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Costs and Financing of Immunization Programs: Findings of Four Case Studies

May 2000

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Partnerships
for Health
Reform



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Partnerships
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Abstract

This report summarizes and compares the results of in-depth case studies of immunization program financing strategies in four countries (Morocco, Bangladesh, Colombia, and Côte d'Ivoire). The objectives of the study were to: (1) draw lessons learned concerning immunization financing strategies that other countries and the international health community can use in planning sustainable financing of immunization programs with country resources; (2) estimate the current and future costs of the country's immunization program, including the additional costs of improvements to the program, both to assist countries in planning their programs and to update and add to the available information on immunization costs of the global community, and (3) provide recommendations to governments on ways to improve its immunization financing strategies for the current program as well as the introduction of improvements to the program.

The cost analyses indicate that most of the costs of immunization programs are recurrent, with personnel time accounting for over half of total costs, followed by vaccines (19 percent–30 percent). Other recurrent costs such as transport and social mobilization account for less than 10 percent of total costs. Differences in the costs of national immunization programs (NIPs) reflect varying service delivery strategies.

Three NIPs use external funding to finance much of the costs of their programs. (The fourth, Colombia, is financed mostly by the government.) The percentage of total costs financed by external sources (donors and World Bank loans) is 27 percent–42 percent. However, an examination of the percentage of program-specific costs (without personnel and building costs) financed by non-government sources shows the role of donor assistance and World Bank loans to be greater, comprising more than three-quarters of program costs.

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Acronyms

BCG	Bacille-Calmette Guerin (tuberculosis vaccine)
CDC	Centers for Disease Control and Prevention
DPT	Diphtheria, Pertussis, Tetanus
EPI	Expanded Program on Immunization
FOSYGA	<i>Fondo de Solidaridad y Garantía</i> (Solidarity and Guaranty Fund)
GNP	Gross National Product
HiB	Haemophilis Influenzae Type B
HPSP	Health and Population Sector Programme
IEC	Information, Education, Communications
IMF	International Monetary Fund
INHP	<i>Institut National d'Hygiène Publique</i> (National Institute of Public Hygiene)
JICA	Japan International Cooperation Association
KFW	<i>Kreditanstalt für Wiederaufbau</i> (German Development Bank)
MMR	Measles, mumps, rubella
MOH	Ministry of Health
MOHFW	Ministry of Health and Family Welfare
NGO	Non-governmental Organization
NID	National Immunization Day
NIP	National Immunization Program
NNT	Neonatal Tetanus
OPV	Oral Polio Vaccine
PAHO	Pan American Health Organization
PHR	Partnerships for Health Reform
SIDA	Swedish International Development Agency
USAID	United States Agency for International Development
VII	Vaccine Independence Initiative
WHO	World Health Organization

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Executive Summary

Background, Objectives, and Methods

With support from the Child Survival Division of the United States Agency for International Development's Office of Health and Nutrition, the immunization financing initiative of the Partnerships for Health Reform (PHR) is assisting in the evaluation and development of country-level financing strategies for sustaining and expanding immunization programs with local resources. In support of this objective, PHR conducted in-depth studies in four countries (Morocco, Bangladesh, Colombia, and Côte d'Ivoire) to assess financing strategies being used for immunization programs. This paper summarizes and compares the results of the four countries. The main objectives of the study were to: (1) draw lessons learned concerning immunization financing strategies that other countries and the international health community can use in planning sustainable financing of immunization programs with country resources; (2) estimate the current and future costs of the country's immunization program, including the additional costs of improvements to the program, both to assist the countries in planning their programs and to update and add to the available information on immunization costs of the global community, and (3) provide recommendations to the countries' governments on ways to improve immunization financing strategies for their current programs as well as for the introduction of improvements to the programs.

In each country case study, current financing strategies are examined (in terms of their adequacy; sustainability; and impact on coverage, equity, and efficiency); the total costs of the program are estimated as are additional costs of possible improvements such as adding new vaccines or innovations; and various options are presented for improving the financing and sustainability of the program. The financing analysis is based on the estimated costs—as opposed to expenditures—to make it possible to account for all resources to the program, including donor contributions, non-governmental organization contributions, local government contributions, and personnel time. The study provides estimates of the share of financing by each major funding source, both in terms of the total estimated cost of the program and the “program-specific” costs, that is, the costs that are incurred specifically for the delivery of immunization services, excluding costs such as personnel and building. The estimates include polio eradication activities.

Costs

The cost analyses indicated that most of the costs of immunization programs were recurrent, with personnel time accounting for over half of total costs, followed by vaccines (19 percent-30 percent). Other recurrent costs, such as transport and social mobilization, accounted for less than 10 percent of total costs. Differences in the costs of national immunization programs (NIPs) in Morocco, Bangladesh, and Côte d'Ivoire reflected varying service delivery strategies. For example, in Morocco, where National Immunization Days (NIDs) include the provision of most antigens, the costs of transportation were a higher percentage of total costs than in the other countries. Routine immunization activities made up the majority of costs of the program (68 percent-84 percent), and NIDs a smaller percentage.

The cost of immunizing children with the routine antigens was found to be relatively low as a share of various aggregates. The cost of the NIP as a share of GNP was only 0.03 percent, 0.1

percent, and 0.09 percent in Morocco, Bangladesh, and Côte d'Ivoire, respectively, and the government contribution was from 2 percent-5 percent of the health budget. In addition, the per capita cost of the NIPs was less than \$1.00 in Morocco, Bangladesh, and Côte d'Ivoire and cost per fully immunized child was under \$25.00 in all three countries.

The introduction of new vaccines such as Hepatitis B was found to be relatively expensive compared to the basic antigens, though still a low proportion of aggregate spending, suggesting that their introduction needs to be carefully planned, and options such as phasing in by regions or targeted populations considered. It is also important to consider whether introducing a new vaccine will not adversely affect the use of the six traditional EPI antigens.

Financing

When the governments' contribution to their immunization programs was assessed, three NIPs (Morocco, Bangladesh, and Côte d'Ivoire) were found to use external funding to finance much of the costs of their programs. In Colombia, however, the government finances most of the costs of its NIP. The percentage of total costs financed by external sources (donors and World Bank loans) in the other three countries was 27 percent-42 percent. When the percentage of program-specific costs financed by non-government sources was examined, the role of donor assistance and World Bank loans was greater and comprised over three-quarters of program costs.

Rather than having a diversity of funding sources for routine immunization, the programs now are increasingly dependent on one source of external funding, such as the World Bank as in the case of Morocco and Bangladesh, or the European Union as in the case of Côte d'Ivoire. Polio eradication activities, on the other hand, are financed by several donors and international organizations.

Donor contributions were often found to be unevenly targeted in terms of their developmental impact. They continue to be used to finance recurrent costs such as vaccines and supplies rather than long-term improvements, such as infrastructure (e.g., cold chain) or the introduction of new technologies such as new vaccines. In the three countries dependent on outside funding, 83 percent-91 percent of donor and World Bank funding went towards recurrent costs in 1998. The high use of external funding for recurrent costs appears to have permitted the inefficient use of resources. One example is the discrepancy between the study's estimate of vaccine needs of the country and what the program actually buys each year.

The experience suggests that external funding, including development bank loans, should be redirected. In the event that external funding is being used for recurrent costs, as in the case of the three countries, the funding should be given on a short-term basis and a plan for the gradual withdrawal of the funds and replacement with country-level resources should be established as part of the negotiation process. In addition, some of these funds can be used to finance long-term investments instead of recurrent costs.

In order to finance program improvements during the next five years, some resource mobilization will be required. This can be accomplished by increasing central government budget allocations through the operating budget, and tapping into other local sources, such as local government, health insurance, and ultimately household contributions. Using local resources to pay for the country's vaccine supply should not constitute a heavy burden (the NIP budget represents less than 5 percent of the Ministry of Health budget), especially given the priority that the governments place on human development and public health. Diversifying the financing of the NIP to include local government, health insurance, household, and other contributions also fits in well with many planned

health sector reforms that call for expanding household contributions, increasing the role of the private sector in delivering basic health services, and decentralizing the government health system.

Vaccine Financing and Procurement Mechanisms

The UNICEF procurement system is being used in both Morocco and Bangladesh in conjunction with participation in the Vaccine Independence Initiative. The UNICEF procurement offers high-quality vaccines at low prices due to the discount the fund receives for the volume of vaccines it orders. The VII allows governments to pay with local currency and payment is not due until the vaccines are received. Each has been found to have both advantages and disadvantages. For Morocco, the primary advantage is to allow payment at the time the order is received. For Bangladesh, which uses the regular UNICEF procurement for all vaccines, advantages are high quality and low unit costs. For diphtheria, pertussis, tetanus (DPT), however, for which it uses the VII in addition to UNICEF procurement, it gains little advantage because of its use of World Bank lending to pay for vaccines and a mismatched fiscal year; these factors obviate the need for the VII. Some of the disadvantages to using the VII or UNICEF procurement are that (1) it creates some dependency on UNICEF; (2) it reduces opportunities for capacity-building in procurement, negotiating on open market, etc. and (3) there can be time lags in the UNICEF system, due to the demands of its bureaucratic procedures.

Côte d'Ivoire directly procures its vaccines. However, a comparison of unit costs indicates that the government is paying higher unit costs for its vaccines with the exception of measles vaccine. This suggests that it needs to explore other possibilities for suppliers to find more competitive prices.

Colombia procures its vaccines directly from manufacturers as well as through the Pan American Health Organization (PAHO) Revolving Fund. In 1995-1997, it obtained its vaccines from both local producers and international manufacturers. Then, in 1998, it began using the PAHO Revolving Fund.

Recommendations

Some general recommendations for NIPs can be made on the basis of the findings of the studies. For governments and NIPs, recommendations include the following:

- > Develop a multi-year strategic plan for their NIPs, in order to establish an immunization program that is both successful and sustainable over the long term.
- > Take into account national health plans and ongoing and planned economic, social, and health reforms when developing the NIP strategic plan.
- > Use cost, financing, and effectiveness data to make a case to greater allocations of national resources for the NIP.
- > Create an immunization coordinating committee should be in place to ensure that there is effective consensus on objectives, coverage data, and performance, and that regular reviews are conducted on cost and financing of the NIP.
- > Reduce dependency on external funding sources for operating costs.
- > Integrate action and coordination among all basic health services to ensure that recommendations made for NIPs are consistent with the rest of the health system activities.

- > Clarify the general roles and responsibilities of government, donors, lenders, and other international organizations.
- > Examine opportunities for cost savings in estimating vaccine needs and reducing vaccine wastage.
- > Make an effort to build capacity at the national level of ministries of health and NIPs for conducting costing and financing studies so that program financing needs can be projected and monitored efficiently.

Plans for the future of a program, including the introduction of new vaccines and technologies, the diversification of financing sources, and the mobilization of new resources should be based on information concerning needs, effectiveness, costs, and cost-effectiveness. Given a program's objectives and plans for the future, some applied studies and analyses are recommended at the central and provincial levels: inventory of the cold chain, cost-benefit studies of new vaccines, analysis of future needs for NIDs and other types of campaigns, role of the private sector, and a study of cost recovery.

Recommendations to international organizations and donors include:

- > Support to immunization activities should be coordinated and reoriented with the establishment of interagency coordinating committees or the equivalent. All partners should agree on objectives, coverage data, performance, and financing of the NIP.
- > External resources should complement country-level public efforts rather than substitute for them. Therefore, external support for basic vaccines and supplies as well as operating costs should be phased over to funding by local resources (central and local governments, health insurance, cross-subsidization mechanisms, prepayment schemes, etc.) for all but the poorest and most troubled countries.
- > If external funding is currently being used for recurrent costs (e.g., basic vaccines and supplies as in the case in Bangladesh, Côte d'Ivoire, and Morocco), a plan for the gradual withdrawal of the external funds and replacement with country-level resources should be established.
- > External funding, including development bank loans, should be redirected and used to finance, if needed, long-term improvements, such as infrastructure (e.g., cold chain), technical assistance, capacity building, and, perhaps, with progressive withdrawal, to introduce new vaccines and technologies.

1. Introduction

In recent years, national governments and the international health community have become increasingly concerned with the issues of financing childhood vaccines and immunization programs. Despite tremendous gains achieved in immunization coverage in the 1980s in nearly all developing countries with the establishment of Expanded Programs on Immunization (EPI)—now often called national immunization programs (NIPs)—coverage rates in the 1990s reached a plateau or even declined in a number of countries, especially in Sub-Saharan Africa, as donors reduced their funding for immunization, as national health budgets declined with deteriorating economic conditions, and as other health priorities, such as HIV/AIDS, consumed increasing attention and limited health funds.

With support from the Child Survival Division of the United States Agency for International Development Office of Health and Nutrition, the immunization financing initiative is assisting in the evaluation and development of country-level financing strategies for sustaining and expanding immunization programs with local resources. PHR conducted in-depth studies in four countries (Morocco, Bangladesh, Colombia, and Côte d'Ivoire) to assess financing strategies being used for immunization programs.¹ This paper summarizes and compares the results of the four countries.

The objectives of the studies were to: (1) draw lessons learned concerning immunization financing strategies that other countries and the international health community can use in planning sustainable financing of immunization programs with country resources; (2) estimate the current and future costs of the country's immunization program, including the additional costs of improvements to the program, both to assist the countries in planning their programs and to update and add to the available information on immunization costs of the global community; and (3) provide recommendations to governments on ways to improve immunization financing strategies for their current programs as well as for the introduction of improvements to the programs.

¹ While most results are available for Bangladesh, Côte d'Ivoire, and Morocco, fewer were available for the Colombia study.

2. Methodology

The study methodology was based on a study protocol that specified research questions, methods of investigation, and expected results. These research questions were formulated after a review of current immunization financing strategies was undertaken (DeRoeck and Levin, 1998). This protocol was adapted in order to consider specific concerns and issues of the NIP managers and local policymakers within the specific countries.

Each country case study examined the current financing strategies of the country's program (in terms of their adequacy; sustainability; and impact on coverage, equity and efficiency); estimated the total costs of the program as well as additional costs of possible improvements to the program such as adding new vaccines or innovations; and presented various options for improving the financing and sustainability of the program. These options include: changing vaccine procurement mechanisms, increasing central government allocations to immunization activities, reducing costs, changing the role of the private sector in immunization service delivery, and mobilizing resources through different mechanisms.

Key questions for each case study varied somewhat according to the context of the particular country but generally included:

What are the total annual costs of the NIP and what are its principal components?

- > What are the costs of polio eradication activities vs. routine program costs?
- > What are areas for possible cost savings and what degrees of cost savings?
- > What are the trends in financing for immunization programs? What is the mix of financing strategies that the country has been using to fund immunization services and the procurement of vaccines?
- > What percentage of NIP costs is the government financing? What types of costs are donors primarily covering?
- > What is the private sector's contribution to the provision of immunization services?
- > What will be the impact of introducing program improvements such as additional vaccines on the cost and financing of the immunization programs? How will the country finance the additional vaccines?
- > How successful have the various mechanisms to facilitate vaccine financing (e.g., the Pan American Health Organization's [PAHO] Revolving Fund, UNICEF's Vaccine Independence Initiative [VII], the European Union [EU] Initiative) been in increasing the country's self-sufficiency in vaccine supply?
- > What has been the impact of these mechanisms on the country's vaccine supply, the coverage and quality of the immunization program, the availability of funds for other components of the program, and funding for key health program inputs?

- > What are the projected costs of the program for the next five years, including the additional costs of program improvements (e.g., introduction of Hepatitis B, replacing the cold chain)?

The criteria for selection for the case studies were as follows: a relatively well-performing immunization program; the planned introduction of additional vaccines; current or planned diversification of financing sources for immunization services; range of complexity among the sample of countries in the mix of financing sources and strategies for health and NIP services; variety of regions in the world and socioeconomic levels represented among countries; participation in a program to facilitate vaccine financing, such as the VII.

The first country case study, **Morocco**, was chosen by PHR and the World Health Organization (WHO) because it was the first country to use the VII and its NIP had begun introducing Hepatitis B within the country. **Bangladesh**, on the other hand, was chosen because of its relatively high level of self-sufficiency in vaccine financing (estimates of central government contributions range from 40 percent to 45 percent of total immunization program costs) despite a relatively low income level (see Table 1), the presence of an active non-governmental organization (NGO) community, and its involvement in the VII.

The case study country from sub-Saharan Africa, **Côte d'Ivoire**, was selected by PHR and WHO due to its procurement of vaccines through the open market rather than the UNICEF system, its introduction of yellow fever vaccine, and its plans to begin introducing the Hepatitis B vaccine in the capital, Abidjan, and then phasing it in throughout the country.

The fourth case study, **Colombia**, was chosen in part because it differed from the others in that it has a more complex program. It also was chosen because it provided an opportunity to assess the impact of health sector reform on immunization financing—in this instance, decentralization of the General Social Security System in Health (*Sistema General de Seguridad Social en Salud*).

2.1 Data Collection and Analysis

The four assessment teams comprised health economists, immunization specialists, research analysts, national immunization program officials, and local consultants.² The specific modes of data collection and analysis varied according to available information and resources in each country.

Assessment teams obtained cost and financing data from documents and in-depth interviews with key informants in each country's ministry of health (MOH), ministry of finance, and private sector; and among donors and international communities.

Data were collected at sub-national levels as well as at national levels. In the Bangladesh study, for example, two small surveys were conducted to obtain missing information on local government contributions and provision of immunizations by private clinics and doctors' chambers.

Detailed information on costing and financing methodology, including definitions of total and program-specific costs, calculation of vaccine and supply needs, description of variables, and study constraints and limitations, are described in the individual PHR case study reports (Kaddar et al., 1999, Levin et al., 1999, Maceira et al., 2000, Kaddar et al., 2000).

²The Côte d'Ivoire and Morocco case studies were conducted in collaboration with WHO. PHR collaborated with PAHO in carrying out the Colombia case study.

Figure 1 presents a framework of data analysis used by assessment teams.

Figure 1. Data Analysis Framework

Type of Costs		
Sources of Financing	Investment Costs	Recurrent Costs
Internal		
External		

The organization of financing data in this framework indicates whether internal sources (central government, local government, health insurance, private sector, etc.) are being used for financing recurrent and investment costs as well as how external sources' (donors, development banks, and international organizations) support has been targeted. This information helps managers and donors evaluate the roles and responsibilities of the government, international donors, NGOs, and the private sector in financing the NIP. Long-term sustainability is strengthened by a country's capacity to internally finance recurrent costs, and to limit external funding to investment costs, such as the purchase of cold chain equipment and assistance in introducing new vaccines.

The study assessment teams encountered some constraints and limitations during data collection and analysis. In some cases, data were lacking, information systems had changed, or data were only available for the current year. Also, information was sometimes lacking for financing sources other than the central MOH. Such constraints made it difficult to estimate contributions of non-MOH financing sources for immunization, such as donor and private sector contributions, insurance programs, and cost recovery activities in the public sector. For each team, data limitations and the fact that immunization plans were still being developed also made it difficult to provide meaningful cost projections for some of the planned additions and changes to the NIP. Specific data limitations are discussed in each country report.

2.2 Costing and Financing Analyses

The estimation of costs concentrated on what the ministry of health and its partners currently spend and will need to spend in the future to provide immunization services, with acceptable levels of quality and coverage. The costs of resources provided by the government from sectors other than health were considered only for the National Immunization Day (NID) cost analysis. The costs to consumers, such as costs of travel to a health facility, were not estimated in these analyses.

Estimated costs, as opposed to expenditures, were used as a basis for the financing analysis. This allowed for accounting of all resources directed to the program, several of which would not appear in expenditure reports, including in-kind contributions from communities and from other (non-health) sectors, donor contributions of materials and equipment, and personnel time.³ However, in some cases, expenditure data were used when information was not available on costs such as quantities. The costs of donated items were included whenever documented amounts and costs were available.

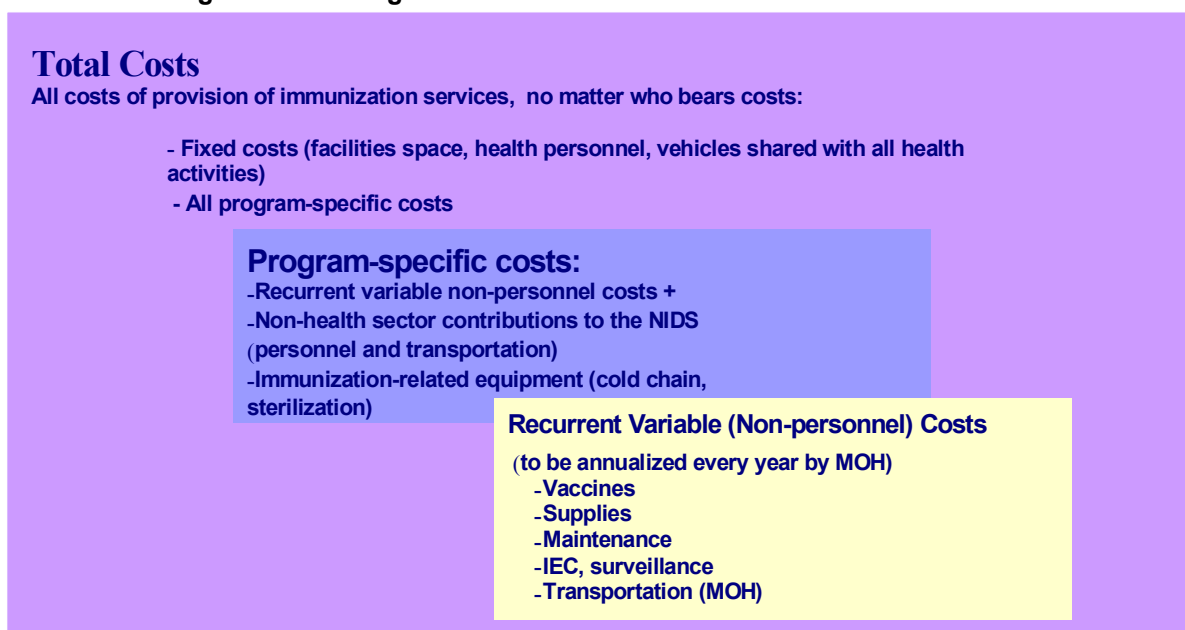
³ In addition, when estimating costs, the purchase cost of capital goods is distributed across the estimated useful life of the investment time, with an adjustment by a factor that accounts for the opportunity cost of having money tied up in capital.

For the financing analysis, teams assessed costs using the following categories: total estimated costs, program-specific costs, and recurrent, variable, non-personnel costs.

- > **Total estimated costs** of the NIP were calculated, regardless of who bears these costs. Total costs include the proportion of depreciated capital costs—health facilities, vehicles, equipment, etc.—that are estimated to be used for immunization services, as well as the estimated cost of health personnel time used to provide immunization services. In addition, when estimating costs, the purchase cost of capital goods is distributed across the estimated useful life of the investment time, with an adjustment by a factor that accounts for the opportunity cost of having money tied up in capital.
- > **Program-specific costs** of the immunization program include only the costs that are incurred specifically for the delivery of immunization services, over and above the costs shared with other health activities and regardless of who pays for them. These include: all recurrent variable costs required to provide immunization services, such as vaccines, syringes, needles, and other vaccine supplies; transportation costs for both the NIDs and routine services; maintenance and overhead costs; and information, education, communications (IEC)/social mobilization costs that are related to the immunization program; contributions from non-health sectors for the NIDs; and the cost of immunization-related equipment (i.e., cold chain and sterilization equipment).
- > **Recurrent, variable, non-personnel costs** are the costs that the MOH must mobilize each year for the NIP, either from its own budget or from donors. These costs include vaccines, syringes, and other supplies, and other recurrent costs such as maintenance, transportation costs incurred by the MOH, IEC, and short-term training.

Teams also use these costs as the basis for estimating the additional costs of, and financing required for, future planned improvements, such as introducing Hepatitis B into the program and renewing or improving the cold chain system. They are also used as the basis for developing potential financing scenarios.

Figure 2. “Nesting” of the Cost Estimates Made in the Studies



3. Background

3.1 Health and Socioeconomic Characteristics of the Four Countries

The four countries in the study differ in terms of socioeconomic indicators and health indicators. Table 1 shows some basic health and socioeconomic indicators for each of the four countries in the study. The countries' health indicators vary widely, with the two countries with lower GNP per capita (Bangladesh and Côte d'Ivoire) having similarities and the two countries with higher income per capita (Morocco and Colombia) also having similarities.

Life expectancy levels are lower in Côte d'Ivoire and Bangladesh, and higher in Morocco and Colombia. Similarly, the infant mortality rates are higher in the lower-income countries, Côte d'Ivoire and Bangladesh, and lower in the middle-income countries, Morocco and Colombia.

Table 1. Socioeconomic and Health Indicators of Four Case Study Countries, 1998

	Morocco	Bangladesh	Côte d'Ivoire	Colombia
Population (in millions)	28.1	128	15.7	41.0
GNP per capita	\$1,250	\$260	\$700	\$2,280
Life expectancy	66	57	56	70
Infant mortality rate	55	77	86	26
DPT3 coverage rate	89%	68%	64%	69%*

Source: World Bank 1999, PHR reports.

* The DPT3 coverage declined from 92 percent in 1996 to 69 percent in 1998 after health reforms were introduced.

The DPT3 coverage is less than 70 percent in Côte d'Ivoire, Bangladesh, and Colombia. The Côte d'Ivoire NIP recently increased its coverage rates from 41 percent to 64 percent through increasing its commitment to the program. The rates in Bangladesh, on the other hand, have plateaued. In Colombia, the coverage is relatively low for the country's income level and reflects a recent decline that took place after health reforms were introduced (discussed in a later section). The DPT3 coverage is relatively high in Morocco and has increased since NIDs were introduced in 1987.

3.2 Immunization Service Delivery Strategies

The mix of service delivery strategies used in each country differs. In Morocco and Côte d'Ivoire, the principal strategy for rural and urban areas is the use of fixed delivery points; these outlets include health centers, dispensaries, and local hospital outpatient services. Immunization services are offered at these facilities on average between two and five times a week. The urban facilities offer services more frequently than rural health centers and dispensaries. Mainly certified nurses and health assistants administer immunizations.

A second strategy that is used in Morocco and the Côte d'Ivoire at the rural level is outreach activities. The nurse at the rural health center conducts this activity at the health center or with community volunteers. Depending on the center's logistical capacity, the nurse visits all villages

within a predetermined radius of the center once a month to offer immunization services. Insufficient resources for transportation limit this approach.

In Bangladesh, service delivery strategies differ for rural and urban areas. In rural areas, field workers provide immunization services at eight outreach sessions per month in each ward.⁴ Their services are supplemented by others at union-level clinics, sub-district hospitals, and district hospitals. In the urban areas, immunizations are delivered primarily through fixed delivery in local government clinics on a weekly basis. Since the local government has limited staff, the services of city/municipal vaccinators are supplemented by service provision at hospitals, by NGOs, and by private for-profit providers.

Côte d'Ivoire, Bangladesh, and Morocco conduct national immunization days in order to eradicate polio. Morocco began conducting NIDs in 1987 in order to increase coverage for the six EPI antigens for children under one. Since 1995, the NIDs in Morocco also began providing polio to all children under the age of five as part of the polio eradication campaign. In Côte d'Ivoire and Bangladesh, however, only polio immunizations and Vitamin A supplements are provided during these campaigns.

In Colombia's urban areas, immunizations are provided at health centers and posts as well as at hospitals, with outreach activities in risk areas. National vaccination days are also conducted periodically. In addition, private institutions and the Social Security Institute provide immunizations for their members and beneficiaries. In rural areas, besides immunizations at health centers and posts, both campaigns and mobile teams are used periodically. Since polio has been eradicated from this country, no NIDs for polio eradication are being conducted, but measles campaigns are conducted periodically.

NIP Vaccines

In the 1960s, programs usually provided only one or two vaccines, such as BCG. Since the 1970s, when the Expanded Program on Immunization was launched, national immunization programs have included the following vaccines in their programs for children under the age of one: BCG (Bacille-Calmette Guerin, against tuberculosis), DPT (against diphtheria, pertussis, and tetanus), poliomyelitis, and measles, as well as tetanus toxoid for women of childbearing age.

Vaccine development has continued to take place and NIPs are gradually adding newer vaccines to their programs, depending on the epidemiology of the country and additional costs and management support required, and affordability. Some vaccines, such as yellow fever and Japanese encephalitis, are only added if the disease is endemic in the country or at a subnational level. Other antigens that are gradually being added to programs include Hepatitis B vaccine, HiB (Haemophilus influenzae type B), and MMR (measles, mumps, and rubella), or combinations.

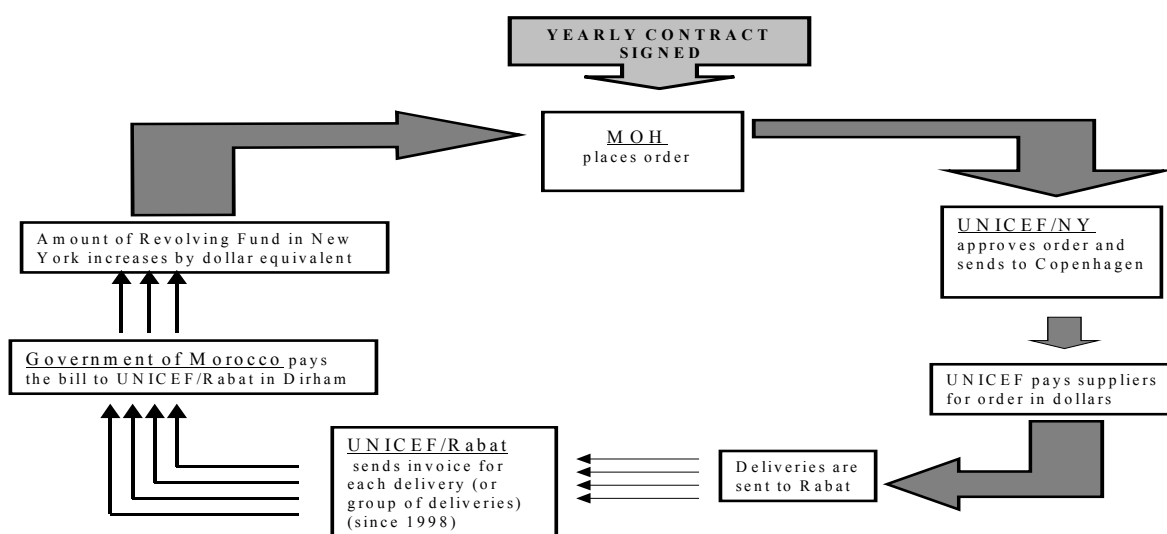
In general, the cost-per-dose of the newer vaccines is considerably higher than those of the traditional EPI antigens. The higher prices are largely due to the characteristics of the market for vaccines: the high development costs for new vaccines and small number of companies involved in vaccine production, and use of patents.

⁴ Wards are the smallest administrative unit of the health system in rural areas and serve populations of approximately 6,000 persons.

3.3 Vaccine Financing and Procurement Mechanisms

Several procurement mechanisms are used by the countries to obtain vaccines. Both Morocco and Bangladesh use the UNICEF procurement system in conjunction with participation in the Vaccine Independence Initiative to finance the purchase of vaccines (Figure 3). The VII is a revolving drug fund that permits countries to buy vaccines through UNICEF's procurement system using local currency and to pay for them only after the vaccines arrive in country, thereby eliminating two major obstacles—the lack of hard currency and the need to pay in advance—that developing nations often face in purchasing vaccines on the open market. Morocco now purchases all of its vaccines through the VII. Bangladesh purchases its vaccines through the UNICEF's regular procurement system; it uses the VII to buy one antigen, DPT.

Figure 3. The VII Revolving Fund Cycle in Morocco



In contrast, Côte d'Ivoire obtains its vaccines through the open market using tenders and bids to organize competition among suppliers. The National Institute of Public Hygiene (*Institut National d'Hygiène Publique*, INHP) and the Central Medical Store (*Pharmacie de la Santé Publique*) play a key role in procurement, reception, storage, and distribution of the vaccines and supplies.

Colombia procures its vaccines directly from manufacturers as well as through the PAHO Revolving Fund. In 1995-1997, it obtained its vaccines from both local producers (BCG, DPT, and yellow fever) and international manufacturers. In 1998, the purchase of measles vaccines took place through the PAHO Revolving Fund while other vaccines were acquired from foreign and local providers.

3.4 Health Reforms in the Four Countries

Three of the four countries—Bangladesh, Morocco, and Colombia—are undergoing health reforms that already have had or are likely to have an impact on the immunization programs. The fourth country, Côte d’Ivoire, is planning health reforms as well.

In Bangladesh, the reform package developed with the World Bank and other donors for 1998-2003 is known as the Health and Population Sector Program (HPSP). The reforms that are being put into place include (1) an integration of the health and family planning branches within the Ministry of Health and Family Welfare (MOHFW), (2) a pooled funding mechanism, and (3) the rural service delivery system shifted from community-based to fixed clinic delivery. The HPSP will affect the NIP in two ways: Regarding service delivery, vaccinations will be given in fixed sites staffed by a health assistant and family welfare assistant; rural outreach sites will be gradually phased out. Regarding procurement, the HPSP will centralize the procurement system in the MOHFW rather than working through the EPI unit.

Morocco recently started decentralizing its health system and is pursuing a number of other health reforms related to hospital autonomy, private sector and health insurance development. The major planned changes that will affect the NIP are the following: increased participation of the private health sector in immunization service delivery and decentralization of the health system.

Colombia has undergone far-reaching economic, political, and institutional changes during the 1990s. It began the decentralization of health services in 1991. Under the new laws, departments and municipalities now have expanded authority and access to resources for management of health services at those levels, and a General Social Security Health System has been established to guarantee equal and compulsory access for the entire population. Colombia is now grappling with a decentralized health system and a variety of financing sources and providers for immunization. Funding sources include the central government, social security, local government allocations, and out-of-pocket payments to private providers. Private providers and NGOs provide an estimated 10 percent of immunization services, and the role of the social security system as a provider of immunization services has expanded with recent reforms. The challenge to the health reforms is for local governments to allocate national funds sufficiently to cover program needs.

In Côte d’Ivoire, the MOH is planning to decentralize management of its program to the districts. In these districts, the local health services will collaborate with NGOs to deliver services.

4. Immunization Program Costs

The estimated total costs of the national immunization programs are presented in the case study reports and summarized below.⁵ Because costs are not comparable across countries due to differences in population size, coverage rates, exchange rates, and purchasing power parity, the percentage of total costs spent on recurrent and capital costs is where appropriate comparisons may be made.

Table 2 presents the estimated total costs of the NIPs. In the three countries with complete information, recurrent costs accounted for 89 percent-92 percent of total costs, while annualized capital costs made up the remaining 8 percent-11 percent. Personnel was the largest cost category and accounted for more than half of total costs (and approximately two-thirds of recurrent costs), followed by vaccines (19 percent-30 percent). Other cost components of recurrent costs comprised less than 10 percent of total costs.

Table 2. Estimated Total Costs of National Immunization Programs (US\$000s)

Cost Components	Morocco (1997-1998)	Bangladesh (1997-1998)	Côte d'Ivoire (1998)	Colombia (1998)*
Recurrent Costs				
Personnel	6,718.1 (59.9%)	17,731.7 (51.5%)	5,792.4 (60.6%)	46.0**
Vaccines	2,217.7 (19.8%)	10,649.0 (30.9%)	1,836.1 (19.2%)	\$14,749.0
Supplies	157.7 (1.4%)	1,173.9 (3.4%)	344.9 (3.6%)	\$1,323.0
Transportation	534.7 (4.8%)	596.7 (1.7%)	247.1 (2.6%)	\$132.0
Short-term training	2.9 (0.03%)	71.9 (0.2%)	47.8 (0.5%)	9.0
Social mobilization	95.3 (0.85%)	532.2 (1.5%)	265. (2.8%)	659.0
Maintenance/Overhead	181.2 (1.6%)	326.0 (0.9%)	215.6 (2.3%)	2,218.0
Subtotal	\$9,907.5 (88.5%)	\$31,081.3 (91.1%)	\$8,749.3 (91.5%)	\$19,136.0
Capital Costs				
Building	935.6 (8.4%)	1,739.2 (5.1%)	556.7 (5.8%)	NA
Vehicles	57.5 (0.5%)	200.5 (0.6%)	65.4 (0.7%)	NA
Equipment	289.3 (2.6%)	1,380.6 (4.0%)	182.5 (1.9%)	177.0
Long-term training	8,510 (0.08%)	15.2 (0.0%)	—	NA
Subtotal	\$ 1,290.7(11.5%)	\$3,335.4 (8.9%)	\$804.5 (8.4%)	\$177.0
Total Annual Costs	\$11,213.2 (100%)	\$34,416.8 (100%)	\$9,558.2 (100%)	\$19,313.0

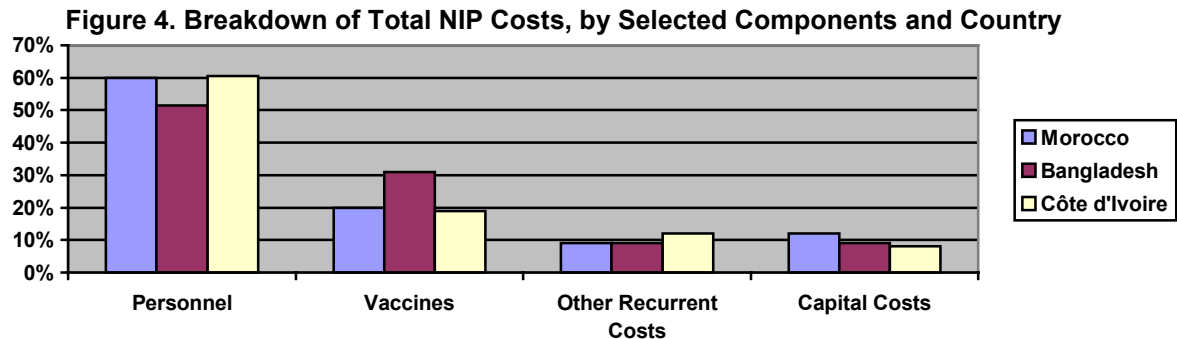
* The Colombian costs do not include the cost of service delivery personnel, buildings, and vehicle costs.

** Personnel costs are only for support to the cold chain and do not include the value of time spent on service provision.

⁵ Because the costs are not fully documented for Colombia and are not comparable, the comparison of costs are mainly among the three national programs of Morocco, Bangladesh, and Côte d'Ivoire.

The costs for vaccines in Colombia were high since the country has expanded the number of vaccines in its routine immunization program. Besides the more traditional vaccines of BCG, DPT, polio, and neonatal tetanus (NNT), the program also provides Hepatitis B, Hib, yellow fever, and MMR.

The composition of total costs differed among the three countries (see Figure 4). In Morocco and the Côte d'Ivoire, personnel costs accounted for about 60 percent of total costs and vaccines for about 20 percent. In Bangladesh, 51.5 percent was for personnel costs and some 31 percent was for vaccines. Morocco spent a larger share on transportation than did the other two countries, perhaps because of more extensive NID activities.



The costs of NIPs were broken down between routine immunization activities and campaign activities, or NIDs. The percent of total costs spent for routine activities was similar for Bangladesh and Côte d'Ivoire (84 percent and 82 percent) where campaign activities provided only polio immunizations and Vitamin A supplementation (see Figure 5). However, in Morocco, where all six traditional antigens usually are provided during NIDs, the percent spent on routine activities was lower (68 percent).

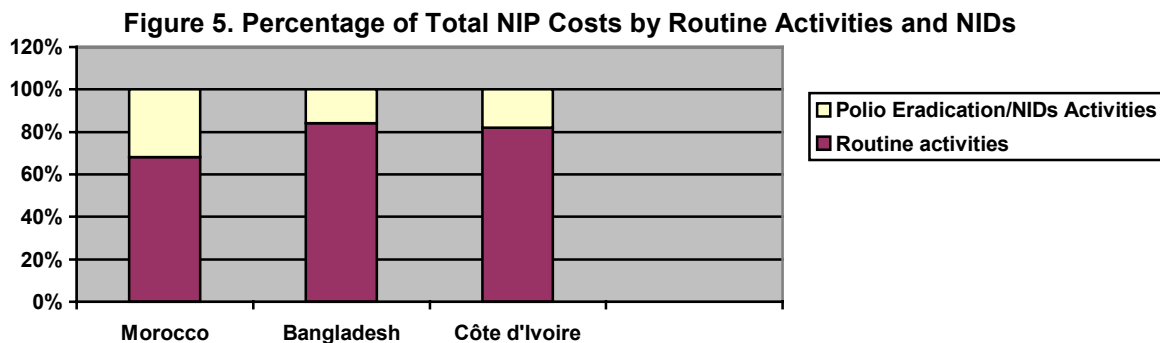
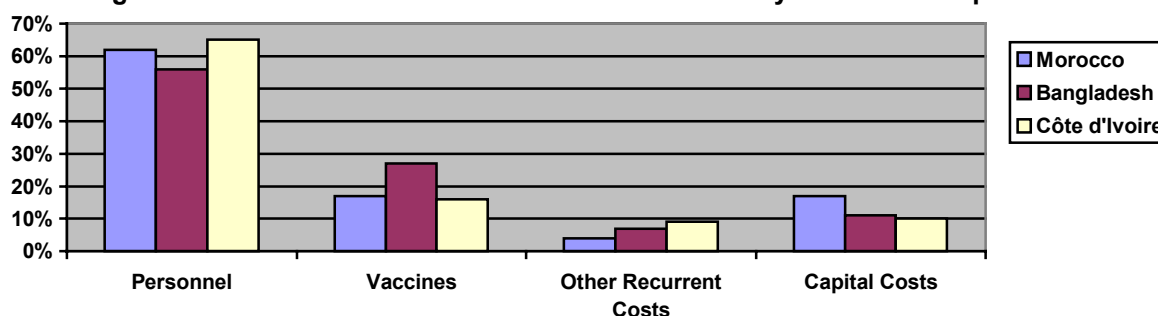


Figure 6 shows the percentage of total costs spent on routine immunization in each of the three countries. Personnel costs accounted for an even larger percentage of routine activities (56 percent-65 percent) than of the program as a whole, while vaccine costs comprised a lower percentage (16 percent-27 percent). Other recurrent costs made up less than 10 percent of total costs while capital costs ranged from 10 percent to 20 percent.

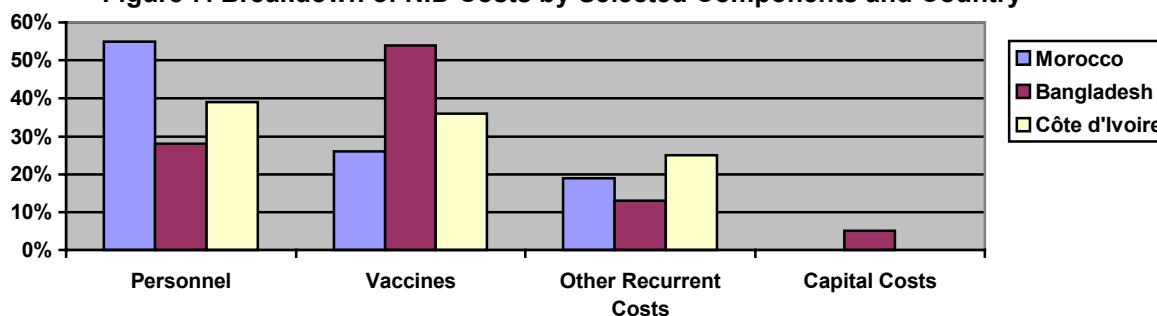
Differences were again found in the composition of routine immunization costs among the three country programs. In addition to a lower percentage of total costs spent on personnel and more spent on vaccines in Bangladesh, capital costs accounted for a larger share of costs in Morocco than in the other two countries (due to the larger health infrastructure involved).

Figure 6. Breakdown of Routine Immunization Costs by Selected Components



The percentage of specific components of NID costs in 1998 are shown in Figure 7. Personnel constituted the largest costs in Morocco and Côte d'Ivoire, accounting for 55 percent and 40 percent of total costs, respectively. In Bangladesh, on the other hand, vaccines comprised over half of total costs (54 percent), while personnel accounted for 28 percent.⁶ Other recurrent costs comprised between ten and thirty percent of total costs due to the higher needs for transport and social mobilization for this activity. Capital costs were relatively low for this activity.

Figure 7. Breakdown of NID Costs by Selected Components and Country



NIP recurrent, variable, non-personnel costs were also estimated to determine the annual funding that a program must mobilize each year (Table 3). Because personnel are not a part of these costs, vaccines accounted for the majority of costs (62-80 percent). Other costs were supplies (6-12 percent), transportation (1-8 percent), maintenance and overhead (2-12 percent), and social mobilization (3-9 percent).

Table 3. Estimated Recurrent, Variable, Non-personnel Costs of the NIPs (US\$000s)

Cost Components	Morocco (1997-1998)	Bangladesh (1997-1998)	Côte d'Ivoire (1998)	Colombia (1997)
Vaccines	2,217.7 (79%)	10,649 (79.8%)	1,836.1 (62.1%)	14,749 (77%)
Supplies	157.8 (5.6%)	1,173.9 (8.8%)	344.9 (11.7%)	1,323 (6.9%)
Transportation	137.8 (4.9%)	596.7 (4.5%)	247.1 (8.4%)	132 (0.7%)
Maintenance/Overhead	181.2 (6.5%)	326.0 (2.4%)	215.6 (7.3%)	2,218 (11.6%)
IEC/Social mobilization	95.3 (3.4%)	532.2 (4.0%)	265.5 (9.0%)	659 (3.5%)
Short-term training	2.9 (0.1%)	71.9 (0.5%)	47.8 (1.6%)	9(0.0%)
Total	\$2,792.6 (100%)	\$13,349.7 (100%)	\$2,956.9 (100%)	\$19,090(100%)

⁶ This may be because the cost of the other sector volunteers were undervalued.

The percentage of costs of vaccines was lower in Côte d'Ivoire than in the other three countries and is probably related to the relatively high cost of supplies and transport in that country. While supplies were costliest after vaccines in Bangladesh and Côte d'Ivoire, maintenance and overhead comprised a higher percentage in Morocco and Colombia.

Measures of cost-effectiveness were calculated for each of the three countries with total cost information and are shown in Table 4. The cost per dose ranged from \$0.41 in Côte d'Ivoire to \$0.77 in Morocco, and was higher for routine programs than for NIDs. The costs of fully immunizing a child by the age of twelve months were surprisingly similar for the three countries for the NID as a whole, (\$20.89-\$24.29). The per capita cost was highest in the Côte d'Ivoire (\$0.61) and lowest in Bangladesh (\$0.28).

Table 4. Cost-effectiveness Estimates for National Immunization Programs

Measure	Morocco(1997/98)		Bangladesh(1997/98)		Côte d'Ivoire(1998)	
	Output	Cost-effectiveness Ratio	Output	Cost-effectiveness Ratio	Output	Cost-effectiveness Ratio
Number of doses administered:						
Routine activities	6,822,748	\$1.12/dose	34,378,179	\$0.84/dose	15,322,840	\$0.51/dose
NIDs	7,819,647	\$0.45/dose	32,245,922	\$0.17/dose	7,890,000	\$0.21/dose
Total	14,642,394	\$0.77/dose	66,624,101	\$0.52/dose	23,212,840	\$0.41/dose
Children fully-immunized by age 12 months (FIC)	536,692 (82.5%)	\$20.89	1,603,260 (54%)	\$21.47	393,740 (65%)	\$24.29
Per capita cost	28,000,000	\$0.40	123,080,614	\$0.28	15,695,251	\$0.61

5. Financing of Immunization Services

In this chapter, patterns in the financing of national immunization programs in the four countries are discussed. To give a context for the financing of NIPs, the trends in financing of the health system in the three countries of Morocco, Bangladesh, and Côte d'Ivoire are presented first. Table 5 shows that private and public expenditures on health comprised about 4 percent of GNP in Morocco and Bangladesh. The percentage was lower in Côte d'Ivoire, but information was only available on public expenditures and not private ones. The percent of the total government budget that was spent on the health sector ranged from 4.9 percent in Morocco to 7.7 percent in Bangladesh, the country with the lowest per capita income level.

Table 5. Health Care Financing Indicators, 1998

	Cost of NIP/GNP	Public and private expenditure on health/GNP	Government health sector budget/total budget	Government expenditure on NIP/total government health budget
Morocco	0.03%	3.8%	4.9%	2.2%
Bangladesh	0.1%	3.9%	7.7%	4.4%
Côte d'Ivoire	0.09%	1.3%*	7.5%	4.6%
Colombia	NA	NA	5.4% (1993)	2.8%**

Sources: World Bank 2000, Bangladesh MOHFW 1999, Kaddar, Tanzi, and Dougherty 2000, Kaddar, Muherji, et al. 1999.

* Does not include private expenditures on health

** Includes only investment budget

The percentage that the government spends on the national immunization program in each of the three countries shows a similar pattern as the percentage spent on the health sector. The percentage is lowest in the middle-income country, and similar for the two low-income countries: 4.4 percent and 4.6 percent.

5.1 Sources of Program Financing

5.1.1 Central Government

The central governments of each of the countries finance personnel costs as well as many of operational costs, such as supplies and transport costs. It also usually contributes towards capital investments. In the case of Morocco, sectors other than the Ministry of Health, such as the armed forces and Ministries of Interior and Education, also contribute towards the national immunization program.

In Colombia, all national resources for financing of the EPI were implemented through the Ministry of Health investment budget. However, with reform, the sources of EPI financing within the government have diversified, incorporating resources that support the compulsory health plan (subsidized and contributory capitation payment unit, and Solidarity and Guaranty Fund [FOSYGA] promotion subaccount) and the basic care plan (current national revenues, fiscal transfers, national resources for purchasing materials and for investment, resources from the FOSYGA promotion and

prevention sub-account, funds from public borrowing, foreign assistance, and the departments' and municipalities own resources). Departments and municipalities must ensure that the necessary resources are allocated to support the development of the program at those levels and must guarantee that immunization services are provided to the affiliated population. The program's sources of financing are numerous and their allocation depends to a great extent on the priorities and decisions made at the departmental and municipal levels. The new *fiscal transfer* is calculated on the basis of the nation's current revenues (tax and non-tax revenues) and will be increased by up to one-half of a percentage point.

The fiscal transfer is subject to divestiture to the departments and districts for direct care or to the municipalities for health and education services. The funds must be distributed in the following way: a minimum of 60 percent must go to education, a minimum of 20 percent must go to health and 20 percent is permitted for free allocation between the two sectors.

5.1.2 Local Government Funding

In Bangladesh, local governments began financing the salaries of NIP personnel in urban areas as well as some operational costs with the use of tax revenues. In Morocco, local governments contribute personnel and transport costs during the NIDs. Municipal and departmental governments in Colombia are providing some of the resources for the immunization programs.

5.1.3 World Bank Loan Funds

World Bank loans are being used to pay for vaccines and supplies in two countries, Morocco and Bangladesh.⁷ In Morocco, the multi-sectoral loan program, financed for four years with \$68 million, includes support for the NIP as well as for other activities. In Bangladesh, the loan is currently being used to purchase all traditional antigens except for DPT. Although the funding for the World Bank loans is obtained externally, governments usually consider this funding to be part of their budgetary resources.

5.1.4 Donors

Donors play an important role in providing support to many of the NIPs. The support to routine immunization programs has been taking place since the 1980s and the trend has been that gradually one or two major donors provide most of the funding. Support for polio eradication activities, on the other hand, is relatively new in most countries and involves multiple donors. In Morocco, important donors have included USAID, UNICEF, WHO and Rotary International. USAID and UNICEF have purchased cold chain equipment, WHO has financed improvements to the surveillance system, and Rotary International has paid for polio vaccine. In Bangladesh, a few donors (i.e., Japan International Cooperation Agency [JICA], and Swedish International Development Agency [SIDA]) have financed vaccines and cold chain equipment others have focused on training and IEC/social mobilization (e.g., USAID and UNICEF), while others have financed polio eradication activities (Rotary International, U.S. Centers for Disease Control and Prevention [CDC], and WHO). In Côte d'Ivoire, the donors financing the routine immunization program include the European Union and the German

⁷ It should be noted that Morocco's World Bank loan is at the standard rate of interest, slightly below commercial rates. The Bangladesh loan is an International Development Association loan with a long grace period and a concessional interest rate.

Development Bank (*Kreditanstalt für Wiederaufbau*, KfW) while other donors have concentrated on financing the NIDs (JICA, Rotary International, CDC, UNICEF, and WHO).

Colombia receives technical and financial assistance from PAHO/WHO. This support, in the form of technical cooperation, training, research, and other contributions, amounted to \$632,668 during the period 1994-98.

5.1.5 Not-for-profit Private Sector

NGOs only play a significant role in one of the countries, Bangladesh. These organizations, most of whom received general funding from donors such as USAID and the British Department for International Development, provide services and support activities in urban areas. Since they receive vaccines and supplies from the government, they finance the country program primarily through provision of personnel time and operational costs such as transport.

5.1.6 For-profit Private Sector

While the role of these private practitioners is small (less than 5 percent of total immunization activities), and they cater to only a small upper-income population, they are usually the first group to introduce new vaccines and technologies into a country. Their fees are usually fairly high. For example, in Bangladesh, the private doctors charge approximately \$2.00 for a DPT immunization and as high as \$8.20 for a Hepatitis B immunization. (Levin et al. 1999) In Morocco, fees for the complete series of EPI vaccines are typically about \$27, not including the charges for medical visits to a general practitioner (Kaddar et al. 1999).

Private sector companies are also making contributions to NIPs. In Morocco, private pharmaceutical companies have donated free vaccines on an irregular basis, while in Côte d'Ivoire, AXA (insurance) and other companies have contributed to the NIP.

5.1.7 Community Financing

Relatively little of the NIPs' costs are financed through household contributions. In Morocco, a small percentage of consumers pay fees if they use the private sector or for syringes if they purchase them before having their children immunized. This tends to happen mostly in urban areas. In Bangladesh, consumers pay fees primarily in urban areas if they obtain immunizations at NGOs, sometimes at local government clinics, or at private doctors or clinics. In Côte d'Ivoire, consumers purchase vaccination cards in public sector facilities for a small fee as well as pay for immunizations at the National Institute of Public Hygiene (INHP).

5.2 Trends in Immunization and Vaccine Financing

Total expenditures (in nominal US\$) on the national immunization programs have been increasing during the last five years in three of the countries. They increased by about 15 percent in Bangladesh, 17 percent in Morocco and 21 percent in Côte d'Ivoire (excludes large contribution of KfW for cold chain in 1999) (Figure 8). However, in Colombia, the expenditures decreased in 1998.

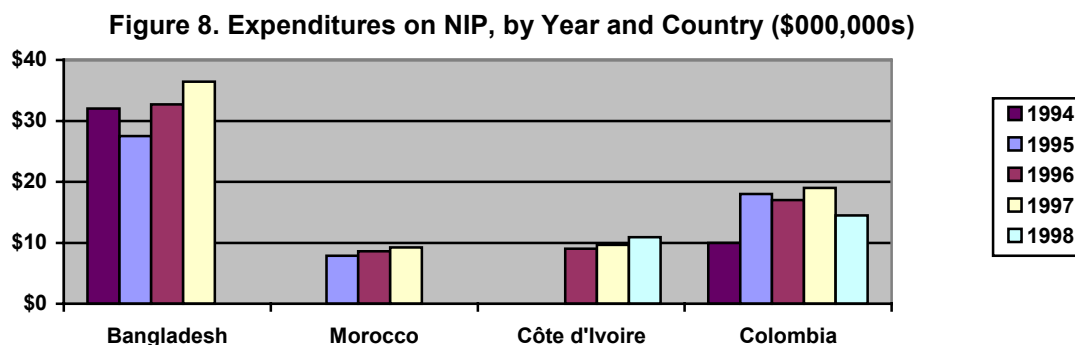


Figure 9 indicates that government expenditures (in nominal US\$) on the NIP have also increased, by 14 percent, 8 percent and 21 percent in Bangladesh, Morocco, and Côte d'Ivoire. However, a temporary decrease in government contributions occurred in Bangladesh in 1995/96, probably because of vaccine overstocks.⁸

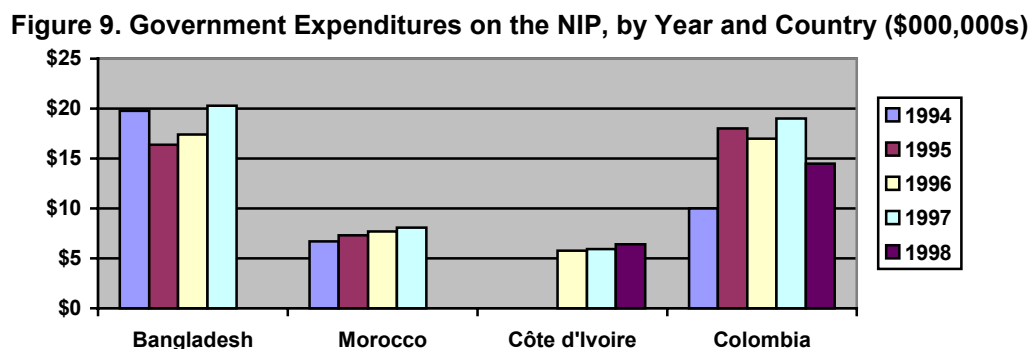


Table 6 shows the current total NIP costs, by source and use of funding, for each of the three countries. The main source of financing in each is the government, due to its expenditures on personnel costs. The percentage funded by governments ranges from 73 percent in Morocco to 58 percent in Bangladesh. The second largest source of financing was World Bank loans in Morocco and Bangladesh, and donors (EU in particular) in the case of Côte d'Ivoire.

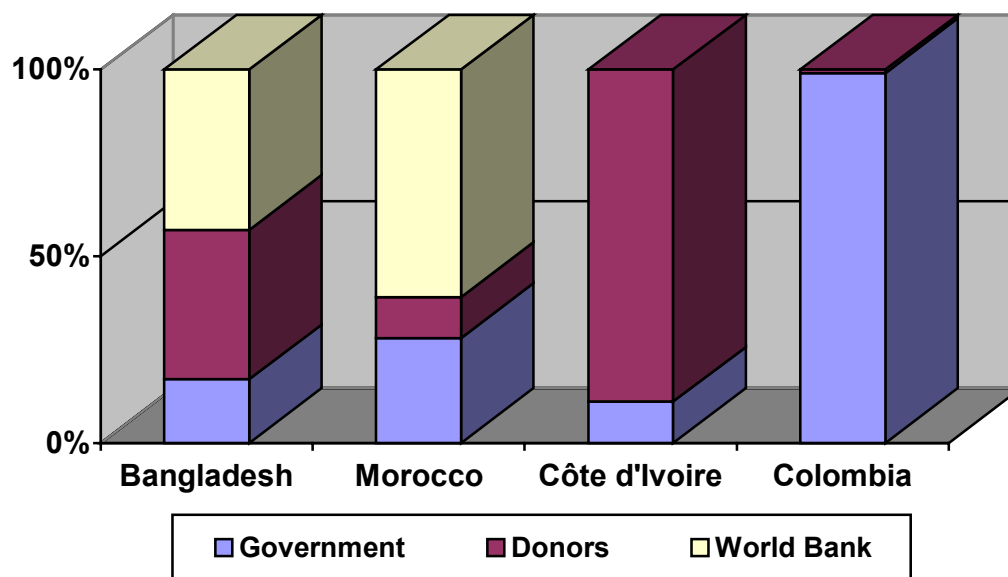
⁸ In Côte d'Ivoire, a decrease in expenditures probably occurred in 1999 due to the conflict with the International Monetary Fund, World Bank, and European Union.

Table 6. Total NIP Costs, by Source and Use of Financing (US\$000s)

	Morocco			Bangladesh			Côte d'Ivoire	
	Govt	Donors/ Int. Orgs.	World Bank	Govt	Donors/ Int. Orgs.	World Bank	Govt	Donors/ Int. Orgs.
Recurrent								
Vaccines	0	0	2218	772	3,390	6,487		1,836
Supplies	0	0	158	813	361	0	—	345
Transport	473	35	26	532	65	0	179	65
Short-term training	0	3	0	0	71	0		48
IEC/Social mobilization	0	95	0	0	532	0		265
Maintenance	181	0	0	326	0	0	100	73
Subtotal	\$7,372	\$148	\$2402	\$19,715	\$4,877	\$6,487	\$6,162	\$2,723
Capital								
Buildings	749	0	187	174	0	1,565	257	300
Vehicles	29	14	14	0	200	0		70
Equipment	0	289	0	61.5	1,319	0		182
Training	0	8.5	0	0	15	0		
Subtotal	777	312	201	236	1,534	1,565	257	552
Total	\$8,149 (73%)	\$460 (4%)	\$2,603 (23%)	\$19,951 (58%)	\$6,411 (19%)	\$8,052 (23%)	\$6,419 (66%)	\$3,275 (34%)

However, when program-specific costs are examined, i.e., the costs specific to the immunization program not shared by other programs, the role of the government in financing the program is considerably smaller. As can be seen in Figure 10, the percent funded by the government declines from 58-73 percent to 11-28 percent. Of the three countries, Columbia is the most self-sufficient while Côte d'Ivoire is the least.

Figure 10. Sources of Program-specific Costs, 1998



Two countries are using World Bank loans to pay for much of their program-specific costs. Morocco is paying for all of its vaccines through the Vaccine Independence Initiative with World Bank funds. Bangladesh is paying for most of its vaccines with the use of its World Bank loan. Rather than using these funds to pay for investments to the program, these external funds are used primarily to finance recurrent costs.

All three of the countries receiving considerable external funding are dependent upon these funds to finance much of the program-specific recurrent costs of their programs. Table 7 shows that 70 percent-88 percent of program-specific recurrent costs are funded through external sources. This analysis indicates that much of external funding is being used to pay for recurrent costs and especially for vaccines and supplies.

Table 7. Sources of Financing by Type of Cost, 1998

Sources of Financing	Investment Costs	Recurrent Costs
Internal		
Morocco	60% (0.0%)	74% (30.0%)
Bangladesh	7.1% (3.8%)	63.4% (18.3%)
Côte d'Ivoire	32% (0.0%)	69% (9.0%)
External		
Morocco	40% (100.0%)	26% (70.0%)
Bangladesh	93% (95.8%)	36.6% (81.7%)
Côte d'Ivoire	68% (100.0%)	31% (91.0%)

Note: The percentages in parentheses refer to program-specific costs while the other percentages are for total costs.

6. Costs and Financing Projections for NIPs

In order to project future costs of NIPs, the future costs of the “basic” program as well as necessary improvements were estimated. Some of the improvements include the introduction of new vaccines and technologies, improvements to the cold chain, use of auto-destructible syringes, and improvements in coverage. Because the addition of vaccines is the most costly improvement to programs, in some cases, the cost of improvements with and without the addition of new vaccines was estimated by the studies. In order to assess funding gaps, the funding required for ‘basic’ program needs with and without improvements was compared to the available funding from the projected government budgets.

A second issue that was investigated in the studies was whether cost savings could be realized in the programs. In addition, the impact of health reform on service delivery was investigated and its potential impact on costs and financing of NIPs is discussed.

6.1.1 Program Improvements

The program improvements that were projected for each country were based on discussions with the ministries of health and key stakeholders in the countries. They differed depending on the context of the country. In all countries, the difference between projected government funding, future funding requirements for the “basic”. needs of the program, and the future costs of the program with planned improvements was then calculated. In all countries, gaps in funding were found.

Disparities in Immunization Coverage Rates within Countries

Often, NIPs have identified differences in immunization coverage between urban and rural areas and sometimes specific districts or regions. These disparities occur because of differences in access to health facilities and socioeconomic status or due to poor logistics in remote areas. For example, in Morocco, coverage in rural areas is lower than in urban areas because of a shortage of fixed health facilities in rural areas. Although national immunization days are conducted to reduce disparities in coverage, they take place only during two months of the year and do not compensate for the lack of access during the rest of the year.

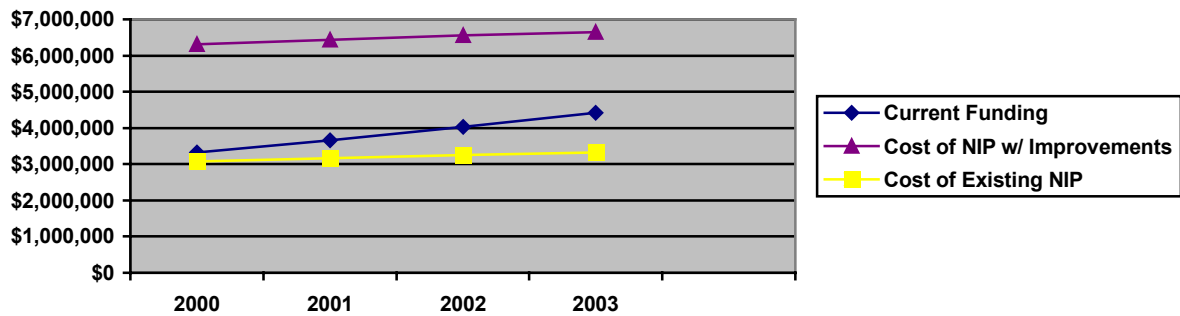
In Bangladesh, routine infant coverage for measles among districts varied widely and ranged from 16 percent to 76 percent for measles and 24 percent to 75 percent for oral polio vaccine (OPV3) in 1998. Some of the reasons for limited access to services in some districts included vacancies in health worker posting, seasonal changes in availability to services, and poor supervision. In Côte d’Ivoire, the highest coverage rates were in the south and lowest in the west. The disparities were associated with poor supervision and inadequate numbers of immunization sessions in rural areas.

As a high priority when planning improvements for the NIP, countries should identify strategies to increase coverage in low-performance areas and develop plans to reduce disparities in coverage.

The improvements projected for Morocco included costs of adding Hepatitis B for all children under one year beginning in 1999/2000; upgrading the cold chain; introducing auto-destruct syringes; improving immunization coverage in lower-performance areas; and improving disease surveillance,

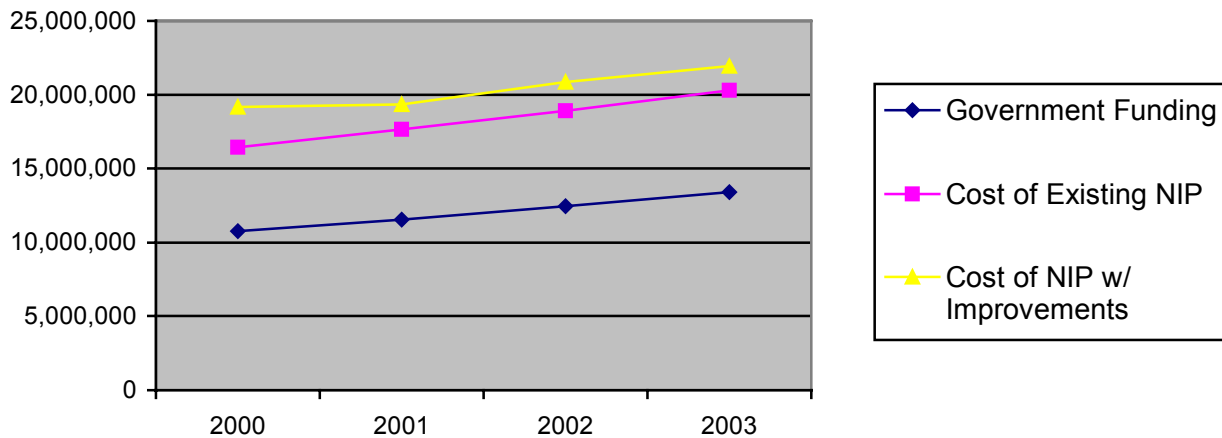
the management information system, and monitoring/supervision and research. (See Morocco report for details.) The gap between projected government funding, the funding of the “basic” immunization program, and funding of the immunization program with planned improvements is shown in Figure 11.

Figure 11. Projected Gap in Funding between Existing NIP and with Improvements, Morocco 2000-2003



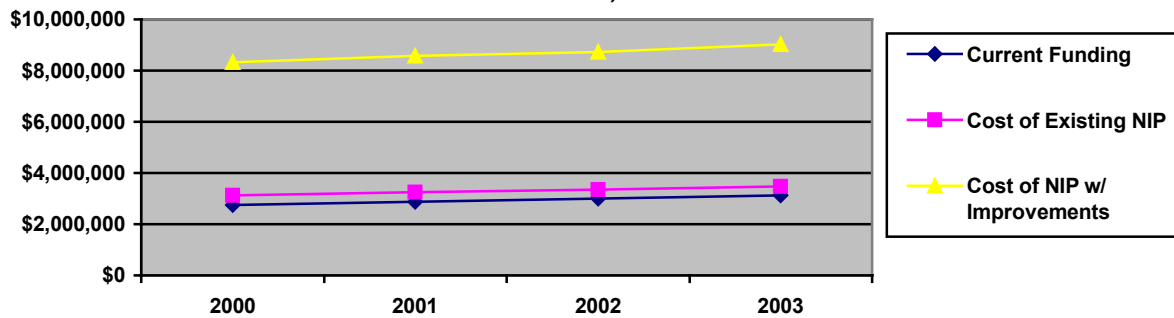
In Bangladesh, two scenarios of improvements were projected. (See Bangladesh report.) The first included: catch-up campaigns for low-performance districts, improvements in sterilization of reusable needles and syringes, improvements to the cold chain, improvements in waste disposal, introduction of annual refresher training for mid-level managers, and additional costs associated with the health sector reform. The second included all the improvements in the first scenario and added introduction of the Hepatitis B vaccine. The gap between projected government funding, the funding of the “basic” immunization program, and funding of the immunization program with planned improvements is shown in Figure 12.

Figure 12. Projected Gap in Funding between Existing NIP and with Improvements, Bangladesh, 2000-2003



For Côte d'Ivoire, the cost of the projected improvements to the program included: (1) adding Hepatitis B for infants, increasing coverage rates to 80 percent, introducing auto-destruct syringes, improving the cold chain, and funding of other equipment for the NIP. The costs of the "basic" program with improvements are shown with and without Hepatitis B. The gap between projected government funding, the funding of the "basic" immunization program, and funding of the immunization program with planned improvements is shown in Figure 13.

Figure 13. Projected Gap in Funding between Existing NIP and with Improvements, Côte d'Ivoire, 2000-2003



In the Colombia analysis, the future cost of vaccines and supplies was estimated for the years 1999-2003, based on the official National Department of Statistics (DANE) population projections, and the basic vaccination schedule established in the country. It includes some direct costs (syringes and reagents) and indirect costs (maintenance, transport, training, and mass media) that have been financed in order to support the program through the MOH budget.

Costs were estimated by considering three possible scenarios, based on the behavior of inflation (constant, increasing, and declining). The declining scenario was calculated based on the consumer price index. According to the National Planning Department, it is expected that the country will have a favorable economic situation with declining inflation for the next five years. With the exception of the MMR vaccine, estimates were calculated including the guarantee that in the period under analysis (1999-2003), the complete schedule would be administered to 100 percent of the target population for each of the vaccines.

7. Financing Program Improvements

Program improvements can be financed in two ways: through improving program efficiency and realizing cost savings, and through mobilizing additional resources for the program.

7.1.1 Cost Savings

The studies also identified ways in which current and future costs could be reduced. These include improving methods of projecting vaccine needs and stock management, reduction in vaccine wastage rates, and alternatives for Hepatitis B vaccines and single-use syringes.

First, the ways in which vaccine needs are forecast and stock management is undertaken were assessed in the three countries. Ways in which these elements could be improved and cost savings realized were identified. In Morocco, for example, vaccine needs are estimated by using a target population figure of 650,000 each year, adding factors for wastage as well as a 25 percent addition for a buffer stock. However, this method overestimates vaccine needs since the base population is too large, the wastage rates assumed are different from actual rates, and stocks already held were not taken into account. By making adjustments to the way in which vaccine needs were estimated, vaccine costs would be reduced by \$850,000 (\$1.35 million in 1999/2000 rather than \$2.2 million in 1997/98).

Secondly, cost savings can be achieved through reductions in vaccine wastage. If the number of immunization sessions is reduced, then the number of children vaccinated per session is likely to increase and vaccine wastage decreased. This strategy should only be used if use patterns are well-established and a reduction in the number of sessions will not lower utilization and service quality.

Another way to reduce costs is changing from outreach sites to fixed sites as in the case of Bangladesh, where immunizations in rural areas will begin to be delivered from community clinics rather than at outreach EPI sites. Because clients will be coming for other services at the community clinic, more should bring their children to be immunized during sessions and less vaccine wastage should occur.⁹

Introducing the open-vial policy, i.e., reusing vials of vaccines after they have been opened using a vaccine vial monitor, also helps reduce vaccine wastage. The policy applies to certain vaccines: OPV, DPT, DT, Hepatitis B, and liquid formulations of Hib vaccines. This WHO recommendation is not widely used (WHO 2000).

Other alternatives that can lower costs to NIPs considering the introduction of new vaccines are, for example, to choose lower-cost vaccines. For example, plasma-derived Hepatitis B vaccine costs about 20 percent less than recombinant DNA Hepatitis B vaccine and is equally effective, immunogenic, and safe. If the program immunizes all newborns nationwide beginning this year, it can save an estimated \$344,000 in 1999/2000 by using the plasma-derived vaccine. An alternative would be to use a combination DPT-Hepatitis B vaccine, which has the recombinant DNA type of vaccine.

⁹ This approach to reduce costs assumes that the benefits of community clinics will be well-advertised and clients will be willing to travel the longer distance to the community clinics.

7.1.2 Resource Mobilization

Governments can also finance NIP program improvements through the mobilization of new resources. Some options include increasing the following: central government budget allocations, the role of local governments in financing immunization services, health insurance mechanisms, the role of the private sector in the provision of services, the role of donors, cost-sharing by consumers, and cross-subsidization.

One way to increase resources available to the NIP is through increasing central government budget allocations. Since central government budget allocations to NIPs were less than 5 percent in all three countries and as low as 2.2 percent in Morocco, governments should consider increasing their allocations.

Local governments in Morocco and Bangladesh recently have begun contributing towards NIPs with financing of personnel costs, supplies, and transport. Since these local governments only contribute a small percentage of total costs of the immunization programs in their areas, they should be able to gradually increase their contributions. As Morocco (and eventually Côte d'Ivoire) gradually phases in decentralization, some activities that regional managers could take on include program support for NIDs and mini-campaigns, and the storage and distribution of vaccines and supplies through the establishment of regional cold rooms. In Bangladesh, the city corporations and municipalities currently fund primarily personnel costs and could gradually increase their financing of other costs such as supplies. In Colombia, departmental and municipal resources already are used to pay for some of the costs of the immunization program.

In all of the countries, the private for-profit sector is providing immunizations to a small segment of the population. Some potential exists for increasing the use of this sector so that public resources could be increased for lower- and middle-income segments of the population. For example, in Morocco, the mandatory health insurance for public and private formal sector employees could be used to pay for immunization services. If the role of the private for-profit sector increases, however, it will be important for governments to play a regulatory role to ensure that immunizations are provided in a safe, timely, and affordable manner.

Another potential way to increase resources available to NIPs is through increasing the role of the not-for-profit private sector. For example, in Bangladesh, NGOs play a small but important role in the provision of immunization services in urban areas. These organizations provide mostly personnel services, social mobilization and training support using government supplied vaccines. The contribution of NGOs could be increased through expanding their role in hard-to-reach areas as well as through encouraging NGOs to take on the purchase of supplies and vaccines from the government.

Consumers are playing a small role in the financing of NIPs through either paying for immunizations, vaccination cards, or syringes or through contributory insurance plans. In Côte d'Ivoire, consumers purchase vaccination cards for a small fee. In Bangladesh, consumers using NGO services and at some city corporations pay modest fees (less than cost) for immunizations.

Another possible way to mobilize resources is through cross-subsidization. The revenues from charging for non-EPI vaccines could be used to pay for EPI vaccines. The INHP experience in Côte d'Ivoire is one example. The INHP is charging higher fees to clients for non-traditional vaccines such as Hepatitis B vaccine in order to subsidize the fees for traditional vaccines.

Donors are currently providing financial assistance to NIPs by financing both operating and investment costs. A more developmental role for donors and international organizations is to provide

technical assistance, assist in the introduction of new vaccines and technologies, and pay for investment costs rather than to provide funding for basic vaccines and operational costs.

7.2 Assessment of Vaccine Financing and Procurement Mechanisms

Morocco currently buys all of its vaccines through the VII, which has allowed the country to purchase the vaccines in local currency and only once deliveries are made. This ensures that it gets high-quality, low-cost vaccines through UNICEF's procurement system. Despite some past problems with the turnover rate of the VII Revolving Fund, due to shipping or payment delays, this mechanism has worked fairly well overall and has allowed the government to greatly increase its vaccine purchases over the past five years, without ever defaulting on a payment. The MOH has expressed its interest in continuing to use the VII to purchase the basic EPI vaccines, especially since the operation of the revolving fund has improved in the past few years. The main issue currently facing the MOH and USAID/Rabat concerning the VII is whether the government should purchase Hepatitis B through this mechanism.

The Bangladesh Ministry of Health and Family Welfare, on the other hand, has fewer reasons to continue using the VII for two reasons: (1) It does not currently have a foreign currency problem since it is using a World Bank loan to pay for vaccines. (2) It is on a different fiscal year than UNICEF and does not need to delay its payments for vaccines until the time of ordering the vaccines. However, there are some advantages of continuing to use the UNICEF procurement system without the VII Revolving Fund, such as quality assurance and accountability.

In Côte d'Ivoire, vaccines are purchased through the open market. When unit prices for vaccines were compared between Côte d'Ivoire and those that Bangladesh and Morocco purchase through the UNICEF system, those of Côte d'Ivoire were slightly higher (\$7.11 for the full package of traditional EPI vaccines compared to \$6.11 for Morocco and \$5.82 for Bangladesh) (see Table 8). These results suggest that Côte d'Ivoire should examine whether it can get better prices through the UNICEF procurement system.

Table 8. Price Comparisons between the Côte d'Ivoire, Morocco and Bangladesh in Antigen Price, 1998

Antigen	Doses per Vial	Morocco price per vial	Bangladesh price per vial	Côte d'Ivoire price per vial	Price difference for Côte d'Ivoire
BCG	20	1.63	1.47	2.50	+\$1.03-0.87
DPT	20	1.03	0.98	1.33	+\$0.35-0.30
Polio	20	1.12	1.09	1.32	+\$0.23-0.20
Measles	10	1.64	1.59	1.03	-\$0.61-0.56
Tetanus	20	0.69	0.68	0.93	+\$0.25-0.24
Total Price	NA	\$6.11	\$5.81	\$7.11	+\$1.30-1.00

7.3 Impact of Health Reform on Immunization Programs

The impact of health reform varies by country. In two countries, Morocco and Bangladesh, the reforms are beginning to be implemented and the full impact is not yet known. Colombia's reforms have occurred when immunization coverage has fallen. Côte d'Ivoire has not made health sector reforms.

In Morocco, because decentralization has just begun, the changes have not had much effect on the NIP program. The program continues to be managed at the central level, in the MOH Population Department. Its resources are limited, the staff numbering only three to four persons. The consequence of this setup is that not enough feedback is received from the field or from other departments in the ministry, and little long-term planning is taking place.

In Bangladesh, the health reforms include integration of the health and family planning wings of the program as well as changing the service delivery strategy from outreach to fixed sites. These changes have just begun taking place and so the full impact of the reforms is not yet known. There are two likely effects on the program. First, the changes to the service delivery strategy should affect the costs of the program. There are likely to be cost savings to the providers since they can provide all the services from one spot. On the other hand, clients will have to travel farther to the community clinics and outreach sites. Thus, it will be important to have additional IEC/social mobilization activities to inform them both of the new location for, as well as the importance of immunizing children and pregnant women. Presumably, the NIP will have higher costs for the additional social mobilization and communications needed but cost savings from economies of scale from immunizing more children and women (lower vaccine wastage) should take place.

Another effect of the Bangladesh health reform on the national immunization program is a change in the procurement mechanism. In the past, the EPI program procured vaccines, supplies, and equipment directly. Under the Health and Population Sector Program, all materials are now obtained through a unified procurement system in the ministry. The effect of this new system has been to centralize the decision making on use of resources, and, in the short-term, in 1998-99, has resulted in logistical problems in the shift over to the new system. There has been a slowing of the disbursement of funds for transport and other operational costs. Another effect is that donors that have traditionally provided funding for immunization programs, such as SIDA, now are asked by the MOH to provide their funding into one 'basket' that provides funding to all services. These donors are then less accessible for special needs of the immunization program.

In Colombia, health reform has had a negative impact on the immunization program, particularly in terms of the levels of funding for the program through transfers from the central government to departments and municipalities. This finding suggests that the positive effects of reform from making management local does not compensate for the adverse effects caused by a decrease in ministerial funds.

The decline in resources allocated to the program from the central government constitutes a challenge to the Colombian immunization system. It requires the management strengthening of departmental and local institutions, in order to more than compensate for weaknesses generated by the change in organization. Therefore, the options for improvement of coverage and surveillance are related to the introduction of a NIP control and monitoring system for districts and departments to ensure that they, in turn, supervise themselves and their municipalities. This system should measure technical and administrative results of the program, as well as help managers identify problems and formulate strategies and solutions.

8. Conclusions and Lessons Learned

This set of PHR country case studies has highlighted the critical role of financing in ensuring sustainable immunization activities, as well as the complexity surrounding this issue. They revealed some issues as well as provided some lessons summarized below.

8.1 Costs

The analyses indicated that personnel time, mostly service delivery personnel, accounts for over half of total costs, followed by vaccines (19 percent-30 percent). Other recurrent costs, such as transport and social mobilization, accounted for less than 10 percent of total costs. Differences in the costs of NIPs in the three countries reflected varying service delivery strategies. For example, in Morocco, where NIDs include the provision of most antigens, the costs of transportation were a higher percentage of total costs than in the other countries. Routine immunization activities made up the majority of costs of the NIPs (68 percent-84 percent), and NIDs a smaller percentage. The costs of NIDs in Morocco constituted a larger percentage of total costs than in the other countries, since more antigens were provided.

The cost of immunizing children was found to be low, compared to some aggregates. The total cost of the NIPs is low compared to health care expenditures overall, to GNP, and to the health budget as a whole. The cost of the NIP compared to GNP was less than one percent in Morocco, Bangladesh, and Côte d'Ivoire. In addition, the per capita cost of the NIPs was less than \$1.00 and the cost per FIC was under \$25.00 in all three countries.

The introduction of new vaccines such as Hepatitis B was found to be relatively expensive compared to the basic antigens, suggesting that their introduction needs to be carefully planned, and options such as phasing in by regions or target groups considered, if needed.¹⁰

It should be noted that these costs are estimated in a context where productivity of personnel is sometimes low and integrated service delivery approaches are not well-developed. Thus, significant cost savings may be possible within these contexts.

8.2 Financing

When the governments' contribution to their immunization programs were examined, the three NIPs in the case studies, other than Colombia, were using external funding for much of the costs of their programs. The percent of total costs financed by external sources (donors and World Bank loans) were 27 percent-42 percent. When the percentage of program-specific costs (without personnel and building costs that are shared with other health services) financed by non-government sources was examined, on the other hand, the role of donor assistance and World Bank loans was greater and comprised over three-quarters of program costs.

¹⁰ It is also important to consider whether introducing a new vaccine will not adversely affect the use of the six antigens.

Rather than having a diversity of funding sources for routine immunization, the programs other than Colombia tend to be dependent on one source of external funding, such as the World Bank as in the case of Morocco and Bangladesh, or the European Union¹¹ as in the case of Côte d'Ivoire. In the case of Bangladesh, the primary source of funding is the World Bank loan that is mixed with pooled donor funds. Polio eradication activities, on the other hand, are being financed by a diverse set of donors and international organizations.

In the case studies, donor contributions were often found to be unevenly targeted and coordinated. They are used to finance recurrent costs, such as vaccines and supplies, rather than long-term improvements, such as infrastructure (e.g., cold chain); critical systems, such as diseases surveillance and routine immunization reporting; capacity-building; and to introduce new vaccines. In the three countries, 83 percent-91 percent of donor and World Bank funding went towards recurrent costs in 1998. The high use of external funding for recurrent costs appears to have discouraged the efficient use of resources. One example is the discrepancy found between the study's estimate of vaccine needs of the country and what the program actually buys each year.

The experience suggests that external funding, including development bank loans, should be more coordinated and redirected. In the event that external funding is being used for recurrent costs, as in the case of the three countries, consideration should be given to planning for the gradual withdrawal of the funds and their replacement with country-level resources. In addition, some of these funds could be used to finance long-term investments instead of recurrent costs.

In order to finance program improvements, some resource mobilization will be required. This can be accomplished by increasing central government budget allocations through the operating budget, and tapping into other local sources, such as local government and household contributions. Using local resources to pay for the country's vaccine supply does not constitute a heavy burden (the immunization budget represents less than 5 percent of the MOH budget), especially given the priority that the governments state on human development and public health. Diversifying the financing of the NIP to include local government, health insurance, and other contributions also fits in well with many planned health sector reforms that call for expanding household contributions, increasing the role of the private sector in delivering basic health services, and decentralizing the government health system, including financial responsibility.

8.3 Vaccine Financing and Procurement Mechanisms

The VII is used in both Morocco and Bangladesh. The VII is used by the Morocco NIP to purchase all of its vaccines, but only to a limited extent in Bangladesh (for one vaccine). The VII has some advantages over direct procurement. It allows governments to pay with local currency and at the time the order is received rather than at the time the order is placed. For Morocco, the primary advantage is the latter since it does not have a currency convertibility problem due to its access to a World Bank loan. In addition, use of the VII offers the government some added since the order-payment cycle has been reduced to five months.

In contrast, Bangladesh gains little advantages by using the VII for DPT in addition to regular UNICEF procurement, due to the country's World Bank loan and different fiscal year. Bangladesh does benefit from using the regular UNICEF procurement system to purchase its vaccines, because the system ensures low unit costs and high quality of vaccines. Both the VII and UNICEF

¹¹ This funding is not part of *Appui au Renforcement de l'Indépendance Vaccinale en Afrique Sahélienne* (ARIVAS).

procurement systems also have certain disadvantages: (1) They create some dependency on UNICEF, (2) they reduce opportunities for capacity-building in procurement, negotiating on open market, etc., and (3) there can be time lags in the UNICEF system, due to the demands of its bureaucratic procedures.

Côte d'Ivoire is using direct procurement to obtain its vaccines. However, a comparison of unit prices (see Côte d'Ivoire study) indicates that the government is paying higher unit prices for its vaccines with the exception of measles vaccine. This suggests that the government should explore other possibilities for suppliers to find more competitive prices.

8.4 Gaps in Financing in Next Five Years

The projections of future NIP funding needs indicate that funding gaps will occur during the next five years, particularly if improvements are made to the programs. Two ways of financing program improvements were identified: (1) achieving cost savings through gains in program efficiency, and (2) mobilizing additional resources. Cost savings can be achieved through improvements in estimation of vaccine needs and reductions in vaccine wastage and operational costs. These savings can fill some, but not all, of the funding gap.

Countries can take a number of steps to mobilize additional resources for NIP: central governments increase their contribution to the program; local governments increase their contribution to the program; households contribute via fees for services or coverage through insurance are increased, use of the private for-profit sector to provide services is increased; use of the NGO sector in underserved areas, such as urban areas in Bangladesh is increased; and international donors and lenders finance new technologies, technical assistance, and investment costs.

8.5 Usefulness of Costing of NIPs

The estimation of program costs is an effective way to assess resource requirements for immunization activities, to estimate the share of each component, and to identify potential cost saving measures. It also assists program managers to assess the roles of governments, the private sector, donors, and international organizations in financing of the NIPs.

Program cost analysis is not undertaken on a regular basis in most developing countries due to factors such as lack of information; lack of explicit need expressed by MOH management or ministries of finance or planning; and lack of capacity. The global assessment tool developed by WHO in 2000 is well suited to guide basic immunization financing assessments.

The PHR immunization financing tool (Kaddar et al. 2000) shows how a more detailed assessment may be performed. This tool was designed to complement to the WHO assessment tool and can be used when a more in-depth cost and financing analysis is desired.

8.6 Additional Research

The case studies identified areas where further research could be undertaken. One area is that of the cost of improving service quality. Safety is an underestimated problem for immunization programs, particularly given the concern that communicable diseases can be spread through injections. Often, a national strategy needs to be developed for sterilization of needles and syringes,

and should be coordinated with other parts of the health system. In the case where disposable syringes are being considered, their introduction should be coordinated with other health services.

Other areas that need further research include: the role of the private sector in providing immunizations and means of regulation of this sector; user fee practices and impacts on service utilization; and the cost of improving the coverage rate in poor and underserved areas.

Since little is known about the importance of the role of the private for-profit sector in providing immunizations and the quality of service, it would be useful to research further the private for-profit role in various countries and the potential for expanding its role. As part of this research, it will be important to evaluate the role the government should take in regulating this sector.

Little information on the application of user fees was obtained in the countries studied. It would be useful to know more about the willingness of clients to pay for immunization services, the use of revenues obtained from immunization services, and cost recovery rates, as well as the impact that fees have on service utilization.

In the countries studied, the cost of improving the coverage rates in poor and underserved areas was not known. These costs should be assessed to assist NIPs and donor partners in planning.

8.7 Recommendations

Based on the findings of the four PHR country case studies on immunization financing and the ongoing health sector reforms, the following recommendations are made. The first set of recommendations is aimed primarily at the countries and national immunization programs. The second set is directed at international organizations and donors.

8.7.1 For Countries and NIPs

Program Planning, Management, and Evaluation

- > Develop a multi-year strategic plan for their NIPs, in order to establish an immunization program that is both successful and sustainable over the long term.
- > Take into account national health plans and ongoing and planned economic, social and health reforms when developing the NIP strategic plan.
- > Use cost, financing, and effectiveness data to make a case to greater allocations of national resources for the NIP.
- > Create an immunization coordinating committee should be in place to ensure that there is effective consensus on objectives, coverage data, and performance, and that regular reviews are conducted on cost and financing of the NIP.
- > Reduce dependency on external funding sources for operating costs.
- > Integrate action and coordination among all basic health services to ensure that recommendations made for NIPs are consistent with the rest of the health system activities.

- > Clarify the general roles and responsibilities of government, donors, lenders, and other international organizations.
- > Examine opportunities for cost savings in estimating vaccine needs and reducing vaccine wastage.
- > Make an effort to build capacity at the national level of Ministries of health and NIPs for conducting costing and financing studies so that program financing needs can be projected and monitored efficiently.

In the context of decentralization, the immunization program should develop detailed *annual* immunization plans, which should include quantifiable coverage and other performance objectives by district, province, or region; activities planned to increase coverage; and resources to be mobilized by district. Annual planning will allow the program to more easily assess its performance on a regular basis and make necessary changes.

The consideration and analysis of costs should be included in the decision-making process on a more systematic and regular basis, along with the considerations of effectiveness and quality. This is especially critical as the government and other internal sources finance more and more of the program in the future. To more systematically include cost considerations in the planning of the NIP would require conducting the following:

- > provincial-level cost analyses to obtain information on costs at the local level, the costs of different delivery strategies (e.g., mobile health teams, home visits, mini-campaigns), and the costs of delivering services under different conditions (e.g., rural vs. urban settings);
- > national-level training on cost and financing analysis for immunization and other public health activities to MOH staff, and regional or provincial training to familiarize those responsible for immunization activities at these levels with cost analysis and its practical use in program planning and implementation;
- > cost data collection on a regular basis by including indicators in routine reporting forms to the program and in coverage or evaluation surveys.

With the ongoing decentralization process, the role of the central-level immunization program unit should change accordingly to move away from the day-to-day management of the program to overall planning and coordination, including such functions as:

- > setting strategic objectives and determining new approaches;
- > developing management, reporting, and evaluation tools;
- > planning procurement of vaccines and supplies;
- > developing dialogue and coordination with other health programs and divisions involved in preventive health services, epidemiology, primary health care, etc.
- > improving financial planning and budget setting at the national level;
- > developing information system (on coverage rates, routine service delivery statistics, disease surveillance, costs, etc.); and research, assessment, and evaluation.

Applied Research

Plans for the future of the program, including the introduction of new vaccines and technologies, and the diversification of financing sources and mobilization of new resources, should be based on information concerning needs, effectiveness, costs, and cost-effectiveness. Given the program's objectives and plans for the future, the following applied studies and analyses are recommended at the central and subnational levels:

At the national level:

- > An inventory study of the current cold chain system with periodic updates to determine the quantity, types, and condition of equipment in use, the equipment and storage needs for the next 10 years or so, and what type of system to put in place to manage and monitor the system on a regular basis;
- > For long-term planning, cost-analysis studies on the burden of disease targeted by new vaccines, such as Hib and rotavirus, to determine which vaccines to introduce, to what target population, and when; also cost-effectiveness studies of the introduction of combination vaccines;
- > A study on the current and potential role of the private sector in immunization service delivery and financing to help determine the current participation of the private health sector in delivering immunization services, when appropriate; the advantages and disadvantages of increasing the role of the private sector should be assessed; what would stimulate greater private participation, where appropriate;
- > An analysis of the appropriate use of NIDs within the country as polio eradication activities come to a close and regional differences are becoming evident and other campaigns (such as measles eradication) are being considered;
- > A study of cost recovery and out-of-pocket payments for government immunization services should be carried out to: (1) determine the extent to which cost sharing is currently practiced in the government sector, including charging a fee for vaccination cards and having patients buy their own disposable syringes; (2) analyze the amount of revenues generated (or, in the case of having patients bring their own syringes, the cost savings) and the uses of these revenues; and (3) analyze the feasibility of officially instituting cost sharing for immunization services in the government sector, such as charging for vaccination cards, and the possible impact on financing, coverage, and equity.

At the sub-national level:

- > An analysis of the differences in immunization coverage by area and socioeconomic level of the population in order to determine effective strategies for improving coverage in low performing areas;
- > A study on ways to improve immunization coverage, considering the effectiveness, costs, and cost-effectiveness of different delivery and social mobilization strategies, including NIDs; local-level mini-campaigns; increased outreach through mobile health teams, home visits, etc.; and different types of IEC and social mobilization strategies;

- > An analysis of the potential for reducing vaccine wastage, for which antigens, and how to reduce wastage for each region.

Vaccine Procurement and Supply

The immunization unit and the MOH should assume a greater role in projecting vaccine needs and in reducing the wastage rate. Immunization staff should update its training in determining vaccine needs based on actual population and vaccine wastage data; how to develop and negotiate an international tender and bid for vaccines (where relevant); and how to manage and monitor vaccine stocks. Systems should also be developed to assist with these tasks.

The MOH should consider procuring new and combination vaccines through UNICEF, at least for the first few years, given UNICEF's reasonable prices and assured good quality. The MOH can use the UNICEF procurement system, which requires hard currency payments in advance, or the VII mechanism.

Financing

Governments need to increase their ownership of their national immunization programs over the next few years through increasing their central government allocations to the program and exploring the feasibility and making plans for mobilizing new resources, including health insurance reimbursements and local government contributions. Governments of most countries should plan on financing from their own funds 100 percent of the basic vaccine and vaccine supply needs and other operating costs.

MOHs should create and maintain a separate line item in the health budget for all vaccines and supplies.

Involvement of NGOs, local health authorities, and the private sector in the provision and financing of immunization services should be encouraged.

8.7.2 Recommendations to International Organizations and Donors

- > International support to immunization activities should be coordinated and reoriented with the establishment of inter-agency coordinating committees (ICC) or equivalents in each country as a critical step. These may be sub-committees of coordinating committees for broad health sector development. A second step is to ensure that there is an effective consensus among all partners on objectives, coverage data, performance and financing of the NIP. The existence of a multi-year strategic plan for the NIP is a powerful instrument to combine and coordinate resources and to build a sustainable immunization program.
- > External resources should be targeted as complements to the national public effort rather than as a substitute. Therefore, external support for basic vaccines and supplies as well as operating costs should be phased over to funding by local resources (central and local governments, health insurance, cross subsidization mechanisms, pre-payment schemes, etc.) for all but the poorest and most troubled countries.
- > If external funding is currently being used for recurrent costs (e.g., basic vaccines and supplies as in the case in Bangladesh, Côte d'Ivoire and Morocco), a plan for the gradual

withdrawal of the external funds and replacement with country-level resources should be established.

- > External funding, including development bank loans, should be redirected and used to finance, if needed, long-term improvements, such as infrastructure (e.g., cold chain), technical assistance, capacity building and, perhaps, with progressive withdrawal, to introduce new vaccines and technologies.
- > Improvements need to be made to the VII financing and UNICEF procurement systems to avoid delays and billing problems and to increase quality of services. Capacity-building activities need to be part of VII and UNICEF services.

Annex A. Estimated Costs of Routine and Immunization Programs and NIDs

Table A1. Estimated Total Costs of Routine Immunization Programs

Cost Components	Morocco(1997/98)	Bangladesh (1997/98)	Côte d'Ivoire (1998)
Recurrent Costs			
Personnel	4,750,467 (62.0%)	16,221,739 (55.8%)	5,130,535 (65.1%)
Vaccines	1,287,163 (16.8%)	7,752,000 (26.7%)	1,244,221 (15.5%)
Supplies	91,669 (1.2%)	841,087 (2.8%)	344,854 (4.4%)
Transportation	26,438 (0.4%)	410,152 (1.4%)	130,777 (1.7%)
Short-term Training	2,896 (0.0%)	47,717 (0.2%)	27,821 (0.4%)
Social Mobilization	17,293 (0.2%)	273,347 (0.9%)	37,017 (0.5%)
Maintenance and Overhead	181,172 (2.4%)	326,043 (1.1%)	172,756 (2.2%)
Sub-total	\$6,357,198 (83.1%)	\$25,872,085 (89.4%)	7,067,980 (89.7%)
Building	935,646 (12.2%)	1,739,150 (6.0%)	556,663 (7.1%)
Vehicles	57,499 (0.8%)	200,478 (0.7%)	69,823 (0.9%)
Equipment	289,313 (3.8%)	1,122,000 (3.9%)	182,474 (2.3%)
Long-term Training	8,510 (0.1%)	15,180 (0.5%)	—
Subtotal	\$1,290,968 (16.9%)	3,076,304 (10.6%)	804,497 (10.3%)
Total Annual Costs	\$7,648,166 (100%)	\$28,948,889 (100%)	7,876,941 (100%)

Table A2. Estimated Total Costs of National Immunization Days

Cost Components	Morocco (1997/98)	Bangladesh (1997/98)	Côte d'Ivoire (1998)
Recurrent Costs			
Personnel	1,967,588 (55.2%)	1,487,087 (27.6%)	661,844 (39.4%)
Vaccines	930,520 (26.1%)	2,896,201 (53.7%)	611,883 (36.4%)
Supplies	66,067 (1.8%)	320,870 (6.0%)	-
Transportation	508,226 (14.3%)	186,522 (3.5%)	116,299 (6.9%)
Short-term Training	-	-	19,929(1.2%)
Social Mobilization	78,000 (2.2%)	248,261 (4.6%)	228,480 (13.6%)
Maintenance & Overhead	-	-	42,853 (2.5%)
Sub-total	\$3,565,137 (100%)	\$5,138,941 (95.3%)	\$1,681,288 (100%)
Capital Costs			
Equipment	-	251,870 (4.7%)	-
Subtotal	-	251,870 (4.7%)	-
Total Annual Costs	\$3,565,137 (100%)	5,390,811 (100%)	\$1,681,288 (100%)
% of Total NIP Costs	31.8%	15.7%	17.6%

*Note: Non-health sector contributions are included in the estimate for Morocco and the Côte d'Ivoire. In Bangladesh, the contributions of NGOs and local governments are included.

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