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Cost and Effectiveness Analysis of the Ndola Demonstration Project in Zambia

Executive Summary

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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.

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

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 to 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.