

# Results



Final October 2006

**A** primary goal of the USAID-funded LINKAGES Project (1996–2006) was to demonstrate in several countries an increase in optimal feeding practices among infants within a relatively short period of time (20–24 months) and at a scale that could achieve significant public health impact. LINKAGES supported the design and implementation of national-level advocacy, district-level programming, community-based counseling, and support groups to achieve measurable improvements in infant feeding behaviors. Based on scientific evidence of the benefits of optimal feeding practices for child survival, growth, and development, LINKAGES focused on the following objectives:

- ◆ Increase the timely initiation of breastfeeding (TIBF) rate (within the first hour of birth)
- ◆ Increase the exclusive breastfeeding (EBF) rate of infants less than six months of age
- ◆ Improve the lactational amenorrhea method (LAM) rate as a proxy for expanding the offering of LAM
- ◆ Increase the timely complementary feeding (TCF) rate of infants 6– < 10 months

This issue of *Experience LINKAGES* reports on the project's indicators and tools for measuring change, the results achieved, and lessons learned in collecting infant feeding data. For a description of LINKAGES' strategy for achieving results, see *Experience LINKAGES: Program Approach*. The publication series *World LINKAGES* describes specific interventions used in each country.

## Program Context

LINKAGES supported long-term, large-scale country programs in Bolivia, Ethiopia, Ghana, Jordan, Madagascar, and Zambia. Using breastfeeding as its entry point, LINKAGES helped strengthen and expand the infant and young child feeding components of other programs such as child survival, reproductive health, nutrition, and prevention of mother-to-child transmission (PMTCT) of HIV. In Ethiopia and Madagascar, breastfeeding was promoted as part of other essential nutrition actions and child survival interventions. In Zambia

the project promoted informed infant feeding choices within PMTCT services. In Jordan the objective was to increase quality offering and acceptance of LAM as a transition to the use of other modern family planning methods.

In each country the program reached a sizeable population, as shown in table 1. To monitor program progress, LINKAGES used a common set of breastfeeding and infant feeding indicators based on WHO definitions (1991) and Wellstart International's toolkit for monitoring and evaluating breastfeeding activities (1996). These standard indicators were all field tested prior to application. They were limited in number and fairly easy to both measure and interpret. This strong monitoring and evaluation base, with its clearly articulated indicators to measure progress in achieving results, set the direction for the project.

**Table 1. Coverage at End of Program Activities**

Country Population	Project Catchment Population	Catchment Area
Bolivia 9 million	1 million	153 districts throughout country
Ethiopia* (Oromia) 26 million	3.8 million	19 districts
Ghana 21 million	3.5 million	Communities in 31 districts in 7 of 10 regions
Jordan 5.3 million	1 million	All (351) MCH centers throughout the country
Madagascar 18 million	6.3 million	23 districts in 2 of 6 regions
Zambia 11 million	1 million	54 sites in 6 districts

\* LINKAGES was involved in project activities in 64 districts in three regions of Ethiopia with a total catchment population of 15 million people. Survey results from the three regions were not merged; results presented here are from the Oromia Region.

*Experience LINKAGES* is a series of publications on the strategies, tools, and materials used by the LINKAGES Project to achieve results.

## Results

Results are shown from LINKAGES baseline and endline surveys in Bolivia, Ethiopia, Ghana, Madagascar, and Zambia for three indicators—timely initiation of breastfeeding, exclusive breastfeeding, and timely complementary feeding. The LAM rate is reported for Bolivia and Madagascar. These key impact indicators were measured and calculated consistently across country programs using data from community surveys. In Jordan, however, service delivery statistics were used to calculate LAM uptake. Ethiopia and Madagascar were among the first countries to use a new infant and young child feeding indicator, and these results are reported as well. Table 2 provides information on survey dates, sample sizes, sampling methodologies, and populations surveyed. The *p* values are presented in each figure.<sup>1</sup>

### Timely initiation of breastfeeding (within one hour of birth)

Approximately one-fourth to one-half of infant deaths in developing countries occur in the first week of life. A recent study in Ghana found that

timely initiation of breastfeeding—within the first hour of birth—could prevent up to 22 percent of neonatal deaths.<sup>2</sup> In many developing countries initiation of breastfeeding is delayed by hours if not days. Early initiation provides newborns with high levels of antibodies, vitamin A, and other protective factors through colostrum, the sticky, yellow-white early milk. Skin-to-skin contact during breastfeeding stabilizes the baby's temperature, respiratory rate, and blood sugar level.

In LINKAGES' five large-scale country programs, timely initiation of breastfeeding rate<sup>3</sup> increased at statistically significant levels in all countries (figure 1). With the exception of Ghana, the endline ranged from 68 percent to 77 percent. In most cases the largest gains in feeding practices were achieved for this indicator, perhaps because it is a one-time behavior. Based on annual monitoring data, there appears to be a positive correlation between intensity of the program at the community level and the rate of timely initiation of breastfeeding. Since program intensity was not formally quantified, the correlation could not be measured statistically.

**Table 2. Survey Background**

	Survey Date	n (TIBF)	n (EBF)	n (LAM)	n (TCF)	Sampling Methodology	Survey Targets
Bolivia	April 2000	4 327	2 970	2970	901	Stratified cluster sampling by NGO†	Mothers of children younger than 12 mo
	May 2003	1 668	834	834	834	Lot quality assurance sampling by NGO and by health supervision areas	
Ethiopia (Oromia)	June 2004	298	152	n/a	94	Stratified cluster sampling by <i>woreda</i> (district)	Mothers of children younger than 23 mo
	May 2006	483	214	n/a	187	Purposive stratified cluster sampling by <i>kebele</i> * (only where program was actively working)	
Ghana	October 2000	454	255	n/a	148	Stratified cluster sampling by NGO	Mothers of children younger than 12 mo
	December 2003	900	536	n/a	117		
Madagascar	February 2000	600	319	318	192	Stratified cluster sampling by district	Mothers of children younger than 23 mo
	November 2005	195	500	500	362		
Zambia	May 2000	209	208	n/a	n/a		Mothers of children younger than 12 mo
	September 2004	522	392	n/a	n/a		

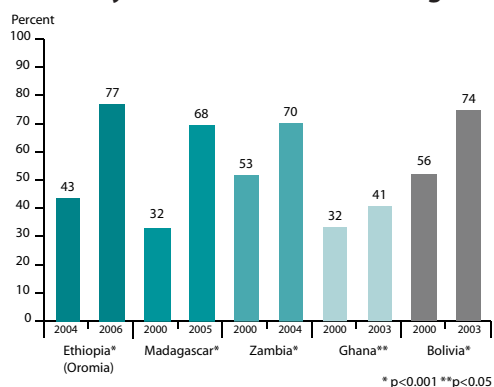
† Nongovernmental organization \* *Kebele* is the smallest administrative unit in Ethiopia.

<sup>1</sup> The *p* values indicate the level at which the results are statistically significant. Results with a *p* value less than .05 are considered statistically significant.

<sup>2</sup> Edmond et al, Delayed breastfeeding initiation increases risk of neonatal mortality. *Pediatrics* 2006, 117:380-386

<sup>3</sup> The timely initiation of breastfeeding rate is the percentage of infants less than 12 months of age who are put to the breast within one hour of birth.

**Figure 1: Timely Initiation of Breastfeeding**

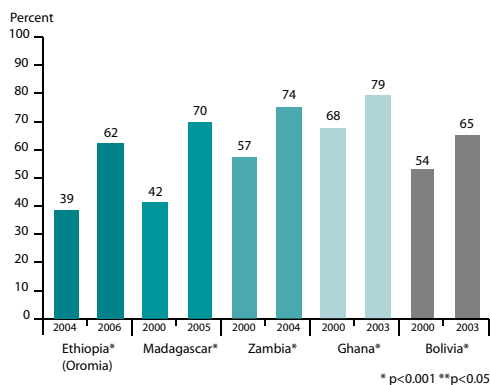


**Exclusive breastfeeding among infants less than six months old**

Breastmilk provides all the energy, nutrients, and water that an infant needs during the first six months. Exclusive breastfeeding reduces infant deaths caused by common childhood illnesses such as diarrhea and pneumonia, hastens recovery during illness, and helps space births. Survey data in 1999 from 43 countries indicated that less than half (48 percent) of infants 0– < 4 months of age were exclusively breastfed in the previous 24 hours. Increasing exclusive breastfeeding among infants in this age group as well as those 4–5 months of age is critical.

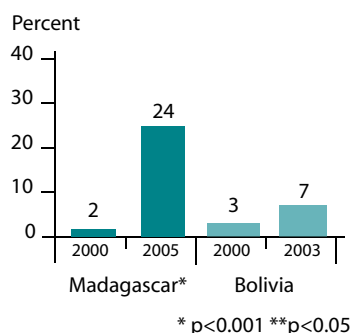
As with timely initiation of breastfeeding, the exclusive breastfeeding rate<sup>4</sup> increased at statistically significant levels in the five program countries (figure 2). The baseline rates varied widely across countries, from 39 percent in the Oromia Region of Ethiopia to 68 percent in Ghana. In over 5 years in Madagascar, exclusive breastfeeding increased 28 percentage points. In 4 years in Zambia it increased 17 percentage points. And in 3 years in both Ghana and Bolivia, the rate increased by over 10 percentage points, while in Ethiopia it increased over 20 percentage points in 2 years.

**Figure 2: Exclusive Breastfeeding**



**Lactational amenorrhea method (LAM)**

**Figure 3: Lactational Amenorrhea Method**



LAM is a modern contraceptive method based on the natural infertility resulting from full or nearly full breastfeeding in the absence of menses up to six months postpartum. LAM, under typical use, is more than 98 percent

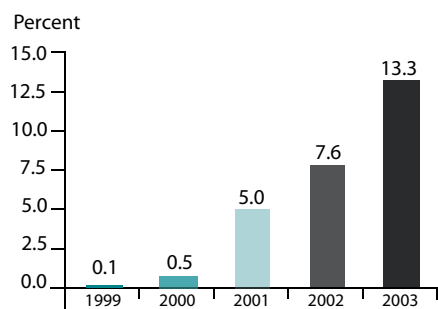
effective and contributes to the first six months of birth spacing. Safe and affordable, LAM is also the most effective short-term modern method of contraception accessible to all women right after delivery. Despite these benefits, LAM is often misunderstood and undervalued by family planning and maternal and child health program planners and service providers. Consequently, many women are not presented with LAM as a family planning option.

LINKAGES used the LAM rate as a proxy for the expanded offering of the lactational amenorrhea method. This rate reflects the proportion of eligible women who consciously and deliberately accept LAM as a modern contraceptive method. Eligible women are those with infants less than six months old. Baseline results of the LAM rate in Madagascar and Bolivia were similar (figure 3). In Madagascar the LAM rate increased dramatically, from 2 percent to 24 percent, which is statistically significant. Although the LAM rate more than doubled in Bolivia, this increase was not significant.

In Jordan the focus was on phased-in LAM training of all public, clinic-based maternal and child health service providers. Service statistics were analyzed to determine the LAM *user* rate. Because this rate reflects LAM use among *all women of reproductive age* using family planning services, it underestimates use among eligible women. When infant age is not available, the LAM user rate serves as a proxy for LAM use. In Jordan the LAM user rate among women who received services at the government’s health centers increased dramatically over time, from 0.1 percent in 1999 to 13.3 percent in 2003 (figure 4). Due to the tendency of the LAM user rate to underestimate actual trends, this increase is more dramatic than it appears.

<sup>4</sup> The exclusive breastfeeding rate is the percentage of infants less than 6 months old who receive only breastmilk, and no other solids or liquids including water (based on 24-hour dietary recall), with the exception of drops or syrups consisting of vitamin or mineral supplements and medicines.

**Table 4. LAM use among women of reproductive age using FP services - Jordan**

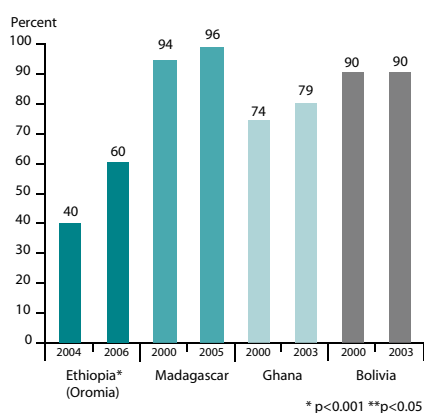


**Timely complementary feeding among infants 6 through 9 months old**

Rates of malnutrition usually peak between 6–24 months, the time of complementary feeding. During this period other foods or liquids should be provided along with breastmilk. The second half of the first year is an especially vulnerable time because infants are learning to eat and must be fed soft foods frequently and patiently. If their nutritional intake is inadequate, the consequences persist throughout life.

Generally, LINKAGES did not experience the same level of increases in complementary feeding that were achieved in breastfeeding. This is primarily because the complementary feeding indicator<sup>5</sup> is sensitive only to late introduction of complementary foods in addition to breastmilk, while in fact it is more common that foods are introduced too early rather than too late. In LINKAGES countries where this indicator was measured, only Ethiopia had a very high rate of late introduction of foods at baseline and showed significant improvement after the program intervention, from 40 percent to 60 percent. In program areas in other countries, the baseline rate was high and remained high, with no statistically significant changes (figure 5).

**Table 5. Timely Complementary Feeding**



**Infant and young child feeding among children 6 through 23 months old**

New complementary feeding indicators that will provide richer and more programmatically relevant information are current being developed and tested to help program managers better plan and assess their interventions to address early and late introduction of complementary foods, feeding frequency, and dietary diversity.

Several iterations of complementary feeding indices (e.g., the young child feeding index<sup>6</sup>) and indicators have been developed. The infant and young child feeding (IYCF) indicator is currently being adopted by USAID and will likely be integrated into future Demographic and Health Surveys (DHS). Three key feeding behaviors among children 6–23 months old make up all of the new complementary feeding indicators currently being discussed or proposed: 1) continued breastfeeding, 2) age-appropriate frequency of feeding, and 3) dietary diversity (food group diversity)

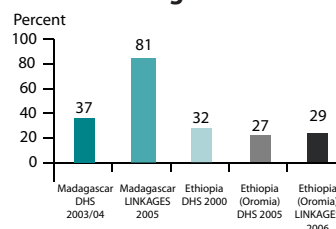
Specifically, the criteria for the new IYCF indicator adopted by USAID are shown in table 3. follows:

**Table 3. Criteria for IYCF Indicator**

Criteria for Breastfed Children 6–23 months	Criteria for Non-Breastfed Children 6–23 months
Continued breastfeeding	Fed breastmilk substitute
Frequency of feeding of complementary foods 6–8 months: 2 + times 9–23 months: 3 + times	Frequency of feeding of complementary foods 6–23 months: 4 + times
Dietary diversity 3 + food groups	Dietary diversity 4 + food groups (with dairy products as one of the groups)

LINKAGES’ surveys in 2005 and 2006 included questions that permitted calculation of the IYCF indicator. The Madagascar endline survey in 2005 found very favorable results (81 percent) compared to national results (37 percent) from the 2003 DHS. In Ethiopia, however, program area results in Oromia in 2006 (29 percent) were not significantly different than the DHS results in 2003–2004 (figure 6).

**Table 6. Infant and Young Child Feeding**



<sup>5</sup> The timely complementary feeding rate is the percentage of infants 6 through 9 months of age who receive breastmilk and a solid/semi-solid food (based on 24-hour recall). Solid foods are defined as foods of mushy or solid consistency, not fluids.

<sup>6</sup> Arimond M. and Ruel M. Generating Indicators of Appropriate Feeding of Children 6 through 23 Months from the KPC 2000 +, FANTA Project, Washington, DC: AED, November 2003.

## Measuring Progress

**M**easuring progress required appropriate management, methods, and instruments to assess current feeding practices and monitor program impact. LINKAGES' approach to monitoring and evaluating its country programs centered on a comprehensive design, strong management, and technical focus that facilitated efficient and effective collection of high quality process and outcome data. The strategy was guided by four principles: measure indicators mandated by the project as well as those important to the program and to the target population, collect only data that can and will be used, maintain objectivity through autonomy, and foster innovation. Implementation of the strategy was guided by an M&E team comprised of headquarters and country-level staff and required an effective supervisory system and spirit of teamwork.

**Baseline surveys:** Data were collected on key indicators and other program-related questions using large sample sizes to detect a small, yet significant change in behaviors. In some instances where Demographic and Health Survey (DHS) results were timely and available, DHS data served as a baseline. Indicator targets were established based on baseline or DHS data.

**Rapid assessment procedure (RAP) surveys:** On an annual basis, LINKAGES collected data on key indicators using a shorter questionnaire and smaller sample sizes than those used for baseline and endline surveys. RAP surveys serve as a tool to quickly measure progress in achieving targets for key indicators and inform program management of areas that may need special attention. The RAP survey methodology employed by LINKAGES varied by country.

- ◆ *Bolivia:* Lot quality assurance sampling (LQAS) methodology was used so that each partner NGO would be able to assess results within their respective program areas.
- ◆ *Ghana:* Cluster sampling methodology was used with stratification by NGO to ensure representative results for each of the three NGO partners.
- ◆ *Madagascar:* Cluster sampling methodology was used. Communities included in the survey were not selected randomly from all possible communities in the program area. To assess appropriateness of program design, only communities in each of the intervention districts that were observed to be most actively promoting program strategies were included in the sampling framework.

**Endline surveys:** To evaluate the effectiveness of interventions, LINKAGES undertook endline surveys using large sample sizes and the same questionnaires used during the baseline survey.

**Special surveys:** LINKAGES occasionally conducted special surveys and studies to evaluate program activities. These included performance monitoring, media evaluations, qualitative studies, and cost-effectiveness analyses.

**Routine data collection:** In countries in which LINKAGES' activities concentrated on facility-based activities, such as LAM at family planning clinics in Jordan or voluntary HIV counseling and testing in Zambia, data were collected routinely through the integration of data collection tools into the local or national health management information systems.

Program results were compared with several data points depending on the local circumstances and data availability, including baseline surveys, survey results from control communities, Demographic and Health Surveys, Multi-Indicator Cluster Surveys, and data from other organizations working within or nearby LINKAGES program areas. Different sampling methodologies were used depending on circumstances in each country. For this reason, statistical comparisons across different countries were not made although comparisons across time within a country were made. Multistage cluster sampling was used in most countries, and depending on the particular needs of local clients and the specifics of the program, various levels of stratification and/or parallel sampling were included. LQAS was used in some countries when the circumstances called for setting up decentralized monitoring systems (e.g., many NGOs as in Bolivia) or systems that planned on monitoring targets at the supervisory level (e.g., Freedom from Hunger in Ghana).

## Lessons Learned Using Infant Feeding Indicators

LINKAGES' experience confirms that the more complex the feeding practice, the harder it is to change and measure. The challenges of evaluating infant feeding programs are summarized below.

**Infant feeding behavior data relies upon precise age data.** While many health interventions can be tracked with only a general reference to the child's age (e.g., less than five years), tracking breastfeeding practices requires more precise assessment of the infant's age. The birth date a mother gives for her infant can be checked against a child health card or other official registry of the child's birth date.

**The detection of relatively small changes (five to ten percentage points) over time in breastfeeding initiation requires large sample sizes.** Adequate sample size to derive the timely initiation of breastfeeding rate sometimes requires asking all mothers of infants less than 12 months when they initiated breastfeeding.

**The use of 24-hour recall data overestimates the percentage of infants exclusively breastfed.** The exclusive breastfeeding rate should be interpreted as the percent of infants who received only breastmilk in the past 24 hours rather than the percent who have been exclusively breastfed since birth. In the 24 hours before the survey, a mother may have practiced exclusive breastfeeding, but she could have fed her infant other liquids at another point in time. Despite its shortcomings, the advantage of this approach is that it is not subject to recall error because the recall period is limited to the previous 24 hours.

**A single complementary feeding indicator gives an incomplete picture of this complex feeding behavior.** The timely complementary feeding rate—an accepted, standard indicator—reflects general dietary intake of solid and semi-solid foods along with breastmilk during a specified time period. The indicator does not, however, capture factors such as quantity and quality of food, frequency and

timeliness of feeding, food hygiene, and feeding during/after illness. LINKAGES worked with USAID, the World Health Organization, and other groups to define and test indicators that would measure these factors.

**Infant feeding questions typically require more interviewer time and training than “yes” or “no” questions.** Interviewers must ask respondents about a series of foods given within the previous 24 hours to calculate exclusive breastfeeding and timely complementary feeding rates. In recall questions, foods should be grouped into major categories to minimize interviewer fatigue and interviewee boredom with a long, detailed list of foods. Interviewers should undergo intensive training on infant feeding questions related to infant food groups.

**The LAM Rate does not report on appropriate use of the method.** The LAM rate is based on a woman's indication that LAM is deliberately used as a method of family planning. As with other methods of family planning, no determination is made as to whether the woman who states she is using LAM meets the criteria for its use or can identify on her own the criteria for its use. LINKAGES did, however, capture additional survey data to determine whether a woman knew the criteria and currently used LAM.

**For more information on country data and surveys, visit [www.linkagesproject.org](http://www.linkagesproject.org).**



Experience LINKAGES is a publication by LINKAGES: Breastfeeding, LAM, Related Complementary Feeding, and Maternal Nutrition Program, and was made possible through support provided to the Academy for Educational Development (AED) by the Bureau for Global Health of the United States Agency for International Development (USAID), under the terms of Cooperative Agreement No. HRN-A-00-97-00007-00. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of USAID or AED.

