Assessment of Promotion of Foods Consumed by Infants and Young Children in Phnom Penh: Assessment and Research on Child Feeding (ARCH) – Cambodia Country Report



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# List of Abbreviations

ANC	Antenatal care
ARCH	Assessment and Research on Child Feeding
BFHI	Baby-friendly Hospital Initiative
BMS	Breast-milk substitute
CDHS	Cambodia Demographic and Health Survey
CPCF	Commercially produced complementary food
нкі	Helen Keller International
IBFAM	International Baby Food Action Network
IFPRI	International Food Policy Research Institute
IGBM	Interagency Group on Breastfeeding Monitoring
IYC	Infant and young child
IYCF	Infant and young child feeding
нкі	Helen Keller International
NECHR	National Ethics Committee for Health Research
NICU	Neonatal intensive care unit
NIS	National Institutes of Statistics
ODK	Open Data Kit
OPD	Outpatient department
PPS	Probability proportional to size
SD	Standard deviation
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States dollar
wно	World Health Organization

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#### 1. Summary:

Despite improvements in the nutritional status of children in Cambodia over the last 15 years, 40% of Cambodian children less than five years of age are stunted (NIS, 2011). Commercially produced complementary foods can help improve nutritional status of young children if they are fortified and of optimal nutrient composition. However, other commercial snack foods may be detrimental to young child feeding 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.

In 2005, Cambodia passed the *Sub-Decree on Marketing of Products for Infant and Young Child Feeding* (No. 133, November 2005). The Sub-decree 133 was passed to regulate the promotion of infant and young child food products within Cambodia, including breast-milk substitutes and complementary food products marketed as suitable for children under 2 years of age (Kingdom of Cambodia, 2005). Under this law, promotion of these products is prohibited without prior approval of the government. Helen Keller International's Assessment and Research on Child Feeding (ARCH) project implemented a study to assess mothers' exposure to commercial promotions for infant and young child food products inside and outside the health system of Phnom Penh, as well as mothers' utilization of commercial food products for child feeding. A health facility-based, cross-sectional survey was conducted among 306 mothers being discharged after delivery and 294 mothers of children less than 24 months of age who were utilizing child health services.

Results indicate that promotion of commercial infant and young child (IYC) food products is prevalent inside and outside the Phnom Penh health system. Nearly one-third (31.7%, n=97) of mothers discharged after delivery of their newborn reported observing brands/logos of breast-milk substitutes on health facility equipment, 13.4% (n=41) reported receiving a recommendation from a health professional to use a breast-milk substitute, and 9.5% (n=29) reported receiving a free breast-milk substitute from a health professional. Eighty-six percent (n=253) of mothers of children under 24 months of age reported that they had seen, heard, or read a commercial promotion for a breast-milk substitute since the birth of their youngest child, and 29.3% (n=86) reported a promotion for a commercial complementary food product. Television and inside stores/pharmacies were the most common sources of these promotions for IYC food products. Promotions for commercially produced snack food products for general consumption were even more common, being reported by 96.9% (n=285) of mothers of children less than 24 months of age.

Utilization of commercial food products among infants and young children is common among Phnom Penh mothers, particularly feeding of breast-milk substitutes and commercially produced snack food products for general consumption. Over half (56.9%, n=174) of mothers discharged after delivery reported providing a breast-milk substitute as a pre-lacteal feed to their newborn. Consumption of breast-milk substitutes was high across varying ages of young children; 43.1% of children 0-5 months of age, 39.7% of children 6-11 months of age, 13.9% of children 12-17 months of age, and 33.8% of children 18-23 months of age were currently consuming breast-milk substitutes at the time of interview. Of children 6-23 months of age, 55.0% (n=122) had consumed a commercially produced snack food product in the day prior to interview, and 80.6% (n=179) had consumed one in the week prior to interview. Consumption of commercial complementary food products was low, with only 12 (5.4%) children 6-23 months of age having eaten one in the day prior to interview.

Findings indicate that there is a need to improve infant and young child feeding practices among children less than 24 months of age living in Phnom Penh. While almost all children included in the study had ever been breastfed, only 36.1% of infants 0-5 months of age were exclusively breastfed and continued breastfeeding was low; two-thirds (67.3%) of children 12-15 months of age and only 12.5% of children 20-23 months of age were still being breastfed at the time of interview. Less than one-third (32.0%) of children 6-23 months of age achieved a minimum acceptable diet in the day prior to interview.

Despite being prohibited without government permission, commercial promotion for breast-milk substitutes is highly prevalent in Phnom Penh, and utilization of these products among Phnom Penh mothers is also very common. Full implementation of Cambodia's Sub-decree 133 is needed to regulate promotion of breast-milk substitutes, while nutrition and maternal and child health interventions and policies need to support enabling environments for exclusive and continued breastfeeding. Since promotion and utilization of snack foods during the complementary feeding period is also highly prevalent, nutritious snack options should be promoted and consumption of commercially produced snack foods high in sugar and salt and low in nutrients should be discouraged.

## 2. Introduction:

Exclusive breastfeeding for the first six months of life with continued breastfeeding up to two years of age or beyond is the optimal course of feeding for infants and young children (WHO & UNICEF, 2003). A child's nutritional needs increase around the age of six months; therefore, it becomes necessary to introduce complementary foods in a timely, safe and adequate manner, while continuing to breastfeed. This period commonly corresponds to growth faltering in young children, and is an important focus area for preventing future childhood malnutrition (Shrimpton, 2001).

Despite Cambodia's great improvement in health and development over the last decade, childhood undernutrition remains a serious concern. Forty percent of children less than 5 years of age are stunted, 28% are underweight, 11% are wasted, and 55% are anemic (NIS, 2011). The 2010 Cambodian Demographic and Health Survey (CDHS) found that the percentage of children stunted increased from 10% among children less than 6 months of age, to 19% among children aged 9-11 months, and to 47% between 18-23 months of age (NIS, 2011).

In 2009, the Cambodia Socio-Economic Survey (CSES) found that 98% of Cambodian women had ever breastfed their youngest child (NIS, 2009). While the country experienced improved exclusive breastfeeding (EBF) rates among infants less than 6 months of age between 2000 and 2010, increasing from 11% to 74%, there has been a decline to 65% according to the 2014 CDHS preliminary results (NIS, 2015). There is evidence of increasing breast-milk substitute use across Cambodia (Prak et al., 2015). UNICEF secondary analysis of CDHS 2010 data revealed that among breastfeeding children less than 3 years of age, infant formula use increased from 0.1% in 2000, to 3.5% in 2005, to 4.7% in 2010 (UNICEF, 2013). The highest rate of formula utilization is by the wealthy in urban areas. Bottle use has also increased in Cambodia. In 2010, 6.5% of newborns aged 0-1 month were fed with a bottle and nipple, rising to 23% of 4-5 month olds and peaking at 31% for infants aged 9-11 months (NIS, 2011).

Several studies have indicated that mixed feeding among Cambodian infants less than 6 months of age is also common. The 2009 CSES found that almost 25% of breastfed infants aged 0-1 month were fed water or juice and 17% were also fed formula or other milk (NIS, 2009) on the preceding day. These rates rose to 43% for water or juice consumption and 19% for consumption of formula or other milk for infants aged 4-5 months. One survey among stunted infants and young children found that while all infants were initially breastfed, 50% received solid foods, mainly rice porridge, earlier than 6 months of age (Anderson et al., 2008).

Sub-optimal complementary feeding practices in Cambodia also remain an issue. In 2010, only 24% of Cambodian children aged 6-23 months met the minimum standard with respect to all three infant and young child feeding (IYCF) indicators (feeding frequency, minimum diversity and consumption of breast milk or other types of milk), with dietary diversity showing the most inadequacy in young children's diets (NIS, 2011). Only 37% of all children aged 6-23 months had been fed foods from the minimum number of food groups for their age. Adequate feeding frequency of infants aged 6–11 months was 62% whereas dietary diversity (a minimum of 4 or more food groups) for infants aged 6–11 months was only 24% (Marriott et al., 2011).

Prior research also indicates that consumption of other commercial foods, often with poor nutritional content, may be prevalent among young children in Cambodia. One study among stunted toddlers living in Phnom Penh found that diluted sweetened condensed milk was frequently given as a source of milk for non-breastfed children aged 12-42 months, along with other sugary drinks (Anderson et al., 2008). Anderson also found that snack foods, such as crisps, biscuits and sponge cake were given to infants and young children, with the purchase and consumption of these snacks often not supervised by an adult (Anderson et al. 2008). Another study found that 87% of babies under 6 months of age who were not exclusively breastfed were fed solids, including snack cakes (Wren & Chambers, 2011). Secondary analysis of the 2010 CDHS also found that 44% of Cambodian children 6-23 months of age consumed sugary foods on the preceding day (Huffman et al., 2014).

In response to unethical marketing activities by breast-milk substitute manufacturers, the World Health Organization (WHO) developed the *International Code of Marketing of Breast-milk Substitutes* (WHO International Code). The Cambodian government adopted much of this Code as national policy; the Cambodian *Sub-Decree on Marketing of Products for Infant and Young Child Feeding* (No. 133, November 2005) aims to promote and support breast-feeding by regulating the promotion of commercial food products, including breast-milk substitutes and complementary foods, marketed for children less than 2 years of age. The subsequent Joint Prakas on the *Marketing of Products for Infant and Young Child Feeding* (No. 061, August 2007) is intended to operationalize the implementation and monitoring of the Sub-Decree 133. At this date, implementation of the Sub-decree 133 and Joint Prakas has not yet occurred, but the Ministry of Health and other relevant line ministries are in the process of beginning key activities.

Understanding what messages mothers in Phnom Penh receive from the health system and outside from the commercial sector about infant and young child feeding is needed in order to reinforce positive messages and discourage inappropriate promotion of commercial complementary foods as well as commercial foods for general consumption commonly fed to but not specifically marketed for infants and young children. It is also important to ensure that breast-milk substitutes are not promoted, which would be a violation of the International Code of Marketing of Breast-milk Substitutes (WHO, 1981). Numerous studies have been conducted on infant feeding and promotion practices through interviews with mothers in health facilities. The Interagency Group on Breastfeeding Monitoring (IGBM) and UNICEF (2007) developed a sampling methodology which has been used in Pakistan (Save the Children and Gallup Pakistan, 2013), Botswana (IGBM and UNICEF, 2005), and Poland, Thailand, Bangladesh and South Africa (Taylor, 1998). Other studies have used similar methods to assess health system practices related

to infant feeding in Burkina Faso and Togo (Aguayo et al, 2003), Jamaica (Hamilton, 2002), the Philippines (Sobel et al, 2011), and Quebec (Haiek, 2012). A country level study in the Ukraine (Babak et al, 2004) used questionnaires developed by the International Baby Food Action Network (IBFAN) to collect information from mothers in health care facilities, from retail outlets, and from product labels. These studies have documented promotion of breast-milk substitutes (BMS) within health systems, including provision of free samples and presence of promotional materials, and have also documented point of sale promotions, which are all prohibited by the International Code of Marketing of Breast-milk Substitutes (WHO, 1981).

Brownlee (2009) has proposed methods to obtain information on maternity center practices related to breastfeeding and compliance with the Baby Friendly Hospital Initiative. In Honduras, Ecuador and El Salvador, Perez-Escamilla (2004) documented that monitoring health system practices through interviews with mothers brought about improved breastfeeding practices. Women were asked about their prenatal and delivery experiences, such as whether breastfeeding was discussed during prenatal visits, whether infants were given other liquids in the hospital, and whether staff helped mothers with breastfeeding at/after delivery. This information was fed back to health center staff and led to improvements in health system practices.

Helen Keller International (HKI) is implementing a project titled "Assessment and Research on Child Feeding (ARCH)", which has gathered 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 Cambodia,' was conducted; findings from this study are detailed in this report.

This study sought to build the understanding around mothers' exposure to commercial promotions for infant and young child food products in Phnom Penh, and their utilization of these products. While building upon the methods and research mentioned above, this study sought to gather additional information not included in previous studies. First, prior research has focused on mothers' exposure to promotions during pregnancy and delivery of a child, while this study also captured recall information on mothers' exposure through the first 1,000 days of a child's life – from conception until 2 years of age. Additionally, this study sought to gather information on promotions and consumption of complementary foods, in addition to breast-milk substitutes. Finally, while some surveys have gathered information on consumption of 'sugary snack' foods, it was felt that the prevalence of consumption of a greater range of commercially produced foods not marketed to but commonly fed to children under 2 years of age, including commercially produced snack food products, needed to be documented in order to develop

policies and messages to discourage their use in infant and young child feeding. Consequently, this study gathered consumption data on a range of commercially produced foods for general consumption. Information on spending and the rationale for feeding such products was also gathered for those commercial products hypothesized to be commonly fed to infants and young children.

# 3. Materials and Methods:

# 3.1 Research objectives

The ARCH 'Assessment of promotion of foods consumed by infants and young children in Cambodia' study seeks to assess exposure to promotional practices among mothers utilizing the health system in Phnom Penh, Cambodia, as well as to assess their current infant and young child feeding practices, including utilization of commercially produced foods.

The primary objectives of the study are to:

- Estimate the prevalence of promotional practices occurring within the health system for breastmilk substitutes (including infant formula, follow-on formula, and growing-up/toddler milks)
- Estimate the prevalence of promotional practices occurring within the health system for complementary foods (including advice on home-prepared and commercially produced 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 are 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 foods for general consumption commonly fed to young children
- Document mothers' exposure to promotion of commercial food products occurring outside the health system

# **3.2 Definitions**

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

<u>Breast-Milk Substitutes (BMS)</u>: The *Code* 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 defines 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 months to 12 months), and other milk or milk-like products (in liquid or powdered form) marketed or otherwise represented as suitable for feeding children younger than two years of age, including growing-up milk and

toddler milks, but excludes other beverages and foods marketed or otherwise represented as a partial or total replacement for breast milk.

<u>Commercially Produced Complementary Foods (CPCF)</u>: 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:

- (a) Making use of the words baby/babe/infant/toddler/young child in the context of a child's age e.g. baby food (food for babies), not the size/maturity of the product e.g. baby potato (young potato),
- (b) Recommending an age of introduction less than two years on the label, or
- (c) 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 include cereal/porridge, homogenized/pureed food, snacks/finger food, gravy/soup, tea/water/juice, etc.

<u>Commercially produced foods for general consumption commonly fed to children under the age of two</u> <u>years (CPF):</u> Foods commonly fed to, but not marketed specifically for, children younger than two years of age e.g. soda/carbonated beverages, 100% juice/juice drinks, bottled water, condensed milk/evaporated milk, chocolate/milk beverages, biscuits/cookies, savory snacks (chips, crisps), sweet snacks (cakes/doughnuts and candy/sweets/chocolate), processed cereals (e.g. maize meal), breakfast cereals, instant noodles and peanut butter).

<u>Commercially produced snack food products</u>: Commercially produced foods typically eaten between meals and for consumption among the general population. Savory snacks include fried chips, crisps or salted biscuits. Sugary snacks include chocolates, sweets, candies pastries, cakes or sweet biscuits.

## 3.3 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. Data were gathered from a period of November 2013 – February 2014.

Because prior studies have indicated commercial products to be more widely available in urban areas (Sweet et al, 2012), the study populations included in this survey were limited to mothers currently living in and utilizing health facilities within the geographical limits of Phnom Penh. Mothers living outside of Phnom Penh, 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 (NICU);
- 2. Mothers who experienced severe delivery complications during the birth of their newborn/youngest child;
- 3. Mothers whose newborn/youngest child is 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. Children too ill for interview.

#### 3.4 Sample size

In their studies of caregivers, Taylor (1998), IGBM/UNICEF (2005), and Save the Children and Gallup Pakistan (2013) interviewed about 800 women (400 pregnant and 400 with children less than 6 months of age) in each site (often in capital cities). Other studies have had much smaller sample sizes ranging from 50 to about 300 caregivers (Aguayo et al, 2003; Hamilton, 2002; Sobel et al, 2011; Perez-Escamilla, 2004; Babak et al, 2004; and Haiek, 2012). The Baby-Friendly Hospital Initiative (BFHI) self-assessment tool to help health systems assess practices around breastfeeding support (Brownlee, 2009) suggests collecting 30 interviews with mothers in one month in each health facility and report BFHI compliance if 80% of mothers respond affirmatively to questions related to the BFHI global criterion. The IGBM and UNICEF (2005) methodology uses 800 women with infants < 6 months because "the sampling of 800 women gives a 95% power to observe at least one reported violation 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%." Because of 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  $\pm 5\%$ . 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 for mothers at discharge and 280 for 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; the

final sample was 306 mothers being discharged after delivery and 294 mothers of children less than 24 months of age utilizing child health services. A total of 441 mothers being discharged after delivery were approached for interview. Seven (1.6%) mothers refused participation and 128 (29.0%) were excluded based on at least one of the criteria detailed above; 108 (24.5%) of mothers lived outside of Phnom Penh, 17 (3.9%) mothers reported severe complications during delivery, 11 (2.5%) infants had been in the NICU after delivery, and 2 (0.5%) children were from a multiple birth. The final sample of successfully completed interviews among mothers discharged after delivery was 306 mothers. A total of 498 mothers utilizing child health services at a facility were approached for interview. Ninety-one (18.3%) of these mothers refused participation and 113 (22.7%) mothers were excluded; 96 (37.8%) mothers lived outside of Phnom Penh, 11 (2.2%) mothers reported severe complications during delivery, 7 (1.4%) infants had been in the NICU after delivery, and 1 (0.2%) child was from a multiple birth. The majority of refusals by mothers was due to the mothers not having time and needing to leave the health facility after their child received services. The final sample of successfully completed interviews among mothers with children under 24 months of age utilizing child health services was 294 mothers.

#### 3.5 Sampling procedure and data collection

In order to reflect the significant share of Cambodia's urban mothers who utilize private facilities, a proportion of the sample for each study population was taken from private facilities. Approximately 30% of urban Cambodian mothers with facility-based deliveries deliver at private facilities (NIS, 2011); therefore, 30% of discharge mothers were interviewed at private facilities. Due to logistical challenges and inability to obtain facility approval from private facilities, only public facilities were sampled for interviews with mothers of children less than 24 months utilizing child health services.

Lists of all public health facilities offering maternity and/or child health services were obtained from the Health Management Information System (HMIS) database of the Ministry of Health. This included national hospitals, referral hospitals, and health centers; health posts were excluded. In addition, this same data source had utilization rates for these facilities for the preceding year (2012), which included total number of deliveries and number of child health visits, including out-patient department (OPD) and immunization. The annual rates were then calculated as the monthly average per facility by dividing by 12 months. Due to logistics and the need to complete data collection within 8-10 weeks, facilities with less than 50 deliveries/child health visits per month were excluded from the sampling frame. This excluded 27 out of 36 public facilities for delivery, but the 9 included in the sampling frame represented 79.6% of all public facility-based births in Phnom Penh in January – December 2012. For facilities with child health services, this excluded 6 out of 37 public child health facilities, but the 31 included in the sampling frame represented 97.3% of all child health visits in Phnom Penh public health facilities.

Because a complete listing and utilization rates of private maternity facilities was not available, a comprehensive list of was developed based on input from local experts and scoping of the private health facility landscape in Phnom Penh. Each private facility identified was contacted in order to request monthly delivery rates, and these rates were cross-checked by a repeated request for information several weeks later. Twenty-six private maternity facilities in Phnom Penh were contacted. Of these, only 1 reported rates of 50 or more deliveries per month on average. Therefore, the remaining facilities were at least 50. If sampled, coordination was established with all facilities in the group to alert the survey supervisors one day in advance if a mother would be discharged on the following day so that enumerators could be sent for interviews.

All health facilities were then sampled by allocating clusters using probability proportional to size (PPS). The calculated monthly utilization rates served as each facility's or group of facilities' 'population'. Facilities for mothers discharged after delivery and facilities for mothers of children < 24 months of age 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). For facilities where discharged mothers of newborns would be interviewed, 19 clusters were chosen: Thirteen clusters were sampled in the sampling frame of public maternity facilities and 6 clusters were sampled for private maternity facilities to follow the 30% reported for deliveries in private facilities. For facilities with child health services where mothers of children less than 24 months would be interviewed, 18 clusters were sampled in the sampling frame of public facilities. Because sampling of facilities was proportional to size, larger facilities had a greater chance of being sampled for only one cluster. Seven public maternity facilities and 15 private facilities were sampled and participated in the survey. For facilities offering child health services, 11 public facilities were sampled. **Figure 1** details the sampling of facilities and mothers for each study population across public and private health facilities.

Figure 1. Sampling profile for mothers and facilities



Two sampling procedures were utilized for the two study populations. In both cases, sampling of mothers was exhaustive, meaning all mothers were sampled, in order to maximize the number of interviews completed per day and to ensure data collection completion within the timeframe required of the study:

<u>Mothers at discharge:</u> Staff in sampled facilities was alerted about data collection approximately one week prior to survey. Survey supervisors worked closely with nurses-in-charge to identify those mothers for discharge, and enumerators interviewed mothers after they had completed the discharge procedure and paperwork. Interviews continued until all mothers scheduled for discharge that day had been interviewed, or until the sample for the facility in question had been reached.

<u>Mothers with children under 24 months</u>: Staff at sampled facilities was alerted about data collection approximately one week prior to survey. Women with children at clinics offering child health services, either in the immunization or outpatient department (OPD), at a sampled health facility were approached for interview by survey supervisors. Survey supervisors screened every woman with a child who passed through the entrance/exit point of the child health clinic area.

Women were first screened to assess: 1) if they were the mother of the child with them; 2) if this child was under 24 months of age and 3) if they lived in Phnom Penh. Survey supervisors also assessed the age of the child to verify if an interview was still needed for the specific age category. All exclusion criteria, including those assessed during screening, were included in the formal questionnaire used for interviewing mothers.

Approval for this study was obtained from the Cambodia National Ethics Committee for Health Research (NECHR) prior to data collection.<sup>1</sup> Informed consent was obtained from all participants prior to the conducting of any interview.

#### 3.6 Questionnaire design

Two questionnaires were developed to obtain data from the separate study population 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.<sup>2,3</sup> Both questionnaires collected data on mothers' 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 were collected among both study populations, and current breastfeeding practices and complementary feeding practices on the preceding day 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 (WHO, 2008). Both questionnaires asked mothers to report on promotional practices experienced inside and outside 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 thought to be commonly fed to young children (based on a review of literature), as well as on the types of foods mothers aspired to feed their youngest child and reasons for this aspiration.

<sup>&</sup>lt;sup>1</sup> Approval was obtained on August 28, 2013 (Registration No. 0155/2013).

<sup>&</sup>lt;sup>2</sup> Questionnaires available upon request.

<sup>&</sup>lt;sup>3</sup> Questions regarding exposure to promotions were adapted from the Interagency Group on Breastfeeding Monitoring Protocol (IGBM, 2007).

#### Table 1. Questionnaire topic sections

Section	24 Month	Discharge
Mother characteristics	Х	Х
Child characteristics	Х	Х
Childcare practices	Х	
Breastfeeding practices	Х	Х
Infant feeding in last 24 hours and last week	Х	
Complementary food advice	Х	
Health communication	Х	Х
Advice and information	Х	Х
Promotions	Х	Х
Samples	Х	Х
Gifts	X	X

Interviews were conducted using a mobile data collection 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 Formhub, 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 to a web-based database (Formhub, 2013). The questionnaires were translated from English into Khmer, back translated into English to ensure accuracy, and uploaded into Formhub in Khmer. Interviews were conducted in Khmer using the Samsung Galaxy tab 2.07 model tablet. Submitted questionnaires were reviewed weekly to ensure data quality.

# 3.7 Statistical analyses

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

# 3.7.1 Creation of variables

Several variables of interest were created during analysis of the datasets.

*Infant and young child feeding (IYCF) definition:* IYCF indicators assessed in this study were defined according to the WHO's guidelines for assessing IYCF practices (WHO, 2008). Complementary feeding indicators, including minimum dietary diversity, minimum meal frequency, and minimum acceptable diet, were limited to children 6-23.9 months of age, while breastfeeding indicators were assessed across the entirety of both samples.

*Safe source of drinking water:* Main sources of drinking water reported by mothers were categorized into 'safe' and 'unsafe' sources. 'Safe' water included: piped water, a tube well, a borehole, a protected well, protected spring, or bottled water. 'Unsafe' water included: water from an unprotected well, unprotected spring, water from a tanker truck or small cart, rainwater, or surface water.

# 4. Results – Mothers discharged after delivery

## 4.1 Demographics and socio-economic characteristics

Demographic and socio-economic characteristics for mothers discharged after delivery of their newborns are shown in **Table 2**. The majority of all mothers were currently married at the time of interview, and approximately half (54.6%, n=167) of mothers reported their newborn to be their only child. Among those that were currently married, 6.9% (n=21) of mothers discharged after delivery reported that their husband currently lived away from home. Over ninety percent of mothers had attended any level of formal education; 21.2% (n=65) of discharged mothers reported attending university or higher graduate studies. Thirty percent (n=93) of discharged mothers reported currently working outside the home.

The majority of mothers had received some antenatal care (ANC) during pregnancy with their youngest child; 97.0% of women living in urban Cambodia had received ANC according to the most recent CDHS (NIS, 2011). Nearly one-fourth (23.5%, n=72) of newborns were delivered via Caesarean section (C-section), and all mothers delivered with the assistance of a health professional, including a doctor, nurse or auxiliary nurse midwife. According to the 2010 DHS, the rate of C-section deliveries across urban Cambodia is 8.2% (NIS, 2011).

The mean age of newborns when mothers were interviewed at discharge after delivery was 3.4 days. Most mothers (78.6%) with vaginal deliveries were discharged within 2-4 days following delivery, while 69.4% of mothers with caesarian-section deliveries were discharged within 5-7 days following delivery.

Almost all mothers reported a safe source of drinking water for their household. The majority of mothers reported that their household owned a television and motorbike (87.9% and 85.0%, respectively). Over one-fourth (26.1%, n=80) of mothers with newborns reported that their household owned a car.

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	Mothers discharged after delivery ( $n = 306$ )
Mother	
Age (years) (mean $\pm$ SD)	$27.3 \pm 4.7$
Parity (number) (mean $\pm$ SD)	$1.7 \pm 1.0$
Marital status (%)	
Married	99.3
Divorced, widowed or separated	0.7

Level of education (%)	
None	2.0
Non-formal education	1.0
Primary	32.0
Lower secondary	29.7
Upper secondary	14.1
Tertiary education	21.2
Works outside the home (%)	30.4
Main caregiver of child (%)	_*
Received antenatal care (%)	89.9
Assisted delivery (%)	100.0
Child	
Age (mean $\pm$ SD)	$3.4 \pm 1.8$ (days)
Sex (female) (%)	51.3
C-section delivery (%)	23.5
Household	
Safe source of drinking water (%)	95.4
Assets, ownership (%)	
Bicycle	35.6
Car	26.1
Motorbike	80.7
Refrigerator	37.6
Television	87.9

Several differences in demographic and socio-economic characteristics were found when comparing mothers attending public versus private maternity facilities in Phnom Penh. Forty percent (n=81) of mothers discharged after delivery in a public facility had attended primary school as their highest level of education, as compared to 17.7% (n=17) of mothers delivering in private facilities. Conversely, 34.4% (n=33) of mothers discharged after delivery in a private facility had attended university or higher education, as compared to 15.2% (n=32) of mothers delivering in public facilities (p<0.001). Thirteen percent (n=27) of mothers discharged after delivery in a public facility had not received ANC, as compared to only 4.2% (n=4) of mothers delivering in a private facility (p=0.023). The C-section delivery rate among discharged mothers was also higher in private facilities as compared to public (30.2% [n=29] versus 20.5% [n=43], respectively); this difference was not statistically significant (p=0.081). Ownership of televisions (95.8% vs. 84.3%, p=0.004), refrigerators (65.6% vs. 24.9%, p<0.001), motorbikes (89.6 vs. 76.7%, p=0.008), and cars (52.1% vs. 14.3%, p<0.001) was higher among discharged mothers delivering in private facilities.

#### 4.2 Antenatal care and IYCF counseling

As many mothers look to healthcare professionals and health workers for guidance on infant and young child feeding, these actors can play an influential role in early childhood nutrition. Information was gathered from mother participants in order to assess mothers' experience of advice and counseling within

health facilities that would support and encourage optimal breastfeeding and complementary feeding practices. Mothers discharged after delivery in a maternity ward were asked about their exposure to breastfeeding counseling and IYCF messages throughout their pregnancy and during delivery; results are shown in **Table 3**.

Overall, just over one-third (36.3%, n=111) of mothers received breastfeeding advice during ANC during their pregnancy with their newborn. The most commonly reported breastfeeding messages received among mothers were related to promotion of exclusive breastfeeding and early initiation of breastfeeding. Provision of information regarding the risks of feeding infant formula were reported by 8.8% (n=27) of all mothers.

In addition, mothers were asked to report their exposure to educational messages on IYCF either during pregnancy or since delivery. Among mothers at discharge who reported exposure to IYCF messaging, 84.3% (n=183) reported this exposure to messaging specifically during pregnancy, not after delivery. The most common educational messages reported spontaneously were related to the introduction of complementary foods at 6 months of age, exclusive breastfeeding and feeding a variety of foods during the complementary feeding period.

	Mothers discharged after delivery ( $n = 306$ )
Receiving information on breastfeeding from a health worker during ANC (%)	36.3
Breastfeeding messages received during ANC (%)	
Exclusive breastfeeding	19.3
Early initiation	19.0
Risks of feeding infant formula	8.8
Risks of feeding other foods/liquids before 6 months	3.6
Continued breastfeeding until 2 years and beyond	1.6
Heard, saw or read any IYCF educational message (%)	70.9
Content of IYCF education message (%)	
Introduction of complementary foods at 6 months	40.2
Exclusive breastfeeding	34.0
Feeding variety of foods	25.5
Early initiation	15.7
Feeding iron-rich foods	10.8
Continued breastfeeding until 2 years and beyond	3.9
Feeding frequently	2.3
Increase consistency as child grows	1.6

Table 3. Breastfeeding and IYCF messaging

Reported sources of this IYCF educational messaging are shown in **Figure 2**. The most common sources of IYCF educational messages were health facilities (43.6%) and television (39.5%). Personal contacts, such as relatives or friends/neighbors were reported less, by 11.8% (n=36) and 7.2% (n=22) of mothers, respectively.

Information on exclusive breastfeeding was a highly reported educational message among mothers, during both ANC visits and from exposure to other IYCF messaging routes. Overall, 44.8% (n=137) of mothers reported exposure to a message on exclusive breastfeeding either during ANC or through another educational message source.



Figure 2. Percentage of mothers who reported hearing IYCF messages by different sources

Just over half of mothers (57.5%, n=176) reported receiving assistance in positioning and/or attachment for breastfeeding from a health worker after delivery of their newborn/youngest child. Rates of assistance with positioning/attachment were not significantly different in private health facilities as compared to public (51.0% vs. 60.5%, p=0.155).

### 4.3 Commercial promotion within the health system

In addition to gathering information regarding advice and counseling on optimal infant and young child feeding received by mothers in the health system, mothers were also asked about exposure to commercial promotions for breast-milk substitutes and commercial complementary food products within the health system; results are shown in **Table 4**.

Table 4. Mothers' exposure to commercial promotions within the health system

	Mothers discharged after delivery ( $n = 306$ )
Received recommendation to use infant formula from a health professional, %	13.4
Observed branding/logos on health facility equipment, %	31.7
Observed commercial advertisement of infant formula within health facility, %	7.5
Received infant formula sample from a health professional, %	9.5
Received bottle or teat sample from a health professional, %	1.0
Observed commercial advertisement of complementary foods within health facility, %	0.3
Received complementary food sample from a health professional, %	0.0
Received a gift from a health professional branded with infant formula company, $\%$	7.8

Article 15 of Cambodia's Sub-decree 133 states that '... all health institutions in both public and private sector... shall not demonstrate how to use infant formula, except to mothers or members of the families in a special case...'' (Kingdom of Cambodia, 2005). Among mothers discharged after delivery, 13.4% (n=41) received a recommendation from a health professional, either during pregnancy or just after delivery, to feed their newborn breast-milk substitutes; recommendations from health professionals accounted for 37.3% of all recommendations made to discharged mothers (other sources of breast-milk substitute recommendations are discussed below). Two-thirds (65.9%) of mothers who reported recommendations by health professionals received the recommendation to use a breast-milk substitute as a pre-lacteal feed in the first 3 days after delivery of their youngest child. Health professional recommendations to use infant formula for pre-lacteal feeding were reported by 8.8% (n=27) of all mothers. Nurses and midwives were reported as the most common sources of these health professional recommendations. Rates of breast-milk substitute recommendations from health professionals were significantly higher for mothers who delivered in private health facilities compared to public (50.0% vs. 25.0%, p=0.010). Recommendations by health professionals to feed other types of milks (such as powdered/tinned milk, fresh animal milk or condensed milk) were rare; no mothers reported receiving such a recommendation during their pregnancy or after delivery.

Article 13 and Article 14 of Cambodia's Sub-decree 133 prohibits promotion by manufacturers within any health facilities, including advertisements or donation of equipment or materials that feature a brand or logo of the breast-milk substitute manufacturer (Kingdom of Cambodia, 2005). Mothers were asked to report their exposure to such promotions within the health system. Observation of commercial advertisements for breast-milk substitutes within the health system was not common among mothers interviewed; 7.5% (n=23) of mothers discharged after delivery reported seeing, hearing or reading such an advertisement within a health facility during pregnancy or since delivery. Reports of observed advertisements within health facilities were similar between mothers who delivered in private versus public facilities (8.3% versus 7.1%, p=0.265).

Observations of advertisements for commercially produced complementary food products in a health facility were rare, reported by only 1 mother (0.3%).

Another study conducted in tandem with this survey confirms low rates of product promotion in health facilities. It assessed point-of-sale promotions for breast-milk substitutes or commercial complementary foods at pharmacies or vendors located within the health facilities. Of the 29 facilities, 28 had pharmacies on the premises. None of the pharmacies sold standard infant formula for use among infants < 6 mo., follow-up formula, or toddler/growing-up milks. Two pharmacies sold formula for special medical uses (such as lactose free formula). No commercially produced complementary foods were sold in pharmacies. No promotions were found for any of these products in the pharmacies. Two vendors out of the four located within the grounds of the health facilities sold breast-milk substitutes and one of those had two displays promoting a breast-milk substitute.

Mothers reporting observations of breast-milk substitute or commercial complementary food branding or logos on health facility equipment or materials was more common; 31.7% (n=97) of mothers discharged after delivery reported such an observation. Observed branding was most commonly reported to have occurred on posters displayed in a health facility, but logos and branding were also reported on notepads, blankets, decorations and health facility equipment.

Mothers were asked if they had received a sample of a breast-milk substitute, bottle, pacifier or teat from a health professional. In addition to being prohibited in Article 14 and Article 15 of Cambodia's Subdecree 133, the absence of health workers' provision of breast-milk substitute product samples and materials for bottle feeding is used as an indicator for hospitals certified under the Baby Friendly Hospital Initiative (Kingdom of Cambodia, 2005; Brownlee, 2009). Ten percent (n=29) of mothers discharged after delivery reported receiving a free sample of a breast-milk substitute from a health professional; just over half (51.7%) of these samples came from midwives and 41.4% were given by nurses. No mothers reported receiving a complementary food sample during pregnancy or after delivery of their newborn. Three mothers (1.0%) also reported receiving a sample of a bottle or teat from a health professional.

Mothers were also asked to report any gifts received from someone other than a friend, family member or neighbor; this question was followed up by a series of questions to identify if the gift was provided by a health professional and if any branding, particularly from an infant and young child (IYC) food product manufacturer, was displayed on the gift. Eight percent (n=24) of mothers reported receiving gifts of 'mothers' milk' from health professionals. These mothers' milks are intended for use by a mother during pregnancy and lactation and are often manufactured by companies that also produce infant formula. All mothers discharged after delivery that reported receiving a gift of mothers' milk from a health professional reported 'Matilia' as the brand; Matilia is manufactured by FranceBeBe, a leading infant formula manufacturer in Cambodia.

#### 4.4 Recommendations and commercial promotion outside the health system

Article 13 of Cambodia's Sub-decree 133 stipulates that manufacturers should not publically advertise to promote either breast-milk substitutes or commercial complementary foods marketed for children under 24 months of age without prior approval of the government (Kingdom of Cambodia, 2005). Therefore, in addition to information regarding exposure to promotion of IYC food products inside the health system, mothers were asked to report their experience of promotions outside of the health system, including recommendations to use IYC food products, commercial promotions for breast-milk substitutes and commercially complementary foods. For comparison, mothers were also asked to report on promotions observed for commercially produced snack food products for general consumption commonly fed to children less than 24 months of age.

Mothers may receive advice and recommendations on infant and young child feeding from many sources beyond health workers and outside the health system, including through personal and commercial interactions. Mothers were asked to report all sources of recommendations received for use of breast-milk substitutes or other milks for their youngest child; results are shown in **Figure 3**.

Figure 3. Percentage of mothers who received recommendations for breast-milk substitutes among mothers discharged after delivery (n=306)



Just over one-third (35.9%, n=110) of mothers received a recommendation during pregnancy or delivery to use a breast-milk substitute. Recommendations for breast-milk substitutes from personal contacts were common. Fourteen percent (n=43) of mothers reported receiving a recommendation from a friend or neighbor, and 11.8% (n=36) reported receiving a recommendation from a relative. Recommendations from commercial sector sources were rare; nine mothers (3.0%) reported receiving a recommendation from a shop sales person or pharmacist.

Recommendations to feed other types of milks (powdered/tinned, fresh animal milk, and condensed) were very low among mothers discharged after delivery; only 12 mothers (3.9%) reported receiving such a recommendation.

Mothers were asked also asked if they had seen, heard, or read a commercial promotion for various commercial products, including breast-milk substitutes, commercially produced complementary foods, and commercially produced foods for general consumption commonly fed to young children. Mothers were asked to recall during their pregnancy and since delivery of their newborn; results for promotions of breast-milk substitutes (BMS) and commercially produced complementary foods (CPCF) are shown in **Figure 4**.

Figure 4. Percentage of mothers exposed to commercial promotion for breast-milk substitutes and commercial complementary foods among mothers discharged after delivery (n=306)



Overall, 84.6% (n=259) and 27.1% (n=83) of discharged mothers reported observing a breast-milk substitute and a commercial complementary food promotion, respectively. Television was the most commonly reported source of promotions, being reported by 80.7% (n=247) of mothers as the source of breast-milk substitute advertisement for and by 23.2% (n=71) of mothers for commercial complementary food advertisements. Observation of commercial promotions in shops or pharmacies was the second most commonly reported location. Mothers reported several types of complementary food products as promoted, shown in **Figure 5**. Promotions for infant cereals, including Cerelac and the locally-produced Bor Bor Rong Roeung, were the most commonly reported.



Figure 5. Percentage of mothers who reported promotions for commercially produced complementary foods, as reported by mothers discharged after delivery (n=306)

Mothers were also asked to report if they had heard, seen or read any promotions for commercially produced foods for general consumption commonly fed to young children; these included commercial snack foods such as savory crisps, biscuits, cake and candy. Results are shown in **Figure 6**.



Figure 6. Percentage of mothers who reported exposure to promotion for commercially produced snack food products, as reported by mothers discharged after delivery (n=306)

Promotions for these commercial snack food products were more commonly reported by mothers as compared to promotions for either breast-milk substitutes or commercially produced complementary foods; overall, 96.1% (n=294) of discharged mothers reported observing such a promotion.

In addition to observation of commercial advertisements for commercial IYC food products, mothers were also asked about exposure to other promotional practices sometimes employed by manufacturers, including receipt of free samples, discounts or coupons. Exposure to these other promotional practices was very low. Only 6 (2.0%) mothers reported receiving a free sample of a breast-milk substitutes outside the health system (5 from company representatives and 1 from a shop salesperson/pharmacist) and none received a free sample of a commercially produced complementary food outside the health system. Additionally, only 10 mothers (3.3%) reported receiving a discount or coupon for breast-milk substitutes and 1 (0.3%) reported receiving a discount or coupon for a commercially produced complementary food.

#### 4.5 Breastfeeding practices among mothers with newborns

Breastfeeding initiation and practices by mothers soon after delivery were documented among mothers; findings are shown in **Table 5**. Only one-third of mothers (34.0%, n=104) initiated breastfeeding early, defined as within one hour after delivery (WHO, 2008). Early initiation of breastfeeding was significantly

higher among mothers who delivered at public facilities (46.2%, n=97), as compared to private (7.3%, n=7; p-value < 0.001). Over half (55.6%, n=170) of mothers reported holding their newborns immediately after delivery; rates were higher among mothers delivering at public facilities as compared to private (61.4% vs. 42.7%, p=0.003). Pre-lacteal feeding, referring to the provision of liquids other than breast milk in the first 3 days after delivery, was highly prevalent, with almost two-thirds (62.4%, n=191) of mothers reporting providing a pre-lacteal feed to their newborn. The rate of pre-lacteal feeding among mothers discharged after delivery in public facilities (53.3%, n=112) was found to be significantly lower, as compared to private facilities (82.3%, n=79; p-value <0.001).

	Mothers discharged after
	delivery ( $n = 306$ )
Early initiation of breastfeeding, %	34.0
Immediately held newborn after birth, %	55.6
Pre-lacteal feeding, %	62.4

Table 5. Early breastfeeding practices among mothers discharged after delivery

Among mothers who gave their youngest child something to drink other than breast milk in the first 3 days after delivery, a breast-milk substitute was the most commonly used liquid for pre-lacteal feeding. Ninety-one percent (n=174) of mothers who practiced pre-lacteal feeding fed their newborn a breast-milk substitute. Plain and bottled water were reported among 19.9% (n=38) and 13.1% (n=25) of mothers who provided a pre-lacteal feed. Most mothers (85.6%, n=149) that fed a breast-milk substitute in the first 3 days after delivery obtained the breast-milk substitute by purchase, versus receiving it for free. The most commonly reported brands/manufacturers of breast-milk substitutes used as a pre-lacteal feed among mothers included Dumex, France Bebe, and Similac.

Though pre-lacteal feeding of breast-milk substitutes was high among mothers interviewed in this survey, many mothers reported that this was not actually what they wanted for their newborn. Nearly three-fourths (71.3%, n=124) of mothers who provided breast-milk substitutes as a pre-lacteal feed reported having not wanted breast-milk substitutes fed to their newborn. The most common reason mothers reported were related to their own breast milk supply; almost half (48.9%, n=85) of mothers reported using a breast-milk substitute as a pre-lacteal feed because their own breast milk supply had not yet come in, and 29.9% (n=52) reported that they did not have enough breast milk for their newborn. Fifteen percent (n=26) of mothers that provided a breast-milk substitute as a pre-lacteal feed to their newborn also reported doing so because they needed to return to work soon, and reported the convenience/time-saving benefit of breast-milk substitutes.

# 5. Results - Mothers of children less than 24 months of age

#### 5.1 Demographics and socio-economic characteristics

Demographic and socio-economic characteristics for mothers of children less than 24 months of age visiting child health services are shown in **Table 6**. The majority of all mothers were currently married at the time of interview, and approximately half of mothers (52.7%, n=155) reported their child under 24 months of age to be their only child. Among those who were currently married, 4.8% (n=14) of mothers reported that their husband currently lived away from home. Over ninety percent of mothers (93.2%, n=274) had attended any level of formal education and 7.5% (n=22) of mothers reported attending university or higher graduate studies. Approximately one-fourth (24.1%, n=71) of mothers visiting child health clinics reported currently working outside the home, and 83.0% (n=244) reported themselves to be the main caregiver of their youngest child.

The mean age of children less than 24 months of age was 11.7 months, as would be anticipated given the effort made to sample children across an equal distribution of ages 0 -23 months. The majority (92.9%, n=273) of mothers had received some antenatal care (ANC) during pregnancy with their youngest child; 97.0% of women living in urban Cambodia had received ANC according to the most recent NDHS (NIS, 2011). Fifteen percent (n=43) of children under 24 months of age were delivered via Caesarean section (C-section), and almost all mothers (99.3%, n=292) delivered their youngest child with the assistance of a health professional, including a doctor, nurse or auxiliary nurse midwife. According to the 2010 DHS, the rate of C-section deliveries across urban Cambodia is 8.2% (NIS, 2011).

Almost all mothers reported a safe source of drinking water for their household. The majority of mothers reported that their household owned a television and motorbike (85.0% [n=250] and 80.6% [n=237], respectively). One-fifth (20.4%, n=60) of mothers with a child under 24 months of age reported that their household owned a car.

	Mothers with children
	< 24  months (n = 294)
Mother	
Age (years) (mean $\pm$ SD)	$27.9 \pm 4.9$
Parity (number) (mean $\pm$ SD)	$1.7 \pm 1.0$
Marital status (%)	
Married	98.6
Divorced, widowed or separated	1.4
Level of education (%)	
None	6.8
Non-formal education	0.0
Primary	35.4

Table 6. Demographic and socio-economic characteristics of mothers of children under 24 months of age

Lower secondary	34.7
Upper secondary	15.6
Tertiary education	7.5
Works outside the home (%)	24.1
Main caregiver of child (%)	83.0
Received antenatal care (%)	92.9
Assisted delivery (%)	99.3
Child	
Age (mean $\pm$ SD)	$11.7 \pm 6.7$ (months)
Sex (female) (%)	46.6
C-section delivery (%)	14.6
Household	
Safe source of drinking water (%)	95.2
Assets, ownership (%)	
Bicycle	39.1
Car	20.4
Motorbike	80.6
Refrigerator	25.9
Television	85.0

# 5.2 Antenatal care and IYCF counseling

Mothers of children less than 24 months of age were asked about their exposure to breastfeeding counseling and IYCF messages; results are shown in **Table 7**.

Overall, just over half (56.5%, n=166) of mothers received breastfeeding advice during ANC during their pregnancy with their newborn. The most commonly reported breastfeeding messages received among mothers were related to promotion of exclusive breastfeeding and early initiation of breastfeeding. Information regarding the risks of feeding infant formula were reported by 8.8% (n=26) of all mothers. Just over half of mothers (52.0%, n=153) reported receiving assistance in positioning and/or attachment for breastfeeding from a health worker after delivery of their youngest child.

In addition, mothers were asked to report their exposure to educational messages on infant and young child feeding inside and outside the health system; 85.7% (n=252) of mothers reported having heard, seen or read an education message on IYCF since the birth of their youngest child. The most common educational messages reported were related to the introduction of complementary foods at 6 months of age, feeding a variety of foods during the complementary feeding period, and exclusive breastfeeding.

Table 7. Percentage of mothers who received breastfeeding and IYCF messaging, mothers of children less than 24 months of age

	Mothers of children less than $24 \text{ mths } (n = 294)$
Receiving information on breastfeeding from a health worker	56.5

during ANC (%)	
Breastfeeding messages received during ANC (%)	
Exclusive breastfeeding	32.3
Early initiation	30.3
Risks of feeding infant formula	8.8
Continued breastfeeding until 2 years and beyond	4.4
Risks of feeding other foods/liquids before 6 months	3.7
Hygiene during breastfeeding	2.4
Heard, saw or read any IYCF educational message (%)	85.7
Content of IYCF education message (%)	
Introduction of complementary foods at 6 months	51.4
Feeding variety of foods	36.4
Exclusive breastfeeding	28.2
Feeding iron-rich foods	14.3
Early initiation	10.5
Feeding frequently	6.1
Continued breastfeeding until 2 years and beyond	5.4
Increase consistency as child grows	5.4
Increase quantity as child grows	0.7
Safe and clean food preparation and storage	0.7
Increase feeding during and after illness	0.7
Responsive feeding	0.3

Reported sources of this IYCF educational messaging are shown in **Figure 7**. The most common sources of IYCF educational messages were television (54.4%, n=160) and health facilities (45.2%, n=133). Personal contacts, such as relatives or friends/neighbors were also very common, being reported by 12.2% (n=36) and 11.2% (n=32) of mothers, respectively.

Figure 7. Percentage of mothers who reported sources of IYCF messages among mothers of children less than 24 months of age



# 5.3 Commercial promotion within the health system

Results regarding mothers' exposure to commercial promotions for breast-milk substitutes and commercial complementary food products within the health system are shown in **Table 8**.

	Mothers of children $<$ 24 mths ( $n = 294$ )
Received recommendation to use infant formula from a health professional, %	18.4
Observed branding/logos on health facility equipment, %	19.0
Observed commercial advertisement of infant formula within health facility, %	3.7
Received infant formula sample from a health professional, %	7.8
Received bottle or teat sample from a health professional, %	3.1
Observed commercial advertisement of complementary foods within health facility, %	1.0
Received complementary food sample from a health professional, %	0.0
Received a gift from a health professional branded with infant formula company, %	0.7

Table 8. Percentage of mothers exposed to commercial promotions within the health system among mothers with children less than 24 months of age

Among mothers with children less than 24 months of age, 18.4% (n=54) received a recommendation from a health professional to use a breast-milk substitute since the birth of their youngest child. Nurses and midwives were reported as the most common sources of these health professional recommendations. Recommendations by health professionals to feed other types of milks were rare; only one mother (0.3%)reported receiving such a recommendation. Observation of commercial advertisements for breast-milk substitutes within the health system was not common among mothers interviewed; eleven mothers (3.7%) reported seeing, hearing or reading such an advertisement within a health facility since the birth of their voungest child. Observations of advertisements for commercially produced complementary food products in a health facility were only reported by three (1.0%) mothers. Nineteen percent (n=56) of mothers reported observing a breast-milk substitute or commercial complementary food brand or logo on health facility equipment or materials. The majority of observed branding was reported to have occurred on health facility posters. Eight percent (n=23) of mothers reported receiving a free sample of a breast-milk substitute from a health professional; just over half (52.2%) of these samples came from midwives and 26.1% were given by nurses. Nine mothers (3.1%) also reported receiving a sample of a bottle or teat from a health professional. Two mothers (0.7%) reported receiving a gift of 'mothers' milk' from a health professional since the birth of their youngest child, again these mothers' milks were manufactured by France Bebe, a leading infant formula manufacturer in Cambodia. No mothers reported receiving a complementary food sample.

Mothers with children 6-23 months of age visiting a health facility for child health services were also asked if health workers recommended particular foods for complementary feeding; results by age category are shown in **Figure 8**. Homemade *borbor khap krup kroeung* (enriched rice porridge) and whole family foods, such as meat, fruit, vegetables and butter/oil, were the foods most commonly recommended by health workers for children 6-23 months of age. Commercially processed infant cereals were less commonly recommended by health workers, with 26.6% (n=59) of all mothers of children 6-23 months of age reporting a recommendation to feed their child a commercial infant cereal as compared to 57.2% (n=127) of mothers reporting a recommendation to feed homemade *borbor khap krup kroeung*.

Figure 8. Foods recommended by health worker to mothers of children 6-23 months



# 5.4 Recommendations and commercial promotion outside the health system

Recommendations received by mothers of children less than 24 months of age to use a breast-milk substitute or other milks for their youngest child are shown in **Figure 9**. Just over half (50.3%, n=148) of all mothers received a recommendation to use a breast-milk substitute since the birth of their youngest child. Aside from health professionals (discussed above), the most commonly reported sources of recommendations for breast-milk substitutes were personal contacts. Twenty percent (n=58) of mothers reported receiving a recommendation from a relative, and 14.3% (n=42) reported receiving a recommendation from a friend or neighbor. Recommendations from commercial sector sources, such as company representatives or store owners, were rare. Eight percent (n=24) of mothers reported receiving a recommendation to feed other types of milks to their youngest child, almost exclusively powdered or liquid form; these recommendations were mainly from personal contacts, such as friends, neighbors, or relatives.

Figure 9. Percentage of mothers who received recommendations for breast-milk substitutes among mothers of children less than 24 months (n=294)



Mothers of children less than 24 months of age were asked to recall if they had seen, heard or read a commercial promotion for IYC food products since the birth of their youngest child; results for promotions of breast-milk substitutes (BMS) and commercially produced complementary foods (CPCF) are shown in **Figure 10**. Overall, 86.1% (n=253) and 29.3% (n=86) of mothers reported observing a breast-milk substitute and a commercial complementary food promotion, respectively. Television was the most commonly reported source of promotions, while promotions in shops or pharmacies were the second most commonly reported location. Infant cereals made up the majority of promotions reported for commercial complementary foods, and seventeen percent (n=15) of these reported promotions were for baby rusks. Five mothers (1.7%) reported promotions for 'AD Milk' brand, a sweetened liquid milk product that is not marketed specifically for children less than 2 years of age, but which is commonly consumed by young children in Cambodia.

Figure 10. Percentage of mothers exposed to commercial promotion for breast-milk substitutes and commercial complementary foods among mothers of children less than 24 months of age (n=294)



Mothers were also asked to report if they had heard, seen or read any promotions for commercially produced foods for general consumption commonly fed to young children; these included commercially produced snack food products such as savory crisps, biscuits, cake or candy. Results are shown in **Figure 11**. Almost all mothers (96.9%, n=285) reported hearing, seeing or reading a promotion for a commercially produced snack food product since the birth of their youngest child. Reported promotions were highest for candy/sweets/chocolate and savory snacks with 92.9% (n=273) and 91.2% (n=268), respectively, of mothers reporting having observed promotions for these types of products.





Receipt of free samples, discounts or coupons for commercial IYC food products was low among mothers of children less than 24 months of age. Only 14 (4.8%) of mothers reported receiving a free sample of a breast-milk substitute outside the health system (10 from company representatives and 4 from a shop salesperson/pharmacist) and 1 (0.3%) mother reported receiving a free sample of a commercially produced complementary food from a shop salesperson/pharmacist. Additionally, only 12 mothers (4.1%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) reported receiving a discount or coupon for breast-milk substitutes and 4 (1.4%) report

#### 5.5 Infant and young child feeding practices

In addition to gathering information on exposure to promotional practices for commercial food products, mothers of children less than 24 months of age were asked about current infant and young child feeding practices, including breastfeeding and complementary feeding.

## 5.5.1 Current breastfeeding practices

Current breastfeeding practices were assessed among mothers of children less than 24 months of age; results are shown in **Table 9**. Almost all (97.3%, n=286) children less than 24 months of age had ever been breastfed. Two-thirds (67.3%) of mothers of children 12-15 months of age reported that their child was still breastfeeding, while only 12.5% of children 20-23 months of age were currently breastfeeding. Exclusive breastfeeding was being practiced by 36.1% of mothers of children less than 6 months of age, while 51.4% were predominantly breastfeeding.<sup>4</sup> Bottle feeding was practiced by over half (55.1%, n=162) of mothers of children less than 24 months of age.

n	0⁄0
294	97.3
72	83.3
73	69.9
72	68.1
77	23.4
72	36.1
72	51.4
52	67.3
32	12.5
72	45.8
73	67.1
	n 294 72 73 72 77 72 72 72 52 32 72 52 32 72 73

Table 9. Current breastfeeding practices among mothers of children less than 24 months of age

<sup>&</sup>lt;sup>4</sup> Predominant breastfeeding was defined in accordance with WHO IYCF indicators and allows for infants' consumption of certain liquids in addition to breast milk, specifically water and water-based drinks, fruit juice and ritual fluids (WHO, 2008).

12-17 months	72	51.4	
18-23 months	77	55.8	

<sup>1</sup> Among children 0-5 months

<sup>2</sup> Among children 12-15 months

<sup>3</sup> Among children 20-23 months

**Figure 12** details the items consumed other than breast milk among children less than 6 months of age who were not exclusively breastfed (63.9%, n=46). Over two-thirds (67.4%) of non-exclusively breastfed children under 6 months were given a breast-milk substitute in the previous day. Sixty-one percent were given plain water, and 26.1% were given bottled water. Nine percent had consumed soft/semi-soft/semi-solid foods in the previous day. Only 1 child (out of 60 infants) aged 0-3.9 months consumed semi-solid or solid foods on the preceding day, while 25.0% of 12 infants 4.0-5.9 months of age did so (p=.005).

Figure 12. Percentage of children fed items other than breast milk among non-exclusively breastfed children 0-5 months of age (n=46)



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

Complementary feeding practices of children 6-23 months of age were assessed; this included 222 children. Fourteen children 6-23 months had not eaten food on the previous day. Infant and young child feeding indicators relating to complementary feeding are shown in **Table 10**. Minimum dietary diversity, defined as a child consuming at least 4 of 7 food categories in the previous day (WHO, 2008), was met by 54.5% (n=121) of children 6-23 months of age. Minimum meal frequency, defined as a child consuming food the minimum number of times in the previous day depending on their age and breastfeeding status (WHO, 2008), was met by 55.9% (n=124) of children 6-23 months of age. A minimum acceptable diet,

defined as the combination of these two indicators (WHO, 2008), was achieved by less than one-third (32.0%, n=94) of children 6-23 months of age.

Minimum dietary diversity, % <sup>1</sup>	54.5
Minimum meal frequency, % <sup>2</sup>	55.9
Minimum acceptable diet, %	32.0

Table 10. Complementary feeding indicators among children 6-23 months of age (n=222)

<sup>1</sup> Calculated based on WHO IYCF indicators; minimum dietary diversity was defined as consumption of at least 4 out of 7 food categories (WHO, 2008)

<sup>2</sup> 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 children 9-23 months, and at least 4 times for non-breastfed children 6-23 months (WHO, 2008)

The types of foods consumed by children 6-23 months of age in the day prior to interview are shown in **Table 11**. Cereal-based foods, such as rice, noodles, and breads, were consumed by almost all (89.6%, n=199) children 6-23 months, meat/poultry was consumed by almost two-thirds (62.2%, n=138), fish/seafood was consumed by almost half (47.7%, n=106). Dark green leafy vegetables were also consumed by nearly half (44.1%, n=98) of children 6-23 months of age. Savory foods (including fried potato or banana chips) and sugary foods were each consumed by over one-third of children 6-23 months (39.2%, n=87; 41.0%, n=91, respectively). Rates of consumption for dairy foods, such as yogurt, were low.

Cereal-based foods	89.6
Meat or poultry	62.2
Fish or seafood	47.7
Butter, oil or fat	44.6
Other fruits and vegetables	44.1
Dark green leafy vegetables	44.1
Sugary snack foods	41.0
Savory snack foods/chips	39.2
Yellow/orange fleshed vegetables	31.5
Eggs	27.5
Sugar or honey	23.9
Organ meats	18.9

Table 11. Percentage of children	6-23 mo of age cons	suming different food	ls on preceding day	(n=222), %
----------------------------------	---------------------	-----------------------	---------------------	------------

Yellow/orange fleshed fruits	12.2
Potatoes	9.5
Yogurt	9.0
Beans or Lentils	7.7
Grubs, snails, or insects	2.7
Nuts	2.3
Dried Fruits	0.9
Peanut butter	0.5
Cheese	0.0

Liquids consumed by all children 6-23 months of age are shown in **Table 12**. Plain water was most commonly consumed on the day prior to interview, received by 82.9% (n=184), and almost two-thirds (64.4%, n=143) had consumed broth. Almost one-fourth (24.8%, n=55) had consumed liquid, tinned or powdered milk, indicating that milk products are a more common source of dairy as compared to yoghurt and cheese

Rates of breast-milk substitute consumption were high among children over 6 months of age; almost onethird of children (29.3%, n=65) had consumed this in the previous day. Consumption rates were consistently high across age categories; 39.7% of children aged 6-11 months of age, 24.2% of children ages 12-23 months had consumed a breast-milk substitute in the day prior to interview.

Plain water	82.9
Broth	64.4
Rice water	44.1
Bottled water	38.7
Breast-milk substitute	29.3
Tinned/powdered milk	24.8
Juice/juice drink	22.1
Tea/coffee	14.4

Table 12. Percentage of children 6-23 months of age consuming different liquids on preceding day (n=222), %

Yogurt-based drink	8.1
Soft drink/carbonated beverage	8.1
Condensed milk	4.9
ORS	4.1
Sugar water	1.4

# 5.5.3 Consumption of homemade and commercial complementary foods

Forty percent of children 6-23 months of age (n=88) had consumed a homemade complementary food on the day prior to interview. Over half (57.7%, n=128) had consumed a homemade complementary food in the week prior to interview, and 30.6% (n=68) of mothers reported feeding a homemade complementary food to their child every day in the past week. Consumption was higher among younger age categories; 38.6% of children 6-11 months and 39.8% of children 12-17 months had been fed a home-prepared complementary food, as compared to 21.6% of children 18-23 months (p-value=0.002). The most commonly consumed home-prepared complementary foods included rice porridge (consumed by 52.3% of those who ate homemade complementary foods), and rice and soup (consumed by 31.8%). Nearly all (90.9%) of these homemade complementary foods contained cereals, 59.1% contained meat/poultry, and 44.3% contained dark green leafy vegetables. Over one-third (39.8%, n=35) of mothers who fed their child a homemade complementary food in the day prior to interview reported that they fed this food because it was 'healthy', 29.5% (n=26) of these mothers reported feeding this food because 'the child likes it', and 19.3% (n=17) reported feeding this food because it is traditionally fed. Fifty-nine percent of non-working mothers reported feeding their child a home-prepared complementary food in the day prior to interview, as compared to 40.9% of working mothers; however, this difference was not statistically significant (p-value=0.255).

Consumption of commercially produced complementary foods was less common than homemade complementary foods, with only 5.4% (n=12) having consumed a commercially produced complementary food in the day prior to interview. Eleven of these twelve mothers had fed an infant cereal.

#### 5.5.4 Consumption of commercially produced foods for general consumption

Mothers were asked to report on their youngest child's consumption of commercially produced foods for general consumption. Consumption of some of these foods in the day and week prior to interview among children 6-23 months of age is shown in **Figure 13**.

Figure 13. Percentage of children 6-23 months of age consuming commercially produced snack foods for general consumption on the preceding day(n=222)



Overall, over half (55.0%, n=122) of children 6-23 months had consumed a commercially produced snack food product in the day prior to interview and 80.6% (n=179) had consumed one in the week prior to interview. Savory snacks were most commonly consumed; over one-third of children 6-23 months (36.0%, n=80) consumed a chips/savory snacks in the previous day, and almost two-thirds (61.3%, n=136) reported consumption in the last week. Rates of commercial snack food product consumption increased significantly with age; 38.4% of children 6-11 months of age, 58.3% of children 12-17 months of age, and 67.5% of children 18-23 months of age consumed a commercial snack food product in the day prior to interview (p=0.002).

The frequency of consumption in the last week is shown in **Figure 14**. Savory snacks and cakes/doughnuts were consumed daily by over one-fifth of children 6-23 months of age (21.1% and 20.4%, respectively) who ate them in the last week.



Figure 14. Frequency of commercially produced snack food product consumption among children 6-23 months of age in the week prior to interview

Mothers who had fed these products in the past week were asked to explain why they fed these foods to their child; these reasons are shown in **Figure 15**. For all commercial snack products, the majority of mothers reported feeding the product to their youngest child because 'the child likes it', but also many mothers reported that the child demanded it or 'needed' it because they were crying. Few mothers reported feeding any of these commercial snack food products because they were healthy, however, 13.8% of mothers that fed biscuits/cookies and 13.0% of mothers that fed cake/doughnuts reported this as their main reason.



Figure 15. Reasons mothers of children 6-23 months fed commercial snack food products

Mothers who reported purchasing these commercial snack food products in the last week reported spending \$.20 USD per day on cookies/biscuits, \$.08 USD per day on candy/chocolate, \$.19 USD per day on chips/savory snacks, and \$.32 USD on cakes/doughnuts.

# 5.5.5 Food aspirations among mothers of children less than 24 months of age

In order to assess mothers' intentions and aspirations to feed foods that may be beyond their current purchasing power, all mothers of children less than 24 months were asked if there were any foods they would like to feed their child if they had more money. Nearly half (45.2%, n=133) of all mothers reported wanting to feed additional foods if they had the financial ability to do so; the types of foods mothers aspired to feed to their youngest child are shown in **Figure 16**. Breast-milk substitutes were the most commonly reported (15.6%, n=46) food that mothers aspired to buy for their children, closely followed by meat (15.3%, n=45) and fruit (14.3%, n=42). There was no statistical difference in aspirations to feed breast-milk substitutes by age of the child (p=0.841).

Figure 16. Percentage of mothers who reported aspirations to feed other foods among mothers of children less than 24 months of age (n=294)



Mothers who reported having food aspirations were also asked why they would like to feed these foods if they had enough money; results for mothers that reported aspirations of feeding breast-milk substitutes are shown in **Figure 17**. The main reason these 46 mothers reported aspiring to feed a breast-milk substitute to their child was because they believed there was a direct benefit for the child; 78.3% reported believing it was healthy for the child and 32.6% reported believing it would make the child smart. Reasons related to time availability were less common, with 15.3% of these mothers reporting wanting to feed a breast-milk substitute because they have to go to work and only 5.3% because it would be convenient (more than one reason could be reported).





#### 5.6 Associations between promotion and consumption of commercially produced foods

Associations between mothers' exposure to promotion and feeding practices were tested; though the sample size for this survey was calculated with the intent to establish a prevalence rate and not to test associations, several relationships were found.

Recommendations from health workers were found to be influential in some feeding practices. An association was found between mothers receiving a recommendation from a health professional to feed their youngest child a breast-milk substitute and pre-lacteal feeding. Seventy-two percent of mothers of children less than 24 months who reported a health professional's recommendation to use a breast-milk substitute provided a breast-milk substitute as a pre-lacteal feed to their youngest child, as compared to 34.6% of mothers who did not receive a recommendation to use a breast-milk substitute from a health

worker (p<0.001). This trend was present among discharged mothers as well (73.2% versus 54.3%, p-value=0.027). Among mothers of children less than 24 months of age, there was no significant difference in the proportion of mothers currently feeding their child breast-milk substitutes and receiving a health worker recommendation to use breast-milk substitutes (p=1.000).

Exposure to commercial promotion outside the health system was less influential in predicting utilization of commercial food products among mothers of children less than 24 months of age. There was no association between mothers having heard, seen or read a promotion for breast-milk substitutes and utilization of these products; 33.7% of mothers who reported observing a promotion for a breast-milk substitute had fed one to their child on the previous day, as compared to 27.5% of mother who had reported not observing a promotion (p=0.578).

#### 6. Conclusions and Discussion

In 2005, Cambodia passed *Sub-Decree on Marketing of Products for Infant and Young Child Feeding* (*No. 133*) in order to nationally enact the *International Code of Marketing of Breast-milk Substitutes* (Kingdom of Cambodia, 2005). Articles 13-15 of Sub-decree 133 specifically cover restrictions on promotion of breast-milk substitutes and any other food products marketed to children less than 24 months of age within the health system, as well as restricting commercial promotion outside the health system unless prior approval from the Ministry of Health has been obtained. This study sought to assess the levels of promotion of commercially produced infant and young child food products both inside and outside the health system of Phnom Penh, Cambodia, as well as to assess promotion for and consumption of commercially produced for data capture of exposure to promotion during pregnancy and delivery, while interviews with mothers of children less than 24 months attending child health clinics allowed for data capture of exposure to promotion for the birth of the youngest child onwards, as well as consumption information.

Findings from this study indicate that promotion of breast-milk substitutes within the Phnom Penh health system is prevalent, occurring mainly through displays of branding on health facility equipment/materials, recommendations from health professionals for mothers to use breast-milk substitutes, and distribution of free breast-milk substitute samples by health professionals. Nearly one-third (31.7%, n=97) of mothers discharged after delivery and 19.0% (n=56) of mothers of children less than 24 months reported observing branding/logos of breast-milk substitutes on materials or equipment within a health facility. Thirteen percent (n=41) of mothers discharged after delivery and 18.4% (n=54) of mothers of children under 24 months reported receiving a recommendation from a health professional to feed their youngest

child a breast-milk substitute. Ten percent (n=29) of discharged mothers and 7.8% (n=23) of mothers with children under 24 months of age also reported receiving a free sample of a breast-milk substitute from a health professional, most commonly nurses or midwives.

Consumption of breast-milk substitutes was high among children less than 24 months of age; 43.1% (n=31) of children 0-5 months and 29.3% (n=65) of children 6-23 months had consumed a breast-milk substitute in the day prior to interview. Continued breastfeeding was low among mothers interviewed, with rates decreasing among older children; only 12.5% of mothers reported continued breastfeeding for children 20-23 months of age. Additionally, pre-lacteal feeding of breast-milk substitutes was highly prevalent in both study populations; 56.9% (n=174) of mothers at discharge after delivery and 41.5% (n=122) of mothers with children less than 24 months of age reported feeding their youngest child a breast-milk substitute in the first 3 days after delivery. Comparison of national level data indicates that the rate of pre-lacteal feeding in urban Cambodia has been decreasing, from 56.9% in 2005 to 25.8% in 2010 (NIPH/NIS, 2006; NIS, 2011); however, findings from this survey indicate that rates in Phnom Penh remain high. Given that pre-lacteal feeding hinders the practice of exclusive breastfeeding, can reduce the duration of breastfeeding, and carries an increased risk of infection, this finding carries great weight for the protection and promotion of optimal breastfeeding in Phnom Penh.

The influential role of health workers can also result in sub-optimal infant and young child feeding practices if the messages contradict recommendations for optimal practices. Positive breastfeeding counseling and advice can be negated by health workers' encouragement to use a breast-milk substitute. In this survey, an association was found between health workers' recommendations of breast-milk substitutes and mothers pre-lacteal feeding. Prior studies from varying geographical areas have also noted the influential role of pre-lacteal feeding recommendations by health workers in increasing rates of prelacteal feeding (Pandey et al, 2010; Isenalumhe & Oviawe, 1987; Hossain et al, 1992; Talukder et al, 1997). Because interviews were conducted with mothers and not health workers, the reason for such high rates of breast-milk substitute recommendations by health workers, particularly for pre-lacteal feeding, is not entirely clear from the data. One study from Nigeria assessed reasons why health workers encouraged mothers to provide pre-lacteal feeds to their newborns; nurses were found to be most likely to recommend pre-lacteal feeding because of theorized low milk production in the first days after delivery (Akuse & Obinya, 2002). Almost all mothers who pre-lacteal fed reported doing so because their milk had not yet come in or because they believed their milk supply was low and it is plausible that both mothers and health workers shared a common concern regarding low milk supply soon after delivery. While this is a common concern among mothers, the colostrum supply of nearly all mothers is adequate for newborns; the average volume of colostrum produced by mothers is 56 mL on the first day after delivery and 185

mL on the second (Neville et al., 1988), suitable for newborns whose stomach capacity is very small in the first days after birth. Given the importance of early initiation of breastfeeding in stimulating milk production, the encouragement of pre-lacteal feeding by health workers for fear of low milk supply could actually result in decreasing a mother's supply that would otherwise be sufficient (Ahmed, 1996; Yamauchi, 1990; WHO, 1996).

In addition to high rates of pre-lacteal feeding, the high rate of utilization of breast-milk substitutes among children under 24 months of age is a serious concern in regards to its impact on exclusive breastfeeding and duration of breastfeeding, which can have wider nutrition and health effects on children and mothers (Stuebe, 2009). Recent secondary analysis of CDHS findings from 2000-2010 also indicate the greatest rise in bottle use among the urban poor, a population particularly at risk for use of contaminated water during mixed feeding (Prak et al., 2014). Various studies have assessed the influence of commercial promotion within the health sector and its impact on breastfeeding patterns, including the impact of free samples or 'discharge packs' on rates of exclusive breastfeeding (Rosenberg et al., 2008; Frank et al., 1987) and duration (Dougherty & Kramer, 2006), and exposure to facility-based advertising and early cessation of breastfeeding (Howard et al., 2000). This study found that promotion within the Phnom Penh health system exists, but also that promotion outside the health system, particularly via television and points-of-sale, is even more prevalent. While many factors influence a mother's breastfeeding decisions and use of breast-milk substitutes, including time, support and socio-cultural factors, it is likely that commercial marketing also plays a heavy role. This survey found that among mothers of children below 24 months of age, the food most desired to feed their child was breast-milk substitutes because mothers reported that these products were 'healthy' for their child and would 'make them smart'. A review of television commercials for breast-milk substitutes aired from September 2013-2014 in Phnom Penh found that messaging regarding health and nutrition claims, particularly around child growth and intelligence, were very common (M. Champeny, unpublished observations). In addition to reducing promotion within Phnom Penh health facilities, there is a great need to combat the pervasive marketing that is occurring generally in the city, and potentially across the country.

While promotion for commercially produced complementary foods within the health system was not common, promotions outside the health system were more commonly reported by mothers; however, utilization of commercial complementary foods was very low among mothers interviewed. Twenty-seven percent (n=83) of mothers discharged after delivery and 29.3% (n=86) of mothers of children less than 24 months reported seeing, hearing or reading a promotion for a commercially produced complementary food product. Similar to breast-milk substitute advertisements, most of these promotions were reported to

have been observed on television. Additionally, over one-quarter (26.6%, n=59) of mothers of children 6-23 months reported receiving a recommendation from a health worker to feed their child a commercially processed infant cereal. However, only 5.4% (n=12) of mothers of children 6-23 months of age reported having fed a commercial complementary food, mainly an infant cereal, to their youngest child in the day prior to interview. Based on these findings, while promotions for these food products are moderately prevalent in Phnom Penh, they are not typically used by mothers. Unlike breast-milk substitutes, if properly formulated for a young child and used appropriately during the complementary feeding period, fortified commercially produced complementary foods could play a positive role in the diets of young children in Cambodia.

Among children 6-23 months of age, consumption of commercially produced snack foods was marked, and promotion for these products was highly prevalent. Over half (55.0%, n=122) of children 6-23 months of age had consumed a commercially produced snack food product in the day prior to interview, most commonly savory snacks/chips, and 82.0% (n=182) had consumed one in the week prior to interview. This rate is much higher than that reported for urban areas (32%) in Cambodia in the 2010 CDHS (Huffman et al, 2014). Such high rates of salty snack food consumption are of grave concern, as salt intake during early childhood has been shown to be correlated with high blood pressure in childhood (Strazzullo et al., 2012). Consumption of salt during infancy has also been shown to increase salt preference later on in life at 36–48 months of age (Stein et al., 2012). The prevalence of overweight and obesity is increasing in children younger than five years globally, and is a contributor to diabetes and other chronic non-communicable diseases in adulthood (Black et al 2013). In addition to being commonly fed to young children, promotions for these commercially produced snack foods, such as biscuits and cookies, are highly prevalent in Phnom Penh, with almost every mother in each study population reporting observation of such a promotion.

Addressing the high consumption of savory and sugary snack food products and high rates of promotion should be a national priority. Mothers reported that they feed these products to their children primarily because children like them/demand them and because they are convenient, while mothers feed home-made complementary foods because they are deemed healthy.

There is a need for nutrition interventions in Cambodia to encourage replacement of unhealthy snacks with more nutritious, affordable foods, in order to improve infant and young child nutritional status and to prevent increases in childhood overweight and obesity. Overconsumption of unhealthy foods early in life can displace consumption of other important micronutrients, and contribute to not only childhood

overnutrition, but also undernutrition (Anderson, 2008). Indicators of quality of diet for children 6-23 months in this study were of concern; less than one-third (32.0%, n=71) of children 6-23 months of age in this study achieved a minimum acceptable diet, and only half (54.5%, n=121) consumed the minimum recommendation for dietary diversity in the day prior to interview. A number of studies have shown the association between malnutrition in early life and obesity risk later in life (Black, 2013; Huh, 2011). Efforts to ensure adequate nutrition for infants and young children would serve to combat malnutrition during childhood, with the potential to positively impact adult overnutrition and associated non-communicable diseases.

# 7. Recommendations

- Reports of commercial promotions for breast-milk substitutes are highly prevalent in Phnom Penh, particularly on television and in points-of-sale. Though these promotions are prohibited by national law, implementation and monitoring of Sub-decree 133 is needed to better regulate this promotion in order to protect breastfeeding for the nutrition and health of infants and young children in Cambodia.
- Utilization of breast-milk substitutes is very common among mothers in Phnom Penh, both as a pre-lacteal feed for newborns and continued use from birth up to 24 months of age. Mothers in this survey also reported time and work commitments as reasons for using breast-milk substitutes. Among mothers that aspired to feed breast-milk substitutes, many mentioned the belief that these products would improve the health/growth and intelligence of their child. In addition to addressing the widespread commercial promotion that is occurring in Phnom Penh, there is also a need to promote exclusive *and* continued breastfeeding as beneficial to children's health and development, and also support policy and workplace environments that enable breastfeeding.
- Observations of promotions for commercially produced snack food products were commonly
  reported by the nearly all mothers interviewed in this study. Consumption of these commercial
  snack products, particularly savory snacks/chips, is also common among children 6-23 months of
  age. Overconsumption of such foods can contribute to childhood malnutrition, as well as adult
  obesity and non-communicable disease. Nutrition interventions in Cambodia should encourage
  replacement of unhealthy snacks with more nutritious and convenient foods for young children.

# 8. References

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