Cost Analysis of the National Vitamin A Supplementation Programs in Ghana, Nepal, and Zambia

Synthesis of Three Studies

MOST
The USAID Micronutrient Program

USAID
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

This publication was made possible through support provided by the Office of Health, Infectious Disease and Nutrition, of the Bureau for Global Health, U.S. Agency for International Development (USAID).

MOST is managed by the International Science and Technology Institute, Inc. (ISTI) under the terms of Cooperative Agreement No. HRN-A-00-98-0047-00. Partners are the Academy for Educational Development (AED), Helen Keller International (HKI), the International Food Policy Research Institute (IFPRI), and Johns Hopkins University (JHU). Resource institutions are CARE, the International Executive Service Corps (IESC), Population Services International (PSI), Program for Appropriate Technology in Health (PATH), and Save the Children.

Suggested Citation:

MOST, USAID Micronutrient Program. 2004. *Cost Analysis of the National Vitamin A Supplementation Programs in Ghana, Nepal, and Zambia: A Synthesis of Three Studies*. Arlington, Virginia, USA

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April 2004

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Although a variety of vitamin A supplementation programs have been implemented in developing countries, little is known to date about their costs. The major objective of this study is to provide researchers and policymakers with that cost information.

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Acronyms

CHW	Child Health Week
FCHV	Female Community Health Volunteer
IEC	Information, education, and communication
MOH	Ministry of Health
MOST	USAID Micronutrient Program
NGO	Non-governmental organization
NIDs	National Immunization Days
NTAG	Nepal Technical Advisory Group
Sub-NIDs	Sub-National Immunization Days
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Summary

Study Objectives and Methodology

Objective

Although a variety of vitamin A supplementation programs have been implemented in developing countries, little is known to date about their costs. The major objective of this study is to provide researchers and policymakers with that cost information.

Methodology

The analysis synthesizes the major findings of recent studies on the cost of vitamin A supplementation programs in Ghana, Nepal, and Zambia. Each program is based upon periodic capsule distribution to all children 6 to 59 months of age. Because special events surrounding distribution were well promoted, coverage has been high in all three countries.

Cost analysis of the three programs drew upon primary and secondary data for distribution rounds conducted in both 2000 and 2001. The three studies use a similar costing methodology based on a combination of two common approaches used in cost analysis:

- Expenditure approach, in which accounting or expenditure data are analyzed and assigned to specific program activities;
- Ingredients approach, in which all inputs needed to generate a given activity are identified and assigned specific costs.

Two major cost categories are emphasized: program-specific, and personnel and capital. Program-specific costs are those incurred exclusively for the delivery of vitamin A, such as the costs of capsules, supplies, transportation, fuel and vehicle maintenance, training, and social mobilization. Personnel and capital are shared resources — that is, resources not attributable to a single program or intervention. Since the costs of shared resources would arguably be incurred with or without the vitamin A distribution campaign, they are not included in the analysis of program-specific costs.

Major Characteristics of the Three Programs

Program Objectives

The long-term objective of the three programs is to reduce vitamin A deficiency among children six months to five years of age. In the short term, this objective is to be achieved mainly through vitamin A capsule supplementation carried out during nationwide vitamin A distribution campaigns covering a high percentage of those children.

Empirical Foundation

The three programs originated in an environment where clinical and subclinical signs of vitamin A deficiency were documented. The magnitude of the problem in each country was defined using empirical evidence demonstrating the need to reduce vitamin A deficiency. In each case,

country-specific data served to enlist the support of policymakers and build consensus on the need to develop a national vitamin A delivery system.

General Approach

The three programs are based on active distribution of capsules twice a year to children six months to five years of age. Each program follows a campaign model based on intensive social mobilization and service delivery over a period of two to seven days.

Mass Campaign Strategy for Social Mobilization and Operational Support

In all three countries, vitamin A distribution is a complex task encompassing preparation, distribution, and post-distribution activities. Those activities, implemented over a period of four to six months, take place at the national as well as local level.

Multisectoral Support

Each of the programs is a collaborative effort involving a multiplicity of actors from government and non-government organizations (NGOs) across an array of sectors.

Strong Volunteer Base

In all three countries, community volunteers play a vital role in program implementation. These volunteers receive no pay, their only monetary compensation being an allowance for attending training sessions and a travel allowance during vitamin A distribution days.

Active Donor Support

International donor organizations, particularly the U.S. Agency for International Development (USAID) and the United Nations Children's Emergency Fund (UNICEF), have provided funding and technical assistance for all aspects of vitamin A distribution: procurement of supplies, logistical support, and monitoring and evaluation.

High Coverage

In Nepal, average coverage in program districts has exceeded 80 percent since 1997, and approached 100 percent in April 2001. Ghana achieved a national coverage of nearly 90 percent during the first stand-alone vitamin A distribution campaign implemented in July 2000. Actual coverage exceeded target coverage in May 2001 and May 2002. In Zambia, Child Health Week (CHW) supplementation coverage rose from about 28 percent in 1999, when vitamin A capsules were delivered through routine services, to 88 percent in February 2002.

Cost Analysis

Program Costs

Average total costs are estimated at $2.9 million per year. Although program-specific costs represent almost 40 percent of total costs, over twice as much as capital costs, they are lower than personnel costs.

Capital costs. These account for 15 percent of total costs, with vehicles — at nearly 75 percent of capital costs — taking the lion's share. The remaining capital costs are almost equally divided between office equipment and long-term training.

Personnel costs. Personnel costs are almost one-half of total costs. Volunteer labor represents about one-third of these costs, government personnel almost two-thirds, and NGO personnel only 1 percent. The cost of government personnel from institutions other than the Ministry of Health (MOH) represents 10 percent of personnel costs, reflecting a multisectoral approach to program implementation.

As noted, volunteer labor represents about one-third of personnel costs, which amounts to 16 percent of total costs — higher than the percentage for capital costs, at 15 percent. Such a large percentage reflects the critical role volunteers play in all phases of vitamin A distribution.

Costs by Funding Source

Government provides about two-thirds of total costs, USAID 28 percent, and UNICEF 5 percent. Other bilateral donors and international and local NGOs contribute 1 percent of total costs. While the governments contribute nearly all personnel costs and most of the capital costs, their contributions to program-specific costs do not exceed 4 percent. International donors, particularly USAID (65 percent of program-specific costs) and UNICEF (21 percent) provide the bulk of those costs, their high shares a direct result of the leading role the two institutions have played in promoting vitamin A in all three countries.

Average Cost per Child Dosed

The average cost per child dosed twice per year is about $0.40 — if only program-specific costs are considered. That figure rises to an annual average of just under $1.15, if personnel and capital costs are also included.

Cost-Effectiveness

At an average cost per death averted of about $65, vitamin A supplementation in Ghana, Nepal, and Zambia is highly cost-effective relative to many other public health interventions. When measured in terms of cost per death averted, the program compares favorably with malaria chemoprophylaxis, breastfeeding promotion and measles immunization, and is measurably more cost-effective than most other programs such as cholera immunization and health interventions associated with diarrheal disease.

This study synthesizes major findings of three recent studies on the cost of vitamin A supplementation programs. These programs — in Ghana, Nepal, and Zambia — are based on a form of periodic distribution to all children 6 to 59 months of age. Because special events surrounding capsule distribution were well promoted, coverage has been high in all three countries.

Section 1: Introduction

Study Objectives

Although a variety of vitamin A supplementation programs have been implemented in developing countries, little to date is known about their costs. The major objective of this study is to provide researchers and policymakers with cost information on vitamin A supplementation. The analysis synthesizes major findings of three recent studies on the cost of vitamin A supplementation programs. These programs — in Ghana, Nepal, and Zambia — are based on a form of periodic distribution to all children 6 to 59 months of age. Because special events surrounding capsule distribution were well promoted, coverage has been high in all three countries.

Methodology

Background

This study was prepared under MOST, the USAID Micronutrient Program, which is funded by the Office of Health and Nutrition of the United States Agency for International Development (USAID). MOST is USAID's flagship project for the promotion of activities to improve the micronutrient status of at-risk populations throughout the world.

Analysis in the next two sections is based upon three studies of the national vitamin A programs in Ghana (Rassas et al. 2004[a]), Nepal (Fiedler 2001), and Zambia (Rassas et al. 2004[b]). USAID and UNICEF have provided substantial support to these three programs. Cost analysis of the programs drew upon primary and secondary data for vitamin A distribution rounds conducted in 2000 and 2001. All three studies use a similar costing methodology.

Costing Methodology

The costing methodology used in this study is based on a combination of two common approaches used in cost analysis:

- Expenditure approach, in which accounting or expenditure data are analyzed and assigned to specific program activities;
- Ingredients approach, in which all inputs needed to generate a given activity are identified and assigned specific costs.

The first step in data collection consisted of obtaining expenditure information from all organizations that participated in the vitamin A distribution rounds under consideration. These data were then combined with other information obtained from a variety of sources. Within the time allocated to fieldwork for each study, every effort was made to identify all major inputs used at each operational and administrative level. The quantity and price of each input for each activity were then estimated, and these estimates used to analyze each program's cost structure.

Definitions and Calculation Procedures

Recurrent and Capital Costs

In estimating a program's annual costs, it is useful to distinguish between recurrent costs (those incurred in purchasing recurrent inputs — or inputs purchased each year) and capital costs (those incurred in purchasing capital inputs — or inputs with a useful life span of more than one year). It is important to separate these two cost categories not only because they are estimated differently, but also because the distinction is fundamental to analyzing program sustainability — which is largely a function of recurrent costs.

Recurrent costs are incurred to purchase inputs with a life span of less than one year and, as their name suggests, are incurred periodically. Recurrent inputs are usefully grouped into categories such as materials and supplies (e.g., vitamin A capsules and educational materials), utilities (e.g., fuel and electricity), and services (e.g., information, education, and communication [IEC] and media campaigns).

Capital costs are incurred in purchasing goods whose useful operating life exceeds one year. Such costs include vehicles, buildings, large equipment, and computers and other office assets. Certain expenses of a non-capital nature, such as long-term training, are necessary for setting up a program. Since these expenses are not recurrent, however, and have an impact spanning several years, they are capitalized to reflect their long-term nature.

Program-specific Costs vs. Other Costs

Two major categories of costs are emphasized in this study: program-specific costs and also "other" costs, which include personnel and capital costs. Total costs consist of program-specific, personnel, and capital costs. The distinction between program-specific, personnel, and capital costs — rather than the usual distinction between capital costs and recurrent costs (including personnel costs) — is used in describing the results presented in this study. The need to distinguish between program-specific, personnel, and capital costs is justified by the importance of each of these cost categories in the three vitamin A programs.

Personnel costs. Health personnel in each of the three countries under consideration are involved in a variety of activities, in addition to vitamin A supplementation. Thus, personnel costs are shared among many other health interventions and not incurred exclusively for the delivery of vitamin A.

To determine the personnel costs of the vitamin A program, it was necessary to identify all personnel involved in program implementation. For instance, the cost of management personnel was first estimated at all levels of the planning, distribution, and evaluation and monitoring chain. Then, the proportion of time each person devoted to the supplementation program was determined by dividing the number of days spent on the program in a given period by the person's total working days, and multiplying that figure by the person's total remuneration during that period.

Total personnel costs of the program for, say, a given district were estimated as the sum of this product for all personnel involved in the supplementation program in that district. Summation over all districts generated total personnel costs at the district level. Total personnel costs were derived as the sum of personnel costs at all levels of program implementation. Percentages of personnel time allocated to the program were obtained from interviews with participants.

Program-specific costs are those incurred exclusively for the delivery of vitamin A: costs of capsules, supplies, transportation, fuel and vehicle maintenance, training, IEC, and social mobilization. Personnel and capital are shared resources — that is, resources not attributable to a single program or intervention. Since the costs of shared resources would arguably be incurred with or without the vitamin A distribution campaign, they are not included in the analysis of program-specific costs.

Program-specific costs are of particular relevance to decision-makers and program managers for two reasons. First, since these costs include resources the MOH in a particular country must mobilize yearly to implement the program, they are a vital determinant of program sustainability. Second, they are critical in comparing the costs of vitamin A distribution with those of other nutritional interventions or in examining alternative program options, such as integrating vitamin A supplementation into other health-care delivery systems.

Organization of the Study

The analysis that follows is divided into two major sections: the first describes the main characteristics of the three programs, and the second presents a detailed cost analysis of those programs. Cost-effectiveness of the three programs relative to other primary public health interventions is investigated as part of the second section.

Section 2: Major Characteristics of The Three Programs

Program Objectives

The long-term objective of the three programs is to reduce vitamin A deficiency among children aged six months to five years. In the short term, this objective is to be achieved mainly through vitamin A capsule supplementation carried out during nationwide distribution campaigns covering a high percentage of those children.

Empirical Foundation

All three programs originated in environments where clinical and subclinical signs of vitamin A deficiency were documented. In each country, the magnitude of the problem was defined using empirical evidence demonstrating the need to reduce vitamin A deficiency. Then, country-specific data served to enlist the support of policymakers in those countries and build consensus on the need for a national vitamin A delivery system.

The national vitamin A program in Nepal grew out of three major research projects conducted between 1988 and the early 1990s. Using different approaches and starting from different assumptions, the three studies showed that periodic dosing of children 6 to 60 months of age with high-dose vitamin A capsules would lower mortality by 25 to 30 percent. At a national vitamin A workshop held in 1992, during which those findings were discussed, a recommendation was made to develop a vitamin A program; in 1993, the government of Nepal adopted the recommendation.

Vitamin A deficiency in Zambia was first recognized as a public health problem in the early 1960s, when it was described as the major cause of blindness in a particular province. In the 1980s, there was growing interest in defining the extent of the problem in children. That interest led to a study in 1985, involving 4,275 children aged 6 to 72 months, which revealed that 1.89 percent of those children had xerophthalmia (clinical vitamin A deficiency), while 16.5 percent had biochemical levels of severe deficiency ($<$ 10 ug/dl).

In 1997, a baseline survey found that 65.7 percent of children had serum retinol levels of $<$20 ug/dl, with night-blindness prevalence of up to 6.2 percent in the same cohort. Those prevalence rates placed Zambia in the category of severe clinical vitamin A deficiency, according to World Health Organization (WHO) population-affected cutoffs. As the study discovered, routine vitamin A supplementation coverage for children was 28.4 percent — highlighting the need to intensify such coverage.

Following a series of studies conducted in selected locations in Ghana, supplementation for preschool children and post-partum mothers in the three northern regions was recommended. In 1997, supplementation for preschool children began in those regions. A prevalence survey carried out later in the southern and coastal regions showed subclinical vitamin A deficiency to be a severe problem among the target population. Of all children studied in the southern zone, 37.2 percent had serum retinol below 10 ug/dl. Based upon results of this survey, the supplementation program was extended to cover pre-school children in the entire country.

General Approach

Twice a year, at designated times, the three programs distribute capsules to children aged six months to five years. Each program follows a campaign model based upon intensified social mobilization and service delivery over two to seven days. The twice-yearly events have created a cadre of field-tested personnel in the three countries, who are skilled at working with the local communities and at promoting their support and active participation.

All three programs have been associated with National Immunization Days (NIDs), a WHO global program to eradicate polio. Since NIDs were held annually, however, they provided an opportunity for only one dose of vitamin A each year. Because children with vitamin A deficiency should receive a supplement at least twice a year (every four to six months), another mechanism was needed for the second dose. Relying exclusively upon facility-based distribution to deliver the second dose was not a viable option for several reasons, but in particular because health-facility attendance for older children was not high enough to ensure adequate coverage in the one-to-five-year age group.

In Zambia, the first non-NIDs vitamin A supplementation program was launched in August 1999, and later renamed Child Health Week (CHW) to make the focus on the child more explicit. It was also felt that, instead of limiting activities to a vertical vitamin A supplementation program, the opportunity should be seized to deliver an integrated service that included not only vitamin A capsules but also other health services such as de-worming, health education, immunization, family planning, prenatal care, and growth monitoring. Districts were encouraged to provide an integrated package of services commensurate with their local capacity and need — as long as vitamin A supplementation remained the core activity during that week.

In Zambia, the first NIDs campaign took place in 1997, and was a nationwide undertaking. The program was scaled down to about half the districts in recent years. Since 1999, the focus has shifted to priority districts, where communities have been at a constant risk of cross-border polio infections due to civil-war-related migrations from neighboring countries. This narrower focus is referred to in Zambia as sub-NIDS.

The first round of vitamin A supplementation in Ghana was integrated into NIDs in 1996. By 1999, a detailed plan was developed to implement a nationwide stand-alone supplementation program for the second round. In 2000, the Ministry of Health (MOH) carried out the first vitamin A stand-alone capsule distribution in the country's ten regions. Since that date, the program has become a two- to three-day stand-alone event used to deliver a second dose of vitamin A to all children 6 to 59 months of age.

In contrast to Zambia and Ghana, Nepal followed a phased approach to program implementation. Integration of vitamin A into NIDs in Nepal was initiated in 1997, four years after a supplementation program was established in 8 of the country's 75 districts. The second distribution campaign has since been phased in at a rate of eight to ten districts per year. By 2001, the program covered all but three politically unstable districts. Under the program, high-dose vitamin A capsules are distributed to all children aged 6 to 59 months during a two-day event.

Mass Campaign Strategy for Social Mobilization and Operational Support

In all three countries, vitamin A distribution is a complex task implemented over a period of four to six months. Activities consist of preparation, distribution, and post-distribution tasks — each of these conducted at the national as well as local level.

In Ghana, major program components at the national level include strategy development and planning; logistical support; development of monitoring and evaluation materials, as well as behavior-change communication materials and manuals; promotion activities

using nationwide awareness campaigns and mass-media promotion through advocacy workshops, press seminars, and announcements in churches and mosques; and preparation of program review and evaluation documents. Preparatory activities at the national level are implemented over a period of six months.

The preparatory period at the local level lasts from three to six months and includes (1) resource mobilization; (2) training of health workers, community volunteers, teachers, and those performing social mobilization functions, as well as orientation of school children; (3) social mobilization of communities through mass media, including radio announcements, program discussions, community announcements through chiefs and assemblymen, and other community information channels; and (4) planning meetings to assess human resource development needs, vehicle requirements in terms of repair and maintenance, location of distribution points, and assignments of monitoring teams.

Completing post-distribution activities is an equally demanding task. During the post-distribution period, for example, process reports are finalized. Evaluation and review meetings take place within each district with district assemblies and other decentralized departments. Reports are disseminated to the regional health administration and the district assemblies. Later, monitoring surveys verify coverage and obtain qualitative information to be presented in supervisory reports.

CHW preparation in Zambia includes organization of funds for district and provincial CHW budgets; production of IEC materials for district and national dissemination; dissemination of promotional and advocacy materials through the mass-media; preparation of monitoring and evaluation materials; and staff orientation.

At the provincial level, preparatory activities include drawing up provincial CHW budgets; initiating preparatory activities at the district level; orienting district health management team staff; collaborating with central or national level agencies; and preparing protocols for monitoring districts during the campaign.

The preparatory period at the district level lasts about three months, during which several activities take place: resource mobilization, including budgeting and local mobilization of funds, vehicles, fuel, and other logistical needs from local non-government organizations and other government organizations; social mobilization and advocacy activities within the district; logistical planning and preparation of distribution posts and assignments of monitoring teams; orientation of health workers and volunteers; and delivery to the distribution posts of vitamin A capsules, other medical supplies, and IEC materials.

Following the distribution campaign, district health management teams compile district coverage and expenditure reports for each CHW. Provincial health officers and district health management teams then hold CHW review meetings to discuss lessons learned. Observations during those meetings inform planning for the following CHW round. Lessons learned are also shared with representatives from central agencies at the next orientation meeting.

As part of post-CHW activities, monitoring surveys verify coverage reported by districts, as well as qualitative information presented in supervisory and observation reports. Such surveys yield better understanding of the opportunities and challenges of the CHW strategy, leading to any needed design revisions for the next CHW campaign.

For five to six weeks each year, the Nepal Technical Advisory Group (NTAG), a Nepali non-governmental organization (NGO) developed specifically to implement the vitamin A program, promotes vitamin A distribution. Promotional activities include radio and television advertisements broadcast on nationwide channels, radio spots on regional channels, and pamphlet distribution. A host of spontaneous promotional events also take place just before the distribution campaign, including vitamin A rallies, vitamin A fairs, and town criers urging mothers to bring their children to get their vitamin A capsules.

Post-distribution activities in Nepal are similar to those conducted in Ghana and Zambia. During each distribution round, about two hundred officials from central and regional government and local and international NGOs travel throughout the country to observe, promote, support, and supervise distribution activities.

Multisectoral Support

As may be seen, each of the three vitamin A programs is a collaborative effort involving multiple actors from government and non-government organizations across an array of sectors. In Nepal, the Ministries of Health, Education, Culture, and Local Development, plus NGOs and many other organizations and agencies, participate in training as well as in distribution.

Promotion of multisectoral collaboration is also a distinctive feature of the Ghana and Zambia programs. In Zambia, for example, MOH personnel work in close collaboration with a variety of other government organizations and NGOs. These aid CHW and NIDs at the district and provincial levels, especially through contribution of staff and motor vehicles to the local resource pool.

In Ghana, the district assemblies provide leadership and support to the vitamin A campaigns; district assemblies and other decentralized departments are government organizations supporting MOH personnel at the regional, district, subdistrict, and community levels. District assemblies provide funding, vehicles, and fuel on distribution days. Along with the other decentralized departments, they form part of the monitoring and supervision teams during fieldwork. Teachers from the Ghana Education Service and their students also provide valuable assistance alongside the community-based volunteers.

Strong Volunteer Base

In all three countries, community volunteers play a vital role in program implementation. These volunteers receive no pay, their only monetary compensation being an allowance for attending training sessions and a travel allowance during vitamin A distribution days.

In Nepal, for example, the Female Community Health Volunteer (FCHV) network, consisting of over 45 thousand volunteers, forms the backbone of the national vitamin A program. FCHVs are selected from local Mothers' Groups. As initially designed, the Mothers' Group program organized groups of mothers to identify health problems and serve as health education resources for the community. Under the FCHV program, each local Mothers' Group selects its FCHV member. In locations having no Mothers' Group, an FCHV is assigned by a local official or a MOH representative. FCHVs are charged with distributing the vitamin capsules on distribution days.

In Zambia, volunteers assist with capsule distribution as well as with supervision and administration of the CHW and NIDs programs. Volunteers come from local communities and governmental departments at the district level. Community-based volunteers are in direct contact with caregivers and children, working closely with health workers and opinion leaders to mobilize guardians of children, administer vitamin A, and maintain distribution records.

Volunteers from the Ghana Education Service, along with personnel from other decentralized departments, aid the supervision and capsule-distribution effort in that country. Community-based volunteers work very closely with health workers, assemblymen, chiefs, and other community leaders to mobilize beneficiaries, administer vitamin A, and maintain distribution records. The number of volunteers in Ghana is estimated at about 65 thousand.

Active Donor Support

International donors, particularly USAID and UNICEF, have provided funding and technical assistance for all aspects of vitamin A distribution, including procurement of supplies, logistical support, and monitoring and evaluation.

USAID has supported the national vitamin A supplementation program and CHW in Zambia since 1999, principally with financial and technical assistance in support of strategic planning, development of technical guidelines and IEC materials, and orientation of program staff at all levels. Together with the Japan International Cooperation Agency, UNICEF, WHO, and Rotary Club International, USAID supports the NIDs program in Zambia by contributing to the NIDs "basket," an arrangement that enables donor agencies to pool financial resources into a common fund for the implementation of the NIDs program.

UNICEF contributions to CHW include procuring vitamin A capsules; financing and participating in monitoring activities during and after CHW; and supporting the distribution of vitamin A capsules and other supplies to the provinces and districts. UNICEF and WHO also procure vaccines and vitamin A capsules for NIDs and contribute to the NIDs basket.

Since 2000, USAID has assisted Ghana's MOH in developing policy, plans, technical guidelines, and materials for a sustainable vitamin A supplementation strategy. UNICEF has supplied capsules and other supplies. WHO has printed vitamin A fact sheets and manuals, and Rotary Club International has financed a number of training sessions and procured motorcycles, computers, and other office equipment.

USAID, UNICEF, and the Australian Agency for International Development have provided significant financial assistance to the program in Nepal.

High Coverage

Average coverage in Nepal's program districts has exceeded 80 percent since 1997, and approached 100 percent in April 2001. In Ghana, a national coverage of nearly 90 percent was attained during the first stand-alone vitamin A distribution campaign implemented in July 2000; actual coverage exceeded target coverage in May 2001 and May 2002.

In Zambia, CHW supplementation coverage increased from about 28 percent in 1999, when vitamin A capsules were delivered through routine services, to 88 percent in February 2002. Coverage nearly doubled between 1997 and 1998, following introduction of the mass campaign approach, and has steadily increased since that date.

Section 3: Cost and Cost-Effectiveness Analysis

Program Costs

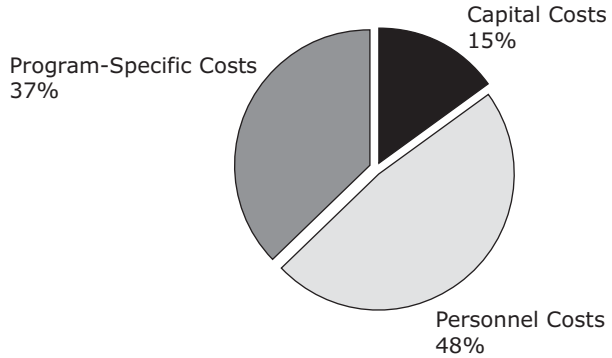
As shown in Table 3.1, total costs across the three programs are estimated at about $2.9 million per year.[1] Program-specific costs represent 39 percent of total costs, more than twice as much as capital costs but lower than personnel costs (see Figure 3.1).[2]

Table 3.1: Annual Costs (*)

Cost Item	Amount	
	Dollars (000)	Percent of Total Cost
Program-Specific Cost		
Total Program-Specific Cost	1,053	37
Personnel Cost		
Government	913	
Volunteers	448	
Other	16	
Total Personnel Cost	**1,377**	**48**
Capital Cost		
Vehicles	317	
Office Equipment	46	
Long-term Training	58	
Total Capital Cost	**421**	**15**
Total Cost	**2,851**	

(*) (a) Figures in this and the following tables are weighted averages for the three countries. The number of children dosed in each country was used to calculate the weights. (b) Since the Nepal study did not estimate personnel and capital costs, figures for those cost items are weighted averages for Ghana and Zambia only. The Nepal study contains estimates for "incremental costs" only and does not consider personnel and capital costs for several reasons, including time and resource constraints. (c) The estimates for Zambia do not describe the cost of vitamin A distribution as a discrete activity, but represent the cost of an integrated package of services that include vitamin A.

Figure 3.1: Program-specific, Personnel, and Capital Costs as a Percentage of Total Costs



Capital costs are 15 percent of total costs. Vehicles account for nearly 75 percent of capital costs, with the remainder almost equally divided between office equipment and long-term training. Personnel costs are almost one-half of total costs.

Volunteer labor represents about one-third of personnel costs, government personnel almost two-thirds, and NGO personnel only 1 percent. The cost of government personnel from institutions other than the MOH represents 10 percent of personnel costs, reflecting the multisectoral support described in the previous section.

The cost of volunteer labor represents 16 percent of total costs — higher than the percentage for capital costs (15 percent). Such a large percentage reflects the critical role volunteers play in all phases of vitamin A distribution, as detailed in the previous section.

1 Cost estimates discussed in this section do not take NIDs into consideration. Since vitamin A distribution associated with NIDs is a temporary arrangement, supplementation using more-permanent, non-NIDs channels was considered more relevant. This is not to suggest that the NIDs platform should be dismantled once polio is eradicated; in many countries, NIDs distribution systems have had a significant impact on building a sustainable vitamin A delivery system.

2 For definitions and calculation procedures, see Section 1.

Figure 3.2: Annual Total Cost by Funding Source

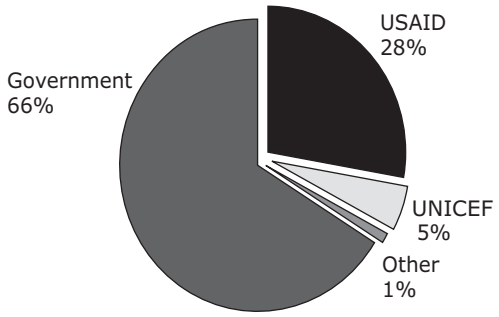
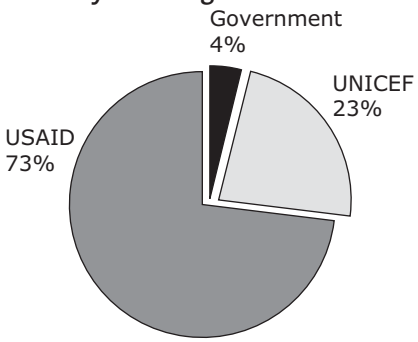


Figure 3.3: Annual Program-specific Costs by Funding Source



Costs by Funding Source

Costs by funding source are described in Figures 3.2 and 3.3. Government provides 66 percent of total costs, USAID 28 percent, and UNICEF 5 percent. Other bilateral donors (AusAID in Nepal) and international and local NGOs contribute 1 percent of total costs.

While the governments contribute nearly all personnel costs and most of the capital costs, their contribution to program-specific costs does not exceed 4 percent. International donors, particularly USAID (65 percent of program-specific costs) and UNICEF (21 percent), provide the bulk of those costs. Such high shares are a direct result of the leading role the two institutions have played in promoting vitamin A in the three countries.

Average Cost per Child Dosed

As Table 3.2 indicates, the average cost per child dosed twice per year is $0.42 — if only program-specific costs are considered. The annual average is $1.14, if personnel and capital costs are included as well.

Table 3.2: Annual Cost per Child Dosed

Cost Category	Cost per Child
Program-specific Costs	0.42
Personnel Costs	0.55
Capital Costs	0.17
Total Costs	**1.14**

Cost-Effectiveness

While cost information is needed to assess affordability, cost-effectiveness analysis helps identify interventions that use resources most efficiently. Cost-effectiveness may be defined as the achievement of maximum provision of goods or services from given quantities of resource inputs. One method commonly used to assess cost-effectiveness of vitamin A relative to other health interventions is to compare cost per death averted for each intervention.

At an average cost per death averted of about $65,[3] vitamin A supplementation in Ghana, Nepal, and Zambia is highly cost-effective relative to many other public health interventions. When measured in terms of cost per death averted, the program compares favorably with malaria chemoprophylaxis, breastfeeding promotion and measles immunization, and is measurably more cost-effective than most other programs such as cholera immunization and health interventions associated with diarrheal disease (Table 3.3).[4]

The vitamin A programs in Ghana, Nepal, and Zambia are highly cost-effective relative to other public health care interventions when other criteria are used for comparison. For instance, the programs compare favorably with interventions in other countries to prevent HIV infection. Although the cost per

3 This estimate is based on program-specific costs. When total-cost figures are used, cost per death averted is estimated at about $236.

4 It is extremely important to stress that the estimated results supporting this conclusion should be taken to represent an order of magnitude, rather than an absolute level for several reasons. First, the potential sources of estimation error in the three studies as well as in all the other studies reviewed place certain limitations on the cost estimates used for comparison. Second, the assumptions used to derive estimates vary widely among studies (*Next page*).

HIV infection prevented can be as little as $11, it can also exceed $20,000. Measures to improve blood safety to prevent one case of HIV range from just under $20 to about $1,000. Breastfeeding and formula-feeding interventions cost from about $3,800 to over $21,000 per infection prevented (Creese et al.).

Summary and Conclusions

This paper synthesizes major findings of three recent studies on the cost of vitamin A supplementation programs. These studies — in Ghana, Nepal and Zambia — are based on a form of periodic distribution to all children 6 to 59 months of age. Because special events surrounding capsule distribution were well promoted, coverage has been high in all three countries.

Costs were divided into three categories: program-specific, personnel and capital costs. Analysis of the three programs' cost structure indicates that vitamin A supplementation costs are not prohibitive. Cost per child covered twice per year is $0.40 — if only program-specific costs are considered. The annual average is $1.14, if personnel and capital costs are also included. Analysis of cost per death averted demonstrates that vitamin A supplementation is highly cost-effective relative to other primary health interventions. Such findings suggest that vitamin A supplementation should receive priority consideration when allocating resources to primary health interventions.

Table 3.3: Cost-Effectiveness of the Vitamin A Supplementation Program Relative to Other Public Health Care Interventions *

Intervention **	**Cost per Death Averted *****
Vitamin A (weighted average for Ghana, Nepal, & Zambia)	*Program-specific costs: $66 (a) Total costs: $236 (a)*
Tuberculosis (4)	$20-$76 (d)
Malaria Chemoprophylaxis (1)	145 (c)
Insecticide-Treated Bednets (2)	188 (c)
Breastfeeding Promotion (5)	$190 (a)
Measles Immunization (5)	$243 (a)
Rotavirus Immunization (5)	$375 (a)
Measles Outbreak Response Immunization (3)	$600 (b)
Acute Respiratory Infection (4)	$379-$1,610 (b)
Malaria (4)	$78-$990 (a)
Malaria Vector Control (5)	$1,411 (a)
Complications of Pregnancy (4)	$836-3,967 (b)
Cholera Immunization (5)	$3,405 (a)
Oral Rehydration Therapy (5)	$3,835 (a)
Diarrheal Diseases (4)	$1,000-$10,000 (b)

Notes:

* Figures for interventions other than vitamin A are not specifically for Ghana, Zambia or Nepal

** Since the list of interventions contained in this table is not based on a comprehensive literature search, it is presented for illustrative purposes only.

*** Unless otherwise specified, more than one figure indicates a range of estimates, rather than a single estimate.

(a) Y2000 dollars; (b) Y1993 dollars; (c) Y1990 dollars; (d) Y1989 dollars

Sources: (1) Picard et al. 1993; (2) Picard et al. 1992; (3) Sniadack et al. 1999; (4) Cited in Filmer & Pritchett; (5) Cited in Fiedler

4 (*continued*) Third, it is not clear in most instances whether program-specific or total costs are used. Even when both-cost categories are spelled out, it is not apparent that all costs are included in the estimates. This omission applies more particularly to capital and labor. It is evident that these and other limitations carry over into the cost-effectiveness comparison. It should also be noted that since labor and capital are not always adequately accounted for, it is not always obvious whether program-specific or total costs should be used for comparison. For this reason, it was decided to include estimates for the vitamin A programs using both program-specific and total costs in Table 3.3.

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