Delivering the Money:

The Importance of Efficient Financial Flows for Vaccine Distribution

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VillageReach® Starting at the Last Mile

WILLIAM DAVIDSON INSTITUTE

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Policy Series Overview

We are mid-way through the Decade of Vaccines, marking a period of significant activity to prevent millions of deaths through more equitable access to vaccines. Today, about 80% of children around the world receive a complete routine of life-saving vaccines during their first year of life. The Decade of Vaccines was established to bring attention to the importance of reaching the final 20% of children without access to life-saving vaccines. This decade is bearing witness to many exciting efforts to strengthen routine immunization, accelerate control of vaccine-preventable diseases, and introduce new and improved vaccines.

To a large extent, the evaluation of this decade's success will be based on the degree to which vaccines reach the children who need them. A strong end-to-end immunization supply chain (iSC) should be able to adapt to the resource constraints of communities to ensure that delivery, from the point of production to the point of immunization, is complete. This policy series considers the different components of the supply chain, addresses the challenges faced at the last mile for distribution, and presents examples of innovative approaches to address those challenges. The sixth paper in the series considers how the financial structure and flow can influence the performance of the supply chain.

VillageReach Overview

VillageReach has worked for more than a decade to develop, test, and refine system innovations to improve the performance of in-country iSC. Working closely with the MoH in Mozambique and with support from the Bill & Melinda Gates Foundation, the Final 20 Program (designed to reach the final 20% of children without access to vaccines) is building a sustainable model of innovative supply chain design, enhanced data collection and reporting, and public-private partnerships to improve the iSC.

To address the unique challenges of last mile distribution, VillageReach is engaged in a multi-year program in Mozambique to improve the performance of the iSC, focusing on rural communities that represent over 50% of the country's population. The approach — the Dedicated Logistics System (DLS) — was developed in collaboration with provincial governments and the Mozambican organization Fundação para Desenvolvimento da Comunidade (FDC). The DLS uses dedicated logisticians, level jumping, dedicated resources, and service delivery-level data to improve iSC effectiveness and efficiency.

William Davidson Institute Overview

Established at the University of Michigan in 1992, the William Davidson Institute (WDI) is an independent, non-profit research and educational organization focused on providing private-sector solutions in emerging markets. WDI's Healthcare Initiative develops intellectual capital that helps increase access to essential medicines, vaccines and other health technologies in developing countries. We do this by helping create scalable and sustainable models for supply chains and delivery in healthcare. We help stimulate stakeholder discussions around new solutions to the many problems affecting global healthcare and explore new ideas through models, field experiments, and pilot implementations.

We are grateful for contributions from our colleagues Kaleb Brownlow (The Bill & Melinda Gates Foundation), Simon Conesa (Management Sciences for Health [MSH]), Kwesi Eghan (MSH), Mike McQuestion (Sabin Vaccine Institute), and Walter Proper (John Snow, Inc.), whose insight and expertise has greatly assisted and improved our research. However, the content and conclusions of this paper should not be reported as representing the views of any of the above individuals or institutions.

Executive Summary

Ensuring adequate and reliable flow of funding all the way to the point of care is critical to an effective immunization supply chain (iSC). On many occasions, however, vaccine programs face inadequate funding for vaccine distribution, as well as barriers to accessing existing funds, both of which contribute to iSC underperformance and program delays. Funding bottlenecks at the last mile often result from process breakdowns such as administrative delays, ineffective budgets, or a lack of financial clarity and transparency. These problems can be extremely complex, often the result of deep-seated institutional management challenges. Fortunately, there are approaches that iSC managers can take to improve the accessibility of last mile distribution financing: Understanding and tracking true costs of distribution, using that cost data to inform an evidence-based advocacy strategy, and incorporating ease of financial management as criteria in future supply chain design decisions.

Interruptions in funding flows exacerbate iSC challenges. When funding for cold chain maintenance, vaccine distribution, and other iSC activities isn't available when and where it is needed, vaccine programs may be negatively effected.

Vehicle "graveyard", Mozambique

Introduction

Of all investments that a public health system can make, immunization remains one of the most universally cost effective. Reducing the burden of diseases like measles, polio, and meningitis through vaccination saves millions of lives per year, creates billions of dollars in economic value, and provides an estimated 10-to-25-fold return on invested dollars.[1] Worldwide, country governments and global donor organizations have made enormous progress towards developing new vaccines and strengthening the supply systems that deliver them to the beneficiaries who most need them. Since the World Health Organization's (WHO) Expanded Program on Immunization (EPI) began forty years ago, coverage rates for a basic set of four core vaccines have increased from 5% to more than 80% globally.[2]

Despite the immunization successes achieved to date, there is still much work to be done. Globally, 1.5 million children still die each year from vaccine-preventable illnesses, and iSCs still face significant challenges in ensuring complete coverage and equitable distribution. Addressing these fundamental iSC challenges will be essential in reaching the final 20% of children who still do not receive a basic set of immunizations.

One key driver of iSC underperformance is the funding of last mile vaccine distribution. Recent studies estimate that for lower-income countries, 10-15% of overall immunization program funding is needed for distribution costs including transportation, labor and storage.[3] For a supply chain to be effective, funding for those distribution costs must also be accessible – it must be quickly mobilized wherever and whenever it is needed by health program managers. Anytime the flow of such funding is disrupted, perhaps due to administrative delays or inaccurate budgets, health programs risk stocking out of products and having to cut back on program activities. Immunization supply chains are particularly sensitive to these funding flow disruptions, because of the need to constantly maintain temperature control all the way out to last mile points of care. In this case an interruption

1 Ozawa S, Clark S, Portnoy A, et al. Return on Investment from Childhood Immunization in Low- and Middle-Income Countries, 2011–20. Health Affairs. 35(2); 2016.
2 Subaiya S, Dumolard L, Lydon P, et al. Global Routine Vaccination Coverage, 2014. Centers for Disease Control and Prevention (CDC). 2015. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6444a5.htm
3 Portnoy A, Osawa S, Grewal S, et. al. Costs of vaccine programs across 94 low- and middle-income countries. Vaccine. 33S; 2015.

in funding can cause not just stocked-out clinics and untreated clients, but also costly spoilage of temperature-sensitive vaccines. Addressing the root causes of distribution funding interruptions is a crucial step in building a more effective vaccine program.

Financing for last mile vaccine distribution has traditionally received only modest attention from donors and policy makers, compared with other immunization issues like vaccine development, procurement, and cold chain technology. That is beginning to change, however, as the global portfolio of vaccine products continues to become broader and more expensive, and as coverage rates continue to rise for each of these products. Immunization supply chains are being asked to carry unprecedented volumes and values of product, and with that comes an increased pressure on last mile supply chains to deliver vaccines more efficiently and effectively.[4] At organizations such as Gavi, the Vaccine Alliance, partners are expressing an urgent need to better track and manage sub-national funds for routine immunization services.[5] Initiatives like UNICEF's Rapid Assessment Approach — tested in Uganda[6] and subsequently adapted and implemented by UNICEF and VillageReach in Mozambique — are casting increasing light on the financial bottlenecks faced by local-level country governments for vaccine distribution.

This policy paper highlights key financial flow bottlenecks that were identified in Mozambique using the Rapid Assessment Approach, and explores similar documented challenges in other countries. The paper also discusses some approaches that policy-makers and program managers can implement to mitigate these bottlenecks and improve accessibility of financing for last mile vaccine distribution.

Key financial bottlenecks impacting vaccine distribution

Broadly speaking, in many low- and middle-income (LMIC) countries, funding for immunization programs comes from one of three sources (Figure 1):

- **Government general revenues:** Money is allocated through a three-way communication and budget exchange between the Ministry of Finance (MoF), the Ministry of Health (MoH) and the national parliament. Budgets are typically prepared and aggregated on an annual basis at each level of the MoH. The national health budget is then approved or adjusted by the MoF which submits a single government budget to parliament for approval.
- **External donor budget support:** Donor agencies such as Gavi or UNICEF provide additional financial support, either through the general MoH budget or independently-managed funds.
- **Direct partner support:** Many donor agencies and other non-governmental organizations (NGOs) provide support directly to immunization and maternal-child health programs at the provincial and district levels of the MoH. These funding streams vary widely, but are often targeted with respect to both their geographic and programmatic focus.

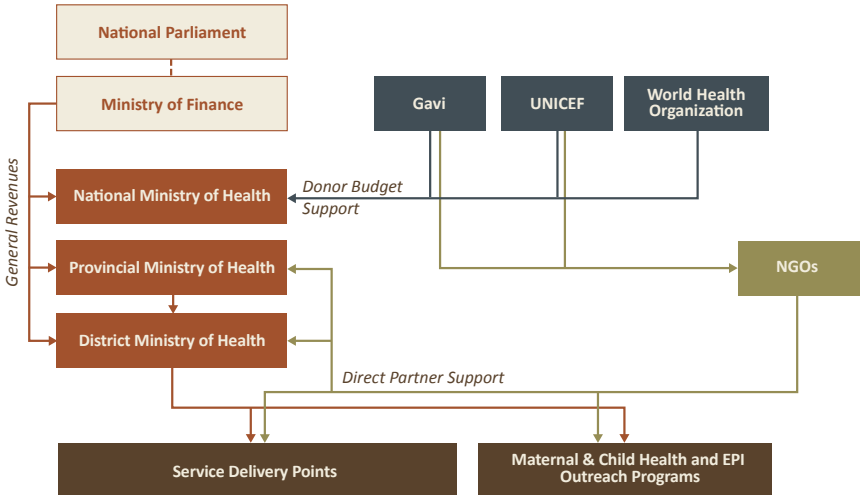
For vaccine distribution specifically, some funding may come through external donors like Gavi or NGOs, but the large majority comes through the general MoH budget process.

Vaccine distribution programs generally face two broad categories of challenges related to financing:

1. Overall inadequacy of public funding dedicated to distribution.
2. Challenges and bottlenecks in accessing the public funding provided.

4 Sabot O, Yadav P, and Zaffran M. Maximizing Every Dose and Dollar: The Imperative of Efficiency in Vaccine Delivery. NBR Impact and Innovation Series. 2011.
5 UNICEF. Financing for immunization at sub-national levels: A systematic literature review. 2014. Available at: http://www.unicef.org/health/files/GAVI_LitReview_050814_ForProduction_a.pdf
6 UNICEF. Addressing sub-national financial bottlenecks for immunization services: piloting a rapid assessment approach. 2014. Available at: http://www.unicef.org/health/files/RapidAssess_EPI_financing_Tool_Uganda_061414_FINAL-for-Printer.pdf

Figure 1: Common types of funding flows in a publicly-managed immunization supply chain

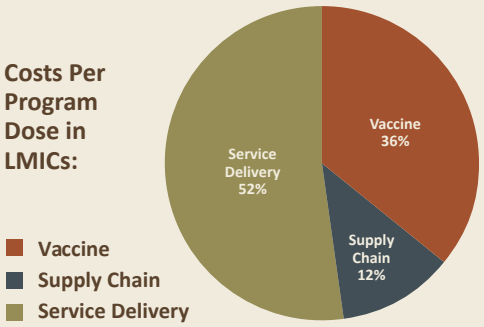


At the sub-national level these two problems are often interrelated, with overlapping causes and related solutions, and they cannot be discussed in isolation from one another. To ensure efficient financing for last mile vaccine distribution, both problems need to be addressed together.

Problem 1: Overall inadequacy of public funding dedicated to distribution

According to recent studies, costs to fully immunize a child can range anywhere from $25 to over $300 per child depending on the country,[7] but in 2014, Gavi-eligible countries averaged only $7 per child on routine immunization expenditures,[8] with global donors like UNICEF and Gavi making up most of the difference. Multilateral donor funding focuses primarily on vaccine procurement and other health system strengthening efforts rather than distribution, despite the fact that in many countries distribution accounts for a significant portion (10-15%) of total immunization costs.[9] There are a few potential reasons why these distribution costs may be underfunded relative to other immunization program costs:

Multi-lateral donor funding focuses primarily on vaccine procurement and other health system strengthening efforts rather than distribution, despite the fact that in many countries supply chain accounts for a significant portion (10-15%) of total immunization costs.



Vaccine distribution costs are difficult to measure

Compared to other common MoH expenditures, supply chain distribution costs tend to be extremely diffuse in the way they are incurred. In a traditional, multi-tiered public supply chain, every clinic worker counting inventory, every bus ride to collect commodities, and every district or provincial vehicle making delivery runs all contribute to the cost of distributing commodities. Not only are these costs widely dispersed across many geographies and budget lines, they also rely heavily on shared resources. For example, health clinic workers, vehicles, and regional supervisors are all involved in supply chain activities, but are also

7 Brenzel L, Young D, Walker DG. Costs and financing of routine immunization: approach and selected findings of a multi-country study (EPIC). Vaccine. 33(Suppl 1): A13–20; 2015.
8 Nader AA, de Quadros C, Politi C, et al. An analysis of government immunization program expenditures in lower and lower middle income countries 2006–12. Health Policy Plann. 30(3); 2015.
9 Portnoy A, Ozawa S, Grewal S, et al. Costs of vaccine programs across 94 low- and middle-income countries. Vaccine. 33: A99-A108; 2015.

involved in clinical care, management, and multiple other activities beyond supply chain. Thus it can be difficult to quickly and accurately separate the fraction of those resources that are needed for distributing commodities. MoH budgets operate best with units that are tangible — nurses hired, medicines purchased, clinics constructed. Supply chain costs can be difficult to express in these terms, and as a result they risk being underrepresented in a tightly-constrained MoH budget.

Vaccine distribution costs are less appealing to fund

A MoH is fundamentally a political entity, subject to political pressures and the need to demonstrate clear results to constituents. Partner organizations must also be able to demonstrate results, often to donors and stakeholders that are thousands of miles away. While everyone ultimately has the best interest of the patient in mind, in reality not all expenditures are equally easy to link to results. Vaccine distribution costs are disproportionately allocated to operating expenses, e.g., fuel for vehicles, maintenance, staff salaries and per diems. From a donor's perspective, these recurring costs are less "sustainable" than a one-time, catalytic health investment. From a MoH perspective, operating costs are less visible to beneficiaries and constituents, while building new clinics, buying new medicines, and hiring more doctors are examples of high-visibility initiatives that directly impact patients and are directly attributable to Ministry and donor actions. Thus distribution and operating costs will always face a subtle but inherent funding disadvantage unless program managers demonstrate a clear and direct link to patient impact.

Lack of MoH executive leadership focused on supply chain

The upper levels of most ministries of health traditionally feature medically-focused leadership positions, such as a Chief Medical Officer and a Director of Pharmacy, who work directly with the Minister of Health, and who manage and advocate for their own dedicated share of internal resources. However, no such executive-level positions exist for supply chain, despite the fact that procurement and distribution are core functions of any centralized public health system. By contrast, most private companies in high-income countries running similar operations would feature an executive-level position, such as a Chief Supply Chain Officer, to ensure strategic planning and advocacy for supply chain activities. The fact that most ministries of health in LMICs lack such executive-level supply chain leadership puts those supply chain costs at an even further funding and advocacy disadvantage.

Problem 2: Challenges and bottlenecks in accessing public funding for distribution

Very few low- and middle-income countries have effective financial management systems in place to monitor how resources flow through their system after they are dispersed.[10] As a result, financial data are often weak, incomplete, inaccurate or entirely missing. These weak financial processes exist not only at the national level, but extend to regional and local governments as well,[11] right where immunization programs require the most financial support. This lack of strong processes manifests in several ways:

Cash flow problems stemming from delays and slow administrative processes

The UNICEF/VillageReach financial flows assessment in Mozambique highlighted the impact of budgetary and process delays on immunization program operations. The fiscal year begins on January 1st in Mozambique, but in the past three years the national budget has never been approved earlier than mid-January, with actual disbursement requiring an additional three to four weeks. This leaves program managers with a four to six week funding gap in January and February, which many districts do not have the working capital or cash reserves necessary to cover. If program managers cannot find alternate sources of funding — private credit or emergency funding — they may be forced to cut back on immunization and outreach activities.

10 Glassman A, Sakuma Y. Intergovernmental Fiscal Transfers for Health: Overview Framework and Lessons Learned. Consultation draft for the Center for Global Development. Center for Global Development. 2014. Available at: http://www.cgdev.org/sites/default/files/CGD-Consultation-Draft-Glassman-Sakuma-IGFT-Health.pdf
11 Ibid.

Even after budgets are approved and funding is disbursed, however, slow bureaucracy often prevents local managers from efficiently accessing and spending their disbursements. For example, in Mozambique the district-level government funding is often managed through a single person, the district secretary, who may quickly become a bottleneck if many departments are submitting requests simultaneously. Thus program managers must anticipate funding needs days or weeks in advance, potentially even for small funding requests like fuel or maintenance. When an unexpected need arises, they may be unable to mobilize the cash in a timely manner. Funding delays and cash flow problems such as these are some of the most widely-reported challenges among on-the-ground practitioners across LMICs, in countries like Nigeria, Sri Lanka, [12,13] and likely many others.

Competition with other health programs and activities for available funding

While many country governments have adopted budget lines for some routine immunization activities, these lines often do not include supply chain and distribution expenses. Again in Mozambique, programs like Maternal & Child Health and Malaria all compete with immunization program managers for the same pool of shared distribution and supply chain resources. This leaves supply chain program managers in the position of having to coordinate with - sometimes even compete with - other programs for resources like fuel, vehicles, and supervision time. During times of the year when other programs, such as malaria campaigns or nutrition programs, are ramping up their activities, money for immunization distribution can be particularly tight.

Difficult Choices

Multiple Programs Compete for Limited, Shared Resources

Lack of top-down clarity and predictability in budget planning process

From year to year, immunization program managers must budget and conduct their activities in the face of this uncertain financing at the national level. As has been the case in Mozambique, district managers are often required to create annual immunization budgets without any advance insight into their true budget limit, and knowing that parliament is likely to reduce their proposed budget significantly. In some cases this lack of clarity may create conditions that incentivize over- or under-estimation of costs and activities, further exacerbating the problem.[14,15] Finally, managers cannot always assume that approved money will actually be allocated, as problems like cash hoarding and budget misclassification prevent money approved by parliament from ever reaching provincial and district bank accounts. Another key driver of budget uncertainty at the program level is revenue uncertainty at the national level. Many donor organizations are unable to make multi-year funding commitments, and many LMIC countries also have economies that are more heavily tied to natural resource extraction. The International Monetary Fund has shown that such countries are more prone to volatility in both their economic growth and their currency valuation.[16] In short, it is difficult to provide a reliable budget when the revenue streams comprising that budget are also unreliable.

12 Uzochukwu BSC; Chukwuogo O; Onwujekwe OE. Financing Immunization for Results in Nigeria: Who funds, who disburses, who utilizes, who accounts? Financing bottlenecks and accountability challenges. African J Health Econ. 2004.
13 Michaud C. Flow of Donor Funds in Cambodia, Indonesia, and Sri Lanka. Annex C: External resource flows to the health sector in Sri Lanka. World Health Organization. 2004.
14 Omitoogun W, Hutchful E. Budgeting for the Military Sector in Africa: Processes and Mechanisms of Control. Oxford University Press; 2006.
15 International Monetary Fund. IMF Technical Assistance Evaluation: Public Expenditure Management Reform in Selected African Countries. Washington D.C. 2005.
16 International Monetary Fund. Revenue Mobilization in Developing Countries. IMF Washington D.C. 2011. Available at https://www.imf.org/external/np/pp/eng/2011/030811.pdf

Lack of bottom-up transparency in financial reporting

In many countries, financial transparency can also be difficult to achieve because it is perceived as risky by district- and provincial-level managers. Work by the Sabin Institute in Vietnam and Kenya showed that when asked about how provinces spent their allocated money for immunization, provinces were reluctant to be transparent as they were afraid of subsequent cuts in funding.[17] In Vietnam, only 25 of 63 provinces reported what they are spending and on what activities. Many donors exacerbate this problem by allocating funding based on proposals rather than prior cost and performance. Particularly in decentralized health systems (Egypt and Indonesia are examples), the MoH may allocate funding to regional offices, which are not required to report back their activities, costs or performance to donors.

Approaches taken to address financial flow challenges

While many of the problems described earlier are the result of financial management process bottlenecks, it is important to remember that such processes cannot be addressed solely within the confines of immunization programs. Public financial management challenges are complex and broad in scope — not only do they affect all health programs, they are often systemic throughout the entire government. Overcoming an institutional challenge of this magnitude is likely to be a slow and evolving process, requiring technological innovations that are introduced hand-in-hand with actions and approaches that on-the-ground program managers take to improve the underlying conditions for sound financial management.

Increasing overall domestic funding for immunization programs and vaccine distribution

Country ownership is a key tenet of the WHO Global Vaccine Action Plan, which calls in part for full domestic financing of immunization programs. This goal has led many governments to push for new legislation and engage in new approaches designed to increase overall domestic immunization funding.

Managers cannot always assume that approved money will actually be allocated, as problems like cash hoarding and budget misclassification prevent money approved by parliament from ever reaching provincial and district bank accounts.

- **Advocating for increased government allocations:** One approach to increase program and distribution funding levels is to make policymakers more aware of immunization's status as a health "best buy". In Senegal, the immunization team managed to advocate directly to the Minister of Finance and secured an 86% budget increase. Cameroon and Vietnam EPI programs have also used data-driven advocacy to secure budget increases, while Uganda, Mali, and DRC have all created advocacy networks that include members of parliament.[18] These country examples show there is room to increase immunization funding by having intentional, data-driven conversations to better inform policymakers.

- **Stand-alone national funds:** Some countries have enacted legislation to create trust funds specifically dedicated to immunization. The Bhutan Health Trust Fund is a longstanding example of such a fund, while Nepal, Nigeria, and Senegal are all in the process of developing similar independent funds. Such a mechanism requires active management, resource tracking, and a means of accumulating capital (e.g. donor seed funding or allocation of domestic funds) but could potentially offer a number of benefits. These funds could allow a country to pool multiple donor and domestic contributions, simplifying administration and coordination costs. They could also be used to buffer the impact of fluctuating donor commitments, government revenues, or currency valuation, ensuring more predictable iSC financing.

17 Sabin Vaccine Institute. Sustainable Immunization Financing: Summary Digest. Vol 4: Issue 4. December 2012.
18 Examples courtesy of the Sabin Vaccine Institute's Sustainable Immunization Financing (SIF) Program. Available at http://www.sabin.org/programs/vaccine-advocacy-and-education/sustainable-immunization-financing-sif-program

- **Special taxes:** Some countries, including Vietnam, Haiti, Mexico, and Costa Rica, have bolstered immunization funding streams through transparent, legislative earmarks.[19] These include sources like luxury goods taxes, lottery revenues, or taxes on "unhealthy" products such as tobacco or alcohol. Such earmarked tax programs typically provide only a supplemental income, and may potentially constrain government spending flexibility. Furthermore, other health, education, and social programs besides immunization may compete for the same funding streams. Regardless, such programs are often well-supported by the public, who sees "unhealthy" spending being used in a transparent way to generate revenue for the public good.

All of the above approaches are designed to increase overall immunization program funding, but for any of them to impact supply chain operating and distribution costs, such costs must still be explicitly accounted for in the budgeting process. Once again, it is imperative that EPI program managers track and budget for distribution costs, or they may continue to be neglected even if overall funding increases.

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Managing vaccine stock in a walk-in cold room
Photo credit: Bill & Melinda Gates Foundation

Understanding true costs of vaccine distribution

Like any private organization tracking the cost of goods sold or setting prices for a service contract, a government-run health system must systematically track and understand its supply chain costs in order to be an effective distributor of health commodities. Unless these costs are clearly known and accounted for, it will be difficult under any circumstances to reliably allocate the right amount of money to the right levels in the supply chain. Tracking distribution expenses is a clear first step, both to ensure sufficient overall funding and that such funding flows to the correct destinations. Tools to measure supply chain costs generally fall into one of two categories:

In many countries there is room to increase immunization funding by having intentional, data-driven conversations to better inform policymakers.

- **Costing tools:** A plethora of methodologies and tools exist for developing point-in-time estimates of LMIC health supply chain costs. One of the more well-known immunization costing tools is the PROVAC-CostVac tool, developed by the Pan American Health Organization. PROVAC-CostVac was developed according to WHO guidelines to provide a transparent, user-friendly framework for collecting and analyzing cost data at national and subnational levels.[20] It is intended to improve the consistency and availability of cost data for national immunization managers and decision makers.

- **Resource Tracking Tools:** While costing tools provide a single point estimate of specific supply chain costs, resource tracking tools are generally broader in scope, used to track ongoing disbursements and expenditures for budget management and reporting purposes. One such tool is the Public Expenditure Tracking Survey (PETS), developed by the World Bank in the early 2000s to track expenditures and disbursements at all levels of government, and potentially highlight misallocated funds. PETS has been predominantly used in the education sector with very few examples of use in iSCs. Another more health-focused approach is the National Health Accounts (NHA) methodology,

19 World Bank. Immunization Financing Toolkit. 2010.
20 Castañeda-Orjuela C, Romero M, Arce P, et al. Using standardized tools to improve immunization costing data for program planning: The cost of the Colombian Expanded Program on Immunization. Vaccine. 31:C72-C9; 2013.

developed to help determine a nation's total health expenditure patterns, including public, private, and donor spending. The methodology is not currently able to separate expenditure on immunization from other child health prevention services, and there are concerns about who should have ownership of a country's NHA process. However, the NHA methodology could serve as a useful template for future resource tracking tools that include immunization-specific expenses.[21]

For a country that is not currently tracking iSC expenses, any of these costing or resource tracking tools will provide a positive step forward, as long as the tool 1) incorporates key iSC cost categories, such as transportation, storage, labor, cold chain, and administration, and 2) captures these costs at each sub-national level in the supply chain. To improve overall funding for vaccine distribution, however, we must not only systematically measure the costs of distribution, but systematically use that knowledge to improve budgeting and advocacy efforts. They provide vital evidence needed to justify vaccine distribution budgets and to advocate for additional funding among national-level policymakers.

To improve overall funding for vaccine distribution, we must not only systematically measure the costs of distribution, but systematically use that knowledge to improve budgeting and advocacy efforts.

Monitoring performance of EPI
Photo credit: Bill & Melinda Gates Foundation

Improved financial management technology

Some governments have also turned to technology to help improve their overall financial management processes. Since 2004, the Government of Uganda has used the Integrated Financial Management System (IFMS) to connect all its central government ministries, the Bank of Uganda, and the Uganda Revenue Authority. The IFMS combines budget preparation, budget execution, accounting and reporting systems. Similar integrated systems exist in Tanzania, Ghana, Kenya, and Malawi.[22] While these systems look good on paper, they often experience challenges in real life. First, they require regular updates and hardware replacement, both of which are costly.[23,24] In addition, experts in the field point to management weaknesses beyond technological ones, thus weakening the argument for IFMS as an effective financial management tool. In short, financial management technology can seemingly improve budget reporting and visibility, but it will not provide a cover for poor underlying financial management processes.

Performance or results-based financing

To strengthen its immunization programs, Gavi has employed performance-based financing (PBF) mechanisms in both its Health System Strengthening (HSS) and Immunization Services Support (ISS) funding programs. Through these mechanisms, in-country MoH units are typically provided with bonus payments for achieving a certain health goal, such as a number of new children immunized. Gavi's PBF programs have generally been found to have a significant positive impact on immunization coverage rates and volume of maternal & child health services, such as in the Democratic Republic of the Congo, where districts that implemented PBF incentives achieved a 16% higher diphtheria-tetanus-pertussis (DTP3)

21 UNICEF. Financing for immunization at sub-national levels. A systematic literature review. 2014. Available at http://www.unicef.org/health/files/GAVI_LitReview_050814_ForProduction_a.pdf.
22 Diamond J, Khemani P. Introducing Financial Management Information Systems in Developing Countries. International Monetary Fund (IMF) working paper. 2005.
23 Ibid
24 Semakula L, Muwanga R. Uganda: implementing an integrated financial management system and the automation of the budget process: Ministry of Finance and Planning and Economic Development, Overseas Development Initiative. 2012. http://www.budget-strengthening.org/countrylearningnotes/uganda-implementing-anintegrated-financial-management-syste.html.

vaccination rate compared to districts without such incentives.[25,26] Gavi's PBF program in Cambodia's also suggests that PBF schemes designed specifically for immunization financing could incentivize accurate reporting and strengthen financial management capacity.[27] However, PBF schemes can also be very complex and should be carefully evaluated with respect to their development and implementation as well as sustainability before they are considered as viable possibilities for iSC financial processes.[28]

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Vaccination day at a health center
Photo credit: Bill & Melinda Gates Foundation

Good supply chain design to improve simplicity and predictability of funding flows

Supply chain designs often focus on the flow of products and information, but it is important not to forget their impact on the flow of funding as well. Given the complexity, and likely the long timeline involved in large-scale institutional budgetary reform, program managers may find it easier to align the structure and design of their iSC with the strengths and weaknesses of the existing MoH budgeting process.

- **Reducing complexity and number of tiers:** Many health supply chains follow the MoH administrative structure with every additional tier or parallel program creating an extra set of budgets that must be reliably and accurately funded, as well as an additional administrative layer separating information from the appropriate decision-makers. While some physical structure is obviously required in any supply chain, many countries are beginning to rethink traditional supply chain structures. The direct delivery pilot in Tanzania, and the informed push models in Mozambique, Zimbabwe, Nigeria, Senegal, and elsewhere all move health commodities directly from a regional/provincial level to the service delivery point, skipping the district level. While all have been implemented under the banner of improving product availability, they also greatly simplify and consolidate the financial transactions needed for distribution. By eliminating district-level distribution responsibilities, these models could drastically reduce the number of distribution budget lines that need to be maintained.

- **Outsourcing:** When the MoH is directly responsible for distribution, i.e. when they are the owner-operators of the warehouses and trucks, they bear all of the responsibility for budgeting, tracking, and funding operating costs. This is often not a core strength of governments, as earlier sections of this paper have indicated. However, if distribution is outsourced to a private company, as Senegal and Togo have done with their Informed Push Model pilot programs, the private partner is typically the one to manage those small last mile budgeting tasks, leaving the government to manage only a single high-level service contract. This type of system does require the presence of a capable local logistics provider and strong government capacity to effectively bid and manage contracts, both of which can be challenging. If successful, however, an outsourced system has the potential to consolidate last mile distribution and data collection down to a single annual budget line for the MoH.

25 Gavi. Immunization Services Support. 2016. Available at: http://www.gavi.org/support/iss/
26 World Bank. Immunization Financing Toolkit. 2010. Available at: http://www.gavi.org/library/publications/other-publishers/ world-bank/immunization-financing-toolkit--a-resource-for-policy-makers-and-program-managers/
27 Matsuoka S, Obara H, Nagai M, et al. Performance-based financing with GAVI health system strengthening funding in rural Cambodia: a brief assessment of the impact. Health Policy Plann. 29(4):456-65; 2014.
28 Ibid.

Improving Financing for Vaccine Distribution – Final Considerations

Most supply chain systems can be broken down into three major flows — the physical flow of commodities, information, and funds — all of which are necessary for a distribution system to be effective. Commodity and information flows often receive attention through investments in procurement, logistics information systems, cold chain, and warehouse management. However, the flow of funding is still an uncoordinated and sub-optimized flow in immunization supply chains. Immunization program managers face a variety of financial bottlenecks, many of which are symptoms of deeper underlying financial management challenges. In spite of these challenges, however, there are a few key steps that donors, partners, and program managers can take to improve financing for vaccine distribution:

- **Advocate at all levels of government for distribution support and budget clarity:** Where financial visibility is low and information exchange is weak, donors and policy makers can only fund the activities they know and see on a regular basis. EPI program managers and partners must advocate for the value of providing adequate and easily accessible financing for iSC supply chain.

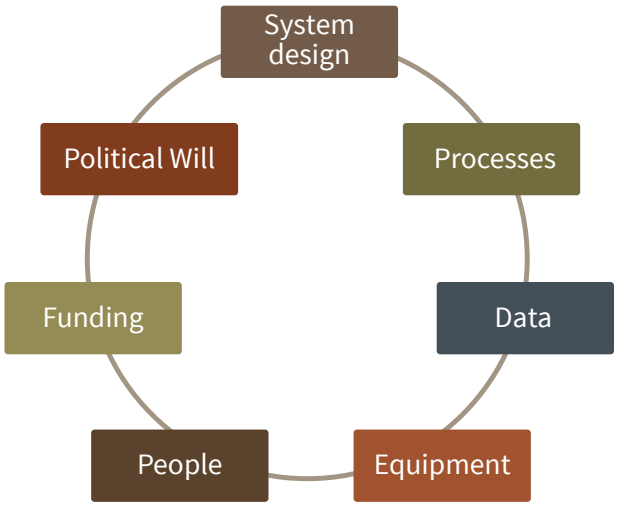
- **Measure and track distribution costs:** No one can effectively advocate for distribution funding without a clear understanding of what funding is actually needed. Where resources are shared and funding allocation decisions are not well-controlled, the ability to provide quantitative evidence of prior expenditures is a powerful means to secure adequate resources for distribution.

- **Rethink supply chain design to streamline funding flows:** If efficient budget management is a challenge, there are supply chain designs that can reduce the number and complexity of budgets that must be managed. Another option is to build the capacity of the MOH to effectively manage private contracts, letting the private sector handle the grind of managing diffuse fuel and maintenance budgets.

- **Improve underlying processes before adding technological solutions:** Computerized financial management systems offer the prospect of improved visibility and integration, but not even the best systems can cover over the impact of budget delays, excessive administration, lack of cash flow, and other underlying financial process problems. By focusing on these problems first, countries and partners can set the stage for a more impactful and sustainable introduction of technology in the future.

There are no quick and easy solutions to the challenges of improving last mile financial flows. Financial management challenges are extremely complex, even by the standards of other immunization supply chain problems, and broad institutional reform will surely be a slow and evolving process. But by continuing to advocate for improved vaccine supply chains, we can make significant progress in providing quality immunization services to the final 20% of the world's children who are still in need.

Policy Series Background



Components of the Vaccine Supply Chain

This paper is the sixth in a series addressing the components of the immunization supply chain. The health supply chain is a dynamic ecosystem which can increase access to high quality products by efficiently bringing the different components together to ensure delivery of commodities, as seen in the figure above. System design involves the set-up of the components of the supply chain system and how they interface with each other. The processes and policies determine how logistics practices get implemented in the field. Information and data flow influence forecasting, procurement, and daily management of the system, both at the global and in-country levels. Equipment ensures vaccines are delivered and have proper storage at every point of the supply chain. A key component is the people who operate and influence the supply chain and their capabilities, expertise, culture and behavior. The availability of funding, and particularly the flow of funding for each of the different levels of the system, is vital to ensuring delivery of vaccines. Finally, political will and the aspirations of leaders and champions can influence the performance of a supply chain by regulation and creating an enabling environment. Determining how the seven main components of the immunization supply chain work together ultimately influences the degree of availability of vaccines at the point of immunization.

This paper was developed together with William Davidson Institute, building on the extensive experience with private-sector solutions in emerging markets. Additional papers in this series address the other components of the supply chain, drawing on the evidence from the last mile of vaccine distribution through the Final 20 Project and global experience.

For more information, please visit www.villagereach.org or http://wdi.umich.edu

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