30 interviews with mothers over the course of one month in each health facility and reporting BFHI compliance if 80% of mothers respond affirmatively to questions related to the BFHI global criteria (Brownlee, 2009). The IGBM and UNICEF methodology (Interagency Group on Breastfeeding Monitoring (IGBM), 2007) requires interviewing 800 women with infants <6 months because "the sampling of 800 women gives a 95% power to observe at least one reported violation [of the *Code*] if the true prevalence is 2%. If the prevalence is 10%, the sample size generates an estimate of population prevalence with a standard error of 1%." Due to the high cost of collecting such a large sample size and the desire to develop a methodology that could be replicated in subsequent years on a regular basis by local governments and interested stakeholders, a higher standard error was used in this study.

The sample size for this study was calculated to detect a 10% prevalence rate of exposure to promotions within the health system, with a measurement error of ±5%. Using a standard of error of 0.0255 and assuming a design effect of 2 to account for the cluster design, a sample size of 280 mothers at discharge and 280 mothers of children less than 24 months of age was considered adequate. Due to the cluster sampling design utilized (described below), the final sample size was slightly higher than 280 and

came to 295 mothers at discharge after delivery and 305 mothers of children less than 24 months of age utilizing child health services (**Figure 1**).

2.5 Sampling procedure

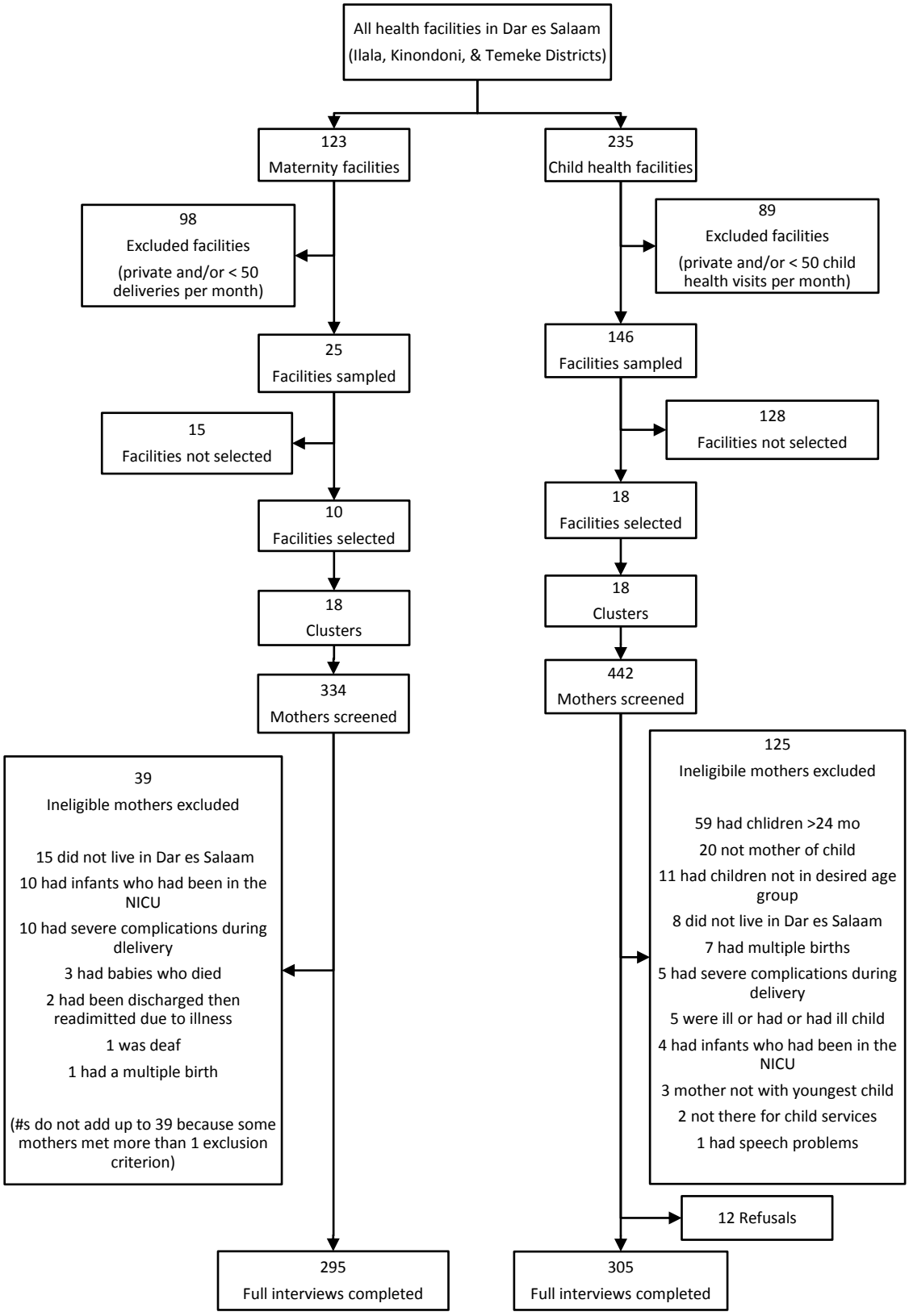
Lists of all health facilities offering maternity and/or child health services in Dar es Salaam's three districts (Ilala, Kinondoni, and Temeke) were obtained from the Tanzania Ministry of Health Database. Health facilities owned by the government or faith-based organizations (voluntary or private) were included, while facilities that were privately owned and not faith-based were excluded. Private facilities were not included in the study because utilization of private facilities in Tanzania is relatively low (6.0% of live births in Dar es Salaam occurred in private health facilities in 2010 (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011)). Additionally, the logistical challenges of including these private facilities were found to be great, including the inability to obtain utilization rates for the sampling procedure and the small scale of these facilities that would result in prolonged data collection beyond the resources of the study. Health facilities included national hospitals, referral hospitals, health centers, and dispensaries; health posts were excluded due to their small size and high likelihood of not offering maternity or child health services and not being staffed by a health professional.

In order to simplify logistics and complete data collection within 8-10 weeks, facilities with less than 50 deliveries or child health visits per month were also excluded from the sampling frame. The Tanzania Ministry of Health Database also included information on the utilization rates for these facilities, which included total number of deliveries and number of child health visits (including out-patient department and immunization visits) for the period of August 2013 to June 2014. These data were cleaned by the HKI Tanzania Office and follow-up inquiries were made to obtain utilization rates for facilities with missing data. The average monthly utilization rates were then calculated for each facility.

The exclusion of privately owned non-faith-based health facilities and facilities with less than 50 deliveries or child health visits per month resulted in the exclusion of 98 out of 123 delivery facilities and 89 out of 235 child health facilities (**Figure 1**). Based on the facility utilization rates obtained, the 25 delivery facilities included in the sampling frame is where 86% of all facility-based births took place in Dar es Salaam from August 2013-June 2014, and the 146 child health facilities included in the sampling frame is where 76% of all child health visits took place in Dar es Salaam from August 2013-June 2014.

Health facilities were then sampled by allocating clusters using probability proportional to size. The calculated average monthly utilization rates served as each facility's "population". Facilities for delivery and facilities for child health services were sampled separately, though some facilities offered both delivery and child health services and were thus included in both sampling frames. Clusters of 16 mothers each were assigned across facilities in the sampling frame; the total of 16 mothers per cluster was chosen to allow for even distribution of child ages across 4 age categories (0-5.9, 6-11.9, 12-17.9, and 18-23.9 months). Because sampling of facilities was proportional to size, larger facilities had a greater chance of being sampled for multiple clusters, while smaller facilities had a greater chance of being sampled for only one cluster.

Figure 1. Sampling profile for mothers and facilities



2.6 Data collection

Data collection took place from October 6-November 19, 2014. Two different sampling procedures were utilized to identify mothers to interview for each of the two study populations (mothers of newborns and mothers of children <24 months of age).

Mothers at discharge: Sampled facilities were alerted of data collection approximately one week prior to survey and again 1-2 days before the study team's arrival. Study supervisors worked closely with nurses-in-charge to identify mothers who had been discharged, and enumerators interviewed mothers after they had completed discharge procedures. Interviews continued until all mothers scheduled for discharge that day had been interviewed or until the sample size for the facility had been reached.

Mothers of children under 24 months: Sampled facilities were alerted of data collection approximately one week prior to survey and again 1-2 days before the study team's arrival. Women with children at clinics offering child health services, either in the immunization or outpatient department (OPD), were approached for interview by study supervisors. Supervisors screened women with children in the child health clinic and OPD areas to assess if 1) they were the mother of the child with them, 2) this child was under 24 months of age, and 3) they lived in Dar es Salaam. Supervisors also asked the mother for the child's date of birth and calculated the age of the child to determine whether the child fell into an age category for which an interview was still needed. The exclusion criteria questions asked by the supervisors during screening were also included in the formal questionnaire used for interviewing mothers and asked again by enumerators.

Ethical clearance for this study was obtained from Muhimbili University of Health and Allied Sciences, Directorate of Research and Publications (Ref No. MU/DRP/AEC/Vol.XVIII/130, July 31, 2014) and the Tanzanian Commission for Science and Technology (COSTECH) prior to data collection. Informed consent was obtained from all participants prior to the conducting of any interview.

2.7 Questionnaire design

Two questionnaires were developed to obtain data from the separate study populations of interest, mothers at discharge after delivery and mothers with children under 24 months of age utilizing child health services; details of questionnaire sections are shown in **Table 1**.[1,2]

Table 1. Questionnaire topic sections

Section	24 Month	Discharge
Mother characteristics	X	X
Child characteristics	X	X
Childcare practices	X	
Breastfeeding practices	X	X
Infant feeding in last 24 hours and last week	X	

[1] Questionnaires available upon request.
[2] Questions regarding exposure to promotions were adapted from the Interagency Group on Breastfeeding Monitoring Protocol (IGBM, 2007).

Complementary food advice	X	
Health communication	X	X
Advice and information	X	X
Promotions	X	X
Samples	X	X
Gifts	X	X

Both questionnaires collected data on maternal characteristics, including: age, marital status, educational attainment, household assets and drinking water source, and details regarding antenatal care and delivery of the youngest child. Data collected specifically on the youngest child included: age, gender, and birth order. Data on pre-lacteal feeding, current breastfeeding practices for the newborn/youngest child were collected among both study populations, and current complementary feeding practices were collected among mothers with children less than 24 months of age. Data to assess these infant and young child feeding practices were gathered in accordance with the WHO guidelines on IYCF practices (World Health Organization, 2008). Both questionnaires asked mothers to report on promotional practices experienced inside and outside of the health system, for both breast-milk substitutes and commercially produced complementary foods; mothers at discharge were asked to recall exposure experienced during pregnancy and after delivery of their newborn, while mothers of children under 24 months were asked to recall promotional exposure only after the birth of their youngest child. Finally, mothers of children less than 24 months of age utilizing child health services were asked to report dietary information for this child. Standardized questionnaires were used to obtain information on which foods and liquids were consumed by the youngest child on the day and night prior to the day of interview. Additionally, data were gathered on the weekly frequency of consumption, reasons for feeding, and expenditure for home-prepared complementary foods and commercially produced snack foods commonly fed to young children, as well as on the types of foods mothers aspired to feed their youngest child and reasons for this aspiration.

Data were collected using a mobile technology system in order to allow for immediate data entry, reduction in data errors, and prompt analyses. The questionnaires were designed in Microsoft Word and then entered in Ona, an open-source online platform that allows data to be collected via phones or tablets, using the Android application Open Data Kit (ODK) Collect. Data were submitted online in real-time to a web-based database. The questionnaires were translated from English into Swahili, back translated into English to ensure accuracy, and uploaded into Ona in Swahili. Interviews were conducted in Swahili using the Samsung Galaxy Tab 2 and 3 model tablets. Submitted questionnaires were reviewed weekly to ensure data quality.

2.8 Statistical analyses

Data were cleaned and analyzed using SPSS version 21 (SPSS Inc.). Proportions and mean ± standard deviation (SD) were used to describe the samples. Differences in age categories and associations were assessed through bivariate comparison, using 2-sided chi-square tests and 2-sided Fisher's exact tests for proportions.

3. Results: Mothers of newborns discharged after delivery

3.1 Demographic and socio-economic characteristics

Of the 334 mothers discharged after delivery approached for interview, 39 were excluded due to ineligibility for the following reasons: 15 mothers did not live in Dar es Salaam, 10 mothers had children who had been in the neonatal intensive care unit, 10 mothers experienced severe complications during delivery, 3 mothers' babies had died, 2 mother-infant pairs had been discharged and then readmitted into hospital due to illness, 1 mother was deaf, and 1 mother had a multiple birth (mothers could have had met more than one exclusion criterion and as a result the numbers do not add up to 39). Complete interviews were obtained for 295 mothers (**Figure 1**).

Demographic and socio-economic characteristics for mothers of newborns discharged after delivery are shown in **Table 2**. On average, mothers were 26 years of age and had given birth to two live children (including the newborn they had recently delivered). For almost half of the mothers, the newborn was their first child (48.1%). About 96% had attended any level of formal education, with 5.1% having attended university. Twenty-six percent of mothers reported working outside of the home. The majority of mothers (87.1%) received antenatal care (ANC) during their pregnancy from a health professional. Almost all mothers had delivered the newborn with the assistance of a health professional (99.3%). About one- fifth of newborns were delivered by c-section (18.3%). The mean age of newborns at discharge was 0.91 days, and 35% of newborns were less than a day old at the time of discharge. The majority of mothers reported having a safe source of drinking water (i.e., water that was piped, rainwater, bottled water, or water from a borehole, protected well, protected spring) for their household (89.5%). The majority of mothers reported that their household owned a mobile phone (91.2%), had electricity (76.3%), or owned a television (66.1%); however, ownership of a refrigerator was less common (40.3%).

Table 2. Demographic and socio-economic characteristics of mothers discharged after delivery

	Mothers discharged after delivery (*n*=295)
Maternal characteristics	
Age (years) (mean ± SD)	26.1 ± 6.0
Parity (number) (mean ± SD)	2.0 ± 1.2
Marital status (%)	
Married or living with a man	83.7
Separated, divorced, or widowed	1.0
Never married and never lived with a man	15.3
Level of education (%)[1]	
None	4.4
Pre-primary	0.3
Primary	58.3
Lower secondary	24.1
Upper secondary	7.1
Tertiary education	5.1
Works outside the home (%)	25.8

Received antenatal care from health professional (%)	87.1
Delivery assisted by health professional (%)	99.3
Child characteristics	
Age (days)(mean ± SD)	0.91 ± 0.91
Sex (female) (%)	43.4
C-section delivery (%)	18.3
Household characteristics	
Safe source of drinking water (%)	89.5
Assets, ownership (%)	
Mobile phone	91.2
Electricity	76.3
Television	66.1
Refrigerator	40.3

[1]2 (0.7%) mothers missing data on level of education

3.2 Exposure to IYCF messaging and counseling

Results regarding mothers' exposure to IYCF messages during pregnancy and since delivery are shown in **Table 3**. Thirty-eight percent of mothers reported receiving breastfeeding information from a health worker during ANC. Slightly less than half of mothers (44.7%) reported hearing, seeing, or receiving an educational message on IYCF either during pregnancy or since delivery. Exclusive breastfeeding was the most commonly reported message topic, and slightly over half (54.6%) of all mothers reported being exposed to messages pertaining to exclusive breastfeeding during their pregnancy or since the delivery of their child. The rate of assistance with positioning or attaching the newborn for breastfeeding from a health worker at or after delivery was 29.5%.

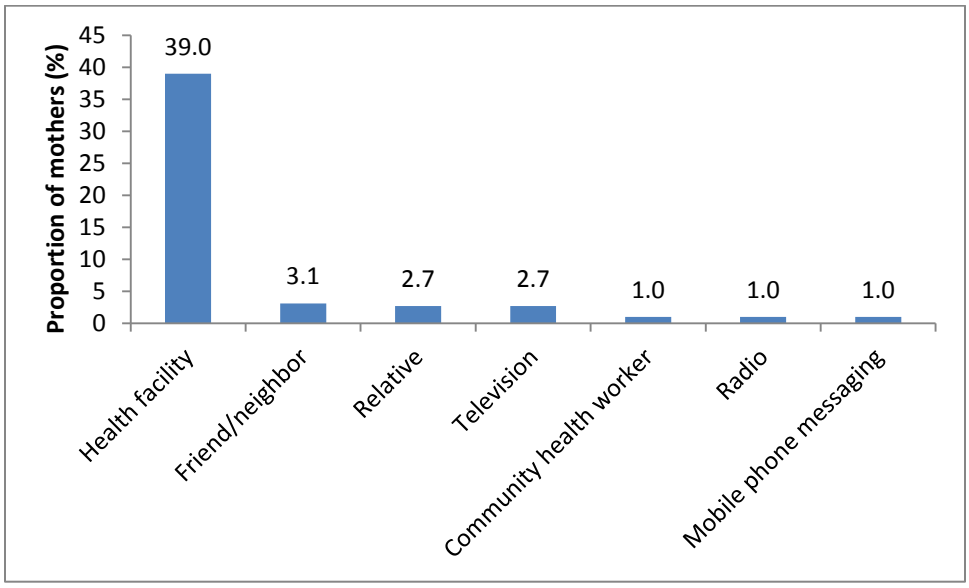
Table 3. Proportion of mothers discharged after delivery who received IYCF messaging

	Mothers discharged after delivery (*n*=295)
Received information on breastfeeding from a health worker during ANC (%)	38.0
Received breastfeeding messages during ANC on the following topics (%):	
Exclusive breastfeeding for the first 6 months	33.6
Continued breastfeeding until 2 years and beyond	13.2
Early initiation of breastfeeding	7.1
How to position the baby during breastfeeding	4.4
Risks of feeding other foods/liquids (not including infant formula) before 6 months	1.7
Hygiene during breastfeeding	1.4
Risks of feeding infant formula	0.7
Heard, saw, or received any IYCF educational message during pregnancy or since delivery (%)	44.7

Heard, saw, or received IYCF educational message during pregnancy or since delivery on the following topics (%):	
Exclusive breastfeeding for the first 6 months	37.6
Introduction of complementary foods at 6 months	15.3
Continued breastfeeding until 2 years and beyond	9.5
Early initiation of breastfeeding	8.8
Increase quantity of food as child grows	2.7
Safe and clean food preparation and storage	2.7
Feeding frequently	2.4
Feeding variety of foods	2.0
Increase food consistency as child grows	0.7
Feeding iron-rich foods	0.3

Reported sources of the IYCF educational messaging are shown in **Figure 2**. The most common source of IYCF educational messages by far was health facilities (39.0%); all other sources were each only reported as sources by less than 4% of mothers.

Figure 2. Proportion of mothers discharged after delivery exposed to IYCF educational message from various sources (*n*=295)



3.3 Promotion of commercially produced IYC foods and other foods within the health system

Mothers' exposure to promotions of IYCF products within the health system is shown in **Table 4**. The proportion of mothers that reported receiving recommendations from a health professional (during pregnancy or since delivery) to use breast-milk substitutes was relatively low (6.1%). Eight mothers (2.7%) received a recommendation to use a breast-milk substitute in the first 3 days of delivering their newborn or prior to discharge for those discharged before the third day. Only 1 mother reported

receiving a recommendation from a health professional during pregnancy or after delivery to feed the baby tinned/powdered milk, and 2 mothers received recommendations from a health professional to feed the baby fresh animal milk. Observation rates of breast-milk substitutes and commercially produced complementary food advertisements within the health facility were low. During pregnancy or since delivery, 2.0% of mothers had read, heard, or seen a commercial advertisement for infant formula within the health facility; 1.0% had read, heard, or seen a commercial advertisement for commercial complementary foods within the health facility; and 4.1% had observed an infant and young child food or drink brand/logo on items in the health facility. No mothers received free samples of infant formula, commercially produced complementary foods, nutrient supplements, bottles, or teats; or gifts branded with an infant formula company from a health professional during pregnancy or after delivery.

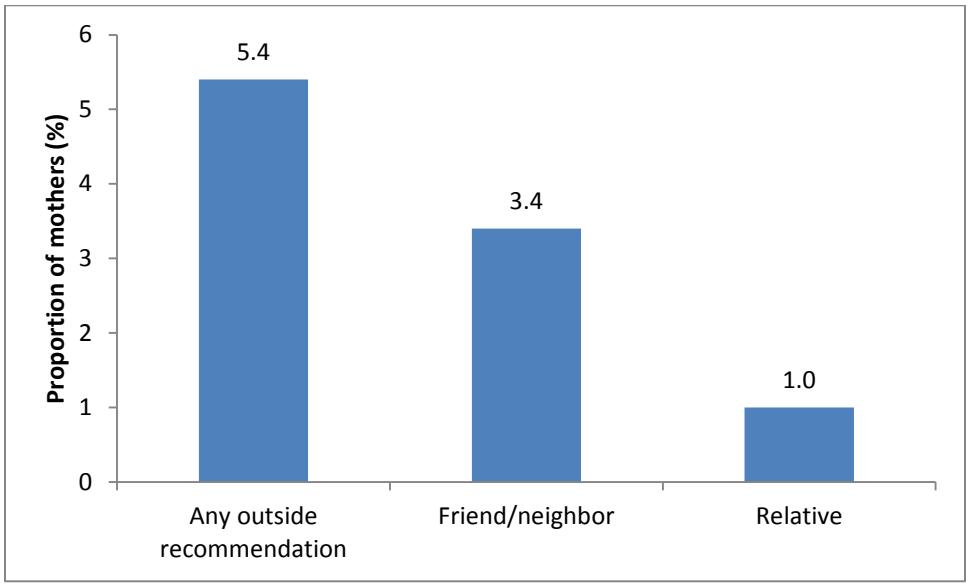
Table 4. Proportion of mothers discharged after delivery exposed to various sources of IYCF product promotions within the health system

	Mothers discharged after delivery (*n*=295)
Received recommendation to use infant formula from a health professional (%)	6.1
Read, saw, or heard commercial advertisement for infant formula within health facility (%)	2.0
Read, saw, or heard commercial advertisement for commercially produced complementary foods within health facility (%)	1.0
Observed commercially produced IYC food brands/logos on items in health facility (%)	4.1
Received infant formula sample from a health professional (%)	0.0
Received bottle or teat sample from a health professional (%)	0.0
Received a commercially produced complementary food sample from a health professional (%)	0.0
Received a gift from a health professional branded with infant formula company (%)	0.0

3.4 Promotion of commercially produced IYC foods and other foods outside the health system

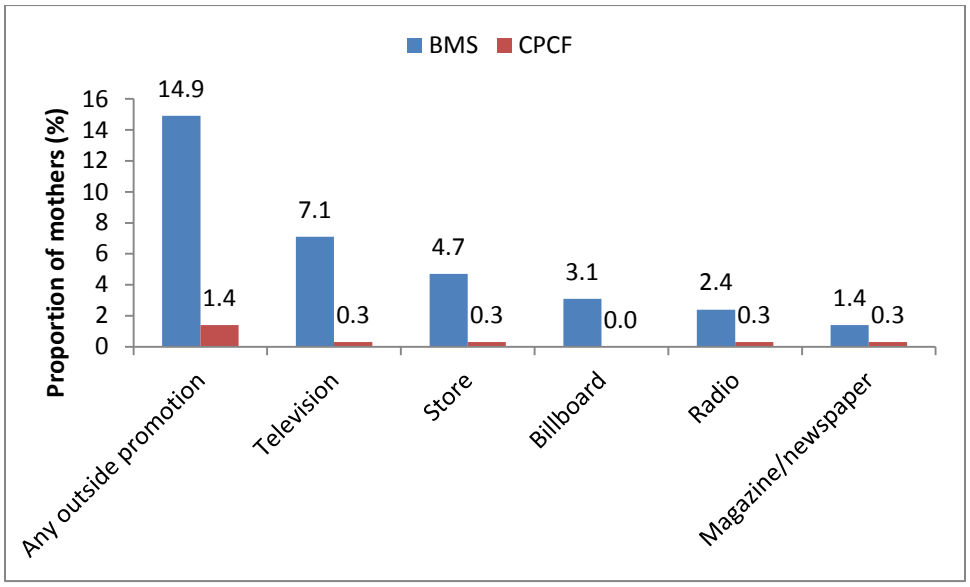
The sources outside of the health system from which mothers received recommendations to use breast-milk substitutes are shown in **Figure 3**. Few (5.4%) mothers received a recommendation during pregnancy or between delivery and discharge to use a breast-milk substitute from a source outside of the health system. The proportion of mothers who reported receiving a recommendation to feed their baby powdered/tinned or fresh animal milk from a source outside of the health system was also low (5.4%).

Figure 3. Proportion of mothers discharged after delivery who received recommendations to use breast-milk substitutes from various sources outside of the health system (*n*=295)



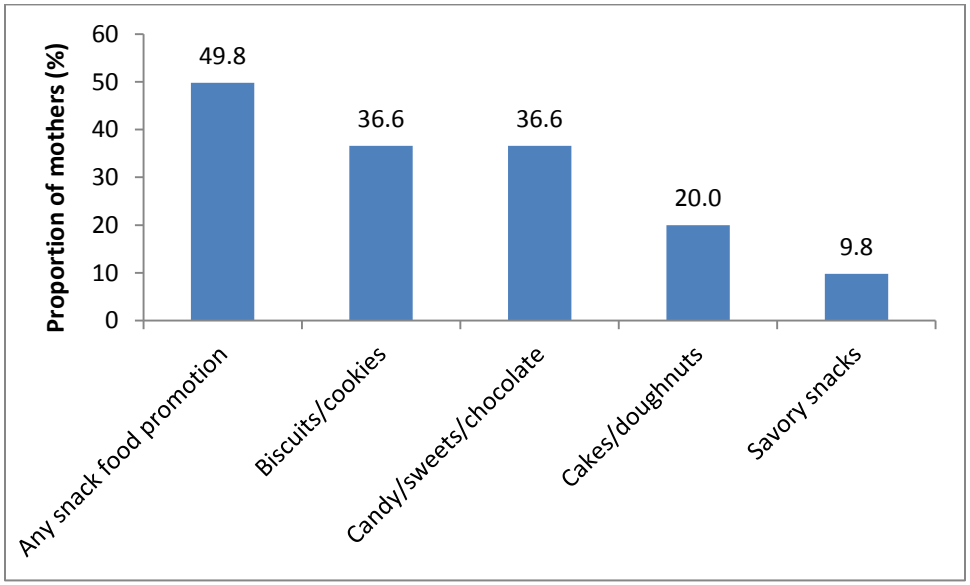
Results regarding mothers' exposure to commercial promotion of commercially produced infant and young child foods during pregnancy and since delivery are presented in **Figure 4**. Commercial promotions of breast-milk substitutes were read, seen, or heard outside of the health system by 14.9% of mothers discharged after delivery, with no single source being reported by more than 8% of mothers. Even fewer mothers (1.4%) reported reading, seeing, or hearing a commercial promotion for commercially produced complementary foods outside of the health system, with at most 1 mother reporting exposure to each source. No mothers received free samples of infant formula, commercially produced complementary foods, nutrient supplements, bottles, or teats; or gifts branded with an infant formula company outside of the health system during pregnancy or after delivery. No mothers received discounts on commercially produced IYC foods inside or outside of the health system during pregnancy or after delivery.

Figure 4. Proportion of mothers discharged after delivery exposed to various sources of commercial promotion of breast-milk substitutes and commercially produced complementary foods outside of the health system (*n*=295)



Mothers' exposure to promotions for commercially produced snack foods (including biscuits, sweets, cakes, and savory snacks) is shown in **Figure 5**. Exposure to promotions for commercially produced snack foods was much more commonly reported by mothers than for commercially produced IYC foods, with half of all mothers reporting having observed such a promotion.

Figure 5. Proportion of discharge mothers who were exposed to commercial promotions of commercially produced snack foods (*n*=295)



3.5 Breastfeeding practices among mothers with newborns

Early breastfeeding practices are described in **Table 5**. Slightly over two-thirds of mothers (68.1%) initiated breastfeeding within one hour of delivery (i.e., early initiation of breastfeeding). Less than a third of mothers (31.5%) reported holding their newborns immediately after delivery. The rates of prelacteal feeding (i.e., the provision of liquids other than breast milk in the first 3 days after delivery or prior to discharge if less than 3 days), were very low, at 4.7%. The main liquid fed during prelacteal feeding was infant formula (given to 3.1% of newborns), and the main reason mothers reported for prelacteal feeding was that their milk had not come in.

Table 5. Early breastfeeding practices among mothers discharged after delivery (*n*=295)

	%
Early initiation of breastfeeding	68.1
Immediately held newborn after birth (%)	31.5
Pre-lacteal feeding (%)	4.7

4. Results: Mothers of children less than 24 months of age

4.1 Demographic and socioeconomic characteristics

Of the 442 mothers of children less than 24 months of age approached for interview, 12 mothers refused to be interviewed, and 125 were excluded due to ineligibility for the following reasons: 59 mothers had children >24 months of age, 20 were not the mother of the child, 11 had children outside of the desired age category, 8 did not live in Dar es Salaam, 7 had had multiple births, 5 had experienced severe complications during delivery, 5 were ill or had a child who was ill, 4 mothers had children who had been in the neonatal intensive care unit, and 3 were not with their youngest child, 2 were not there for child services, and 1 mother had speech problems. Complete interviews were obtained for 305 mothers (**Figure 1**).

Demographic and socio-economic characteristics for mothers of children less than 24 months of age are shown in **Table 6**. On average, mothers were 26.5 years of age. Almost half of the mothers were primiparas (44.4%). About 94% had attended any level of formal education, with 2.3% having attended university. Twenty-three percent of mothers reported working outside of the home, and 92.5% reported themselves to be the main caregiver of their youngest child. The majority of mothers (86.6%) received antenatal care during their pregnancy from a health professional or a community health worker. Almost all mothers had delivered their youngest child with the assistance of a health professional (96.7%). The mean age of children was 11.8 months, as would be expected given the effort made to sample children across an equal distribution of ages 0-23 months. The majority of mothers reported having a safe source of drinking water for their household (76.4%). The majority of mothers reported that their household owned a mobile phone (90.5%), had electricity (64.3%), or owned a television (57.7%); however, ownership of a refrigerator was less common (33.1%).

Table 6. Demographic and socio-economic characteristics of mothers of children <24 mo of age

	Mothers of children <24 mo (*n*=305)
Maternal characteristics	
Age (years) (mean ± SD)[1]	26.5 ± 5.8
Parity (number) (mean ± SD)[2]	2.0 ± 1.3
Marital status (%)	
Married or living with a man	86.6
Separated, divorced, or widowed	3.6
Never married and never lived with a man	9.8
Level of education (%)[3]	
None	5.9
Pre-primary	0.3
Primary	61.6
Lower secondary	21.6
Upper secondary	6.9
Tertiary education	2.3
Works outside the home (%)	22.6
Main caregiver of the child (%)	92.5
Received antenatal care from health professional or community health worker (%)	86.6
Delivery assisted by health professional (%)	96.7
Child characteristics	
Age (months)(mean ± SD)	11.8 ± 6.6
Sex (female) (%)	51.8
C-section delivery (%)	12.5
Household characteristics	
Safe source of drinking water (%)	76.4
Assets, ownership (%)	
Mobile phone	90.5
Electricity	64.3
Television	57.7
Refrigerator	33.1

[1] *n*=303; 2 (0.7%) mothers missing data on age
[2] *n*=304; 1 (0.3%) mother missing data on parity
[3] 4 (1.3%) mothers missing data on level of education

4.2 Exposure to IYCF messaging and counseling

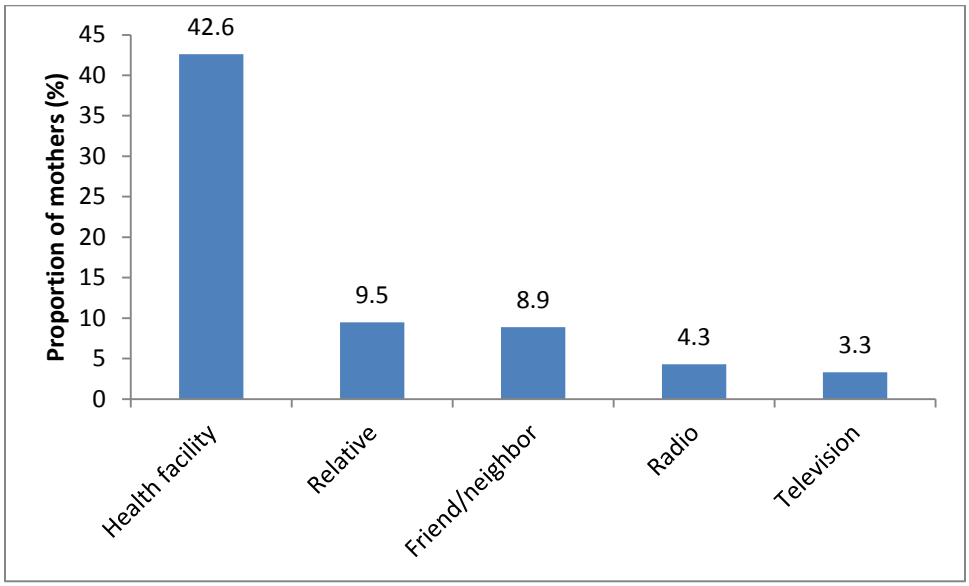
Results regarding mothers' exposure to IYCF messages since their child was born are shown in **Table 7**. Forty-eight percent of mothers reported receiving breastfeeding information from a health worker during ANC while pregnant with their youngest child. Slightly over half of mothers (55.7%) reported hearing, seeing, or receiving an educational message on IYCF since their child was born. Exclusive breastfeeding was the message topic most frequently reported, and slightly over half of all mothers (51.5%) reported being exposed to messages pertaining to exclusive breastfeeding during ANC while pregnant with their youngest child or since their youngest child was born. The rate of assistance with positioning or attaching the baby for breastfeeding from a health worker at or after delivery was 35.1%.

Table 7. Proportion of mothers of children <24 mo of age who received IYCF messaging

	Mothers of children <24 mo (*n*=305)
Received information on breastfeeding from a health worker during ANC (%)	48.2
Received breastfeeding messages during ANC on the following topics (%):	
Exclusive breastfeeding for the first 6 months	38.7
Continued breastfeeding until 2 years and beyond	13.1
Early initiation of breastfeeding	5.9
How to position the baby during breastfeeding	5.9
Risks of feeding other foods before 6 months	3.9
Risks of feeding water before 6 months	2.0
Breastfeed frequently	1.6
Hygiene during breastfeeding	1.3
How often to breastfeed	1.0
Increasing breastfeeding during illness	0.7
Heard, saw, or received any IYCF educational message since child was born (%)	55.7
Heard, saw, or received IYCF educational message during pregnancy or since delivery on the following topics (%):	
Exclusive breastfeeding for the first 6 months	29.8
Feeding variety of foods	14.4
Introduction of complementary foods at 6 months	12.1
Continued breastfeeding until 2 years and beyond	9.8
Safe and clean food preparation and storage	5.9
Feeding frequently	5.9
Early initiation of breastfeeding	5.2
Increase quantity as child grows	3.9
Increase consistency as child grows	1.6
Feeding iron-rich foods	1.3
Responsive feeding	1.0
Increase feeding during and after illness	0.3

Reported sources of the IYCF educational messaging are shown in **Figure 6**. The most common source of IYCF educational messages by far was health facilities (42.6%). All other sources were each only reported as sources by less than 10% of mothers.

Figure 6. Proportion of mothers of children <24 mo exposed to IYCF educational message from various sources (*n*=305)



4.3 Promotion of commercially produced IYC foods and other foods within the health system

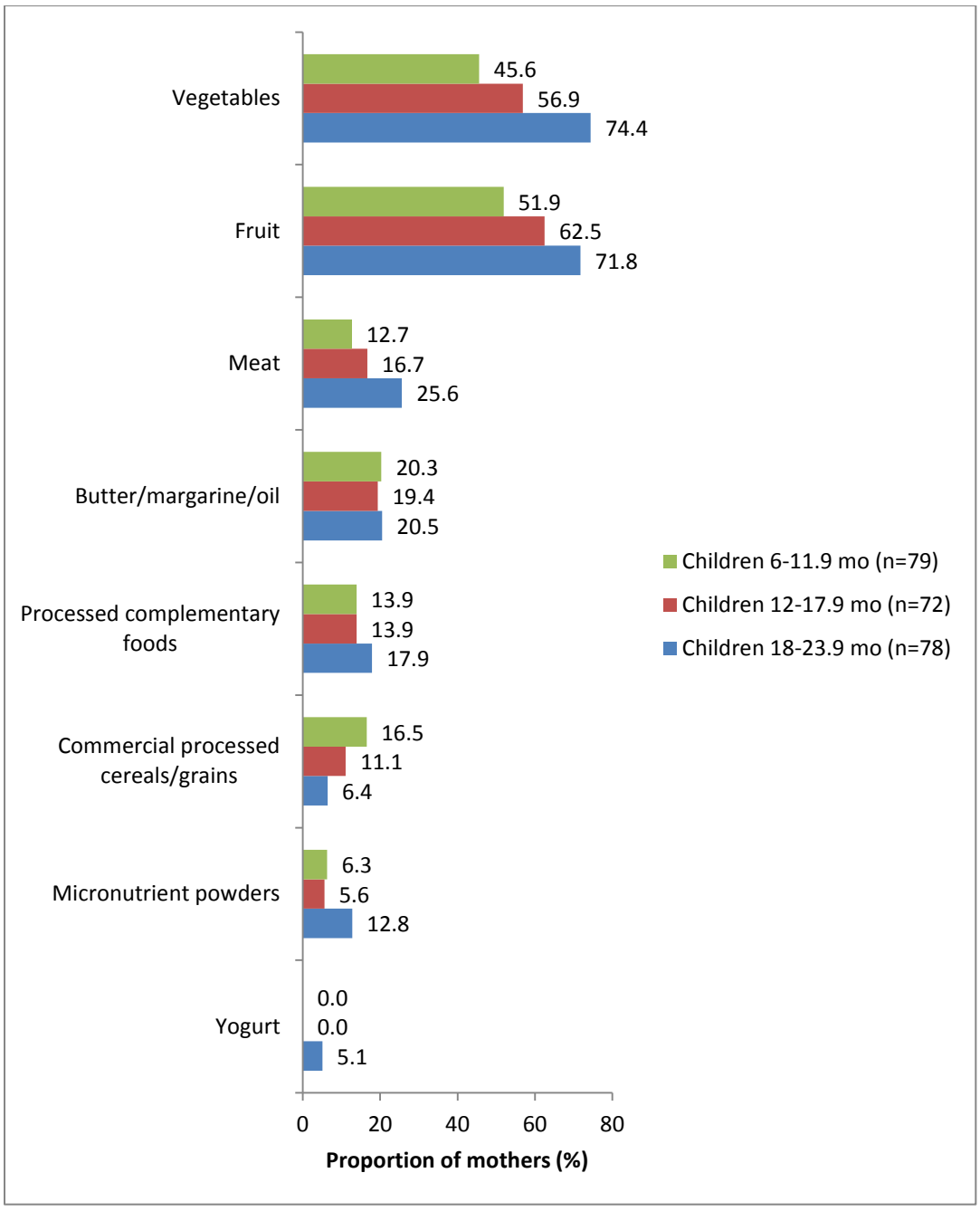
Mothers' exposure to promotions of IYCF products within the health system is shown in **Table 8**. The proportion of mothers that reported receiving recommendations from a health professional (since delivery of their youngest child) to use breast-milk substitutes was relatively low (9.2%). Ten mothers (3.3%) reported receiving the recommendation to use a breast-milk substitute from a health professional within the first 3 days of delivering their child. Since their child was born, only 1 mother reported receiving a recommendation from a health professional to feed the child tinned/powdered milk, and 11 (3.6%) mothers received recommendations from a health professional to feed the child fresh animal milk. Observation rates of breast-milk substitutes or commercially produced complementary food advertisements within the health facility were low. Since the birth of their youngest child, 2.6% of mothers had read, heard, or seen a commercial advertisement for infant formula within the health facility. No mothers had read, heard, or seen a commercial advertisement for commercially produced complementary foods within the health facility; and 3.3% had observed an infant and young child food or drink brand/logo on items in the health facility. Among mothers of 6-23-month-olds, 15.3 % reported receiving a recommendation from a health worker to feed their child a commercially produced complementary food, and <1.5% received a recommendation to feed their child a commercially produced snack food. No mothers received free samples of infant formula, commercially produced complementary foods, nutrient supplements, bottles, or teats; or gifts branded with an infant formula company from a health professional since the birth of their youngest child.

Table 8. Proportion of mothers of children <24 mo exposed to various sources of IYCF product promotions within the health system

	Mothers of children <24 mo (*n*=305)
Received recommendation to use infant formula from a health professional (%)	9.2
Read, saw, or heard commercial advertisement for infant formula within health facility (%)	2.6
Read, saw, or heard commercial advertisement for commercially produced complementary foods within health facility (%)	0.0
Observed commercially produced IYC food brands/logos on items in health facility (%)	3.3
Received infant formula sample from a health professional (%)	0.0
Received bottle or teat sample from a health professional (%)	0.0
Received a commercially produced complementary food sample from a health professional (%)	0.0
Received a gift from a health professional branded with infant formula company (%)	0.0

Results regarding the main foods mothers of children 6-23 months of age reported being recommended to them for complementary feeding by health workers are shown in **Figure 7**. Approximately half to three-quarters of mothers reported that health workers recommended feeding fruit or vegetables to the child; other foods were reported as recommended by less than a quarter of mothers.

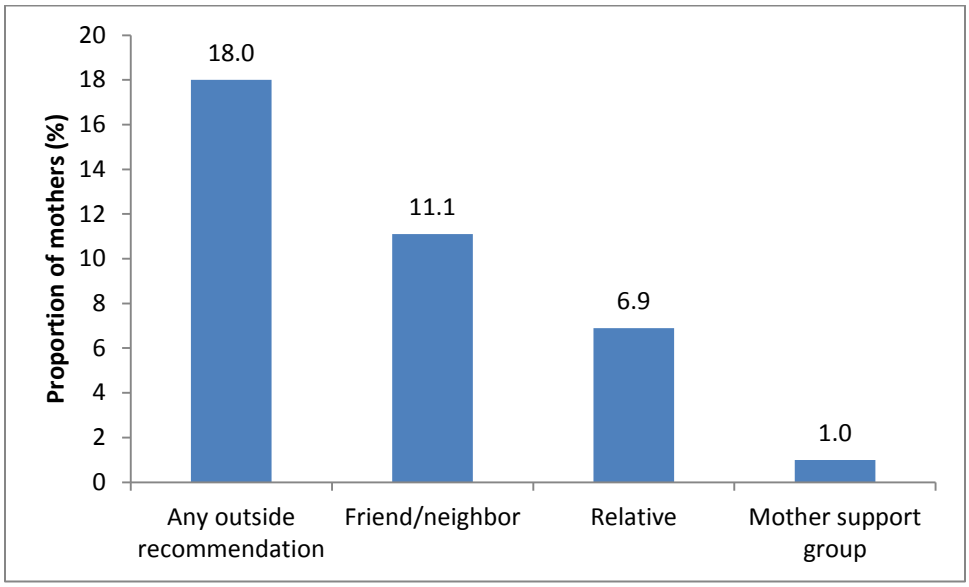
Figure 7. Proportion of mothers of children 6-23 mo who reported receiving a recommendation from a health worker to feed child various foods



4.4 Promotion of commercially produced IYC foods and other foods outside the health system

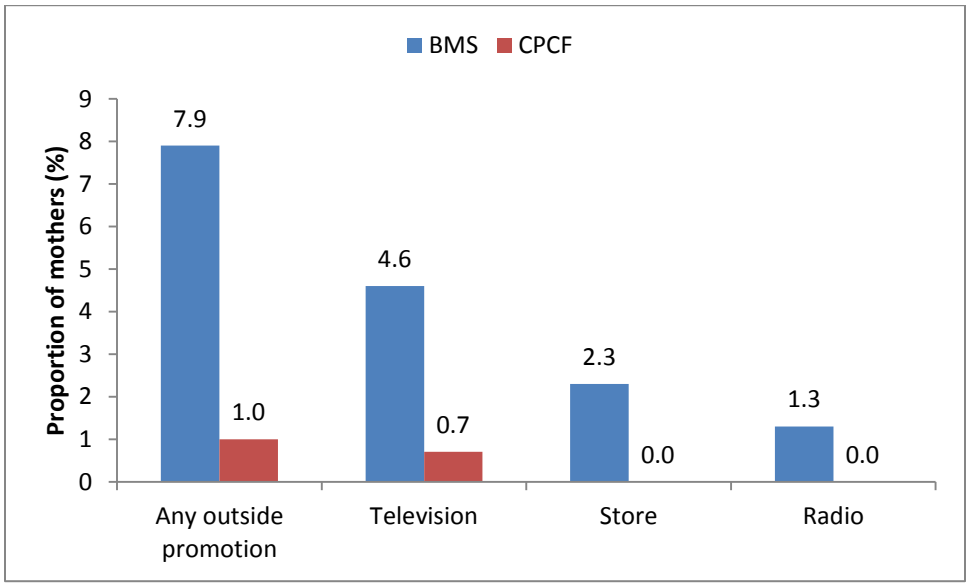
The sources outside of the health system from which mothers received recommendations to use breast-milk substitutes are shown in **Figure 8**. Eighteen percent of mothers received a recommendation since their child was born to use a breast-milk substitute from a source outside of the health system, mainly from friends, neighbors, and relatives. A similar proportion (17.4%) of mothers reported receiving a recommendation to feed their baby powdered/tinned or fresh animal milk from a source outside of the health system.

Figure 8. Proportion of mothers of children <24 mo who received recommendations to use breast-milk substitutes from various sources outside of the health system (*n*=305)



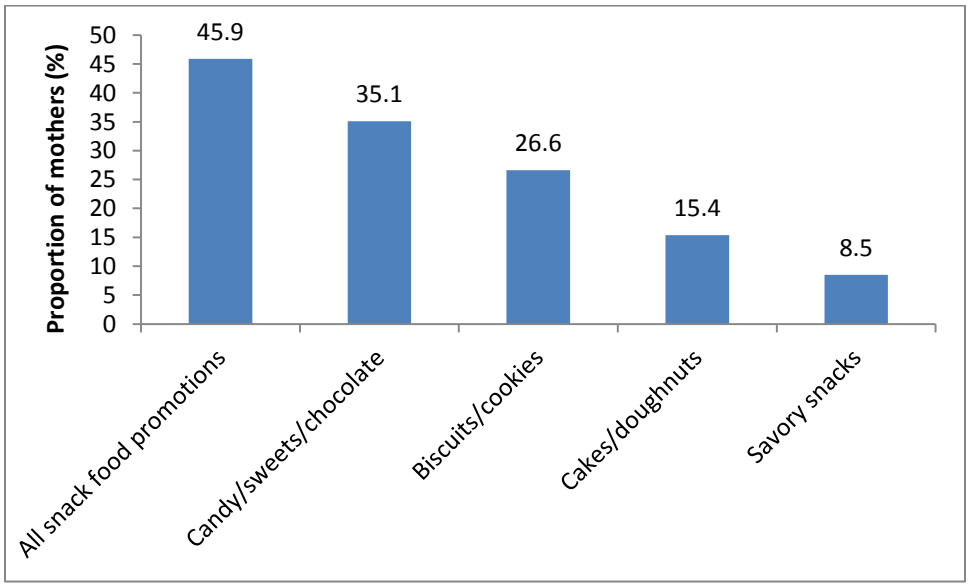
Results regarding mothers' exposure to commercial promotion of commercially produced infant and young child foods since their youngest child was born are presented in **Figure 9**. Commercial promotions of breast-milk substitutes were read, seen, or heard outside of the health system by 7.9% of mothers, with no single source being reported by more than 5% of mothers. Even fewer mothers (1.0%) reported reading, seeing, or hearing a commercial promotion for commercially produced complementary foods outside of the health system, with at most 2 mothers reporting exposure to each source. No mothers received free samples of infant formula, commercially produced complementary foods, nutrient supplements, bottles, or teats; or gifts branded with an infant formula company outside of the health system since the birth of their youngest child. Two mothers reported receiving discounts on infant formula and no mothers reported receiving discounts on commercially produced complementary foods inside or outside of the health system since the birth of their youngest child.

Figure 9. Proportion of mothers of children <24 mo exposed to various sources of commercial promotion of breast-milk substitutes and commercially produced complementary foods outside of the health system (*n*=305)



Mothers' exposure to promotions for commercially produced snack foods is shown in **Figure 10**. Exposure to promotions for commercially produced snack foods was much more commonly reported by mothers than for breast-milk substitutes or complementary foods, and close to half of all mothers (45.9%) reported observing such a promotion.

Figure 10. Proportion of mothers of children <24 mo who were exposed to commercial promotions of commercially produced snack foods (*n*=305)



4.5 Infant and young child feeding practices

4.5.1 Current breastfeeding practices

Breastfeeding practices based on the previous day are shown in **Table 9**. All but 1 mother had ever breastfed their child (99.7%). Breastfeeding rates decreased with age: all children under 6 months were being breastfed, almost all 6-11.9-month-olds were being breastfed, a very high proportion of 12-17.9-month-olds were being breastfed, then a large drop occurred for 18-23.9-month -olds with less than half still being breastfed. Among infants less than 6 months of age, 40.8% were being exclusively breastfed and 53.9% were being predominantly breastfed. Among all children, 12.5% had been fed from a bottle the previous day.

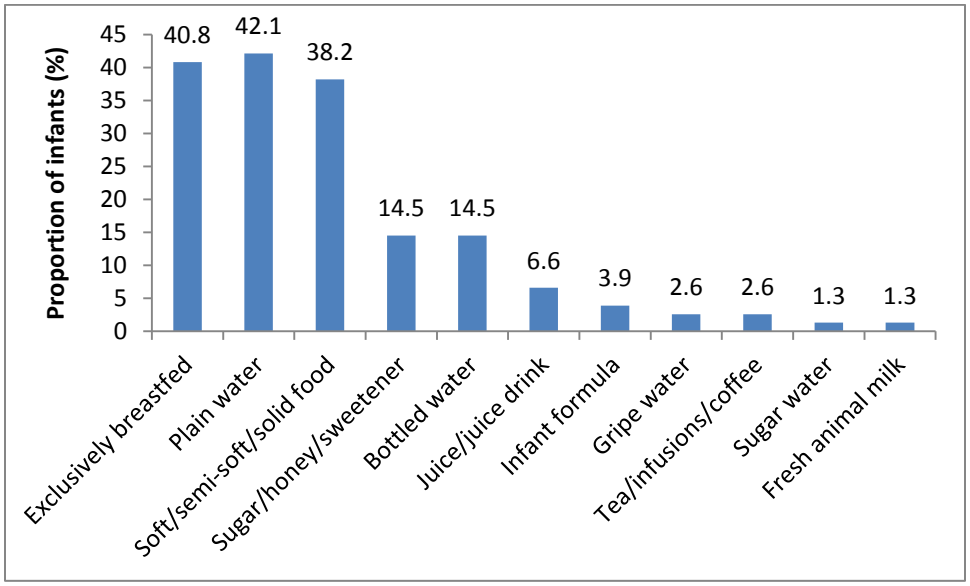
Table 9. Current breastfeeding practices among mothers of children <24 mo of age

	n	%
Ever breastfed	305	99.7
Currently breastfeeding		
0-5.9 months	76	100.0
6-11.9 months	79	94.9
12-17.9 months	72	84.7
18-23.9 months	78	46.2
Exclusive breastfeeding[1]	76	40.8
Predominant breastfeeding[1]	76	53.9
Continued breastfeeding at 1 year[2]	53	83.0
Continued breastfeeding at 2 years[3]	42	33.3
Bottle feeding		
0-5.9 months	76	10.5
6-11.9 months	79	21.5
12-17.9 months	72	11.1
18-23.9 months	78	6.4

[1] Among children 0-5.9 months
[2] Among children 12-15.9 months
[3] Among children 20-23.9 months

Figure 11 shows the items that were consumed by children less than 6 months of age. Close to half of all children less than 6 months of age were fed plain water, and over a third were fed soft, semi-soft, or solid foods in the previous day. Other liquids were fed to less than 15% of infants.

Figure 11. Proportion of infants <6 mo of age fed various items (*n*=76).



4.5.2 Complementary feeding practices and dietary intake among children 6-23 months

Infant and young child feeding indicators are presented in **Table 10**. Minimum dietary diversity and minimum meal frequency were met by 49.3% and 70.3% of children 6-23 months of age, respectively (see Table 10 footnotes for definitions). A minimum acceptable diet, defined as the combination of these two indicators(World Health Organization, 2008), was consumed by over a third (38.4%) of children 6-23 months of age.

Table 10. Proportion of children 6-23 mo of age whose diets met complementary feeding indicators (*n*=229)

Minimum dietary diversity (%)[1]	49.3
Minimum meal frequency (%)[2]	70.3
Minimum acceptable diet (%)	38.4

[1] Calculated based on WHO IYCF indicators; minimum dietary diversity was defined as consumption of at least 4 out of 7 food groups(World Health Organization, 2008)

[2] Calculated based on WHO IYCF indicators; minimum meal frequency was defined as at least 2 times for breastfed children 6-8 months, at least 3 times for breastfed children 9-23 months, and at least 4 times for non-breastfed children 6-23 months(World Health Organization, 2008)

The types of foods consumed by children 6-23 months of age on the day prior to interview are shown in **Table 11**. Cereal-based foods, including porridge made from maize meal and other grains, were consumed by almost all (96.5%) 6-23-month-olds. Sugar or honey were consumed by over three-quarters (82.5%), and butter, oil, or fat were consumed by over half (58.1%). Other foods were consumed by less than half of all 6-23-month-olds.

Table 11. Proportion (%) of children 6-23 mo of age fed various foods on the day prior to the interview (*n*=229)

Cereal-based foods	96.5
Sugar or honey	82.5
Butter, oil or fat	58.1
Potatoes	45.4
Other fruits and vegetables	38.4
Dark green leafy vegetables	37.6
Yellow/orange fleshed vegetables	33.6
Nuts	30.1
Fish or seafood	27.1
Meat or poultry	26.6
Sugary snack foods	26.6
Beans or lentils	24.0
Yellow/orange fleshed fruits	8.3
Eggs	7.4
Savory snack foods	4.8
Organ meats	3.5
Peanut butter	2.6
Yogurt	2.2
Cheese	0.4

Liquids consumed by children 6-23 months of age are shown in **Table 12**. Plain water was the most commonly consumed liquid. Juice/juice drinks and tea/coffee were consumed by close to half of 6-23-month-olds, and bottled water and fresh milk by close to a quarter.

Table 12. Proportion (%) of children 6-23 mo of age fed various liquids on the day prior to the interview (*n*=229)

Plain water	81.7
Juice/juice drink	48.0
Tea/coffee	41.0
Bottled water	24.5
Fresh milk	21.8
Broth	9.2
Breast-milk substitute	4.8
Soft drink/carbonated beverage	3.9
Tinned/powdered milk	3.9
Yogurt-based drink	2.2
ORS	0.9
Sugar water	0.4

4.5.3 Consumption of homemade and commercially produced complementary foods

Homemade complementary foods were consumed by 85.2% of 6-23 month old children on the day prior to interview and by 91.7% in the week prior to the interview. Two-thirds of mothers (66.8%) reported feeding a homemade complementary food to their child every day in the week prior to the interview. The proportion of children who consumed homemade complementary foods on the day prior to the interview did not differ by age (6-11 months: 90.7%, 12-17 months: 92.6%, 18-23 months: 82.1%, p=0.10). The types of home-prepared complementary foods consumed are presented in **Table 13**. Porridge was the most commonly consumed home-prepared complementary food, consumed by over three-quarters (78.2%) of 6-23-month-olds.

Table 13. Proportion (%) of children 6-23 mo who consumed various homemade complementary foods in the previous day (*n*=229)

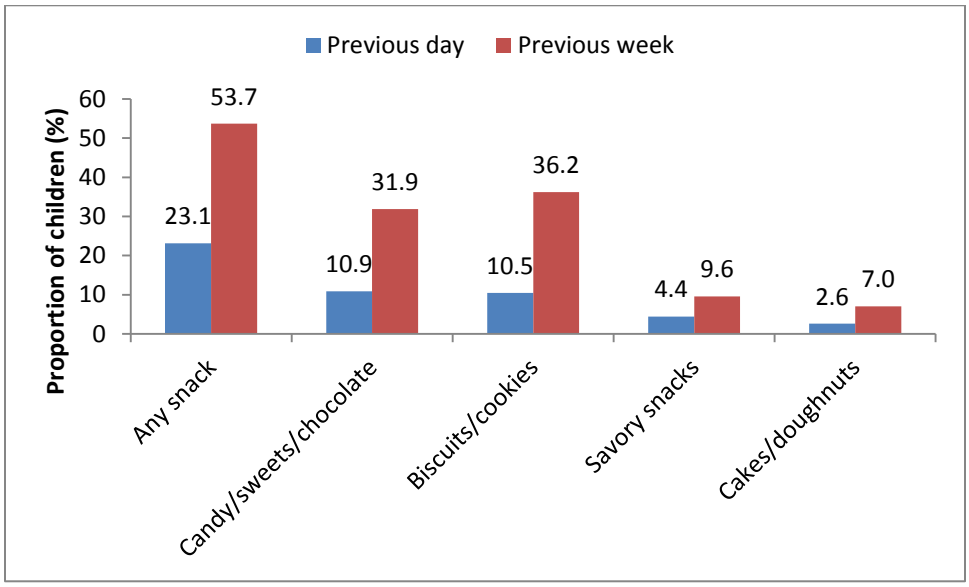
Porridge	78.2
Cooking bananas	19.7
Mashed potatoes	9.6
Soup/stew	7.0
Mashed fruit or vegetables	6.1
Ugali (a maize meal and water dish)	6.1

The proportions of 6-23-month-olds who consumed homemade complementary foods that contained specific ingredients were as follows: cereals (80.8%), sugar/sweeteners (58.5%), fats/oils (43.7%), and potatoes/cooking bananas (31.0%). With regard to micronutrient-rich ingredients, 14.8%, 12.7%, 7.0%, and 3.1% of 6-23-month-olds consumed a homemade complementary food in the previous day containing vitamin-A rich fruits or vegetables, flesh foods (meat, poultry, fish, seafood, organ meats), dark green leafy vegetables, and eggs, respectively. Of the mothers who fed their child a homemade complementary food on the day prior to interview, 41.5% reported that they fed this food because it was 'healthy', 21.0% of these mothers reported feeding this food because 'the child liked it', and 20.0% reported feeding this food because it was traditionally fed. Consumption of commercially produced complementary foods was less common than consumption of homemade complementary foods, with only 3.1% of 6-23-month-olds having consumed a commercially produced infant cereal.

4.5.4 Consumption of commercially produced snack foods

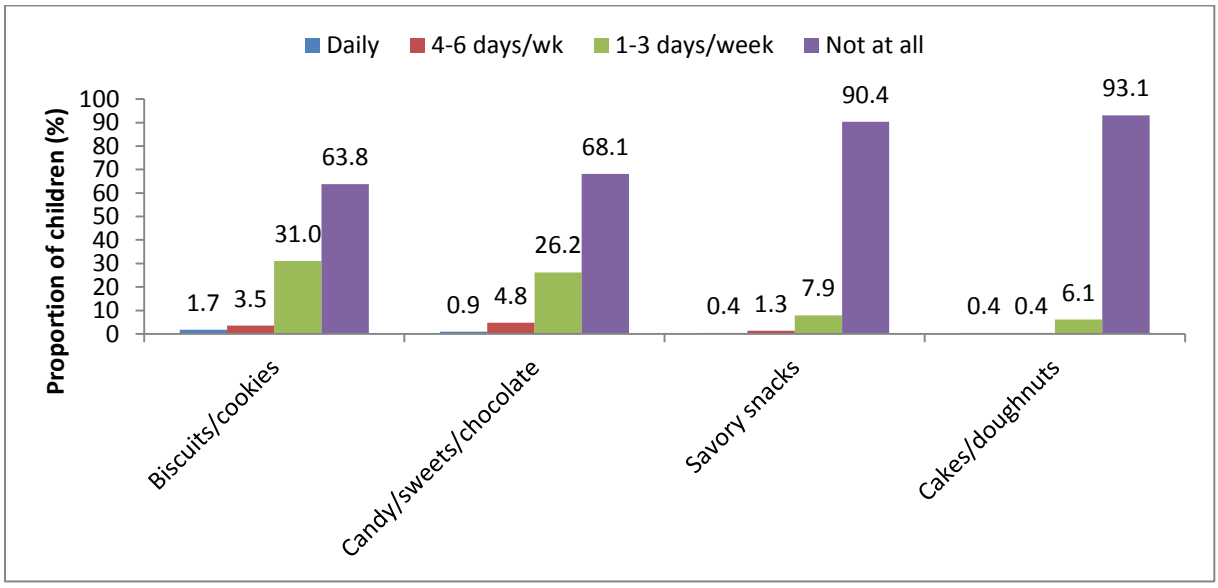
Consumption of commercially produced snack foods on the day and in the week prior to the interview among children 6-23 months of age is shown in **Figure 12**. Overall, about one quarter (23.1%) of all 6-23 month old children had consumed a commercially produced snack food on the day prior to the interview, and over half (53.7%) had consumed one in the week prior to the interview. One-fifth (20.5%) of 6-23-month olds consumed commercially produced sugary snack foods on the day prior to the interview. Rates of commercially produced snack food consumption differed significantly with age; 8.0% of children 6-11.9 months of age, 33.8% of children 12-17.9 months of age, and 39.7% of children 18-23.9 months of age consumed a commercially produced snack food on the day prior to the interview ($p<0.001$).

Figure 12. Proportion of 6-23-mo-olds who consumed various commercially produced snack foods on the day and in the week prior to the interview (*n*=229)



The frequency with which each type of commercially produced snack food was consumed in the week prior to the interview is presented in **Figure 13**. No snacks were consumed daily by more than 2% of children.

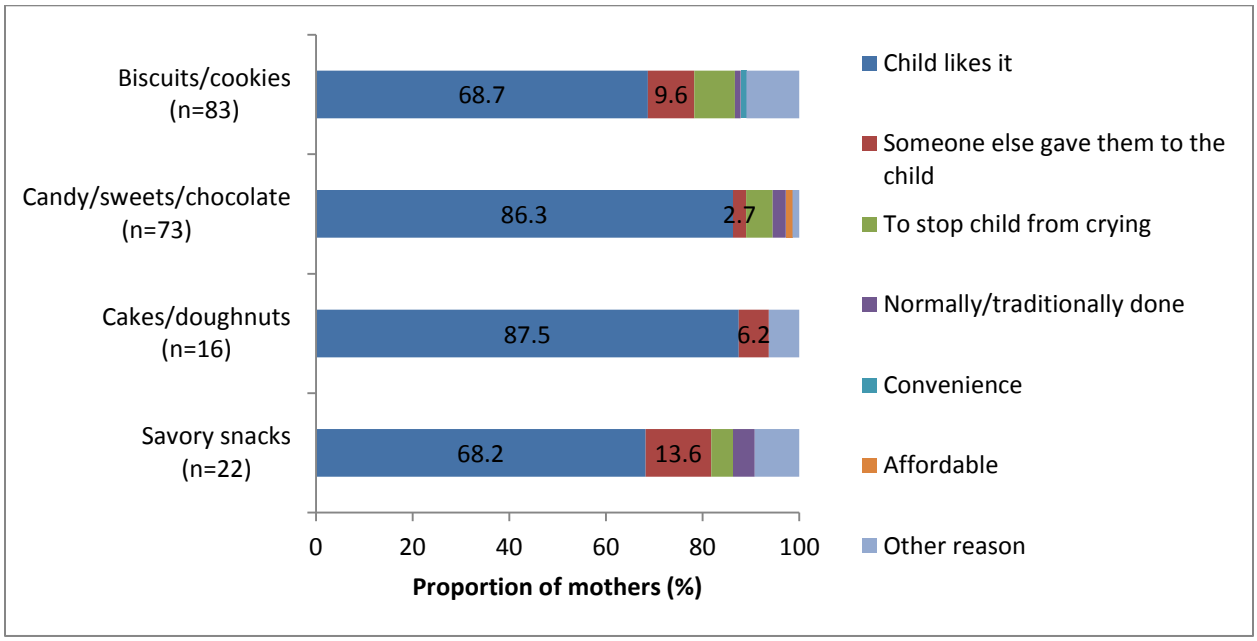
Figure 13. Frequency of consumption of commercially produced snack foods among 6-23-mo-olds (*n*=229)



Reasons for why mothers fed these products in the past week to their children are shown in **Figure 14**. For all commercial snack products, the majority of mothers reported feeding the product to their youngest child because the child liked it. Other reasons reported by mothers to a much smaller extent (reported by less than 15% of mothers) were that someone else gave the snack to the child, feeding the

snack was what was normally/traditionally done, it was convenient, the snack was affordable, and the snack was fed to the child to stop the child from crying.

Figure 14. Proportion of mothers that reported the main reason for feeding their child commercially processed snacks to their child in the previous weeks

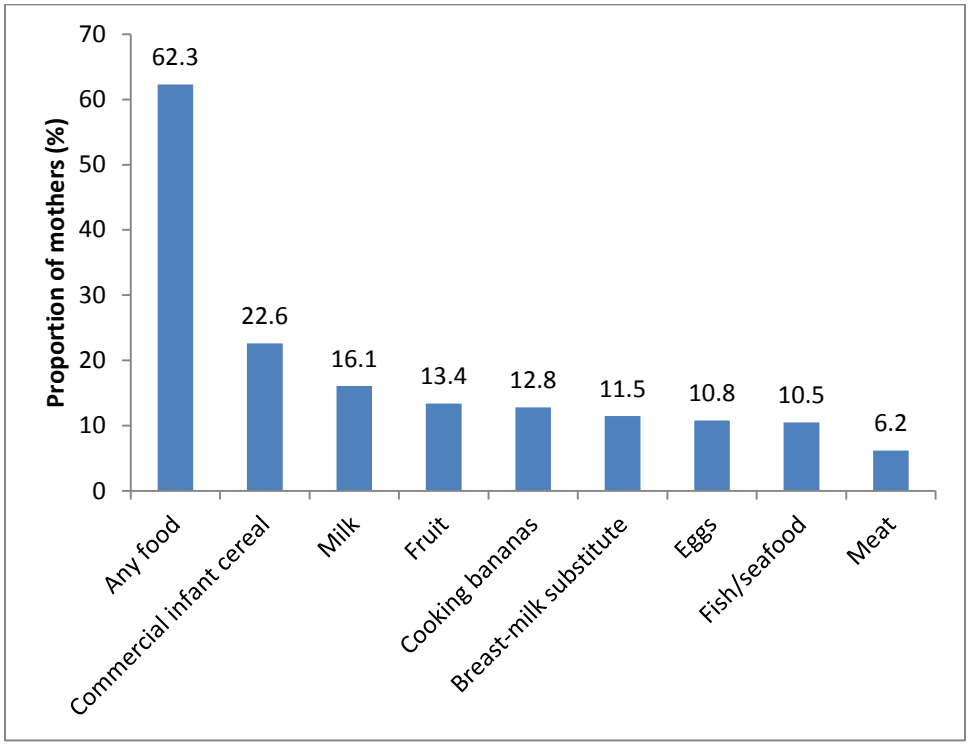


Mothers who reported purchasing these commercially produced snack products in the week prior to the interview reported spending (mean ± SD) USD 0.09 ± 0.13 per day on savory snacks, USD 0.08 ± 0.09 per day on cakes/doughnuts, USD 0.07 ± 0.04 per day on soft drinks, USD 0.04 ± 0.04 per day on cookies/biscuits, and USD 0.02 ± 0.03 per day on candy/chocolate/sweets.

4.5.5 Food aspirations among mothers of children less than 24 months of age

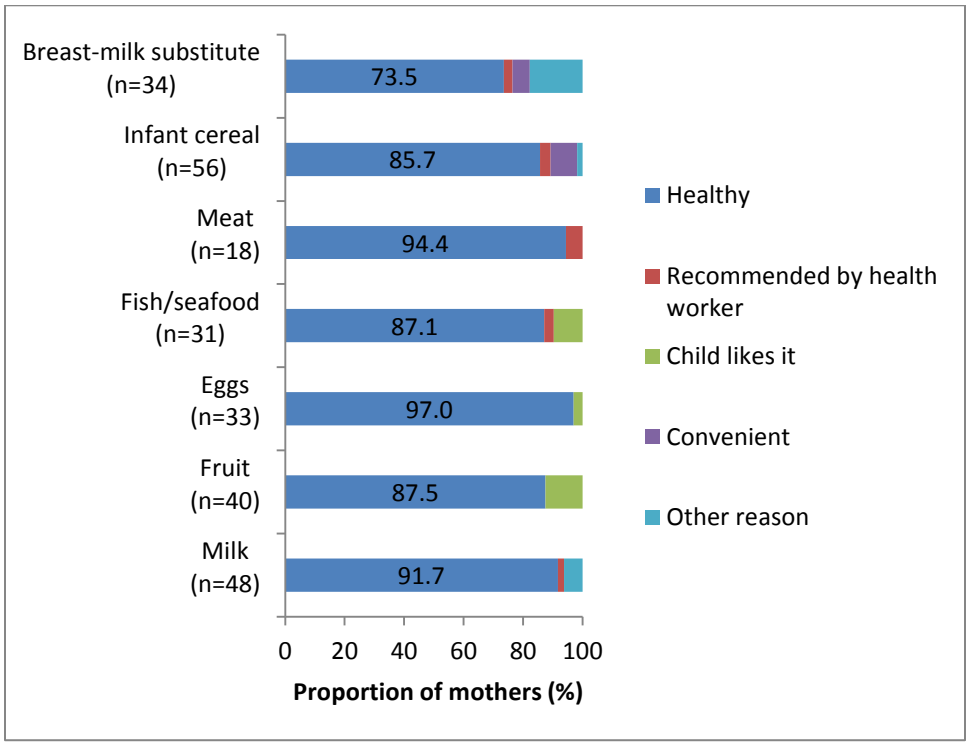
The foods that mothers of children less than 24 months of age aspired to feed their children that were beyond their current purchasing power are shown in **Figure 15**. Close to two-thirds (62.3%) of all mothers of children less than 24 months of age reported wanting to feed their baby additional foods if they had the financial ability to do so.

Figure 15. Proportion of mothers of children <24 mo of age who aspired to feed their child various foods (*n*=305)



Reasons mothers reported for aspiring to feed their children various foods are shown in **Figure16**. In general, for any food, the majority of mothers reported wanting to feed that food to their child because it was healthy.

Figure 16. Proportion of mothers of children <24 mo of age that reported various main reasons for aspiring to give their child various foods



5. Conclusions and Discussion

The results of this study indicate that rates of promotion and consumption of commercially produced infant and young child foods are low, rates of promotion and consumption of commercially produced snack foods are high, and the rates of IYCF support and guidance and several key IYCF indicators are suboptimal in Dar es Salaam.

5.1 Promotion of commercially produced infant and young child foods and snack foods

Overall, promotion rates of commercially produced infant and young child foods ranged from 0.0% to 18.0% and varied by type of food (breast-milk substitute or commercially produced complementary food), type of promotion (commercial advertisement or recommendation), location of promotion (inside or outside of the health system), and study population (mothers discharged at delivery or mothers of children <24 months of age). While less than 2% of mothers of children <24 months of age reported receiving recommendations from health workers to feed their child commercially produced snack foods, close to half of all mothers reported observing a commercial promotion for a commercially produced snack food.

Only a few recent studies were found that presented the prevalence of maternal exposure to breast-milk substitute promotions. A national study of approximately 3,000 American mothers showed that

71%, 86%, and 58% reported exposure to infant formula advertisements on television or radio; in magazines, newspapers, or posters; and on the internet, respectively (Zhang et al., 2013). Additionally, 49% received a formula sample or coupon (Zhang et al., 2013). A study of 562 Italian mothers showed that 81% had reported seeing a formula advertisement (Cattaneo et al., 2014), and a study of over 1,000 Laotian mothers showed that 90% reported frequent exposure to formula television commercials (Phoutthakeo et al., 2013). Compared to the aforementioned prevalences, the prevalences of maternal exposure to commercial promotions of breast-milk substitutes found in this study in Dar es Salaam are much lower.

Overall, the results show that violations of the *Tanzania Food, Drugs and Cosmetics (Marketing of foods and designated products for infants and young children) Regulations, 2013* in Dar es Salaam are not extensive. These violations could increase with improvements in socioeconomic status resulting in commercially produced IYC foods becoming more affordable for mothers and companies becoming more aggressive in their marketing. Improvement in SES could also be accompanied by more prevalent television ownership; since television was the main source of commercial promotions reported by mothers, this could also lead to increased exposure to commercial promotion of commercially produced IYC foods. Continued monitoring of violations of the *Regulations* are needed to detect any changes and allow for prompt action to be taken to keep the prevalence of marketing of products that could adversely affect infant and young child health low. In order to combat the potentially negative effects of mothers' frequent exposure to commercially produced snack food promotions on infant and young child feeding, efforts are needed to increase maternal knowledge on the poor nutrient quality of these snack foods.

5.2 Consumption of commercially produced infant and young child foods, snack foods, and homemade complementary foods

In this study, the rates of consumption of breast-milk substitutes were below 5% for all age groups. When the rate of formula consumption for breastfed and non-breastfed children under 2 years of age were calculated from the DHS data, the results showed that 0.8% and 2.8% consumed infant formula in Tanzania and Kenya, respectively (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011, Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010). The DHS rates may be lower than that in this study because they include rural infants in the estimate who are less likely to consume formula than urban infants. Another possibility is that the higher use breast-milk substitute among the study sample than the DHS samples is due to the higher c-section rates among the study mothers which may have made it more difficult for them to breastfeed (mothers at discharge: 18.3%, mothers of children <24 mo of age: 12.5%, 2010 Tanzania DHS urban mothers: 9.6%).

Commercially produced infant cereals were reported to be consumed by only 3.1% of 6-23-month olds in this study. This rate was similar to the rates of consumption of fortified baby foods (i.e., commercially produced baby cereal) on the previous day among 6-23-month-olds in the 2010 Tanzania DHS (breastfed: 3.6%, non-breastfed: 5.4%) as well as the 2008 Kenya DHS (breastfed 4.8%, non-breastfed 4.5%) (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011, Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010).

Over half of all 6-23-month-olds were reported to have consumed a commercially produced snack food in the week preceding the interview, and a fifth were reported to have consumed a commercially produced sugary snack food on the day preceding the interview. The latter rate was similar to that shown in an analysis of DHS data by Huffman *et al*. in which 23% of urban 6-23-month-olds in Tanzania were reported to have consumed sugary foods on the day preceding the interview (Huffman et al., 2014). For comparison, the rate of consumption of sugary snack foods among urban 6-23-month-olds in 12 other African countries ranged from 25% to 48% (Huffman et al., 2014).

Homemade complementary foods were consumed by the majority of 6-23-month-olds (85.2%) with porridge being the most commonly consumed homemade complementary food by far and, subsequently, over 80% of 6-23-month-olds having consumed a homemade complementary food containing cereals on the day preceding the interview. Few of the homemade complementary foods contained micronutrient-rich ingredients and instead often contained sugars or sweeteners. The results of this study were lower than the 2010 Tanzania DHS data which show that over 92% of 6-23-month-olds consumed food made from grains on the day preceding the interview, possibly due to this study's sample being restricted to urban mother-infant pairs whose diets may be less dominated by cereals due to higher SES of their parents.

The low rate of breast-milk substitute use in Dar es Salaam is encouraging. Continued monitoring is needed to ensure that this trend is maintained, especially with 12% of mothers aspiring to feed their baby BMSs if it were affordable suggesting that improvements in SES could lead to greater BMS use, and potential increases in c-section deliveries. Since the feeding of infant cereals is already a common practice but more micronutrient dense versions of the porridges are needed, when it is affordable, commercially produced fortified infant cereals could be a viable alternative to meeting the nutrient needs of infants and young children. A less expensive option could be the use of micronutrient powders or lipid nutrient supplements to enrich the micronutrient contents of porridges already fed to children. Since no children were reported to have consumed these point-of-use supplements, additional research is needed to learn about the feasibility of promoting and distributing these products. Increasing the use of fortified commercially produced infant cereals and supplements in complementary feeding would require amending the *Regulations* to permit their lawful marketing and monitoring of the quality of these products to ensure that they provide adequate nutrients to infants and young children. In general, additional efforts are needed to help mothers implement optimal complementary feeding practices, including the addition of micronutrient-rich foods to homemade complementary foods and not feeding commercially produced snack foods.

5.3 Promotion and rates of optimal infant and young child feeding practices

Rates of promotion of optimal infant and young child feeding practices were low, and the proportion of mothers who reported exposure to IYCF messaging ranged from 38.0% to 55.7%, with rates varying by type of message, study population, and timing of when message was received (pregnancy, postpartum, or both). These rates were deemed low since it would be desired that the vast majority of mothers report exposure to IYCF messaging. No observational studies were found that presented rates of maternal exposure to IYCF messaging for comparison. Research is needed to identify ways in which maternal exposure to optimal IYCF messages can be increased. If health workers are already burdened

and have little time to provided IYCF messages to women, other means of outreach for consideration include media (e.g., TV and radio commercials, billboards, additional posters in health facilities, cell phone messaging, etc.) and using outreach activities in other sectors (e.g., agriculture, bed net distribution, microcredit, WASH) as an opportunity to provide/reinforce IYCF messages.

While rates of prelacteal feeding were low, rates of other IYCF practices were suboptimal. Rates of key infant and young child feeding indicators shown in this study varied in their comparability to those shown in the 2010 Tanzania DHS. The rate of early initiation of breastfeeding among mothers discharged at delivery in this study was similar to that of urban mothers in the 2010 Tanzania DHS (69.6% vs. 61.7%) (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). The rate of prelacteal feeding shown in this study among mothers discharged at delivery was much lower than that reported among urban mothers in the DHS (4.8% vs. 24.4%). It is likely that the low prevalence of prelacteal feeding reported in this study was due to interviews occurring before infants had completed 3 days of life. Most of the mothers were being discharged with and interviewed about a 1-day-old child, thus the interview did not capture any liquids or foods that could have been given to the child in the subsequent second and third days postpartum, which could have led to an underestimation of the true prevalence of prelacteal feeding.

These low IYCF indicator rates are low compared to those in other countries. In a study in Bangladesh of close to 25,000 infants, 89.2% were given a prelacteal feed (Sundaram et al., 2013). According to the available data in UNICEF's State of the World's Children 2015 Country Statistical Information, Eritriea, Malawi, and Samoa all have early initiation of breastfeeding rates greater than 90%; Cambodia, Malawi, Peru, the Solomon Islands, and Sri Lanka have exclusive breastfeeding rates greater than 70% for children <6 months; Bangladesh and Nepal have continued breastfeeding at 2 years rates greater than 90%; and the highest prevalence of children consuming a minimum acceptable diet is 54% in Honduras (UNICEF).

The low prelacteal feeding rate occurring in health facilities in Dar es Salaam is commendable. Improvements in breastfeeding and complementary feeding practices could be addressed with helping mothers implement optimal IYCF practices, particularly with regard to avoidance of giving water within the first 6 months, avoidance of early introduction of complementary foods, continued breastfeeding to 2 years, and dietary diversity.

6. Recommendations

Based on the findings of this study, the following recommendations are made:

1. Continued monitoring of violations of the *Tanzania Food, Drugs and Cosmetics (Marketing of foods and designated products for infants and young children) Regulations, 2013* can help detect increases in marketing of commercially produced infant and young child foods and allow for prompt action to be taken to keep maternal exposure to commercial promotions of products that could adversely affect infant and young child health low.
2. Strategies to change mothers' infant and young child feeding behaviors are needed, particularly with regard to avoidance of giving water within the first 6 months, avoidance of early introduction of complementary foods, the benefits of breast-milk over breast-milk substitutes, continued breastfeeding to 2 years, dietary diversity, the addition of micronutrient-rich foods to homemade complementary foods, and avoidance of feeding commercially produced snacks to children.
3. Increasing mothers' access to low-cost fortified foods or supplements could help meet children's micronutrient needs. If these products were commercially promoted, the *Tanzania Food, Drugs and Cosmetics (Marketing of foods and designated products for infants and young children) Regulations, 2013* would need to be adapted to permit legal marketing of these products. These products would also need to be monitored to ensure that they provide adequate nutrients to infants and young children.

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