New Models for Financing Vaccination Programs in Southeast Asia

Financial Innovations Lab® Report

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Financial Innovations Labs® bring together researchers, policymakers, and business, financial, and professional practitioners to create market-based solutions to business and public-policy challenges. Using real and simulated case studies, participants consider and design alternative capital structures and then apply appropriate financial technologies to them.

Acknowledgments

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A nonprofit, nonpartisan economic think tank, the Milken Institute believes in the power of finance to shape the future. The Milken Institute produces rigorous, independent economic research—and maximizes its impact by convening global leaders from the worlds of business, finance, policy, academia, and philanthropy. By fostering collaboration between the public and private sectors, we transform great ideas into action.

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INTRODUCTION

Vaccination is a crucial component in the global fight to reduce mortality from infectious disease. Each year, according to the World Health Organization, vaccines save between 2 million and 3 million children under age 5—and could save another 1.5 million.[1] They're also among the most medically effective and cost-effective of public health interventions,[2] yet WHO's Global Vaccine Action Plan has had mixed results since the program's launch in 2012. In developing countries, especially, strains on public health budgets during periods of economic downturn, depreciating currencies, and budget austerities limit coverage, even for children and adults who otherwise have access to some health care.

The cost of immunization, however, pales in comparison to the estimated economic burden that vaccine-preventable deaths pose on economies and health-care systems. The direct economic benefit, of course, derives from the cost savings of preventing these diseases in the first place. Studies have found that the costs of disease outweigh the costs of a vaccine in many cases.[3] There are also significant indirect benefits of vaccines, including a reduction in the number of work- and schooldays missed due to illness, and lowered rates of infectious disease transmission.[4]

Funding for vaccine procurement and distribution generally comes from governments, private health-care providers, and, in the developing world, from nongovernmental organizations (NGOs) and donors as well. And while many countries have increased their public health allocations, they still face challenges from budgetary shortfalls, weak agency and information infrastructures, and shifts in global markets. A sudden unfolding health crisis, natural disaster, or war can reprioritize allocations of sparse public health funds.

In order to brainstorm mechanisms to continue to finance important vaccination delivery programs, the Milken Institute convened a Financial Innovations Lab® in Jakarta in August 2016. After years of economic growth, Indonesia has begun to transition from donor-based funding to internal budgetary allocations.[5] Yet the country faces a number of challenges: no centralized body exists to manage vaccine procurement and delivery across the nation, the public health system itself is strained, and the national infrastructure is weak. By population, Indonesia ranks fourth in the world,[6] and while half the population lives on Java, the rest live on over 6,000 inhabitable islands spread across a vast archipelago. The Financial Innovations Lab brought together investors, donors, health experts, industry executives, and government officials to discuss new ways to finance vaccine delivery. The Lab focused on models that have successfully leveraged public-sector funding to attract private investment while introducing new sources of potential capital for more efficient and effective funding flows. This report summarizes the outcomes of the discussion and outlines steps to move the funding models into implementation.

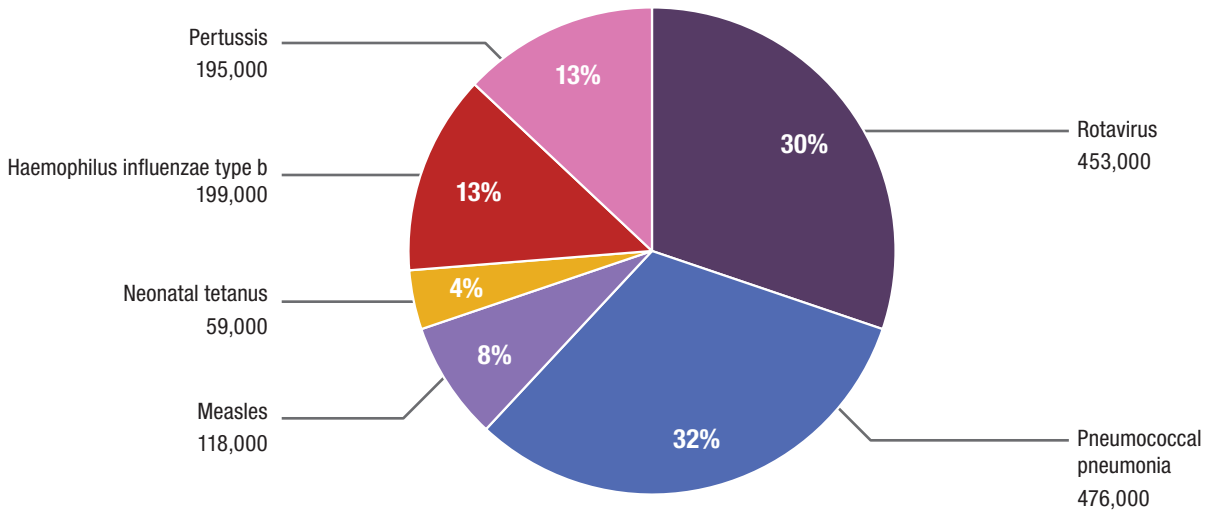
ISSUES AND PERSPECTIVES

THE HEALTH BURDEN OF VACCINE-PREVENTABLE DISEASES

Vaccination is considered one of the most direct and cost-effective public health interventions, and a major focus of the World Health Organization (WHO) for fifty years. Coming off the remarkable early successes in its Smallpox Eradication Program (1966–1980),[7] WHO launched an Expanded Program on Immunization (EPI) in 1974, targeting the eradication of tuberculosis (TB), diphtheria, pertussis (whooping cough), tetanus, measles, and polio. Another success story, this program reportedly covers 80 percent of the world's infants.[8]

Yet in spite of these impressive numbers, vaccine-preventable diseases still reach into the millions; of children under age 5, for example, some 1.5 million die each year because they didn't receive routine vaccinations, as shown in figure 1.[9] Others who fall ill but survive are likely to live with chronic symptoms or disabilities.[10] And while last year alone, according to UNICEF, "86 percent of the world's children received the required three doses of diphtheria-tetanus-pertussis–containing vaccines," an estimated 19.4 million didn't.[11] Of those 19.4 million left unprotected, the vast majority live in Africa, the Eastern Mediterranean, and Southeast Asia.[12]

FIGURE 1 | Global number of child deaths due to vaccine-preventable diseases



Source: World Health Organization, UNICEF.

VACCINE DELIVERY: ACTIVITIES AND COSTS

There are two ways to achieve vaccination coverage: through routine vaccine delivery systems that use existing health facilities to reach their target groups, and through "supplementary immunization activities," or SIAs.[13] Routine vaccine delivery systems focus on providing a range of vaccinations, particularly those cited on national immunization programs. The SIAs target specific disease preventions, for example, a vaccine that wasn't covered by the routine vaccine delivery system, or additional (repeated) vaccine doses to renew immunity.[14] The process for delivery either way involves producing or acquiring the vaccine, distributing it through a country's health system, using trained health-care workers to administer the vaccines, and monitoring the success of the campaign through data collection.

Given the range of activities needed, human resource costs figure heavily in vaccine delivery, for hiring, training, and managing health-care workers, and training people to conduct awareness campaigns. Additionally, physical resources, such as health-care facilities and transportation, are necessary. In order to transport vaccines from one area to another, it's vital to secure and maintain a cold chain, i.e., a temperature-controlled delivery infrastructure. Cold-chain delivery also requires special vehicles, adding overhead in terms of fuel, vehicle registration and insurance, and repairs. Over time, system servicing and maintenance will contribute to the overall costs of the vaccine delivery.

The estimated costs vary greatly by region, of course, and by delivery method, the price of the vaccines, and the scale of the vaccination effort. Estimates suggest that in East Asia and the Pacific, the cost to fully immunize a child is US$13.25. In sub-Saharan Africa, it costs US$14.21; in Europe and Central Asia, US$23.12; and in the Middle East and North Africa. US$22.15.[15] In the developing world, where challenging climates, inefficient infrastructure, and limited health-care facilities make it difficult to deliver and administer vaccines, the majority of these costs (80–90 percent) are recurrent—e.g., personnel required for ongoing campaigns and health-care facilities, and infrastructure, such as the vaccines and syringes.[16]

CURRENT FUNDING LANDSCAPE

Governments, public and private donors, and NGOs like the Geneva-based GAVI (the Global Alliance for Vaccines and Immunization), have long been responsible for the organization and funding of vaccine administration in the developing world. Through its vaccine fund, GAVI has raised more than US$1.3 billion since 1999 to support and build vaccine delivery systems in the world's poorest countries.[17] However, as global wealth continues to increase, more countries are transitioning from GAVI-subsidized programs, and their challenge is how to address fiscal policies, budget constraints, and other practical issues associated with administering vaccines on their own. As of this year, five partner countries have transitioned to full self-financing, and another sixteen are moving through the five-year "accelerated transition" period.[18] These sixteen countries, of which Indonesia is one, are expected to achieve full self-payment status by 2018.[19]

GAVI and other organizations have worked with these countries to help them prepare to self-finance, but a gap in sustainable financing remains, and these systems are vulnerable to economic downturns—such as occurred during the 2007-2009 global financial crisis—that can cause state and donor aid budgets to evaporate. Additionally, it is expensive to incorporate new vaccines into national vaccination programs, especially if the vaccines must be imported.

Over time, unit prices may decline as production becomes more efficient, as more manufacturers enter the market and drive down pricing through competition, and as demand for these vaccines increases. However, for many developing countries, the procurement and administration of vaccines remains expensive, making it difficult for them to improve the coverage of existing programs and introduce new ones.

CASE STUDY: INDONESIA

Country Context

Indonesia's 257.6 million people belong to more than 300 ethnic groups and permanently inhabit more than 900 islands.[20] Due to its archipelago geography and the significant economic and demographic differences between its urban and rural areas, the country faces enormous variations in health outcomes, as well as infrastructure and governance capacity. In remote areas, people may have access to the most rudimentary health care; they may even refuse vaccines, making education and delivery efforts to reach this "last mile" of unimmunized individuals and regions very costly.

THE THREAT OF DENGUE

Among the vaccination gaps in Indonesia, perhaps none is more urgent than a dengue vaccine. Dengue, and its more harrowing appearance as severe dengue, or dengue hemorrhagic fever, came to Indonesia in 1968. It is a vector-borne, in this case mosquito-born, virus—four different viruses, in fact. Humans are vulnerable, according to WHO, if they are bitten by the females of the *Aedes aegypti* and *Aedes albopictus* mosquitoes that breed in any kind of standing water. They have spread from the cities to the countryside, causing regular outbreaks. Symptoms range from flu-like to severe pain and nausea, uncontrollable bleeding, and organ failure. Severe dengue is a major cause of childhood deaths.[24]

According to a 2012 WHO Southeast Asia regional report, Indonesia had more cases than any other country in the region (125,045), and was second only to Brazil in global reporting.[25] It has spread to all thirty-four provinces and is endemic in many large cities and small towns. A 2013 study in BMC Public Health estimates that "costs of dengue outbreaks" for Indonesia totaled SGD 6.75 million in 2011, though the authors warned that their calculations were based on a cross-country literature review without standardized calculations or methodologies. One paper, from Australia, did include resource costs, showing that outbreak costs were higher than costs of interventions.[26]

Treatment for dengue and severe dengue is basic: rest, fluids, close monitoring. Mosquito control and avoidance have been the only prevention methods, with guidelines that include using mosquito repellent, sleeping under mosquito netting, and monitoring standing water and all moist environments that could harbor larvae. Some local efforts are remarkable for their ingenuity. For example, the large-scale, low-cost Eliminate Dengue Indonesia project was launched in 2014 by the Tahija Foundation, in collaboration with research from medical faculty at Gadjah Mada University. That year, mosquitoes carrying the *Wolbachia* bacterium (whose effects on humans or the environment are said to be negligible) were released into wild populations. The bacteria prevent the mosquitoes from transmitting the virus; the project predicts that over successive generations, the risk of dengue spread will lessen dramatically as more mosquitoes are bred that carry the virus-suppressing bacterium.[27]

There has also been remarkable advancement in a dengue vaccine, Dengvaxia (CYD-TDV), developed by Sanofi Pasteur. In December 2015, Mexico and the Philippines became the first countries to license the vaccine for marketing, followed by Panama, El Salvador, Costa Rica, and Brazil.[28] This past July, WHO issued a position paper on the new vaccine, acknowledging the rapid spread of the disease; WHO estimates that most of the world's reported cases—some 50–100 million—are in Asia.[29] The paper notes that all four kinds of dengue virus are generally present in infected areas, and that their relationships with specific immune responses need greater understanding. WHO looked at the vaccine's characteristics, including how well the pathogen produces an immune response, the efficacy and duration of protection, vaccine safety issues, the estimated impacts of vaccine programs; and cost-effectiveness. Its early cautious recommendation placed emphasis on behaviors that also help prevent infection, such the use of insecticides and nets, removing standing water, and on greater monitoring to track outcomes.

Health care in Indonesia involves a system of public and private hospitals, local clinics, and physician networks. Indonesia launched its universal health-care system, or JKN (Jaminan Kesehatan Nasional), in 2014, with the goal of providing all Indonesians with health insurance that can be supplemented with private coverage, if an individual desires and can afford it. The private health-care system is quite large; about 62 percent of the country's hospitals are private, and as overall wealth has increased, demand for private care has grown.[21] Given the geographic diversity, access to hospitals can be a challenge, and many communities rely on public clinics, called *puskesmas*, designed to deliver basic care. There are upwards of 9,500 *puskesmas*, a third of which have inpatient services. Each serves 25,000-30,000 patients, some operating with only one health-care worker.[22]

In 2001 the country decentralized management of the public health-care system, transferring some duties and responsibilities, along with personnel, to district and municipal authorities. Decentralization has put additional strain on the system, including on vaccine delivery, in part because of inconsistencies posed by having multiple authorities and funding streams.[23] Additionally, the system is feeling the pressure of weak infrastructure, gaps in medical staffing and facilities, and fiscal pressure caused by limited government funding.

Vaccine Production and Financing

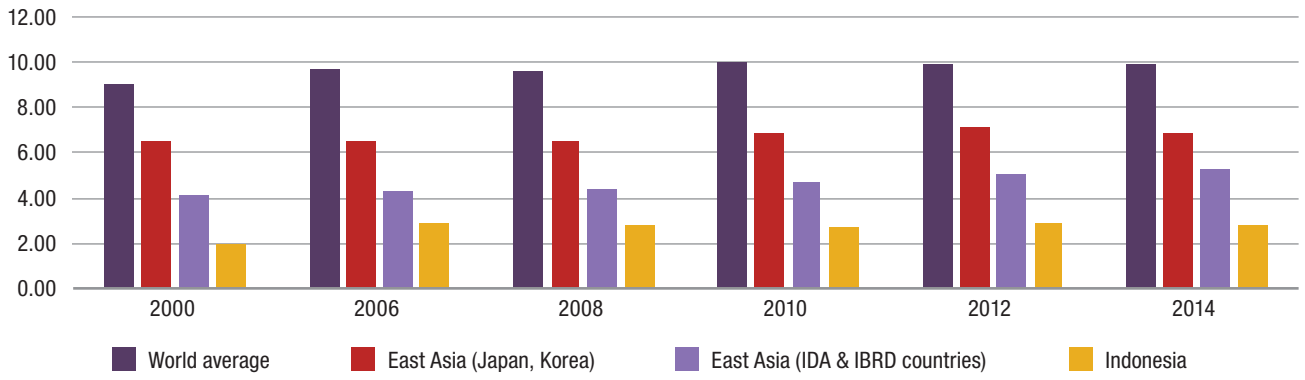
Vaccines can be delivered through both the public and private health systems. The country has a National Immunization Program, which includes eight of the twelve antigens recommended for routine immunization by WHO (the four missing vaccines are for WHO-recommended rotavirus, pneumococcal, rubella, and HPV, or human papillomavirus).[30] Indonesian law requires that all vaccines within its public program be produced domestically through the long-established government-owned corporation PT Bio Farma, which is also a major exporter of vaccines worldwide. By producing vaccines at home, the government can avoid imports costs, thus adding to the affordability of treatment and ensuring a continuous supply. Patients can still access other vaccines, such as HPV vaccines, produced internationally, through the private hospital system.

New vaccines can be distributed through the private system, but to reach both the public and private markets, products must be approved by the national government, including a rigorous multistep process. In fact, the Ministry of Health, through PT Bio Farma, has introduced only one new vaccination (in 2013) into the National Immunization Program since 1998,[31] when the country began to shift from autocracy to a democratic regime. A study analyzing that introduction looked back at the only previous one (a hepatitis B vaccine in 1997) for comparison and identified four areas that have a role in the decision-making process: domestic medical need, sufficient financing, sufficient production capacity, and sufficient political support.[32] If a new vaccine is approved for the national program, it is then procured from PT Bio Farma by the government. However, if it is to remain in the private market, the individual patient must purchase it.

Following decentralization, local implementation and operational funding to support EPI vaccination programs was transferred from the central government to district and municipal authorities. The central government has remained in control of "supplementary immunization activities, procurement of vaccines and syringes, technical assistance, development of guidelines, monitoring and evaluation, quality control, and training." [33]

The Indonesian government allocates only a small fraction, 2.8 percent, of its GDP to public health-care expenditures. This is low relative to world and East Asia and Pacific averages of 9.9 percent and 6.9 percent, respectively, as shown in figure 2.[34] In 2016, the government agreed to increase the spending on health, from roughly 2.0 percent of the annual national budget to 5.0 percent, or roughly US$ 8 million. However, that includes all health expenditures, not those specifically for vaccination programs.

FIGURE 2 Health expenditure as percent of GDP



Source: World Bank.

In terms of financing its routine immunization program, more than 50 percent of the national immunization program is financed by the central government, 40 percent is financed by provincial and district governments, and less than 10 percent is financed by external donors, such as GAVI and others.[35]

The country has received GAVI funding for its vaccination programs since 2002, but as Indonesia's economic condition improves and as it solidifies its status as a middle-income country, it is set to transition from GAVI funding in 2018 and must prepare to pivot to self-financing within the next five years.

New information from WHO and UNICEF shows that from 2006 to 2014, the Indonesian government increased its per capita spending for routine infant immunizations—but that actual need increased at a faster rate, and the government's share of total immunization expenditures dropped from 95 percent to 64 percent over the period.[36]

A shortage of funding, particularly as Indonesia comes off its partnership with GAVI, raises concerns about disruptions, even temporary disruptions, in scheduled immunizations; reductions in immunization coverage; and a return to higher rates of vaccine-preventable diseases.

Barriers to Vaccine Financing in Indonesia

While overall funding is an issue for Indonesia, participants discussed other barriers to the introduction of new vaccines.

BARRIER 1 — COSTLY VACCINE PROCUREMENT

Vaccination through the National Immunization Program is compulsory in Indonesia. Outreach for infant vaccination has been particularly aggressive in recent decades. These costs are covered by JKN, but, as mentioned, any vaccines not included in the government program must be paid for out of pocket. Private insurance may not cover them either, and the costs of these uncovered vaccines are generally prohibitive to the average consumer.

A recent study of the rotavirus vaccine in Indonesia reveals that the majority of local communities would be willing to pay 10,000–50,000 rupiah (US$ 0.80 to US$ 4.00) per immunization. The actual cost of the vaccine is US$ 17-23 per dose on the private market. Any new vaccine would likely need a price subsidy, if it were not included in the public EPI program.

BARRIER 2 — INADEQUATE HEALTH-CARE WORKFORCE

Many health workers and midwives lack the general training necessary to administer and recommend vaccinations. Rural areas in particular suffer from overburdened health workers, who are often serving an entire village singlehandedly. They must tend to serious illnesses, injuries, and births, and it is not surprising that they relegate preventative medicine to the back burner when dealing with streams of crises. In Jakarta, for example, one out of twelve health-care workers in a *puskesmas* is focused on immunization. Employee turnover in the health-care industry is also high. Some work on a volunteer basis, while others receive low salaries. Lab participants noted that many health workers leave for higher education opportunities or other higher-paying occupations. This results in additional costs for hiring and training their replacements.

BARRIER 3

MIXED SOCIAL AND CULTURAL ACCEPTANCE

In the developing world, health care tends to be used for curative reasons rather than preventative, and thus many people don't seek out preventative care, such as immunizations.[37] Religious concerns also exist, particularly for Muslims unsure whether a vaccine may be *haram* (forbidden) or not *halal* (permissible for ingestion). So the vaccine must carry an official labeling or be recommended through trusted religious or community figures. As well, there is reportedly a lack of trust in some communities toward the pharmaceutical companies and fear that the community health workers who deliver the vaccines are unreliable or provide poor information on effectiveness and side effects.[38] Recent news reports exposed a counterfeit vaccine scandal that had been ongoing for more than a decade; the revelations caused an uproar within the community as parents tried to determine whether or not they needed to revaccinate their children.[39]

BARRIER 4

UNDERDEVELOPED DELIVERY INFRASTRUCTURE

An efficient supply chain is imperative for the successful delivery of sensitive medical supplies that have specific expiration dates and temperature requirements; it must also meet international safety standards. A strong cold chain and logistics management system is essential to avoid spoilage and additional financial costs. Systems that can monitor and forecast for expired inventory, stock availability, storage space, and equipment maintenance are all investments to help secure a strong health system for the long term.[40] Unfortunately, many of the *puskesmas* in remote areas lack adequate cold-chain facilities, and those that do have them are often subject to power outages.

BARRIER 5

EXPENSIVE AND CHALLENGING DATA COLLECTION

The combination of too few workers, insufficient training, and weak infrastructure combine to form an informational black hole. Without rigorous and standardized data collection, methodologies, and analysis, it isn't possible to obtain a clear picture on the direct impacts of vaccine programs on communities. Many health workers rely on simple paper and pen to record data; across the system there is no standardized platform to document and upload information. This makes it even more difficult to present compelling arguments for incorporating new vaccines or expanding support for existing programs.

FINANCIAL SOLUTIONS

Funding challenges exist at various stages of vaccination delivery in Indonesia. Lab participants agreed that some operational challenges cannot be fixed by new investment alone, but identified three barriers that could benefit from new and more effective funding to scale up activities.

SOLUTION 1

THE COST OF NEW VACCINES

The National Program for Immunization produces and distributes vaccines for its Expanded Program of Immunization (EPI) but is fiscally constrained from adding new vaccines. New products are subject to a long and complicated approval process before being included in the program, or are only available in the private market.

Without government funding, there are gaps in the ability to procure new vaccines at prices that international pharmaceutical firms find attractive and that customers are willing to pay. To address the funding gaps, Lab participants discussed models that could support private procurement. These would, of course, require government support, especially because any new vaccines would use existing supply chains to facilitate their delivery.

Tax/levy to raise government funds for vaccine procurement

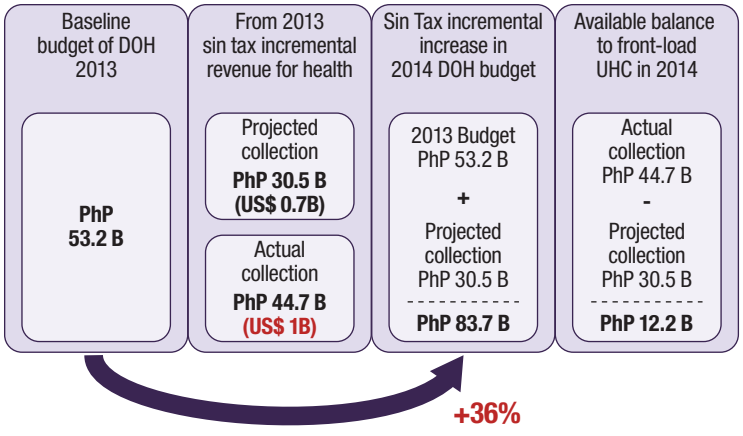
Taxes on certain industries or products have been used effectively by governments to raise funding for social expenditures, including health. The French government, for example, has enacted a small levy (around US$ 1.00 for economy class) on airline ticket purchases, with the capital raised supporting UNITAID, an organization that provides grants for treatment of HIV/AIDS, tuberculosis, and malaria. From 2007 to 2012, UNITAID raised more than US$ 1 billion from the levy.

Countries have also had success with "sin taxes," adding incremental costs to the purchase of consumer goods, like tobacco and alcohol. As seen in figure 3, the Philippines enacted a similar tax on tobacco and alcohol, and currently raises more than US$ 1.2 billion per year for health care and programs that support workers who have lost their jobs because of company cutbacks.

FIGURE 3 "Sin tax" success in the Philippines

A case study of the sin tax in the Philippines

- Enacted in 2012, the sin taxes raise funding for health based on the stock of tobacco and alcohol and stores.
- During the first year, the tax raised more then US$ 1.2 billion for the department of health (DOH).
- The additional funding provided health care to roughly 45 million Filipinos.
- 15% is allocated towards programs to help tobacco farmers and workers who need to find new jobs. The remaining 85% goes to fund universal health care (UHC), upgraded medical facilities, and the training of doctors and nurses.



Source: National Health Insurance Program.

Indonesia is the second-largest Asian market for cigarettes, after China. Nearly 54 million adults in the country smoke.[41] The cost of a pack of cigarettes is comparatively low: in Indonesia it's roughly US$1.40.[42] The World Health Organization recommends that countries place a tax of 75 percent of tobacco's retail cost; in Indonesia that tax is currently only 43 percent.[43]

Lab participants agreed that a sin tax on tobacco could raise additional funding for programs like vaccinations while improving the overall health of the country. But a number questioned the political viability of passing the tax increase. Tobacco is the second-largest industry and as such has a powerful lobby. More research is needed to understand what level of tax would be acceptable to the market and the industry, and still raise enough revenue to make it worthwhile.

Lab participants discussed the political feasibility of a tax on motorcycle purchases. More than 7 million motorcycles were sold in 2012, according to the Indonesian Motorcycle Industry Association, compared to just over 1 million cars. Motorcycles are popular because they're more affordable and useful for getting around the well-known traffic in cities like Jakarta. Yet unlike tobacco, they represent a smaller portion of GDP and, consequently, could be easier to tax. They could also raise less revenue. As with tobacco, more research is necessary to understand how economically viable the tax could be.

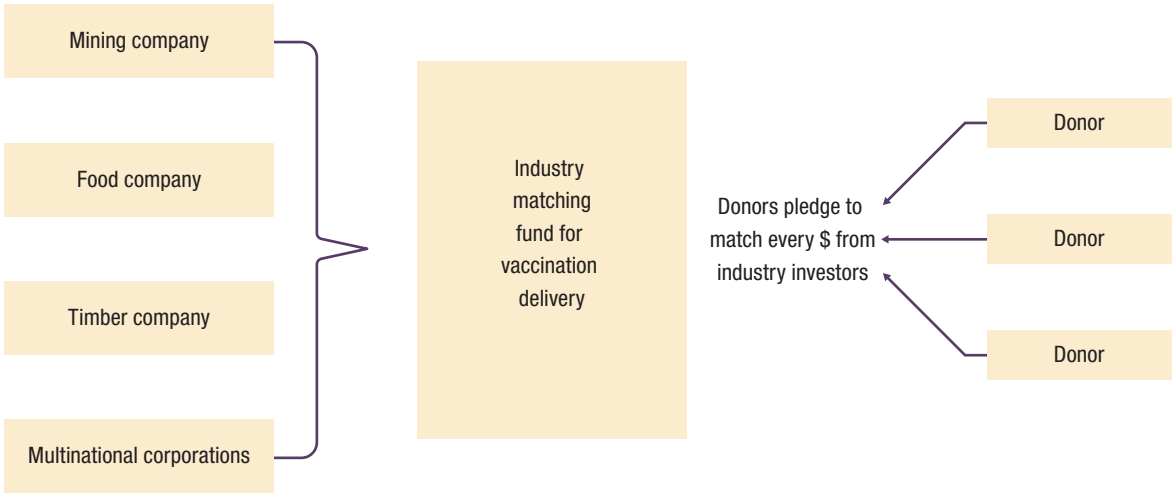
Pooled procurement fund for the private market

Pooled procurement funds could bring together grant capital from a variety of donors who would use their collective bargaining power to access low-cost vaccines and provide a sustained source of funding. Successful examples of procurement facilities led by the public sector include the Strategic Fund of WHO's Pan American Health Organization. The fund allows member countries to purchase vaccines, drugs, and medical supplies at a lower cost than would be paid if bought individually in the market.[44]

Lab participants discussed the viability and desirability of such a fund, but one that would be capitalized by private funding to complement the government's vaccine procurement. Donors, such as bilateral and multilateral agencies or foundations, could seed a pooled fund that would be matched by various companies in Indonesia through their corporate social responsibility programs. Local natural resource industries have a history of supporting community projects; the Tanoto Foundation, for example, supports access to education and teacher training.[45] The matching feature of the fund would provide a philanthropic incentive for industry partners since each dollar raises an additional dollar, giving the donations greater value.

The fund, outlined in figure 4, would provide bridge financing for the procurement of new vaccines by closing gaps in government budgets, assuming that any new vaccine is accepted under the government EPI. Given that the country will soon transition from its partnership with GAVI, this pooled fund could amplify the government's buying power.

FIGURE 4 Pooled procurement model



Source: Milken Institute.

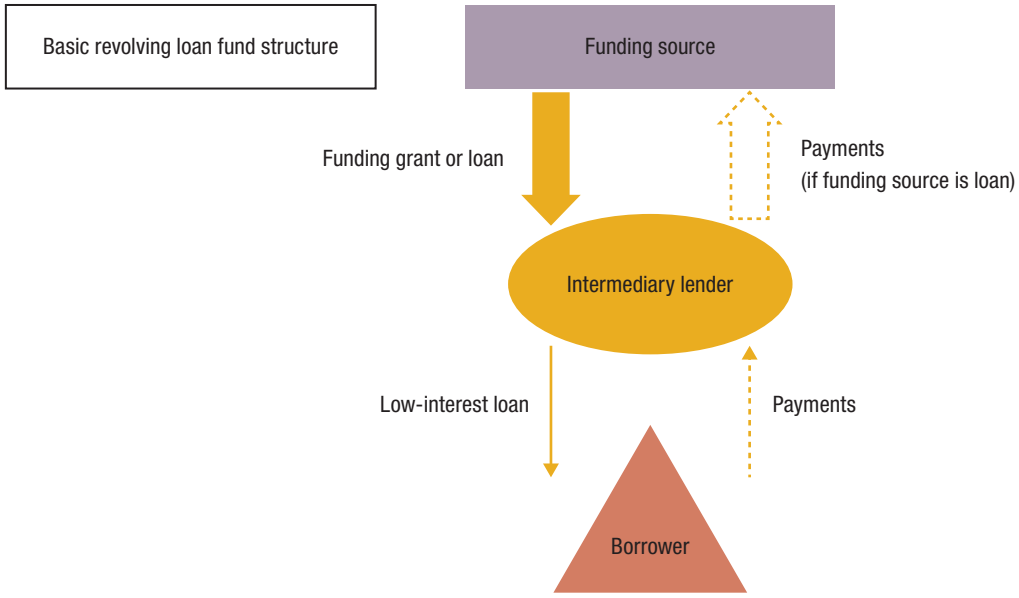
Microcredit facilities for individuals purchasing the vaccine at a private facility

Vaccines that fall outside of the government program, including for diseases like HPV, must be purchased out of pocket through the private health-care system. While economic growth since the late 1990s has enabled more of the population to afford private health care, low-income communities still face financial challenges. For the more than 50 percent of the population living below or at the poverty level (US$ 22.60 per month), purchasing a vaccine for US$ 40.00 or US$ 75.00 is unrealistic.[46] As previously mentioned, surveys have demonstrated that there is a significant gap between what individuals are willing to pay and the price of a particular vaccine.

Indonesia has a robust microfinance industry that provides banking services, including small-business loans in low-income communities. However, some established institutions also provide credit to fund social services. To afford private early childhood education, many schools offer installment plans that cover tuition and other costs. This microcredit is successful because the schools have sufficient working capital to cover expenses without needing immediate payment from every family.

Under the assumption that many community health centers can't provide loans from their already stretched capital reserves, Lab participants discussed a new microcredit facility. It would work within the *puskesmas* system but be privately funded to allow patients to buy vaccines on a low-cost payment plan. Unlike a grant-support fund that would give away the capital at no cost, this kind of financing facility would charge a small amount of interest that would enable funds to be recycled back into the main pool to make additional loans. As seen in figure 5, this model would mimic a traditional revolving loan fund, capitalized by a mix of donor funding and investment capital, with a potential loan-loss reserve to protect against potential default from patients who find themselves unable to repay the loans.

FIGURE 5 Microcredit facility for vaccinations



Source: Milken Institute.

There are sensitivities with the model, of course, particularly because it does add to the purchaser's personal debt. Consequently, modeling is necessary to determine what levels of interest could and should be charged to make the facility sustainable and viable for those it is designed to benefit.

SOLUTION 2

TRAINING AND RETENTION OF HEALTH WORKERS

The shortage of qualified health-care workers to administer the vaccines, particularly in rural areas, is partially driven by a lack of funding to support larger staffs at health clinics. This is compounded by the high turnover rate, in part due to minimal salaries. Even if there is a vaccine available and a paying customer, the delivery process may suffer because of this human capital constraint.

There are programs under way to train and retain health-care workers, including an effort led by UNICEF. Lab participants discussed how this training could be scaled up to reach more workers across the country. To achieve this, more funding is needed. But how to create a more *sustained source of capital* is the challenge reviewed during the Lab.

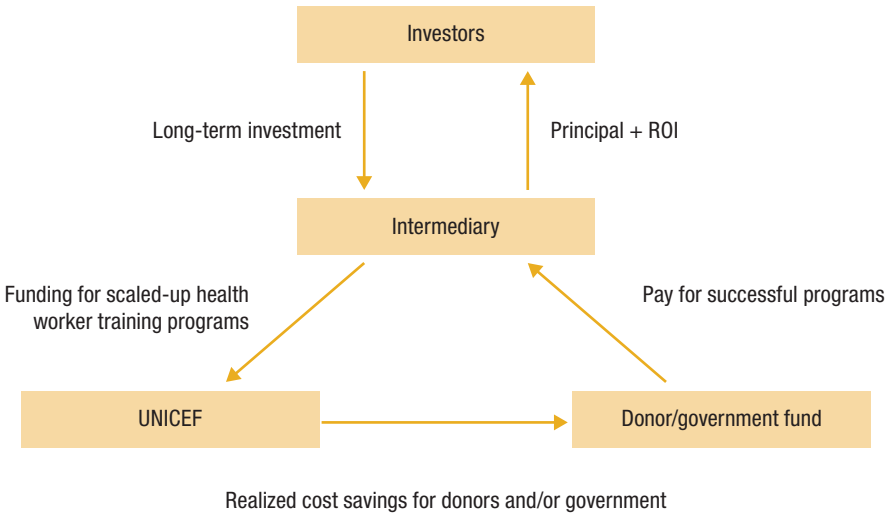
Development impact bond to improve training and retention

One model that could channel multiyear funding to UNICEF is a development impact bond (DIB). A DIB is a variation of the originally named social impact bond, a contract that binds investors to pay upfront for social services; if these services meet their objectives, the investors are repaid with a return on their original investment. This funding comes from an "outcome payer," often a government or donor who would benefit from having the improved social services. The original social impact bond was created to address recidivism around a prison in the United Kingdom. The contract was attractive for the government because its budget allocation for services to prevent recidivism could be directed elsewhere, there would presumably be fewer prisoners, and the prison

budget would decline as a result. The model also shifts the risk of a failed program to the investors, and not to the government or another outcome payer.

As seen in figure 6, a group of investors would enter into a contractual agreement with a financial intermediary—for example, UNICEF—that makes grants to nonprofit organizations to scale up existing training and retention programs for health-care workers. The work of these programs would improve overall health care in the country by training workers and creating a more sustainable source of employees at the local clinics. The outcome payer, either the government or a group of donors, would see increased efficiencies of their programs and would have to spend less of their own funds to fund the initiative. This cost savings would then be passed back to the original investors, assuming that all of the social goals were met. If the programs fail, the investors would not receive their capital.

FIGURE 6 Development impact bond model



Source: Milken Institute.

SOLUTION 3

GAINING SOCIAL AND CULTURAL ACCEPTANCE OF VACCINATION PROGRAMS

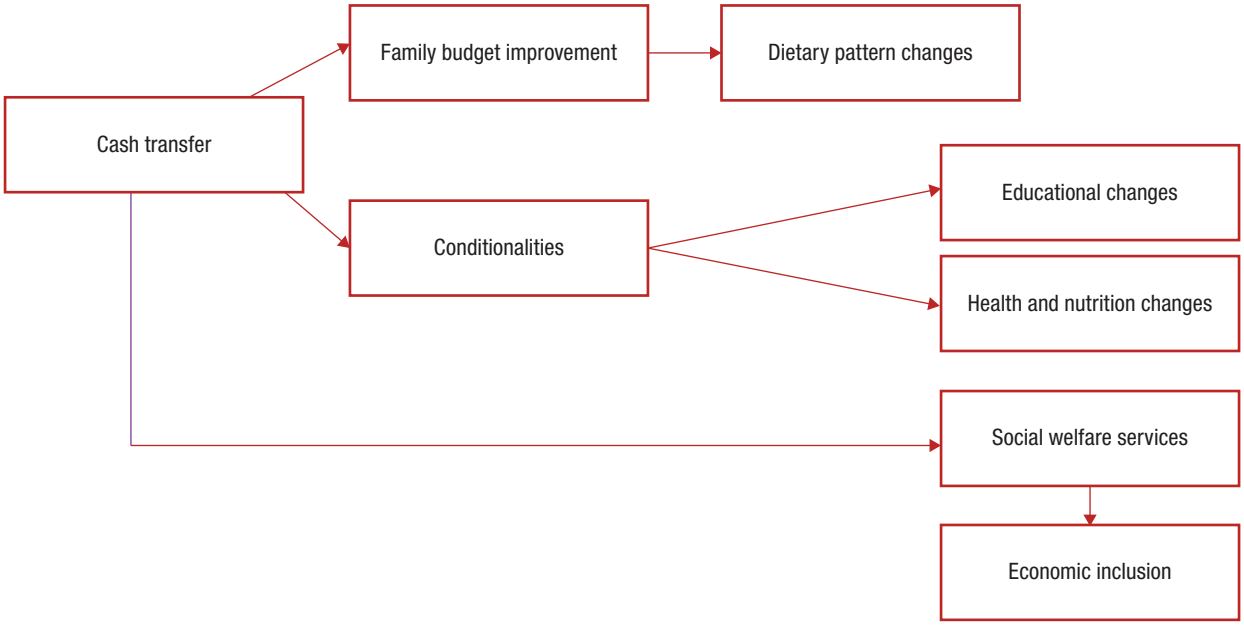
Community engagement is critical to the success of vaccination programs. Yet in Indonesia, gaps remain in public awareness and acceptance of new and existing vaccines. Lab participants discussed different marketing campaigns, led by both the government and industry, to increase public awareness of the benefits of a particular vaccine. These efforts have been successful in counteracting recent social media activity from antivaccination groups across the country.

Conditional cash transfer (CCT) for vaccine access

Social safety net programs have been used across the developing world to improve health and education outcomes. Conditional cash transfers (CCTs) are one such option to provide payments to poor communities after a certain activity has been completed. In Cambodia, CCTs are given to parents when they enroll their daughters into primary school; in Brazil, mothers receive CCTs when they provide healthy food to their children. The payment comes in the form of cash or product—for example, a bag of rice.

CCT programs offer families an opportunity to benefit from some type of behavioral change that will have a positive long-term impact on their social and economic situation. A family in Indonesia may not have be able to afford a vaccine, but CCT could make this possible. Figure 7 demonstrates how CCTs can encourage new behaviors, especially those that make it easier for families to make healthy choices for nutrition and treatments.

FIGURE 7 | Conditional cash transfer model



Source: World Bank.

Lab participants discussed how to use a CCT to deliver vaccines. Culturally, it would be difficult to offer cash, but it was agreed that a food staple, such as rice, could be an incentive payment to have children vaccinated. Participants discussed potential partnerships with food companies like Indofood that could donate the rice as part of their corporate social responsibility programs. The CCTs would provide the rice or similar product in exchange for bringing in a child to be vaccinated through either the EPI program or through the private market for new vaccines.

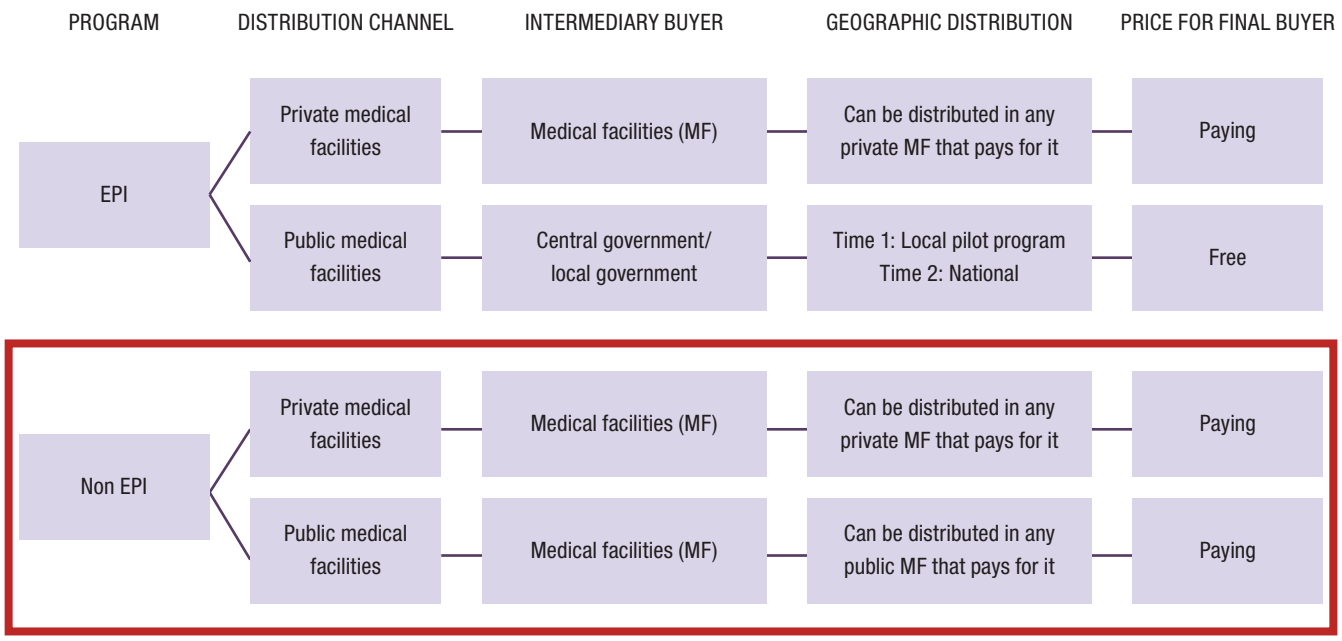
DEMONSTRATION PROJECT: AN APPLICATION FOR DENGUE

The introduction of a new vaccine requires funding for a variety of activities, from procurement to delivery. Lab participants used the new dengue vaccine as the basis for designing a demonstration project that would use some of the models listed above to support the rollout.

A demonstration project would require public-private and private-private partnerships to fund and implement the vaccination program. This has worked successfully in countries like Brazil that have designed projects to vaccinate the 9- to 44-year-old cohort in multiple municipalities in areas of country most affected by the disease.

Participants discussed a potential project in Jakarta; the capital faces a large disease burden but also has a mix of lower- and middle-income communities, some of whom might be able to afford the vaccine through private medical facilities. The demonstration assumes that the vaccine will not initially be a part of the government's EPI program, and that the patient or a private funder would have to pay for it. As seen in figure 8, private or public medical facilities could participate.

FIGURE 8 Demonstration project distribution



Source: Sanofi Pasteur.

The project would be set up to immunize a certain target demographic in specific regions of the city. This would be designed by the municipal government with the support of pharmaceutical partner Sanofi Pasteur (the vaccine manufacturer) under the guidance of the Ministry of Health.

Lab participants discussed various funding models for the demonstration project. See table 1 for what these might include.

TABLE 1 Demonstration project funding models

Procurement
■ Launch of a pooled procurement fund (see Solution 1) to purchase the vaccine for those who could not pay without a subsidy. ■ Launch of a microcredit fund (see Solution 1) to help those who could pay with easier access to financing.
Delivery
■ Development impact bond (see Solution 2) that will scale up health-care worker training programs to ensure effective vaccination service delivery.
Community engagement
■ Conditional cash transfer program (see Solution 3) to drive demand for participation in the demonstration project, including a potential partnership with a food company to supply the incentive payment in the form of rice or other staple.

Source: Milken Institute.

Participants also discussed how to implement a demonstration project, including how to prioritize next steps and determine which solutions require short- or long-term execution.

As seen in table 2, to create an effective project, a few key deliverables should be met, including short- and long-term goals. Participants agreed that more work is necessary to add detail and structure to these next steps.

TABLE 2 Next steps and deadlines

Short term	■ Identify the city area and target population. ■ Create partnerships with food companies or donor groups that will provide payment for the conditional cash transfers through their corporate social responsibility programs.
Medium term	■ Target potential donors for a pooled procurement fund and identify the fund's most efficient structure. ■ Design metrics for a development impact bond that will work with existing partners, such as UNICEF.
Long term	■ Create the structure for a microfinance fund, and approach potential lending partners.

Source: Milken Institute.

CONCLUSION

Vaccines offer a relatively low-cost solution to offset the costs of illness and the economic impacts of disease outbreaks spreading across continents. The number of lives saved and health-care costs avoided by implementing preventative care have been successfully demonstrated; most governments now include mandatory vaccines within their universal health-care plans. But bringing new vaccines where they are most needed is a challenge on many levels.

In countries like Indonesia, the costs of procurement, the lack of health-care workers, and social and cultural wariness toward vaccines in general have created an environment that isn't too far removed, metaphorically, from a pool of standing water—a breeding ground not just for the re-emergence of disease once nearly eradicated, but for new epidemics and disease mutations that could have been made avoidable with simple and affordable prevention. This demonstrates the need for funding in a variety of areas along the value chain, engaging philanthropic partners, private investors, and the government through its existing programs. These tools can help bring in new and sustainable sources of financing, while educating the public on the importance of vaccines and disease containment.

The next step in achieving wider vaccine coverage in Indonesia is to engage local philanthropists, corporations, and government officials, and to demonstrate how these innovative financing solutions can make an impact and allow all citizens to access vaccines that have otherwise been financially inaccessible. Using Jakarta as a pilot, a pooled procurement fund and microcredit fund could be used to lower the costs of vaccines and thus provide wider access. Combined with the issuance of a development impact bond to solidify health-care delivery, and a conditional cash transfer to drive demand, it may be possible within a few years to see the proliferation, not of disease outbreaks, but of much-needed vaccines.

APPENDIX

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ENDNOTES

1. "World Immunization Week 2016: Immunization Game-Changers Should Be the Norm Worldwide," press release. World Health Organization: April 21, 2016. www.who.int/mediacentre/news/releases/2016/world-immunization-week/en/. Accessed September 7, 2016.
2. *State of the world's vaccines and immunization. Third edition* fact sheet. World Health Organization (January 18, 2010). http://www.who.int/immunization/fact_sheet_progress.pdf?ua=1 Accessed September 8, 2016.
3. "Economic Benefits and Costs Associated with Target Vaccinations." Edward P. Armstrong, accessed September 12, 2016. http://www.jmcp.org/doi/pdf/10.18553/jmcp.2007.13.s7-b.12
4. "The Global value of vaccination." (2003) Jenifer Ehreth, Tulane University http://www.uvm.edu/~bwilcke/ehreth.pdf Accessed September 12, 2016
5. "Transition Process," GAVI. www.gavi.org/support/apply/graduating-countries/
6. World Development Indicators, World Bank. 2015. http://data.worldbank.org/data-catalog/Population-ranking-table
7. "The Smallpox Eradication Programme—SEP (1966–1980)," May 2010. World Health Organization.
8. "National programs and systems." World Health Organization. www.who.int/immunization/programmes_systems/en/. Accessed September 9, 2016.
9. *State of the world's vaccines and immunization. Third edition* fact sheet. World Health Organization (January 18, 2010). www.who.int/immunization/fact_sheet_progress.pdf?ua=1 Accessed September 8, 2016.
10. "Vaccine delivery," Gates Foundation. www.gatesfoundation.org/What-We-Do/Global-Development/Vaccine-Delivery
11. "Global DTP3 Coverage," figure published in "Progress and Challenges with Achieving Universal Immunization Coverage: 2015 Estimates of Immunization Coverage: WHO/UNICEF Estimates of National Immunization Coverage (Data as of July 2016)," www.unicef.org/immunization/files/unicef-who-immunization-coverage-2015.pdf. Accessed September 9, 2016.
12. "Immunization facts and figures," UNICEF. http://www.unicef.org/immunization/files/UNICEF_Key_facts_and_figures_on_Immunization_April_2013(1).pdf. Accessed on September 7, 2016.
13. "The use of supplementary immunization activities to improve uptake in current and future vaccines in low income and middle-income countries: a systematic review protocol," February 18, 2014. http://bmjopen.bmj.com/content/4/2/e004429.full. Accessed on September 12, 2016.
14. Logan Brenzel, Lara J. Wolfson, Julia Fox-Rushby, et.al. "Vaccine-Preventable Diseases," Disease Control Priorities in Developing Countries. Chapter 20, pps. 389-411. www.ncbi.nlm.nih.gov/books/NBK11768/pdf/Bookshelf_NBK11768.pdf. Accessed on September 7, 2016.
15. Ibid.
16. Ibid.
17. Ibid.
18. "Transition process," GAVI. www.gavi.org/support/apply/graduating-countries/
19. "Overcoming Challenges to Sustainable Immunization Financing: Early Experiences from GAVI Graduating Countries," Helen Saxenian, Robert Hecht, Miloud Kaddar, Sarah Schmitt, Theresa Ryckman, and Santiago Cornejo. *Health Policy and Planning*, Oxford University Press 2015, 30:198. http://heapol.oxfordjournals.org/content/30/2/197.full.pdf+html
20. "Indonesia: Country at a Glance," World Bank. www.worldbank.org/en/country/indonesia. Accessed September 7, 2016.
21. "Indonesia's universal health care goals," Oxford Business Group. www.oxfordbusinessgroup.com/overview/indonesias-universal-health-care-goals. Accessed on September 12, 2016
22. Ibid.
23. "Health system performance at the district level in Indonesia after decentralization," www.ncbi.nlm.nih.gov/pmc/articles/PMC2839983/
24. "Dengue and severe dengue fact sheet." World Health Organization. Updated July 2016. www.who.int/mediacentre/factsheets/fs117/en/. Accessed September 9, 2016.

ENDNOTES

25. WHO, Regional Meeting on Dengue Prevention and Control, Southeast Asia Regional Office, address by Samlee Plianbangchang, regional director, at regional meeting on dengue prevention and control, New Delhi, September 17-19, 2012. www.searo.who.int/regional_director/speeches/2012/dengue_20120917/en/. Accessed September 9, 2016.
26. Stahl et al. "Cost of dengue outbreaks: literature review and country case studies," *BMC Public Health* 2013, edition 13:1048. http://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-13-1048. Accessed on September 7, 2016.
27. "Eliminate Dengue Indonesia," www.eliminatedengue.com/id#sthash.5A0Ym5H4.dpuf. Accessed on September 7, 2016.
28. "Dengue Immunization Public Program in Paraná State of Brazil Set to Achieve WHO 2020 Ambition," Sanofi Pasteur press release. August 13, 2016. www.sanofipasteur.com/en/articles/Dengue-Immunization-Public-Program-in-Parana-State-of-Brazil.aspx. Accessed September 9, 2016.
29. "Dengue vaccine: WHO position paper: July 2016," World Health Organization. www.who.int/wer/2016/wer9130.pdf?ua=1. Accessed September 9, 2016.
30. Hadisoemarto P, Reich M, Castro M. 2016. "Introduction of pentavalent vaccine in Indonesia: a policy analysis." Health Policy and Planning, 0: 1-10.
31. Ibid.
32. Ibid.
33. "Comprehensive Multi Year Plan National Immunization Program Indonesia: 2010–2014," Directorate General for Disease Control and Environmental Health, Ministry of Health Republic of Indonesia. 2010.
34. "World Development Indicators: Health systems," World Bank. http://wdi.worldbank.org/table/2.15. Accessed September 7, 2016. "Comprehensive Multi Year Plan National Immunization Program Indonesia: 2010–2014,".
35. Directorate General for Disease Control and Environmental Health. 2010. "Comprehensive Multi-Year Plan: National Immunization Program Indonesia 2010–2014."
36. "Indonesia," Sabin Vaccine Institute, July 11, 2016. www.sabin.org/programs/sustainable-immunization-financing/indonesia?language=en. Accessed September 7, 2016.
37. "Vaccinations in Developing Countries: Problems, Challenges, and Opportunities," T. Pang. www.eolss.net/sample-chapters/c03/e1-14-05-06.pdf. Accessed September 12, 2016.
38. Ibid.
39. "President Orders Investigation of Vaccine Fraud," Kompas. http://print.kompas.com/baca/english/2016/06/29/President-Orders-Investigation-of-Vaccine-Fraud
40. Shen, A., "The future of routine immunization in the developing world: challenges and opportunities," *Global Health Science and Practice,* December 1, 2014, Volume. 2, Number 4, pp. 381–394.
41. "Indonesia," The Tobacco Atlas. www.tobaccoatlas.org/country-data/indonesia/. Accessed September 7, 2016.
42. "Tobacco & Cigarette Industry Indonesia," Indonesia-Investments. www.indonesia-investments.com/business/industries-sectors/tobacco/item6873. Accessed September 7, 2016.
43. "Indonesia," The Tobacco Atlas. www.tobaccoatlas.org/country-data/indonesia/. Accessed September 7, 2016.
44. "PAHO Strategic Fund," Pan American Health Organization. www.paho.org/hq/index.php?option=com_content&view=article&id=12163%3Apaho-strategic-fund&catid=8775%3Aabout&Itemid=42005&lang=en. Accessed September 7, 2016.
45. "Tanoto Education," Tanoto Foundation. http://www.tanotofoundation.org/education/en/. Accessed September 7, 2016.
46. "Indonesia: Overview," World Bank, April 5, 2016. www.worldbank.org/en/country/indonesia/overview. Accessed September 7, 2016.

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