



Unified Methodologies for Vaccination Tracking:

Discussion on the work to
merge childhood vaccine and
HPV methodologies into a
single unified approach

Marta Gacic Dobo WHO
gacicdobom@who.int

Every year on 15 July WHO and UNICEF publishes a summary on progress and challenges with achieving universal immunization coverage

Global childhood vaccination coverage holds steady, yet over 14 million infants remain unvaccinated - WHO, UNICEF

Every year, on 15 July, WHO and UNICEF publish a summary on progress and challenges with achieving universal immunization coverage. This year's report shows that global childhood vaccination coverage has remained steady at 85% since 2019, but over 14 million infants remain unvaccinated.

The report also shows that 14 million infants remain unvaccinated, and over 14 million children are not up to date on their vaccinations. This is a significant challenge for global health, as unvaccinated children are at a higher risk of dying from preventable diseases.

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Access to vaccine remains deeply unequal

While global vaccination coverage has remained steady, access to vaccines remains deeply unequal. In high-income countries, over 95% of children are up to date on their vaccinations, while in low-income countries, only 70% are up to date.

Access to WHO dataset

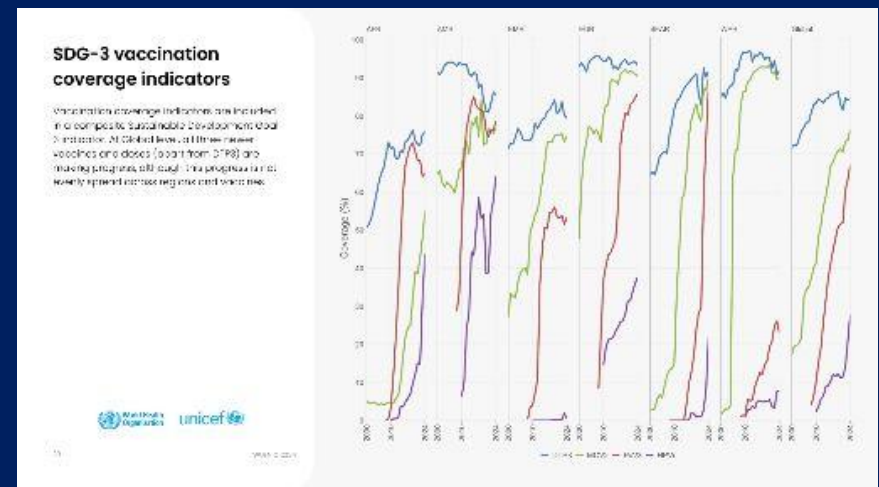
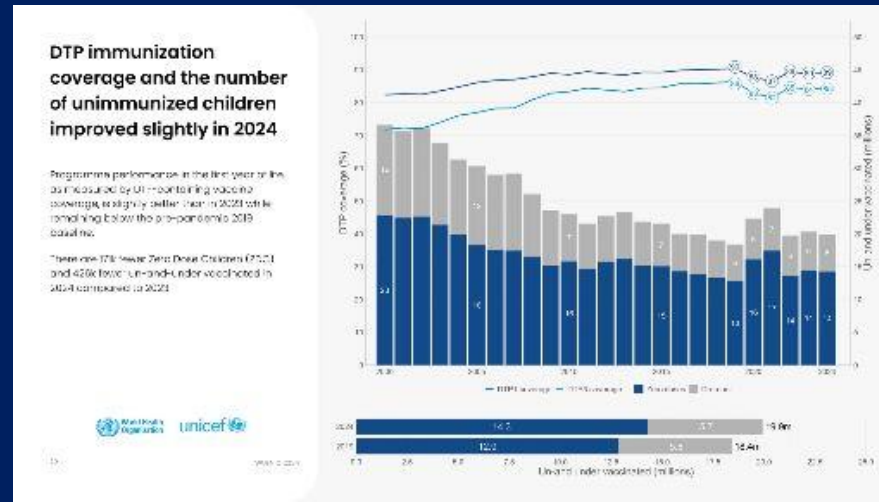
WHO and UNICEF have made their datasets available to the public, allowing researchers and policymakers to analyze vaccination trends and identify areas for improvement.

Access to UNICEF dataset

UNICEF has also made its dataset available to the public, providing more detailed information on vaccination coverage in low-income countries.

Building protection against vaccine-preventable diseases

Building protection against vaccine-preventable diseases is a key goal for global health. This requires a combination of high vaccination coverage and strong surveillance systems to detect and respond to outbreaks.



Measuring immunization coverage

Measles vaccination coverage=82%

Administrative method



Number of doses administered through routine services

Number of population in target group

Survey method



Number of children in the sample vaccinated

Number of children in the sample

Advantages and disadvantages of administrative and survey methods

Administrative method

- Advantages:
 - Based on data necessary for service provision
 - Timely management monitoring tool
 - Provides data at local level
- Disadvantage / Limitations :
 - Denominator (target population may be projected based on old census data)
 - Transcription or calculation errors
 - Incomplete reporting
 - May Include vaccination conducted outside the target group.
 - May not include private sector

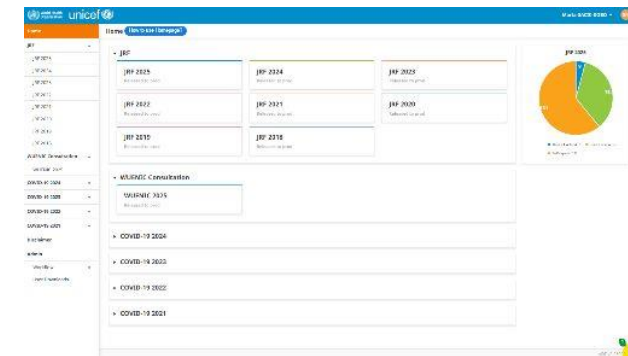
Surveys

- Advantages:
 - Estimate of immunization coverage can be obtained if the denominator is unknown.
 - Provides additional information on social economical status of reached and unreached children
 - Vaccinations given by the private sector reflected
- Disadvantage / Limitations:
 - Provide information on the previous birth year's cohort.
 - Immunization card availability
 - Reliance on recall
 - Interviewer interaction
 - Length or complexity of the questionnaire may compromise the accuracy of the response
 - Representativeness of sample

Data collection: Electronic Joint Reporting Form (eJRF)



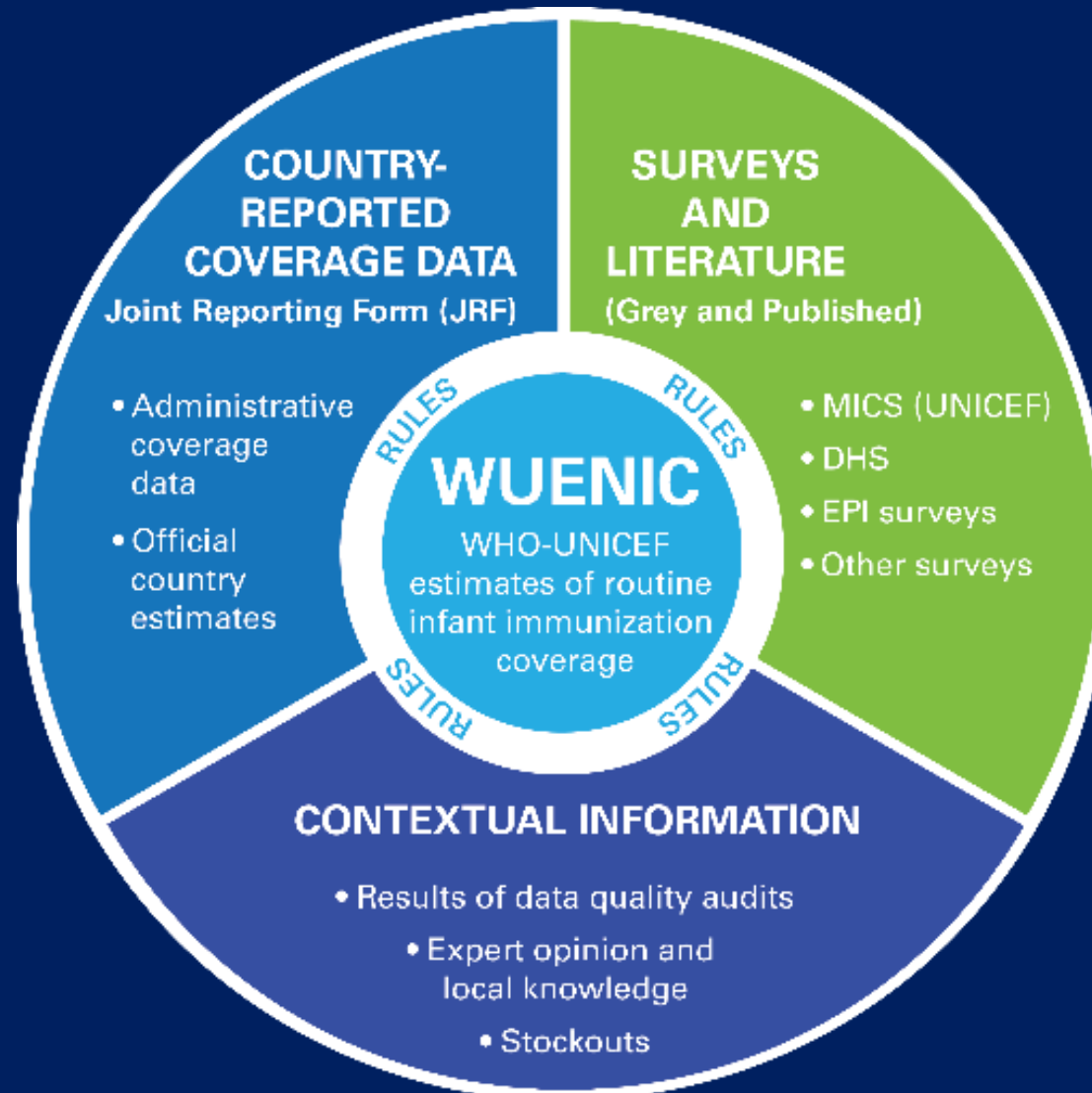
- Since 1998, WHO and UNICEF have jointly collected data from all UN Member States using the standardized Joint Reporting Form (JRF).
- In 2021, the JRF transitioned to a cloud-based platform – **the electronic Joint Reporting Form (eJRF)** – which enhanced efficiency and accessibility of reporting.
- Since its inception, the JRF has evolved to capture a wide range of domains of **standard performance, planning, financing and quality indicators**.
- The eJRF is completed online by national immunization programme staff
- The immunization system performance data are **collected annually for the previous calendar year (January to December)** and countries may update prior years' data at any time.
- The eJRF reporting period is from the first Wednesday of **March to the 30th April**. Reporting completeness very high over 95%.
- The data collected through the eJRF are accessible from: <https://www.who.int/data/immunization>



The screenshot shows a detailed reporting form for Argentina. It includes a header with the UNICEF logo and navigation options. The form is divided into several sections: 'Políticas de inmunización', 'Cobertura de rutina', 'Indicadores de vacunación', and 'Actividades de vacunación en escuelas'. Each section contains specific questions and data entry fields related to immunization policies, routine coverage, and school-based activities.

Data validation: WHO UNICEF Estimates of National Immunization Coverage WUENIC

The eJRF is one of the main source of data that informs WUENIC



WUENIC: Current characteristics and guiding principles



- Rule-based data triangulation exercise undertaken by WHO and UNICEF HQ
- Estimates produced for 16 childhood vaccines/doses
- Routine immunization among single year cohorts (catch-up doses not included)
- All WHO Member States and most of UNICEF programming countries and territories
- Before release subject to county consultation (not clearance)
- Annual release (mid-July) with revision of entire time series , which incorporates new data for previous years
- Immunization coverage trends since 1980 to previous year (e.g. in 2025, 1980-2024)
- Methodology developed in 1999 and incrementally improved by WHO/UNICEF with ad hoc reviews by independent advisory bodies.

Data triangulation from multiple sources

- Red stars = country-reported administrative coverage
- Pink circles = official estimates
- Red bars = survey estimate
 - Moved to the correct cohort year (i.e. the year the children would have been vaccinated, not the year of the survey)

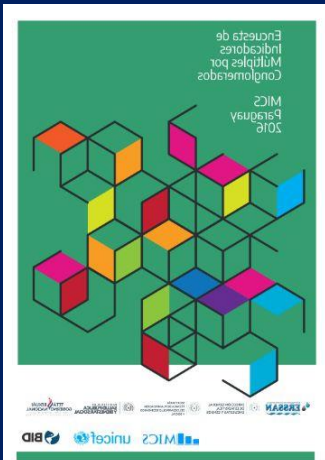


Fieldwork:

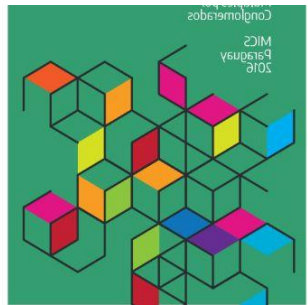
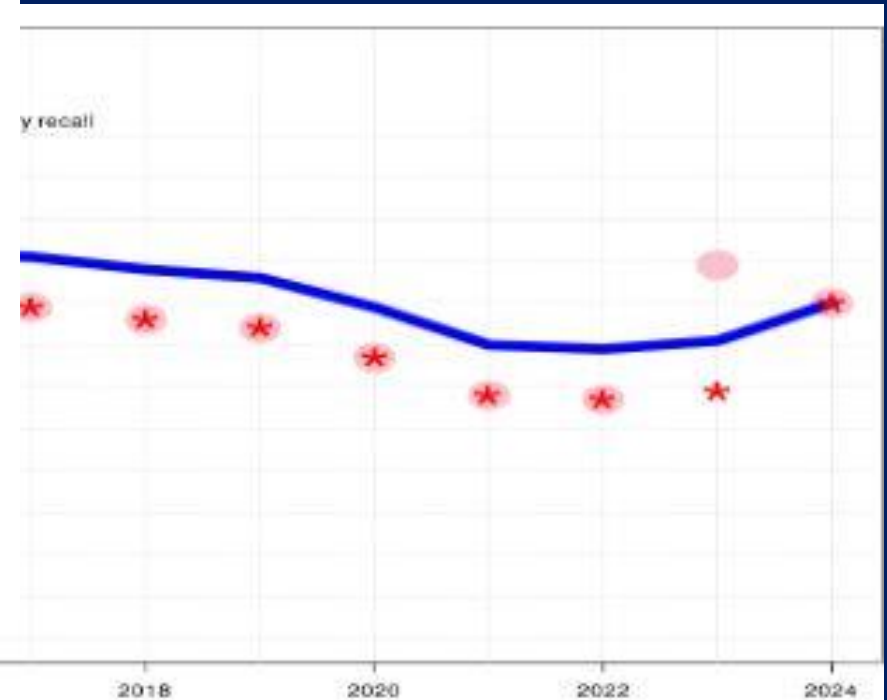
- June – September 2016
- Children 12-23 m were born one year before, and 24-35 m born two years before based on fieldwork dates

Cohort years:

- 12-23 m = 2015
- 24-35 m = 2016



Why is 2024 data point accepted?



June – September 2016
 Children 12-23 m were born one year before, and 24-35 m born two years before based on fieldwork dates

Cohort years:

- 12-23 m = 2015
- 24-35 m = 2016

| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Estimate | 91 | 93 | 92 | 92 | 91 | 88 | 86 | 79 | 70 | 69 | 71 | 80 |
| Estimate GoC | • | • | • | • | • | • | • | • | • | • | • | • |
| Official | 73 | 74 | 80 | 80 | 79 | 76 | 74 | 67 | 58 | 57 | 89 | 80 |
| Administrative | 73 | 74 | 80 | 80 | 79 | 76 | 74 | 67 | 58 | 57 | 59 | 80 |
| Survey | - | 88 | 90 | - | - | - | - | - | - | - | - | - |

Estimates of routine coverage

| 1999 | 2005 | 2010 | 2014 | 2016 | 2017 | 2024 |
|--|--|--|---|--|---|--|
| BCG DTP3 POLIO3 MCV1 (measles) HEPB3 | BCG DTP3 POLIO3 MCV1 HEPB3 DTP1 HIB3 | BCG DTP3 POLIO3 MCV1 HEPB3 DTP1 HIB3 PCV3 ROTA (last dose) YELLOW FEVER | BCG DTP3 POLIO3 MCV1 HEPB3 DTP1 HIB3 PCV3 ROTA (last dose) YELLOW FEVER MCV2 HEPBB | BCG DTP3 POLIO3 MCV1 HEPB3 DTP1 HIB3 PCV3 ROTA (last dose) YELLOW FEVER MCV2 HEPBB RCV (rubella) | BCG DTP3 POLIO3 MCV1 HEPB3 DTP1 HIB3 PCV3 ROTA (last dose) YELLOW FEVER MCV2 HEPBB RCV IPV | BCG DTP3 POLIO3 MCV1 HEPB3 DTP1 HIB3 PCV3 ROTA (last dose) YELLOW FEVER MCV2 HEPBB RCV IPVC MenA |

BCG – for BCG using countries

Yellow Fever - for countries at risk (*national coverage*)

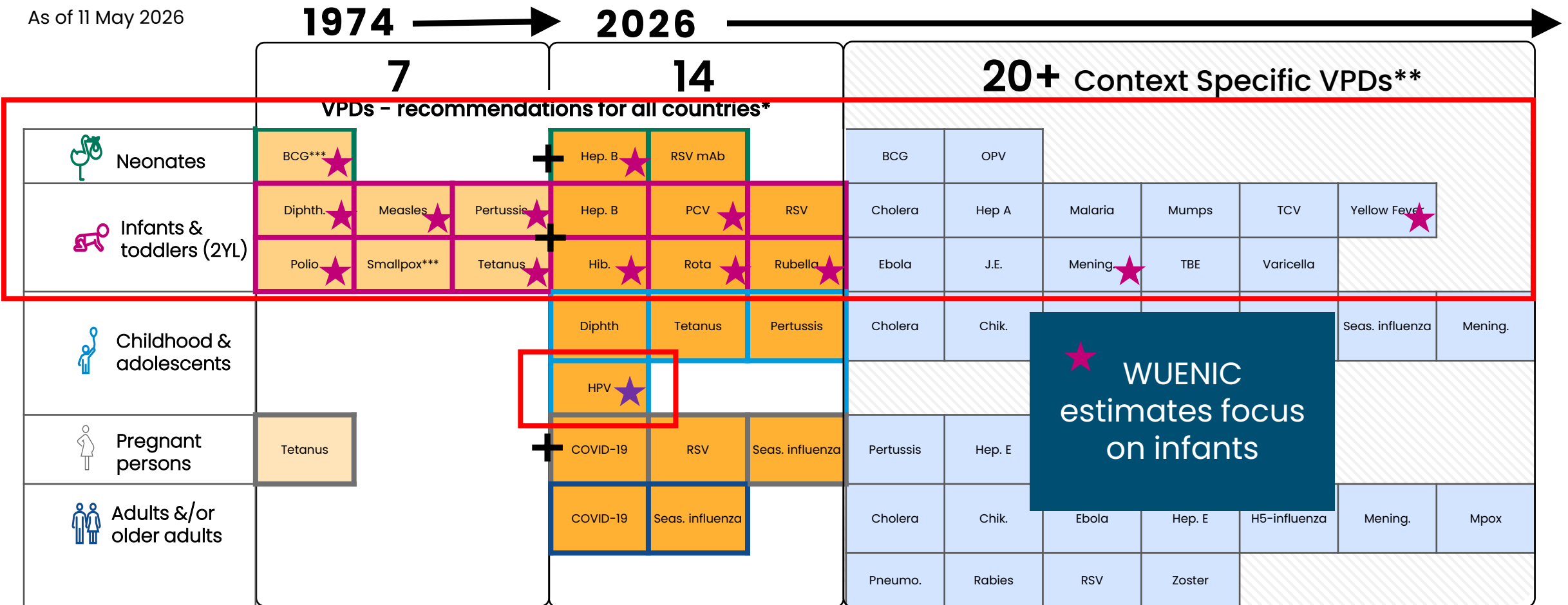
MenA - for countries in meningitis belt

WUENIC Methodology Publications

- [Burton et al. 2009. WHO and UNICEF estimates of national infant immunization coverage: methods and processes.](#)
- [Burton et al. 2012. A formal representation of the WHO and UNICEF estimates of national immunization coverage: a computational logic approach.](#)
- [Brown et al. 2013. An introduction to the grade of confidence used to characterize uncertainty around the WHO and UNICEF estimates of national immunization coverage.](#)
- [Brown et al, 2015, An examination of a recall bias adjustment applied to survey-based coverage estimates for multi-dose vaccines](#)
- [Danovaro-Holliday et al, 2021 Compliance of WHO and UNICEF estimates of national immunization coverage \(WUENIC\) with Guidelines for Accurate and Transparent Health Estimates Reporting \(GATHER\) criteria](#)

Scope of protection | From 7 VPDs in 1974 to more than 30 VPDs in 2026, of which 14 formally recommended for all countries.

As of 11 May 2026



*Fourteen VPDs with WHO recommendations for all countries: [WHO Vaccine Position Papers](#) . For COVID-19 vaccines (upcoming Position Paper in 2026), latest recommendations: [Highlights_WHO SAGE meeting March 2026](#). **Not all context specific VPDs included in this slide have WHO Position Papers, some have published WHO guidance: [Considerations for pneumococcal vaccination in older adults](#); [Ebola vaccination, conclusions and SAGE recommendations](#). Context-specific refers to vaccines targeting VPDs in particular geographic areas or populations, and/or taking into account specific prerequisites or flexibilities of the immunization programme. ***Smallpox and BCG no longer formally recommended for all countries. BCG: bacillus Calmette–Guérin; Hib: Haemophilus influenzae type b; HPV: human papillomavirus; JE: Japanese Encephalitis; H5-influenza: H5 influenza; PCV: pneumococcal conjugate vaccine; RSV: respiratory syncytial virus; mAb: monoclonal antibody; Seas. influenza Seasonal Influenza; TBE: Tick-Borne Encephalitis; TCV: typhoid conjugate vaccine.

HPV Coverage estimates

- Since 2019 **annual Estimates of National HPV Immunization Coverage**
 - Historical series from 2010
 - By sex, dose and age cohorts
- These estimates are derived mainly from administrative data but also few surveys
 - Few available surveys
 - Age-groups vary – young adolescents, women 15-19 yrs

Two main coverage indicators for HPV vaccination:



Programme coverage: vaccination coverage according to the national schedule and the programme's eligibility criteria for each calendar year

short-term performance



Coverage by age 15: proportion of population turning 15 in the reporting year that have been vaccinated against HPV at any time between ages 9 to 14

long-term performance

WUENIC vs. HPV estimates

Similarities

- Shared data collection platform (eJRF)
- Annual programme performance tracking
- Multi-source data triangulation

Differences

- WUENIC: default - reported coverage;
- HPV: default - recalculated coverage

- HPV includes campaigns and coverage by age 15
- WUENIC single cohort and annual performance

- WUENIC started in 1999 and now automated standardised rules with documented justification for exceptions.
- HPV started in 2019

Strengths and limitations

Strengths

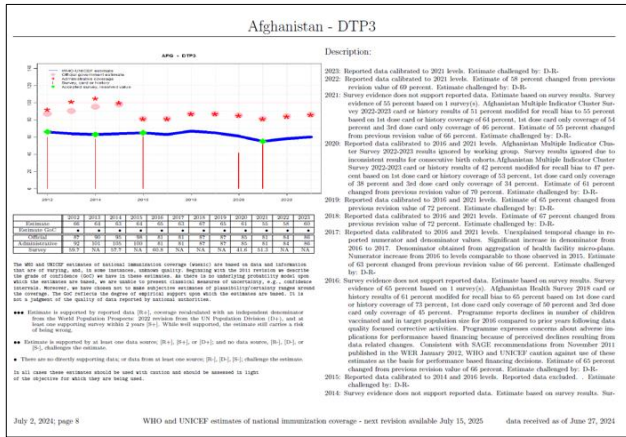
- **Estimates are made using country-specific data**
- **Programme contextual information is considered**
- **Grade of Confidence is used**

Limitations

- **Estimates are affected by the quality of underlying data**
- **No quantitative estimation of uncertainty**
- **Most recent year estimates are informed by less data (surveys inform estimates for earlier year)**

- **Historical series are revised as new data becomes available (updates from UNPD, countries and surveys)**

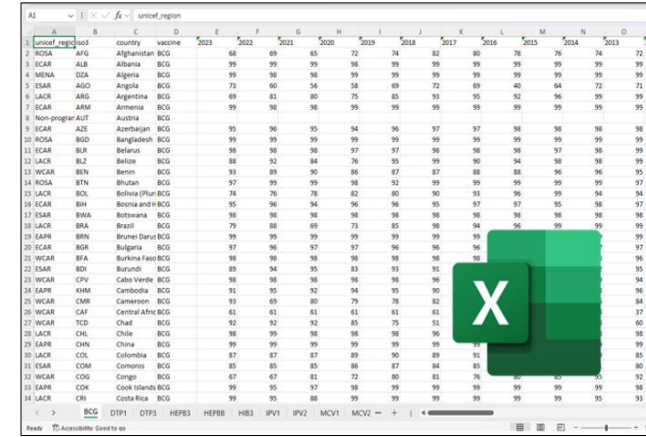
WUENIC country profiles



Interactive WUENIC country profiles



Datasets: WUENIC, HPV, survey database



Additional resources

Additional immunization data resources can be found at:

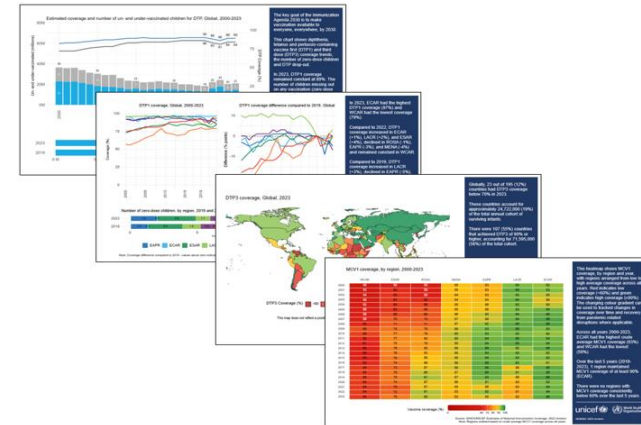
<https://data.unicef.org/resources/immunization/>

Interactive WUENIC country profiles can be found at:

<https://worldhealthorg.shinyapps.io/wuenic-trends/>

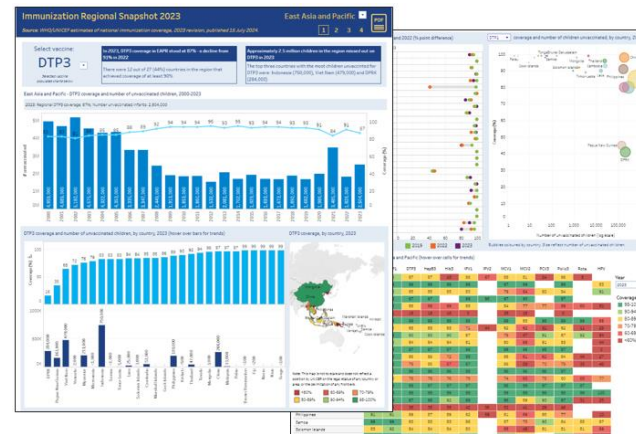
Country and region-specific slide decks:

UNICEF, WHO, World Bank, Gavi and African Union regions

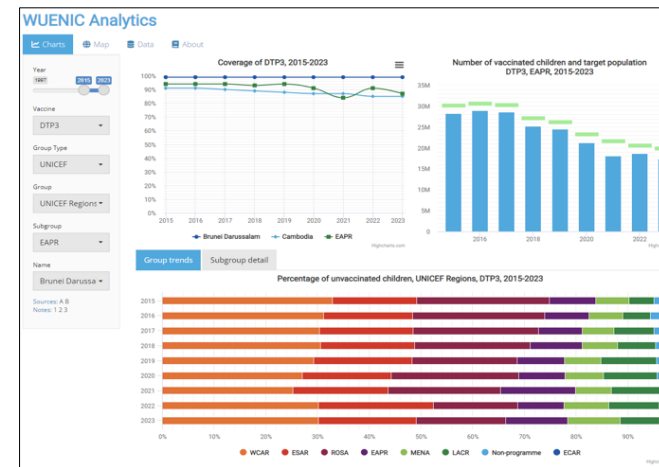


Interactive immunization regional snapshots:

UNICEF, WHO, World Bank, Gavi and African Union regions



WUENIC Analytics Dashboard





Thank you!



GATHER compliance

- Checklist of 18 items consistent with best practice in publishing health estimates
- *Not* designed for health service delivery coverage indicators like vaccination coverage, but provides a useful framework for documenting WUENIC. WUENIC meets all criteria with a caveat

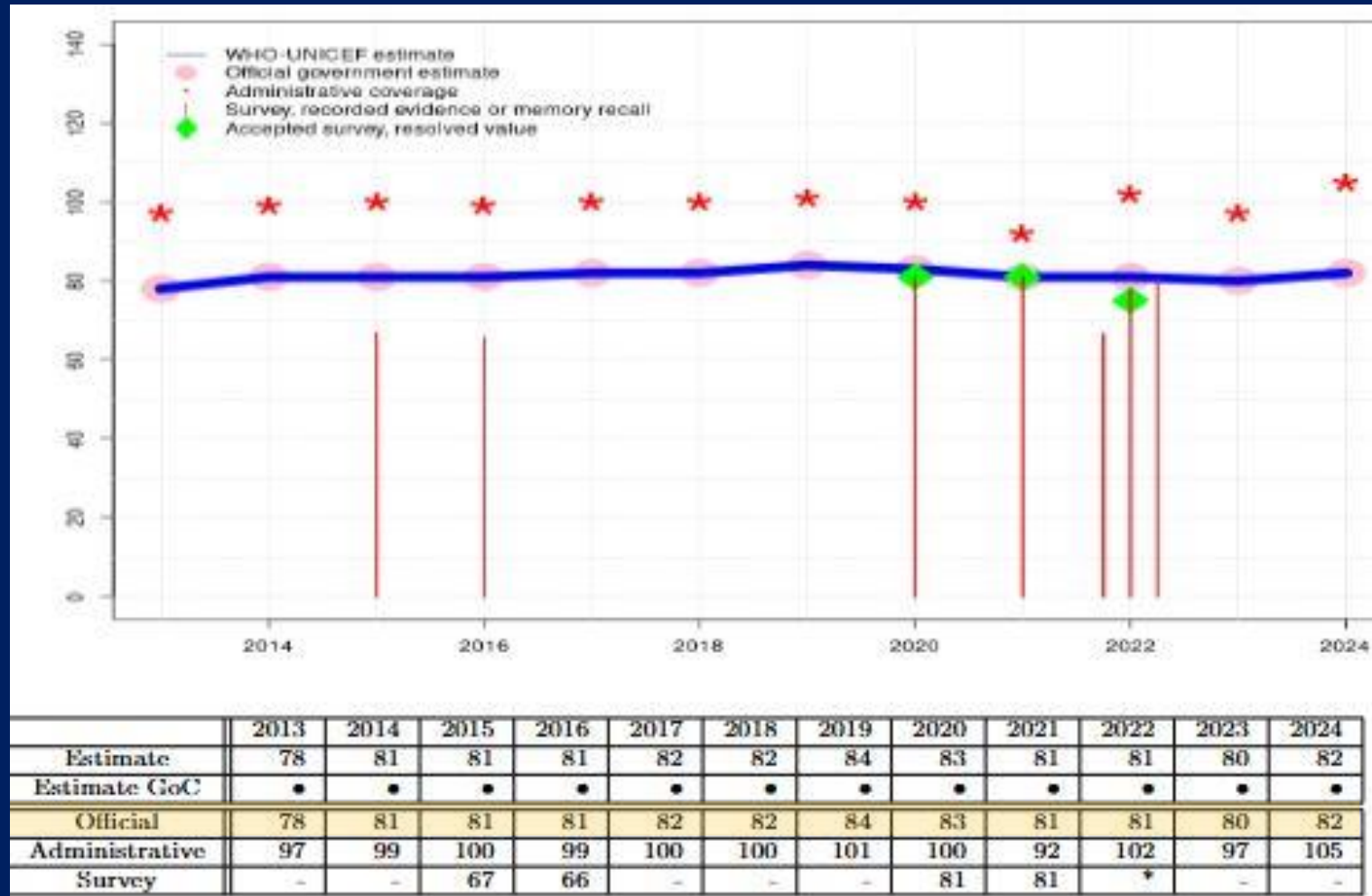
Candidate model evaluation: now done

Uncertainty: Grade of Confidence—a qualitative measure of uncertainty in WUENIC (2011 revision)

<http://gather-statement.org/>

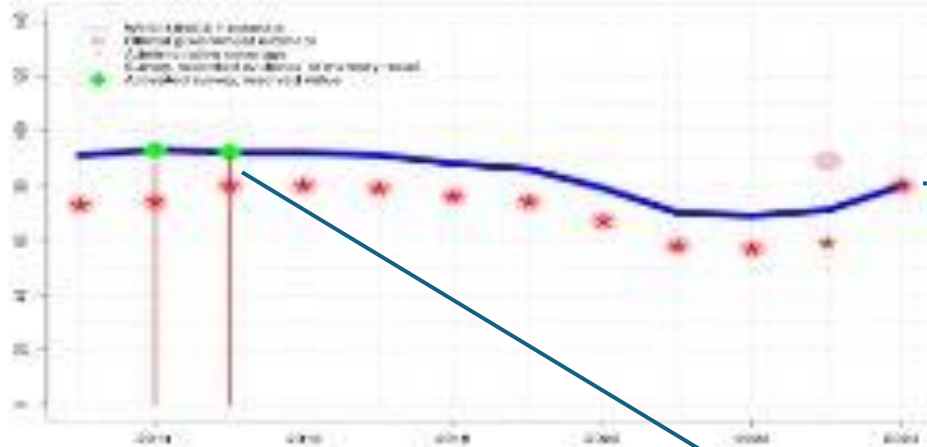
Official estimates

- Pink circles = official estimates
- National authorities also provide an official government estimate of vaccination coverage (displayed as pink circles alongside administrative coverage ^{*})
- Official estimates take into account admin coverage, survey data and additional information that may impact vaccine coverage
- Often the same as the admin data in many countries
- But not always



Additional adjustments

MMR - DTP3



| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|-----------------|------|------|------|------|------|------|------|------|------|------|
| Estimate | 81 | 80 | 82 | 80 | 81 | 80 | 79 | 78 | 78 | 75 |
| Estimate (LoCI) | * | * | * | * | * | * | * | * | * | * |
| Global | 85 | 84 | 83 | 83 | 83 | 82 | 82 | 82 | 82 | 80 |
| Administrative | 85 | 84 | 83 | 83 | 83 | 82 | 82 | 82 | 82 | 80 |
| Theory | - | 80 | 81 | - | - | - | - | - | - | - |

The MMR and DTP3 coverage estimates are based on data and information that are of varying, and, in some instances, unknown quality. Beginning with the 5th revision we describe the grade of confidence (GoC) we have in these estimates. In cases in which the underlying probability model upon which the estimates are based, we are unable to prevent statistical measures of uncertainty, e.g., confidence intervals. However, we have chosen not to make subjective estimates of plausibility/variability ranges around the coverage. The GoC reflects the degree of empirical support upon which the estimates are based. It is not a judgment of the quality of data reported by national authorities.

*** Estimate is supported by reported data (R+), coverage data dated with an independent denominator from the World Population Prospects, 2024 revision from the UN Population Division (D1), and at least one supporting survey within 2 years (S+). While well supported, the estimate still carries a risk of being wrong.

** Estimate is supported by at least one data source (R+), (D+), or (S+); and no data source (R-), (D-), or (S-), challenges the estimate.

* There are no directly supporting data or data from at least one survey (R-), (D-), (S-), challenge the estimate.

In all cases, these estimates should be used with caution and should be assessed in light of the objectives for which they are being used.

Description:

2024: Estimate based on reported data. No nationally representative household survey for the most recent 5 annual birth cohorts. WHO and UNICEF are aware of planned 2025 Vaccination Coverage Survey results and await final results. Increase in estimated coverage between 2023 and 2024 is an artifact resulting from having to use a data calibration from a survey and administrative data until 2023 and averaging the reported data from 2024 reported coverage data over denominators derived from the 2022 census. WHO and UNICEF recommend a revision of the reported data series in light of the new census results. Estimate challenged by: D-

2023: Estimate of 71 percent assigned by working group. Estimate based on reported data collected in previous survey. Official estimate is based on results from a 2022 population census. Estimate challenged by: D-

2022: Reported data calibrated to 2015 and 2023 levels. Estimate challenged by: D-

2021: Reported data calibrated to 2015 and 2023 levels. Estimate challenged by: D-

2020: Reported data calibrated to 2015 and 2023 levels. Programme reports a one month vaccine stockout at national and subnational levels. Estimate challenged by: D-

2019: Reported data collected to 2015 and 2023 levels. Beginning in late 2018, the programme made transition to use of an online electronic medical immunisation registry. Information is not available on the percentage of health facilities with the system up and fully operational. Thus, it is possible that administrative data do not capture all facility level reports. Estimate challenged by: D-

2018: Reported data collected to 2015 and 2023 levels. Estimate challenged by: D-

2017: Reported data collected to 2015 and 2023 levels. Estimate challenged by: D-S-

2016: Reported data collected to 2015 and 2023 levels. Estimate challenged by: D-S-

2015: Survey evidence does not support reported data. Estimate based on survey result. Survey evidence of 86 percent based on 1 survey(s). Paragang Multiple Indicator Cluster Survey 2016 record or recall results of 50 percent modified for recall bias to 82 percent based on 1st dose record or recall coverage of 96 percent, 1st dose record only coverage of 80 percent and 3rd dose record only coverage of 85 percent. Programme reports one month national level stockout of DTP3 containing vaccine. Estimate challenged by: D-

2014: Survey evidence does not support reported data. Estimate based on survey result. Survey evidence of 92 percent based on 1 survey(s). Paragang Multiple Indicator Cluster Survey 2016 record or recall results of 88 percent modified for recall bias to 83 percent based on 1st dose record or recall coverage of 95 percent, 1st dose record only coverage of 85 percent and 3rd dose record only coverage of 81 percent. Estimate challenged by: D-R

2013: Reported data collected to 2019 and 2024 levels. Estimate challenged by: D-