

Data Review and Data Estimation Protocols for JRF immunization expenditure data

January 2022

Acronyms and abbreviations

CDC	United States Centers for Disease Control and Prevention
cMYP	comprehensive multiyear plan
DTP3	diphtheria, tetanus toxoid and pertussis vaccine
e-JRF	electronic Joint Reporting Form
Gavi	Gavi, the Vaccine Alliance
GDP	gross domestic product
GFF	Global Financing Facility
GFSM	Government Finance Statistics Manual
GGE	general government expenditure
GHED	Global Health Expenditure Database
IA2030	Immunization Agenda 2030
IFS	International Financial Statistics
IHME	Institute for Health Metrics and Evaluation
IMF	International Monetary Fund
JRF	Joint Reporting Form
MCV2	measles-containing vaccine, second dose
MI4A	Market Information for Access to Vaccines
NHA	national health accounts
OECD	Organisation for Economic Co-operation and Development
SAGE	Strategic Advisory Group of Experts on Immunization
SHA	system of health accounts
UNICEF	United Nations Children's Fund
UNPD	United Nations Population Division
WEO	World Economic Outlook
WHO	World Health Organization

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Objective and background

As countries act to make progress towards the Immunization Agenda 2030 (IA2030), global level and country level policymakers are expressing the need for “improved” immunization expenditure data to help them foster sustainable immunization programmes.

The World Health Organization (WHO) has initiated a collaborative project aiming at enhancing Joint Reporting Form (JRF) immunization expenditure data collection, quality, granularity and use. The project is organized around four leverage points: (1) enhancing country level data production; **(2) strengthening quality control of data reported globally, (3) releasing global estimates for immunization expenditure data** and (4) intensifying analytical use of data. This note discusses leverage points 2 and 3. The review (leverage point 2) will lead to an improved data set which will then be used as input to produce global estimates for immunization expenditure data (leverage point 3).

The protocol was developed under the oversight of a group of experts¹ in health and immunization expenditure data.

WHO/UNICEF JOINT REPORTING PROCESS

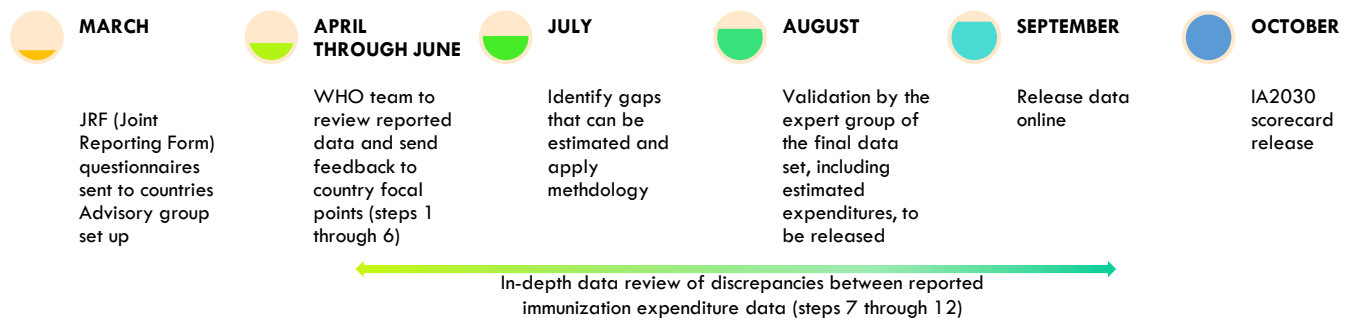
The JRF is coordinated by WHO and UNICEF headquarters. The e-form (e-JRF) is accessible online by national immunization programmes or the immunization focal person in the ministry of health in all Member States in January/February each year (not available publicly). The forms are returned to WHO/Geneva and/or UNICEF/New York by mid-April. The immunization system performance data are collected for a calendar year, January through December, and countries may update prior years’ data at any time through written communication to WHO and/or UNICEF. The nationally reported immunization performance data are then made publicly available on the WHO website (1) (by September).

All forms are received by WHO and UNICEF and reviewed for completeness and consistency. If there are queries, these are sent to countries through the e-JRF to ask for missing information or clarification. This document lists the checks done on the reported data. These checks were traditionally done manually. Increasingly, however, they are either integrated into the e-JRF so countries get prompted while entering the data or automated into the WHO Immunization internal database (and queries are then entered into the e-JRF for countries to review). A multi-organizational expert group serves as review committee to provide technical oversight on the conducted review and decisions. The regional offices play a key role in following up with countries to encourage action and responses.

Reported expenditure data are reviewed only once a year: the data review protocol described in this note provides the guidance applied to review the JRF expenditure data, from April through June for the first six steps of the data review protocol, from April through end of year for the following six steps of the review protocol and in July for the data estimation steps. This process will receive oversight by a group of experts, who will follow and review implementation of both protocols.

¹ The group of experts was set up to prepare and validate the protocol. The expert group includes Tesfaye Ashagari, Seydou Coulibaly, Joe Dieleman, Natalja Eigo, Stéphane Guichard, Alain McLaren, Angela Micah, Sam Omar, Roberta Pastore, Claudia Pescetto, Amos Petu, Tomas Roubal, Hapsa Touré and Hui Wang. The protocol was reviewed, and a few iterations were prepared, during the first quarter of 2020. The proposed protocol was validated in April 2020.

TIMELINE



EXISTING REVIEW STEPS FOR JRF EXPENDITURE DATA

WHO/UNICEF's *Guidance note for strengthening country reporting on immunization and vaccine expenditures in the Joint Reporting Form (JRF) (2)* was fundamental to improving the quantity of reported data (increase in response rate from 50% to almost 80% in 2016) and the quality of immunization expenditure data up until 2017 (fewer inconsistencies reported). Yet progress was not sustained.

Steps for reviewing JRF expenditure data

RAPID DATA REVIEW ALIGNED WITH THE OFFICIAL JRF PROCESS: PREPARING QUERIES TO COUNTRIES

STEP 1. CURRENCY ENTRY ERROR

Currency entry errors must first be checked, and adjustments made, to be able to continue the review. For example, countries may not have indicated the currency of the data entered; two different currencies may have been used for government and total expenditure; or currencies may be different from previous years. The currency information must first be checked and cleaned, and then all data converted into US dollars to continue with the review.

Sources for conversion include IMF International Finance Statistics (IFS) (exchange rates, national currency per US dollar, period average rates) and Organisation for Economic Co-operation and Development (OECD) data (National Accounts Statistics database, exchange rates).

STEP 2. CONSISTENCY CHECK

The consistency check – increasingly automated in the e-JRF so countries receive a flag at the time of data entry – includes the following:

- Government vaccine expenditure does not exceed total vaccine expenditure.
- Government routine immunization expenditure does not exceed total routine immunization expenditure.
- Total vaccine expenditure does not exceed total routine immunization expenditure.
- Government vaccine expenditure does not exceed total government routine immunization expenditure.
- The percentage of government vaccine expenditure reported is equal to the percentage calculated.
- The percentage of government routine immunization expenditure reported is equal to the percentage calculated.

A time trend review checks that there are no gaps in data reporting nor unusually high or low data values, and no excessive changes (unexplained $\pm 15\%$) between the previous year and current year.

STEP 3. BENCHMARK AGAINST OTHER COUNTRIES' VACCINE AND IMMUNIZATION EXPENDITURE

Another important check is to evaluate a country's vaccine and routine immunization expenditure per surviving infant levels against expenditure of neighbouring countries. Discrepancies are possible but should be explained. To run this check, each country's data will be evaluated against the average and median expenditure per surviving infant of countries from the same income/Gavi group.² Discrepancies beyond the first and third quartiles are flagged to confirm the validity of where we would like to investigate further for possible data quality issues.

The expenditure data in US dollars are divided by surviving infant data from the United Nations Population Division (UNPD).

STEP 4. BENCHMARK AGAINST HEALTH EXPENDITURE AND MACRO INDICATORS

Once the data are checked against inconsistencies between indicators or irregularities in time series as per existing steps, it is important to also check that reported vaccine and immunization expenditure coheres with overall health expenditure information and macroeconomic levels. WHO publishes current health expenditure data, by source, for all countries in the Global Health Expenditure Database (GHED) (3). It is therefore possible to check government expenditure on vaccines and routine immunization against government domestic current health expenditure, total expenditure on vaccines and routine immunization against current health

² Low-income countries, Gavi middle-income countries, non-Gavi middle-income countries and high-income countries.

expenditure, and the difference between the two against aid-funded current health expenditure. Benchmarking would be done against the expenditure shares of countries with similar economic contexts. We expect differences between countries, and the check will flag any large discrepancies that we would like to investigate further for possible data quality issues (focusing on data outside first and third quartiles). Total and government expenditure on vaccines and immunization would also be checked against GDP (gross domestic product) and general government expenditure to flag outliers and possible errors.

Immunization and vaccine expenditure data in US dollars are considered as a share of current health expenditure and domestic general government expenditure on health from the [WHO GHED](#). Note that immunization expenditure for year T is reported as a share of the health expenditure of T-2, as it is the only information available. Ratios against macroeconomic series are computed using International Monetary Fund World Economic Outlook (IMF WEO) series.

STEP 5. TRIANGULATE WITH UNICEF CO-FINANCING DATA FOR GAVI COUNTRIES

It is important to check that country-reported data on government expenditure on vaccines is greater than the amount disbursed to procure vaccines as part of Gavi Alliance co-financing commitments.

Data would be provided by Gavi or the UNICEF Supply Division.

STEP 6. TRIANGULATE WITH AVAILABLE IMMUNIZATION EXPENDITURE DATA PUBLISHED IN THE WHO GHED

GHED data are published for expenditures that took place 2 years before JRF reported data, and the immunization expenditure boundary of data published in the GHED is more comprehensive than that of the JRF (e.g. it includes expenditure on supplementary immunization activities and health system delivery shared costs). However, we note that there often are large discrepancies between the two data sources which may require more in-depth investigation (see step 7).

WHO publishes health accounts immunization expenditure data for a selection of countries

(<https://apps.who.int/nha/database/ViewData/Indicators/en>). The GHED reports data using a broader definition of immunization than the JRF; years are not aligned, but it still helps benchmark levels reported by countries).

IN-DEPTH DATA REVIEW SEEKING CAUSES FOR DISCREPANCIES IN REPORTED EXPENDITURE DATA

STEP 7. TRIANGULATE WITH COUNTRY HEALTH ACCOUNTS DATA

When discrepancies between data reported by the JRF and GHED are too large or inconsistent, it is pertinent to run an in-depth analysis to understand the reasons. Only some selected countries can be analysed each year (as it is a lengthy process) – see Annex 2. The review will query country teams about data sources consulted and adjustments made.

STEP 8. TRIANGULATE WITH GAVI GRANTS DISBURSEMENTS

Similarly, it is important to check that country-reported data on total expenditure on routine immunization are higher than grants disbursed by Gavi for vaccines and health system strengthening. There are rare cases where reported expenditures may be lower than disbursed grants, which occurs when disbursed grants are spent in the following year.

Gavi publishes detailed reports on commitments and disbursements by type, country and year (Excel sheet – <https://www.gavi.org/programmes-impact/our-impact/disbursements-and-commitments>).

STEP 9. TRIANGULATE WITH AVAILABLE DATA ON VACCINE PURCHASE (MI4A) AND NUMBER OF VACCINES INTRODUCED³

³ For past years, checks can be run on coverage results. For coverage, use DTP3 (diphtheria, tetanus toxoid and pertussis vaccine) and MCV2 (measles-containing vaccine, second dose) coverage data; if low, it is unlikely that expenditure on vaccine and immunization is high. This information will only help flag where we would like to investigate further for possible data quality issues.

It is important that reported expenditure data do not vary too much from an estimated expenditure value computed from quantity x price. Data on the number of doses purchased by countries are estimated from introduction and coverage data, available from the Global Vaccine Market Model and Market Information for Access to Vaccines (MI4A) online information (4). Vaccine prices by country can be obtained from MI4A but are not published online. We expect that budgets would be aligned with the number of vaccines introduced (if a country has introduced very few of the antigens required by global recommendations, we would not expect to find high immunization expenditure, and vice versa).

STEP 10. TRIANGULATE WITH AVAILABLE BOOST DATA ON GOVERNMENT EXECUTED BUDGET ON VACCINES OR IMMUNIZATION

The World Bank BOOST programme collects and publishes government budget data. When available, immunization or vaccine budget lines of executed budgets are a good data source to check reported data against.

STEP 11. TRIANGULATE WITH GFF RESOURCE MAPPING AND EXPENDITURE TRACKING DATA

The World Bank Global Financing Facility (GFF) programme collects budget and expenditure information for over 30 countries, including data on immunization. When possible, JRF data will be triangulated with GFF data.

STEP 12. TRIANGULATE WITH cMYP DATA COLLECTED BY IHME

The University of Washington and the Institute for Health Metrics and Evaluation (IHME) have published a comparative analysis of immunization expenditure based on data extracted from cMYP (comprehensive multiyear plan), JRF and Gavi co-financing (5). The work, analysis and results will be used for the in-depth review of routine immunization information.

Steps for estimating vaccine expenditure data gaps

WHY ESTIMATE GAPS

The IA2030 global immunization strategy was launched in 2020 at the Seventy-third World Health Assembly. Annual global reporting will monitor the proportion of countries whose government expenditure on vaccines, as a share of total expenditure on vaccines, has increased. The JRF database is the main source of information for this high-level indicator. Yet the response rate for JRF vaccine expenditure questions has been declining in recent years, with just a little more than 50% of all 195 WHO Member States providing data on vaccine expenditure.

A strategy is being investigated to redress the declining reporting of immunization expenditure data, but the impact is expected to take a few years. In the meantime, unreported data should be estimated – when possible – to facilitate reporting of IA2030 global indicators every October at the SAGE (Strategic Advisory Group of Experts on Immunization) meeting.⁴ What follows is a proposed methodology for estimating vaccine expenditure gaps leveraging existing validated health expenditure estimation approaches.

HOW TO ESTIMATE GAPS

STEP 1. RULE FOR DECIDING WHEN TO ESTIMATE A GAP, AND WHEN NOT TO

The estimation methodology protocol proposes an approach to filling in gaps in expenditure **for the most recent year** (e.g. estimating a gap in 2020 expenditure, which countries did not report through the 2021 JRF process). A gap that cannot be filled using all vaccine expenditure information reported by the country (see step 1) can be estimated **if and only if**:

- there are reported expenditure data for at least the 2 preceding years; and
- available expenditure on immunization per surviving infant data show a “stable” trend usable for projections (erratic trends cannot be used to estimate gaps).

STEP 2. ESTIMATING A GAP USING COUNTRIES’ PARTIAL REPORTING OF IMMUNIZATION EXPENDITURE DATA – FIRST OPTION

It happens that a country reports partial expenditure information, such as reporting government expenditure and not total expenditure, or reporting the ratio of government to total expenditure, but not government or total expenditure. In such cases, the missing value can be deducted from the ratio and the available expenditure level, or from the available value in a country where the government fully pays the expenditure and where there is no aid or private spending.

STEP 3. ESTIMATING A GAP IN TOTAL EXPENDITURE ON VACCINES USING AN ALTERNATIVE DATA SOURCE (IF FIRST OPTION NOT APPLICABLE)

MI4A data can be used to estimate expenditure from quantity purchased and prices paid (unpublished information by MI4A) and support gaps in total expenditure on vaccines, especially for higher-income countries (see STEP 9). Higher-income countries tend not to report expenditure through the JRF, but they do report prices and quantities of antigens. The information is not public but can be accessed through the secretariat. Another source of data for vaccine expenditure by high-income countries may be their health accounts reports – when made public (the OECD does not yet publish expenditure on immunization or vaccines).

⁴ Final reporting calendar still pending.

STEP 4. ESTIMATING A GAP IN GOVERNMENT EXPENDITURE ON VACCINES, PROJECTING FROM PAST GOVERNMENT EXPENDITURE ALLOCATED TO VACCINE PROCUREMENT (IF FIRST OPTION NOT APPLICABLE)

Every year, the WHO GHED publishes a technical note on the methodology for updating the database (6). This document describes the methodology used for estimating data gaps. Sections 3.1 and 3.2 on estimating health care financing schemes data and estimating revenues of health care financing schemes data explain that:

[w]hen data are not accessible either directly through country focal points, or from national websites and reports, at least core indicators should be estimated. The Financing Schemes (HF) classification is typically the starting point for updating series or estimating gaps. Estimates are derived using historical values, trends, and extrapolations using macroeconomic data series. For example, macroeconomic general government expenditure series may be used for estimating missing data in government health expenditure series. Estimates should be confirmed as much as possible with qualitative information that schemes were maintained, or if reforms were implemented, which affected expenditures on health [emphasis added].

Gaps in government expenditure on vaccines could be estimated using the same methodology:

1. Compute existing values as a share of GGE (general government expenditure⁵).
2. Check the trend (declining, stable, increasing; if the trend is erratic, we cannot project expenditure).
3. Estimate the ratio for the missing year to align with the trend, typically using a linear trend equation or averaging ratios of the past few years when there are no clear increases or decreases in allocation of government expenditure to vaccines.
4. Apply the ratio to the GGE value of the year to estimate (using the latest IMF WEO GGE data).

STEP 5. RUNNING QUALITY CHECKS POST-ESTIMATION

Estimates ALWAYS need to be checked against information on possible policy change or introduction of new vaccine(s) or special routine immunization campaigns, which would cause a change in expenditure level. Proportions need to be checked: no large fluctuation of the government to total vaccine expenditure ratio; no large fluctuation of vaccine expenditure per live birth. Consistency of trends needs to be checked.

⁵ IMF WEO data. "General government total expenditure (national currency): Total expenditure consists of total expense and the net acquisition of nonfinancial assets. Note: Apart from being on an accrual basis, total expenditure differs from the GFSM [Government Finance Statistics Manual] 1986 definition of total expenditure in the sense that it also takes the disposals of nonfinancial assets into account." Converted into US dollars using IMF IFS (national currency per US dollar, period average rates).

Annex 1: terms of reference of the immunization expenditure data expert group

Background

Immunization expenditure data contribute to key evidence needed by policymakers engaged in making progress towards IA2030 and universal health coverage.⁶ Monitoring immunization expenditure provides evidence that helps identify financial bottlenecks to universal immunization coverage, monitor the sustainability of immunization expenditure and hold stakeholders accountable. In this context, WHO – in collaboration with partners – developed an enhanced protocol for reviewing JRF expenditure indicators and estimating gaps when possible.

Objective

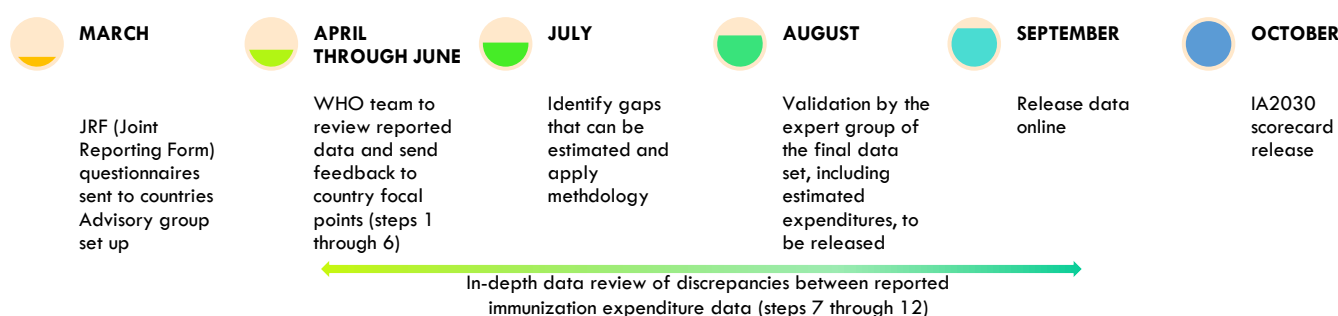
WHO is setting up an ad hoc temporary expert group of health and immunization expenditure data experts to advise WHO as it proceeds with the implementation of the *Data Review and Data Estimation Protocols for JRF immunization expenditure data*. The advisory group will ensure careful implementation of the protocol, and most importantly advise and support decision-making in case of bottlenecks. This process serves as validation of the JRF-based immunization expenditure database, to be released every fall on the [WHO website](#).

Modus operandi

The advisory group will convene four times between the end of June and the end of August towards releasing the data at the end of September (see timeline below). Each meeting will review one of the following steps, in order:

- review reported data, errors flagged by the secretariat and data points identified by the secretariat to be estimated (specifying using which methodology);
- validate estimated gaps using reported JRF data;
- validate estimated gaps in total expenditure on vaccines using the MI4A database after quality check; and
- validate estimated gaps in government expenditure on vaccines using health accounts methodology.

Timeline



Proposed membership

The advisory group will be composed of experts from WHO (headquarters/health accounts team and regional offices), Gavi, IHME, the CDC (United States Centers for Disease Control and Prevention) and UNICEF. It will review and validate WHO preparation of the JRF-based immunization expenditure database following WHO/UNICEF's *Data Review and Data Estimation Protocols for JRF immunization expenditure data*.

⁶ Sustainable Development Goals target 3.8 and WHO Thirteenth General Programme of Work outputs 1.1.3 and 1.2.1.

Annex 2: implementing step 7

CONCEPT NOTE FOR TRIANGULATION OF JRF AND HEALTH ACCOUNTS IMMUNIZATION EXPENDITURE DATA

Background

Countries track and monitor expenditures on health using the system of health accounts (SHA). The level of reported granularity will depend on countries' needs and choices, but, typically, countries' health accounts would provide data immunization and vaccine expenditure. When countries report both health accounts and JRF expenditure on immunization and vaccines, we expect data from these reporting mechanisms to be consistent. Yet, this is not always the case. Global studies – such as by IHME (7) and Abt Associates (8) have testified that discrepancies exist in reported immunization-related expenditure information between the JRF and health accounts. For example, Ikilezi et al. noted that “there were some observed instances when reported values in the JRF [are] larger than the reported values from the NHA [national health accounts]. This is surprising when we assume that the NHA are inclusive of other system costs that may not be captured in the JRF” (7). Similarly, step 6 of the JRF data review protocol triangulates JRF and health accounts data published in the GHED to help validate the reported JRF data. When differences are too large, the triangulation cannot be used as we do not understand the underlying reasons for such differences.

There has been growing interest and investigation around JRF and health accounts immunization-related expenditure data. Research typically focused on the feasibility of using health accounts for reporting to the JRF, and occasionally investigated whether health accounts reports were relevant for immunization programme management (see Abt Associates (9) and WHO (10)). None have yet led to concluding discussions that would result in clear reporting and use recommendations for the JRF.

Objective

To pursue the investigative work started around the two approaches for reporting immunization expenditure data. The aim is to bring forward additional evidence to support the development of a globally agreed recommendation about the use of JRF and health accounts data (from ways to leverage each other to methodology for deciding which source to use for public release when data differ). The aim is to ensure robust, regular reporting of immunization expenditure information to support sustainable immunization programme management.

Outputs

1. Bring awareness of SHA data and team in charge to the JRF data reporters (and vice versa).
2. Investigate and report lessons learned on causes for discrepancies between JRF and health accounts immunization expenditure data. Evidence uncovered will bring transparency to the processes, increase quality of data for both reporting systems and make progress towards increased alignment in methodology.
3. Test using health accounts data to report expenditure data to the JRF. Abt Associates released a primer and a webinar, which offer an introduction to the use of health accounts for immunization programmes, including reporting expenditure to the JRF (11). The next step is to understand what it would take to use health accounts for JRF reporting (aligning reporting periods, definitions and reporting frequency), and test feasibility.

Process and steps

1. In collaboration with regional offices, identify countries interested in running an in-depth analysis of causes for discrepancies between reported JRF and health accounts immunization and/or vaccine expenditure for a given year.
2. Work with country teams – and the support of national consultants – to review (a) what expenditure is tracked (could each team be monitoring different expenditures?), (b) which sources of data are used (do both teams have access to all information?) and (c) what adjustments or assumptions are made (have teams adjusted the data to fit the expenditure boundary and definition?).⁷
3. Report and disseminate lessons learned about differences in reported expenditure data.
4. Organize a high-level meeting, composed of country, regional and global level representation, to present and discuss results towards an internationally agreed set of recommendations for immunization expenditure reporting.

⁷ For example what is being tracked, such as central level expenditure only or central and decentralized level expenditure; or including or excluding shared costs such as doctor's salaries; what data sources are consulted, as one team could be using ministry of finance records and the other team programme budget and expenditure files; or how data might be adjusted, such as in the case where information is not broken down and assumptions are made to estimate the needed amount.

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