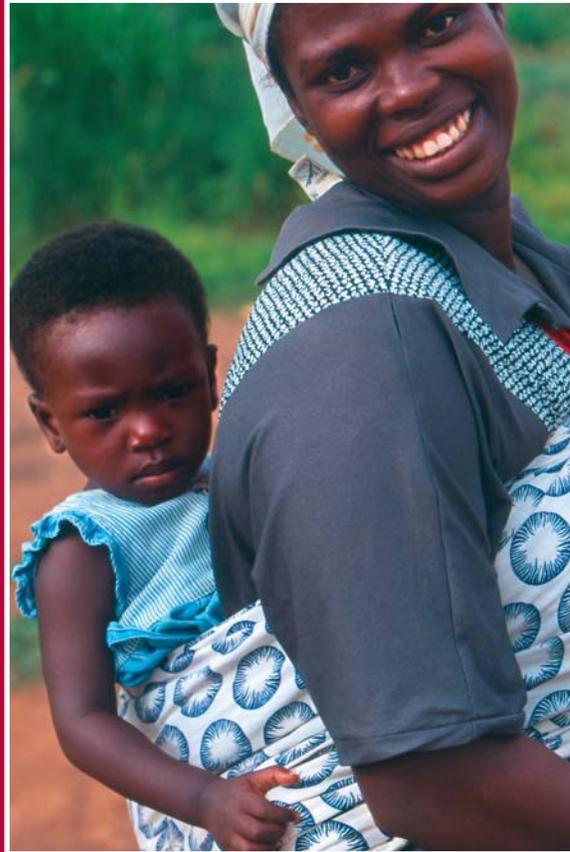


Cost Analysis of the National Vitamin A Supplementation Program in Ghana



The USAID Micronutrient Program



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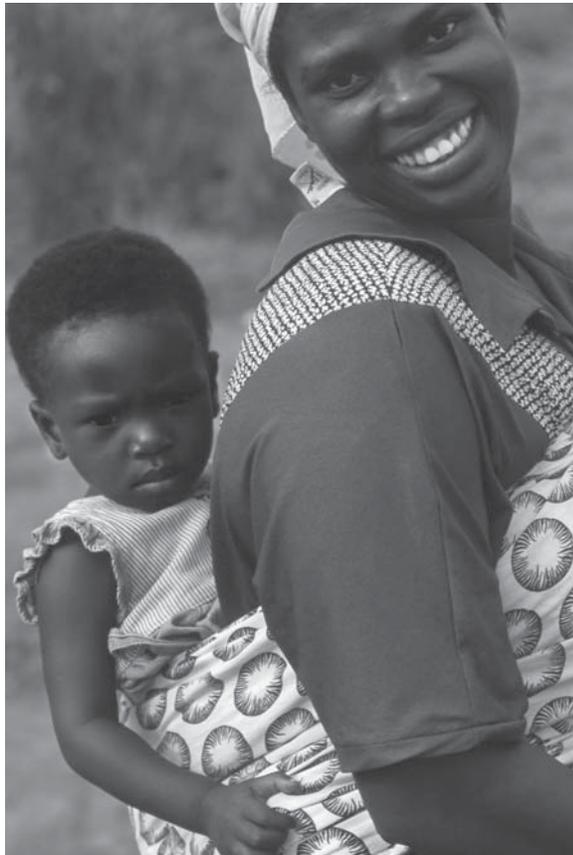
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This study was prepared under MOST, the USAID Micronutrient Program, in response to a request from the Ministry of Health in Ghana. The overall objective of this study is to provide the Ministry of Health with cost information on the vitamin A supplementation program.

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Acronyms

EPI	Expanded Program of Immunization
FAO	Food and Agriculture Organization
GOG	Government of Ghana
IEC	Information, Education, and Communication
MOH	Ministry of Health
MOST	USAID Micronutrient Program
NGO	Non-governmental organization
NID	National Immunization Day
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Currency Unit

4,794 Cedis (¢) = \$1 (weighted average for 2000)

Summary

Study Objectives and Methodology

This study was prepared under MOST, the USAID Micronutrient Program, in response to a request from the Ministry of Health (MOH) in Ghana. The overall objective of this study is to provide MOH with cost information on the vitamin A supplementation program. MOH initiated the program in 1995 through a UNICEF-supported pilot supplementation activity in the three northern regions. In 2000, it became a nationwide undertaking.

The stand-alone vitamin A supplementation campaign of July 2000 was selected for analysis, with field research taking place in Accra and selected regions in Ghana in August–September 2001. Data were collected from both primary and secondary sources at the national, regional, and district levels. The bulk of the data were obtained at the national level, where most of the activities were initiated. More extensive data collection took place in three of the country's ten regions.

Program Description

Program Objectives

The long-term objective of the vitamin A program in Ghana is to reduce vitamin A deficiency by 80 percent among children from six months to five years old. In the short-term, this objective is to be achieved through vitamin A capsule supplementation carried out through nationwide vitamin A distribution campaigns and supplementation to nursing mothers. In endemic areas, vitamin A deficiency will ultimately be reduced through a food-based strategy, in addition to sustained capsule supplementation.

Beneficiary Population

Vitamin A supplementation is undertaken twice a year (four to six months apart) for children 6–59 months old, targeting about 3.5 million children. The children are separated into two age groups (6–11 months and 12–59 months), with different doses administered to each age group.

Program Structure and Participants

The vitamin A supplementation program is a collaborative effort involving several partners, including MOH, donors, district assemblies, and volunteers. MOH provides funds for training, conference facilities, salaries, infrastructure, vehicles, fuel, and similar inputs. Donors — USAID, UNICEF, WHO, and Rotary Club International — provide funding and technical assistance.

District assemblies provide leadership and support to the vitamin A campaigns. Along with the other decentralized departments, the assemblies are part of the monitoring and supervision teams during fieldwork. Teachers and students from the Ghana Education Service provide valuable assistance, alongside community-based volunteers.

Volunteers from the Ghana Education Service, along with personnel from other decentralized departments, assist with the supervision and capsule-distribution effort. Community-based volunteers are in direct contact with caregivers and children and also work very closely with

health workers, assemblymen, chiefs, opinion leaders, gong-gong beaters, and other community leaders to mobilize beneficiaries, administer vitamin A, and maintain distribution records.

Program Activities

At the national level program activities focus upon strategy development and planning, formative research, 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 are implemented over a period of six months.

Major activities at the regional and district levels consist of preparatory activities (requisition and management of funds, logistics, and supplies; preparatory meetings and training programs; information, education, and communication, as well as social mobilization), vitamin A distribution, and post-distribution activities.

Program Costs

Costing Methodology

The costing methodology used in this study is based on a combination of two common approaches used in cost analysis: the expenditure approach, in which accounting or expenditure data are analyzed and assigned to specific program activities; and the ingredients approach, which identifies and assigns specific costs to all inputs needed to generate a given activity.

Cost Categories

Two major categories of costs are estimated in this study: (a) program-specific costs and (b) “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.

Program-specific costs. These are the costs incurred exclusively for the delivery of vitamin A: the costs of capsules, supplies, transportation, fuel, and vehicle maintenance, of training, of information, education, and communication (IEC), and of 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 program, 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 they include resources that MOH must mobilize each year to implement the program, they are a vital determinant of program sustainability. Second, they are critical in comparing the costs of the vitamin A program with those of other nutritional interventions or in examining alternative program options, such as integrating vitamin A supplementation into other health-care delivery systems.

Personnel costs. In Ghana MOH personnel are involved in many activities besides vitamin A supplementation. Personnel costs are therefore 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 first identify all personnel involved in program implementation and then to determine the proportion of time each devoted to the supplementation program. Total personnel costs were derived as the sum of personnel costs at all levels of program implementation.

Capital costs. These include purchased goods whose useful operating life exceeds one year: vehicles, buildings, large equipment,

computers, and other office assets. Certain expenses of a non-capital nature, such as long-term training, are also necessary for setting up a program. Since these expenses are not recurrent and their impact spans several years, they are capitalized to reflect their long-term nature.

Cost Estimates

Estimates by cost category. As shown in the table below, total costs are estimated at about ₵13.7 billion or \$2.9 million per year. Program-specific costs represent 28 percent of total costs, almost twice as much as capital costs but only one-half of personnel costs.

Costs by funding source. The Government of Ghana (GOG) provides about three-quarters (73 percent) of total costs and USAID 21 percent. Remaining funds are provided by UNICEF (4 percent) and Rotary Club International (2 percent).

Of program-specific costs, USAID provides almost 70 percent, with UNICEF contributing 15 percent (in the form of vitamin A capsules), GOG 10 percent, and Rotary Club International 7 percent. GOG contributes all personnel costs and nearly 90 percent of capital costs.

Average cost per child dosed. As indicated in the following table, the average cost per child dosed twice per year is ₵1,197 or \$0.25 — if

only program-specific costs are considered. The annual average is ₵4,306 or \$0.90, if personnel and capital costs are also included.

Cost per averted death. Assuming a 19 percent reduction in the mortality rate of children between 6 and 59 months due to the vitamin A program, annual cost per death averted in Ghana is estimated at about \$77, if only program-specific costs are considered, and \$277 when all personnel and capital costs are included.

The vitamin A program in Ghana is also highly cost-effective relative to other primary health care interventions. When measured in terms of cost per death averted, vitamin A supplementation compares 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.

Conclusions

The overall objective of this study is to provide MOH with cost information on the national vitamin A supplementation program in Ghana. The stand-alone vitamin A supplementation campaign of July 2000 was selected for analysis. Effective promotion of the special events surrounding vitamin A distribution during the campaign led to high coverage.

Costs were divided into three categories: program-specific, personnel and capital costs. Of these, personnel costs (including volunteers) were highest and capital costs lowest. Average cost per child dosed twice per year is \$0.25 — if only program-specific costs are considered. The annual average is \$0.90, if personnel and capital costs are also included. Analysis of cost per death averted suggests that vitamin A supplementation is highly cost-effective. Such findings suggest that the vitamin A supplementation program in Ghana should receive priority consideration when allocating resources to primary health interventions.

Annual Vitamin A Distribution Costs

Cost Item	Amount		
	₵Million	Dollars	% of Total Cost
Program-specific Cost	3,803	793,339	28
Personnel Cost	7,816	1,630,551	57
Capital Cost	2,053	428,378	15
Total Costs	13,672	2,852,268	

Annual Cost per Child Dosed

Cost Category	Population Dosed	Distribution Costs		Cost per Child	
		₵Million	\$000	Cedis	Dollars
Program-specific Costs	3,175, 806	3,803	793	1,197	0.25
Personnel Costs		7,816	1,631	2,461	0.51
Capital Costs		2,053	428	647	0.13
Total Costs		13,672	2,852	4,305	0.90

The overall objective of this study is to provide the Ministry of Health with cost information on vitamin A supplementation. The Ministry of Health intends to use this information to integrate the vitamin A supplementation program into routine primary health care services over the next five years.

Chapter 1: Introduction

Background

General Background

This study was prepared under MOST, the USAID Micronutrient Program. 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.

Undertaken in response to a request from the Ministry of Health (MOH) in Ghana, the study estimated the cost of that country's vitamin A supplementation program. MOH initiated the program in 1995 through a UNICEF-supported pilot supplementation activity in the country's three northern regions; in 2000, it became a nationwide undertaking. MOST support to the program started in 2000.

Socioeconomic Setting

With a landmass of 239,000 square kilometers, Ghana is situated on the west coast of Africa. It shares boundaries with Togo to the east, Burkina Faso to the north, and Côte d'Ivoire to the west. The Atlantic Ocean to the south provides a coastline of 540 kilometers. Ghana has three vegetation zones: a coastal savanna in the south, a forest belt in the center, and a dry savanna in the north. The country has 10 administrative regions divided into 110 districts. According to the 2000 population census, Ghana's population is 18.4 million.

About 66 percent of its people live in rural areas, with agriculture accounting for 51 percent of gross domestic product and employing about 60 percent of the labor force. Annual per capita income in Ghana is less than \$400 per year, and the World Bank's 1998 Ghana Living Standards Survey revealed that one out of three Ghanaians is poor. The Food and Agriculture Organization (FAO) has classified Ghana as a country with a structural food deficit. Rural households are highly dependent upon household production and consume a large share of food from their own farms. In recent years, government expenditure on health relative to total government expenditure has been between four and five percent, well below the 10 percent recommended by the World Health Organization (WHO). Inflation is currently estimated at over 40 percent.

Background of the Vitamin A Program

Vitamin A deficiency is a significant public health problem in Ghana. For example, the latest WHO update on the global prevalence of vitamin A deficiency showed significant sub-clinical levels of vitamin A deficiency among Ghanaian children and women of child-bearing age (WHO 1995).

The Navrongo Health Research Centre, which conducted vitamin A supplementation trials between 1989 and 1991, discovered that vitamin A deficiency was endemic in northern Ghana. Nearly 65 percent of the children surveyed were severely or moderately deficient. That particular study demonstrated that periodic supplementation with large doses of vitamin A reduced mortality among children six months to five years of age by 10.5 percent. The study also indicated that supplementation significantly mitigated the severity of illnesses and reduced children's needs for clinical visits.

These findings were consistent with trends established by studies the Noguchi Memorial Institute for Medical Research conducted elsewhere in Ghana. In 1989, the institute undertook studies in Gomoa Onyadze (Central Region) and in 1994 studied Hatso (Greater Accra Region). Other studies were conducted in Kpando, Hohoe, Jasikan, and Nkwanta in the Volta Region. All these studies demonstrated that vitamin A deficiency was prevalent among women and three- to five-year-olds.

Following these studies and in line with the objectives of the National Plan of Action for Food and Nutrition, a committee was set up to design a vitamin A framework. The committee included representatives from MOH, UNICEF, the Ministry of Food and Agriculture, the Kintampo Health Research Centre, and the Noguchi Memorial Institute.

The vitamin A framework proposed four main components for the national vitamin A program:

- ▲ Provision of high-dose supplementation for pre-school children and post-partum mothers in the three northern regions using a child-to-child strategy, community volunteers, and health center contacts
- ▲ Use of vitamin A in the treatment of measles
- ▲ A prevalence survey and description of the vitamin A situation in the seven southern regions
- ▲ Development of food-based strategies to reduce vitamin A deficiency as a long-term intervention

Vitamin A supplementation for pre-school children began in the three northern regions in 1997, while a directive on the use of vitamin A in the management of measles was given to all regions.

A prevalence survey MOH carried out in the southern and coastal regions revealed that sub-clinical vitamin A deficiency was a severe problem among the target population. Of children studied in the southern zone, 37.2 percent had serum retinol below 10 µg/dl.

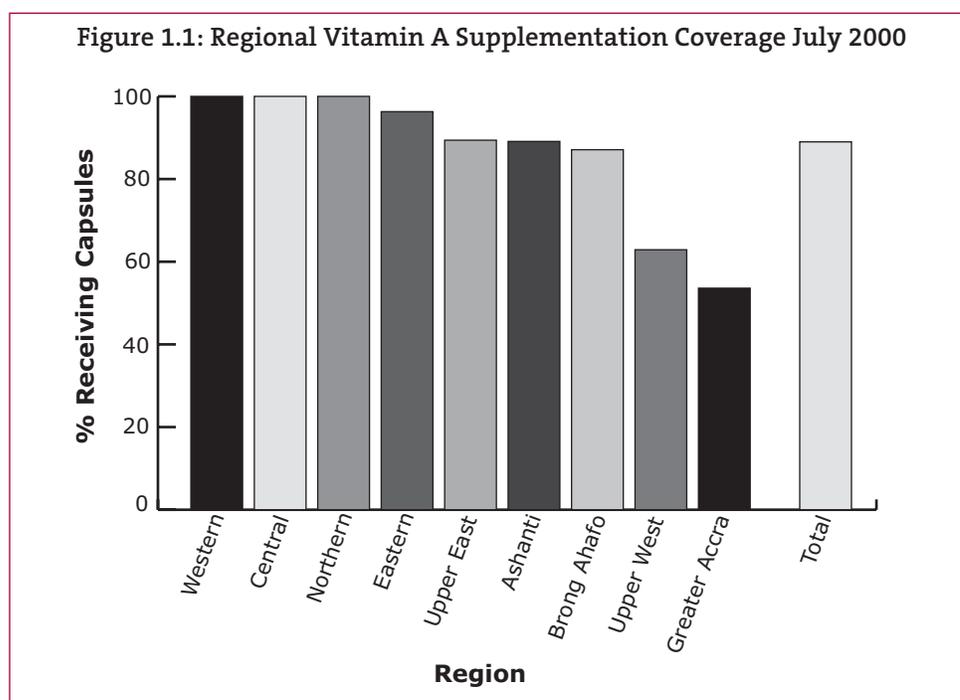
Following this survey, a decision was made to extend the supplementation program to cover pre-school children in the entire country.

To ensure a positive public health impact, two doses of vitamin A at four- to six-month intervals are required. One round of vitamin A supplementation was integrated into national immunization days (NIDs) in 1996; by 1999, a detailed plan had been developed to implement a nationwide stand-alone supplementation program for the second round. In 2000, the nutrition unit of MOH, with technical assistance from USAID and UNICEF, planned the first vitamin A capsule stand-alone distribution in the country's ten regions.

To implement the promotion and behavior change communication component of the program, MOH used intensive social mobilization campaigns. It also developed a variety of training materials, including modules for vitamin A monitoring and evaluation. Currently being investigated are ways to initiate food-based approaches that complement micronutrient supplementation.

To monitor the implementation at the district and sub-district levels, a system has been put in place to check quality of training, service provision, capsule administration, and the effectiveness of the information, education, and communication campaigns (IEC).

As demonstrated in Figure 1.1 below, a national coverage of nearly 90 percent was attained during the first stand-alone vitamin A distribution campaign implemented in July 2000 — a remarkable achievement.



Study Objectives

The overall objective of this study is to provide MOH with cost information on vitamin A supplementation. MOH intends to use this information to integrate the vitamin A supplementation program into routine primary health care services over the next five years.

More-specific objectives of the study are to:

- ▲ Document the vitamin A program as it presently operates
- ▲ Analyze the program's cost structure
- ▲ Develop estimates of program costs and financing requirements
- ▲ Document sources and levels of financing, and their implications for sustainability
- ▲ Provide a baseline cost-analysis document against which future vitamin A strategies can be compared
- ▲ Provide a reference to compare the costs of the vitamin A program with those of other nutrition interventions
- ▲ Provide a reference to train MOH staff in cost-analysis techniques that may be applied to other health interventions

Methodology

Selection of the Stand-Alone Supplementation Campaign

The stand-alone vitamin A supplementation campaign of July 2000 was selected for analysis for two reasons. First, it was the only stand-alone program when the study was initiated. Second, since vitamin A supplementation associated with NIDs is only a temporary arrangement, stand-alone supplementation programs were considered more relevant for decision making.

Data-Collection Methodology

Field research for this study was conducted in Accra and selected regions in Ghana in August–September 2001. Data were collected from both primary and secondary sources at the national, regional, and district levels. Data collection was based upon review of available documents and thorough interviews with program implementers. Some financial data at the regional level were collected via fax and telephone. The following major program participants were interviewed for this study:

- ▲ MOH officials, including the nutrition officer; public health practitioners (doctors and nurses); regional, district, and sub-district health management teams; regional bio-statisticians; medical stores officers at the national, regional, and district levels; and other MOH officers responsible for accounting, transport, estate, and other activities.
- ▲ Heads of the decentralized departments, including the Ministry of Food and Agriculture, Ministry of Education and Ghana Education Service, Department of Social Welfare, Department of Community Development, National Mobilization Program, district assemblies, National Commission for Civic Education, and Non-Formal Education Division.
- ▲ Volunteers and beneficiaries, including community-based volunteers, teachers, and students, and mothers and caregivers.
- ▲ Donors, including USAID, UNICEF, WHO, and Rotary Club International.

The bulk of the data were obtained at the national level, where most of the activities were initiated. More extensive data collection took place in three of the country's 10 regions — Ashanti, Northern, and Greater Accra Regions — which represent the forest, northern savanna, and coastal areas, respectively. In selecting the three regions, several factors were considered, including access to health care, geography and ecology, ethnic grouping, approaches to vitamin A distribution, population density, socioeconomic factors, attitude toward health care, budget available for the study, and time available for research.

Two districts, one urban and one rural, were visited in each of the three selected regions: Kumasi Metropolitan and Ahafo Ano South districts in Ashanti; Tema municipality and Ga districts in Greater Accra; and Tamale municipality and Tolon-Kumbungu districts in the Northern Region. These districts were also selected to reflect the major vitamin A distribution strategies.

Chapter 2: Program Description

Program Objectives

The long-term objective of the vitamin A program in Ghana is to reduce vitamin A deficiency by 80 percent among children of six months to five years. In the short-term, this objective is to be achieved both through vitamin A capsule supplementation carried out during nationwide vitamin A distribution campaigns and through supplementation to nursing mothers. Ultimately, vitamin A deficiency will be reduced through a food-based strategy, in addition to sustained capsule supplementation in endemic areas.

Beneficiary Population

Two main population groups were identified as beneficiaries: children up to six years of age and post-partum women (see Table 2.1). Vitamin A supplementation is undertaken twice a year (four to six months apart) to children six–59 months old, targeting about 3.5 million children as follows:

Table 2.1: Vitamin A Beneficiaries, Dosage, and Frequency of Administration

Age	Dosage	Frequency
Children 6–11 months	100,000 IU x 2	6 months
Children 12–59 months	200,000 IU x 2	6 months
Post-partum mothers	200,000 IU x 2	Within 8 weeks of delivery

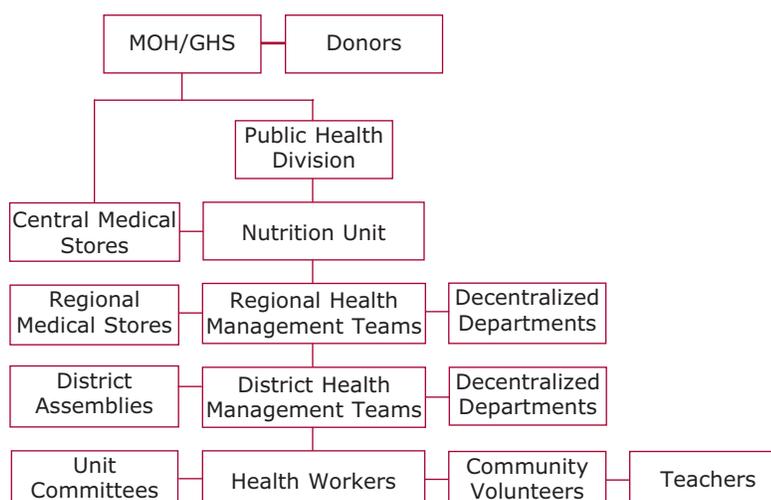
The children are separated into two age groups, with different doses administered to each. Some districts are also actively targeting post-partum mothers within eight weeks of delivery.

Program Structure and Activities

Program Structure and Participants

As depicted in Figure 2.1, the vitamin A supplementation program is a collaborative effort involving several partners — including MOH, donors, district assemblies, and volunteers.

Figure 2.1 Vitamin A Supplementation Program Structure



The health system in Ghana operates at five levels: national, regional, district, sub-district, and community. MOH is the government body with overall responsibility for the vitamin A program, and the program is carried out through the Ghana Health Service. Its Nutrition Unit handles programming, planning, and implementation functions. Donors supporting the vitamin A program include USAID (through MOST), UNICEF, WHO, and Rotary Club International.

Regional health management teams perform strategic planning and monitoring functions at the regional level, with district health management teams and sub-district health management teams managing programs at those levels. The sub-district health management teams consist of the health center management team, heads of other technical units, and health-care providers in the sub-districts. Health workers operate at the community level.

District assemblies and decentralized departments are government organizations supporting MOH personnel at the regional, district, sub-district, and community levels. Community-based volunteers play a vital role in the vitamin A distribution program at the community level.

Program Actors and Their Roles

Ministry of Health

As detailed in Table 2.2, MOH provides funds for training, conference facilities, salaries, infrastructure, vehicles, fuel, and similar inputs. General administrative support, supervision, and monitoring are partially funded by donors. The district health management teams are funded and supported by numerous organizations at the local and district levels alongside MOH. Teams at all levels from national to community are Government of Ghana (GOG) employees, except the village-based volunteers who are usually self-employed farmers and traders.

Donors

Donors provide funding and technical assistance that will enable MOH to build a sustainable vitamin A program; MOH's long-term objective is to integrate vitamin A distribution into routine health services.

Since 2000, USAID (through MOST) has assisted the Nutrition Unit in developing policy, plans, technical guidelines, and materials for a sustainable vitamin A supplementation strategy.

UNICEF has provided support for the vitamin A prevalence survey in southern Ghana and vitamin A supplementation in the north since 1996. UNICEF also supplied capsules, notebooks, and tally sheets for the 2000 campaign. WHO printed vitamin A fact sheets and manuals and provided scissors for use during the 2000 distribution campaign. Moreover, Rotary Club International financed a number of training sessions and also procured motorcycles, computers and other office equipment, as well as additional vitamin A capsules. Rotary International also bore distribution costs in the Eastern and Western Regions.

District Assemblies and Other Decentralized Departments

District assemblies provide leadership and support to the vitamin A campaigns: for example, funding, vehicles, and fuel on distribution days. Along with the other decentralized departments, the assemblies are part of the monitoring and supervision teams during fieldwork. Teachers and students from the Ghana Education Service provide valuable assistance, alongside community-based volunteers.

Volunteers

Volunteers from the Ghana Education Service, along with personnel from other decentralized departments, aid the supervision and capsule-distribution effort. Community-based volunteers, trained during the Guinea-

worm-eradication program and presently used for other community health programs, play a vital role on vitamin A distribution days. These volunteers are in direct contact with caregivers and children and also work very closely with health workers, assemblymen, chiefs, opinion leaders, gong-gong beaters, and other community leaders to mobilize beneficiaries, administer vitamin A, and maintain distribution records.

research; 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 are implemented over a period of six months.

Program Activities at the National Level

Preparatory Activities

A major component of program activities at the national level consists of strategy development and planning; formative

Table 2.2: Roles of Organizations Involved in Vitamin A Distribution

Donors	MOH Headquarters	MOH at Other Levels	NGOs & Other GOG Departments
<ul style="list-style-type: none"> ▲ Technical assistance ▲ Funding ▲ Capsule importation 	<ul style="list-style-type: none"> ▲ Liaison with donors and MOH regional and other authorities ▲ Provision of capsules and logistical support ▲ Compilation of coverage data at national level ▲ Disbursement of funds and compilation of expenditure data ▲ Monitoring of training activities ▲ Organization of distribution days ▲ Coordination of national planning meeting ▲ Oversight of review and other meetings 	<p>Region</p> <ul style="list-style-type: none"> ▲ Training ▲ Monitoring ▲ Logistical support ▲ Reporting <p>District</p> <ul style="list-style-type: none"> ▲ Training ▲ Monitoring ▲ Logistical support ▲ Reporting <p>Sub-District</p> <ul style="list-style-type: none"> ▲ Training ▲ Monitoring ▲ Reporting ▲ Mobilization of volunteers and communities ▲ Logistical support <p>Community Volunteers</p> <ul style="list-style-type: none"> ▲ Mobilization ▲ Supplementation ▲ Reporting ▲ Record keeping ▲ Liaison between community and health workers 	<p>Participate in the following activities</p> <ul style="list-style-type: none"> ▲ Planning meeting ▲ Training program ▲ Distribution-day activities ▲ Review meetings ▲ Coverage analysis ▲ Monitoring & supervision of distribution-day activities ▲ Provision of funds, fuel, means of transportation and other incentives to volunteers and health workers on distribution days

Procurement of Vitamin A Capsules, Packaging, and Other Supplies

In preparation for the distribution campaign, MOH in collaboration with donors makes vitamin A capsules available to each region. Supplies must be requested at least six months before administration. Figure 2.2 shows the lead time required for procurement and delivery of capsules to the distribution points on distribution days.

Procurement of vitamin A capsules and their delivery to regional medical stores are illustrated in Figure 2.3. Vitamin A stocks are cleared by UNICEF or MOH from the port upon delivery, then trucked to MOH central medical stores in Tema. These stores hold MOH nationwide supplies, pharmaceutical materials, drugs, vehicle parts, stationery, and similar supplies. The vitamin A coordinator sends all regional requisitions for capsules to the central medical stores; these requisitions provide details on dosage and quantity requirements for the two age groups (0–11 months and 12–59 months). Capsules are

collected by the regions before the campaign is initiated.

Other supplies such as scissors, banners, badges, IEC materials, ziplock bags, and stationery are collected from MOH offices in Accra. Capsules and other supplies are stored in the regional medical stores before being transferred to the districts, sub-districts, health centers, schools, individual health workers, and volunteers.

Vitamin A capsules are distributed in batches of 500 each, along with tally sheets for each district and sub-district, ziplock bags for re-bagging small quantities of the capsules, and scissors for cutting the capsules open.

Capsules are distributed and accounted for through normal MOH channels. Quantities of vitamin A capsules delivered and used are reconciled using tally sheets completed during administration. Supervisors and monitoring officers moving from point to point during distribution carry capsules to provide backup supplies.

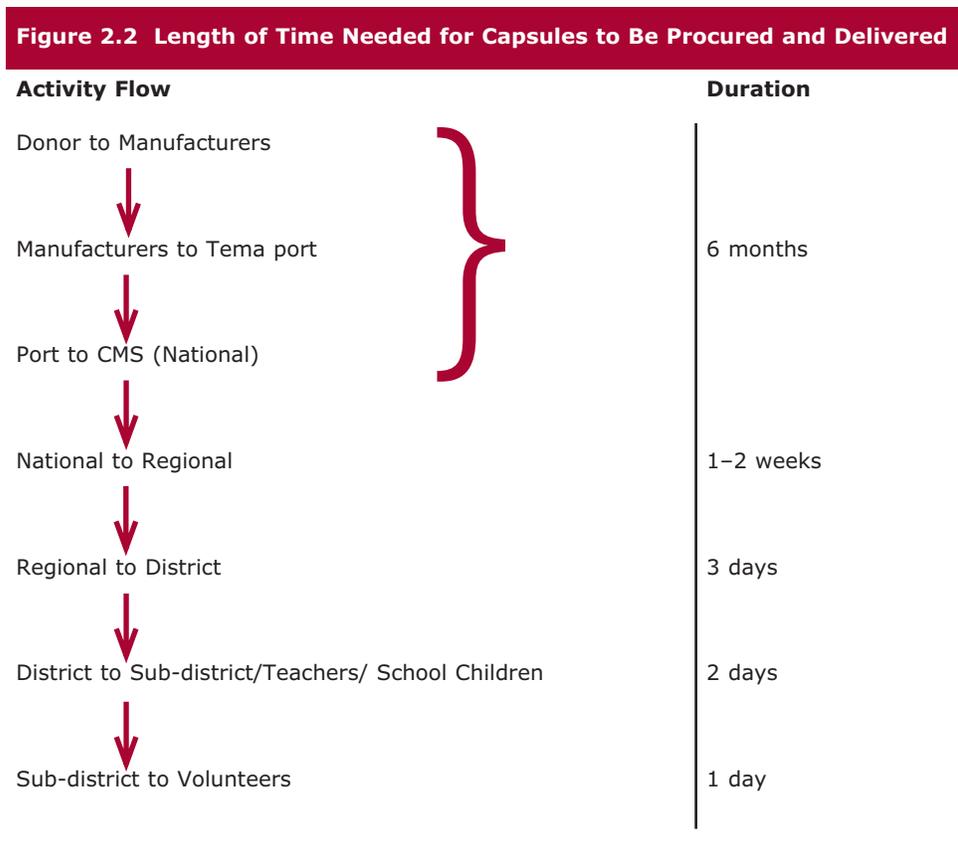
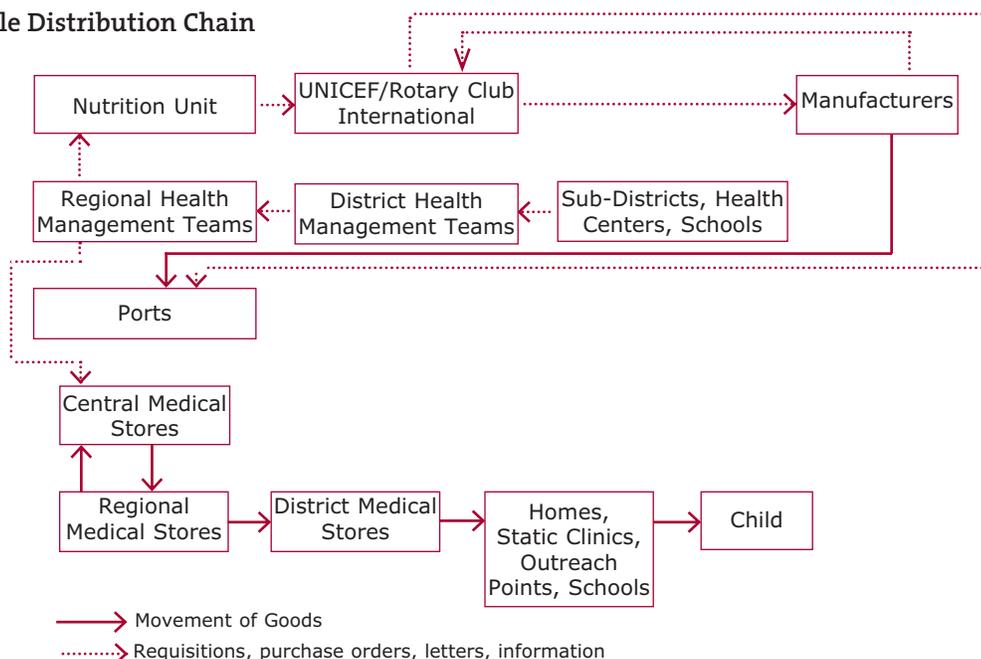


Figure 2.3. Capsule Distribution Chain



Program Activities at the Regional and District Levels

Figure 2.4 is a diagrammatic representation of the tasks performed by implementation teams at the regional, district, and sub-district levels. Major activities at these levels are threefold: preparation (requisition and management of funds, logistics, and supplies; prep meetings and training programs; IEC, as well as social mobilization), vitamin A distribution, and post-distribution tasks.

Preparatory Activities

The preparatory period, which lasts about three to six months, involves a variety of activities:

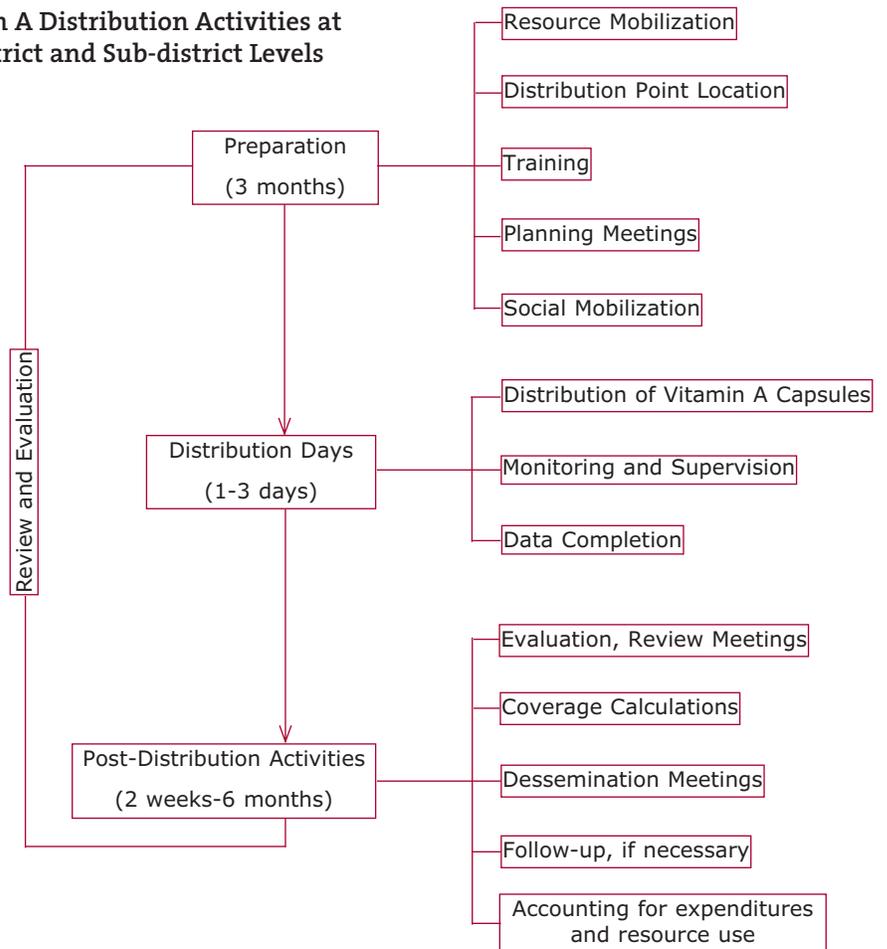
- ▲ Resource mobilization (budgeting; mobilization of funds; requisitions and procurement of capsules and other supplies; solicitation of funds, vehicles, fuel, and other logistical needs from local NGOs, district assemblies, and decentralized departments; and logistical management, including transfer of capsules and IEC materials to distribution points)
- ▲ Training of health workers, community volunteers, teachers, and those performing social-mobilization functions; orientation of school children

- ▲ Social mobilization of communities through mass media (radio announcements, discussion programs, durbars, gong-gong beating, chiefs and assemblymen, community announcements, and other community information channels), caregivers, and mothers
- ▲ Planning meeting to assess human resource development needs, vehicle requirements in terms of repair and maintenance, location of distribution points, and assignments of monitoring teams.

Computation of Vitamin A Capsule Requirements

Computation of the number of vitamin A capsules required is carried out at the district and regional levels using census figures adjusted for population growth and the number of children reached during outreach and at static clinics. The sub-districts and other distribution points determine the quantities of the two doses required and communicate their estimates to the district, which compiles sub-district data and forwards a request to the regional nutrition officer. The same procedures are used to determine vitamin A capsule requirements at the regional level.

Figure 2.4 Vitamin A Distribution Activities at the District and Sub-district Levels



Using data from all regions the Nutrition Unit in Accra estimates total requirements, usually adding a 20 percent buffer for potential distribution losses and computation errors. This information is then forwarded to the central medical stores in Tema and also to the donor agency, which places the order and pays the manufacturer directly.

The formula used in calculating the quantity of capsules required for each district is illustrated in Table 2.3 below.

Vitamin A Distribution

Capsules are distributed over a period of two weeks, and each region chooses, within those two weeks, the specific day(s) during which capsules will be administered. About 20,000 health workers, teachers, volunteers, and children participate in the distribution.

In the first round MOH uses a stand-alone vitamin A distribution system. Following a recommendation made during a strategy development and planning workshop held in 1999, regions selected one of the three main distribution

Table 2.3: Calculation of Number of Capsules Required for Each District

Item	Symbol/Formula
Population of district estimated from 1984 or 2000 census	A
No of Children 6–59 months old	B = 20% of A
No of children 6–11 months	B ₁ = 10% of B
No of children 12–59 months	B ₂ = 90% of B
Capsules for lactating mothers	4% of lactating mothers
Buffer Stock 1	C = 20% of B ₁
Buffer Stock 2	D = 20% of B ₂
Capsules Required:	
100,000 IU	B ₁ + 20% of B ₁
200,000 IU	B ₂ + 20% of B ₂
Total	(B₁ + 0.20B₁) + (B₂ + 0.20B₂)

strategies tried in the northern regions. To take full advantage of existing MOH service-delivery systems, all regions are required to use health-worker contacts. Under this strategy, health workers distribute vitamin A capsules at one of three locations: health centers or similar health institutions, other distribution points selected for this purpose, and homes of the target beneficiaries.

In addition to health-worker contacts, one of two other strategies — the child-to-child approach or the community-based distribution system — must be selected. Under the child-to-child approach, school children provide their teachers with a list of any children in their families aged six-months to five years. The school children are then requested either to ask caregivers or mothers to bring those young children to school on distribution day or to bring the youngsters themselves. School children may also take the capsules to their younger siblings at home.

Under the community-based volunteer system, community members — trained as Guinea-worm coordinators, clinic attendants, disease surveillance workers, and other such community health workers — volunteer to receive training in administering capsules and implementing associated recording and reporting tasks.

During the 2000 distribution campaign, eight regions distributed vitamin A through community volunteers and health contacts employing a combination of community distribution and house-to-house visits. Upper West Region and Greater Accra Region used the child-to-child approach and health contacts.

The Greater Accra Region distributed vitamin A through the large number of health institutions and pre-schools available in the Accra metropolitan area and the Tema municipal area. Basic schools were also used in rural areas.

In Upper West Region, a modified child-to-child strategy was implemented; due to parents' preference for teachers and health

workers to administer the vitamin A capsules, caregivers sent their wards to area schools to receive the capsules.

Sub-district health workers, volunteers, and supervisors are assigned specific distribution points. Then, children in the target groups are either reached at their homes or brought to a distribution point, where the vitamin A capsules are administered and the activity carefully recorded on tally sheets. For some children, the activity was recorded in their road-to-health chart card. As a part of the process, mothers are counseled on the importance of vitamin A and informed about the next dosing day.

A monitoring team consisting of national, regional, and district supervisors carries out organized and random spot checks. Where necessary, vitamin A capsule administrators are assisted in performing their tasks.

Capsule-distribution teams use all means of transportation available within the region and district, whether these be 4x4 vehicles, 2x4 pickups, motorcycles, or bicycles. MOH, district assemblies, decentralized departments, and local and international NGOs provide fuel and contribute to vehicle maintenance.

At the end of each day, tally sheets are counted and summary sheets completed. Data are compiled by sub-district and district health management teams. After all figures are checked for accuracy, district coverage is calculated.

District coverage data are sent to the regional nutrition officers and senior medical officers of public health, who compile regional coverage figures before sending them to the Nutrition Unit in Accra. Using regional figures, the Nutrition Unit estimates national coverage.

Post-distribution Activities

Completing post-distribution activities is a demanding task. During the post-distribution period, for example, process reports are finalized. Evaluation and review meetings are held within each district with

district assemblies and other decentralized departments. Reports are disseminated to the regional health administration and the district assemblies.

Regional review meetings, usually held in the regional capital, involve the district health management teams, nutrition officers, and representatives of other departments. Reports of regional review meetings are forwarded to the regional coordinating councils, which are governmental forums for managing regional activities. Copies of the reports are also distributed to participants at the national vitamin A supplementation review meeting in Accra. Participants in this meeting are donor representatives (USAID, UNICEF, WHO, Rotary Club International); MOH, including the nutrition unit, the public health unit, and the reproductive and child health unit; senior medical officers of public health for each region; regional nutrition officers; media personnel; heads of regional health management teams; and representatives of other relevant organizations, as appropriate.

A monitoring survey (“mini-survey”) is later conducted to verify coverage as well as qualitative information presented in supervisory reports. That survey is used to gain better understanding of the opportunities and challenges of a vitamin A stand-alone campaign strategy. It is also used to design future vitamin A distribution campaigns. Each region receives copies of the review and monitoring report.

Finally, a summary of expenditure, accompanied by original receipts, is sent to regional authorities, who pass it on to the national vitamin A coordinator. To ensure accountability and respond to donors’ record-keeping needs, expenditure data and original receipts are forwarded to relevant donors.

Activities related to the vitamin A program are part of the routine activities district and sub-district health management teams perform twice a year. However, since vitamin A distribution is only one component of a larger public health program the teams must implement each year, one of their major objectives is to complete the vitamin A distribution activity as quickly as possible. Completing the activity thoroughly, but expeditiously, enables them to concentrate on other primary care activities, such as those related to the expanded immunization program and the child welfare program.

Chapter 3: Program Costs

Methodology

Costing Methodology

The costing methodology used in this study is based on a combination of two common approaches used in cost analysis: the expenditure approach, whereby accounting or expenditure data are analyzed and assigned to specific program activities; and the ingredients approach, in which all inputs needed to generate a given activity are identified and assigned specific costs.

Early data-collection efforts revealed that exclusive reliance upon the expenditure methodology had several shortcomings. First, cost data were in certain instances too aggregated to be useful in evaluating individual program activities. Second, data failed to capture the cost of significant inputs, such as labor. Third, data did not properly account for capital inputs such as vehicles, computers, and similar equipment.

The first step in the data-collection process for this study consisted of obtaining expenditure data from all organizations that participated in the July 2000 vitamin A campaign. Those data were then combined with other information obtained from a variety of sources at the national, district, and sub-district levels. During the limited time allocated to field research conducted for this 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 estimated. Such an approach enabled the study team not only to use a more-comprehensive methodology in analyzing costs, but also to gain a better understanding of the structure and functioning of the vitamin A program in Ghana.

Definitions and Calculation Procedures

Recurrent Costs and Capital Costs

In estimating the annual costs of a program, 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 in analyzing program sustainability — which is largely a function of recurrent costs.

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

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

The longer life span of capital inputs relative to recurrent inputs is an important consideration in developing accurate annual cost estimates. Since capital costs generally represent a significant proportion of total costs, an expenditure-based approach for estimating annual costs can be misleading. For instance, capital expenditures can be significantly higher in a start-up year than in subsequent years; thus, using expenditure data for a start-up year is likely to overestimate annual costs. Conversely, using expenditure data pertaining to a year that shortly follows the start-up phase may well underestimate “average” or “typical” annual costs.

To develop an annual use of capital assets that would smooth out the varying annual costs over the useful life of capital inputs, the annualization method was used in this analysis.¹

Program-specific Costs vs. Other Costs

Two major categories of costs are estimated in this study: “program-specific” costs and “other” costs. Other costs 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 vitamin A program.

Personnel costs. MOH personnel in Ghana are involved in a variety of activities in addition to vitamin A supplementation. Personnel costs are therefore shared among many other health interventions and are 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 estimated at all levels of the planning, distribution, and evaluation and monitoring chain. For each person, it was necessary to determine the proportion of time devoted to the supplementation program by dividing the number of days spent on the program in a given period by the person’s total working days and multiplying that proportion 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. 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. Such costs are those incurred exclusively for the delivery of vitamin A: for example, the costs of capsules, supplies, transportation, fuel and vehicle maintenance, training, and IEC and social mobilization. Personnel and capital are shared resources, as they are not attributable to a single program or intervention. Since the costs of shared resources would arguably be incurred with or without the vitamin A program, 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 they include resources that MOH must mobilize each year to implement the program, such costs are a vital determinant of program

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1 Straight-line depreciation is the simplest technique to estimate annual capital costs. In the straight-line depreciation approach, capital costs are divided by the estimated useful life of the capital item in years. However, straight-line depreciation underestimates the cost of capital because it does not take into account the time value of money. A more accurate method, referred to as the annualization method, includes both the useful lifespan of the capital item being analyzed and the interest forgone each year. Even though annualization yields a higher cost than other methods of depreciation, it is a more appropriate method, especially in an inflationary economy such as Ghana’s in recent years.

sustainability. Second, they are critical in comparing the costs of the vitamin A program with those of other nutrition interventions or in examining alternative program options, such as integrating vitamin A supplementation into other health-care delivery systems.

Program-specific costs were first estimated for the July 2000 vitamin A distribution campaign. Since the program consists of two campaigns every year, those costs were doubled to obtain annual estimates. Other costs, including capital costs, were estimated directly on an annual basis.

As explained in the section on data-collection methodology, this analysis is based in part on cost information obtained from interviews with a limited number of program

participants in representative geographic areas. More-extensive fieldwork and primary data collection would undoubtedly have provided more-refined estimates.

Results

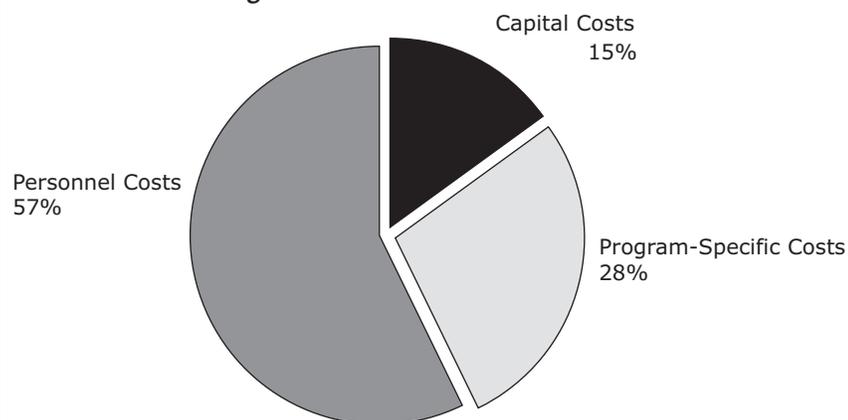
Total Costs

As shown in Table 3.1, total costs are estimated at about ₵13.7 billion or \$2.9 million. Program-specific costs represent 28 percent of total costs, almost twice as much as capital costs but only one-half of personnel costs (see also Figure 3.1). Capsules and capsule distribution represent about 25 percent of program-specific costs. National IEC and campaign activities, technical assistance, and training represent a larger proportion (about 45 percent) of those costs. National-level planning and implementation, social mobilization, monitoring and mini-surveys, supplies other than capsules, and vehicle and equipment maintenance represent about 30 percent of program-specific costs.

Capital costs are 15 percent of total costs: vehicles form the bulk (83 percent) of these. At 57 percent of total costs, personnel costs are higher than program-specific and capital costs combined. MOH personnel costs are about 60 percent of all personnel costs, with the remaining 40 percent divided between government personnel other than MOH personnel (14 percent) and volunteers (26 percent). The cost of volunteer labor represents 15 percent of total costs, the same percentage as for capital costs. Such a large percentage reflects the vital role volunteers play in the vitamin A program.

Table 3.1: Vitamin A Distribution Costs

Cost Item	Amount		% of Total Cost
	₵Million	Dollars	
Program-Specific Cost			
National IEC Campaign	527	109,893	
National-Level Planning & Implementation	108	22,484	
Capsule Distribution	405	84,583	
Social Mobilization	44	9,139	
Monitoring	241	50,180	
Training	544	113,537	
Technical Assistance	625	130,349	
Mini-Surveys	225	46,974	
Scissors and Other Supplies	120	25,037	
Capsules	587	122,364	
Vehicle and Equipment Maintenance	378	78,799	
Total Program-Specific Cost	3,803	793,339	28
Personnel Cost			
Government			
MOH	4,688	978,069	34
Decentralized Departments	1,074	224,146	8
Community Volunteers	2,053	428,335	15
Total Personnel Cost	7,816	1,630,551	57
Capital Cost			
Vehicles	1,719	358,683	13
Office Equipment	130	27,146	1
Long-term Training	204	42,549	1
Total Capital Cost	2,053	428,378	15
Total Cost	13,672	2,852,268	

Figure 3.1: Program-Specific, Personnel, and Capital Costs as a Percentage of Total Costs**Cost per Region**

As summarized in Table 3.2, Ashanti Region accounts for 13 percent of total costs, followed by Eastern Region (11 percent) and Northern Region (10 percent). Greater Accra (7 percent), Upper West (6 percent), and Upper East (five percent) have the lowest cost. Cost at the national level amounts to about 15 percent of total costs. The cost differential among regions can be attributed mainly to personnel costs, which range from eight percent (Ashanti) to three percent (Upper East). Program-specific costs and capital costs each account for only one to two percent of total cost.

Table 3.2: Cost per Region

Region/Cost Category	Cost			Region/Cost Category	Cost		
	¢Million	\$000	% of Total		¢Million	\$000	% of Total
Ashanti	1,759	367	13	Central	1,146	239	8
Program-specific	336	70	2	Program-specific	192	40	1
Personnel	1,152	240	8	Personnel	770	161	6
Capital	271	56	2	Capital	184	38	1
Eastern	1,442	301	11	Western	1,098	229	8
Program-specific	253	53	2	Program-specific	222	46	2
Personnel	961	200	7	Personnel	707	147	5
Capital	227	47	2	Capital	169	35	1
Northern	1,342	280	10	Greater Accra	933	195	7
Program-specific	310	65	2	Program-specific	162	34	1
Personnel	834	174	6	Personnel	690	144	5
Capital	198	41	1	Capital	81	17	1
Brong Ahafo	1,267	264	9	Upper West	863	180	6
Program-specific	235	49	2	Program-specific	92	19	1
Personnel	834	174	6	Personnel	690	144	5
Capital	198	41	1	Capital	81	17	1
Volta	1,166	243	9	Upper East	618	129	5
Program-specific	212	44	2	Program-specific	133	28	1
Personnel	770	161	6	Personnel	389	81	3
Capital	184	38	1	Capital	96	20	1
				National Level	2,040	426	15
				Program-specific	1,656	345	12
				Personnel	21	4	—
				Capital	363	—	—
				Country Total	13,672	2,852	100

Table 3.3: Cost by Administrative Level

Level/Cost Category	Amount		
	¢Million	Dollars	% of Total Cost
National Level	2,040	425,452	15
Program-specific costs	1,656	345,452	12
Personnel costs	21	4,299	—
Capital costs	363	75,760	3
Regional Level	273	57,044	2
Program-specific costs	157	32,808	1
Personnel costs	79	16,521	1
Capital costs	37	7,716	—
District Level	11,359	2,369,712	83
Program-specific costs	1,990	415,079	15
Personnel costs	7,716	1,609,731	56
Capital costs	1,653	344,903	12
Total	13,672	2,852,268	100

Generally, regional costs are correlated with the number of children dosed. Other reasons for the cost differential are size, distribution strategy, and accessibility of distribution centers.

Cost by Administrative Level

Table 3.3 shows that most costs (83 percent) are incurred at the district level, whereas those at the national level are 15 percent and those at the regional level only about two percent. Costs at the national level are mainly program-specific costs that include technical

support, national-level planning, and national IEC and campaign costs.

Program-specific costs at the national level (12 percent of total costs) are only slightly lower than those incurred at the district level (15 percent). Similarly, program-specific costs incurred at the district level (about ¢2 billion or \$415,000) are only 20 percent higher than those incurred at the national level. Since the costs presented here are for the first nationwide vitamin A campaign in Ghana, it is likely that costs at the national level will decrease as the program matures and gains in operational efficiency, and as the districts take on increased management responsibility. At nearly 90 percent of district-level costs, personnel and capital costs represent most of the costs incurred at the district level; personnel costs alone account for 75–80 percent of district-level costs.

Cost by Strategy

As described in the section called Vitamin A Distribution, all regions use a health-contact strategy in addition to either a community-based distribution system or child-to-child approach. During the 2000 distribution campaign, Upper West and Greater Accra were the only two regions using the child-to-child approach (Table 3.4). All other regions used community volunteers.

Table 3.4: Total Cost by Strategy

Region	Coverage (%)	Population Served	Cost				Strategy
			Total		Per Child		
			¢Million	\$000	Cedis	Dollars	
Ashanti	89.1	541	1,759	367	3,250	0.68	Volunteers
Eastern	96.3	425	1,442	301	3,394	0.71	Volunteers
Northern	100.4	394	1,342	280	3,405	0.71	Volunteers
Western	108	377	1,098	229	2,914	0.61	Volunteers
Brong Ahafo	87.3	309	1,267	264	4,099	0.86	Volunteers
Central	100.8	287	1,146	240	3,997	0.83	Volunteers
Greater Accra	53.8	282	933	195	3,306	0.69	Child-to-Child
Volta	94.8	280	1,166	243	4,169	0.87	Volunteers
Upper East	89.4	200	618	129	3,084	0.64	Volunteers
Upper West	62.9	81	863	180	10,639	2.22	Child-to-Child
National			2,040	426			
Total	89	3,176	13,672	2,852	4,305	0.9	

At \$0.69 per child, Greater Accra compares favorably with the country’s total (\$0.90) as well as with the eight regions that used the volunteer strategy; figures for those eight regions ranged from \$0.61 to \$0.87, averaging \$0.75. Upper West had the highest cost per child (\$2.22), possibly attributable to its low population density. Upper West has a population density of 31 per square kilometer as against a national average of 77 and 897 for Greater Accra (Ghana Statistical Service). Two other factors that may have played a contributing role are the number of children in school and how evenly they are distributed among communities and households.

The lower coverage in the regions that used a child-to-child strategy (Greater Accra and Upper West) may be explained by two additional factors. First, distribution in the two regions in 2000 coincided with the school examination period, a scheduling conflict that resulted in a shorter distribution

period. Second, the national IEC campaign placed more emphasis on health contacts and volunteers. It is possible that an IEC campaign placing equal emphasis on the child-to-child strategy would have achieved higher coverage.

Costs by Funding Source

Costs by funding source are described in Table 3.5 and Figures 3.2 and 3.3. GOG provides about three-quarters (73 percent) of total costs and USAID 21 percent. Remaining funds are provided by UNICEF (4 percent) and Rotary Club International (2 percent).

USAID provides almost 70 percent of program-specific costs. UNICEF contributes 15 percent (in the form of vitamin A capsules), GOG 10 percent, and Rotary Club International 7 percent. GOG contributes all personnel costs and nearly 90 percent of capital costs.

Table 3.5: Cost by Funding Source

Source	Funding							
	Program-specific Costs		Personnel Costs		Capital Costs		Total Costs	
	Dollars	%	Dollars	%	Dollars	%	Dollars	%
GOG	78,799	10	1,630,551	100	375,855	87	2,085,204	73
USAID	539,913	68	—	—	52,524	13	592,437	21
UNICEF	122,364	15	—	—	—	—	122,364	4
Rotary Club Int’l	52,263	7	—	—	—	—	52,263	2
Total	793,339	100	1,630,551	100	428,378	100	2,852,268	100

Figure 3.2: Total Cost by Funding Source

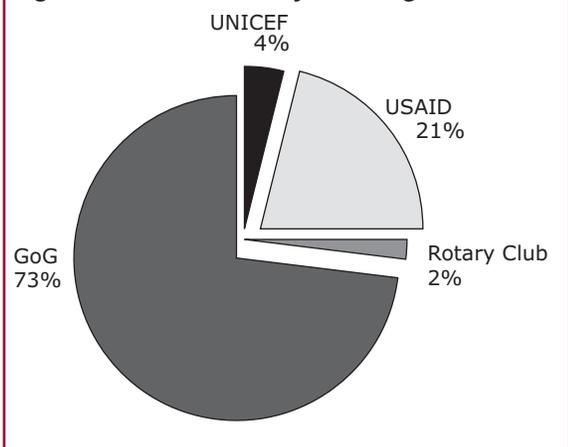
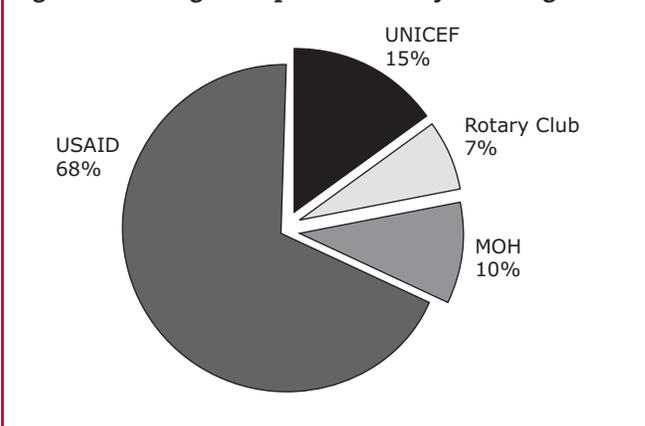


Figure 3.3: Program-specific Cost by Funding Source



Average Cost per Child Dosed

As Table 3.6 indicates, the average cost per child dosed twice yearly is ₵1,197 or \$0.25, if only program-specific costs are considered. The annual average is ₵4,306 or \$0.90, if personnel and capital costs are also included.

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.

Assuming a 19 percent reduction in mortality rate of children between six and 59 months due to the national vitamin A program,² cost per death averted in Ghana is estimated at about \$77, if only program-specific costs are considered, and \$277 when all personnel and capital costs are also included. Under alternative assumptions, the estimated cost per death averted ranges between \$61 and \$163 for program-specific costs and between \$218 and \$586 for total program costs.³ Assuming a

Table 3.6: Annual Cost per Child Dosed

Cost Category	Population Dosed	Distribution Costs		Cost per Child	
		₵ Million	\$000	Cedis	Dollars
Program-specific Costs	3,175, 806	3,803	793	1,197	0.25
Personnel Costs		7,816	1,631	2,461	0.51
Capital Costs		2,053	428	647	0.13
Total Costs		13,672	2,852	4,305	0.90

Table 3.7 presents annual costs per child dosed in selected countries. Estimated average costs per child dosed in Ghana are lower than those estimated in other countries for which data are available; this finding applies to both program-specific and total costs. Program-specific costs in other countries are about 2.5 to 13 times higher than in Ghana, while total costs are about two to four times lower in Ghana than in those countries.

2 This assumption is based on findings in the Ghana VAST Study (VAST 1993). Coverage in the VAST study was estimated at near 90 percent for each supplementation round. It is also worth noting that the number of deaths averted depends upon the underlying birth and death rates for the population, as well as upon the effectiveness of the program. We have used the most current available estimates of fertility and mortality. In subsequent years, as these rates change so will estimates of deaths averted.

3 The following table provides a detailed description of those results.

(a) Reduction in mortality rate under alternative scenarios		23%	19%	15%	10%
(b) Number of births per year *	674,901				
(c) Annual mortality rate for children 6-59 months **	65 deaths per 1000 births				
(d) Number of deaths among children 6-59 months (with vitamin A program): (b)X0.111	43,840				
(e) Expected number of deaths among children 6-59 months without the vitamin A program: (d)/[1-(a)]		56,935	54,124	51,577	48,711
(f) Number of deaths averted (e)-(d)		13,095	10,284	7,737	4871
(g) Annual program-specific costs	\$793,339				
(h) Annual total costs	\$2,852,268				
(i) Cost per death averted (program-specific cost): (g)/(f)		\$61	\$77	\$103	\$163
(j) Cost per death averted (total cost): (h)/(f)		\$218	\$277	\$369	\$586

Notes:

* Calculations using DHS 2002 and U.S. Bureau of the Census International Database online (mid-year 2001 estimates).

** Calculated from data in World Bank Country Profile table for 2000 and Ghana DHS survey for 1998-99 as follows:

- Use the following figures for infant mortality rate (IMR) and under-five mortality rate (U5MR): IMR=58.2 per 1000 births; U5MR=112.1 per 1000 births.
- Calculate mortality rate for children 12-59 months of age (MR 12-59 months) as the difference between U5MR and IMR: 112.1-58.2=53.9 per 1000 births.
- Calculate mortality rate for children 6-11 months of age (MR 6-11 months) assuming that 81% of infant mortality $\frac{3}{4}$ most recent DHS estimate $\frac{3}{4}$ occurs before age 6 months: $IMR \times (1-0.81) = 58.2 \times (1-0.81) = 11$
- Calculate mortality rate for children 6-59 months of age as the sum of MR 6-11 months and MR 12-59 months: $11+53.9=65$ deaths per 1000 births.

23 percent reduction in mortality rate due to the vitamin A program,⁴ program-specific and total costs are estimated at \$61 and \$218, respectively.

These estimates compare favorably with estimates for other countries. Based on data for 10 countries in 1998 and 14 countries in 1999, incremental cost per death averted⁵ was estimated at \$72 (with a range of \$36–142) in 1998 and \$64 (with a range of \$32–126) in 1999. Average total cost per death averted was \$310 (with a range of \$157–\$609) in 1998 and \$276 (with a range of \$139–\$540) in 1999. (Ching et al.).⁶

The vitamin A program is highly cost-effective relative to many other public health care interventions.⁷ 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 3.8).

Table 3.7: Annual Cost per Child Dosed in Selected Countries

Country	Cost (in Y2000 dollars)	
	Program-specific	Total
Ghana (1)	0.25	0.90
Guatemala (1)	3.25	
Nepal (1)	0.67	
Peru (1)	1.42	3.44
Peru (2)		1.82
Philippines (3)	3.27	

Notes:

- (1) Two free-standing vitamin A campaigns
- (2) Two rounds integrated into routine EPI
- (3) One vitamin A campaign and one NIDs-linked round

Sources:

Derived from figures in Fiedler; Ureta, et al.; Capistrano, et al.; OMNI 1998; and Phillips, et al. Figures were converted into Y2000 dollars.

4 This assumption is based on the conclusion in Beaton et al. 1994 – the most widely quoted meta-analysis of vitamin A supplementation on mortality – that vitamin A supplementation resulted in an average reduction of 23 percent. Coverage figures in this study ranged from 58 percent to 93 percent, with most over 85 percent.

5 Incremental costs and average total costs are defined in Ching et al. as follows:

$I=(v * kxd)/z$ and $A=(b * k * d)/Z$; where I=incremental costs per death averted above the cost for polio immunization alone, A=average total cost per death averted for delivering vitamin A supplements alone, v=assumed incremental cost per child reached in addition to costs already incurred for polio vaccination, b=assumed average total cost per child reached for delivering vitamin A supplement alone, k=total number of children reached in a campaign, d=total number of doses administered (or campaign held) during one year, and z=estimated number of deaths averted with vitamin A supplementation. Since I and A are somewhat comparable to, but not identical with, program-specific and total costs as defined in the present study, some caution is necessary when comparing estimates in the two studies.

6 Several factors accounted for the variations in the costs per death averted by country, including campaign strategy used, number and proportion of the child population targeted and reached, and variations in child mortality rates among countries.

7 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 this study as well as in all the studies reviewed place certain limitations on the cost estimates used for comparison. Second, the assumptions used to derive estimates vary widely among studies. 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 program using both program-specific and total costs in Table 3.8.

Table 3.8: Cost-Effectiveness of the Vitamin A Supplementation Program in Ghana Relative to Other Public Health Care Interventions *

Intervention **	Cost per Death Averted ***
Vitamin A Supplementation in Ghana	Program-specific costs: \$77 (a) Total costs: \$277 (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 for Ghana.

** 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 and Pritchett, (5) Cited in Fiedler

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Annex Tables

Table A.1: Program-specific Costs by Region

Region	Cost		
	¢Million	Dollar	% of Total
Ashanti	336	70,081	9
Northern	310	64,677	8
Eastern	253	52,809	7
Western	222	46,295	6
Brong Ahafo	235	48,966	6
Volta	212	44,227	6
Central	192	40,071	5
Greater Accra	162	33,864	4
Upper East	133	27,728	3
Upper West	92	19,169	2
National Level	1,656	345,452	44
Total	3,803	793,339	100

Table A.2: National IEC and Campaign Costs

Cost Item	Cost	
	¢million	Dollars
IEC Production Costs	434	90,541
Artwork	2	420
Commercials	23	4,723
Commercials	23	4,723
Concept Board Dipstick	8	1,574
Graphic and Mirror	50	10,494
Jingle–Theme Composition	10	2,099
Logo	15	3,148
Posters and Stickers	65	13,512
Public Relations	38	7,871
Radio	201	41,978
Campaign Costs	93	19,352
Art work	3	525
Banners	50	10,494
Décor, Banners, etc.	8	1,574
Drama	5	1,049
Launch–PA System	1	262
Launch–Venue	1	262
Leaflets	1	173
Press Kits–Artwork	2	341
Press Kits–Separation	1	289
Production	3	708
Project Management	13	2,624
Supplies	5	1,049
Total	527	109,893

Table A.3: National-Level Planning and Implementation Costs

Cost Item	Cost	
	Million Cedis	Dollars
Monitoring	71	14,783
Drivers' Allowances	9	1,794
Manual Development	26	5,495
Per Diem	23	4,746
Travel & Transport	13	2,748
Press Orientation	37	7,701
Allowances – Facilitators & Script Production	8	1,765
Stationery	0	86
Travel & Transport	28	5,851
Total	108	22,484

Table A.4: Capsule Distribution Costs

Cost Item	Cost	
	¢Million	Dollars
Community Volunteers	270	56,406
Per Diem	133	27,810
Transport & Travel	2	366
Total	405	84,583

Table A.5: IEC, Awareness and Social Mobilization Costs

Cost Item	Cost	
	¢Million	Dollars
Per diem	2	358
Social Mobilization	26	5,515
Travel & Transport	16	3,266
Total	44	9,139

Table A.6: Monitoring Costs

Cost Item	Cost	
	¢Million	Dollars
Drivers' Allowances	26	5,434
Per diem	170	35,562
Travel & Transport	44	9,184
Total	241	50,180

Table A.7: Training Costs

Cost Item	Cost	
	¢Million	Dollars
Allowances–Community Volunteers	275	57,368
Allowances–Drivers	7	1,399
Per diem	195	40,773
Stationery	12	2,546
Travel & Transport	55	11,452
Total	544	113,537

Table A.8: Technical Assistance Costs *

Cost Item	Cost	
	¢Million	Dollars
Office Rental	52	10,800
Miscellaneous Expenses	13	2,792
Telephone	18	3,798
Travel & Transport	34	7,021
Personnel Costs	350	72,938
Program Management	158	33,000
Total	625	130,349

* Figures do not include all technical assistance costs. They represent only USAID/MOST costs that are not incorporated into other program activities.

Table A.9: Costs of Mini-Surveys

Cost Item	Cost	
	¢Million	Dollars
Per diem	34	7,134
Personnel Costs	114	23,809
Transport & Travel	77	16,031
Total	225	46,974

Table A.10: Annual Costs of Capsules by Region

Region	Estimated Number of Capsules Used	Cost	
		¢Million	Dollars
Ashanti	1,136,463	100	20,851
Brong Ahafo	649,001	57	11,908
Central	602,165	53	11,048
Eastern	891,805	78	16,363
Greater Accra	592,708	52	10,875
Northern	827,618	73	15,185
Upper East	420,746	37	7,720
Upper West	170,300	15	3,125
Volta	587,288	52	10,775
Western	791,099	70	14,515
Total	6,669,193	587	122,364

Note:

The number of capsules is estimated by multiplying the number of children dosed by two (reflecting the number of distribution rounds per year) and adding 5 percent for wastage.

Table A.11: Vehicles and Equipment Used for Vitamin A Distribution

Item	Number
Motor Vehicles	928
Motorbikes	1,545
Bicycles	293
Photocopiers	121
Computers	121

Note:

Figures are estimates for all vehicles and equipment used at all administrative levels (national, regional, district and sub-district levels).

Table A.12: Vehicle and Equipment Maintenance Costs by Administrative Level

Administrative Level	Costs (in ₵million, unless indicated)					Total	
	Motor Vehicles	Motorbikes	Bicycles	Photocopiers	Computers	₵Million	Dollars
National	48	—	—	2	2	51	10,715
Regional	5	1	—	1	1	8	1,577
District 220	74	3	12	10	319	66,507	
Total	273	75	3	15	12	378	78,799

Notes:

- (1) Maintenance costs were calculated using data in previous table and data from MOH and commercial dealers in Accra.
(2) Calculations assume 5 percent of total use for vitamin A distribution.

Table A.13: Estimated Number of Shared Personnel

Personnel	Level and Number			
	National	Region	District	Total
Senior Medical Officer–Public Health	1	10	110	121
Principal Nursing Officer–Public Health	1	10	147	158
Senior Nursing Officer–Public Health	1	10	110	121
District Accountant	1	10	110	121
Technical Officers	1	10	678	689
Field Technicians	1	10	128	139
Other Nurses, etc	1	20	3,887	3,908
Drivers	2	10	843	855
Officers of Decentralized departments	—	20	312	332
Teachers	—	2	1,900	1,902
Community Volunteers	—	—	65,182	65,182
Total	9	112	73,407	73,528

Source: Estimates based on a survey conducted for this study.

Table A.14: Estimated Costs of Shared Personnel

Personnel	Number	Average Salary Scale (¢Million)	Estimated Costs	
			¢Million	Dollars
Government Personnel				
MOH				
Senior Medical Officer–Public Health	121	22	173	36,152
Principal Nursing Officer–Public Health	158	17	178	37,050
Senior Nursing Officer–Public Health	121	8	69	14,446
District Accountant	121	10	64	13,303
Technical Officers	689	6	787	164,078
Field Technicians	139	3	35	7,402
Other Nurses, etc	3,908	6	2,973	620,225
Drivers	855	3	409	85,414
Subtotal	6,112	76	4,688	978,069
Decentralized Departments				
Officers of Decentralized departments	332	9	141	29,427
Teachers	1,902	9	933	194,718
Subtotal	2,234	17	1,074	224,146
Community Volunteers	65,182	1	2,053	428,335
Total	73,528		7,816	1,630,551

Note:

Estimated costs to the vitamin A program are based on the estimated time devoted by the various categories of staff to the vitamin A program.

Table A.15: Replacement Cost of Vehicles and Office Equipment

Item	Number	Replacement Value		
		Per Unit (¢Million)	¢Million	Dollars
Motor Vehicles				
Cross Country Vehicle Type 1	1	288	288	60,000
Cross Country Vehicle Type 2	9	102	922	192,375
Other Vehicles	918	91	83,639	17,448,333
Subtotal Motor Vehicles	928	481	84,848	17,700,708
Motorbikes	1,545	15	23,077	4,814,220
Bicycles	293	0.29	84	17,600
Photocopiers	121	21	2,552	532,400
Computers	121	7	870	181,500
Total	—	525	111,432	23,246,428

Notes:

- (1) Replacement values were obtained from commercial dealers.
- (2) Figures are estimates based on survey conducted for this study.

Table A.16: Capital Costs

Item	Replacement Value	Useful Life (Years)	Annualized Costs	
			¢Million	Dollars
Motor Vehicles	4,610	10	1,370	285,869
Motor Bikes	1,169	10	347	72,473
Bicycles	4	5	2	341
Photocopiers	159	5	61	12,816
Computers	54	5	21	4,356
Total	5,996	—	1,802	375,855

Notes:

- (1) Replacement values are based on 5 percent use for the vitamin A program.
- (2) A discount rate of 27 percent was used in calculating the annualized costs.

Table A.17: Estimated USAID Annual Costs

Item	Cost	
	¢Million	Dollars
Recurrent Costs		
National IEC & Campaign Costs	527	109,893
National-level Planning & Implementation	71	14,783
Regional-level Planning & Implementation	155	32,418
District-level Planning & Implementation	836	174,446
Press Orientation	37	7,701
Personnel	350	72,938
Monitoring (mini-surveys)	225	46,974
Scissors and Office Supplies	120	25,037
Administrative Expenses	275	57,411
Total Recurrent Costs	2,596	541,602
Capital Costs		
Long-term Training	204	42,549
Computers and Office Furniture	48	9,974
Total Capital Costs	252	52,524
Total Costs	2,848	594,126

Table A.18: July 2000 Capsule Distribution List

Blue Capsules (100,000 IU)				
Region	Required	Buffer	Total	
			Capsules	Bottles *
Ashanti	67,476	13,495	80,971	162
Brong Ahafo	39,332	7,866	47,198	95
Central	40,000	8,000	48,000	96
Eastern	72,390	14,478	86,868	174
Greater Accra	50,579	10,116	60,695	122
Northern	100,000	20,000	120,000	240
Upper East	24,909	4,982	29,891	60
Upper West	15,000	3,000	18,000	36
Volta	34,167	6,833	41,000	82
Western	50,018	10,004	60,022	120
Total	493,871	98,774	592,645	1,187
Red Capsules (200,000 IU)				
Ashanti	539,798	107,960	647,758	1,296
Brong Ahafo	314,647	62,929	377,576	756
Central	300,000	60,000	360,000	720
Eastern	452,950	90,590	543,540	1,087
Greater Accra	404,658	80,932	485,590	972
Northern	500,000	100,000	600,000	1,200
Upper East	199,271	39,854	239,125	479
Upper West	112,000	22,400	134,400	269
Volta	273,334	54,667	328,001	656
Western	378,148	75,630	453,778	908
Total	3,474,806	694,961	4,169,767	

* A bottle contains 500 capsules.

Source: Central Medical Stores, Tema.

Table A.19: Estimated Capsules Used in July 2000 Round

Region	Children Dosed	Wastage	Total Capsules	Value	
				Cedis	Dollars
Ashanti	541,173	27,059	568,232	49,975,803	10,426
Brong Ahafo	309,048	15,452	324,500	28,539,712	5,954
Central	286,745	14,337	301,082	26,480,093	5,524
Eastern	424,669	21,233	445,902	39,216,986	8,181
Greater Accra	282,242	14,112	296,354	26,064,254	5,437
Northern	394,104	19,705	413,809	36,394,395	7,592
Upper East	200,355	10,018	210,373	18,502,220	3,860
Upper West	81,095	4,055	85,150	7,488,895	1,562
Volta	279,661	13,983	293,644	25,825,906	5,388
Western	376,714	18,836	395,550	34,788,477	7,257
Total	3,175,806	158,790	3,334,596	293,276,741	61,182