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Cost and Effectiveness Analysis of the Ndola Demonstration Project in Zambia

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Abstract

This study analyzes the cost and effectiveness of the Ndola Demonstration Project (NDP) in Zambia implemented by LINKAGES (a USAID-funded cooperative agreement managed by the Academy for Educational Development) and its partners, including the Ministry of Health and the Ndola District Health Management Team. The NDP introduced voluntary counseling and testing (VCT) and infant feeding counseling in existing health centers with the goal of preventing mother-to-child transmission (MTCT) of HIV/AIDS. The indicators used to measure effectiveness are: 1) Exclusive breastfeeding (EBF) rate among infants 0-<6 months of age; 2) Timely initiation of breastfeeding (TIBF) rate; 3) Rate of assisted deliveries at a health center (ANC); 4) Percentage of mothers with children aged 0-<6 months who have had an HIV test (VCT); and, 5) Percentage of mothers with children aged 0-<6 months who know that HIV can be transmitted during breastfeeding (HIV/AIDS knowledge). This study found that total LINKAGES and partner costs over the study period were $575,914 or $4.58 per beneficiary. Training activities and monitoring and evaluation were the key cost drivers, accounting for 59% and 35% of total costs, respectively. Differences in cost per new acceptor among the five indicators may be related to the target population, but may also be explained by whether a behavior is easily susceptible to change. The cost per beneficiary to replicate the set of activities targeting TIBF, EBF, ANC, VCT, and HIV/AIDS knowledge is $2.72. Replication costs per new TIBF, and EBF, acceptor are $50 and $104, respectively. LINKAGES may be able to improve its cost effectiveness by expanding its target population. The cost per new EBF acceptor in Zambia was $104, compared with data from Madagascar and Ghana showing cost per new EBF acceptor to be $10 and $34, respectively, and data from Brazil showing cost per new EBF acceptor to be $59. Further analysis of the economies of this package of activities, the economies of scale associated with this type of behavior change, and cost differences of changing different types of behavior would better inform cost effective program design.

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Acronyms

ANC	Antenatal Care
BCC	Behavior Change Communication Program
CBoH	Central Board of Health
DALY	Disability Adjusted Life Year
EBF	Exclusive breastfeeding
DHMT	District Health Management Team
IFC	Infant Feeding Counseling
MOH	Ministry of Health
NGO	Non-governmental organization
NFNC	National Food and Nutrition Commission
PMTCT	Prevention of Mother-To-Child Transmission of HIV
STI	Sexually Transmitted Illness
TIBF	Timely initiation of breastfeeding
TDY	Temporary Duty
USAID	United States Agency for International Development
VCT	Voluntary Counseling and Testing
ZIHP	Zambia Integrated Health Program

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Executive Summary

Introduction

In order to enable women to make informed choices about reducing the risks of HIV transmission to their infants and partners, as well as protecting themselves from future infection, the Zambia Ministry of Health, in collaboration with LINKAGES and its partners, and with the support of USAID, decided to pilot the introduction of voluntary counseling and testing (VCT) and infant feeding counseling (IFC) in existing antenatal care clinics and surrounding communities in an area of high HIV/AIDS prevalence. Ndola district was selected as the pilot site due to its high HIV prevalence rates and strong community mobilization against HIV/AIDS.

LINKAGES and its partners worked closely with the Ndola District Health Management Team (DHMT) to develop the Ndola Demonstration Project (NDP), officially launched in 1999. The aim of the NDP was to test the feasibility, acceptability, and implications of integrating VCT and improved counseling on infant feeding into health and community services. This study focuses on NDP activities during a 13-month period: April 2000 to April 2001. This period represents one of concentrated activities and significant resources focused on PMTCT, which was a new component of HIV/AIDS control in Zambia.

The NDP-based approach to PMTCT aims to increase knowledge of infant feeding options and PMTCT, skills of health providers and counselors, VCT acceptability and use among women and in antenatal care settings, and partner involvement (LINKAGES 2002). The novelty of the NDP approach is the placement of IFC as the centerpiece of the PMTCT intervention and its integration into a comprehensive package of services based in antenatal care settings (Horizons 2002).

LINKAGES does not directly implement interventions in the community but rather provides training, materials, and technical assistance to enable MOH, NGO, the DHMT, and community-level partners to promote and support informed infant feeding and PMTCT practices. These partners have an established presence and network within the communities, and conduct health promotion activities as part of their ongoing activities as health workers or community leaders and volunteers. LINKAGES' interventions enable the partners to promote appropriate IF and PMTCT behaviors more effectively within their ongoing program of activities.

This study was conducted to provide information to USAID and LINKAGES' in-country partners on the costs and cost-effectiveness of the NDP's integrated approach to PMTCT in Zambia. The specific questions of interest are:

- How do the costs and outcomes of the NDP compare?
- What were the key cost drivers in the implementation of the NDP?
- What would it cost to replicate these activities in Zambia and is it cost effective?
- How can LINKAGES improve the cost effectiveness of its infant feeding activities in the context of an integrated PMTCT approach?
- How does the cost effectiveness of NDP interventions in Zambia compare with other infant feeding interventions?

Methodology and Data Collection

The study bases its analysis on costs incurred between April 2000 and 2001, coinciding with the dates of a baseline and midterm household survey, which documents outcomes over this period. At the request of LINKAGES, this study focuses on five key indicators to measure the effectiveness of LINKAGES' behavior change strategy:

1. Exclusive breastfeeding (EBF) rate among infants 0-<6 months of age
2. Timely initiation of breastfeeding (TIBF) rate (breastfeeding initiation within the first hour of birth)
3. Rate of assisted deliveries at a health center (ANC)
4. Percentage of mothers with children aged 0-<6 months who have had an HIV test (VCT rate)
5. Percentage of mothers with children aged 0-<6 months who know that HIV can be transmitted during breastfeeding (HIV/AIDS knowledge)

The full cost of LINKAGES/Zambia activities that support the promotion of targeted behaviors, including allocation of all overhead/fixed costs in Zambia, and all costs managed through LINKAGES' Zambia subcontractor are included in the analysis. Direct costs of the LINKAGES DC office to support the NDP are also included. Indirect costs of the LINKAGES DC office are excluded. The direct costs of local partners are included, but overhead costs are always excluded because infant feeding and PMTCT activities represent a small portion of overall activities and has minimal impact on fixed costs. Household and volunteer costs are not included in this study. Once all the costs are compiled, costs are allocated to achieving behavior change by allocating costs to the full set of LINKAGES/Zambia activities, a subset of which target community level behavior change and are included in this study.

The key indicator used to measure cost effectiveness is the total cost per new acceptor for each of the target behaviors (EBF, TIBF, ANC, VCT, HIV/AIDS knowledge). Two other indicators used are the cost per targeted child, defined as target population for each of the behaviors, and the cost per beneficiary, defined as the total population of the target area. The number of new acceptors is calculated by multiplying change in the rate of the targeted behavior (e.g., the EBF rate) by the total number of children targeted over the period. For example, the cost per new EBF acceptor is expressed in the following formula:

$$\frac{\text{[cost of activities to promote EBF]}}{\text{[target population]} * (\text{[EBF rate-2001]} - \text{[EBF rate-baseline]})}$$

The methodology used in this study was initially developed for similar cost-effectiveness studies of LINKAGES' programs in Ghana and Madagascar. The data from this study will be used to provide complementary and comparative results.

Findings by Specific Research Questions

1. How do costs and outcomes compare during the study period?

There is no clear relationship between costs per beneficiary and outcomes, as measured by the percentage point changes in the five indicators. For example, the cost per beneficiary for TIBF was

$0.69, yielding a 30 percentage point increase in the targeted behavior, while the per beneficiary cost of VCT activities was $1.00, with a corresponding increase of 10 percentage points in the number of new acceptors. This finding suggests that some behaviors are more costly to change than others.

2. What are determinants of costs and cost effectiveness?

The clear cost drivers during this period were training and monitoring and evaluation activities. Costs related to health worker and community trainings, including curriculum development, totaled $338,715, or 59% of total costs, reflecting the early focus on developing the skills and capacity of health workers to provide the NDP service package, which included the introduction of VCT services. Health workers completed a 12-day course covering infant feeding, prevention of HIV/AIDS, VCT, and basic counseling, as well as an intensive 8-week counseling course and practicum. Monitoring and evaluation activities account for over one-third of total costs over the study period.

Across all five of the key indicators, the target population is very small, which means that there is opportunity for achieving economies of scale. The smaller target population for activities related to ANC coupled with the modest behavior change (15%) results in a relatively high cost per new acceptor for ANC. There was little difference in the level of partner participation across NDP activities, with LINKAGES activities representing over 90% of total costs for all activities. The level of partner participation does not appear to be a factor in determining cost effectiveness.

As shown in Table ES1, there was no clear relationship between marginal cost and the cost per new acceptor. Although VCT started at low levels at baseline, it proved difficult to significantly increase the rate of VCT. In fact, this behavior showed the lowest rate of increase, and was the most costly behavior to change. VCT was a new service offered during the study period, and significant resources had to be invested to both educate health workers and community about its potential benefits. These data also show that creating general acceptance of VCT is not an easy or inexpensive task.

Table ES1: Comparison of Baseline and Outcome Behavior Rates and Cost Effectiveness

Indicator	Indicator Baseline Rate	Indicator Outcome Rate	Cost per New Acceptor (US$)
TIBF	53%	83%	$ 79.46
EBF	57%	75%	$ 158.84
ANC	48%	63%	$ 309.62
VCT	5%	15%	$ 358.16
HIV/AIDS Knowledge	67%	82%	$ 200.67

3. What would it cost to replicate these activities in Zambia and is it cost effective?

The cost of replication was calculated by including only the costs of ongoing implementation activities (as start-up costs would not be incurred again, and evaluation costs do not lead to behavior change nor are they included in comparable studies). The cost to implement the full package of LINKAGES' activities was $2.72 per beneficiary – it is not possible to calculate the cost per targeted child because the target populations are not the same for all indicators.

Table ES2 presents the cost effectiveness of promoting each of the target behaviors.

Table ES2: Cost Effectiveness of Promoting TIBF, EBF, ANC, VCT, and HIV/AIDS Knowledge (LINKAGES and Partner Implementation Costs)

	TIBF	EBF	ANC	VCT	HIV/AIDS Knowledge
LINKAGES and Partner Costs (US$)	**$54,047**	**$66,340**	**$71,624**	**$73,322**	**$77,049**
Target Population	3,614	3,614	3,614	2,891	3,614
Percent Difference between Baseline and 2001 RA	30%	18%	15%	10%	18%
Est. Number of New EBF Acceptors	1,092	640	422	351	654
Cost per New EBF Acceptor (US$)	**$49.51**	**$103.69**	**$169.67**	**$209.13**	**$117.77**

The cost per new acceptor ranges from $50 for TIBF to $209 for VCT. These findings raise questions about whether there are economies of scope to be gained from integrating this particular package of interventions – infant feeding and VCT – that is, whether there are savings to be gained from integrating these activities within one program, compared with implementing these activities separately. The findings also highlight the question of whether some behaviors are inherently more difficult and costly to change.

4. How can LINKAGES improve its cost effectiveness?

During the study period, the target population was very small, ranging from 2,891 for antenatal care to 3,614 for the other four indicators (TIBF, EBF, VCT, HIV knowledge), which means that the NDP costs, including in-country and DC support costs, are only spread across a small number of individuals. For some activities, such as training workshops/courses and technical support from the DC office, greater economies of scale may be possible. LINKAGES may be able to lower its costs per acceptor by expanding the program to cover a larger population. Expanding this study to include the time period after NDP expansion would enable further analysis of the impact of the mix of activities and size of the target population on the cost-effectiveness of the NDP approach to PMTCT.

5. Is LINKAGES cost effective compared with other infant feeding interventions?

While infant feeding counseling is the centerpiece of the NDP, the NDP's integrated PMTCT package is considerably different from breastfeeding promotion interventions in other countries, reducing the validity of cost-effectiveness comparisons between the NDP and breastfeeding interventions in other countries. However, the infant feeding components within the NDP appear to be more costly at an average cost per new EBF acceptor of $104, compared with data from Madagascar and Ghana showing cost per new EBF acceptor to be $10 and $34, respectively, and data from Brazil showing cost per new EBF acceptor to be $59. This finding raises the question of whether there are economies of scope to be gained from integrating this particular package of interventions.

Discussion and Conclusions

This study is the third in a series of studies of LINKAGES' interventions in infant feeding and maternal health. Other studies were conducted in Ghana and Madagascar. Together they represent a body of knowledge concerning factors that impact cost effectiveness and how to improve cost effectiveness. Previous studies highlighted further questions related to the impact of the mix of activities, as well as program parameters such as the scale and scope of the program.

The results in Zambia challenged us with a somewhat new question of whether some behaviors are inherently more costly or difficult to change – most notably VCT behavior. The high cost per new acceptor for this behavior compared with other behaviors repeatedly leads us back to this question. The fact that VCT was just introduced during the study period may also explain its higher cost. Understanding the costs of behavior change for different types of behaviors, combined with analysis of how the behavior change translates into health outcomes such as Disability Adjusted Life Years (DALYs), would be extremely useful in overall cost effectiveness analysis. For example, while VCT behavior may be more costly to change, it may still be a cost effective health intervention if it leads to a higher increase in DALYs.

A comparative analysis of the data across Zambia, Madagascar and Ghana is planned for later this year (potentially including analysis of costs per DALY), which may allow examination of some of these questions. Follow-up studies using different study periods would also provide more information on some of these questions.

Given the significant investments in PMTCT programs, it is important conduct analysis of the cost effectiveness of various programs using a common methodology. However, to make comparisons between different programs requires the ability to convert behavioral and other outcomes to a common health impact indicator (such as DALYs) reliably. Absent such conditions, comparisons of cost effectiveness are inexact and each intervention must be assessed on its own merits.

1. Background to the Study

In 1997, the USAID-funded LINKAGES Project was asked by the Zambian Central Board of Health (CBoH) through the National Food and Nutrition Commission (NFNC) to provide technical assistance in developing guidelines for the National Policy on Breastfeeding Practices and HIV/AIDS Transmission from Mother to Child in Zambia. In response to this request, LINKAGES, in collaboration with the CBoH and NFNC, conducted an assessment of existing efforts to prevent mother-to-child transmission (PMTCT) of HIV/AIDS and recommended implementation strategies for PMTCT interventions proposed in the policy guidelines.

The overall objective of the proposed PMTCT interventions was to enable women to make informed choices about reducing the risks of HIV transmission to their infants and partners, as well as protecting themselves from future infection. As a result of the assessment, three key interventions were identified to respond to this objective: the provision of voluntary testing and counseling (VCT) to enable women to know their HIV status, counseling on the relative risks and benefits of different infant feeding behaviors, and follow-up care and support in clinics and communities. Antenatal care clinics were identified as a natural setting for the introduction of these services due to their use by women of reproductive age who might not normally access health services and because women may be more receptive to health information during this period of care (Horizons 2002).

In 1998, the Ministry of Health, the CBoH, and NFNC, in collaboration with LINKAGES, Zambia Integrated Health Program (ZIHP), Hope Humana, and Horizons, and with the support of USAID, decided to pilot the introduction of VCT and infant feeding counseling (IFC) in existing antenatal care clinics and surrounding communities in an area of high HIV/AIDS prevalence. Ndola district was selected as the pilot site due to its high HIV prevalence rates and strong community mobilization against HIV/AIDS. In addition, the Ndola District Health Management Team (DHMT) was already working in the field of HIV/AIDS with the support of government organizations such as the National Voluntary Counseling and Testing Service.

LINKAGES and its partners worked closely with the Ndola DHMT to develop the Ndola Demonstration Project (NDP). The aim of the NDP was to test the feasibility, acceptability, and implications of integrating VCT and improved counseling on infant feeding into health and community services. In 1999, the NDP was officially launched as part of Zambia's national PMTCT efforts. In 2002, the NDP approach to PMTCT was replicated or adapted in other areas of the country, including northern Ndola District, in Mtendere clinic in Lusaka district, and in Kabwe and Livingstone districts. This study focuses on NDP activities during a 13-month period: April 2000 to April 2001. This period represents one of concentrated activities focused on PMTCT, which was a new focus for HIV/AIDS control in Zambia. Significant resources were focused on this aspect of HIV/AIDS control, as evident in the study findings.

The NDP-based approach to PMTCT aims to increase knowledge of infant feeding options and PMTCT, skills of health providers and counselors, VCT acceptability and use among women in antenatal care settings, and partner involvement (LINKAGES 2002). The novelty of the NDP approach is the placement of IFC as the centerpiece of the PMTCT intervention and its integration into a comprehensive package of services based in antenatal care settings (Horizons 2002). At the time of the NDP's development, VCT services were only being provided at the Hope Humana clinic

and at the Ndola Hospital as a component of the blood transfusion process. There were, however, strong community-based care services being provided through the Ndola Dioceses.

The following specific indicators were identified to measure the NDP's impact and achievements:

1. Exclusive breastfeeding (EBF) rate among infants 0-<6 months of age
2. Timely initiation of breastfeeding (TIBF) rate (breastfeeding initiation within the first hour of birth)
3. Rate of assisted deliveries at a health center
4. Level of knowledge about the modes of HIV transmission
5. Rate of use of VCT services among pregnant women

LINKAGES uses a combination of strategies to promote informed and improved infant feeding practices in the integrated, NDP-based approach to PMTCT. These strategies include collaboration with MOH partners, nongovernmental organizations (NGOs), health providers, and community groups/leaders to promote infant feeding in the context of child survival and PMTCT, advocacy and policy development at the national level, and behavior change communication. LINKAGES does not directly implement interventions in the community but rather provides training, materials, and technical assistance to enable MOH, NGO, private sector, and community-level partners to promote and support informed infant feeding and PMTCT practices. Many of these partners have an established presence and network within the communities, and conduct health promotion activities as part of their ongoing activities as health workers or community leaders and volunteers. LINKAGES' interventions enable the partners to promote appropriate IF and PMTCT behaviors more effectively within their ongoing program of activities.

While LINKAGES has been successful in increasing target infant feeding behaviors, USAID and other stakeholders are increasingly interested in the cost of these interventions relative to results. LINKAGES requested Abt Associates to conduct a cost and effectiveness analysis of the NDP in Zambia. This study represents the third of a three-study series on the cost effectiveness of LINKAGES' interventions in select countries. Studies of the cost-effectiveness of LINKAGES' programs in Ghana and Madagascar were completed in 2002 and 2004, respectively.

2. Objectives of the Study

This study was conducted to provide information to USAID and LINKAGES' in-country partners on the costs and cost-effectiveness of the NDP's integrated approach to PMTCT in Zambia. The main objective is to analyze the cost-effectiveness of NDP activities in Zambia from April 2000 – April 2001. The results of this study are presented in many different ways to respond to the interests of different readers of this report. For example, USAID may be more interested in the cost effectiveness of its funding through LINKAGES, while the Zambian MOH may wish to see the total costs borne by various levels of the health system. Depending on their objectives, different readers will be interested in analysis performed in somewhat different ways. While all the data analysis adheres to the methodology described in Section 4, costs are disaggregated in various ways to answer different questions. The specific questions of interest are:

- How do the costs and outcomes of the NDP compare?
- What were the key cost drivers in the implementation of the NDP?
- What would it cost to replicate these activities in Zambia and is it cost effective?
- How can LINKAGES improve the cost effectiveness of its infant feeding activities in the context of an integrated PMTCT approach?
- How does the cost effectiveness of NDP interventions in Zambia compare with other infant feeding interventions?

As detailed in the findings section, the data collected aimed to answer these questions, but drawing conclusions in other areas will require further study.

3. Description of LINKAGES and Partner Activities

LINKAGES has been working in Zambia since 1997 to "enable women to make and act effectively on informed choice to feed their infants optimally in the context of high HIV prevalence" (LINKAGES 2002). From 1997 to mid-1998, LINKAGES worked closely with the CBoH through the NFNC to develop guidelines and implementation strategies for the National Policy on Breastfeeding Practices and HIV/AIDS Transmission from Mother to Child. This effort resulted in the decision to pilot an integrated, comprehensive approach to PMTCT, with infant feeding as its centerpiece, in antenatal clinic settings and surrounding communities in Ndola district. This pilot, conducted between 1999 and 2002, is referred to as the Ndola Demonstration Project (NDP).

From mid-1998 to 1999, LINKAGES worked closely with the Ndola Health Management Team (DHMT) and other partners, including the MOH, NFNC, Hope Humana, Horizons, and ZIPH to design the NDP intervention package. During this period, formative research was conducted to examine current feeding practices, identify appropriate replacement feeding methods, and to assess the feasibility and acceptability of infant feeding counseling and the introduction of VCT services in antenatal and community settings. The findings of the formative research were used to design the intervention package, training strategies and curricula, BCC, and monitoring and evaluation tools.

The NDP enhanced the antenatal care package at six DHMT health centers in Ndola: Lubuto, New Masala, Twapia, Mushili, Kaloko, and Kabushi. The NDP intervention package included:

- Infant feeding counseling, the content of which varied depending on whether a woman decided to undergo an HIV test and the results of that test
- Promoting exclusive breastfeeding for women who are HIV-negative or whose status is unknown
- VCT and counseling services in antenatal clinics
- Improving the capacity of communities to provide counseling and support services

Officially launched in 1999, the NDP was developed at a time when women did not have access to short-course antiretroviral drugs (ARVs), such as nevirapine or AZT. At the same time PMTCT was recognized as an important component of HIV/AIDS control, and significant resources were provided for PMTCT activities. In 2001/2002, the NDP integrated PMTCT approach was adapted to include ARVs in the intervention package and expanded to other areas within Ndola district and to other districts.

From 2000-2002, LINKAGES worked closely with its MOH, NGO, and other partners to implement, strengthen, and evaluate the NDP. This study focuses on the period from April 2000 to April 2001, the dates of the baseline and mid-term surveys used to evaluate the impact of the NDP. This period follows the formative research phase of the NDP and coincides with what could be considered the first phase of implementation of the NDP. A detailed explanation of the activities of each of the key NDP partners during the twelve-month study period is provided below.

3.1. LINKAGES Activities during the study period

During the study period, LINKAGES continued to participate in national policy and advocacy activities related to infant feeding. However, the vast majority of LINKAGES' activities during the

study period were focused on the NDP, including the training of health workers and community members in Ndola, infrastructure and service improvements at NDP clinics, and monitoring and evaluation.

As stated above, LINKAGES does not implement activities directly at the health center or community level, but instead strengthens the capacity of it local partners, who have community level networks, to promote improved health behaviors. In this vein, LINKAGES' core activities during the study period included developing training strategies and training curricula and conducting training workshops for health care and community service providers. Training activities were extensive in terms of the duration of training and the number of participants.

For health providers, including district health officials, LINKAGES and its partners designed the following three courses:

- **12-day Integrated Infant Feeding Course.** This course for health workers (referred to as the "Basic" course) includes 2 weeks of classroom sessions that cover a wide range of topics, including breastfeeding physiology and practices, maternal and infant nutrition, infant feeding options in the context of HIV/AIDS, the epidemiology and prevention of HIV/AIDS, STIs, HIV testing, VCT, and basic counseling. The course also includes a practicum during which participants visit the postnatal ward in a local clinic to observe breastfeeding practices, and a practicum to prepare replacement foods;
- **6-day Training of Trainers (TOT) Workshop.** The TOT workshop is designed to qualify previous participants of the 12-day health workers' course to conduct trainings in health facilities and communities. During the study period, participants in the TOT workshop included DHMT members and health workers from MOH and private/NGO clinics.
- **8-week Psychosocial Counseling Course and Practicum**. The psychosocial counseling course provides training in pre- and post-HIV counseling, including antenatal care, infant feeding, and HIV prevention. The course includes two weeks in the classroom, followed by a five-week practicum and a final week back in the classroom. During the practicum, participants practice counseling in a clinic setting, usually seeing five or more patients during the practicum period.

Community members (volunteers) are also trained to be community service providers. A slightly modified version of the 12-day basic and counseling courses for health workers, as well as on-the-job mentoring, are offered to members of local associations, women's groups, community health workers, traditional birth attendants and healers, growth monitors, and people living with HIV/AIDS. For both the health worker and community training courses and workshops, participants' are taught how to integrate BCC methods in their health service activities.

Table 1 summarizes the range of facilitated training activities during the study period. As can be seen, the trainings were all off-site and lasted one to eight weeks.

Table 1: Summary of LINKAGES Training Activities During Study Period

Training	Target Audience	Duration	Venue	No. of Trainings in Study Period	Total Participants Trained
Integrated Infant feeding	Health workers	12 days	Savoy Hotel, Ndola	4	91
Training of Trainers	Health workers who would become trainers	6 days	Savoy Hotel, Ndola	1	19
Psychosocial Counseling & Practicum	Health workers	2 weeks in class with 5 week practicum and a 3rd week in class	Savoy Hotel, Ndola	2	41
Community Integrated course	Community members (volunteers)	12 days	Savoy Hotel, Ndola	1	24

In addition to health worker and community training activities carried out during the study period, LINKAGES staff provided overall NDP coordination support and technical assistance to the Ndola DHMT to manage and oversee NDP-related clinic and community health services. LINKAGES also provided financial support for infrastructure and other upgrades to the Lubuto clinic, including a laboratory for VCT, a counseling room, and an expanded waiting room area within the antenatal care ward.

Lastly, in collaboration with Horizons and other partners, LINKAGES participated in the design and implementation of monitoring and evaluation activities during the study period. The main activities were the baseline household survey conducted in April 2000 prior to implementation of the NDP and the mid-term survey conducted in April 2001.

3.2. Partner Activities

As mentioned above, LINKAGES relies on its various partners to promote targeted behaviors at the community level. During the study period, LINKAGES worked closely with Hope Humana, MOH (including the NFNC, Ndola DHMT, and health center staff), ZIHP, and the Horizons Project.

3.2.1. Hope Humana

Hope Humana People to People ("Hope Humana") was established as an NGO in Ndola in December 1996. Hope Humana provides health and support services, including VCT, to various communities in Ndola, including people living with HIV and AIDS. From April 2000 – September 2001, Hope Humana, under a subcontract with LINKAGES, assisted LINKAGES in organizing and implementing many of the training courses and workshops conducted under the NDP, with support from LINKAGES staff. In addition, Hope Humana provided the equivalent of one full-time counselor and a lab technician to provide initial VCT services and to mentor newly trained staff at NDP clinics. Hope Humana was also tasked with overseeing the LINKAGES-funded renovations of the Lubuto clinic.

3.2.2. Ministry of Health (Central Board of Health, National Food and Nutrition Commission and Ndola District Health Management Team)

The role of the CBoH during the design and implementation phases of the NDP was primarily to ensure that the project adhered to broader health sector reform strategies. The National Voluntary Counseling and Testing Service, however, provided HIV test kits and related supplies including gloves and pipettes to the NDP.

LINKAGES worked closely with the NFNC to develop nutrition and PMTC policies and guidelines and to design the NDP. The NFNC assisted in the formative research conducted prior to implementation of the NDP, the development of training strategies and curricula, and the review of monitoring and evaluation tools. During the study period, a NFNC representative participated in many of the Ndola training workshops and courses. More generally, the NFNC served as a key conduit between LINKAGES and the MOH and CBoH throughout the NDP design and implementation process.

The primary role of the Ndola DHMT during the study period was to oversee all NDP service provision activities, including supervising staff at NDP clinics and monitoring activities ranging from infant feeding counseling and VCT to health education talks at the clinics. MOH staff at the six NDP clinics were responsible for providing all antenatal care, infant feeding counseling, VCT services, and health education activities included in the NDP intervention package. At most clinics, two or more health education talks on various infant feeding and PMTCT subjects were held every week in the antenatal wing of the clinic.

3.2.3. Horizons Program

The Horizons Program, implemented by the Population Council, was responsible for operations research and monitoring and evaluation (M&E) components of the NDP. During the study period, Horizons, in collaboration with LINKAGES and other NDP partners, designed, implemented, and analyzed the baseline and midterm households conducted in 2000 and 2001, respectively. To support their M&E activities, Horizons paid for a DHMT member to devote 50 percent of their time to NDP M&E activities, and also seconded a local staff person to the Ndola DHMT to collect and manage NDP data produced at the health center level. In addition, Horizons provided equipment and supplies to the Ndola DHMT to support M&E activities.

3.2.4. Zambia Integrated Health Project (ZIHP)

During the study period, the service delivery component of ZIPH, whose mandate focuses on community health services, provided financing and support for three NDP community trainings: a community Basic course, a community counseling course, and a mother/father support group training without group facilitation.

3.2.5. Community-level partners

A key component of NDP's approach to PMTCT is building the capacity of and utilizing community-based volunteers to disseminate key messages, assist women in adopting improved health behaviors, and to provide HIV/AIDS counseling and support services for community members. During the study period, community volunteers participated in the 12-day basic and counseling courses. Community volunteers were selected due to their leadership or involvement in community health services and/or

because they were well-respected members of the community. These volunteers were then expected to provide health education, counseling, and/or support services within their communities.

4. Methodology

The period examined in this study is April 2000 through April 2001. This period was selected to coincide with the LINKAGES' baseline and midterm household surveys conducted at the beginning and end of this period. A comparison of the results of these two surveys provides documentation of activity outcomes during the study period.

LINKAGES requested that this cost effectiveness study focus on five NDP key indicators to measure changes in infant feeding and PMTCT behaviors during the study period:

1. Exclusive breastfeeding (EBF) rate among infants 0-<6 months of age
2. Timely initiation of breastfeeding (TIBF) rate (breastfeeding initiation within the first hour of birth)
3. Rate of assisted deliveries at a health center (ANC)
4. Percentage of mothers with children aged 0-<6 months who have had an HIV test (VCT)
5. Percentage of mothers with children aged 0-<6 months who know that HIV can be transmitted during breastfeeding (HIV knowledge)

4.1. Types of Costs Included in the Analysis

LINKAGES support in the development, implementation, and evaluation of the NDP incurred costs at the LINKAGES/Zambia office, at LINKAGES' headquarters in Washington, DC, and through its subcontract with Hope Humana. This study considers all of these costs.

All field costs incurred during the study period to support and implement the NDP are included in this analysis. This includes the allocation of all overhead/fixed costs (office administration, rent, office equipment, etc.) associated with the LINKAGES/Zambia offices in Lusaka and Ndola.

Direct costs of the LINKAGES/DC office support to the NDP during the study period are also included. Indirect costs of LINKAGES/DC (including DC office rent, accounting, financial management and billing, contracts management, etc.) are not included. This is in part because the overhead costs related to LINKAGES/DC and the LINKAGES contractor would not be incurred in replication in-country. Further, the administrative and overhead structure exists for a wide array of activities, and does not vary based on community-based infant feeding and PMTCT activities in Zambia.

Partner costs related to NDP activities are also included. Examples of these costs are staff time, costs of training workshops, and per diem and transportation for supervision. Partner overhead/fixed costs are excluded because NDP activities represent a very small portion of their overall activities, and have minimal impact on their fixed costs, whether analysis is of cost effectiveness or replication costs.

Household or volunteer costs are not included in this study for several reasons – volunteers had worked in communities prior to LINKAGES interventions, the costs of volunteer time are not incurred costs, and the opportunity cost of the volunteers would have minimal impact on overall cost effectiveness. Table 2 summarizes the types of costs included in this analysis.

Table 2: Types of Costs Included in Analysis

Partner	Costs Included	Costs Excluded
LINKAGES/DC	• Direct costs – TDY costs, consultancies, technical and other support to Zambia, etc	• Indirect costs of the DC office are excluded for analysis of the costs of replicating activities (DC office rent, financial and contracts management, etc)
LINKAGES/Zambia	• Direct costs – cost of staff, training workshops, development of materials, monitoring and evaluation, etc. • Indirect costs – cost of Zambia offices in Lusaka and Ndola (rent, utilities, support staff, administration) • Office vehicle and office equipment purchase during the study period.	• Cost of some office equipment purchased prior to the study period
Partners	• Direct costs – cost of staff, training workshops, supervision, community mobilization activities, monitoring and evaluation, etc.	• Indirect costs – administration exists primarily for other activities • Volunteer costs – not incurred costs, and would have little overall impact on analysis

4.2. Allocation of Costs to Activities

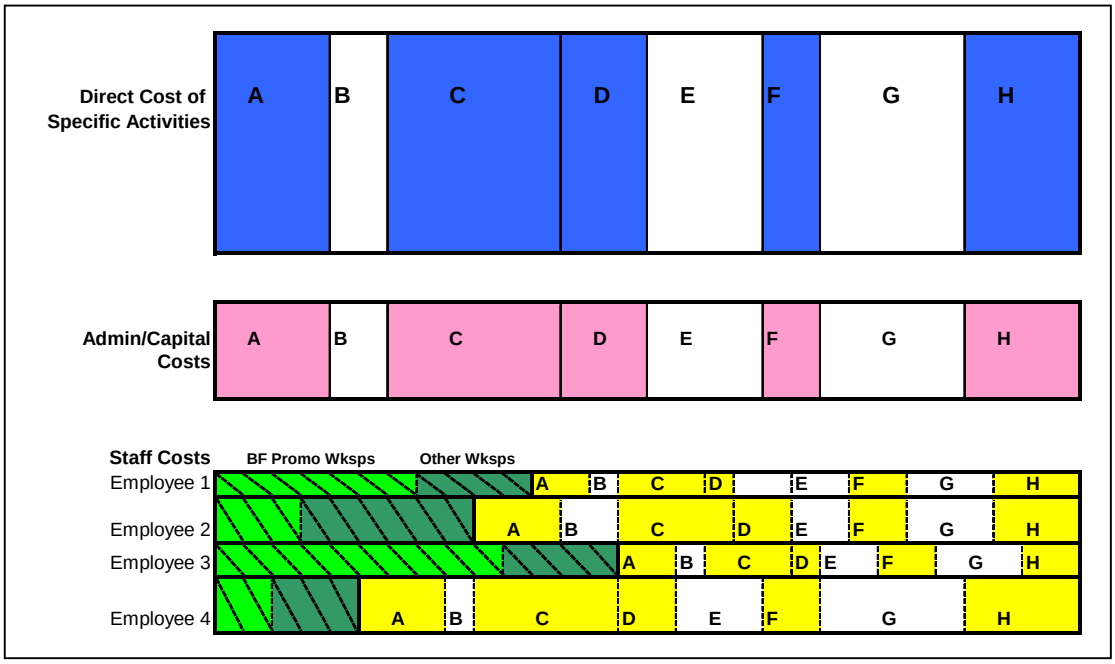
During the study period, LINKAGES/Zambia conducted a variety of activities to support the NDP at the Washington, DC headquarters level, as well as in Zambia at the national and district/community level. Each activity that took place during the study period was reviewed with consideration of its objectives and content, and a subset of activities was designated as ones supporting informed infant feeding and PMTCT practices at the community level. The direct costs for each activity (community level infant feeding/PMTCT and other activities) were compiled (see Annex A for a list of all LINKAGES activities, specifying whether the activity costs were included in this study). Overhead and administrative costs were pro-rated across all activities based on the direct cost of each activity. A one-year estimate of the capital costs was calculated based on useful life, and then pro-rated across all activities based on the direct cost of each activity. In many cases, data on actual staff time spent by activity was not available, so unspecified time spent by LINKAGES/Zambia staff costs was allocated pro-rata across all activities based on the direct cost of the activity.

LINKAGES/DC costs were allocated to specific activities where appropriate (consultancies, monitoring and evaluation, etc). Non-specific support costs were pro-rated across all LINKAGES/Zambia activities based on the direct cost of the activity. Thus, all costs incurred during the study period were allocated to the full set of LINKAGES' activities, a subset of which is included in this study.

Costs for partner activities were calculated in a similar way. Descriptions of activities were collected through interviews with partners (NFNC, Hope Humana, district-level MOH and former Horizons personnel, and health facility staff). Data on the direct cost of each activity were collected. Activities included training workshops, supervision, and monitoring and evaluation. Where possible, staff cost was allocated based on actual time spent in support of specific NDP activities. Staff time not directly attributable to workshops was allocated across activities based on the direct cost of the activity.

Figure 1 shows an illustrative allocation of LINKAGES costs. The top rectangle represents all of the direct costs of LINKAGES activities A, B, C, etc. A subset of these activities is included in this study, as indicated in blue. The second rectangle represents all of LINKAGES' administrative costs, and their allocation to each of the activities. The bottom rectangle represents LINKAGES staff costs, of which the portion in green is attributable to specific activities. The remaining staff cost is then allocated across all activities.

Figure 1: Allocation of LINKAGES' Costs



4.3. Use of Household Surveys to Measure Outcomes

The measure of effectiveness used in this study is based on the findings of the baseline and mid-term household surveys conducted in the target populations of the 6 NDP clinics in April 2000 and April 2001. Two household surveys were administered: (1) a survey of mothers of infants less than six months old and (2) a general community survey of men and women 15 years or older. To measure changes in the indicators used in this study, only data from the community mothers survey was used.

For the community mothers survey, 209 mothers of infants less than six months old were interviewed for the baseline survey and 328 mothers were interviewed for the midterm survey. It should be noted that the sampling methods differed between the two surveys due to the desired increase in sample size for the April 2001 survey (Horizons 2002).

Table 3: Key Indicators – Baseline and Mid-term Data

	2000	2001
TIBF - Initiation of breastfeeding rate within the first hour of birth	53	83
EBF - Exclusive breastfeeding rate among infants 0-<6 months of age	57	75
ANC - Percentage of mothers who deliver at a health center vs. at home or in a hospital	48	63
VCT - Percentage of mothers with children aged 0-<6 months who have had an HIV test	5	15
HIV Knowledge - Percentage of mothers with children aged 0-<6 months who know HIV can be transmitted during breastfeeding	67	85

As the results of the 2001 survey show, there were increases in all indicators during the study period.

4.4. Indicators of Cost Effectiveness

Three measures of cost and effectiveness are used in this study: 1) cost per beneficiary, or cost per capita; 2) cost per targeted child; and, 3) cost per new acceptor. While the first two indicators look at unit costs, only the third indicator compares costs with outcomes. Since the outcome data available was at the behavior change level (not actual health outcomes), it is necessary to develop an indicator that compares costs with behavior change. The indicator used throughout this study to measure cost effectiveness is the cost per new acceptor (EBF, TIBF, ANC, HIV test, HIV knowledge). The number of new acceptors is calculated by multiplying change in the rate of the targeted behavior (e.g., the EBF rate) by the total number of children targeted over the period. As an example, the indicator of the cost effectiveness of promoting EBF in each district is expressed in the following formula:

$$\frac{\text{[cost of activities to promote EBF]}}{\text{[target population]} * (\text{[EBF rate-2001]} - \text{[EBF rate-baseline]})}$$

The denominator, the difference in EBF rate between April 2001 and the baseline household survey multiplied by the target population, represents the number of new acceptors, or people whose behavior has changed as a result of the breastfeeding promotion interventions. The cost of activities to promote EBF is divided by the estimated number of new acceptors, providing a measure of the costs incurred per new acceptor to obtain the desired behavior change. A similar formula is applied with 2001 and baseline household survey rates for the other four indicators to measure the cost effectiveness of promoting informed infant feeding and PMTCT behaviors.

4.5. Comparability and Applicability of this Study

There have been few studies of the cost effectiveness of breastfeeding and PMTCT interventions in developing countries, and no studies of programs that are similar to LINKAGES' model of targeting rural areas and acting solely as a catalyst or facilitator for desired behavior change. It is therefore difficult to provide results that are directly comparable with other studies of breastfeeding programs, although this study attempts a rough, indicative comparison. This study does not address the question of whether LINKAGES' interventions are more or less cost effective than other child survival

interventions. However, the methodology developed can be used to analyze other breastfeeding and child survival interventions and is applicable across LINKAGES' program countries.

4.6. Limitations of this Study

As detailed earlier, the measures of cost effectiveness are based solely on a comparison of the results of the 2000 (baseline) and 2001 midterm household survey data. These measures are accurate to the extent that the rates of TIBF, EBF, ANC, VCT, and HIV knowledge estimated through these two surveys accurately represent changes in behaviors and knowledge in LINKAGES' target districts. Because the cost effectiveness analysis is conducted over a limited, one-year time period, the results may not be representative of cost effectiveness over a longer time period. Interventions may become more efficient (increasing cost effectiveness) or it may be increasingly difficult to sustain high rates of the targeted behaviors (reducing cost effectiveness). As noted earlier, in the case of the NDP, the intervention package changed after the study period to include ARVs, which could have an impact on cost effectiveness as well. This issue may be explored in a second phase of this study that focuses on the expansion sites of the country program.

The measures of cost effectiveness also depend heavily on the allocation of costs of activities to the different behaviors targeted with each activity. Allocation of cost to each targeted behavior, as discussed in Section 4.3, is based on quantitative data (wherever possible) of the time and other resources devoted to different behaviors. This allocation method, however, does not necessarily capture differences between what is required to encourage "one-time" behaviors (such as TIBF), versus "continuous" behaviors (such as EBF), versus behaviors that may be more difficult to adopt from a psychosocial perspective (VCT). To the extent that the findings show significant differences in cost per new acceptor, we see that some behaviors are harder and more costly to change or sustain than others.

4.7. Costing Terminology

There is a common terminology that is often used to describe different types of costs. This sub-section reviews the common costing terminology and explains some of the terms used within this report to prevent any confusion in terminology.

Costs are often categorized into fixed and variable costs, or capital and operating costs. Fixed costs are costs that do not vary with the volume of output (in this case the target population, or the number of children changing behavior), while variable costs do vary with output. Capital costs refer to costs of goods that have a useful life of more than one year (such as equipment or vehicles), while operating costs refer to items that have a useful life of under one year (such as supplies, radio broadcasts). Capital costs generally involve payment for some good that maintains value to the owner. Categorizing costs in these ways can serve many purposes, including analysis of pricing, cost control, profit maximization, and budget planning.

Categorizing costs in this manner has limited applicability to the questions addressed in this study – all costs are included in this study, and are allocated to activities as described earlier in this section. Another cost-related term often used is *marginal cost*. Marginal cost refers to the additional cost to produce one additional unit of output. This study does not seek to analyze the marginal cost of reaching each additional child – this intervention is not a standard production or service delivery one,

where the marginal cost is related to capacity and variable costs. Analysis of marginal cost goes beyond costing and would require data on the rate of behavior change, given varying baseline behavior rates, and varying levels of intervention.

Two economic terms that are used throughout this study are *economies of scale* and *economies of scope*. Economies of scale refers to savings that can be gained by increasing the volume of output, which in this context refers to the total population covered. There are economies if fixed costs can be spread over a larger population, thus lowering the average cost per person targeted. Economies of scope refers to savings that can be gained by increasing the types of outputs. One health delivery example might be providing immunization and baby-weighing services at the same time in the same facility – the cost of each service is lower than if they were provided separately. Both these concepts are important in understanding how to improve cost effectiveness.

Lastly, one of the key measures of cost effectiveness used in this report is the "cost per new acceptor." This term refers to the *total* costs incurred per child that is induced to change behavior – it does not refer to marginal cost, which is the *additional* cost incurred per additional child changing behavior.

5. Data Collection

Data collection for this study occurred in two phases. The first phase of data collection and analysis took place in Washington, DC from August – October 2003. The second phase of data collection was conducted in Zambia in November 2003, with limited follow-up clarification thereafter.

5.1. LINKAGES' Costs

Data on LINKAGES' costs were collected from records kept in the LINKAGES DC and Zambia offices. The costs paid directly by the DC office include costs related to the resident advisor, technical support from DC-based staff, costs for consultancies to support in-country activities, and activities subcontracted to Hope Humana. Other costs related to the Zambia program are general DC-based management, administrative, and support costs.

During the study period, costs to support activities in country were paid by the DC office through its subcontract with Hope Humana or directly by the LINKAGES office in Lusaka. In cases where the Lusaka office paid directly for activities, detailed cost information for the study period was readily available in the monthly financial ledgers produced by the Lusaka office. Most of these financial ledgers were available at the DC office, but additional cost information was also collected from the accountant in the LINKAGES/Zambia office during the November data collection period. Cost data was disaggregated by specific activities (such as the cost for a training on a line item basis), and for overhead costs (such as office equipment and supply expenditures). The data from Zambia were maintained in local currency (Zambian Kwacha) and converted to US dollars using the exchange rate for the month during which the cost was recorded in the financial ledgers in Zambia.

Detailed cost data related to LINKAGES' subcontract with Hope Humana were available at the LINKAGES' DC office. Cost data was disaggregated by specific activities and the specific task orders under which the activity was funded. Data on total costs related to NDP activities were also collected at the LINKAGES DC office.

5.2. Partner Costs

Data on MOH partner costs were collected through interviews with staff at the central, district, and health center level. In addition, program documents and financial data provided by the LINKAGES' offices in DC and Zambia were reviewed. Data were collected on activities conducted, expenditures, and estimates of staff time spent on activities promoting PMTCT behaviors.

At the central level, NFNC staff working on the NDP during the study period were interviewed. At the district level, interviews were conducted with DHMT members to determine staff time spent on NDP trainings, planning and reporting on NDP-related activities, and integrated supervision visits to the six NDP health clinics. At the health facility level, interviews were conducted with health staff to determine the amount of staff time spent discussing specific NDP-related topics during various types of consultations, during health education talks, and during integrated supervisions conducted by the DHMT. As such, much of the data on MOH staff costs are based on recall of activities implemented, estimates of staff time commitments, and estimates of activity costs from the study period. Although

several staff provided written estimates of costs, no historical documents (expense reports, budgets, etc.) were available verifying the cost estimates.

Data on costs incurred by ZIHP were gathered previously by LINKAGES/DC staff based on financial information provided by the ZIHP office in Lusaka. The cost of local staff paid for by Horizons to support NDP activities was gathered through an interview with one former Horizons staff person and the former DHMT Director. The study team was not able to collect cost data related to time spent by DC and Nairobi-based Horizons staff on monitoring and evaluation activities.

5.3. Data Limitations

Given the nature of a retrospective study, data access was not easy, particularly with some of the partners. Sometimes data required adjustment for use in this study. In some cases, data could not be reconciled across several sources, and a judgment was made to use available data from the source or sources deemed more reliable. With the exception of health education talks focused on infant feeding, there was no quantitative data regarding health facility staff time dedicated to breastfeeding activities, so calculations of staff time costs are based on staff recall of estimated time spent on activities.

6. Findings

The findings presented are organized along each of the study questions:

- How do costs and outcomes compare?
- What are the determinants of costs and cost effectiveness?
- What would it cost to replicate these activities in Zambia and is it cost effective?
- How can LINKAGES improve its cost effectiveness?
- How does the cost effectiveness of the NDP interventions in Zambia compare with other infant and young child feeding interventions?

Selected information is shown in the sections below to address the questions of interest. Annex B includes detailed cost data for LINKAGES and its partners.

6.1. How Do Costs and Outcomes Compare During the Study Period?

> ***Overall Finding****: Total LINKAGES and partner costs over the study period were $575,914, or $4.58 per beneficiary. The cost of promoting TIBF was lower than each of the other indicators, yet that indicator realized the most significant improvement, suggesting that some behaviors are harder to change than others.*

To answer the question of how costs and outcomes compare during the study period, all costs for LINKAGES Zambia and DC based activities and partner activities to promote the five target indicators are included.

6.1.1. LINKAGES' and Partner Costs

Table 4 shows total NDP costs incurred by LINKAGES' and LINKAGES' partners during the study period. The total cost of LINKAGES' activities to promote the five key study indicators was $524,717, representing approximately 91 percent of total NDP costs during the study period. LINKAGES' partners incurred costs of $51,197. On a per beneficiary (or per capita) basis, using an average number of beneficiaries over the study period[1], LINKAGES' costs represented $4.18 per beneficiary and partner costs $0.41 per beneficiary.

[1] The beneficiary population is defined as the total population of the NDP program area, which includes the target populations of the six NDP clinics.

Table 4: LINKAGES' Costs Allocated by Indicator

Number of Beneficiaries	125,650[2]			
	LINKAGE COSTS		PARTNER COSTS	
Indicator	Total Cost	Cost Per Beneficiary	Total Cost	Cost Per Beneficiary
TIBF	78,241	0.62	8,495	0.07
EBF	90,278	0.72	11,339	0.09
ANC	121,450	0.97	9,252	0.07
VCT	114,922	0.91	10,652	0.08
HIV/AIDS Knowledge	119,826	0.95	11,459	0.09
TOTAL	**$524,717**	**$4.18**	**$51,197**	**$0.41**

6.1.2. Package of LINKAGES and Partner Interventions Compared with Outcomes

Table 5 presents the total cost of LINKAGES and partner activities compared with the outcomes in each of the key indicators. Total costs were $575,914 and the costs per beneficiary ranged from $0.69 for activities promoting timely introduction of breastfeeding to $1.04 for activities to raise knowledge about the transmission of HIV/AIDS through breastfeeding.

Table 5: Relationship Between Costs and Outcomes (LINKAGES and Partner Costs)

Number of Beneficiaries	125,650		
Indicator	Cost	Per Beneficiary	Pct Point Chg in Indicator
TIBF	86,736	0.69	30%
EBF	101,617	0.81	18%
ANC	130,702	1.04	15%
VCT	125,574	1.00	10%
HIV/AIDS Knowledge	131,285	1.04	18%
TOTAL	**$575,914**	**$4.58**	

Comparing the costs per beneficiary and outcomes, as measured by percentage point changes in the five indicators, there is no clear relationship between costs and outcomes. The total and per beneficiary cost of activities aimed at promoting timely introduction of breastfeeding were lower than costs of activities aimed at other target behaviors, but achieved better outcomes than the more costly activities. This suggests that some behaviors are more costly to change than others.

[2] The total number of beneficiaries increased from 124,942 in 2000 to 126,358 in 2001.

6.2. What are Determinants of Costs and Cost Effectiveness?

> ***Overall Finding****: Training activities and monitoring and evaluation were the key cost drivers, accounting for 59% and 35% of total costs, respectively. Differences in cost per new acceptor among the five indicators may be related to the target population, but may also be explained by whether a behavior is easily susceptible to change.*

Higher total cost or cost per beneficiary does not necessarily imply lower or higher cost effectiveness (defined as cost per new acceptor). Many factors affect total costs and cost effectiveness. Costs are disaggregated in a variety of ways to examine patterns among different types of costs, and factors that affect cost effectiveness.

6.2.1. Key Cost Drivers

Table 6 presents the cost of each NDP activity during the study period. The clear cost drivers during this period were training and monitoring and evaluation activities. Costs related to health worker and community trainings, including curriculum development, totaled $338,715, or 59% of total costs. The majority of training costs (78%) were spent on health worker training courses. This reflects the early focus of the NDP on developing the skills and capacity of health workers to provide the NDP service package, which included the introduction of new VCT services. Health workers completed a 12-day course covering infant feeding, prevention of HIV/AIDS, VCT, and basic counseling, as well as an intensive 8-week counseling course and practicum.

Monitoring and evaluation activities account for over one-third of total costs over the study period. These activities include the design and implementation of the baseline and midterm household and provider surveys, in partnership with Horizons, as well as routine data collection to monitor the progress of the NDP. In addition to in-country costs, monitoring and evaluation costs were also incurred at the LINKAGES/DC office for the technical assistance provided by DC-based monitoring and evaluation experts.[3]

It should be noted that the costs of renovating the Lubuto clinic presented in Table 6 ($7,725) represents a one-year estimate of these capital costs, based on an estimated 20-year useful life for the structural additions and lab facility.

[3] The costs of time spent by Horizons staff based in Horizons' DC or Nairobi office are not included in monitoring and evaluation cost figures, but the direct costs of local Horizons staff are included.

Table 6: Cost By Activity (LINKAGES and Partner Costs)

Activity	Cost	As % of Total Cost	Cost per Beneficiary
Orientation/Consensus Building Activities	10,322	2%	0.08
Curriculum Development	20,819	4%	0.17
HW Basic Course	60,569	11%	0.48
HW Counseling Course	163,227	28%	1.30
HW Supervision/On-the-job Training	20,685	4%	0.16
HW TOT - Basic Course	19,616	3%	0.16
Clinic Structure Upgrades	7,725	1%	0.06
Community Basic Course	17,451	3%	0.14
Community Counseling Course	36,347	6%	0.29
BFHI	8,045	1%	0.06
M&E Activities	202,391	35%	1.61
Services & Sensitization (HC level)	8,266	1%	0.07
Admin/Management/Supervision	450	1%	0.003
TOTAL	**$575,913**	**100%**	**$4.58**

6.2.2. Cost Effectiveness of the NDP

As noted previously, the indicator used to measure cost-effectiveness in this study is cost per new acceptor of a desired behavior change (in the case of TIBF, EBF, ANC, VCT) or related information (in the case of the HIV knowledge indicator). Table 7 shows the breakdown between LINKAGES and partner costs allocated to the five study indicators, compared with the cost per new acceptor. The cost per new acceptor ranged from $79 for timely introduction of breastfeeding (TIBF) to $358 for each new VCT acceptor. Table 7 also presents various factors that can impact cost effectiveness, including total cost, the size of the target population, changes in outcome indicators, and partner inputs. It is often not one factor that explains the cost effectiveness of an intervention, but the interaction between all of these factors.

Table 7: Comparison of LINKAGES and Partner Cost Breakdown and Cost Effectiveness

Indicator	Cost	Target Population	Percent Change in Indicator	Number of New Acceptors	LINKAGES Cost as % of Total	Cost per New Acceptor (US$)
TIBF	86,736	3,614	30%	1,092	90%	$ 79.46
EBF	101,617	3,614	18%	640	89%	$ 158.84
ANC	130,702	2,891	15%	422	93%	$ 309.62
VCT	125,574	3,614	10%	351	91%	$ 358.16
HIV/AIDS Knowledge	131,285	3,614	18%	654	91%	$ 200.67

While there is some variation in the total costs of activities aimed at the five indicators, total costs alone do not explain the significant differences in cost effectiveness ratios across the indicators. For example, there is minimal difference in the total costs related to the ANC, VCT, and HIV knowledge indicators, yet the corresponding cost per new acceptor range from $201 to $358.

Also shown in Table 7, there is almost no variation in the target population for the five indicators. For all indicators except the ANC indicator, the target population is defined as women with children aged six months or less during the study period. In the case of the ANC indicator, the target population is only women who were pregnant during the study period. Across all five indicators, the target population is very small, which means that there are few opportunities for achieving economies of scale. The smaller target population for activities related to ANC alone does appear to drive cost effectiveness; however, the smaller target population coupled with the modest behavior change (15%) together produces a relatively high cost per new acceptor for ANC. The combination of a small target population and relatively small changes in targeted behaviors also explains the elevated costs per new acceptor for the other indicators (with the exception of TIBF).

There was little difference in the level of partner participation across NDP activities. LINKAGES activities represented over 90% of total costs for all activities carried out during the study period. Therefore, the level of partner participation does not appear to be a factor in determining cost effectiveness.

6.2.3. Cost Effectiveness and Baseline Rates of Targeted Behaviors

As explained in Section 4.7, marginal cost refers to the additional cost required to produce one additional unit of output. Marginal cost is generally expected to increase as you reach higher behavior rates – that is, it may be more costly to increase EBF from 80% to 90% than it is to increase EBF from 30% to 40%. The data in Zambia, however, does not allow us to reliably analyze the impact of increasing marginal costs, as we cannot separate the effect of differences in baseline behavior rates from the cost differences of changing different behaviors. Table 8 shows the baseline and outcome rates of the five targeted behaviors, together with the cost per new acceptor.

Table 8: Comparison of Baseline and Outcome Behavior Rates and Cost Effectiveness

Indicator	Indicator Baseline Rate	Increase in Outcome Rate	Cost per New Acceptor (US$)
TIBF	53%	30%	$ 79.46
EBF	57%	18%	$ 158.84
ANC	48%	15%	$ 309.62
VCT	5%	10%	$ 358.16
HIV/AIDS Knowledge	67%	18%	$ 200.67

Although VCT started at low levels at baseline, it proved difficult to increase the rate of testing significantly. In fact, this behavior showed the lowest rate of increase, and was the most costly behavior to change. It should be noted that VCT was still a relatively new service during this period, and significant resources had to be invested to both educate health workers and community about its potential benefits. This data also shows that creating general acceptance of VCT is not an easy or inexpensive task, and suggests that some behaviors are more difficult to change than others.

6.3. What Would It Cost to Replicate These Activities in Zambia and Is it Cost Effective?

> ***Overall Finding***: *The cost per beneficiary to replicate the set of activities targeting TIBF, EBF, ANC, VCT, and HIV/AIDS knowledge is $2.72. Replication costs per new TIBF, and EBF, acceptor are $50 and $104, respectively.*

6.3.1. Cost to Replicate Package of LINKAGES and Partner Activities

Even though the design of the Ndola project has changed considerably since the period of this study, we have calculated the replication costs during the study period to understand how this intervention model compares with others. Calculating replication costs is also useful for comparison with LINKAGES interventions in other countries, and other cost effectiveness studies.

To calculate replication costs, activities in Zambia were classified as start-up/development activities, ongoing implementation activities, or monitoring and evaluation activities. Development activities are one-time activities that would not be replicated, such as consensus building workshops. Implementation activities are an ongoing part of the program and include training workshops, Baby-Friendly Hospitals, etc. Monitoring and evaluation activities are aimed only at assessing outcomes from the interventions. Table 9 shows the classification of all community-level behavior change activities conducted by LINKAGES and its partners.

Table 9: Classification of LINKAGES and Partner Activities April 2000 – April 2001

ACTIVITIES	Start-up, Implementation, or Monitoring/Evaluation
Orientation/Consensus Building Activities	Start-up
Curriculum Development	Start-up
HW Basic Course	Implementation
HW Counseling Course	Implementation
HW Supervision/On-the-job Training	Implementation
HW TOT - Basic Course	Implementation
Clinic Structure Upgrades	Implementation
Community Basic Course	Implementation
Community Counseling Course	Implementation
BFHI	Implementation
M&E Activities	Monitoring/Evaluation
Services & Sensitization (HC level)	Implementation
Admin/Management/Supervision	Implementation

Disaggregating costs associated with implementation activities provides the most accurate estimate of costs of replicating activities in Zambia. Start-up or development costs would not be incurred for replication in country. Implementation costs cover the ongoing intervention costs such as the cost of training, services, and supervision. Monitoring and evaluation costs are not included as they do not directly produce behavior change and because evaluation costs are not included in other breastfeeding cost effectiveness studies, which are used for comparison.

The costs associated with implementation activities to promote TIBF, EBF, VCT, and HIV/AIDS knowledge are shown in Table 10. These activities all target women with infants less than 6 months old, and can be grouped together to estimate replication costs per child. Total implementation costs for these activities were $270,575, which represents $75 per targeted child and $2.15 per beneficiary.

Table 10: Costs of Replicating TIBF, EBF, VCT, and HIV/AIDS Knowledge Promotion Activities (LINKAGES and Partner Implementation Costs Only)

	Total
LINKAGES Costs (US$)	$232,885
Partner Costs (US$)	$37,902
Total Costs of EBF, TIBF, and LAM Promotion (US$)	**$270,787**
Target Population	3,614
Cost per Child (US$)	**$75**
Total Beneficiaries	125,650
Cost per Beneficiary (US$)	**$2.15**

Table 11 presents the implementation costs for the complete package of LINKAGES' activities aimed at improving all five indicators. Since activities to promote TIBF, EBF, VCT, and HIV/AIDS knowledge have a different target population than activities to promote ANC, it was not possible to estimate the cost per targeted child for the complete package of LINKAGES' activities. However, the cost per beneficiary was calculated at $2.72.

Table 11: Costs of Replicating Total Package of LINKAGES' Activities (LINKAGES and Partner Implementation Costs Only)

	Total
LINKAGES Costs (US$)	$296,575
Partner Costs (US$)	$45,807
Total Costs of Nutrition Promotion Activities (US$)	**$342,382**
Total Beneficiaries	125,650
Cost per Beneficiary (US$)	**$2.72**

It should be made clear that this section examines only the cost of replicating activities in Zambia. It would be inaccurate to apply these data to estimate replication costs in other countries, even ones with similar programs, because of differences in local costs. Further, this study did not include the costs of volunteer time (such as volunteer mother support group leaders or village health workers), since they are generally not formally employed and it is difficult to value their time. If these activities are replicated on a larger scale, volunteer costs could potentially become incurred costs, as paid workers may have to be employed to perform the tasks of the volunteers. Such costs would still have a small impact on overall costs, since the salaries paid would be low relative to other costs.

6.3.2. Cost Effectiveness of Replication

In addition to examining the cost of replicating these activities, we also examine the cost effectiveness of replicating these activities. As in the previous section, the cost of replicating these

activities is limited to implementation costs only. Thus to measure cost effectiveness of replication, total implementation costs are compared with the number of new acceptors of the targeted behaviors (EBF, TIBF, etc), to calculate the implementation cost per new acceptor.

Table 12 presents the cost effectiveness of promoting each of the target behaviors.

Table 12: Cost Effectiveness of Promoting TIBF, EBF, ANC, VCT, and HIV/AIDS Knowledge for Replication (LINKAGES and Partner Implementation Costs)

	TIBF	EBF	ANC	VCT	HIV/AIDS Knowledge
LINKAGES and Partner Costs (US$)	**$54,047**	**$66,340**	**$71,624**	**$73,322**	**$77,049**
Target Population	3,614	3,614	3,614	2,891	3,614
Percent Difference between Baseline and 2001 RA	30%	18%	15%	10%	18%
Est. Number of New EBF Acceptors	1,092	640	422	351	654
Cost per New EBF Acceptor (US$)	**$49.51**	**$103.69**	**$169.67**	**$209.13**	**$117.77**

The cost per new acceptor range from $50 for TIBF to $209 for VCT. As discussed in a later section, the costs per new acceptor are higher than LINKAGES' programs in other countries, which raise questions about whether there are economies of scope for this particular package of interventions – infant feeding integrated with VCT. These data alone do not allow us to draw conclusions about the cost effectiveness of replicating these activities versus other child health interventions, although this methodology could be applied to analyze other interventions for comparison. A follow-on analysis that may allow further conclusions to be drawn on the cost effectiveness of LINKAGES' interventions relative to other child health interventions would be to compare these costs with morbidity or mortality averted or Disability Adjusted Life Years (DALY) gained as a result of behavior changes.

6.4. How Can LINKAGES Improve its Cost Effectiveness?

> ***Overall Finding***: *LINKAGES may be able to improve its cost effectiveness by expanding its target populations. More data and further analysis of the impact of the mix of activities, and the economies of scale associated with this type of behavior change is needed to better inform cost effective program design.*

Due to the short study period and the findings presented above, only limited recommendations can be made regarding how to improve cost-effectiveness of the NDP. During the study period, the target population for each of the indicators is very small, ranging from 2,891 for antenatal care to 3,614 for the other four indicators (TIBF, EBF, VCT, HIV knowledge). As a result, the costs of NDP activities, including in-country and DC support costs, are only spread across a small number of individuals. For some activities, such as training workshops/courses and technical support from the DC office, greater economies of scale may be possible. In other words, the average cost per individual targeted, and associated behavior changes, may decline as the target population increases.

The NDP model of PMTCT was expanded to other areas within Ndola district, and replicated or adapted in other districts in Zambia, after the study period. Therefore, expanding the time period of this study would enable further analysis of the impact of the mix of activities and size of the target population on the cost-effectiveness of the NDP approach to PMTCT.

6.5. Is LINKAGES Cost Effective Compared with Other Infant Feeding Interventions?

> ***Overall Finding***: *While infant feeding counseling is the centerpiece of the NDP, the NDP's integrated PMTCT package is considerably different from breastfeeding promotion interventions in other countries, reducing the validity of cost-effectiveness comparisons between the NDP and breastfeeding interventions in other countries. However, the infant feeding components within the NDP appear to be more costly at an average cost per new EBF acceptor of $104, compared with data from Madagascar and Ghana showing cost per new EBF acceptor to be $10 and $34, respectively, and data from Brazil showing cost per new EBF acceptor to be $59.*

Other cost effectiveness studies of breastfeeding promotion interventions are limited. Apart from a sister study of LINKAGES' interventions in Madagascar and Ghana, the most notable studies of breastfeeding promotion cost effectiveness – indeed, the only studies available – were a series of studies conducted in 1992-93 in seven hospitals in Brazil, Honduras, and Mexico (funded through the USAID LAC-HNS project). It is difficult to compare the results of the LAC-HNS studies due to differences in the nature of the interventions (hospital- vs. community-based settings and mix of activities) and the nature of the study methodology. Nonetheless, some comparison is useful. Disaggregated data was only available for Brazil, and so detailed comparisons are made with that study only.

The interventions studied under LAC-HNS were very different from Zambia (NDP), Madagascar and Ghana. Those studies included only interventions in hospitals in urban settings. In contrast, the Zambia, Madagascar, and Ghana cost-effectiveness studies included interventions based at health clinics and in communities. In Zambia, the intervention area is an urban area. In Madagascar, the intervention areas are a mix of urban and rural setting, while in Ghana, the intervention areas are among the most remote and least densely populated areas of the country. Because of the scale of the Brazil intervention, and the capacity of persons with direct contact with mothers, the hospitals studied did not use the model of cascading training of trainers, a component that accounts for a large portion of costs in the LINKAGES interventions. The primary costs in the LAC-HNS study hospitals were the costs of staff time for special clinics and individual counseling, the cost of changes in physical space required, and the cost of promotion materials.

The costing methodology and the effectiveness measures used were also very different. The LAC-HNS studies reported aggregate net costs, which took into account savings from breastfeeding (primarily the foregone cost of infant formula). The LAC-HNS studies include only implementation costs and exclude start-up or monitoring and evaluation costs. Hospital overhead and administrative costs were not included in the study. The measure of EBF was also different – in Brazil the EBF measure was based on interview results at a three-month follow-up visit. Thus, it only measures EBF at three months after delivery. The summary data provides only the net cost (after savings from

formula) per additional child breastfeeding. The disaggregated data were available for Brazil, and were adjusted to allow comparison here.

Under various assumptions, the gross cost of breastfeeding promotion per newborn in Brazil at the time of the study ranged from $11.09 to $11.94. The EBF rate in the program hospital was 43%, and was 20% in the control hospital. Based on an average cost per newborn of $11, this translates into a cost per new EBF acceptor of $48 ($11/23%). Applying the total inflation rate (in US dollar terms) of 22.4% between 1992 and 2000, the cost per new EBF accepter in Brazil was $59, in 2000 dollars. In Zambia, the average implementation costs per new EBF acceptor was $104. By comparison, the average implementation cost per new EBF acceptor was $10 in Madagascar and $34 in Ghana.

7. Discussion and Conclusions

7.1. Review of Key Research Questions

Review of the cost data and cost effectiveness ratios allows us to answer some key questions about LINKAGES' work:

- *How do costs and outcomes compare?*
  Total LINKAGES and partner costs over the study period were $575,914 or $4.58 per beneficiary. The cost of promoting TIBF was lower than each of the other indicators, yet that indicator realized the most significant improvement, suggesting that some behaviors are harder to change than others.

- *What are the determinants of costs and cost effectiveness?*
  Training activities and monitoring and evaluation were the key cost drivers, accounting for 59% and 35% of total costs, respectively. Differences in cost per new acceptor among the five indicators may be related to the target population, but may also be explained by whether a behavior is easily susceptible to change.

- *What would it cost to replicate these activities in Zambia and is it cost effective?*
  The cost per beneficiary to replicate the set of activities targeting TIBF, EBF, ANC, VCT, and HIV/AIDS knowledge is $2.72. Replication costs per new TIBF, and EBF, acceptor are $50 and $104, respectively.

- *How can LINKAGES improve its cost effectiveness?*
  LINKAGES may be able to improve its cost effectiveness by expanding its target population. More data and further analysis of the impact of the mix of activities, and the economies of scale associated with this type of behavior change is needed to better inform cost effective program design.

- *How does the cost effectiveness of the interventions in Zambia compare with other infant and young child feeding interventions?*
  While infant feeding counseling is the centerpiece of the NDP, the NDP's integrated PMTCT package is considerably different from breastfeeding promotion interventions in other countries, reducing the validity of cost-effectiveness comparisons between the NDP and breastfeeding interventions in other countries. However, the infant feeding components within the NDP appear to be more costly at an average cost per new EBF acceptor of $104, compared with data from Madagascar and Ghana showing cost per new EBF acceptor to be $10 and $34, respectively, and data from Brazil showing cost per new EBF acceptor to be $59.

7.2. Additional Research Questions

This study is the third in a series of studies of LINKAGES' interventions in infant feeding and maternal health. Other studies were conducted in Ghana and Madagascar. Together they represent a body of knowledge concerning factors that impact cost effectiveness and how to improve cost

effectiveness. Each study also highlights issues that require further investigation. Some questions identified in previous studies were:

- What is the impact of each of the individual activities?
- What is the optimal mix of activities?
- What is the level of input required for specific activities, given program parameters such as target population, population density?
- How does the scale and scope of the program impact cost effectiveness?
- How sustainable is the behavior change (i.e., will the new behavior continue after the activities end, and can the behaviors become cultural norms)?

The Zambia findings highlight the need for greater understanding of the impact of population size, and the scale and scope of the program. The Zambia program is much smaller than either the Ghana or Madagascar programs, and its size appears to be a contributor to its lower cost effectiveness. It is also unclear how the particular package of interventions in Zambia affects cost effectiveness – that is, whether there are economies of scope that may improve cost effectiveness, or whether integrating infant feeding with VCT provides no cost savings or even somehow increases unit costs.

Additionally, this study also identifies another question, which was considered in the other countries, but did not present itself as such a critical question. The results in Zambia challenged us with the question of whether some behaviors are inherently more costly or difficult to change – most notably VCT behavior. The high cost per new acceptor for this behavior compared with other behaviors repeatedly leads us back to this question. The fact that VCT was just introduced during the study period may also explain its higher cost. Understanding the costs of behavior change for different types of behaviors, combined with analysis of how the behavior change correlates with health outcomes such as Disability Adjusted Life Years (DALYs), would be extremely useful in overall cost effectiveness analysis of health interventions. For example, while VCT behavior may be more costly to change, it may still be a cost effective health intervention if it leads to a significant increase in DALYs.

Some of these questions may be addressed by comparing cost effectiveness of LINKAGES' interventions across countries, and by extending the period of study. A comparison of the findings across Zambia, Madagascar and Ghana (potentially including analysis of costs per DALY), and possible follow-up studies using different study periods will help us to analyze some of these questions.

7.3. Implications for the Future

LINKAGES' infant feeding interventions in Zambia appear to be less cost effective than its interventions in other countries. Because we have no comparators, we do not know how its PMTCT results compare with other programs. However, it is unfair to compare Zambia results with those in other countries because the very small program size had a significant negative impact on cost effectiveness. Further, we cannot compare the costs for changing VCT behavior with costs of changing infant feeding behaviors because the behaviors are so different.

Given the significant investments in PMTCT programs, it is important conduct analysis of the cost effectiveness of various programs using a common methodology. However, in order to make

comparisons between different programs requires the ability to convert behavioral and other outcomes to a common health impact indicator (such as DALYs) reliably. Absent such conditions, comparisons of cost effectiveness are inexact and each intervention must be assessed on its own merits.

Annex A: List of All LINKAGES & NDP Activities

ACTIVITIES	Costs Included in this Study
TRAINING WORKSHOPS/COURSES	
Curriculum development	Y
Heath worker 12-day basic course	Y
Heath worker counseling Course	Y
HW Supervision/On-the-job Training	Y
Heath worker TOT - Basic Course	Y
Community 12-day basic course	Y
Community counseling course	Y
RESEARCH	
Formative Research	N
Community Assessment	N
MONITORING & EVALUATION	
Baseline household and provider surveys – April 2000	Y
Mid-term household and provider surveys – April 2002	Y
POLICY AND ADVOCACY	
Orientation/Consensus Building Activities	Y
OTHER ACTIVITIES	Y
Clinic Structure Upgrades	Y
BFHI	Y
Health services & sensitization at health center level	Y
Admin/Management/Supervision at district and health center level	Y

Annex B: Detailed Cost Data

SUMMARY OF LINKAGES AND PARTNER COSTS

all costs in US Dollars

PARTNER/Activity	TIBF	EBF	ANC	VCT-T	VCT-K	Total
LINKAGES						
Orientation/Consensus Building Activities	$ 1,385	$ 1,385	$ 2,771	$ 2,351	$ 2,430	$ 10,322
Curriculum Development	$ 4,189	$ 6,777	$ 2,078	$ 3,691	$ 4,084	$ 20,819
HW Basic Course	$ 13,463	$ 18,564	$ 4,992	$ 10,861	$ 11,808	$ 59,689
HW Counseling Course	$ 21,790	$ 21,790	$ 43,579	$ 36,971	$ 38,216	$ 162,346
HW Supervision/On-the-job Training	$ 2,776	$ 2,776	$ 5,553	$ 4,711	$ 4,869	$ 20,685
HW TOT - Basic Course	$ 4,226	$ 5,827	$ 1,567	$ 3,409	$ 3,706	$ 18,735
Clinic Structure Upgrades	$ -	$ -	$ 2,834	$ 2,405	$ 2,486	$ 7,725
Community Basic Course	$ -	$ -	$ -	$ -	$ -	$ -
Community Counseling Course	$ 2,597	$ 2,597	$ 5,194	$ 4,406	$ 4,555	$ 19,349
BFHI Activities	$ 1,373	$ 4,120	$ -	$ 1,255	$ 1,297	$ 8,045
M&E Activities	$ 26,441	$ 26,441	$ 52,882	$ 44,863	$ 46,374	$ 197,001
TOTAL	**$ 78,241**	**$ 90,278**	**$ 121,450**	**$ 114,922**	**$ 119,826**	**$ 524,717**
MOH						
HW Basic Course	$ 176	$ 176	$ 176	$ 176	$ 176	$ 881
HW Counseling Course	$ 176	$ 176	$ 176	$ 176	$ 176	$ 881
HW TOT - Basic Course	$ 176	$ 176	$ 176	$ 176	$ 176	$ 881
Admin/Management	$ 21	$ 21	$ 125	$ 106	$ 109	$ 381
Services & Sensitization	$ 1,047	$ 2,395	$ 1,202	$ 1,614	$ 2,008	$ 8,266
Supervision	$ 8	$ 12	$ 28	$ 10	$ 12	$ 69
Test kits	$ -	$ -	$ -	$ -	$ 2,038	$ 2,038
TOTAL	**$ 1,604**	**$ 2,956**	**$ 1,882**	**$ 2,258**	**$ 2,658**	**$ 11,358**
ZIPH						
Community Basic Course	$ 3,936	$ 5,428	$ 1,460	$ 3,175	$ 3,452	$ 17,451
Community Counseling Course	$ 2,281	$ 2,281	$ 4,563	$ 3,871	$ 4,001	$ 16,998
TOTAL	**$ 6,218**	**$ 7,709**	**$ 6,022**	**$ 7,046**	**$ 7,454**	**$ 34,449**
HORIZONS						
M&E Activities	674	674	1,348	1,348	1,348	5,390
TOTAL	**674**	**674**	**1,348**	**1,348**	**1,348**	**5,390**
ALL PARTNER COSTS						
HW Basic Course	$ 176	$ 176	$ 176	$ 176	$ 176	$ 881
HW Counseling Course	$ 176	$ 176	$ 176	$ 176	$ 176	$ 881
HW TOT - Basic Course	$ 176	$ 176	$ 176	$ 176	$ 176	$ 881
Community Basic Training	$ 3,936	$ 5,428	$ 1,460	$ 3,175	$ 3,452	$ 17,451
Community Counselors Course	$ 2,281	$ 2,281	$ 4,563	$ 3,871	$ 4,001	$ 16,998
Admin/Management	$ 21	$ 21	$ 125	$ 106	$ 109	$ 381
Services & Sensitization	$ 1,047	$ 2,395	$ 1,202	$ 1,614	$ 2,008	$ 8,266
Supervision	$ 8	$ 12	$ 28	$ 10	$ 12	$ 69
M&E Activities	$ 674	$ 674	$ 1,348	$ 1,348	$ 1,348	$ 5,390
TOTAL	**$ 8,495**	**$ 11,339**	**$ 9,252**	**$ 10,652**	**$ 11,459**	**$ 51,197**
LINKAGES AND ALL PARTNERS						
Orientation/Consensus Building Activities	1,385	1,385	2,771	2,351	2,430	10,322
Curriculum Development	4,189	6,777	2,078	3,691	4,084	20,819
HW Basic Course	13,639	18,741	5,168	11,037	11,984	60,569
HW Counseling Course	21,966	21,966	43,755	37,147	38,393	163,227
HW Supervision/On-the-job Training	2,776	2,776	5,553	4,711	4,869	20,685
HW TOT - Basic Course	4,402	6,003	1,743	3,585	3,882	19,616
Clinic Structure Upgrades	0	0	2,834	2,405	2,486	7,725
Community Basic Course	3,936	5,428	1,460	3,175	3,452	17,451
Community Counseling Course	4,878	4,878	9,757	8,277	8,556	36,347
BFHI Activities	1,373	4,120	0	1,255	1,297	8,045
M&E Activities	27,115	27,115	54,229	46,211	47,722	202,391
Admin/Management	21	21	125	106	109	381
Services & Sensitization	1,047	2,395	1,202	1,614	2,008	8,266
Supervision	8	12	28	10	12	69
TOTAL	**86,736**	**101,617**	**130,702**	**125,574**	**131,285**	**575,913**
% of Total	15%	18%	23%	22%	23%	100%

COST OF ACTIVITIES, ALLOCATED BY INDICATOR

	Tot Pop	WRA
Pop covered at April '01	126,358	31,773
Pop covered at April '00	124,942	31,417
Avg No. of Beneficiaries	**125,650**	**31,595**

INDICATOR	% Chg in Indicator	LINKAGES		PARTNER		TOTAL	
		Cost	Per Beneficiary	Cost	Per Beneficiary	Cost	Per Beneficiary
TIBF	30%	78,241	$0.62	8,495	$0.07	86,736	$0.69
EBF	18%	90,278	$0.72	11,339	$0.09	101,617	$0.81
ANC	15%	121,450	$0.97	9,252	$0.07	130,702	$1.04
VCT-T	10%	114,922	$0.91	10,652	$0.08	125,574	$1.00
VCT-K	18%	119,826	$0.95	11,459	$0.09	131,285	$1.04
TOTAL	**18%**	**524,717**	**$4.18**	**51,197**	**$0.41**	**575,913**	**$4.58**
		91%					

COST EFECTIVENESS RATIOS (LINKAGES & Partner Costs)

INDICATOR	Age Group as Percent of Pop	Total Cost by Indicator	Percent Change in Indicator	Target Population	Number of New Acceptors	Cost per New Acceptor
TIBF (preg women/women w/infants 0-6 months)	2.86%	86,736	30%	3,614	**1,092**	$ 79.46
EBF(preg women/women w/infants 0-6 months)	2.86%	101,617	18%	3,614	**640**	$ 158.84
ANC (preg women)	9.10%	130,702	15%	2,891	**422**	$ 309.62
VCT-T (preg women/women w/infants 0-6 months)	2.86%	125,574	10%	3,614	**351**	$ 358.16
VCT-K (preg women/women w/infants 0-6 months)	2.86%	131,285	18%	3,614	**654**	$ 200.67

Assumptions:

* Ave. cost HIV test kit '00-'01: $3.14 (PHRplus)
* 15% of activity costs aimed at HIV testing indicator targeted men
* 12% of activity costs aimed at HIV/AIDS prevention/PMTCT indicator targeted men
* ZIPH figures based on AED/DC estimates
* Horizons-paid salaries based on estimates by interviewees (including one paid by Horizons)
* Cost of international participants at HW/TOT trainings have been subtracted from total training costs

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