

Underspent Immunization Budgets

A budget credibility analysis of 22 countries

Chloe Cho and Jason Lakin, IBP, and Ulla Griffiths, UNICEF | December 2019

INTRODUCTION

Every year immunization prevents an estimated 2 to 3 million deaths worldwide.¹ One of the most cost-effective public health interventions, it boasts high economic benefits: one study found that \$1 spent on immunization generates savings of \$16 by reducing costs associated with treatment and lost earnings.² Immunization also has positive equity implications, both because the poor tend to bear a disproportionate burden of preventable diseases and because the disparity in child vaccination coverage rates across income levels is small relative to other health interventions. Significant progress has been made in the accessibility and coverage of vaccination globally, but challenges remain. Roughly 20 million children do not receive routine immunization services, and approximately 1.5 million children die each year because they are not vaccinated.³

To what extent are dedicated immunization funds spent?

Much attention has been paid to funding gaps and financial sustainability of immunization programs. However, according to a Resource Guide produced by Results for Development, governments also face challenges with regards to timely and complete execution of their existing immunization budgets. In the Republic of the Congo, for example, “disbursement delays and commitment shortfalls from the state budget contributed to vaccine shortages around the country.”⁴ Lack of coordination, conflicting priorities and poor public financial management systems can undermine the impact of investments and benefits of immunization. Accordingly, one of the critical questions in immunization financing is *how much is being spent*.⁵

¹ “Immunization programme,” UNICEF, <https://www.unicef.org/immunization>.

² Sachiko Ozawa et al., “Return on Investment from Childhood Immunization in Low- And Middle-Income Countries, 2011-20,” *Health Aff (Millwood)*, Feb 2016, 35(2): p. 199-207.

³ “Immunization coverage,” World Health Organization, Jul 2019, <https://www.who.int/news-room/fact-sheets/detail/immunization-coverage>.

⁴ Results for Development, “Immunization financing: a resource guide for advocates, policymakers, and program managers,” Washington D.C., 2017, p. 91, <https://bit.ly/2mXqlhP>.

⁵ Ibid; also see “Financial sustainability for immunization in the poorest countries: lessons from GAVI 2000-2006,” GAVI Alliance, <https://bit.ly/2n3RISB>.

Two of the indicators used in the World Health Organization (WHO) and the United Nations International Children’s Emergency Fund (UNICEF) Joint Reporting Form (JRF) for immunization, which contains data for 194 countries, are government expenditures for (a) vaccines and (b) routine immunization services.⁶ However, the relationship between the values reported to the JRF and the approved budget is not clear. To be able to answer key questions on vaccine financing – “Are budgeted funds for vaccine procurement released in a timely manner? Does late disbursement impede procurement? What options might be available to address this problem?” – it is important to evaluate whether or not countries are able to execute their immunization budgets as planned.⁷

This brief explores immunization spending, drawing on budget data from BOOST.⁸ The mere existence of line items for immunization, which can increase visibility throughout the budget process, is often considered to be essential for ensuring sustainability. Thus, it is encouraging to find related line items in 22 BOOST budget databases, which cover the period 2009-2017. Our objective was to look at the “budget credibility” of these items – that is, the extent to which these specific line items have been executed as planned, or as originally approved by the legislature. It can be difficult to identify and separate out expenditure on immunization, as activities are often integrated with other public health programs and administered by various actors including those outside of government.⁹ As such, the analysis does not serve as a comprehensive assessment of immunization expenditures.

However, what is captured in our analysis represents at least a critical portion of immunization expenditures; with the amounts varying greatly by country, a total of roughly \$2.6 billion was approved through the budget items covered over the assessed period. In several of the countries we find alarmingly low execution rates or large underspending. This finding is especially troubling given that among the 22 countries, 20 have reported at least one case of vaccine “stockout” – i.e., shortage – over the assessed period and 12 still have relatively low coverage (below the global average) for DTP3, the third dose of combined diphtheria-tetanus-pertussis vaccine.

METHODOLOGY: Identifying and assessing immunization budgets

Using keywords such as ‘vaccination’ and ‘immunization’, we searched for functions or programs (programmatic units) and agencies or departments (administrative units) related to immunization for the 58 countries covered by the BOOST database. We did not rely on economic classifications because specific categories for vaccine purchases are rarely available and partly because it can be harder to separate health spending (e.g., from livestock

⁶ JRF expenditure data are available at: “Immunization Financing Indicators,” World Health Organization, Dec 2016, https://www.who.int/immunization/programmes_systems/financing/data_indicators/en/.

⁷ Results for Development, “Immunization financing: a resource guide for advocates, policymakers, and program managers,” Washington D.C., 2017, page 94.

⁸ The BOOST dataset brings together detailed and disaggregated expenditure data for a considerable number of mostly low- and middle-income countries, either drawing on these countries’ own budget transparency portals or on datasets produced by the government in collaboration with World Bank teams. For more information, visit their [website](#).

⁹ For example, we were not able to include immunization activities financed under the Basic Package of Health Services in Afghanistan or vaccine purchases by the national health insurance program in Costa Rica.

vaccination). Under this approach, we were able to identify relevant budget items in 22 countries. Except in a few cases where subnational governments or independent commissions and agencies were included, all line items were under the Ministry of Health. Annex 1 shows the titles of the programmatic or administrative budget units responsible for immunization identified in the 22 countries.

For comparison, total health expenditure was calculated using functional classification. When the BOOST database was not broken down by function or sector, we used the country's own Ministry of Health expenditure data. Aggregate expenditure refers to what is reported by each database. Many BOOST databases also provide information on financing source (e.g., domestic or foreign financing). For 18 of the 22 countries in our sample, we used such information to analyze budget execution of external and internal funding separately.

The figures presented in the following sections are taken as an average over the available years of data for each country. Using each country / year combination as one observation (e.g., using five observations for Afghanistan instead of one), average underspending across the sample would be slightly different.¹⁰

FINDINGS: Budget credibility of immunization line items

In the countries in our sample we found that immunization line items were underspent by roughly 30% on average, compared to 16% for health and 13% for overall government expenditures (Table 1). The extent of immunization budget deviation varied considerably across the 22 countries, ranging from -76% in Uganda to +15% in Armenia. In 12 of the countries (Benin, Cameroon, Costa Rica, Guinea Bissau, Haiti, Kenya, Lesotho, Macedonia, Mauritania, Paraguay, Sao Tome and Principe and Uganda), immunization line items were severely underspent relative to the total health budget.

Looking more closely at the data, we found that:

1. **On average, underspending of immunization tends to be more significant in low-income countries compared to middle-income countries** (Table 2). Of note, these averages mask large variations within each income group.

¹⁰ For instance, average underspending would be 30% for immunization (vs. 29%, as shown later in Table 1), 19% for health (vs. 16%), and 15% for aggregate budgets (vs. 13%).

TABLE 1. Average budget deviation of immunization, health and aggregate expenditure (%)

Country	Years of data	Immunization	Health	Aggregate
Afghanistan	2012-2016	-27.4	-29.7	-26.6
Angola	2009-2016	-18.8	-32.1	-17.1
Argentina	2010-2016	-2.9	-5.0	-3.9
Armenia ¹	2010-2017	14.5	-1.7	1.9
Benin	2009-2016	-73.9	-44.3	-28.7
Burkina Faso	2009-2015	-25.4	-37.8	-5.4
Cameroon	2014-2015	-8.3	15.0	-6.1
Costa Rica	2009-2016	-31.9	-7.4	-10.2
Dominican Republic	2016	-8.0	-20.2	2.5
Guinea Bissau	2012-2014	-17.2	-0.5	6.4
Haiti	2011-2015	-69.0	-12.7	-18.9
Kenya	2015-2017	-62.2	-18.2	-11.5
Lesotho	2013-2016	-52.0	-15.4	-18.0
Macedonia	2011-2016	-34.0	-2.7	-9.3
Mali	2009-2016	-8.6	-20.0	-13.8
Mauritania	2009-2014	-39.9	-0.2	-9.8
Niger	2009-2016	-18.9	-30.1	-31.2
Paraguay	2009-2017	-44.4	-27.8	-27.1
Sao Tome and Principe	2009-2016	-36.4	-17.7	-31.9
Senegal	2010-2017	-8.5	-10.2	1.0
Tajikistan	2010-2011	2.1	-4.3	4.6
Uganda	2010-2016	-76.2	-37.6	-23.8
Average (22 countries)	2009-2017	-29.4	-16.4	-12.6

¹ The average immunization figure for Armenia is driven upward by a large deviation of +114.1% in 2014, when the budget was revised from AMD 0.7 billion to 1.4 billion.

TABLE 2. Budget deviation of immunization line items by country income group

Income level	# of countries	Avg. aggregate budget deviation (%)	IMMUNIZATION LINE ITEMS (%)				
			Avg.	Std. dev.	Min	Med	Max
Low	9	-15.7	-36.1	28.4	-76.2	-25.4	-8.5
Lower-middle	8	-11.0	-25.1	26.9	-62.2	-27.6	14.5
Upper-middle	5	-9.6	-24.2	17.9	-44.4	-31.9	-2.9

Note: Uses country income classification for the World Bank's 2017 fiscal year, which is the latest year covered in this analysis. Aggregate = aggregate budget, avg. = average, std. dev. = standard deviation, min = minimum, med = median, max = maximum.

2. Within the immunization budgets we scrutinized, **underspending appears largely related to the acquisition of goods and services – a category that generally includes vaccine procurement.** On average, this category

represents more than 80% of the value of the immunization line items¹¹ and is underspent by roughly 30%. The average underspending in other categories is much smaller, around 13%, but this number is skewed by large overspending on transfers to other decentralized bodies in Costa Rica and on unidentified current expenditure in the Dominican Republic.¹² Excluding these two countries, average underspending is roughly equal – at about 32% – for goods and services and the remainder of the budgets.

Subcategories on vaccine procurement were available in 4 countries (Burkina Faso, Lesotho, Mali and Niger). We find that, on average, more than 80% of the immunization budgets – and almost all their goods and services’ budgets – are allocated for vaccine procurement. The extent of underspending is only slightly smaller for vaccine procurement than for the immunization line items as a whole (Table 3). Despite the small size of the subsample, this suggests that the underspending across our sample is likely to be concentrated in vaccine procurement.¹³

TABLE 3. Average budget share and deviation in immunization line items by economic category (%)

Country	Share of the approved immunization budget (%)		Avg. budget deviation (%)		
	Vaccine procurement	All goods & services	Vaccine procurement	All goods & services	Total Immunization
Burkina Faso	69.4	82.6	-21.4	-21.9	-25.4
Lesotho	68.9	68.9	-45.3	-45.3	-52.0
Mali	92.7	98.7	-8.3	-8.7	-8.6
Niger ¹	99.4	100.0	-18.8	-18.9	-18.9
Average (4 countries)	82.6	87.6	-23.5	-23.7	-26.2

¹“Support for international vaccine procurement” reclassified from subsidies to goods and services. Without the reclassification, average budget shares would be much smaller at just under 60% for both vaccine procurement and goods and services. Also, average budget deviation for the two categories would be slightly smaller, at -21% and -23%, respectively.

3. Information about financing source is limited, and possibly unreliable, but external financing seems to play a role. BOOST data suggest that donors contribute to the financing of immunization line items in 9

¹¹ Exceptions in terms of the budget share include Sao Tome and Principe, where all the budget is classified as subsidies and transfers, and Senegal, where roughly 90% is classified as transfers from the central government to other public authorities. For the analysis of budget credibility by economic category, we reclassified “support for international vaccine procurement” in Niger from operating grants to goods and services.

¹² Each category represented less than 5% of actual expenditure on immunization related items in the respective country.

¹³ Macedonia is excluded from the subsample because the subcategory on “vaccines” is available only in the executed budget. We could also assume that subcategories such as “pharmaceutical products” in Argentina and “medical supplies” in Uganda refer to vaccine procurement. Using similar keywords, we can identify relevant economic items in 5 more countries: Argentina, Costa Rica, Paraguay, Tajikistan and Uganda. The pattern is similar across the larger subsample that includes all 9 countries, with average budget deviations of -30% for the overall immunization line items and -28% for vaccine procurement.

countries of our sample; Afghanistan, Argentina, Benin, Kenya, Lesotho, Niger, Paraguay, Sao Tome and Principe, and Uganda. In 9 other countries (Angola, Burkina Faso, Costa Rica, the Dominican Republic, Macedonia, Mali, Mauritania, Senegal and Tajikistan), line items captured in our analysis are all internally sourced.

On average, a quarter of the immunization budget was financed externally across all countries with available data. Across the nine countries that received donor support, externally sourced budgets represent about half of immunization line items and are underspent by a striking 73%. When we exclude donor funds, average underspending in immunization decreases from approximately 30% to 11% (Table 4).

Donor funds were supposedly underspent by 100% in 4 countries, including Benin and Uganda. Given the relatively high share of external financing in these two countries, this has a significant impact on the overall deviation in immunization line items. Benin and Uganda also show very large underspending for external financing at the aggregate level, of 75% and 67% over the assessed period, respectively. Another IBP study noted that in Benin, the overall budget for external investment was underspent by 98% in 2010, due to various reasons including procurement delays and lack of systematic integration; there was not much improvement during the period 2013-2017, when the external investment budget of the Ministry of Health was underspent by 74% on average, perhaps due to under-reporting. In Uganda, a Gavi Full Country Evaluations report noted a gap in cash support and delays in execution at the district level in 2016.

Generally, it is unclear whether the lack of execution of donor funds reflects actual underspending or reporting issues. Donor projects and activities are not always well captured in the budget systems of recipient countries, especially at the execution and reporting stages of the budget cycle. In the specific case of immunization, countries that receive vaccine support from Gavi receive the commodities in-kind – and Gavi-procured vaccines are rarely underspent. The Gavi-funded vaccines are unlikely to be recorded in the budget. However, Gavi also provides substantial cash support to countries in the form of vaccine introduction grants and health systems strengthening support. Thus, the underspending seen in our analysis suggests that such in-kind contributions might not be – or perhaps are improperly – recorded in country budget and expenditure systems, although more research would be necessary to confirm this.

TABLE 4. Budget share and deviation of immunization line items by financing source (%)

Country	Share of the approved immunization budget externally financed	Average budget deviation		
		Externally financed immunization	Internally financed immunization	Total immunization
Afghanistan	100.0	-27.4	n/a	-27.4
Angola	0.0	n/a	-18.8	-18.8
Argentina	1.3	-50.2	-2.6	-2.9
Armenia	n/a	n/a	n/a	14.5
Benin	68.5	-100.0	-15.0	-73.9
Burkina Faso	0.0	n/a	-25.4	-25.4
Cameroon	n/a	n/a	n/a	-8.3
Costa Rica	0.0	n/a	-31.9	-31.9
Dominican Republic	0.0	n/a	-8.0	-8.0
Guinea Bissau	n/a	n/a	n/a	-17.2
Haiti	n/a	n/a	n/a	-69.0
Kenya	84.9	-76.4	18.0	-62.2
Lesotho	36.7	-100.0	-25.8	-52.0
Macedonia	0.0	n/a	-34.0	-34.0
Mali	0.0	n/a	-8.6	-8.6
Mauritania	0.0	n/a	-39.9	-39.9
Niger	8.0	-50.5	-16.1	-18.9
Paraguay	0.2	-100.0	-44.3	-44.4
Sao Tome and Principe	75.0	-48.5	0.0	-36.4
Senegal	0.0	n/a	-8.5	-8.5
Tajikistan	0.0	n/a	2.1	2.1
Uganda	76.2	-100.0	64.3	-76.2
Average (22 countries)	25.0	-72.6	-11.4	-29.4

AMIDST DATA LIMITATIONS, WORRISOME RESULTS

The fact that we rely on the nomenclature of administrative or programmatic units may help explain large differences across BOOST and other sources of data for immunization expenditure indicators (see Annex 2 for comparison between the BOOST and JRF data). In some countries, the scope of our analysis may be larger and

include expenditure that is *not* immunization specific. In others, it may be smaller and capture only a portion of government expenditure on immunization.¹⁴

Unfortunately, we are not able to verify the cause of these discrepancies, as the sources of the JRF expenditure data are not reported. It is also worth noting that Ministry of Health staff, who complete the JRF, are generally inexperienced in public financial management. These issues with data quality and transparency pose challenges for analyzing immunization financing. Many experts contend that the JRF data collection process is not rigorous enough and the verification process is lacking.¹⁵

Such data limitations make it difficult to establish a direct link between underspending and ultimate service delivery. However, it is possible that the apparent low budget execution can lead to vaccine stockouts. Data from WHO and UNICEF suggest that stockouts are common around the globe and at least some of these are due to funding or procurement delays.¹⁶

IN SUM, our analysis indicates that a substantial portion of what has been already allocated for immunization may be unspent every year, despite the need for continued progress. The severe underspending on the immunization line items we studied in 22 countries raises concerns. Twenty of these countries reported a total of 96 national stockout events over the period 2009-2017 (Annex 3). In other words, all but two countries in our sample ran out of at least one vaccine during at least one of the years assessed.¹⁷ During the two most recent years we reviewed (2016 and 2017), nine countries in our sample reported a total of 24 vaccine stockouts at the national level.¹⁸ Funding or procurement delays were the most commonly reported causes, accounting for 11 cases. Global vaccination shortages accounted for nine, and inaccurate forecasts for just one. Twenty-one of the 24 national stockouts led to district-level stockouts, which often resulted in vaccination service interruptions. In addition, the DTP3 coverage rate in 2018 was lower than the global average of 88% for 12 of these countries (Annex 4). More research will be needed to confirm what impact lack of budget credibility has on these indicators as well as to identify the specific causes for budget deviations in immunization.

¹⁴ According to the JRF guidelines, available [here](#), the government expenditure on routine immunization should include “recurrent immunization-specific expenditures” and exclude “shared health system costs, extra-budgetary financing from donors, and out-of-pocket and informal private expenditures.”

¹⁵ Griffiths et al. (forthcoming study) report the same challenge and also note that “omission of certain expenditure types is not a likely explanation for the large differences.” Also see findings from Katherine Leach-Kemon et al., “Vaccine resource tracking systems,” *BMC Health Serv Res.* 2014, 14: 421.

¹⁶ Global data for 2018 available in: “Global Vaccine Action Plan Monitoring, Evaluation & Accountability: Secretariat Annual Report,” World Health Organization, 2018, <https://bit.ly/2lmCthF>.

¹⁷ For the two countries that did not report any national vaccine stockouts – the Dominican Republic and Cameroon – we only had limited data for each, of one and two years, respectively.

¹⁸ Angola (4 in 2016), Armenia (1 in 2016), Benin (2 in 2016), Kenya (2 in 2016 and 2 in 2017), Lesotho (2 in 2016), Mali (2 in 2016), Macedonia (1 in 2016), Senegal (2 in 2016 and 5 in 2017) and Uganda (1 in 2016).

ANNEX 1. Administrative or programmatic classification used to select immunization line items in BOOST datasets

Country	Classification used	Latest year in BOOST	No. line items in the latest year
Afghanistan	activity "Expanding national immunization program", which is the same as using project "National Immunization Programme"	2016	3 (34 incl. zeros)
Angola	project "Programa De Vacinação", "Acções De Imunização (Pav)", "Programa De Vacinação Hpv" and "Contrato De Parceria Aquisição Medicam. Vacinas-Parceria Cecoma-Antex"	2016	16 (central); 15 (province)
Argentina	program "Prevención y Control de Enfermedades Inmunoprevenibles"	2016	41
Armenia	program "National Immuno Prevention Program", "Grant program for supporting the services of the National Immuno-preventive Program", "National Immunization Program Support Grant Project" and "Support to services under the national immunal prevention program"	2017	1
Benin	chapitre "PROGRAMME ELARGI DE VACCINATION", "DIRECTION NATIONALE DU PROGRAMME ELARGI DE VACCINATION" and "AGENCE NATIONALE POUR LA VACCINATION"	2016	14
Burkina Faso	admin "Journées Nationales de Vaccination" and "Direction -Prévention- Vaccination"	2015	28
Cameroon	admin "Programme Elargi de Vaccination"	2015	15
Costa Rica	admin "COMISION NACIONAL DE VACUNACION Y EPIDEMIOLOGIA"	2016	3
Dominican Republic	program "CONTROL DE ENFERMEDADES PREVENIBLES POR VACUNAS", which is the same as admin "PROGRAMA AMPLIADO DE INMUNIZACIÓN"	2016	32 (180 incl. zeros)
Guinea Bissau	admin "PROGRAMA DE SUPORTE DE APROVISIONAMENTO DE VACINAS"	2014	1
Haiti	admin "UNITÉ DE COORDINATION NATIONALE DU PROG. DE VACCINATION"	2015	3
Kenya	program "Immunization" and/or admin "Kenya Expanded Programme Immunization"	2017	16
Lesotho	project "GAVI (Support to Immunisation)"	2016	16
Macedonia	program "MANDATORY IMMUNIZATION OF THE POPULATION"	2016	1
Mali	admin "Centre immunization"	2016	6
Mauritania	admin "Programme élargi de vaccination" and "Acquisition des vaccins"	2014	2
Niger	admin2 "DIRECTION DES IMMUNISATIONS (DI)" and, for 2009-2012, "DIRECTION DE LA LUTTE CONTRE LA MALADIE ET LES ENDEMIES (DLME)" where DI used to be located	2016	7
Paraguay	program "Programa Ampliado de Inmunizaciones"	2017	29
Sao Tome and Principe	project "Assistência Infantil e Imunização"	2016	1
Senegal	admin "Programme Elargi de Vaccination"	2017	14
Tajikistan	function "Immunization stations"	2011	16 (central); 42 (district)
Uganda	project "Gavi Vaccines and HSSP" and output code "Immunisation Services/Supplies"	2016	19 (ministry/agency); 116 (hospital)

Note: Where applicable, individual line items are generally by economic classification, but also by sub-department, sub-function and financing source. In Uganda, for example, "Gavi Vaccines and HSSP" under the Ministry of Health include 6 output codes such as "Preventive and Curative Medical Supplies (including immunization)". Each of the output codes includes one or two economic categories, and the project is funded by both external and internal sources. This results in a total of 19 line-items. In contrast, the output code "Immunisation Services" include only one source of financing but 16 referral hospitals, some of which have more than 30 economic categories, resulting in 116-line items.

ANNEX 2. Example of BOOST data on immunization line items – Kenya

Row Labels	Sum of Initial Budget (Printed Estimate)	Sum of Final Expenditure (Total Payment Comm.)
040108 SP. 1.8 Immunization	6,872,636	6,872,636
346 Marsabit County	6,872,636	6,872,636
040503 Immunization	3,323,106,400	670,872,667
108 Ministry of Health	3,323,106,400	670,872,667
00001 Consolidated Fund	723,106,400	670,872,667
22 Use Of Goods And Services	292,106,400	239,880,068
221 Goods And Services	292,106,400	239,880,068
22101 Utilities, Supplies And Services	450,000	334,870
2210101 Electricity	250,000	244,870
2210102 Water And Sewarage Charges	200,000	90,000
22102 Communication, Supplies And Services	148,000	37,000
2210201 Telephone, Telex, Facsimile & Mobile Phone Services	148,000	37,000
22103 Domestic Travel And Subsistence, And Other Transportation Costs	756,400	368,900
2210302 Accomodation - Domestic Travel	540,400	254,900
2210303 Daily Subsistance Allowance	216,000	114,000
22110 Specialised Materials And Supplies	289,000,000	238,157,933
2211005 Chemicals And Industrial Gases	1,000,000	16,800
2211006 Purchase Of Workshop Tools, Spares And Small Equipment	1,000,000	685,100
2211026 Purchase Of Vaccines And Sera	287,000,000	237,456,033
22111 Office And General Supplies And Services	170,000	73,140
2211101 General Office Supplies (Papers, Pencils, Small Office Equipment Etc)	170,000	73,140
22112 Fuel Oil And Lubricants	882,000	372,305
2211201 Refined Fuel And Lubricants For Transport	756,000	372,305
2211203 Refined Fuels And Lubricants For Production	126,000	-
22113 Other Operating Expenses	700,000	535,920
2211305 Contracted Guards And Cleaning Services	700,000	535,920
26 Grants	431,000,000	430,992,599
264 Other Transfers And Emergency Relief	431,000,000	430,992,599
26404 Other Current Transfers, Grants And Subsidies	15,000,000	14,992,599
2640401 Non-Profit Non-Government Organizations	15,000,000	14,992,599
26405 Other Capital Grants And Transfers	416,000,000	416,000,000
2640501 Capital Transfer To Non-Profit Organisations & Associations	416,000,000	416,000,000
12524 Global Alliance Vaccine Initiative (Gavi)	2,600,000,000	-
22 Use Of Goods And Services	2,600,000,000	-
221 Goods And Services	2,600,000,000	-
22110 Specialised Materials And Supplies	2,600,000,000	-
2211026 Purchase Of Vaccines And Sera	2,600,000,000	-
Grand Total	3,329,979,036	677,745,303

ANNEX 3. Comparison between the BOOST data used and the JRF data, converted to USD (thousands)

Country	Latest year in BOOST	JRF data on govt. expenditure		BOOST data		BOOST executed as % JRF routine
		Routine immunization	Vaccines only	Approved budget	Executed budget	
Afghanistan	2016	3,585	1,803	3,346	2,048	57.1%
Angola	2016	n/a	31,595	16,987	9,597	n/a
Argentina	2016	108,070 (about 250 million in 2015 and 2017)	106,938	242,539	241,553	223.5%
Armenia	2017	1,735	1,735	3,916	3,619	208.6%
Benin	2016	3,951	1,605	6,315	1,637	41.4%
Burkina Faso	2015	3,864	2,777	2,845	1,290	33.4%
Cameroon	2015	4,724	3,451	5,231	4,899	103.7%
Costa Rica	2016	15,816	15,791	4,922	4,257	26.9%
Dominican Republic	2016	11,421	11,324	11,711	10,778	94.4%
Guinea Bissau	2014	108	108	101	101	93.5%
Haiti	2015	n/a	n/a	7	0	n/a
Kenya	2017	n/a	7,824	32,201	6,554	n/a
Lesotho	2016	785	456	2,029	865	110.2%
Macedonia	2016	4,342	4,342	5,383	4,306	99.2%
Mali	2016	16,984	3,180	6,036	5,908	34.8%
Mauritania	2014	3,556	519	2,633	2,633	74.0%
Niger	2016	4,189	3,535	4,524	2,078	49.6%
Paraguay	2017	30,586	29,697	32,978	15,467	50.6%
Sao Tome and Principe	2016	555	24	28	28	5.0% (116.7% for vaccines)
Senegal	2017	10,176 (about 2 to 3 million in 2015 and 2016)	2,022	6,304	6,176	60.7%
Tajikistan	2011	1,489	500	816	839	56.3%
Uganda	2016	3,585	1,803	20,634	4,401	122.8%

Source: WHO/UNICEF JRF data available through WHO; budget data and data used for conversion (e.g., official exchange rate data) from the World Bank.

ANNEX 4. Occurrence of national stockout events over the years assessed for budget credibility

Country	Years	Avg. immunization budget deviation	No. stock-out events	No. answers (Y/N/NA)	Frequency of stock-out	By type of vaccines: no. years with stock-out, out of total available
Afghanistan	2012-2016	-27.4	1	22	4.5%	BCG: 1/5 (in 2014)
Angola	2009-2016	-18.8	15	55	27.3%	BCG: 4/8 (in 2012-13,15-16) DTP: 1/8 (in 2015) Measles: 3/8 (in 2011-13) Pneumococcal: 1/8 (in 2016) Rotavirus: 1/8 (in 2016) Yellow fever: 5/8 (in 2009-10,12-13,16)
Argentina	2010-2016	-2.9	6	39	15.4%	BCG: 1/5 (in 2011) DTP: 2/6 (in 2012-13) Measles: 2/6 (in 2012-13) Yellow fever: 1/6 (in 2010)
Armenia	2010-2017	14.5	4	47	8.5%	DTP: 2/7 (in 2011,15) Measles: 1/8 (in 2011) Pneumococcal: 1/6 (in 2016)
Benin	2009-2016	-73.9	2	54	3.7%	IPV: 1/3 (in 2016) Yellow fever: 1/8 (in 2016)
Burkina Faso	2009-2015	-25.4	2	43	4.7%	BCG: 1/7 (in 2015) Yellow fever: 1/7 (in 2015)
Cameroon	2014-2015	-8.3	0	16	0.0%	n/a
Costa Rica	2009-2016	-31.9	5	27	18.5%	BCG: 1/5 (in 2009) DTP: 1/5 (in 2014) IPV: 1/2 (in 2014) Pneumococcal: 2/6 (in 2009,11)
Dominican Republic	2016	-8.0	0	8	0.0%	n/a
Guinea Bissau	2012-2014	-17.2	4	20	20.0%	Measles: 1/3 (in 2012) Yellow fever: 3/3 (in 2012-14)
Haiti	2011-2015	-69.0	6	20	30.0%	BCG: 1/4 (in 2014) DTP: 1/3 (in 2014) Measles: 4/5 (in 2011-14)
Kenya	2015-2017	-62.2	7	26	26.9%	BCG: 3/3 (in 2015-17) OPV: 1/3 (in 2015) Yellow fever: 3/3 (in 2015-16)

Country	Years	Avg. immunization budget deviation	No. stock-out events	No. answers (Y/N/NA)	Frequency of stock-out	By type of vaccines: no. years with stock-out, out of total available
Lesotho	2013-2016	-52.0	5	22	22.7%	BCG: 1/5 (in 2014) HPV: 1/1 (in 2016) Measles: 3/5 (in 2013-14,16)
Macedonia	2011-2016	-34.0	3	31	9.7%	BCG: 2/6 (in 2012,16) DTP: 1/5 (in 2012)
Mali	2009-2016	-8.6	7	53	13.2%	BCG: 2/8 (in 2013-14) DTP: 2/8 (in 2015-16) IPV: 1/3 (in 2016) OPV: 1/3 (in 2015) Pneumococcal: 1/7 (in 2014)
Mauritania	2009-2014	-39.9	2	38	5.3%	DTP: 2/6 (in 2010,13)
Niger	2009-2016	-18.9	7	41	17.1%	BCG: 5/7 (in 2009,11,13-15) Measles: 1/7 (in 2011) Yellow fever: 1/7 (in 2010)
Paraguay	2009-2017	-44.4	4	64	6.3%	DTP: 1/9 (in 2015) IPV: 1/4 (in 2014) Measles: 1/9 (in 2015) Pneumococcal: 1/9 (in 2015)
Sao Tome and Principe	2009-2016	-36.4	2	55	3.6%	BCG: 2/8 (in 2013,15)
Senegal	2010-2017	-8.5	8	57	14.0%	BCG: 2/8 (in 2015,17) DTP: 1/8 (in 2017) IPV: 2/4 (in 2016-17) Measles: 1/8 (in 2017) Yellow fever: 2/8 (in 2016-17)
Tajikistan	2010-2011	2.1	1	9	11.1%	DTP: 1/2 (in 2011)
Uganda	2010-2016	-76.2	5	40	12.5%	BCG: 2/7 (in 2013-14) DTP: 1/7 (in 2012) IPV: 1/2 (in: 2016) Measles: 1/7 (in 2014)
Total	2009-2017	-30.4	96	787	12.2%	BCG: 28/124, DTP: 16/120, HPV: 1/13, IPV: 7/46, Measles: 18/124, OPV: 2/50, Pneumococcal: 6/109, Rotavirus: 1/98, Yellow fever: 17/103

Source: WHO/UNICEF JRF data (updated July 2019) shared by UNICEF.

ANNEX 5. Coverage estimates for the third dose of diphtheria toxoid, tetanus toxoid and pertussis vaccine (DTP3)

Group/country	2018 coverage (%)
Afghanistan	66
Angola	59
Argentina	86
Armenia	92
Benin	76
Burkina Faso	91
Cameroon	79
Costa Rica	94
Dominican Republic	94
Guinea Bissau	88
Haiti	64
Kenya	92
Lesotho	93
Macedonia	91
Mali	71
Mauritania	81
Niger	79
Paraguay	88
Sao Tome and Principe	95
Senegal	81
Tajikistan	96
Uganda	93
Sample (22)	84.0
Countries not in sample (172)	88.7
Global average (194)	88.1

Source: WHO/UNICEF Estimates of National Immunization Coverage (WUENIC).