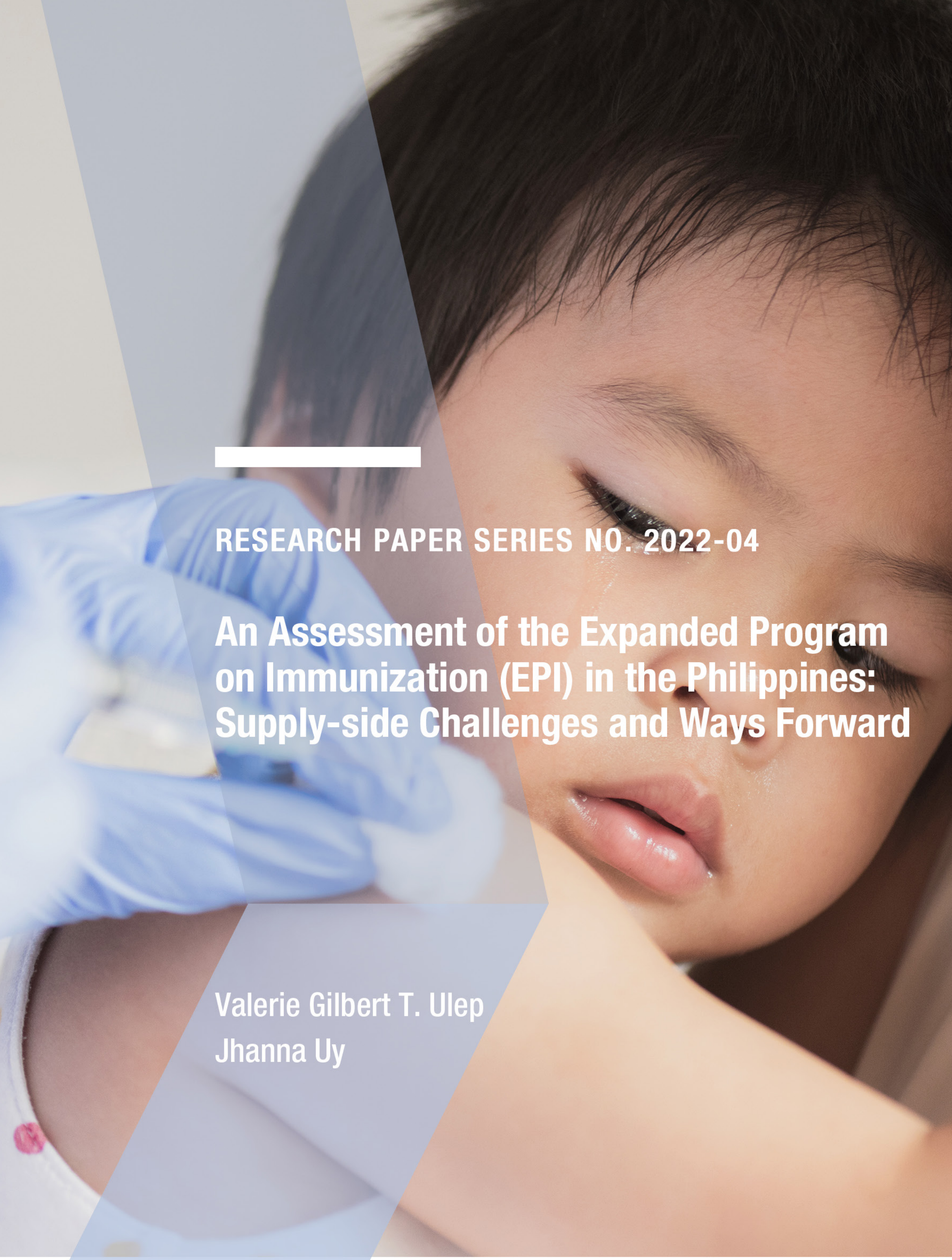

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An Assessment of the Expanded Program on Immunization (EPI) in the Philippines: Supply-side Challenges and Ways Forward

Valerie Gilbert T. Ulep
Jhanna Uy

PIDS

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Please address all inquiries to:

Philippine Institute for Development Studies
18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, 1100 Quezon City
Telephone: (63-2) 8877-4000
Fax: (63-2) 8877-4099
E-mail: publications@pids.gov.ph
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Sheila V. Siar, Gizelle G. Manuel, and Wenilyn M. Asuncion

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List of Acronyms

3PL	third-party logistics
ASEAN	Association of Southeast Asian Nations
BCG	bacillus Calmette–Guérin
DOH	Department of Health
DPT	diphtheria, pertussis, and tetanus
EPI	Expanded Program on Immunization
HepB	Hepatitis B
HHR	health human resources
HPV	human papillomavirus
IPV	inactivated polio vaccine
JEV	Japanese encephalitis virus
LGU	local government unit
MMR	measles, mumps, and rubella
NDHS	National Demographic and Health Survey
OPV	oral polio vaccine
PCV	pneumococcal conjugate vaccine
PhilHealth	Philippine Health Insurance Corporation
PSRC	Philippine Survey and Research Center
RA	Republic Act
RITM	Research Institute for Tropical Medicine
SBA	skilled birth attendance
SIA	supplemental immunization activities
UNICEF	United Nations Children's Fund
VPDs	vaccine-preventable diseases
WHO	World Health Organization

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Abstract

The Philippine Expanded Program on Immunization (EPI) has been in existence since 1976, providing Filipino children access to safe and effective vaccines to protect them from diseases like measles, diphtheria, tetanus, and whooping cough.

EPI is one of the major programs of the Department of Health and has achieved many milestones. Mortality and morbidity due to vaccine-preventable diseases have declined precipitously over the years, saving the lives of many Filipino children. Moreover, polio and maternal and neonatal tetanus were eliminated in 2000 and 2017, respectively.

Despite this progress, basic vaccine coverage hovered at only 70–80 percent in the last 30 years, and EPI has never achieved its target to fully immunize at least 95 percent of children. Hence, this study assesses the performance of EPI in the Philippines. Central to this assessment is the policy question: Why has the country struggled to maintain immunization coverage and repeatedly failed to achieve its national immunization target?

While demand factors like vaccine confidence have contributed to the weak performance of the program, the sharp decline in immunization coverage in recent years is caused mainly by deep-seated supply-side system issues. In particular, leadership, planning, and supply chain problems led to recurring vaccine stockouts in the past decade.

Introduction

The Expanded Program on Immunization (EPI) is a public health program managed and implemented by the Disease Prevention and Control Bureau of the Department of Health (DOH). Since its inception in 1976, EPI has been a cornerstone program of DOH aimed at promoting universal access to effective and safe vaccines. It has saved thousands of Filipino children from disabilities and premature death due to vaccine-preventable diseases (VPDs) like diphtheria, pertussis, tetanus, and measles. Routine vaccination has contributed to substantial improvements in childhood survival and increased life expectancy in the Philippines and globally (Ehreth 2003; McGovern and Canning 2015; Rodrigues 2020).

However, perennial challenges remain in the DOH EPI program. The country has been struggling to maintain immunization coverage at par with global recommendations for herd immunity and reach its target to fully immunize at least 95 percent of all children, as indicated in the *National Objectives for Health: Philippines 2017–2022* (DOH 2018).

This study assesses the performance of EPI in the Philippines. Central to this assessment is the policy question: Why has the country struggled to maintain immunization coverage and repeatedly failed to achieve its national immunization target?

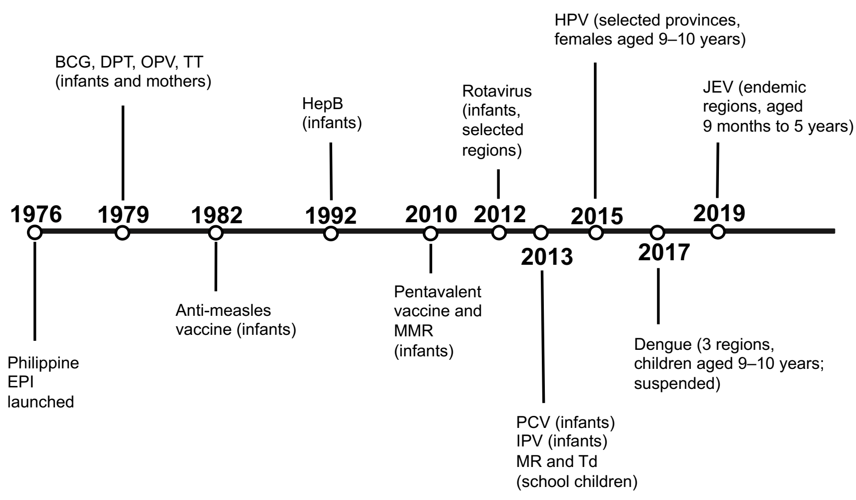
This paper aims to (1) assess the performance of EPI in the last three decades in terms of coverage, timeliness, and equity of administration; and (2) identify the supply-side challenges that could have hindered the achievement of national immunization targets.

The Philippine Expanded Program on Immunization

The Philippines has a long history of EPI. The World Health Organization (WHO) launched EPI in 1974 to promote and develop immunization programs, improve vaccination uptake, and establish disease monitoring systems globally (*Virus Inf Exch Newsl South East Asia West Pac* 1998). The Philippines was one of the first adopters of EPI with the passage of Presidential Decree 996 in 1976, which established EPI in the country to promote universal access to safe and effective vaccines for common VPDs. Republic Act (RA) 10152, also known as the Mandatory Infants and Children Health Immunization Act of 2011, strengthened the implementation of EPI by mandating free routine vaccination for 11 VPDs.

In the early years of EPI's implementation (1976–1982), only six VPDs were targeted as part of the basic routine vaccination. These were tuberculosis, poliomyelitis, diphtheria, whooping cough, tetanus, and measles. Hepatitis B (HepB) was added in 1992 (Patel et al. 2014). Over the years, DOH targeted more VPDs and age groups and added new vaccines (Figure 1). Noteworthy are the inclusions of the second dose of measles vaccine in 2010, pneumococcal conjugate vaccine (PCV) in 2013, and the Japanese encephalitis virus (JEV) vaccine for endemic areas in 2019.

Figure 1. Evolution of EPI in the Philippines, 1976–2019



EPI = Expanded Program Immunization; BCG = bacillus Calmette–Guérin; DPT = diphtheria, pertussis, and tetanus; OPV = oral polio vaccine; TT = tetanus toxoid; HepB = Hepatitis B; HPV = human papillomavirus; JEV = Japanese encephalitis virus; MMR = measles, mumps, and rubella; PCV = pneumococcal conjugate vaccine; IPV = inactivated polio vaccine; MR = measles and rubella; Td = tetanus and diphtheria
Sources: DOH (2017a, 2017b, 2019); Lopez et al. (2018); Wilder-Smith et al. (2019)

The core of DOH EPI is routine vaccination for children ages 0 to 12 months. Table 1 summarizes the vaccination schedule for children.

Table 1. Philippine national immunization schedule for children aged 0 to 12 months

Vaccine/Antigen	Disease	Doses	Schedule
BCG (bacillus Calmette–Guérin)	Tuberculosis	1	Birth (within 24 hours)
HepB (monovalent)	Hepatitis B	1	Birth (within 24 hours)
Pentavalent vaccine (DPT-HepB-HiB)	Diphtheria, tetanus, and pertussis Hepatitis B Hemophilus influenzae type B Meningitis	3	6, 10, 14 weeks
OPV (oral polio vaccine)	Poliomyelitis	3	6, 10, 14 weeks
IPV (inactivated polio vaccine)	Poliomyelitis	1	14 weeks
PCV (pneumococcal conjugate vaccine)	Pneumococcal infections (e.g., meningitis)	3	6, 10, 14 weeks
MCV (measles-containing vaccine) and MMR (measles, mumps, and rubella)	Measles, mumps, and rubella	2	9–12 months, 12–15 months

Source: PFV et al. (2019)

Methods

Table 2 summarizes the study components, its data sources, and the executed analyses. The study has three components: assessing timely and equitable access to childhood vaccines, national government expenditures for EPI, and national supply-side challenges for vaccines. It primarily relies on secondary data complemented by document and literature reviews.

Conceptual framework

EPI aims to reduce the VPD burden by increasing immunization coverage and timeliness. Determinants of immunization coverage and timeliness (Figure 2) are not limited to supply-side factors and may be any of the following:

- Demand-side: Socioeconomic characteristics and knowledge, attitudes, or practices of households and caregivers that lead to the intent to vaccinate

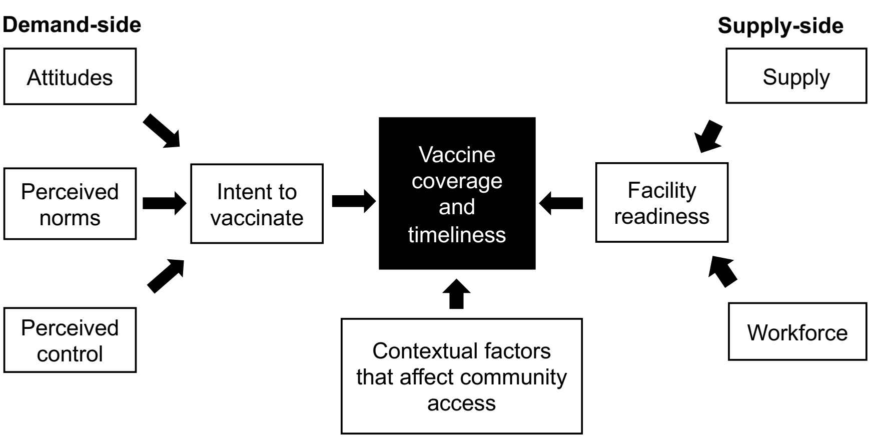
- Supply-side: Supplies, human resources, funds, equipment, and other resources and processes necessary to ensure that a facility can provide vaccination services to children when their caregivers wish to avail of them
- Contextual factors: Geographic distance, financial affordability, and cultural acceptability of immunization services that facilitate or hinder access of parents/caregivers to immunization services

Table 2. Summary of study components and methods

Components	Data Source	Data Analysis
EPI reach, timeliness, and equity	Available nationally representative surveys and surveillance data from DOH, WHO, and UNICEF	Descriptive statistics Regression modeling Equity analysis
EPI public expenditures	DOH administrative data: accounting data (registry of allotments, obligations, and disbursements) and procurement monitoring reports	Descriptive analysis of expenditures
EPI supply-side factors	Review of literature, EPI documents, and past assessments	Narrative analyses

EPI = Expanded Program Immunization; DOH = Department of Health; WHO = World Health Organization; UNICEF = United Nations Children's Fund
Source: Authors' summary

Figure 2. Framework of vaccine coverage and timeliness determinants



Sources: Phillips et al. (2017); Masters et al. (2019)

This study focuses on vaccination coverage, timeliness, and the supply-side factors that affect them. Thus, this paper's fourth section assesses EPI's performance in the last 30 years, looking at VPD incidence and deaths, vaccine coverage, immunization dropouts for multidose vaccines, vaccine administration timeliness, and demand-side determinants. Meanwhile, the fifth section outlines EPI's supply-side challenges related to financing, national vaccine cold supply chain, and human resources and leadership. The last section concludes the paper and provides overarching short- and long-term recommendations.

Performance of EPI

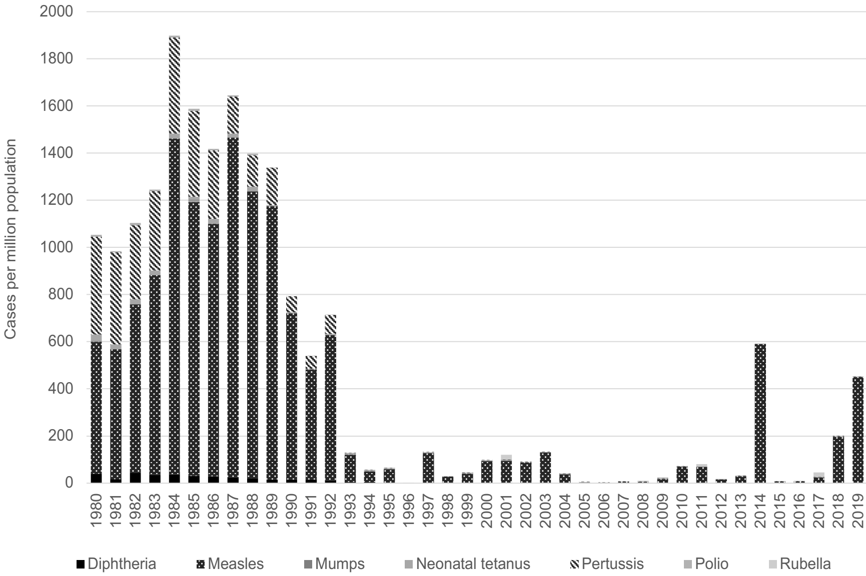
Vaccine-preventable diseases burden

VPD burden is greatly influenced by the uptake of childhood vaccinations and the strength of immunization programs (Nandi and Shet 2020). Morbidity and mortality due to VPDs have significantly declined after EPI's introduction. In the early 1980s, thousands of VPD cases and deaths, particularly for measles and pertussis, were recorded yearly (Figures 3 and 4). By the mid-1990s, however, the number of VPD cases and deaths sharply declined (Figure 4). Polio and maternal and neonatal tetanus were eliminated in the Philippines in 2000 and 2017, respectively.

Despite the success in reducing the VPD burden, occasional disease outbreaks continue to occur. In the last decade, measles outbreaks (dotted pattern in Figure 3) occurred in 2014 (58,848 cases), 2018 (20,827 cases), and 2019 (48,525 cases) (Takashima et al. 2015; UNICEF and WHO 2019). Moreover, the Philippines had two cases[1] of vaccine-derived poliovirus in 2019, even though the country had been declared polio-free in 2000. The occasional outbreaks suggest long-standing problems of undervaccination, untimely administration, and failure to reach and maintain herd immunity levels.

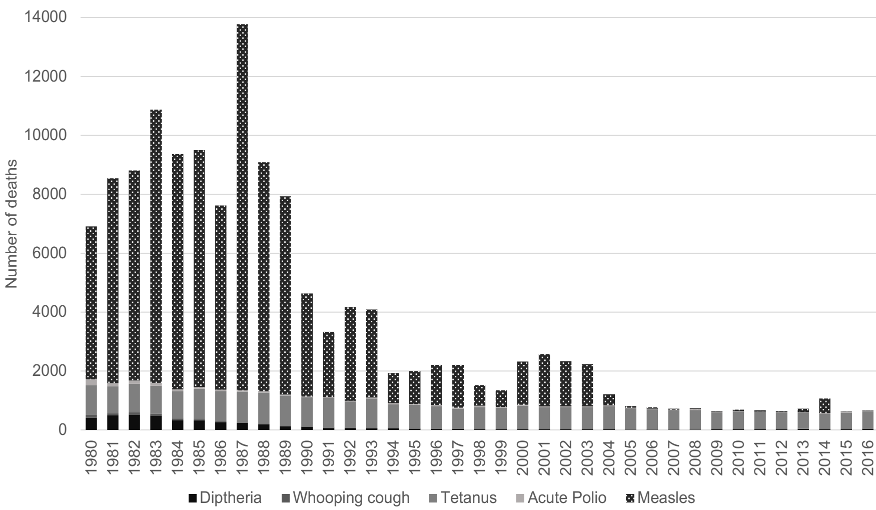
[1] These cases were vaccine-derived poliovirus type 2, which are very rare genetically mutated strains of polio from oral vaccine. Persistently low coverage of OPV and inactivated polio vaccine (IPV) and poor sanitation in communities allow transmission of this strain. Over time, the virus may regain its ability to cause disease. High-immunization coverage of OPV and IPV protects the community from both wild and vaccine-derived poliovirus types.

Figure 3. Cases of vaccine-preventable diseases, 1980–2019



Source of basic data: WHO (2020)

Figure 4. Deaths due to vaccine-preventable diseases, 1980–2016

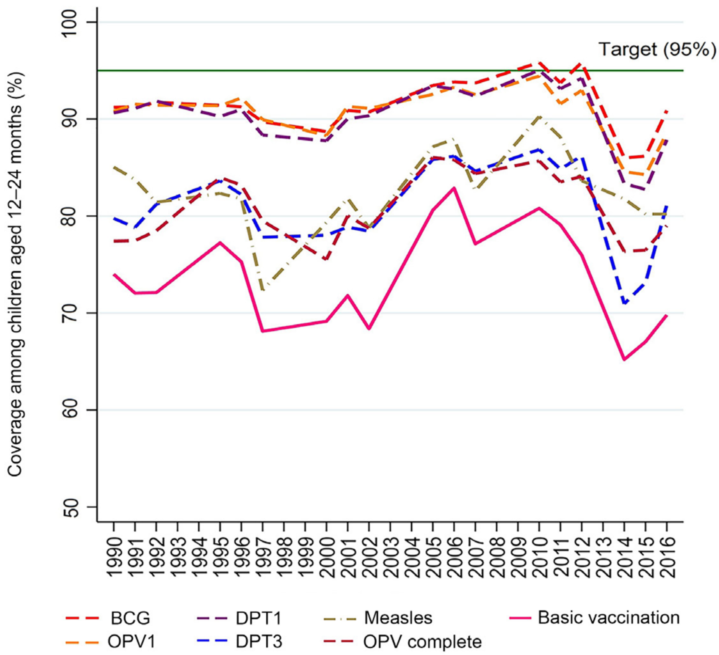


Source of basic data: DOH (various years)

Immunization coverage: National, regional, and equity

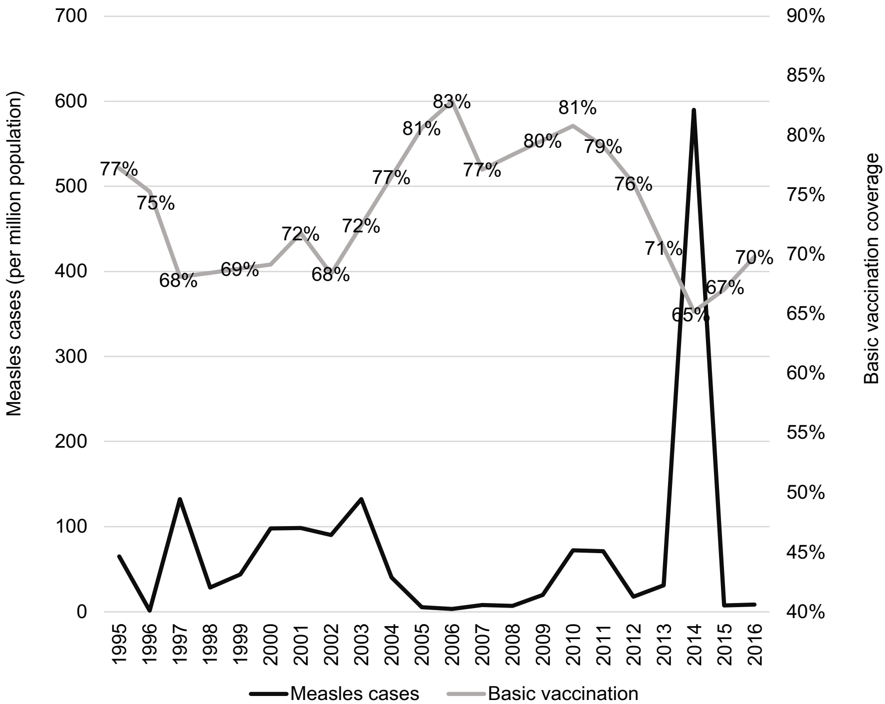
Large fluctuations characterized immunization coverage in the past three decades. The Philippines has never reached its target of 95 percent basic vaccination coverage (i.e., for Bacillus Calmette–Guerin [BCG] vaccine, three doses of oral polio vaccine [OPV], three doses of diphtheria, pertussis, and tetanus [DPT] vaccine, and one dose of measles vaccine). Figure 5 shows that the basic vaccine coverage among children ages 12–24 months has been remarkably unstable over time. From 2002 to 2012, coverage was sustained for all basic vaccines. It steadily increased until 95 percent coverage was achieved for BCG and the first doses of DPT and OPV. Then, coverage plummeted in 2013, with basic vaccination coverage dipping to its lowest point (65%) in 2014, even lower than the levels in the 1990s. Since VPD incidence follows fluctuations in immunization coverage, the measles outbreak in 2014 can be attributed to the large decline in coverage in the previous years (Figure 6).

Figure 5. Vaccination by birth cohort in the Philippines, 1990–2016



BCG = bacillus Calmette–Guérin; OPV1 = first dose of oral polio vaccine; DPT1 = first dose of diphtheria, pertussis, and tetanus vaccine; DPT3 = third dose of DPT vaccine
Source of basic data: PSA and ICF (various years)

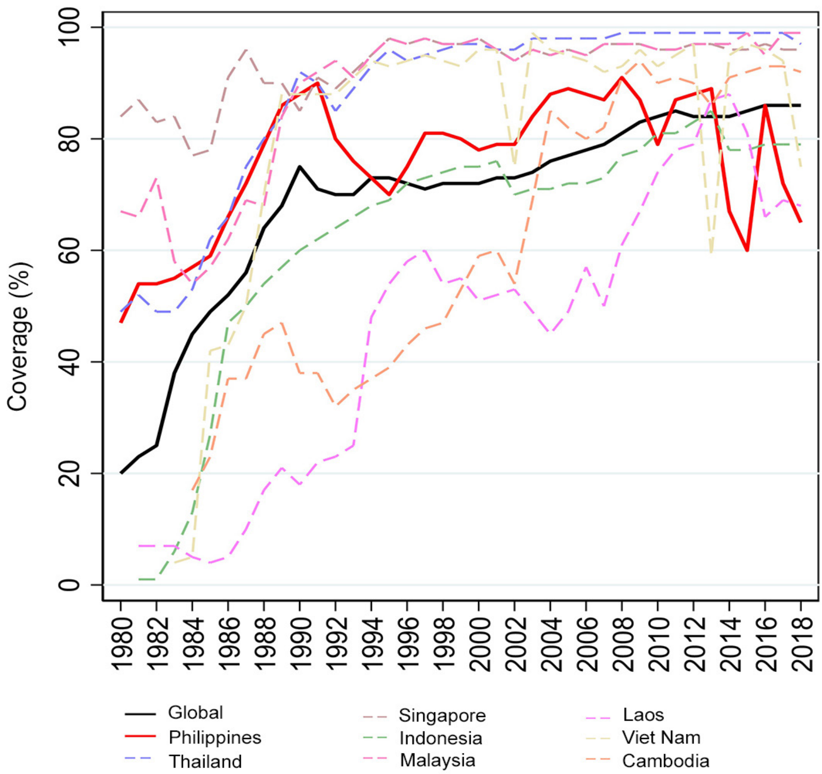
Figure 6. Immunization coverage and measles cases, 1995–2016



Sources of basic data: WHO (2020) (extracted in December 2019); PSA and ICF (various years)

In contrast, the global average increased, and most member-states of the Association of Southeast Asian Nations (ASEAN) successfully maintained high immunization coverage levels. Figure 7 shows the DPT third dose (DPT3) coverage in the Philippines vis-à-vis select ASEAN countries and the global average. From 1980 to 1983, the DPT3 coverage in the Philippines (47%) was more than twice the global average (20%) and much better than Viet Nam, Cambodia, Indonesia, and Laos. After 2012, however, as coverage improved in ASEAN and globally, the Philippines failed to maintain its past gains. In 2017, DPT3 coverage in the Philippines (72%) was lower than in the world's poorest countries like Burundi (90%), Malawi (92%), and Liberia (84%). In 2018, the Philippines (65%) registered the lowest DPT3 coverage among ASEAN countries.

Figure 7. DPT3 coverage in the Philippines and select ASEAN countries, 1980–2018

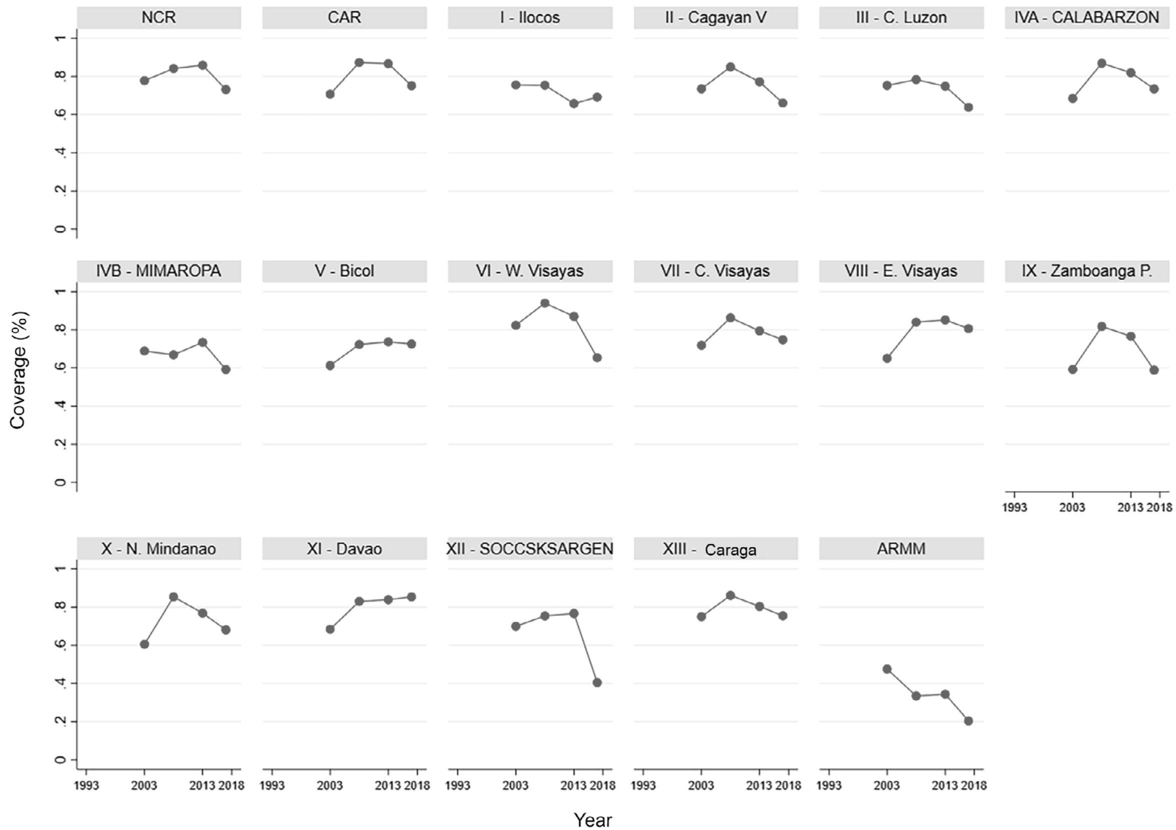


DPT3 = third dose of diphtheria, pertussis, and tetanus vaccine; ASEAN = Association of Southeast Asian Nations
Source of basic data: WHO and UNICEF (2020) (extracted in December 2019)

Like the national trend, regional immunization coverage varied over time. All regions (except Region XI) recorded large fluctuations and a sharp decline in 2013 in their immunization coverages (Figure 8). Alarmingly, coverage in Region XII declined from 80 percent in 2013 to 40 percent in 2017, while coverage in the Autonomous Region in Muslim Mindanao (ARMM)[2] declined from 40 percent in 2013 to 20 percent in 2017. Since 1993, ARMM has not recorded a basic vaccination coverage that is above 50 percent.

[2] ARMM was renamed Bangsamoro Autonomous Region in Muslim Mindanao following the ratification of the Bangsamoro Organic Law in January 2019.

Figure 8. Basic vaccination coverage by region, 1990–2017



NCR = National Capital Region; CAR = Cordillera Administrative Region; CALABARZON = Cavite, Laguna, Batangas, Rizal, and Quezon; MIMAROPA = Mindoro, Marinduque, Romblon, and Palawan; SOCCSKSARGEN = South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos City; ARMM = Autonomous Region in Muslim Mindanao

Source of basic data: PSA and ICF (various years)

Immunization has a socioeconomic gradient across wealth quintiles. Coverage among children from poor households is lower than those of affluent households (Figure 9). Based on the 2017 National Demographic and Health Survey (NDHS), the basic vaccination coverage among children from the top 40 percent of wealthiest households is 75 percent, while that of children from 60 percent of the bottom quintile is 60 percent. However, all socioeconomic groups experienced a decline in basic vaccination coverages post-2013.

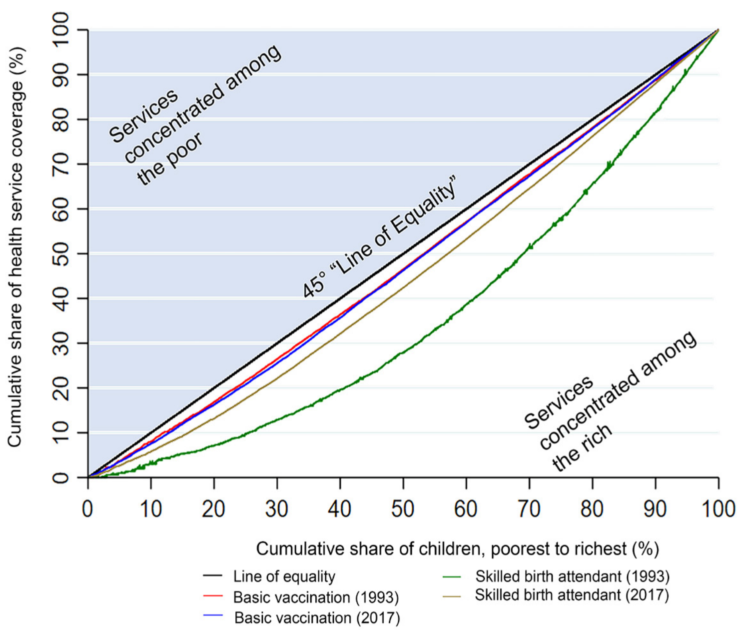
Figure 9. Basic vaccination coverage by socioeconomic status, 1980–2018

Source of basic data: WHO and UNICEF (2020) (extracted in December 2019)

Overall, the inequality associated with immunization coverage is only moderately favoring the rich. Figure 10 shows the concentration curves for basic vaccination coverage and skilled birth attendance (SBA). A concentration curve is commonly used to identify wealth inequality in health services utilization. It plots the cumulative percentage of healthcare utilization (e.g., basic vaccination coverage) on the y-axis against the cumulative percentage of the population (ranked by socioeconomic status from poorest to richest) on the x-axis. If children of all wealth quintiles received equal immunization coverage, the curve would coincide with the 45-degree line or the "line of perfect equality". If the curve lies above the line of equality, coverage is concentrated among the poor. In contrast, when the curve lies below the line of quality, coverage is concentrated among the rich.

Compared to SBA, the concentration curves for basic vaccination are quite near the line of equality (45-degree line), as shown in Figure 10. This means that the difference in the uptake of basic vaccination between rich and poor households is not that large. Likewise, this disparity has not changed over the last 30 years, between 1993 (red) and 2017 (blue) basic vaccination concentration curves. In contrast, the gap in SBA and other maternal-child health services—albeit decreasing over time (brown vs. green curve)—is still greater than the inequality in basic vaccination.

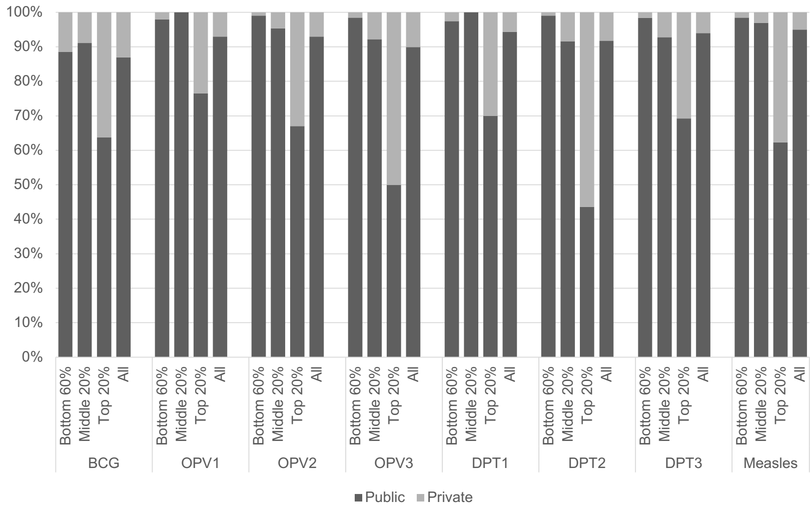
Figure 10. Concentration curves of basic vaccination and skilled birth attendance



Source of basic data: PSA and ICF (various years)

The public sector primarily delivers routine immunization. Analysis of 2017 NDHS data shows that around 95 percent of children received their last vaccination at a public facility. Richer households are more likely to get immunized in the private sector, especially for later doses in a series (Figure 11).

Figure 11. Facility of last immunization by vaccine/dose and socioeconomic status, 2017



BCG = bacillus Calmette–Guérin; OPV = oral polio vaccine; DPT = diphtheria, pertussis, and tetanus
Note: The 2017 National Demographic and Health Survey only asked about the facility of last immunization. Thus, there is no data on the facility for each dose. This estimate is merely a proxy for the share of public/private sector delivery of immunization services.
Source of basic data: PSA and ICF (2017)

Vaccination dropouts

Immunization dropout metrics reflect a program's ability to reach a child multiple times for vaccines with more than one dose. Metrics provide insights on barriers to return, such as stockouts, errors in a child's vaccination scheduling, inadequate caregiver education, or lack of tracking and reminding systems (Hutchins et al. 1993; Cutts et al. 2016; Crocker-Buque et al. 2018).

Table 3 shows the percentage of children that did not complete their succeeding doses for OPV, pentavalent, and measles vaccines.

Table 3. Vaccination dropout for polio, pentavalent, and measles, 2017

	OPV 1 to 2	OPV 2 to 3	Penta 1 to 2	Penta 2 to 3	Measles 1 to 2
Children with vaccination cards, immunized with prior dose, and met minimum age of next dose	n=2922	n=2630	n=2973	n=2668	n=1564
Overall dropout (%)	**3.9**	**5.8**	**3.2**	**5.5**	**30.0**
A. Maternal characteristics					
Educational attainment					
None	7.5	5.6	8.0	9.6	35.7
Primary	8.3	6.1	6.2	6.0	31.4
Secondary or higher	1.9	5.7	1.6	4.9	28.9
B. Barriers to health care and healthcare utilization					
Money					
No problem	3.3	5.4	2.4	5.7	27.4
Big problem	4.5	6.3	4.1	5.3	32.9
Geographic distance					
No problem	3.9	5.4	3.0	5.7	28.6
Big problem	3.7	7.0	3.8	5.0	34.3
Antenatal care					
Less than 4 visits or not seen by a skilled health staff	9.6	4.7	7.5	11.6	37.6
At least 4 visits and seen by a skilled health staff	3.0	6.0	2.6	4.7	29.0
Delivery by a skilled health staff					
No	10.0	9.6	9.2	8.7	38.0
Yes	3.2	5.4	2.5	5.2	29.2
Place of delivery					
Home/other	7.2	9.0	7.9	9.0	35.4
Public hospital	2.9	5.9	2.1	5.0	30.8
Public health center	2.1	5.7	2.2	5.5	34.4
Private facility	4.7	3.9	3.1	4.4	21.5
C. Household characteristics					
Type of residence					
Rural	4.4	6.7	4.1	6.0	32.5
Urban	3.2	4.8	2.1	4.9	27.0
Wealth quintile					
Quintile 1-poorest	5.6	5.5	6.1	7.0	35.5
Quintile 2	3.8	8.7	3.7	7.0	31.8
Quintile 3	2.0	5.4	1.9	5.1	27.5
Quintile 4	4.3	2.3	1.3	3.0	30.8
Quintile 5-richest	2.8	6.4	1.6	4.2	20.2

OPV = oral polio vaccine; penta = pentavalent; n = sample size
Source of basic data: PSA and ICF (2017)

For measles vaccination, almost 30 percent of children who had their first dose did not complete the required second dose.

The effects of sociodemographic factors on vaccine completion vary considerably, not only by vaccine and dose. Based on the regression results, children of mothers without education and with limited access to maternal healthcare services are more likely to miss their second or third doses. For instance, those born at home or without adequate prenatal quality are more likely to drop out or miss their second and third polio and pentavalent vaccine doses.

Timeliness of vaccine administration[3]

Traditionally, EPI's performance is measured by coverage, which is an important proxy for population immunity, and VPD incidence closely follows immunization coverage fluctuations. The *National Objectives for Health: Philippines 2017–2022*, which outlines DOH's medium-term health system targets, only included coverage as an indicator of EPI's success (DOH 2018). However, the importance of vaccine administration timeliness as a metric of EPI's performance is increasingly being recognized globally (Masters et al. 2019). Although coverage is a measure of the immunization schedule's completion, high completion does not necessarily mean timely vaccination. Childhood protection against disease is maximized only when vaccines are delivered promptly within the recommended ages, which is why vaccination schedules exist. Vaccination schedules are determined by accounting for local disease epidemiology to elicit immunity in children before exposure to infectious diseases (Shetty et al. 2019). Late doses increase a child's duration at risk of VPDs, while early or improperly spaced doses may decrease the immune response to vaccines (Omer et al. 2009; Shetty et al. 2019).

Among children immunized with all basic vaccines (8 doses), only 10.6 percent had all their vaccines and doses administered on time (Table 4). There is no difference among socioeconomic classes for

[3] This subsection reiterates select findings from the authors' previous study, "Too early, too late: Timeliness of child vaccination in the Philippines" (Ulep and Uy 2019).

this metric. However, there are differences if timeliness is measured per vaccine dose. In 2017, timely administration of individual vaccines ranged from 38 percent to 67 percent (see Ulep and Uy 2019 for detailed data). From the 1993 to 2017 rounds, the timeliness of BCG (12.9%–64.6%), OPV1 (16.8%–39.5%), and DPT1 (16.4%–37.5%) significantly improved. Children from the top 20 percent of richest households (83.2%) are much more likely to receive BCG birth dose within the recommended schedule (i.e., birth to 2 weeks) than those from the bottom 60 percent (58.6%).

Table 4. Coverage and timeliness of basic vaccination, 1993–2017

NDHS Year	All Children Aged 12–24 Months		Top 20% in Wealth		Bottom 60% in Wealth	
	Coverage (%)	All Timely (%)	Coverage (%)	All Timely (%)	Coverage (%)	All Timely (%)
1993	71.9	2.1	78.3	3.6	70.0	1.6
1998	72.6	2.1	85.1	3.3	68.9	1.5
2003	69.8	2.6	80.4	4.3	66.8	1.9
2008	79.3	5.3	86.6	5.4	75.1	4.0
2013	77.2	9.3	85.8	12.4	74.0	7.0
2017	69.4	10.6	74.4	10.5	65.7	9.2

NDHS = National Demographic and Health Survey
Source of basic data: PSA and ICF (various years)

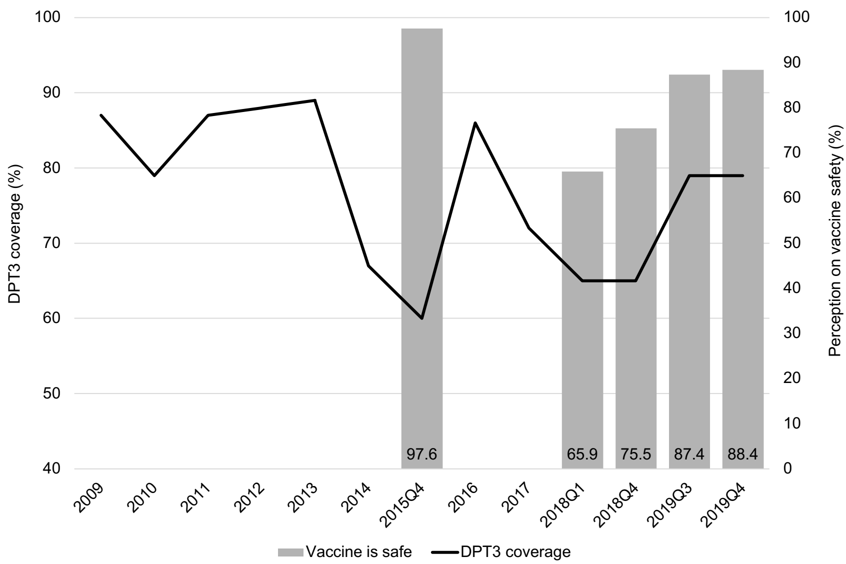
Demand-side: Vaccine confidence

Depending on the period, the decline in immunization coverage in recent years could be partly explained by both supply and demand factors. Supply factors involve health system challenges that could cause vaccine stockouts in health facilities, while demand factors involve the intent of the household to vaccinate their children.

The significant decline in coverage in 2015 could be attributed more to vaccine stockouts and less to demand-side factors. Based on vaccine confidence surveys conducted by the Philippine Survey and

Research Center (PSRC), almost 97 percent of the population in 2015 agreed that vaccines were safe, but coverage was the lowest in decades (Figure 12).

Figure 12. DPT3 coverage and perception of vaccine safety



DPT3 = third dose of diphtheria, pertussis, and tetanus vaccine
Sources of basic data: WHO and UNICEF (2020) (extracted December 2019); survey data from the PSRC (personal communication with the authors on February 12, 2020)

Although vaccine coverage had improved after 2015, public confidence in vaccine safety plummeted to 66 percent in 2018 following the Dengvaxia controversy. After French pharmaceutical company Sanofi announced the results of their clinical data analysis, which found that Dengvaxia increased the risk of severe dengue and hospitalizations, the distribution of the vaccine was suspended in the Philippines due to public fear. The controversy increased vaccine hesitancy in the country; hence, coverage declined concomitantly.

The decline was larger among the rich (see Figure 9), who also experienced a larger decrease in vaccine confidence. Based on the survey data of the PSRC[4] in 2018, only 63 percent of the population belonging to classes A, B, and C agreed that vaccines are safe compared to 70 percent of their poorer counterparts (classes D and E). However, as the next section shows, supply challenges remained during this period and are more likely responsible for the large declines in coverage in recent years.

Supply-side Challenges in EPI

Financing

Routine child immunization is mainly financed by the public sector, specifically the national government through DOH. Data on private sector spending on vaccination is neither systematically collected nor analyzed. Therefore, the total spending on vaccines in the country remains largely unknown (Coe et al. 2017). However, given that routine childhood vaccination, even among the richer segment of the population, is received mainly at public facilities (see Figure 11), this study hypothesizes that the bulk of EPI spending is from the public sector.

The Philippine Health Insurance Corporation (PhilHealth) does not have an immunization package, but reimbursements for birth doses of BCG and Hepatitis B vaccines are included in the Newborn Care Package instituted in 2006. Nevertheless, since DOH procures the majority of vaccines and disposable supplies (e.g., syringes, safety collector boxes) required by the country, it can be surmised that DOH accounts for the lion's share of total public spending for immunization.

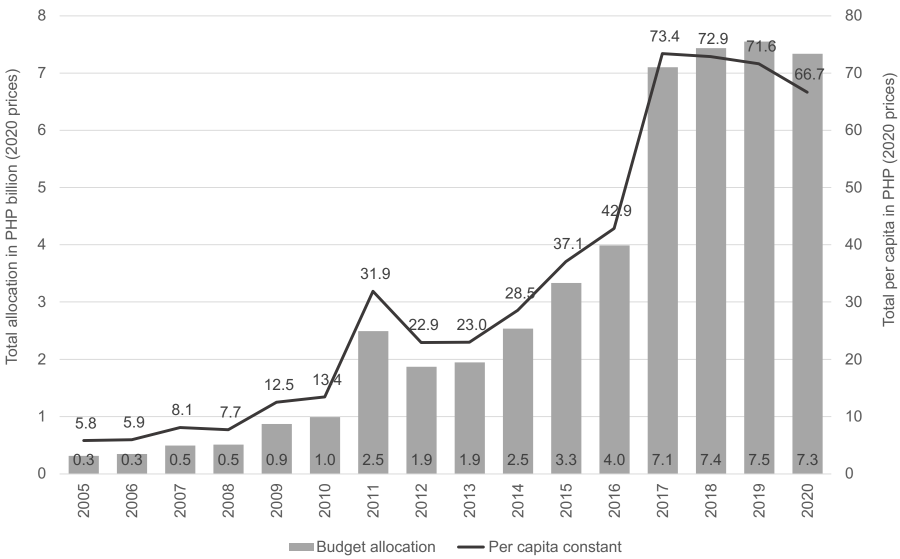
In terms of budget allocation, EPI is a priority program of DOH. In 2020, DOH allocated around PHP 7.3 billion for the program, equivalent to about 7.2 percent of its total PHP 100.56-billion budget. From 2005 to 2020, public spending on EPI increased significantly, with the program receiving a massive infusion of funds after the passage of RA 10351, or the Sin Tax Law, in 2012. Public spending

[4] Survey data were provided by PSRC in personal communication with the authors on February 12, 2020.

increased almost fourfold, from PHP 2 billion in 2013 to PHP 7 billion in 2020 (Figure 13). Likewise, after adjusting for population growth and inflation, public spending per person has increased from PHP 6 per person in 2005 to PHP 67 per person in 2020.

The majority of DOH EPI funds are spent on adding and paying for relatively new vaccines. The sin taxes were used to introduce PCV in 2013 and the human papillomavirus (HPV) vaccine in 2014, as shown in Figure 1 (DOH 2017b). While PCV and HPV were new and underutilized and have been recommended by WHO to be included in EPIs, PCV is much more expensive than core routine vaccines. Based on the EPI's procurement project management plans for 2017 to 2019, PCV costs around PHP 800–870 per dose compared to PHP 7–70 per dose of BCG, polio, pentavalent, and MMR (measles, mumps, and rubella) vaccines.

Figure 13. DOH budget allocation for EPI



DPT3 = third dose of diphtheria, pertussis, and tetanus vaccine
Sources of basic data: WHO and UNICEF (2020) (extracted December 2019); survey data from the Philippine Survey and Research Center (personal communication with authors on February 12, 2020)

Table 5 shows that PCV and HPV accounted for more than 70 percent of the total vaccine spending (excluding service delivery) in 2018 and 2019. This is confirmed by DOH procurement monitoring data from 2013 to 2019 (Figure 14), which also show that spending on routine child vaccines remained relatively stable during the same period.

Table 5. DOH expenditures on vaccines, 2017 and 2018 (in PHP millions)[1]

Vaccines	2017[2]		2018	
	Disbursed	Share	Disbursed	Share
Total (Excluding Taxes)	**7,398.93**	**100%**	**7,061.40**	**100%**
Basic routine (for infants)	1,705.06	24%	1,913.50	27%
BCG	47.99	1%	–	–
Hepatitis B	–	–	–	–
Polio	412.02	6%	416.25	6%
Pentavalent	490.55	7%	481.96	7%
Tetanus-diphtheria	62.76	1%	56.05	1%
Measles	691.74	9%	959.24	14%
Relatively new vaccines	5,693.77	77%	5,147.91	73%
PCV (for infants)	4,692.59	63%	4,822.91	68%
HPV (for girls 9–10 years old)	738.68	10%	325.00	5%
Influenza (for seniors)	262.50	4%	–	–

DOH = Department of Health; PHP = Philippine peso; BCG = bacillus Calmette-Guérin; PCV = pneumococcal conjugate vaccine; HPV = human papillomavirus; DOH-DPCB = DOH–Disease Prevention and Control Bureau

Notes:

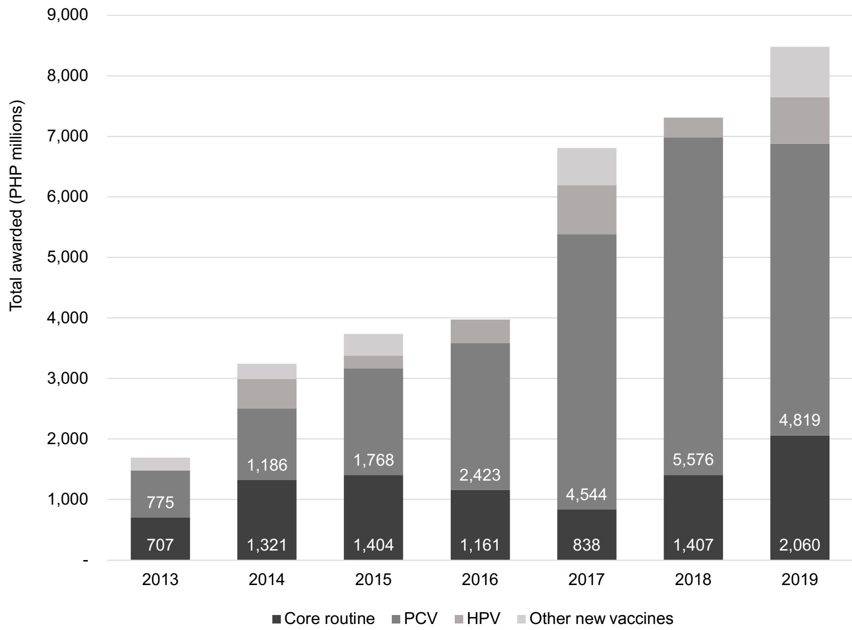
"–" = no expenditures recorded in the Registry of Allotments, Obligations, and Disbursements (RAOD)

[1] The RAOD on the Expanded Program of Immunization, Family Health Nutrition and Responsible Parenthood, and Public Health Management (started in 2018 for DOH-DPCB soft components) were analyzed.

[2] The analysis for 2017 includes the continuing appropriations from 2016 funds.

Source of basic data: DOH RAOD 2017–2019 (personal communication with authors on February 12, 2020)

Figure 14. Total value of successfully awarded and procured vaccines



PHP = Philippine peso; PCV = pneumococcal conjugate vaccine; HPV = human papillomavirus
Note: There are slight differences in totals compared to Table 5 because (1) the procurement monitoring reports measure contracts that were awarded but not necessarily disbursed; (2) there might be differences in the actual year of disbursements based on the Registry of Allotments, Obligations, and Disbursements (RAOD) compared to when the contract was awarded; and (3) there might be contracts that were awarded and disbursed but not recorded in the RAOD as of the time data were obtained.
Source of basic data: DOH Procurement Monitoring Reports 2013–2019 (personal communication with authors on February 3, 2020)

The majority of the EPI budget is spent on vaccines. In 2017 and 2018, vaccines (and their import taxes) accounted for almost 97 percent of the total DOH EPI disbursements (Table 6). Only a small share was accounted for service delivery (including capacity building). Around 1–1.5 percent was allocated for the cold supply chain and less than 1 percent for soft components, such as capacity building, media, promotion, and research.

Table 6. DOH expenditures on EPI, 2017 and 2018 (in PHP millions)[1]

Vaccines	2017[2]		2018	
	Disbursed	Share	Disbursed	Share
Total (excluding taxes)	**7,762.46**	**100%**	**7,596.86**	**100%**
A. Vaccines	7,398.93	95.3%	7,061.40	93.0%
Basic routine	1,705.06	22.0%	1,913.50	25.2%
PCV	4,692.59	60.5%	4,822.91	63.5%
B. Vaccine import taxes	119.09	1.5%	266.43	3.5%
C. Safe injection supplies	140.66	1.8%	26.86	0.4%
Auto-disable syringes	101.11	1.3%	–	–
Reconstitution syringes	11.25	0.1%	3.57	0.0%
Safety collector boxes	28.30	0.4%	23.28	0.3%
D. Supplemental immunization activities (measles and polio)	8.56	0.1%	92.59	1.2%
E. Cold and supply chain	70.83	0.9%	143.21	1.9%
Brokerage and storage	0.40	0.0%	5.00	0.1%
Transport	39.85	0.5%	105.62	1.4%
Warehouse	30.58	0.4%	32.59	0.4%
F. Equipment (vaccine carriers)	11.11	0.1%	–	–
G. Soft components	13.28	0.2%	6.37	0.1%
Media and news	0	0.0%	5.75	0.1%
Research and monitoring	13	0.2%	–	–
Training and events	0.28	0.0%	0.62	0.0%
Influenza (for seniors)	262.50	4%	–	–

DOH = Department of Health; PHP = Philippine peso; BCG = bacillus Calmette-Guérin; PCV = pneumococcal conjugate vaccine; HPV = human papillomavirus; DOH-DPCB = DOH–Disease Prevention and Control Bureau

Notes:

"–" = no expenditures recorded in the Registry of Allotments, Obligations, and Disbursements (RAOD)

[1] RAOD on the Expanded Program of Immunization, Family Health Nutrition and Responsible Parenthood, and Public Health Management (started in 2018 for DOH-DPCB soft components) were analyzed.

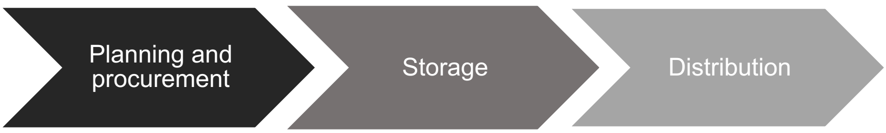
[2] The analysis for 2017 includes the Continuing Appropriations from 2016 funds.

Source of basic data: DOH RAOD 2017–2019 (personal communication with authors on February 12, 2020)

National vaccine supply and cold chain system

This subsection identifies and assesses the challenges from the procurement to the distribution of vaccines (Figure 15). Challenges in each step have adverse impacts on the availability of critical vaccines and contribute to stockouts at facilities.

Figure 15. Vaccine supply chain features



Source: Authors' illustration

Planning and procurement

DOH centrally procures vaccines for the whole country. It prepares a vaccine procurement and allocation plan, which will go through the usual processes stipulated in RA 9184 or the Government Procurement Reform Act of 2003. The yearly vaccine demand is determined according to the projected aggregate number of newborns for the year based on the Philippine Statistical Authority's census data. As part of the standard global practice, there should be a buffer stock, but it is unclear if this is followed conscientiously. It is also unclear how herd immunity thresholds are accounted for in the estimated yearly vaccine demand. Unvaccinated children in the previous years should be included; otherwise, the vaccine-naive population accumulates, eventually leading to outbreaks and catch-up vaccinations.

Once the plan is prepared, the DOH's Procurement Service facilitates the procurement of the vaccines. The Bids and Awards Committee Secretariat consolidates and recommends the plan to the procuring entity for approval.

The Philippines sources its vaccine supply either from the United Nations Children's Fund (UNICEF) or directly from local tenders.

The government usually enters a negotiated procurement with UNICEF through the Vaccine Independence Initiative (VII), established by UNICEF and WHO in 1991 to help lower middle-income countries (LMICs) like the Philippines participate in pooled procurement and benefit from economies of scale. The VII enables LMICs to be self-reliant in vaccine procurement and management (World Bank and Gavi 2010).

In recent years, DOH has attempted to procure vaccines directly from manufacturers, which typically undergoes competitive procurement. Such endeavor is part of the country's long-term efforts toward vaccine independence. However, failed local biddings often occur, casting uncertainty in the national vaccine supply. Table 7 shows the results of EPI vaccine procurement from 2013 to 2019. The primary mode of procurement differs over time: negotiated procurement (primarily with UNICEF) is prominent in 2013, 2014, and 2017, while competitive bidding is evident from 2014 onward.

Table 7. DOH EPI vaccine procurement results, 2013–2019

Year, n (number failed)	Basic Routine (N=84)		Relatively New (N=44)	
	Competitive	Negotiated	Competitive	Negotiated
2013	1 (1)	6 (0)	0 (0)	5 (0)
2014	4 (1)	8 (0)	2 (1)	4 (1)
2015	16 (11)	3 (1)	9 (3)	0 (0)
2016	12 (5)	3 (0)	7 (1)	2 (0)
2017	1 (0)	7 (0)	4 (0)	0 (0)
2018	2 (1)	6 (0)	6 (3)	1 (1)
2019	8 (6)	7 (0)	4 (0)	0 (0)

DOH = Department of Health; EPI = Expanded Program on Immunization; N =sample size; BCG = bacillus Calmette–Guérin; HepB = Hepatitis B; DPT = diphtheria, pertussis, and tetanus; HiB = Haemophilus influenzae type B; PCV = pneumococcal conjugate vaccine; HPV = human papillomavirus; JEV = Japanese encephalitis virus

Notes:

(1) Canceled or repeat order items were excluded.

(2) Basic routine vaccines: BCG, HepB, polio, pentavalent (DPT-HepB-HiB), measles

(3) Relatively new vaccines: PCV, HPV, influenza, rotavirus, JEV

Source of basic data: DOH Procurement Monitoring Reports from 2013–2019 (personal communication with authors on February 3, 2020)

However, the latter has high levels of bidding failures, especially for basic routine vaccines (i.e., BCG, HepB, polio, Penta, and measles). In 2015, 11 out of the 16 competitive bids for basic routine vaccines resulted in bid failures.

When local tenders fail, the government resorts to emergency procurement with UNICEF. For emergency procurements, requests would come in the second or third quarter of the current year, whereas UNICEF requires countries to commit to orders as early as September in the prior year. Late requests and payments (3–5 months) may result in delayed delivery of vaccines when stockouts are already occurring. For instance, emergency procurement with UNICEF happened in 2015 and 2019, when there was failed local bidding for pentavalent and measles vaccines, respectively, and vaccine stores were at stockout levels (Table 8). These last-minute requests and failed commitments do not make the Philippines a “responsible customer” in the global vaccine market, where countries must queue for vaccines, particularly those with only one global supplier (e.g., MMR). Table 8 shows the pattern of failed competitive bids, with more than 100 days "spent" on failed bids in 2015 and 2019.

Procurements typically follow a one-year procurement period. Figure 16 shows the detailed steps in vaccine procurement, including the median duration of each step. More than half of all awarded competitive bids for vaccines or EPI supplies took more than 100 days to procure successfully. Bottlenecks in procurement usually occur in post-qualification, a notice of award, and contract signing.

Table 8. Failed vaccine procurement, 2015 and 2019

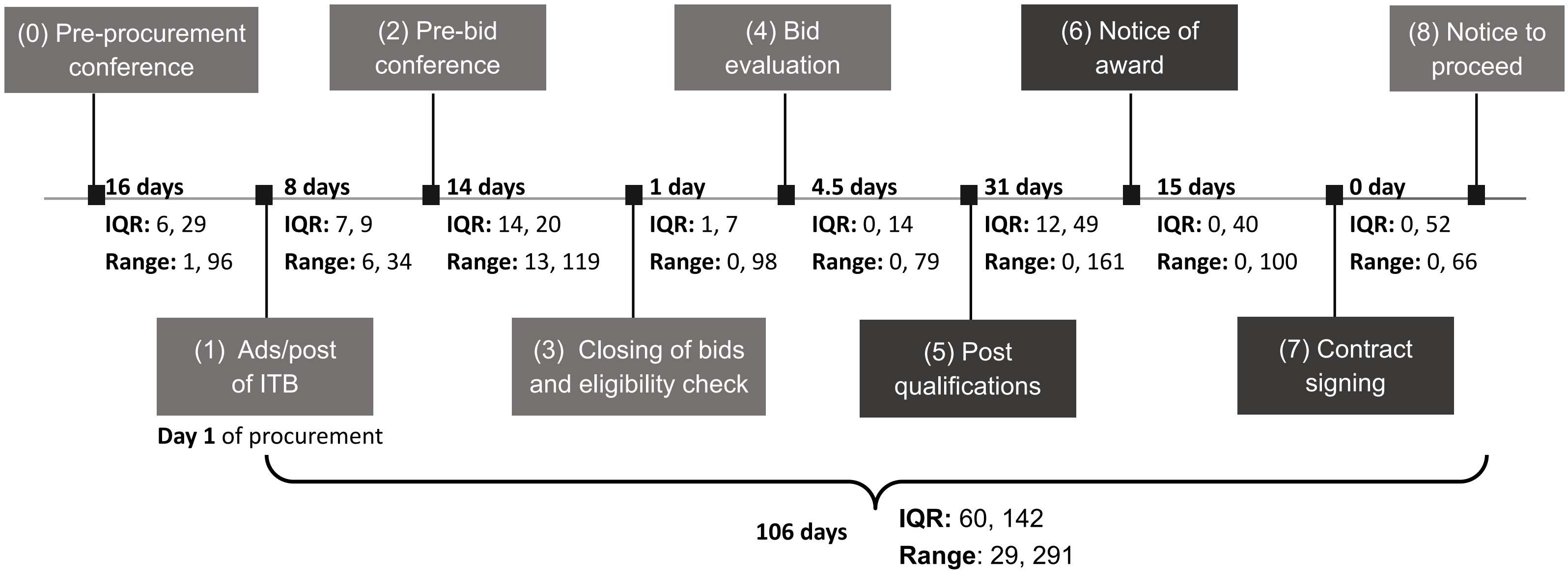
COBAC ID	Procurement Mode	Start Date*	Fail Date	Number of Days Delayed
2015				
A. BCG				
2015-087	Competitive bidding	Mar 6, 2015	Mar 31, 2015	117
2015-087A	Competitive bidding	May 21, 2015	Jun 23, 2015	
NP NO. 2015-015	UNICEF - negotiated	Jul 1, 2015	–	

Table 8 *(continued)*

COBAC ID	Procurement Mode	Start Date*	Fail Date	Number of Days Delayed
B. Pentavalent				
2015-086	Competitive bidding	Mar 6, 2015	Mar 31, 2015	166
2015-086-A	Competitive bidding	Apr 7, 2015	May 12, 2015	
2015-158	Competitive bidding	Aug 19, 2015	–	
EP NO.2015-003	UNICEF - negotiated	Missing date	–	
C. Measles				
2015-080	Competitive bidding	Mar 6, 2015	Mar 31, 2015	157
2015-085	Competitive bidding	Mar 6, 2015	Mar 31, 2015	
2015-085-A	Competitive bidding	May 12, 2015	Jun 23, 2015	
NP-UNICEF-014-2015	UNICEF - negotiated	Missing date	Jul 8, 2015	
2015-111	Competitive bidding	Apr 28, 2015	–	
2015-111-A	Competitive bidding	Jun 29, 2015	Jul 27, 2015	
2015-111-B	Competitive bidding	Aug 10, 2015	–	
2019				
A. BCG				
2019-143	Competitive bidding	Oct 30, 2018	Dec 3, 2019	141
2019-143-B	UNICEF - negotiated	Mar 20, 2019	–	
B. Hepatitis B				
2019-111	Competitive bidding	Oct 30, 2018	Feb 26, 2019	185
2019-111-B	UNICEF - negotiated	May 3, 2019	–	
C. Polio				
2019-222	Competitive bidding	Feb 4, 2019	Aug 4, 2019	151
2019-222-B	UNICEF - negotiated	Jul 5, 2019	–	
D. Measles				
2019-245	Competitive bidding	Oct 30, 2018	Feb 27, 2019	203
2019-245-B	UNICEF - negotiated	May 21, 2019	–	
2019-117-A	UNICEF - negotiated	Feb 26, 2019	–	
2019-172-A	UNICEF - negotiated	Feb 4, 2019	–	
E. Tetanus-diphtheria				
2019-102	Competitive bidding	Jan 16, 2019	Feb 26, 2019	63
2019-102-B	UNICEF - negotiated	Mar 20, 2019	–	

COBAC = Central Office Bids and Awards Committee; UNICEF = United Nations Children's Fund; BCG = bacillus Calmette-Guérin
"–" = bids did not fail.
* Start date is the date of the pre-procurement conference.
Source of basic data: DOH Procurement Monitoring Reports 2013–2019 (personal communication with authors on February 3, 2020)

Figure 16. Median time between procurement steps for awarded competitive bids for vaccines and safe injection supplies, 2013–2019 (N=62)



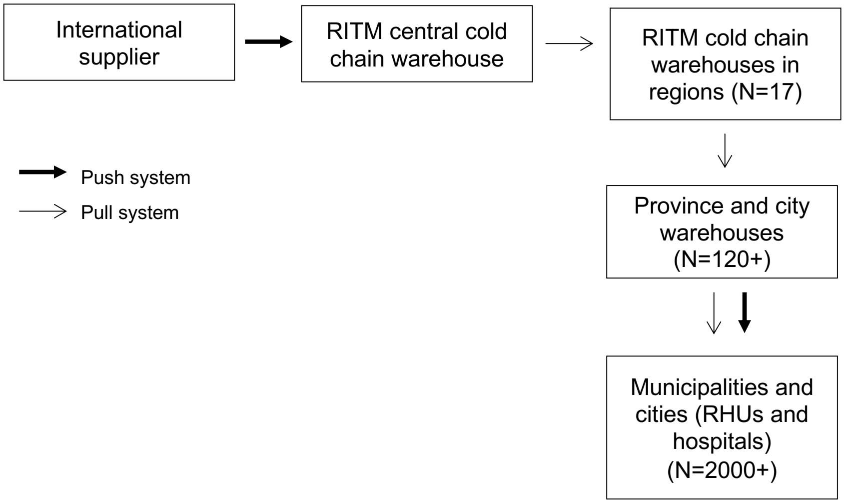
N = sample population; IQR = interquartile range; ITB= instruction to bidders
Source of basic data: DOH Procurement Monitoring Reports 2013–2019 (personal communication with authors on February 3, 2020)

Storage

The duty of an international supplier generally ends at the port. Thereafter, DOH is responsible for preparing the paperwork and paying the duties and taxes before the vaccines can be transported to the cold chain warehouses of the Research Institute for Tropical Medicine (RITM). However, key interview informants revealed that in the past, delays in preparing the required documents resulted in vaccines being held at the port for an extended period. The Bureau of Customs did not release the vaccines until duties and taxes were settled, and DOH needed to pay the additional cost for cold chains at the port to avoid spoilage of vaccines.

The procured vaccines are then stored in government-owned warehouses and allocated to regions and provinces using a pull-and-push vaccine distribution model (Figure 17). That is, the central office allocates vaccines, while regional health offices make requests. The transportation of vaccines from central to regional offices is outsourced to a third-party logistics company.

Figure 17. Vaccine supply flow in the public system



RITM = Research Institute for Tropical Medicine; N = Sample size; RHUs = rural health units
Source: Adapted from Nfor et al. (2017)

The storage at RITM is inadequate and can only accommodate a three-month worth of vaccine supply. RITM has six storage rooms, of which four are cold rooms (above zero; +4 degrees Celsius) with a capacity of 110,000 liters; one freezer (below zero; -15 degrees Celsius) with a capacity of 7,000 liters; and a dry room with a capacity of 13,000 liters (WHO and UNICEF 2017). Based on WHO and UNICEF's assessment of effective vaccine management in the Philippines in 2017, expanding RITM's storage capacity is not possible due to the size of the premises. This dire situation exposes the country to the risk of stockouts and very slow responses to disease outbreaks.

Hence, vaccine procurement and delivery must be split into four tranches a year. Ideally, storage capacity should be enough for the annual supply plus the minimum three-month (or six-month) buffer stock for delays in procurement and outbreaks.

Vaccine stockout has been common in the last 10 years. Table 9 shows the gap in the year-end supply at the national storage facility. Annual vaccine supply requirements and buffer stocks are not met for the basic routine vaccines, with stockouts occurring from 2008 to 2018. Meanwhile, Table 10 shows the duration of stockouts per vaccine. Most vaccine stockouts in recent years occurred when procurement was attempted locally. From 2013 to 2015, pentavalent stockout lasted for nine months, severely affecting immunization services. This was an artificial stockout caused by failed local procurement, as there was no recorded shortage in the global market.

Inefficiencies in distributing vaccines to local government units (LGUs) are also common. Vaccines from the central office are "pushed" to regional or provincial stores primarily by plane or boat, with road transportation contracted to third-party logistic (3PL) companies (WHO and UNICEF 2017). However, there is no organized distribution system. Lower-level LGUs are responsible for collecting the vaccines from regional and selected provincial stores using their own vehicles. According to a study on DOH warehousing conducted in October 2017 by Nfor et al. (2017), 3PLs face difficulty in fulfilling quarterly deliveries of DOH supplies (not just vaccines), which delays the release of commodities, resulting in some regional warehouses receiving only two of the four shipments per year. Moreover, the stocks and inventory of vaccines (as well as other DOH supplies) in health facilities are not electronically monitored (Nfor et al. 2017). This leads LGUs to be prone to vaccine over or understocking. In 2017, RITM piloted a barcode system or the Web-based Vaccination Supply Stock Management. However, the system needs more investment and scaling up.

Table 9. Vaccine stock levels in national storage, 2016–2019

Vaccine	2016	2017	2018	2019
BCG	+5.5 million	+4.1 million	+2.1 million	-2.5 million
Hepatitis B	+1.6 million	-0.47 million	+0.83 million	+0.06 million
OPV	-3.6 million	+2.1 million	-2.2 million	+3.5 million
IPV	-1.3 million	-0.6 million	-0.04 million	-0.26 million
Pentavalent	+1.6 million	-3.4 million	-1.7 million	No data
MMR	+0.2 million	-0.16 million	-1.3 million	-4.96 million

BCG = bacillus Calmette–Guérin; OPV = oral polio vaccine; IPV = inactivated polio vaccine; MMR = measles, mumps, and rubella
Note: light gray = excess of annual requirement; dark gray = deficits
Source: Data from RITM collated by UNICEF and WHO Philippines in 2019 (personal communication with authors on February 21, 2020)

Table 10. Duration of vaccine stockouts at the national level

	2012	2013	2014	2015	2016	2017
Hepatitis B	6 months	–	1 month	–	–	–
Pentavalent	–	9 months	2 months	9 months	–	–
IPV	–	–	–	–	6 months	3 months
OPV	–	–	–	–	1 month	3 months
PCV	–	–	–	–	1 month	4 months

"–" means no stockout
IPV = inactivated polio vaccine; OPV = oral polio vaccine; PCV = pneumococcal conjugate vaccine
Source: Data from RITM collated by UNICEF and WHO Philippines in 2019 (personal communication with authors on February 21, 2020)

Human resources and leadership

While DOH has poured enormous resources into new vaccines and reaching more age groups in recent years, the backend technical workforce has remained scarce. Currently, EPI has only two technical staff in the DOH central office (one program manager and one cold chain manager) and one staff in every region serving other functions. The staff have extensive tasks, including nationwide planning, procurement, managing cold supply chain, leveraging funds, health promotions, monitoring, and supplemental or catch-up vaccination. Understaffing, aggravated by a lack of succession planning and recurrent leadership transfers that lead to loss of institutional memory and knowledge in DOH, poses challenges in delivering the program.

Moreover, there had been negligible investments in capacitating health human resources (HHRs) in DOH and LGUs for EPI. As the number of vaccines to administer increases, so does the need for a well-trained health workforce, especially in LGUs, which are primarily responsible for delivering immunization services. Hence, HHRs need to be better trained not only in safe immunization skills but also in management and supportive supervision skills (Shen et al. 2014). An increased number of vaccines to deliver to the population means increased responsibilities in service delivery, finances, cold chain logistics, and data management. Errors in any part of the vaccine cold supply chain will be much more costly to the health system and pose risks to children (Ward et al. 2019).

Overall, there seems to be a lack of leadership and urgency in addressing the recurring stockouts and low immunization coverage patterns. As mentioned, the majority of the increased EPI funding accrued through sin taxes was spent on procuring new and underutilized vaccines, with the JEV vaccine introduced in 2019 for select high-prevalence areas. While it is commendable that DOH has expanded the EPI, it has not invested in systems strengthening the nonvaccine components of the program, such as modern logistics and supply chain, stock monitoring, business intelligence, and warehousing. DOH kept adding vaccines to the program without first ensuring that the current system and LGUs have the capacity to deliver the basic childhood vaccines (not to mention the new ones) efficiently, equitably, and on time. The unplanned supplemental immunization activities (SIA) to suppress sudden outbreaks also reflect this. The SIAs are not efficient because they disrupt routine immunization and health care. HHRs in LGUs and other DOH programs are fielded out for SIAs when they have their own tasks and programs to focus on.

Conclusions and Recommendations

The Philippine EPI should aim for high immunization coverage and timely vaccine administration. The program has had inconsistent performance in the last few years. This study outlines the demand and supply factors that could explain the country's weak performance. It concludes that without significant investments and pathbreaking reforms in the current delivery system, financing, and leadership, universal coverage targets will remain quixotic, at best. Moreover, DOH needs to ensure that the health system and HHRs can deliver the basic childhood vaccines efficiently and promptly before adding new vaccines that will merely overwhelm the existing weak vaccine cold supply chain.

This paper's policy recommendations are divided into short and long-term solutions:

Short-term solutions

These solutions aim to immediately address supply-side constraints, particularly stockouts:

- In the interim, DOH should consider procuring all its vaccines from UNICEF until the local procurement system can effectively guarantee the country's supply.
- DOH should consider multiyear planning and procurement from local manufacturers and carefully interface this with UNICEF. In particular, the Department should avail of a Multi-Year Obligation Authority from the Department of Budget and Management to reduce the uncertainty of annualized procurement.

- DOH should augment the program's technical staff. Program leaders must have the foresight and critical thinking to understand the current and future needs of the EPI and the ability to communicate these needs within and outside the bureaucracy.

Medium- to long-term solutions

Medium- and long-term solutions are needed to optimize efficiency, timeliness, and equity in vaccine uptake. The program must be aligned with the financing and service delivery model envisioned in the Universal Health Care Act.

- **Improve planning of vaccine requirements.** DOH uses aggregate census data to estimate needs, resulting in poor planning and foresight. The government should explore using actual headcounts and electronic immunization registries to estimate the actual need and monitor vaccine coverage and timeliness. This initiative can be pursued through the new Philippine National ID System.
- **Increase immunization coverage and timeliness by tapping private sector delivery channels.** Given the private sector's large and growing presence, the government can tap them to carry out a publicly financed and privately/publicly delivered EPI. The private sector can deliver child vaccines more routinely and timely than the government's sporadic supplemental vaccination programs. For this to be realized, the government needs to shift its financing scheme from DOH to PhilHealth since DOH is not allowed to contract out private providers, while PhilHealth can.
- **Increase immunization coverage by allowing more health worker cadres (both public and private) to provide routine vaccination.** However, this requires further reconnaissance and amendments to certain laws. In other health systems, nonphysicians can administer vaccines or may receive insurance reimbursements.

- **Improve and invest in supply chain and HHRs.** DOH centrally procures and manages the supply chain (i.e., storage, distribution, handling, stock management, and logistics). The government should explore contracting out the whole supply chain or parts of it to the private sector.
- **Redesign procurement practices to improve efficiency.** The government should find ways to improve efficiency through economies of scale by considering DOH as the sole or the primary procurement entity of vaccines. Private and public health facilities will only source their vaccine requirements from the purchasing entity. However, the government should ensure a robust supply chain for this to be pursued.

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The Authors

Valerie Gilbert T. Ulep is a senior research fellow at PIDS. He has a PhD in Health Economics from McMaster University in Canada. He was a doctoral fellow at the University of Toronto's Centre for Global Health. His research interests include health financing and fiscal space, nutrition, and economic evaluation.

Jhanna Uy is a supervising research specialist at PIDS and a lecturer at the Ateneo de Manila University, Health Sciences Program. She has a master's degree in Epidemiology from the Harvard School of Public Health. She is a health system and policy researcher focusing on reforms for universal health care, particularly in healthcare delivery and health financing.

The Philippine Expanded Program on Immunization (EPI) has been in existence since 1976, providing Filipino children access to safe and effective vaccines to protect them from diseases like measles, diphtheria, tetanus, and whooping cough.

EPI is one of the major programs of the Department of Health and has achieved many milestones. Mortality and morbidity due to vaccine-preventable diseases have declined precipitously over the years, saving the lives of many Filipino children. Moreover, polio and maternal and neonatal tetanus were eliminated in 2000 and 2017, respectively.

Despite this progress, basic vaccine coverage hovered at only 70–80 percent in the last 30 years, and EPI has never achieved its target to fully immunize at least 95 percent of children. Hence, this study assesses the performance of EPI in the Philippines. Central to this assessment is the policy question: Why has the country struggled to maintain immunization coverage and repeatedly failed to achieve its national immunization target?

While demand factors like vaccine confidence have contributed to the weak performance of the program, the sharp decline in immunization coverage in recent years is caused mainly by deep-seated supply-side system issues. In particular, leadership, planning, and supply chain problems led to recurring vaccine stockouts in the past decade.

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