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Estimating the Effect of Suboptimal Breastfeeding Practices on Child Mortality: A Model in PROFILES for Country-Level Advocacy

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Introduction

Malnutrition affects many developing countries, with significant negative consequences for individual health and national development in terms of lost human capital and economic productivity. Investment in nutrition was identified by the Copenhagen Consensus in 2012 as a best investment for developing countries; every dollar invested in nutrition yields a $30 return. Despite this, funding and support for nutrition programming is often lacking.

To address this urgent need for attention and commitment to reducing malnutrition, the USAID-funded Food and Nutrition Technical Assistance III Project (FANTA) at FHI 360 undertakes evidence-based nutrition advocacy using a collaborative approach to engage governments and national stakeholders to develop a shared vision and promote accountability and commitment for nutrition using a tool called PROFILES. Developed to support country-level nutrition advocacy, PROFILES consists of a set of computer-based models that calculate consequences if malnutrition does not improve over a defined time period (e.g., 10 years) and the benefits of improved nutrition over the same time period, including lives saved, disabilities averted, human capital gains, and economic productivity gains (or economic productivity losses averted).

PROFILES estimates are based on reduction in the prevalence of several nutrition problems, such as iron deficiency anemia; low birth weight; vitamin A deficiency; iodine deficiency; and childhood stunting, underweight, and wasting. These estimates are generated through participatory workshops where relevant stakeholders discuss and agree upon the information needed to create

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the estimates. The information is then input into the PROFILES spreadsheet workbook to generate the results. The estimates generated from this tool and its models are the cornerstone of the nutrition advocacy process, which can be used to engage government and other high-level stakeholders in a collaborative process to identify, prioritize, and advocate for evidence-based actions to reduce malnutrition.

Recently, FANTA updated the PROFILES tool to include a model that estimates the effect of suboptimal breastfeeding practices on child mortality. This brief explains why the model on breastfeeding practices was developed, how it is calculated, and how it is used for nutrition advocacy.

Why Advocate for Optimal Breastfeeding Practices?

Optimal breastfeeding reduces the risk of child mortality. It is estimated that, globally, 11.6 percent

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Nutrition advocacy *is a planned, systematic, and deliberate process that is defined and shaped by the specific country context. Nutrition advocacy can support a given country at any stage along the way to providing nutrition services and reducing malnutrition. A central focus of nutrition advocacy is to promote accountability for nutrition and strengthen nutrition governance. For example, nutrition advocacy can serve to support: the development of a nutrition policy, investment of resources to strengthen and expand implementation of nutrition services, and greater coordination between government and nongovernmental organizations that play a role in providing nutrition services across a country. By examining the context of the nutrition situation and tailoring advocacy needs to that situation, advocacy can be more effective in igniting change and making strides toward the desired outcome of a comprehensive nutrition program.*

of deaths of children under 5 years of age (800,000) are attributable to suboptimal breastfeeding practices (Black et al. 2013). In fact, promotion of optimal breastfeeding practices is one of the most effective interventions to prevent deaths for children under 5 worldwide (Bhutta et al. 2013). In addition, breastfeeding is associated with a reduced risk of child obesity, may be protective against the development of type-2 diabetes and certain other noncommunicable diseases later in life (Horta and Victora 2013), and is associated with increased years of schooling (Victora et al. 2005), improved cognition (Anderson et al. 1999), and higher performance on intelligence tests (Horta and Victora 2013). A 30-year prospective, population-based birth cohort study in Brazil, indeed showed that increased duration of breastfeeding is associated with improved intelligence, educational attainment, and income, indicating that breastfeeding may have important long-term positive impacts on economic and social outcomes (Victora et al. 2015).

Optimal breastfeeding, as defined by the World Health Organization (WHO), is the early initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding for the first 6 months of life, and continued breastfeeding for up to 2 years or beyond with appropriate complementary feeding beginning at 6 months (WHO 2001; PAHO/WHO 2002).[1] Adhering to all three WHO recommendations is critical to reducing both neonatal and child mortality as breastfeeding protects against illness (due to a reduced risk of infection) and supports the recovery of a sick child.

Globally, there is consistent and substantial evidence that early, exclusive, and continued breastfeeding through 23 months significantly reduces neonatal and child mortality. A technical brief on the impact of early initiation of breastfeeding on newborn deaths (Begum and Dewey 2010) highlighted studies in Nepal and Ghana that estimated that initiation of breastfeeding within the first hour of birth could prevent 20 percent of neonatal deaths. A systematic review (Debes et al. 2013) found breastfeeding initiation within 24 hours of birth is associated with a 44–45 percent reduction in the relative risk (RR) of all-cause and infection-related neonatal mortality based on three studies in Ghana, India, and Nepal.[2] In addition, two articles (Lamberti et al. 2011 and 2013) found that a lack of exclusive breastfeeding among infants 0–5 months of age and no breastfeeding among children 6–23 months of age is associated with increased diarrhea morbidity and mortality and that suboptimal breastfeeding elevated the risk of pneumonia morbidity and mortality outcomes across age groups (0–23 months). The 2011 study also found a similar pattern for all-cause mortality: among infants 0–5 months of age, risk of all-cause mortality was almost three times higher in children who

Suboptimum breastfeeding results in more than ***800,000*** *child deaths annually.*

[1] Exclusive breastfeeding is the feeding of an infant only with breast milk from his or her mother or a wet nurse, or expressed breast milk, and no other liquids or solids except vitamins, mineral supplements, or medicines in drop or syrup form (WHO 2001). Complementary feeding is defined as the process starting when breast milk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk. The target range for complementary feeding is generally 6 to 23 months of age, even though breastfeeding may continue beyond 2 years (PAHO/WHO 2002).

[2] Relative risk measures the magnitude of an association between an exposed and non-exposed group. It describes the likelihood of developing disease in an exposed group compared to a non-exposed group. The RR is the ratio of the incidence of disease among those exposed to the incidence in the non-exposed.

were only partially breastfed and 14 times higher in children not breastfed as compared to children who were exclusively breastfed. For both diarrhea and all-cause mortality, the protection offered by breastfeeding incrementally increased with increased levels of breastfeeding. The 2008 *Lancet* nutrition series article by Black et al. and subsequent analysis by Lamberti et al. (2011) also found a significantly increased risk of all-cause mortality for children 6–23 months who were not breastfed as compared to children who were breastfed.

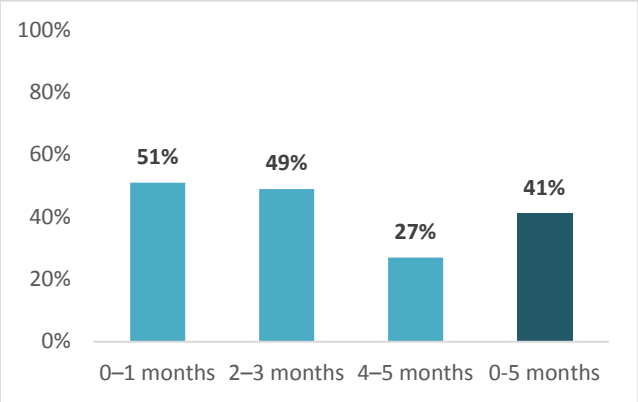
Despite the significant evidence demonstrating the beneficial impact of optimal breastfeeding practices on newborn and child health and survival, there has been little improvement in optimal breastfeeding practices globally. A 2013 analysis by UNICEF using available trend data from a subset of 77 countries between 1995 and 2011 showed that the global prevalence of exclusive breastfeeding had only increased from 32 to 40 percent during that timeframe. Examination of the breastfeeding situation in two countries, Indonesia and Bangladesh, provides further insights on the global breastfeeding context as these two countries reflect some of the common issues facing the promotion of optimal breastfeeding practices in the developing world.

In Indonesia, the 2012 Demographic and Health Survey (DHS) reports that 96 percent of children are ever breastfed. However, only 49 percent are breastfed within an hour of birth and 60 percent of newborns receive other liquids ("prelacteals") before receiving breast milk.[3] Exclusive breastfeeding duration is critically short. While 51 percent of women exclusively breastfeed children 0–1 month of age, by 4–5 months, the exclusive breastfeeding prevalence drops to 27 percent (see Figure 1).[4]

Breastfeeding practices are similar in Bangladesh where the 2011 DHS reports that 99 percent of children are ever breastfed, but only 47 percent of newborns are put to breast within one hour of birth and 39 percent receive prelacteal feeds. However, unlike in Indonesia, exclusive breastfeeding is actually quite common during the first months of a child's life—84 percent of women report exclusively breastfeeding children 0–1 month of age. Nonetheless, similar to Indonesia, the practice of exclusive breastfeeding falls to just 36 percent by the time the child reaches 4–5 months of age (see Figure 2), illustrating why it is important to review exclusive breastfeeding prevalence by age when assessing the prevalence in a country.

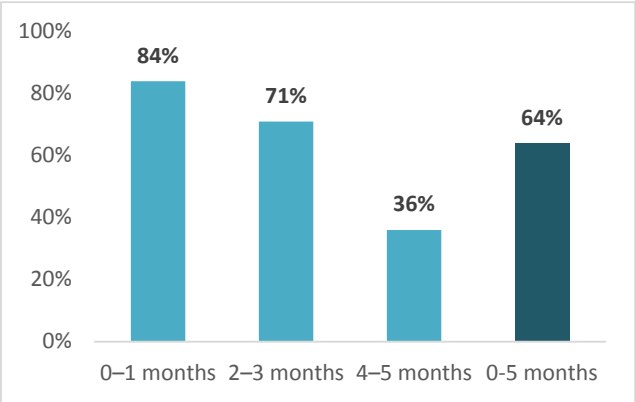
The breastfeeding patterns in both countries—delayed initiation of breastfeeding, provision of prelacteal feeds, and the short duration of exclusive breastfeeding—is a consistent pattern seen across many countries and more broadly reflects upon the quality of breastfeeding practices and the challenges to promoting optimal breastfeeding. These suboptimal practices highlight the need to address both the quality and duration of breastfeeding.

Figure 1. Exclusive Breastfeeding Prevalence by Age in Indonesia



Source: Indonesia DHS 2012

Figure 2. Exclusive Breastfeeding Prevalence by Age in Bangladesh



Source: Bangladesh DHS 2011

[3] The practice of prelacteal feeding is not recommended as it exposes the child to the risk of gastrointestinal infection and limits the frequency of suckling and breast milk consumption by the infant.

[4] To determine the exclusive breastfeeding indicator as defined by WHO, DHS collects information through a 24-hour recall by asking mothers what they fed their infant the day before the interview. Since this indicator only includes information on the previous 24 hours, it often does not account for children who were reportedly given a prelacteal feed within 3 days of birth (WHO 2008).

These suboptimal breastfeeding practices are often due to a lack of family and community support for mothers to breastfeed and a lack of understanding about the importance of quality (early, exclusive, and continued) breastfeeding. Advocacy to support optimal breastfeeding is necessary at the national, community, and family level to create an enabling environment where women are supported to breastfeed. To ignite change at all levels to improve optimal breastfeeding practices, a comprehensive social and behavior change approach is needed. Within this approach, three key components are necessary:

1. Advocacy to increase resources and political/social commitment
2. Social and community mobilization with increased participation, collective action, and ownership
3. Behavior change communication addressing knowledge, attitudes, and practices of specific audiences

Why is This Model Relevant?

Globally, this is an opportune time to focus on advocating for optimal breastfeeding practices given the renewed and targeted focus on the first 1,000 days from a mother's pregnancy until her child turns 2 years of age through the Scaling Up Nutrition (SUN) movement. Optimal breastfeeding is an essential practice during this period to prevent stunting, promote optimal child growth, and reduce child mortality. It is a practice that many countries are rallying around but is challenging to improve without concerted efforts and substantive support for mothers.

Based on new evidence and the targeted focus in many countries on the 1,000 days approach, country-level advocacy to promote optimal breastfeeding is essential to enable countries to fulfill their national commitments to the World Health Assembly targets to reduce stunting and child mortality. To support nutrition advocacy, FANTA updated PROFILES to include a model that estimates child mortality related to suboptimal breastfeeding practices and the number of lives that could be saved by improving breastfeeding practices. This model uses the RRs provided in peer-reviewed literature and country-specific data on breastfeeding prevalence to calculate country-level estimates. FANTA uses these estimates, among others, to support country-level nutrition advocacy efforts that are embedded within the broader social and behavior change approach described previously. Across all the estimates that PROFILES calculates, one objective is that the estimates be in terms that policymakers and stakeholders in each country can relate to. For this model the estimates are calculated in a way that is easy to understand: lives saved and lives lost.

FANTA developed a model on the benefits of optimal breastfeeding practices on reduced child mortality to support evidence-based advocacy in nutrition.

How Does the Model Work?

Models in the PROFILES spreadsheet workbook rely on coefficients from peer-reviewed literature that show the association between a nutrition problem and an outcome of interest. To create the breastfeeding model, FANTA reviewed recent peer-reviewed literature that included coefficients on the increased risk of child mortality due to suboptimal breastfeeding practices. A systematic review by Lamberti et al. (2011), which assesses the levels of suboptimal breastfeeding as a risk factor for selected morbidity and mortality outcomes, provided the necessary coefficients to generate the model. The breastfeeding model in PROFILES uses RRs from the review to calculate the proportion of child mortality related to suboptimal breastfeeding practices (see Table 1).

Table 1. Relative Risk of Mortality due to Suboptimal Breastfeeding Practices

Description of Relative Risks	RR
RR all-cause mortality: predominant breastfeeding versus exclusive breastfeeding (0–5 months)	1.48
RR all-cause mortality: partial breastfeeding versus exclusive breastfeeding (0–5 months)	2.84
RR all-cause mortality: no breastfeeding versus exclusive breastfeeding (0–5 months)	14.4
RR all-cause mortality: no breastfeeding versus any breastfeeding (6–23 months)	3.69

Source: Lamberti et al. 2011

Among children 0–5 months the model looks at suboptimal breastfeeding practices as no breastfeeding, partial breastfeeding, or predominant breastfeeding versus exclusive breastfeeding; among children 6–23 months, the model looks at no breastfeeding versus any breastfeeding. Therefore, to generate the estimates the following country-specific prevalence information is needed, which is often included in nationally representative household surveys such as DHS or Multiple Indicator Cluster Surveys (MICS).

Table 2. Breastfeeding Prevalence Needed for PROFILES Breastfeeding Model

Infants 0–5 months	Children 6–23 months
Percent exclusive breastfeeding	Percent any breast-feeding
Percent predominant breastfeeding	
Percent partial breastfeeding	
Percent not breastfeeding	Percent not breast-feeding

Using the RRs from Lamberti et al. (2011) and country-specific breastfeeding information, the PROFILES breastfeeding model calculates the population-attributable fraction (PAF)[5] and the excess number of deaths (among children 0–5 months and 6–23 months) related to suboptimal breastfeeding. This PAF is then used, together with the total number of deaths in each age group (based on country-specific mortality information) to estimate the excess number of deaths that can be attributed to suboptimal breastfeeding. These results then provide country-specific estimates of the number of lives lost among children under 2 years of age related to suboptimal breastfeeding practices over a certain period of time (assuming that there is no change in breastfeeding practices) and the number of lives that could be saved among children under 2 related to improved breastfeeding practices over the same period of time.

Information Needed to Use the Model

In coordination with government and in-country stakeholders, information needed for the PROFILES models is collected and input into the spreadsheet workbook through a participatory process among the stakeholders. Every model in PROFILES utilizes the following information to generate estimates:

- A **time period** is needed to determine the number of years for which the estimates should be calculated (e.g., 10 years).
- **Prevalence information** provides the magnitude of the nutrition problem (for example, percent of children 0–5 months exclusively breastfed). Current prevalence information is needed to serve as a baseline for the equations in the model.[6]
- **Targets** are set to determine what the goal should be with regard to prevalence of the nutrition problem at the end of the given time period (e.g., improve exclusive breastfeeding from 40 to 85 percent). The targets reflect the proportion by which the nutrition problem will be reduced over the chosen time period and therefore influences the outcome of interest.[7]

  For the breastfeeding model, targets are determined to both increase optimal breastfeeding practices (exclusive breastfeeding 0–5 months and any breastfeeding 6–23 months) and reduce suboptimal breastfeeding practices (predominant, partial, or no breastfeeding for 0–5 months, and no breastfeeding for 6–23 months).
- **Demographic information** serves as the basis for the population projections by providing population size and structure.
- **Mortality, economic, employment, or education-related information** provides details on the outcome of interest. For the breastfeeding model mortality information is required, but economic, employment, or education information is not (however, such

[5] The PAF is defined as the proportion of the condition (e.g., illness or death) that is attributable to the risk factor (e.g., suboptimal breastfeeding). PAF is a function of the prevalence of the risk factor (P) and the relative risk (RR) and is calculated as PAF = (P*(RR-1))/(1+(P*(RR-1))) (Kleinbaum et al. 1982).

[6] PROFILES uses the best available, recent information on point prevalence, which is the prevalence at a point in time, often referred to as a snapshot of a population.

[7] It is important to note that specific nutrition interventions (e.g., optimal breastfeeding counseling) are not input into the model to develop the PROFILES estimates. Rather, the improvement in the nutrition situation is based on the expectation that if nutrition interventions that are known to be effective are implemented at scale they will succeed in reaching the stated targets.

information is utilized in other PROFILES models). This information is needed to compute the consequence of the nutrition problem on the outcome of interest.

How Has the Model Been Used to Support Country-Level Advocacy?

In 2014, FANTA, in partnership with the Government of Tanzania, the Tanzania Food and Nutrition Centre (TFNC), the United Nations Renewed Efforts Against Child Hunger and Undernutrition (UN REACH), and other stakeholders, developed estimates of the benefits of improved nutrition using PROFILES where the breastfeeding model was first utilized during the PROFILES workshop in Dar es Salaam, Tanzania. During the workshop, stakeholders estimated that if there was no change or improvement in the breastfeeding situation over the selected time period (2014–2025), 360,487 lives of children under 2 years of age would be lost. However, if breastfeeding practices improved in accordance with targets over the next 10 years, 85,519 lives of children under 2 would be saved. These results, along with the other PROFILES estimates, have been used to support the national nutrition agenda and advocate for needed resources, expanded services, and the creation of an enabling environment where mothers throughout the country are supported to breastfeed optimally, among other nutrition priorities.

Using this new model in PROFILES as a part of a broader nutrition advocacy process to illustrate the critical link between optimal breastfeeding practices and lives saved lends support to national advocacy efforts to increase, sustain, protect, promote, and support optimal breastfeeding. This is of particular importance now in order to build momentum to reach the World Health Assembly 2025 Global Nutrition Targets, which aim to increase the prevalence of exclusive breastfeeding to 50 percent globally, and reach the Sustainable Development Goals in which addressing poor nutritional status and practices (including suboptimal breastfeeding) will be critical to achieving the goals of reduced maternal, neonatal, infant, and child mortality (WHO 2014). This addition makes PROFILES a more robust tool for nutrition advocacy for increased commitment to and investment in nutrition to reduce mortality during the first 1,000 days.

For more information on FANTA's country-level nutrition advocacy activities using PROFILES, visit www.fantaproject.org/tools/profiles or email FANTA at fantamail@fhi360.org.

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