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# EPIC Studies: Governments Finance, On Average, More Than 50 Percent Of Immunization Expenses, 2010–11

**ABSTRACT Governments in resource-poor settings have traditionally relied on external donor support for immunization. Under the Global Vaccine Action Plan, adopted in 2014, countries have committed to mobilizing additional domestic resources for immunization. Data gaps make it difficult to map how well countries have done in spending government resources on immunization to demonstrate greater ownership of programs. This article presents findings of an innovative approach for financial mapping of routine immunization applied in Benin, Ghana, Honduras, Moldova, Uganda, and Zambia. This approach uses modified System of Health Accounts coding to evaluate data collected from national and subnational levels and from donor agencies. We found that government sources accounted for 27–95 percent of routine immunization financing in 2011, with countries that have higher gross national product per capita better able to finance requirements. Most financing is channeled through government agencies and used at the primary care level. Sustainable immunization programs will depend upon whether governments have the fiscal space to allocate additional resources. Ongoing robust analysis of routine immunization should be instituted within the context of total health expenditure tracking.**

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In May 2012, 194 member states of the World Health Organization (WHO) endorsed the Global Vaccine Action Plan for the Decade of Vaccines.[1] This plan stressed government commitment to immunization through domestic financing to achieve ambitious, but attainable, national targets.[2,3] The plan requires countries and partners to increase available funding for immunization programs to ensure financial sustainability through regular evaluation of resource needs.[4]

Each year since 2012, country ownership, defined as government financing of a country's national immunization program, has been tracked by the WHO based on an analysis of domestic expenditures on immunization per live birth.[2,3] Data on government expenditures come from annual country reports to the WHO and the United Nations Children's Fund (UNICEF).[5] Immunization expenditure reporting is improving, with ninety-two countries presenting sufficient data to assess expenditure trends for 2014. Reported government expenditures on routine immunization per live birth have increased, on average, from US$21.40 to US$26.90 between 2010 and 2014. For low-income countries, spending has more than doubled from US$3 to US$7 per live birth, although these figures remain low.[4]

There is concern over the quality of immunization expenditure data reported to the WHO and UNICEF. Countries may report budgets in-

stead of expenditures, and the sources of information on expenditures vary widely. There are still gaps in information with some countries not reporting or reporting inconsistent and implausible information.[6] While countries and partners are strengthening analysis and reporting of immunization expenditures, the benefits of this process may not be seen for a few years.

Estimating and tracking health and immunization resources and expenditures are important for addressing a number of questions. Are funds being allocated to the most cost-effective interventions and programs, such as immunization? Is funding allocated to those who need resources the most, in terms of geographical location, gender, or age? Is sufficient funding reaching frontline providers for them to deliver high-quality immunization services? Are total allocations and expenditures covering the resource requirements and costs of immunization programs? What share of funding for immunization comes from domestic or government sources compared to external sources, and is this share increasing over time?

The lack of timely, accurate information on health spending is a key constraint for good policy making and enhancing health system performance.[7,8] Various approaches exist for tracking total health and immunization expenditures.[9] The System of Health Accounts (SHA) (formerly known as National Health Accounts), developed by the Organization for Economic Cooperation and Development (OECD) to track and compare health expenditures in a country over a defined period, is the most widely used approach for estimating health expenditures.[10–13] Country-level results of health expenditures are housed in a global database.[14] The SHA approach evaluates all sources of health expenditures (government, household, and donor), how these funds are managed and expended at different levels of the health system, for what types of activities and services, and for whom. However, few dedicated analyses of immunization expenditures have been conducted.

Public expenditure tracking surveys trace differences between budgets and resources received at various levels of the health system to understand financial bottlenecks and to improve accountability.[15] A survey conducted in Tajikistan in 2006 included immunization program expenditure tracking and found that most donor resources were retained at the national level and allocations to subnational levels were inequitable and unrelated to needs or program performance.[16]

There is a dearth of high-quality expenditure information for routine immunization. Globally, it has been estimated that donor agencies spend approximately 20 percent of official health assistance on immunization (US$12.8 billion in 2012).[17] Despite countries' efforts to report immunization expenditures, a global picture does not yet exist because of data gaps. In previous studies, governments accounted for approximately 40 percent of total immunization financing, with more recent estimates approaching 60 percent.[18,19]

This article describes an innovative approach to evaluating immunization expenditures in six countries, conducted as part of the Expanded Program on Immunization Costing and Financing of Routine Immunization (EPIC) studies supported by the Bill & Melinda Gates Foundation. The EPIC studies were conducted in Benin, Ghana, Honduras, Moldova, Uganda, and Zambia. These countries were selected based on whether the immunization schedule included a pentavalent vaccine, which provides protection against five major infections in one shot (diphtheria, tetanus, pertussis, hepatitis B, and *Haemophilus influenzae* type b [Hib]), and whether the country introduced either the pneumococcal or the rotavirus vaccine in the 2011–12 period.[20] The purpose of these studies was to generate high-quality, comprehensive evidence on country-specific costs and financing of routine immunization and new vaccines to fill gaps in global knowledge. The perspective of the analysis was the health system. Routine immunization referred to services provided on an ongoing basis through fixed facility or outreach strategies. Household expenditures and those for supplemental immunization activities were not part of the scope of the EPIC studies.

## Study Data And Methods

A financial flow map was developed for each country showing the cascade from sources to agents, providers, activities, and line items. This mapping helped identify the main players in routine immunization expenditures and also the level of complexity of financial flows that needed to be managed by a country.

Data collection and analysis of funding flows was complementary to an in-depth evaluation of immunization economic costs at various levels of the health system. Costs and expenditures were estimated from a sample of randomly selected districts and primary health care facilities in each country. A common approach summarized methods used for both the cost analysis and financial mapping.[21] Costs and expenditures were disaggregated into recurrent and capital costs, as well as a matrix of activities (fixed, facility service delivery; record-keeping; outreach service delivery; supervision; training; surveillance; social

mobilization and advocacy; vaccine collection, storage, and distribution; cold chain maintenance; monitoring and evaluation; program management; and other) and line items (labor, transport, vaccines and freight, injection supplies, cold chain energy, maintenance, utilities, overhead costs, cold chain equipment, vehicles, and buildings).

For the financial mapping of routine immunization, an approach was developed that drew upon standard methods of SHA coding (2011 version) to facilitate cross-national comparisons.[11,12,23] Primary data on budgets, transfers, and expenditures for routine immunization were collected using a pretested questionnaire adapted from existing resource tracking tools.[23,24] The questionnaire linked funding sources with financing agents, service providers, and activities of immunization. Data were collected from all sources of financing, including government ministries at national and subnational level, bilateral and multilateral technical assistance and donor agencies, nongovernmental organizations, and health insurance schemes.

Validation of actual expenditure at the level of the service provider was not possible because facilities did not maintain financial records for this purpose. Government records were cross-checked against other data sources, such as Gavi secretariat records on disbursements.

All six countries received vaccine commodity support from Gavi, the Vaccine Alliance—a partnership of countries, technical assistance agencies, industry, and donors created in 2000 to support the introduction of new and underused vaccines to the world's poorest children.[25] Cash support from Gavi for health systems strengthening also was factored into our expenditure estimates.

The expenditure coding from the 2011 SHA framework was used to ensure common classification across countries for consistency of analysis. Coding was further disaggregated to be consistent with the activity and line-item details for routine immunization.[20] In Benin, Ghana, and Uganda, data were available for both 2010 and 2011, while expenditure data for Moldova, Honduras, and Zambia were for 2011 only. For this article, data were pooled into a master database and analysed in constant 2011 US dollars.

Information from a companion costing study was used to inform allocations of shared health system expenditures to immunization-related line items and activities. For instance, immunization labor expenditures were drawn from the costing study, which based estimates on a series of in-depth, cascading interviews of health workers.[20] Facilities generally did not know their budgets, funding, or expenditures, and allocation of funding flows to this level was constructed from district-level expenditures and cost study results. In Uganda, general overheads and salaries were financed through block grants to the district health offices, and allocation of expenditures to these line items was based on cost shares.[22]

There were several challenges to the country-level application of the approach. Routine immunization financial flows and expenditures were not benchmarked against total country health expenditures because of the immunization focus of the EPIC studies. However, our analysis showed that immunization expenditures represented 1–9 percent of government health spending. Future immunization expenditure analysis could be conducted as part of national health accounting.

Donors providing periodic or one-time donations to subnational levels may not have been fully accounted for, as expenditure data were collected from agency headquarter levels. However, we estimate any omissions to be small.

Allocation of shared expenditures to subnational units and line items was challenging because of a lack of quality information upon which to generate allocation ratios. For instance, allocation of total expenditures to immunization expenditures by line item was difficult to accomplish in Zambia, where the expenditure records were not disaggregated by line items for nearly one-quarter of the expenditure, such as transportation, per diem, or utilities. Data on expenditures by line item were less robust for several reasons. Donor funding for various activities was often lumped together, and it was difficult to disaggregate between immunization and other child health activities, or between routine immunization and support for supplementary campaigns, such as expenditures related to measles and polio campaigns.

Finally, results from the sample of six countries might not be generalizable to the experiences of other countries. Findings from this exercise are illustrative of financing patterns for the six study countries. Routine tracking of immunization funding flows in additional countries can provide a better indication of trends.

## Study Results

This study reports expenditures for routine immunization in six countries in 2011 US dollars.

### TOTAL SPENDING ON ROUTINE IMMUNIZATION

Our analysis found that approximately $210 million was spent on routine immunization in the six study countries in 2011. Moldova had the lowest expenditure with $8.8 million, and Ghana

**EXHIBIT 1**

**Country Expenditures For Routine Immunization From The Expanded Program On Immunization Costing And Financing Of Routine Immunization (EPIC) Studies, 2010 And 2011**

| Country | 2010 (millions) | 2011 (millions) | Per child dose administered in 2011 for routine immunization |
|---|---|---|---|
| Benin | $10.0 | $11.5 | $ 3.11 |
| Ghana | 55.5 | 70.1 | 7.38 |
| Honduras | —[a] | 47.6 | 12.52 |
| Moldova | —[a] | 8.8 | 12.96 |
| Uganda | 24.7 | 32.9 | 2.77 |
| Zambia | —[a] | 39.0 | 8.12 |

**SOURCE** Authors' calculations of data from the EPIC studies. **NOTE** Figures are in 2011 US dollars. [a]Expenditures for 2010 were not collected in these countries.

had the highest expenditure with $70.1 million (Exhibit 1). Expenditures per targeted child ranged from $25 in Uganda to more than $250 in Honduras (data not shown). Expenditures per child dose administered ranged from less than $3 to nearly $13, with a simple average of $6 per dose.

**SOURCES OF FINANCING** In 2011, government financing of national immunization programs represented an important source of funding in the study countries, ranging from 27 percent in Benin to 95 percent in Moldova, with an average share of domestic immunization financing across the six countries of 64 percent (Exhibit 2).

Funding from Gavi was the second most important source of financing (24 percent, on average, in 2011), followed by multilateral agency financing such as from the WHO (5 percent, on average). Bilateral agency financing—for example, from the US Agency for International Development—accounted for an average of 3 percent of total funding; however, this percentage varied greatly across countries, with Uganda reporting the largest share at 14 percent of total, which was primarily related to bilateral financing of cold chain equipment. Other sources of financing, including nongovernmental support, debt relief, community funding, and insurance, made up an average of 4 percent of financing.

Government funding of vaccines was estimated to be one-fifth of total vaccine financing, on average, ranging from 8 percent of all vaccine financing in Uganda to 67 percent in Moldova.

This study also found that Benin, Ghana, and Uganda experienced 15–33 percent increases in total routine expenditures between 2010 and 2011. These countries experienced more than a 50 percent increase in commodity support from Gavi. As a consequence, the share of government financing in this subset of countries declined over this period. In Ghana, Gavi financing rose from 1 percent to 20 percent of total financing, and government funding declined from 98 percent to 79 percent; however, there was an absolute increase in government financing in the three countries overall.

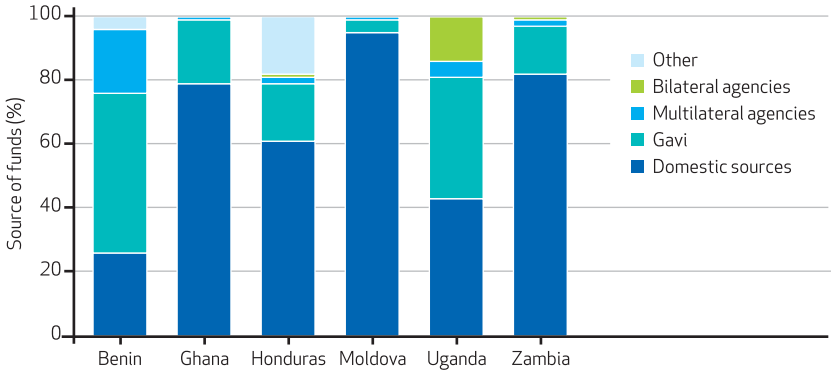
**FINANCING AGENTS** Financing agents are entities that receive and manage funds for routine immunization. In five of the six countries in 2011, the central Ministry of Health received more than two-thirds of all financing, on average (Exhibit 3). In Moldova, where the central Ministry of Health did not play a role, health insurance agencies received 80 percent of routine immunization funding. Central medical stores in Ghana and Uganda received 25 percent and 41 percent of financing, respectively.

**HEALTH CARE PROVIDERS** The study also found that routine immunization funding is directed toward primary health care facilities (76 percent of total funding in 2011; data not shown). Expenditures occurring at administrative levels above the health facility level received 24 percent of total financing, on average. These results are encouraging from a service delivery perspective, as it appears that the majority of immunization funds across the six countries were being spent on service delivery instead of administration.

**EXPENDITURES ON IMMUNIZATION LINE ITEMS** Salaries and wages accounted for most routine immunization expenditures (49 percent, on average), ranging from 15 percent in Benin to 77 percent in Moldova (Exhibit 4). Vaccine expenditures represented the next-largest category (27 percent, average), followed by all other expenditures (24 percent, which includes unallocated expenditures).

**EXHIBIT 2**

**Comparison Of Sources For Routine Immunization Financing In Six Countries, 2011**




**SOURCE** Authors' calculations of data from the Expanded Program on Immunization Costing and Financing of Routine Immunization (EPIC) studies.

## Discussion

This article presents the results of a comprehensive and rigorous mapping of routine immunization expenditures in six countries with varied economic development, population sizes, and immunization service delivery. To our knowledge, this type of analysis had not been conducted previously for routine immunization. The approach to the funding-flow analysis leveraged results from a complementary in-depth facility-based costing study.[20,25–29]

Findings suggest that five of the country governments contributed 50 percent or more to financing routine immunization. In Ghana, Zambia, and Moldova, government financing was more than 75 percent of all routine immunization funding, which is higher than previously estimated.[18,19] In Benin, Ghana, and Uganda, government routine immunization expenditures increased between 2010 and 2011, but the share of government financing dropped as a result of significant increases in Gavi vaccine support, which is the largest external source of funding for routine immunization.

Governments were managing most routine immunization expenditures, and resources were flowing through national systems to a large extent. The majority of routine immunization financing was for salaries and vaccines, as well as for routine service delivery and outreach services.

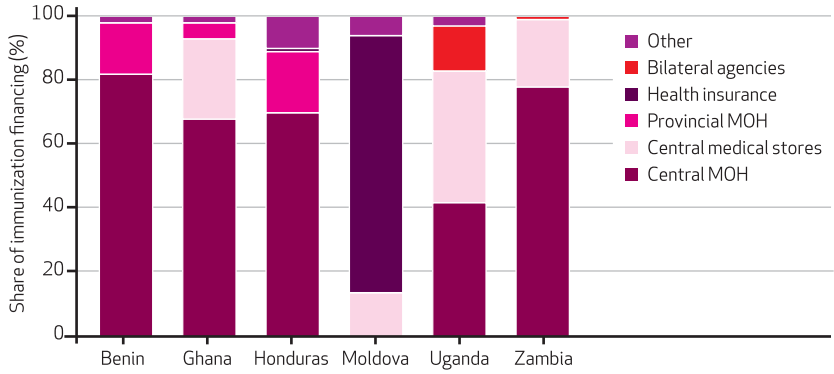
There were challenges associated with allocating shared expenditures, and data on expenditures were not always available in a format that allowed for easy translation into the coding system. Donors did not always fill out the pretest data collection instruments and required multiple visits to obtain relevant information. While the disaggregated coding and spreadsheets used for the analysis were useful for standardizing data collection and evaluating results across countries, the coding structure did not always match the general ledger that recorded government expenditures.

The results of our analysis have implications for the affordability and sustainability of national immunization programs. Gavi requires countries to cofinance new vaccines, with year-on-year increases for higher-income countries and with the aim of increasing domestic immunization financing in order to enhance longer-term sustainability.[30,31] While the total amount of domestic financing from countries is expected to rise with cofinancing of new vaccines, the government share of funding particularly for vaccines may decline in the short run, given significant, time-limited Gavi and other donor support. Government health spending may not grow at the same pace, requiring further prioritization of immunization within the health budget. Securing additional funding in a context of competing priorities for limited resources will be challenging. Donor funding may help ease the initial ramp-up of financing requirements, but these should be gradually taken over by governments. In Moldova, financing from Gavi and the Global Fund to Prevent AIDS, Tuberculosis, and Malaria will be phased out in the next few years; therefore, the country will need to find new sources of financing from its own budget or other sources.[26] Because of limited fiscal space and weak economic prospects, transition to self-financing could pose significant challenges and may put at risk the sustainable financing of these priority programs.

Countries in the sample with higher gross na-

**EXHIBIT 3**

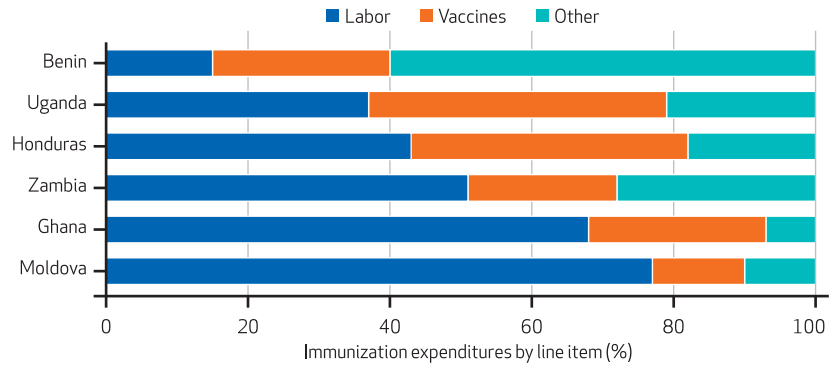
**Percentage Of Routine Immunization Financing Managed By Financing Agents In Six Countries, 2011**




**SOURCE** Authors' calculations of data from the Expanded Program on Immunization Costing and Financing of Routine Immunization (EPIC) studies. **NOTE** MOH is Ministry of Health.

**EXHIBIT 4**

**Percentage Of Routine Immunization Expenditures By Line Item In Six Countries, 2011**




Authors' calculations of data from the Expanded Program on Immunization Costing and Financing of Routine Immunization (EPIC) studies. **NOTE** "Other" includes supplies, maintenance, utilities, transportation, per diem, printing, taxes, vehicles, cold chain equipment, other equipment, vehicles, other, and unallocated.

tional income per capita have a higher share of government financing of vaccines (from 8 percent in Uganda to more than 60 percent in Moldova). While the Ugandan government's contribution to vaccine financing was small relative to the other countries in this study, the total government allocation increased by 14 percent between 2010 and 2011 despite fiscal constraints on the total public budget. The government also was financing 42 percent of the total routine immunization program.[22,32]

Expenditure tracking is useful for policy and program management to ensure the most cost-effective allocations of resources.[32,33] For the Global Vaccine Action Plan, it is important to have regular estimates of immunization expenditures. Full resource tracking down to the service provider level may be expensive and time consuming, and an alternative financial flow analysis may be less costly to implement on a regular basis.[22] The SHA methodology is the most widely used approach globally.[10–13] Its advantage is that all health expenditures are reflected, and disaggregation by disease or program would relate to total health spending. Guidelines are under development to ensure the consistency of the disaggregated approach across countries. However, this study further disaggregated the System of Health Accounts coding to be more program-relevant for immunization, and it based allocations of shared expenditures on a companion costing study.[20,25–29] Our experience would emphasize the need for additional robust evidence, such as that generated through costing studies, to better allocate shared health expenditures to particular disease classifications.

Ultimately, the quality of health expenditure analysis depends upon the quality of the expenditure records upon which these analyses are based. There is a clear need to further improve financial data systems, both public and donor reporting, for national immunization programs and health systems more generally.[7,8] In addition, there is potential to do more than just track expenditures but also to investigate the reasons why funding doesn't flow to intended users and beneficiaries.

**Greater domestic financing for immunization has been thought of as a critical development for overall sustainability.**

Donor funding is often off budget and not captured within the general health budget. Our sample of countries did not have a single mechanism for capturing and reporting all development partners' spending on immunization. Ideally, such a system should allow for more accurate, ongoing assessments of financing and budget execution bottlenecks. Qualitative surveys can complement financial flow and resource tracking exercises.

## Conclusion

Our study found that governments were financing larger shares of routine immunization during 2011–12 than previously estimated. Countries with higher incomes were financing more of their total routine immunization and vaccine requirements, and this is expected to increase as the sample countries fulfill their cofinancing requirements with Gavi.

Greater domestic financing for immunization and vaccines has been thought of as a critical development for overall sustainability. To have greater visibility on trends in government immunization expenditures, ongoing collection and robust analysis of immunization expenditure data must be done within the context of mapping of total health expenditures. ■

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