Monitoring and reporting of essential immunization catch-up in the context of the Big Catch-Up

Interim guidance

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Contents

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Abbreviations

BCG	Bacille Calmette–Guérin
BCU	Big Catch-Up
BeSD	Behavioural and Social Drivers of Vaccination
DHIS2	District Health Information Software 2
DHS	Demographic and Health Survey
DTP	diphtheria-tetanus-pertussis-containing vaccine
EIR	Electronic Immunization Registry
eJRF	WHO/UNICEF Electronic Joint Reporting Form on Immunization
EPI	Expanded Programme on Immunization
HBR	home-based record
HepB BD	Hepatitis B birth dose
Hib	*Haemophilus influenzae* type b
IAR	Intra-Action Review
IPV	inactivated polio-containing vaccine
LQAS	lot quality assurance sampling
MCV	measles-containing vaccine
MICS	Multiple Indicator Cluster Survey
MoH	Ministry of Health
MOV	Missed Opportunities for Vaccination
MR	measles and rubella vaccine
OPV	oral polio vaccine
PCCS	post-campaign coverage survey
PHC	Primary Health Care
PIE	post-introduction evaluation
PIRI	Periodic Intensification of Routine Immunization Activities
RCA	Rapid Convenience Assessment
RCM	Rapid Convenience Monitoring
RTM	Real-time monitoring
SD	Supply division
SIA	Supplementary Immunization Activity
SOP	standard operating procedure
UNICEF	United Nations Children's Fund
VCS	vaccination coverage survey
WHO	World Health Organization
WUENIC	WHO/UNICEF Estimates of National Immunization Coverage
ZD	zero-dose (children that have not received a dose of DTP)

Executive summary

The Big Catch-Up is a global initiative launched in April 2023 to close immunization gaps caused by the backsliding of immunization coverage during the COVID-19 pandemic, restore global immunization levels, and strengthen immunization systems so that catch-up activities become an integral part of immunization programmes. Countries are employing various approaches to catch up un- and under-vaccinated children, such as routine service delivery, Periodic Intensification of Routine Immunization (PIRI), and Supplementary Immunization Activities (SIA). However, a significant challenge is that routine information systems, including vaccination recording and reporting tools, are often not yet adapted to capture catch-up vaccinations. This document guides Ministries of Health, in-country immunization partners, and regional and global stakeholders on monitoring the Big Catch-Up and catch-up as an integral part of routine immunization.

Catch-up strategies should be tailored to each country's needs. The first step is to adapt existing in-country tools such as tally sheets, home-based records (HBRs), and immunization registers to capture the age group to which each vaccine dose is given. Health workers should be trained to screen each child's age and vaccination status and vaccinate according to a nationally available catch-up schedule. Large-scale catch-up activities should be accompanied by targeted field assessments, such as post-campaign coverage surveys (PCCS) or rapid convenience monitoring (RCM). More advanced evaluations can also be considered, including surveys and in-depth case studies. In addition, countries should collect Behavioural and Social Drivers (BeSD) data on vaccine uptake to understand enablers and barriers to catch-up activities.

Suggested indicators at the country level include the availability of a catch-up policy and schedule, adapted data collection tools and the number of catch-up activities implemented. Suggested indicators at the global level include the availability of approved catch-up and recovery plans, policies, schedules, tools, and activities, information systems for capturing delayed doses, appropriate budgeting, additional vaccines requested and received, delayed doses administered, and children reached.

Monitoring the Big Catch-Up is vital to close immunization gaps and prevent further disease outbreaks. It is also essential to learn from the initiative's success, and to ensure accountability between countries, in-country partners, and global stakeholders. During the Big Catch-Up and beyond, data systems should be strengthened to capture delayed doses, and catch-up monitoring should be integrated into all systems for monitoring routine vaccination coverage to ensure that no one is left behind.

1. Context and purpose

The Big Catch-Up: An Essential Immunization Recovery Plan is a global strategy to close the immunization gaps caused by the backsliding of immunization coverage during the COVID-19 pandemic.[1] The strategy focuses on reaching children who missed vaccination since 2020, restoring routine vaccination coverage to at least 2019 levels, and strengthening immunization systems (see Box 1).

Box 1: The Big Catch-Up strategy

Catch-up: Reach children who missed vaccination since 2020, partly due to the pandemic, and provide all missing vaccinations.

Restore: Restore vaccination coverage for the current birth cohort to at least 2019 levels.

Strengthen: Strengthen immunization systems within Primary Health Care (PHC) approaches to improve programme resilience and accelerate towards reaching zero-dose children in line with the Immunization Agenda 2030 and Gavi 5.1 goals and targets.

Providing catch-up vaccination to children who miss doses should be a continuous element of all routine immunization programmes. However, there are many countries where this has not yet been implemented and aligned with national policies and programmes. As a result, the ultimate vision of the Big Catch-Up is to institutionalize routine immunization catch-up, including policy formulation and strengthening routine systems to monitor, document and report catch-up doses over the long run. To implement the Big Catch-Up, or intensified component to reach mainly un- and under-vaccinated children, countries are employing a variety of approaches: catch-up in routine service delivery, Periodic Intensification of Routine Immunization (PIRI),[2] such as Child Health Days or Vaccination Weeks and Supplementary Immunization Activities (SIA)[3,4], or combinations of these.

To understand if catch-up efforts have been able to close immunity gaps for certain populations and vaccines, monitoring should at least provide information on how many children need to be caught up and how many of them have been reached. However, a significant challenge is that routine vaccination recording and reporting tools used by countries, such as home-based records (HBRs), tally sheets, facility-based paper registers, or electronic immunization registries (EIRs), are often not yet adapted to capture catch-up vaccinations. For example, tally sheets may only allow recording of vaccines administered to certain age ranges, or HBRs might provide insufficient space to record catch-up vaccines.[5] These problems can have downstream consequences, such as overestimating administrative coverage if catch-up doses are attributed to the wrong age group, or underestimating cohort coverage from surveys if catch-up doses are not documented in HBRs. Strengthening immunization information systems, the use of HBRs and existing mechanisms to track defaulters, at least up to five years of age, should underpin all efforts to implement and monitor the Big Catch-Up and routine catch-up afterwards.

This document focuses on monitoring the 2023-2025 Big Catch-Up activities and catch-up as an ongoing effort and an integral part of routine immunization in the context of Primary Health Care (PHC). While catch-up as a concept applies to vaccination across the life course, this document will focus on monitoring catch-up vaccination of children under five years of age. Its purpose is to guide Ministries of Health, in-country immunization partners, and regional and global stakeholders in monitoring immunization catch-up, and should be tailored to each country's specific situation and needs.

[1] World Health Organization, United Nations Children's Fund and Gavi, the Vaccine Alliance. The Big Catch-Up: An Essential Immunization Recovery Plan for 2023 and Beyond. New York: WHO, UNICEF and Gavi, 2023.
[2] World Health Organization. Periodic Intensification of Routine Immunization. Lessons Learned and Implications for Action. Pre-print release. Geneva: WHO, 2009.
[3] An SIA provides vaccines to all age-eligible persons, regardless of their previous vaccination status. SIA doses are not captured as routine doses by immunization information systems.
[4] World Health Organization. Planning and Implementing High-Quality Supplementary Immunization Activities for Injectable Vaccines Using Examples of Measles and Rubella Vaccines: Field Guide. Geneva: WHO, 2016.
[5] World Health Organization. Leave no one behind: guidance for planning and implementing catch-up vaccination. Geneva: WHO, 2021.

2. Catch-up vaccination delivery

Key points

- Catch-up vaccination refers to vaccinating an individual who for whatever reason is "late" to receive a vaccine for which he/she is still eligible.
- What is considered "late" vaccination may vary by country, but usually this is defined as at least a month after the recommended age and interval between doses, as per the country's immunization schedule.
- This document focuses on children 12-59 months old who have missed vaccines recommended in the first year of life, and children 24-59 months old who missed vaccines recommended in the second year of life.
- It is important to distinguish between vaccine doses that count towards catch-up and those that are considered "supplemental". A supplemental dose is "extra" and does not count as a routine vaccination.

There are two strategies for vaccination delivery: routine and supplemental. A routine dose is administered according to the national immunization and catch-up schedule, contributing to the individual child's "fully immunized" status and coverage targets. A routine dose must be documented on HBRs, registers, and other data recording tools. Routine immunization catch-up activities include PIRIs (multiantigen immunization campaigns that selectively screen and vaccinate based on immunization status), missed opportunity vaccination exercises, school or daycare entry checks, and other targeted activities.

On the other hand, a supplemental dose is considered "extra". This indicates that the individual's vaccination status is not checked, and doses delivered through SIAs may or may not be recorded in an HBR. Supplemental doses aid in rapidly increasing population immunity and therefore can be considered a catch-up activity, but do not contribute towards achieving *routine* coverage targets, as those given in PIRIs do. Effective monitoring of immunization catch-up can only happen if there is clear guidance on recording and reporting catch-up doses regardless of the vaccination delivery strategy used. See Table 1 for a comparison of routine immunization, PIRI, and SIA.

Table 1: Different types of immunization activities.

Features	Routine	PIRI	SIA
Vaccination according to national immunization schedule	Yes	Yes	No
Can be used to monitor recovery and catch-up	Yes	Yes	No
Frequency of activity			
Continuous throughout year	Yes	No	No
Periodic, time-limited	No	Yes	Yes
Decision to vaccinate based on screening for			
Eligible age	Yes	Yes	Yes
Prior vaccination history	Yes	Yes	No
Delivery strategies			
Fixed site	Yes	Yes	Yes
Mobile	Yes	Yes	Yes
Outreach	Yes	Yes	Yes
Recording of vaccines given			
Home-based record (HBR)	Yes	Yes	Usually not*
Register	Yes	Not always	No
Tally sheet	Yes	Yes	Yes
Caregiver told when next routine dose(s) are due	Yes	Yes	Yes**
Doses included in routine admin data collection system	Yes	Yes	No

Adapted from: World Health Organization. Immunization Practices Advisory Committee (IPAC) Meeting 29-30 June 2010. Meeting report and recommendations. Geneva: WHO, 2010. * If yes must indicate "supplemental dose" not routine. ** Next supplemental dose due; should give message about routine immunization services. PIRI = Periodic Intensification of Routine Immunization. SIA: Supplementary Immunization Activity.

Routine immunization

Routine immunization is the primary approach by which countries deliver recommended vaccines to children following a predetermined immunization schedule. It can be delivered through fixed posts or by outreach and mobile vaccination. It involves dose eligibility screening and meticulous documentation of the vaccines administered, including the date of administration and other pertinent details, for example, the vaccine lot number in some countries. Health facility staff document the vaccine dose administered on the HBR (e.g., child health/immunization card), paper or electronic immunization registry (EIR), and session tally sheet, depending on the country data collection tools.

At the end of each month, the facility compiles and reports the number of persons who received each specified antigen using a standardized reporting form. Common disaggregation in paper systems includes age group and delivery strategy, i.e., fixed post or outreach. Aggregated reports are submitted to the health administration unit overseeing the facility's immunization activities. The latter collates and compiles data from all the facilities under their jurisdiction and then reports to a higher level, e.g., the district or national Expanded Programme on Immunization (EPI). If an EIR is used, data are entered only once, and the indicators are available in the whole system simultaneously for everyone with authorized access.[6] The compilation of reports by level is automated.

Box 2: What should health workers know about recording and reporting catch-up vaccination?

Health workers should be trained how to accurately record and report catch-up vaccination doses:

- All doses, regardless of when they are given, should be recorded on the home-based record, tally sheets, registers, electronic immunization records, and monthly reports, according to when the vaccine is actually administered, even if considered "late" or "delayed" according to the national immunization schedule.
- All doses should be recorded in the order in which they are actually given (e.g. if a child is 15 months old and has never received a measles vaccine, the dose should be recorded as MCV1; and the caregiver should be asked to bring the child back for MCV2 in 4 weeks' time. A dose should never be recorded and reported as MCV2 if the child has not first received MCV1).
- If vaccination history shows that some but not all doses in a vaccine series were given, do not restart the series, regardless of the time that has passed between doses. Continue with the next dose required in the series.

Source: World Health Organization. Leave no one behind: guidance for planning and implementing catch-up vaccination. Geneva: WHO, 2021.

Supplementary Immunization Activity (SIA)

Traditionally, SIAs are organized to raise broad population-level immunity and aim to reduce or interrupt the transmission of specific diseases for outbreak control, elimination, or eradication.[7] Supplementary doses are given within a short and defined time frame. They are provided to all eligible individuals, regardless of their vaccination history. SIA doses are often not recorded in HBRs and immunization registers. Therefore, they are not counted as routine immunization (see Table 1).

Monitoring activities for SIAs include real-time intra-campaign digital monitoring (RTM), rapid convenience monitoring (RCM) or assessment using lot quality assurance sampling (LQAS), usually to guide mop-up activities, and post-campaign coverage surveys (PCCS).[8] Some countries are using planned preventive or reactive SIA

[6] WHO is currently developing a „Digital Adaptation Kit" for immunization with a focus on EIRs. For more information on EIRs see https://iris.paho.org/handle/10665.2/34865 and https://usaidmomentum.org/webinar-optimizing-covid-19-vaccination-data-investments-for-the-future/

[7] World Health Organization. Planning and Implementing High-Quality Supplementary Immunization Activities for Injectable Vaccines Using Examples of Measles and Rubella Vaccines: Field Guide. Geneva: WHO, 2016.

[8] Pan American Health Organization. Tools for monitoring the coverage of integrated public health interventions. Vaccination and deworming of soil-transmitted helminthiasis. Washington, D.C.: PAHO, 2017.

campaigns as part of the Big Catch-Up to reach and vaccinate children who have missed doses. Routine childhood vaccines are administered together with SIA doses as multiantigen campaigns. Table 2 provides an overview of methodologies to monitor vaccination activities.

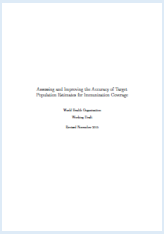
Periodic Intensification of Routine Immunization (PIRI)

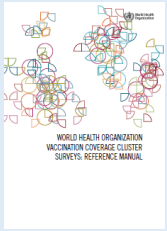
PIRI, sometimes called "intensified outreach", intends to accelerate individual routine immunization completeness by delivering doses using an intensified campaign-like approach that usually targets communities with known recent low routine vaccination coverage. Some countries use PIRI, in the form of health weeks, as a regular approach to complement routine immunization and often to offer a package of health interventions, including vitamin A supplementation and deworming, among others. Unlike SIAs, PIRIs use the individuals' vaccination status and age as the basis to understand what routine vaccines should be provided, if any. PIRI doses are considered routine immunization because doses are administered according to the national immunization schedule, recorded, aggregated, and monitored (as per the recommendations summarized in Table 1).

Many countries are using PIRI to deliver on the Big Catch-Up, given the focused and intensified nature of the approach. Some countries are combining SIAs with PIRI, i.e., with the screening of eligibility for non-SIA doses and targeted delivery of these doses according to the vaccination status of each individual. Some of the tools used for SIA monitoring can be adapted to monitor PIRI, particularly real-time monitoring (RTM) and rapid field assessments.

PIRI is a key delivery strategy for the Big Catch-Up. However, effective monitoring depends on rigorous documentation and checking of vaccination status. This must be facilitated by the availability of HBRs, information to assess a child's age, a national catch-up schedule, and health care workers trained to screen each child's immunization status against this schedule.

Table 2: Different methodologies to monitor immunization activities.

Methodology	Characteristics	Advantages	Challenges	Guidance
Administrative registries	- The numerator is the reported number of persons vaccinated; the denominator is the official population estimate. - May or may not be nominal.	- Provides periodic information to monitor coverage progress. - Provides standardized coverage information for each type of vaccine based on time, place, and person.	- Depending on data quality, both numerators and denominators can over- or underestimate coverage. – Numerators can be affected by inaccurate recording of the place of residence or by inclusion of migrant populations that were not considered in the program's total target population. - If revaccinated people are registered and the registry is not nominal, coverage will be overestimated. - Official demographic data may contain errors or biases.	 World Health Organization. Assessing and Improving the Accuracy of Target Population Estimates for Immunization Coverage. Working Draft. Geneva: WHO, 2015.
Rapid Convenience Monitoring (RCM), also known as Rapid Convenience Assessment (RCA)	- Provides a rapid assessment of the proportion of people vaccinated in a small, conveniently selected area. - Used as supervisory tool.	- Offers a simple, low-cost tool that provides information immediately. - Performed by the local health team under the supervision of other levels, thereby promoting evaluation of program performance and service improvement.	- The data obtained are not representative of the area evaluated; they cannot be aggregated; and they do not allow statistical inferences about the coverage. - If children in the homes visited had a greater probability of being vaccinated or if many homes were excluded because they did not have information or did not	 Pan American Health Organization. Tools for monitoring the coverage of integrated public health interventions.

			participate in rapid monitoring, results may give the false impression that the entire population in the study area is well vaccinated.	Vaccination and deworming of soil-transmitted helminthiasis. Washington, DC: PAHO, 2017.
Lot quality assurance sampling (LQAS)	- Randomly selects lots that are relatively internally uniform. - Establishes minimum and maximum values as acceptance criteria.	- The data collection tools are relatively simple. - Shows the relative uniformity of coverage among lots. - It is not necessary to have information on all lots to make decisions; specific measurements are taken for each lot as soon as results are available.	- Does not estimate coverage of each lot; only indicates if the lot met acceptance criteria. - By establishing a minimum value for deciding whether or not to accept the lot, there is a risk of concluding that lots above that cutoff point do not need interventions. Thus, lots meeting acceptance criteria must also be analyzed. - For high margins of acceptance (e.g., 95% coverage) and narrow ranges of acceptability, the sample size must be large. LQAS has the same limitations in cost and logistics as cluster surveys.	Currently, there is no global LQAS guidance for routine immunization. Please refer to country-specific LQAS guidance, if available.
Immunization coverage cluster survey	- The sampling design is probabilistic, with random selection of the population, allowing for statistical inferences.	- Directly measures coverage of the population universe. - Allows for the compilation of information on a larger number of variables by using more extensive forms than those used in rapid monitoring.	- Requires detailed planning and organization and specialized professionals, resources, and logistics. - Requires a greater investment of time and resources for data entry, processing, tabulation, and analysis. - Unlike LQAS, the cluster survey does not allow for conclusions to be drawn for every cluster in the sample. Estimates are interpreted by summing data from all sampling units. - Biases may affect results.	 World Health Organization. Vaccination Coverage Cluster Surveys: Reference Manual. Geneva: WHO, 2018.

Adapted from: Pan American Health Organization. Tools for monitoring the coverage of integrated public health interventions. Vaccination and deworming of soil-transmitted helminthiasis. Table 4, p29. Washington, D.C.: PAHO, 2017

Conditions to classify a vaccine dose as catch-up

It is crucial to rely on criteria associated with the decision-making process of vaccinators and their recording practices to distinguish between routine and supplemental doses. Immunization managers and partners should use these criteria to refer accurately to the type of doses delivered in any immunization activity and determine if such doses can be used to monitor the Big Catch-Up and routine catch-up activities. This clarification is essential to ensure the required recording and reporting practices are planned and executed to enhance the accuracy and reliability of global, national, and subnational recovery and catch-up immunization coverage estimates.

> *Any vaccination not meeting the routine dose criteria is considered a supplemental vaccination dose and should be reported separately. These doses are not suitable for monitoring immunization recovery and catch-up activities. In the WHO/UNICEF Electronic Joint Reporting Form (eJRF), these doses should be included under the "Supplemental Activities" section.*

Building on the guidance note released by WHO and UNICEF in 2011,[9] Figure 1 shows a flowchart to determine eligibility for catch-up and document a catch-up dose.

[9] World Health Organization, United Nations Children's Fund. WHO-UNICEF Guidance Note: Criteria to determine if a given vaccination is a routine or supplemental dose. Geneva: WHO, UNICEF, 2011.

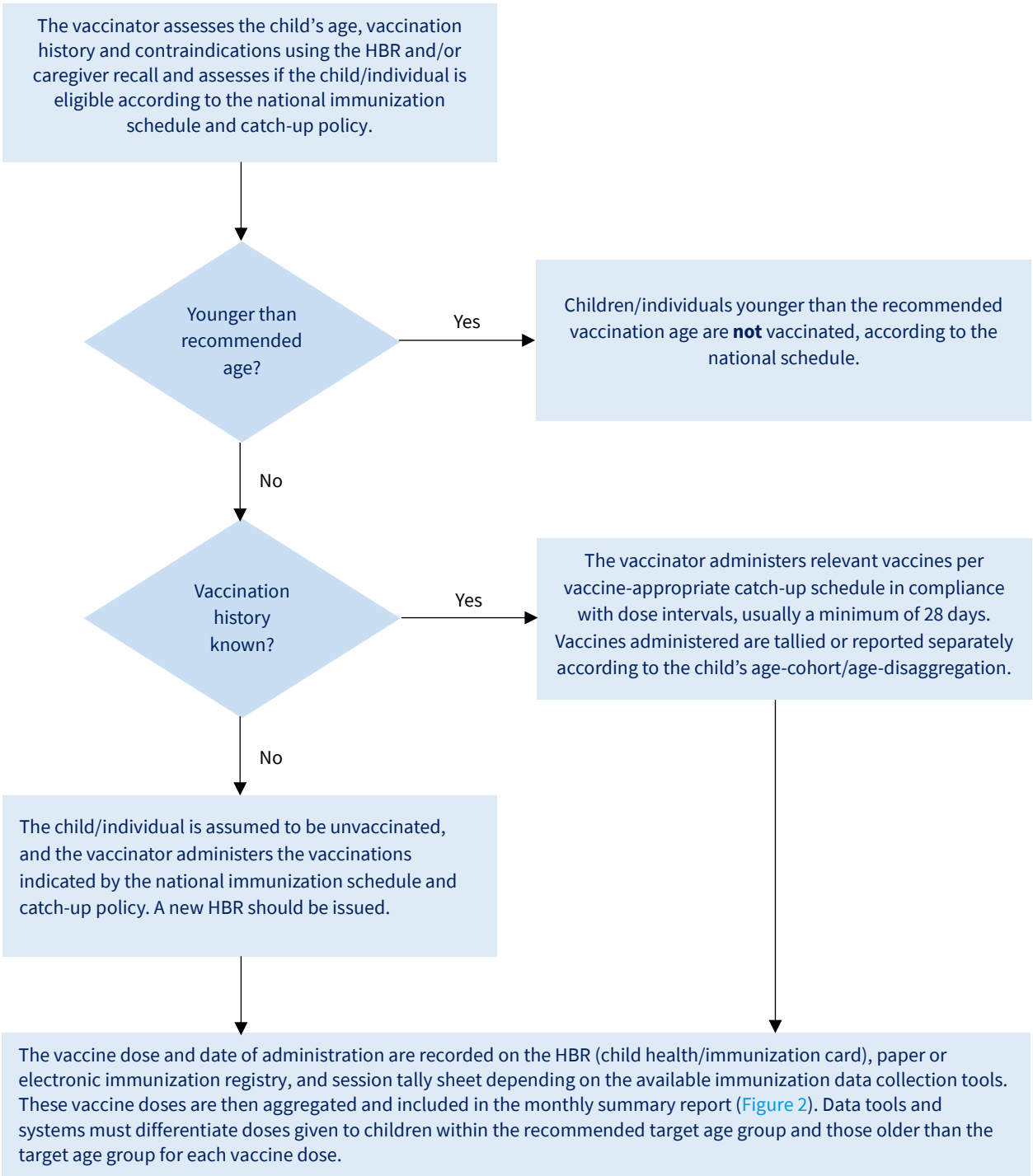


Figure 1: Flowchart to determine eligibility for catch-up and document a catch-up dose.

Adapted from: World Health Organization, United Nations Children's Fund. WHO-UNICEF Guidance Note: Criteria to determine if a given vaccination is a routine or supplemental dose. Geneva: WHO, UNICEF, 2011.

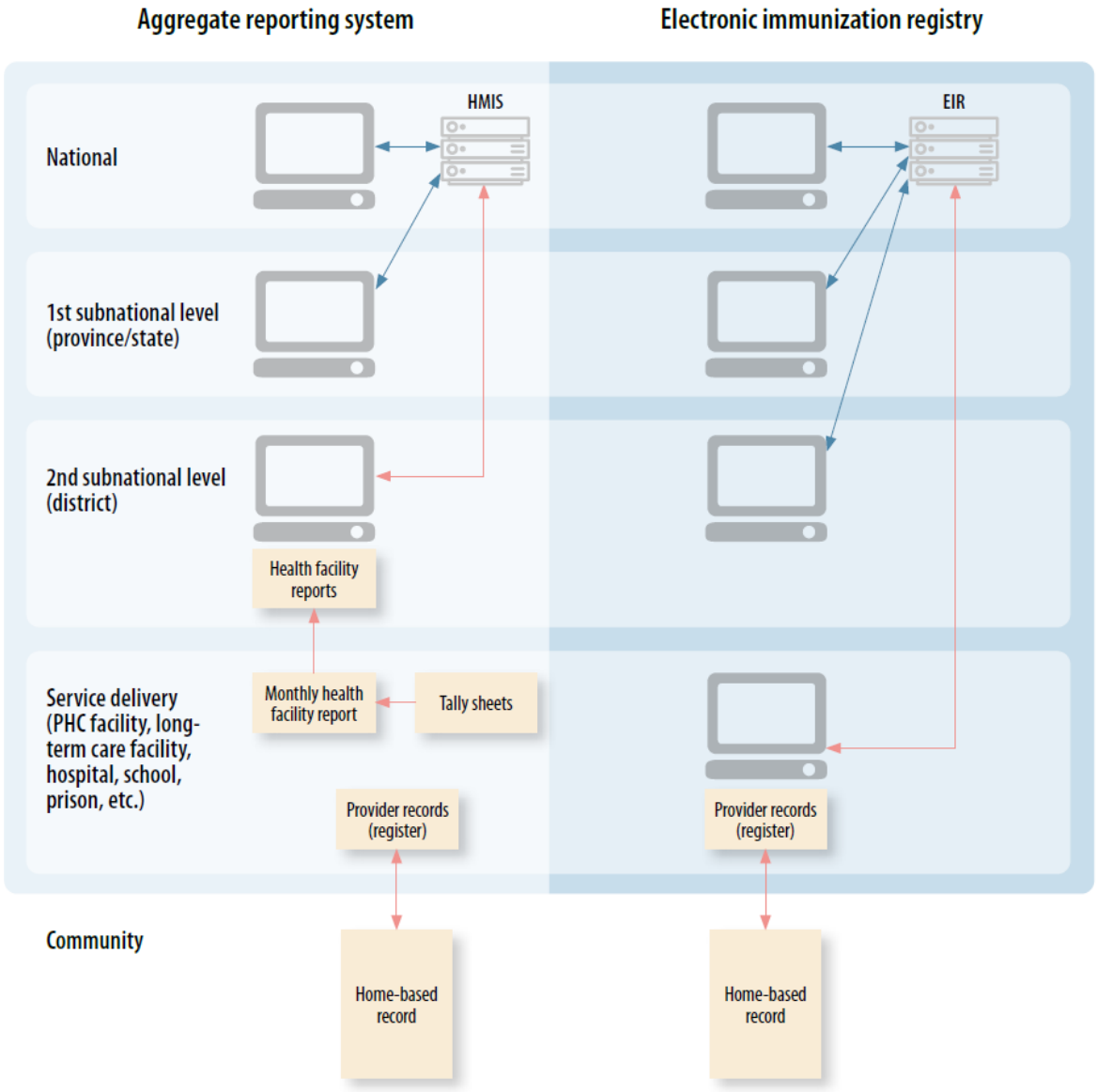


Figure 2: Aggregate versus individual monitoring of immunization activities.

Source: World Health Organization and the United Nations Children's Fund (UNICEF). Monitoring COVID-19 vaccination. Considerations for the collection and use of vaccination data. Interim guidance. 3 March 2021. Geneva and New York: WHO and UNICEF, 2021.

3. Country-level monitoring

Key points

- Catch-up immunization strategies should be tailored to each country's needs based on disruptions during the pandemic, historic immunization coverage, immunity gaps, available resources, and other factors.
- Process and success indicators should be monitored, such as the availability of a catch-up policy and schedule, adapted data collection tools, and the number of catch-up activities implemented.
- Countries should collect data on Behavioural and Social Drivers (BeSD) of vaccine uptake to understand enablers and barriers to catch-up activities.
- Operational considerations address the adaptation of health facility tools and the integration of catch-up activities with the provision of other health interventions.

Countries are encouraged to tailor their strategies for the Big Catch-Up, depending on factors such as the extent of the disruption in immunization services during the pandemic, historic routine immunization coverage, the size and distribution of immunity gaps, and resources available, among other factors.[10]

Monitoring of catch-up activities will therefore depend on factors such as:

1. Which catch-up strategies suit the country context best?
2. Which vaccines and target age cohorts are included in the catch-up vaccination activities?
3. How to define a timely dose versus a late dose?
4. How many children missed vaccine doses as per the national immunization schedule while in the target age group for those vaccines in 2020, 2021, 2022, 2023 (and beyond, as countries integrate catch-up to routine activities)?
5. How many children from previous cohorts successfully received one or more vaccine doses that they missed?

Suggested indicators

Process indicators

Process indicators to be monitored vary according to countries' approaches to the Big Catch-Up. The indicators below represent a minimum set of items suggested for reporting:

Table 3: Suggested country-level process indicators to monitor catch-up.

Indicator
1. Availability of a catch-up policy, including a catch-up schedule
2. Availability of well-developed standard operating procedures (SOPs) to ascertain catch-up eligibility
3. Availability of adapted data collection tools to monitor catch-up (HBRs, tally sheets, registries)
4. Availability of updated information system and tools to capture age-disaggregated vaccination data
5. Number of additional catch-up doses requested
6. Number of additional catch-up doses received
7. Number and proportion of staff trained on catch-up
8. Number and proportion of catch-up and recovery activities implemented in a given time period
9. Number and proportion of social mobilization that accompany catch-up activities implemented
10. Supply and logistics readiness

[10] See also: World Health Organization. Leave no one behind: guidance for planning and implementing catch-up vaccination. Section 2.5. Geneva: WHO, 2021.

Success indicators

Table 4: Suggested country-level success indicators to monitor catch-up.

Indicator
1. Number and proportion of catch-up target population vaccinated with DTP1, among 12-23m and 24-59m*
2. Number and proportion of catch-up target population vaccinated with DTP3, among 12-23m and 24-59m*
3. Number and proportion of catch-up target population vaccinated with IPV1, among 12-23m and 24-59m*
4. Number and proportion of catch-up target population vaccinated with MCV1, among 12-23m and 24-59m* (where recommended <12m) or 24-35m and 36-59m* (where recommended in the second year of life)
5. Number and proportion of catch-up target population vaccinated with MCV2, among 24-35m and 36-59m*
6. Number and proportion of catch-up target population that received at least one vaccine dose

*Data collection tools may include columns by single age-cohorts (e.g., 12-23m) or by multiple ages (e.g., 24-59m). The ability to calculate the indicator will depend on the availability of disaggregated data by age group. If surveys are used to calculate proportion of catch-up target population vaccinated, the disaggregation can be done by year of birth (e.g., children born in 2020, children born in 2021, etc.).

The above indicators can be calculated at national and subnational levels and for a calendar month, quarter, and year for time-bound activities. Other vaccines should be also monitored if they are included in catch-up activities, e.g., yellow fever, OPV, HPV, or meningitis. Countries are encouraged to include only those indictors they can effectively measure and report on without overburdening health workers and the information system.

Data sources

Administrative data

The administrative vaccination data reporting system is the main data source for monitoring routine immunization activities in most countries. However, not all administrative reporting systems are currently designed to capture administration of doses beyond 12 or 24 months of age.

> *The first step toward effective catch-up monitoring is to adapt existing in-country tools such as tally sheets, home-based records (HBRs), and registers to capture the age group to which each vaccine dose is given.*

Examples of adapted data collection tools are provided in Section 6.

Box 3: The importance of home-based records (HBRs) as enablers of effective catch-up vaccination.

Without reliable documentation of individual vaccination history, an individual or caregiver may not be aware that vaccines are due and health workers may be unable to ascertain eligibility for catch-up vaccination. The importance for the individual or caregiver to safely guard the HBR and bring it to every health contact should be stressed at every opportunity.

In some countries, it may not be common practice to recommend caregivers keep HBRs beyond early childhood. However, as programmes move towards a life course approach to vaccination, with additional vaccines introduced at older ages, maintaining an individual record of vaccination history is becoming increasingly important.

HBR stockouts continue to be a problem in many settings, contributing to missed opportunities for vaccination. Countries must ensure that an ample supply of HBRs are available for distribution, including sufficient buffer stock for replacement if a caregiver or individual has misplaced the HBR. Where an individuals' vaccination status cannot be confirmed, it should be assumed that they are not vaccinated, and catch-up vaccination should be offered.

Source: World Health Organization. Leave no one behind: guidance for planning and implementing catch-up vaccination. Box 4, p11. Geneva: WHO, 2021. For more on strengthening the implementation of HBRs, see: World Health Organization. Practical guide for the design, use and promotion of home-based records in immunization programmes. WHO: Geneva, 2015; and World Health Organization. WHO recommendations on home-based records for maternal, newborn and child health. WHO: Geneva, 2018.

Estimating coverage

Estimating catch-up coverage requires identifying the appropriate denominator or target population. Determination of the appropriate denominator depends on the national policy and recommendation for catch-up. If the national policy recommends to only immunize children who missed vaccines recommended in the first year of life in the previous year, then the denominator should only include children who were not immunized with the defined vaccine in the previous year. If the national policy recommends vaccinating children who missed vaccines recommended in the first year of life in the previous two, three or four years, the denominator should account for such children accordingly.

$$P_{catch-up\ coverage} = \frac{Number\ of\ catch-up\ doses\ administered\ to\ children\ in\ target\ group}{Estimated\ number\ of\ missed\ eligible\ children\ in\ target\ group} \times 100$$

where $P_{catch-up\ coverage}$ is the proportion of missed children who received the given catch-up vaccine dose out of the total eligible missed children.

For example, catch-up MCV1 coverage for the 2021 birth cohort would be calculated as:

$$P_{\substack{catch-up\ MCV1\ coverage \\ for\ 2021\ birth\ cohort}} = \frac{Number\ of\ MCV1\ catch-up\ doses\ administered\ to\ 2021\ birth\ cohort}{Estimated\ number\ of\ MCV1\ missed\ children\ in\ 2021\ birth\ cohort} \times 100$$

Numerators

- Number of doses administered by antigen and by age group or birth cohort

Denominators

The denominator is the number of children targeted for catch-up immunization by the national or subnational immunization programme. This could be any of the following:

- Estimated number of under-vaccinated by vaccine dose. If targeting 12-59 months, this would be the sum of estimated under-vaccinated for the previous four years (assuming no previous catch-up activities).
- Estimated number of zero-dose[11] (ZD) children, i.e., not vaccinated with any dose of DTP in the targeted age groups. If targeting 12-59 months, this would be the sum of estimated ZD children for the previous four years (assuming no previous catch-up activities).

[11] Zero-dose (ZD) children are defined in this document as the estimated number of surviving infants who did not receive any dose of a DTP-containing vaccine. This number is calculated by multiplying the estimated number of surviving infants in a given location and calendar year with the proportion of surviving infants who did not receive DTP1.

Box 4: Why should the number of zero-dose (ZD) children only be used to monitor DTP1?

The number of zero-dose (ZD) children is the most appropriate denominator to monitor DTP1. However, using this denominator to monitor catch-up for other vaccines such as MCV1 may lead to an overestimation of coverage. For example, in a country where DTP1 coverage is 80% and MCV1 coverage is 60% (25% relative drop-out), using the ZD denominator would lead to targeting only half the children who really need an MCV1 dose.

In this example, if a birth cohort comprises 1,000 surviving infants, 200 remain as ZD and 400 remain unvaccinated against measles in a given year. Over the course of four years and with a constant vaccination coverage, there would be an accumulated number of 800 ZD children and 1,600 unvaccinated against measles. If the Big Catch-Up reaches 800 children with MCV1, and the coverage is calculated with the denominator of ZD children (800 children), this would give a false sense of security by calculating a coverage of 100% (800/800 children) instead of a most appropriate one of 50% (800/1,600 children).

Household surveys

Surveys can complement administrative monitoring of routine immunization among infants and in the second year of life. The most used surveys to monitor immunization coverage include multi-indicator household surveys such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS), vaccination coverage surveys (VCS, also known as EPI surveys or coverage evaluation surveys), and post-campaign coverage surveys (PCCS). While DHS and MICS often only collect data for children 12-36 months of age, VCS and PCCS can be adapted to include older age groups. Some countries are also adapting MICS and other household surveys to conduct more frequent assessments for routine immunization.

Countries planning to conduct catch-up activities through a large-scale campaign-style delivery approach (i.e., PIRIs or integrated screening and catch-up with SIAs) should strongly consider a modified PCCS following these activities.

The indicators that can be obtained using surveys include coverage by vaccine age group disaggregated by multiple dimensions (sex, urban/rural, socioeconomic status, maternal education, etc), timeliness of vaccination (among those with documented evidence) and Missed Opportunities for (simultaneous) Vaccination (MOV).

VCS and PCCS can also explicitly seek to understand vaccination barriers and enablers by adding the core questions on Behavioural and Social Drivers of vaccine uptake (BeSD) and additional ones as appropriate (see Table 6).

Surveys can provide useful information on catch-up vaccination, for example, by examining dates of vaccination and using probing questions to ascertain vaccination in a given month (see Box 5).

Box 5: What happens when the vaccination status is not adequately ascertained?

Having a home-based record or any other documentation of the vaccination history of a person is crucial to ensure all necessary vaccines are administered as per the vaccination schedule, and to prevent missed opportunities for vaccination.

When documentation of vaccination is not available or readable, a few probing questions should be asked to the child's mother or caregiver. These questions must be adapted and pilot tested before use to promote adequate ascertainment.

Understanding the vaccination status of each child is not only needed to ensure that the child is correctly immunized and instructed to return to complete a vaccination series, but also to avoid a mismatch between the numerator and the denominator.

If previously un- or under- vaccinated children are misclassified as vaccinated, they will not be vaccinated and miss out on much needed doses. In contrast, if previously vaccinated children are misclassified as not vaccinated for a given vaccine dose, they will be vaccinated and added to the numerator while effectively they are not in the denominator, which is an estimated number of un- and under-vaccinated children, leading to an overestimation of catch-up.

As such, countries planning surveys should consider the following adaptations:

- Include up to 59 months of age,
- Take pictures of HBRs to extract data for routine and recent catch-up doses and with adapted probing questions to elicit responses about recent vaccination in catch-up activities among those without HBRs,
- Add BeSD childhood vaccination priority indicators (see Table 6).

Other methodologies for Big Catch-Up monitoring and reporting

While not providing coverage, Rapid Convenience Monitoring (RCM, also known as Rapid Convenience Assessment or RCA)[12] and Lot Quality-Assurance Sampling (LQAS)[13] methods, stratified by age group and vaccination status, can help get a clearer picture of the success of catch-up efforts (see Table 5). LQAS has been applied for routine immunization programme monitoring in some contexts.[14]

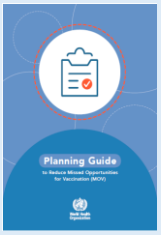
At the health-facility level, we recommend adapting and using supervision tools, Missed Opportunities for Vaccination (MOV) assessments,[15] and real-time monitoring (RTM)[16] (see Table 5). Countries should also collect qualitative data to understand enablers and barriers to catch-up activities following WHO guidance on Behavioural and Social Drivers of Vaccination (BeSD).[17] The five questions to ascertain the BeSD childhood vaccination priority indicators are listed in Table 6.

Mixed methods evaluations and case studies can also be considered to bring together data and information from different sources to have a more holistic picture of the Big Catch-Up and inform establishing catch-up as an integral part of essential immunization.

[12] Pan American Health Organization. Tools for monitoring the coverage of integrated public health interventions. Vaccination and deworming of soil-transmitted helminthiasis. Washington, D.C.: PAHO, 2017.
[13] Brown AE, Okayasu H, Nzioki MM, Wadood MZ, Chabot-Couture G, Quddus A, et al. Lot quality assurance sampling to monitor supplemental immunization activity quality: an essential tool for improving performance in polio endemic countries. J Infect Dis. 2014 Nov 1;210 Suppl 1:S333-340.
[14] Dadari I, Sharkey A, Hoare I, et al. Analysis of the impact of COVID-19 pandemic and response on routine childhood vaccination coverage and equity in Northern Nigeria: a mixed methods study. BMJ Open 2023; 13:e076154.
[15] World Health Organization. Planning guide to reduce missed opportunities for vaccination. Geneva: WHO, 2017.
[16] United Nations Children's Fund. Planning and Implementing Real-time Monitoring Approaches to Strengthen Vaccination Campaigns: Guidance for country partners. New York: UNICEF, 2022.
[17] World Health Organization. Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake. Geneva: WHO, 2022.

Table 5: Other methodologies for Big Catch-Up monitoring and reporting.

Methodology	Characteristics	Advantages	Challenges	Guidance
Behavioural and social drivers of vaccination (BeSD)	Validated data collection tools to understand what drives vaccine uptake	- Developed, tested and validated through a rigorous, evidence-based process. - Provides data to systematically design, implement and evaluate tailored interventions. - Offers insights into how to continually improve programme implementation. - Equips programmes and partners to understand the reasons for low vaccine uptake, track trends over time and reduce coverage inequities. - Can be integrated into other data collection processes (i.e., EPI reviews, coverage surveys, etc).	- Need to define adequate research questions in advance. - Requires close adherence to the validated data collection tools. - Should be adapted and tested to match local needs and context. - Requires collection of detailed demographic information. - Sampling should be representative of the priority population (probability or non-probability sampling). - Analysis and reporting of qualitative results can be complex.	 World Health Organization. Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake. Geneva: WHO, 2022.
Real-Time (intra-campaign digital) Monitoring (RTM)	Activities that employ digital technologies to accelerate the sharing, analysis and use of data to improve campaign quality	- Helps enhance the quality of supplementary immunization activities and campaigns by helping implementers review progress against targets, identify issues and gaps, track supplies, human resources and vaccine sessions, and make prompt decisions about corrective actions. - Can improve public awareness and strengthen local advocacy.	- Planning should be initiated early. - Government ownership and leadership are indispensable to accelerating adoption and ensuring sustainability. - Number of platforms and forms, the use of paper, and manual data processing and downloading should all be minimized. - The “real-time” (same day) element should be prioritized during platform selection, with appropriate processes in place to support accountability for decision making. - Training materials, data entry forms, dashboard templates and other tools should be developed at the global or regional levels for platforms used by multiple countries. - Resources need to be in place for the use of RTM data.	 United Nations Children’s Fund. The Use of Real Time Monitoring Approaches and Tools for Immunization Campaigns: Good Practices and Lessons Learned. New York: UNICEF, 2021.  United Nations Children’s Fund. Planning and Implementing Real-time Monitoring Approaches to Strengthen Vaccination Campaigns: Guidance for country partners. New York: UNICEF, 2022.

Missed Opportunities for (simultaneous) Vaccination (MOV)	Assessment to demonstrate the magnitude and identify causes of missed opportunities, followed by tailored health system interventions to reduce these, leading to an increase in vaccination coverage and timeliness of vaccinations	- Helps to conduct a bottom-up root-cause analysis of bottle-necks in the immunization programme and to design relevant strategies to address them. - Can result to an increase in vaccination coverage and equity and an improvement in timeliness of vaccination.	- Should not be viewed as a stand-alone or discreet "project"; rather as complementary to existing microplanning and programme improvement approaches such as RED ('Reaching Every District'). - Conceived as a health system-wide service improvement effort	 World Health Organization. Planning guide to reduce missed opportunities for vaccination. Geneva: WHO, 2017.
Post-Introduction Evaluation (PIE)	Methodology to evaluate the impact of the vaccine introduction on the country's immunization programme and to rapidly identify problems needing correction as vaccination expands in country, recommended 6–18 months after introduction	- Can lead to improvements in the implementation of the new vaccine and overall immunization programme. - Provides valuable lessons for other countries for future vaccine introductions. - Includes comprehensive tools to address key programmatic vaccine introduction activities at all levels of the immunization system including national, subnational and vaccination facility/site levels.	- Requires site visits that include observation of vaccination sessions, observation of vaccine storage facilities, and interviews with health workers and other priority groups.	 World Health Organization. COVID-19 vaccine post-introduction evaluation (cPIE) guide, revised 10 October 2023. Geneva: WHO, 2023.
Mini Post-Introduction Evaluation (Mini-PIE) Intra-Action Review (IAR)	Lighter, more flexible version of a Post-Introduction Evaluation (PIE), recommended 2-6 months after introduction	- Covers the same programme areas that are addressed in the full PIE but does not require facility/site visits and direct observations.	- Provides less insights into the situation on the ground and the experiences of health workers and priority groups.	 World Health Organization. Mini-cPIE (COVID-19 vaccination Intra-Action Review): What is it and how to conduct one? Geneva: WHO, 2021.
Modified Post-Campaign Coverage Survey (PCCS)	Household survey to assess the vaccination coverage achieved following a vaccination campaign, modified by including other vaccines used in the Big Catch-Up in addition to vaccines used in the respective campaign.	- Usually nationally representative. - Independent data collection and analysis. - Provides timely results. - Can measure several interventions of the same campaign.	- Requires advanced statistical skills with rigorous probability sampling. - Demands sufficient sample size to be nationally representative. - Often not suitable for subnational estimates.	 World Health Organization. Vaccination Coverage Cluster Surveys: Reference Manual. Geneva: WHO, 2018.

Gavi, the Vaccine Alliance. Vaccine Funding Guidelines. September 2023. Annex 2: Post-campaign coverage survey (PCCS) requirements. Geneva: Gavi, 2023.

Table 6: Behavioural and social drivers of vaccination (BeSD) childhood vaccination priority indicators.

Domain/construct	Childhood vaccination survey priority question	Indicator
Thinking and feeling Confidence in vaccine benefits	How important do you think vaccines are for your child's health? Would you say… ☐ Not at all important ☐ A little important ☐ Moderately important, *or* ☐ Very important?	*% of parents/caregivers who say that vaccines are "moderately" or "very" important for their child's health*
Social processes Family norms	Do you think most of your close family and friends want you to get your child vaccinated? ☐ NO ☐ YES	*% of parents/caregivers who say most of their close family and friends want their child to be vaccinated*
Motivation Intention to get vaccine	[COUNTRY NAME] has a schedule of recommended vaccines for children. Do you want your child to get none of these vaccines, some of these vaccines or all of these vaccines? ☐ NONE ☐ SOME ☐ ALL	*% of parents/caregivers who want their child to get "all" of the recommended vaccines*
Practical issues Know where to get vaccination	Do you know where to go to get your child vaccinated? ☐ NO ☐ YES	*% of parents/caregivers who know where to get their child vaccinated*
Practical issues Affordability	How easy is it to pay for vaccination? When you think about the cost, please consider any payments to the clinic, the cost of getting there, plus the cost of taking time away from work. Would you say… ☐ Not at all easy ☐ A little easy ☐ Moderately easy, or ☐ Very easy?	*% of parents/caregivers who say vaccination is "moderately" or "very" easy to pay for*

Source: World Health Organization. Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake. Annex 1: BeSD tools for childhood vaccination. Childhood vaccination priority indicators (version 1.0). Geneva: WHO, 2022.

Operational Considerations

Countries conducting catch-up vaccination using PIRI

Countries using PIRI approaches for catch-up activities should record all vaccine doses administered in:

- HBRs,
- child or immunization registers,
- tally sheets, and
- monthly summary or aggregation.

Tally sheets and monthly summary or aggregation should ideally capture total numbers vaccinated per age cohort. Where current tools do not have space to capture catch-up vaccination doses, tools should be modified to capture and aggregate catch-up doses.

Countries conducting SIAs and adding other antigens for catch-up

In some cases, planned preventive or reactive SIAs can be leveraged as opportunities to integrate catch-up with one or more additional antigens. Children within the target age group for the catch-up vaccination should be screened for prior vaccination status, and vaccines provided should be recorded on their HBR, the immunization register, and the tally sheets. The number of eligible children screened and vaccinated should be aggregated per age cohort in the monthly summaries (as the case with catch-up PIRIs and facility-based administrative data).

In any of these circumstances, health workers should be adequately trained on screening vaccination status, identifying, administering, and capturing missed doses, and aggregating data appropriately.

4. Global monitoring

Key points

- Global monitoring of the Big Catch-Up is vital to assess and learn from the initiative's success, and to ensure accountability between countries, in-country partners, and global stakeholders.
- Existing global reporting mechanisms such as the WHO/UNICEF Electronic Joint Reporting Form on Immunization (eJRF) are limited in capturing data on catch-up activities.
- Suggested global process indicators focus on the availability of approved catch-up and recovery plans, requested and received additional vaccines, and appropriate budgeting for immunization activities.
- Suggested global success indicators focus on the number of countries with catch-up policies and schedules, tools, activities, and information systems for capturing late doses, the number of delayed doses administered, and children reached.

Currently, there is no systematic monitoring and reporting of catch-up vaccination outcomes globally. However, some relevant questions are included in the Electronic Joint Reporting Form on Immunization (eJRF). Countries submit their completed eJRF for review at the regional and global levels each April, reporting data for the previous calendar year.

Improving the completeness and the quality of reported data on delayed vaccination and catch-up will be an important effort to ensure that the regular monitoring of catch-up becomes easier and routinized.

Suggested indicators

The following indicators are proposed to monitor the overall planning, progress, and implementation of countries prioritized for the Big Catch-Up by regions and global stakeholders (see Table 7 and Table 8). Indicators 11 and 12 can be reported from RCM, LQAS or cross-sectional data collection, but the interpretation must be careful as it may not represent the entire population. The list of Preferred Reporting Items for Complex Sample Survey Analysis (PRICSSA) should be followed when reporting survey data.[18]

Box 6: Why the WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) is unable to capture catch-up vaccination.

WUENIC is a methodology to annually assess routine immunization performance for WHO and UNICEF Member States by producing coverage estimates for various childhood vaccines. WUENIC considers reported administrative coverage, survey results, and additional contextual information. However, this method cannot differentiate between catch-up and routine vaccine doses if those given to older children are recorded as within the recommended age. Also, the methodology only regards the previous year's target group and does not account for routine vaccines given to children older than the first or second year of life. Therefore, WUENIC is currently not suited to monitor catch-up vaccination.

[18] Seidenberg AB, Moser RP, West BT. Preferred Reporting Items for Complex Sample Survey Analysis (PRICSSA). Journal of Survey Statistics and Methodology. 2023 Sep 1;11(4):743–57.

Table 7: **Suggested global process indicators to monitor catch-up.**

Indicator	Primary data source	Recommended frequency
1. Number of countries with approved catch-up and recovery plans	MoH	Quarterly
2. Number of countries that requested additional vaccines for catch-up and recovery	Gavi/UNICEF SD	Quarterly
3. Number of countries that received additional vaccines for catch-up and recovery	Gavi/UNICEF SD	Quarterly
4. Number of countries with defined government budget line for catch-up and recovery activities	MoH	One time

Table 8: **Suggested global success indicators to monitor catch-up.**

Indicator	Primary data source	Recommended frequency
1. Number of countries with catch-up policies and schedules	MoH	Yearly
2. Number of countries with specific standard operating procedures (SOPs), and possibly decision support tools, to ascertain vaccine eligibility	MoH	One time
2.1. For those children with an HBR or facility registry entry	MoH	One time
2.2. For those children with no documentation available	MoH	One time
3. Number of countries that implemented, in 2022-2023, specific activities to reduce the number of missed children in 2020-2023, targeting children up to a minimum of 59 months	MoH	Yearly
3.1. Intensifications of routine immunization	MoH	Yearly
3.2. Mixed intensification of routine immunization and SIA	MoH	Yearly
3.3. Establishment or expansion of age eligibility for catch-up vaccination through routine immunization service delivery	MoH	Yearly
3.4. SIAs	MoH	Yearly
3.5. School (or daycare) vaccination checks	MoH	Yearly
4. Number of countries with information systems to capture separate doses given late (all countries through eJRF)	MoH	Yearly
5. Number of countries reporting delayed MCV1 doses for 2023 (and not a value of zero; all countries through eJRF)	MoH	Yearly
6. Number of countries reporting delayed DTP1 doses for 2023 (and not a value of zero; all countries through eJRF)	MoH	Yearly
7. Number of countries reporting delayed DTP3 doses for 2023 (and not a value of zero; all countries through eJRF)	MoH	Yearly
8. Number of children >12 months reached with MCV1 (>24 m if MCV1 in countries recommending in the second year of life)	MoH	Yearly
8.1. by calendar year (all countries through eJRF)	MoH	Yearly
8.2. in Big Catch-Up activities	MoH	Yearly
9. Number of children >12 months reached with DTP3 in catch-up activities	MoH	Yearly
9.1. by calendar year (all countries through eJRF)	MoH	Yearly
9.2. in Big Catch-Up activities	MoH	Yearly
10. Number of children reached with catch-up activities by age group, and with each additional vaccine, other than MCV1 and DTP3 as per what is requested from all countries	MoH	Quarterly
11. Number of countries that conducted field assessments on catch-up vaccination process and outcome. These assessments can include, but are not limited to, RCM/RCA, LQAS, VCS (including PCCS), adapted MOV, mini-PIE, other qualitative assessments, such as those including BeSD	MoH	Yearly
11.1. Household-based	MoH	Yearly
11.2. On health workers	MoH	Yearly
12. Proportion of HBRs by age groups, per survey	Various	all surveys during BCU timeframe
12.1. Ever received	Various	all surveys during BCU timeframe

	12.2. Seen	Various	all surveys during BCU timeframe
	12.3. Comparison with previous surveys, where available	Various	last survey before BCU timeframe
13.	Proportion of DTP1, DTP3, IPV1 and MCV1 doses administered >12 m (or >24 m for MCV1 where recommended in the second year of life), as per survey data,	Various	all surveys during BCU timeframe
	13.1. Other doses, as per specific country plans.	Various	all surveys during BCU timeframe
	13.2. Comparison with previous surveys, where available.	Various	last survey before BCU timeframe

5. Way forward

Closing immunity gaps and vaccinating children who missed doses during the pandemic to avert further disease outbreaks is critical. It is also vital to monitor the success of catch-up activities in countries and globally. In 2024 and beyond, there should be a focus on improving data recording and reporting systems to increase the uptake of delayed doses and facilitating the use of this data for programme action.

Strengthening data systems and monitoring indicators to capture delayed doses should be integral to any routine immunization programme.

Recommended actions:

- Existing immunization monitoring tools in countries should be adapted to capture and promote catch-up vaccination.
- A user-centred approach to the design of data collection and aggregation tools and job aids should be used to foster proper screening, vaccination, recording, and reporting of doses.
- The monitoring of catch-up should be integrated into all systems for monitoring routine vaccination coverage, and countries should promote the key message that vaccination is better late than never to build population immunity.
- These efforts should be complemented by adapted, nationally representative coverage surveys and robust monitoring of all strategies to identify and reach children who have missed vaccines, including those supported by donor funding.

Furthermore, expanding from yearly monitoring to monitoring birth cohorts over time should become the norm to better understand immunity profiles and the success of catch-up vaccination interventions (Box 7 and Figure 3). Routine data collection systems such as District Health Information Software 2 (DHIS2) should be adapted to capture and monitor catch-up doses. Defaulter tracing and monitoring of missed opportunities for vaccination (MOV) should become routine practice and be enhanced using digital technologies such as geocoded population data. Additionally, surveys should be extended to older age groups where feasible, yet with an awareness that if vaccination took place a long time before the survey, the availability of cards and recall may present some challenges. Finally, some countries may consider conducting other assessments, such as serological surveys or data triangulation exercises, to supplement their understanding of population immunity.

Box 7. Why are birth cohorts a useful choice for monitoring immunization performance?

Immunization coverage is commonly defined as the proportion of vaccinated individuals in the target population for a specific vaccine dose. Traditionally, countries have used ranges of recommended age for vaccination to describe the target population, such as "children 12-24 months old". However, many countries have started using a birth cohort approach to monitor immunization programmes, such as monitoring "all children born in the year 2020", as this allows monitoring how the cohort is vaccinated over time, and what proportion of children are caught-up at two, three and four years of age.

The cohort approach to monitoring coverage offers some advantages. First, birth cohorts are clearly defined, and the definition remains constant over time. For example, children born in 2020 can always be identified with accurate birth date information. Second, birth cohorts help analyse the timeliness of vaccination within a population. By following a specific cohort, we can track if children are receiving their vaccines on time or falling behind. Third, using cohorts allows us to monitor the programme's performance and the effectiveness of catch-up efforts over time, as shown in Figure 3. Lastly, cohort data is crucial to identify specific groups that are un- or under-vaccinated, especially due to time-sensitive events such as pandemics or other emergencies, facilitating a swift and targeted response.

When using survey data, cumulative coverage can be graphed as shown in Annex C in addition to coverage by year of birth. However, a limitation of using survey data to monitor vaccination timeliness is that to calculate age at vaccination, an HBR or other document with the vaccination date needs to be available as well as the date of birth.

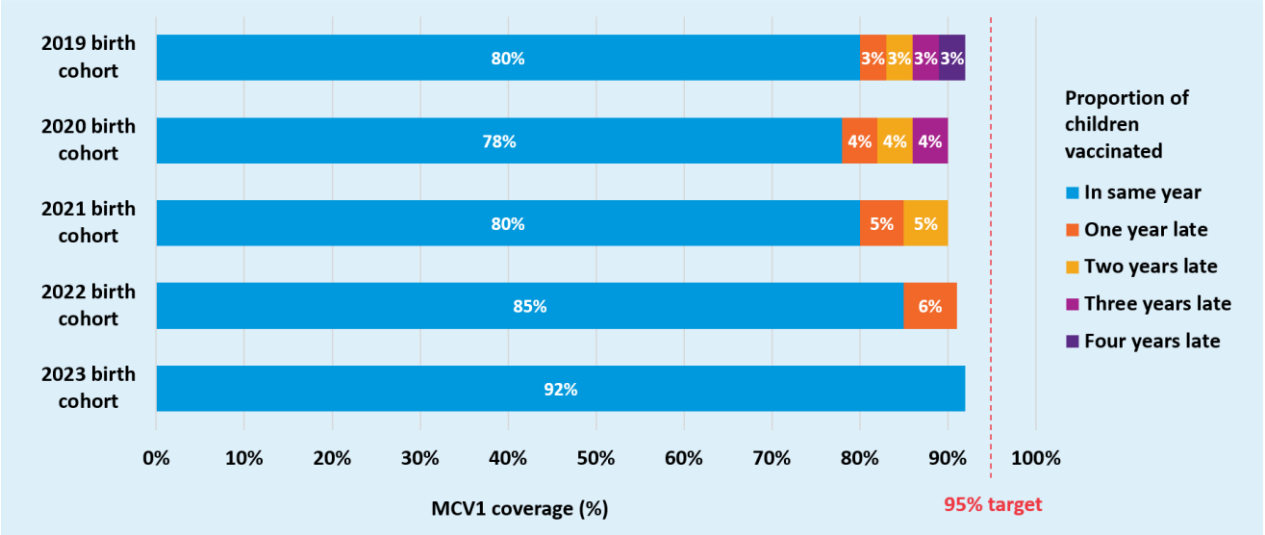
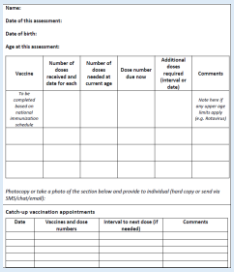
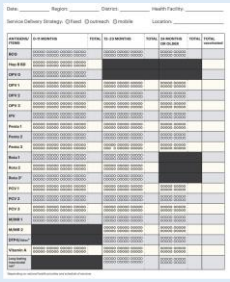
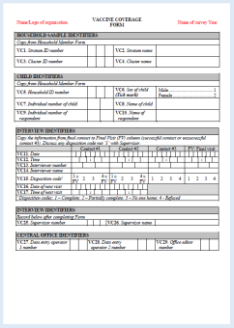


Figure 3: Hypothetical example of MCV1 catch-up monitoring from a country with an aggregated information system, by birth cohort.
MCV1 = first dose of measles-containing vaccine. Dashed line = 95% coverage target.

6. Example tools

Table 9: Example tools to capture and monitor catch-up activities.

Tool	Details
	Catch-up vaccination worksheet for determining eligibility to help health workers assess which doses an individual is eligible for at the time of a visit, and when subsequent doses will be needed. Source: World Health Organization. Leave no one behind: guidance for planning and implementing catch-up vaccination. Geneva: WHO, 2021.
	Tally sheet for routine childhood vaccinations which allows health workers to record catch-up vaccinations administered without restricting recording within an upper age limit. Source: World Health Organization. Leave no one behind: guidance for planning and implementing catch-up vaccination. Geneva: WHO, 2021.
	Sample vaccination coverage survey questionnaire following the 2018 World Health Organization Vaccination Coverage Cluster Surveys Reference Manual. Source: https://www.technet-21.org/en/resources/guidance/sample-questionnaire-generic
	Demonstration video on how to administer catch-up vaccinations. Source: World Health Organization and Immunization Academy. Geneva: WHO, 2023. https://watch.immunizationacademy.com/en/videos/807
	Demonstration video on how to record and report catch-up vaccinations. Source: World Health Organization and Immunization Academy. Geneva: WHO, 2023. https://watch.immunizationacademy.com/en/videos/806

7. Annex

Annex A: Sample form for recording data from rapid monitoring of vaccination

(A) House no.	(B) No. of children 1-4 years old living in the home	(C) No. of children vaccinated by type of vaccine									(D) Behavioural and social drivers of vaccination (BeSD) childhood vaccination priority indicators (see Table 6 for questions and answers).[19]														
		BCG	DTP1	DTP3	OPV1	OPV3	IPV1	MCV1	MCV2	Complete series for age	Answers to question 1: Thinking and feeling				Answers to question 2: Social processes		Answers to question 3: Motivation			Answers to question 4: Practical issues		Answers to question 5: Practical issues			
											a	b	c	d	a	b	a	b	c	a	b	a	b	c	d
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
...																									
Total																									

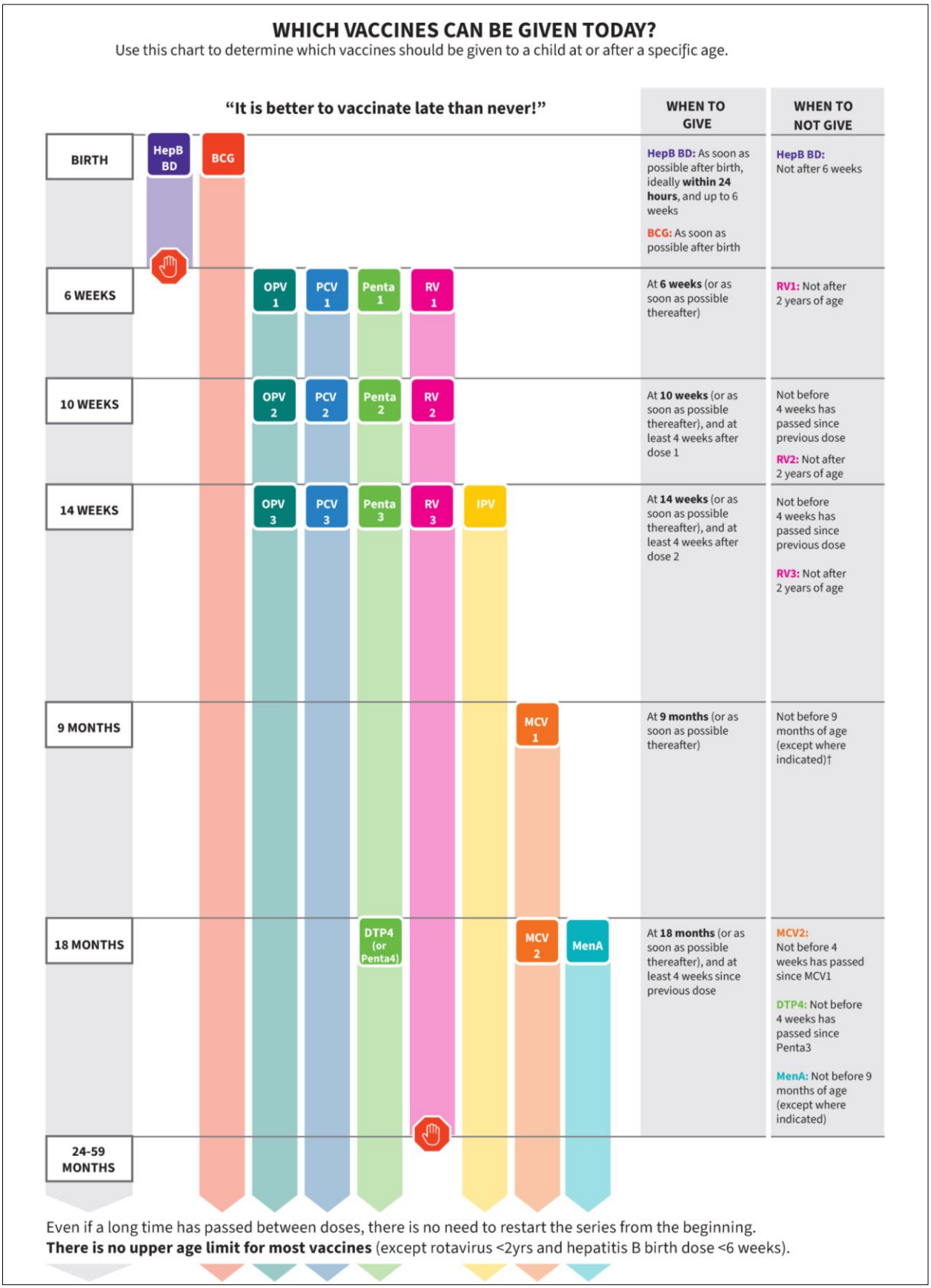
Immunization coverage	**No. of children vaccinated**	**Formula**	**Result**	**Unit**
BCG		$\frac{\text{no. of children vaccinated with BCG}}{\text{total no. of children}} \times 100$		% of children vaccinated with BCG
DTP1		$\frac{\text{no. of children vaccinated with DTP1}}{\text{total no. of children}} \times 100$		% of children vaccinated with DTP1
DTP3		$\frac{\text{no. of children vaccinated with DTP3}}{\text{total no. of children}} \times 100$		% of children vaccinated with DTP3
OPV1		$\frac{\text{no. of children vaccinated with OPV1}}{\text{total no. of children}} \times 100$		% of children vaccinated with OPV1
OPV3		$\frac{\text{no. of children vaccinated with OPV3}}{\text{total no. of children}} \times 100$		% of children vaccinated with OPV3
IPV1		$\frac{\text{no. of children vaccinated with IPV1}}{\text{total no. of children}} \times 100$		% of children vaccinated with IPV1
MCV1		$\frac{\text{no. of children vaccinated with MCV1}}{\text{total no. of children}} \times 100$		% of children vaccinated with MCV1
MCV2		$\frac{\text{no. of children vaccinated with MCV2}}{\text{total no. of children}} \times 100$		% of children vaccinated with MCV2
Complete series for age		$\frac{\text{no. of children with complete series for age}}{\text{total no. of children}} \times 100$		% of children with complete vaccination series for age

Behavioural and social drivers of vaccination	**a**	**b**	**c**	**d**	**Formula**	**Result**	**Unit**
Question 1					$\frac{\text{no. of c answers} + \text{no. of d answers}}{\text{total no. of children}} \times 100$		% of parents/caregivers who say that vaccines are “moderately” or “very” important for their child’s health
Question 2					$\frac{\text{no. of b answers}}{\text{total no. of children}} \times 100$		% of parents/caregivers who say most of their close family and friends want their child to be vaccinated
Question 3					$\frac{\text{no. of c answers}}{\text{total no. of children}} \times 100$		% of parents/caregivers who say they want their child to get all of the recommended vaccines
Question 4					$\frac{\text{no. of b answers}}{\text{total no. of children}} \times 100$		% of parents/caregivers who say they know where to get their child vaccinated
Question 5					$\frac{\text{no. of c answers} + \text{no. of d answers}}{\text{total no. of children}} \times 100$		% of parents/caregivers who say vaccination is “moderately” or “very” easy to pay for vaccination for their child

Adapted from: Pan American Health Organization. Tools for monitoring the coverage of integrated public health interventions. Vaccination and deworming of soil-transmitted helminthiasis. Module 3. Coverage Monitoring in the Field. Washington, D.C.: PAHO, 2017

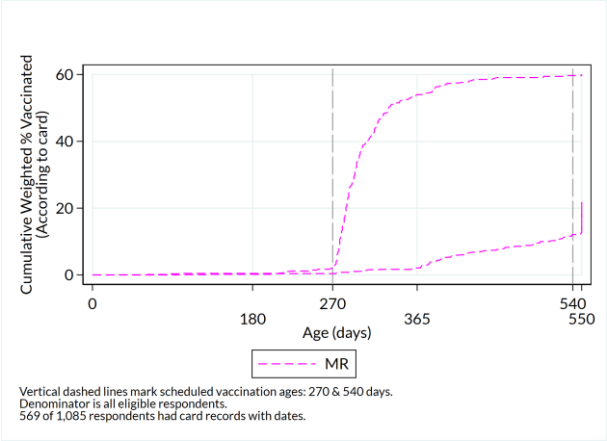
[19] World Health Organization. Behavioural and social drivers of vaccination: tools and practical guidance for achieving high uptake. Annex 1.1. Geneva: WHO, 2022.

Annex B: Sample job aid for screening and catch-up (adapt to national schedule)

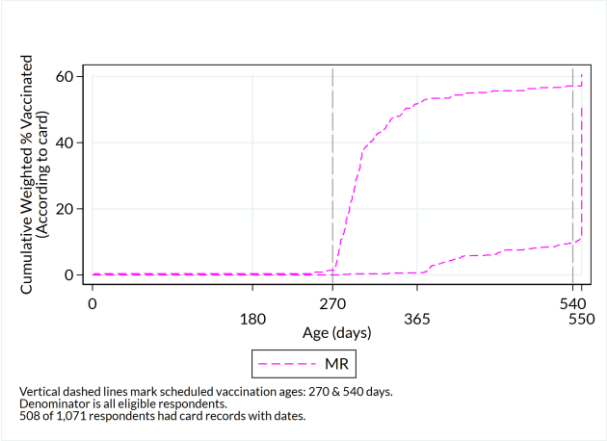


Please note that the first dose in a series should always be documented as DTP1, MCV1, IPV1, etc., regardless of when it was given. Similarly, all subsequent doses in a series should be documented with the correct sequential number (DTP2, DTP3, DTP4, etc.). Adapted from: World Health Organization. Establishing and strengthening immunization in the second year of life: practices for vaccination beyond infancy. Annex 4. Geneva: WHO, 2018.

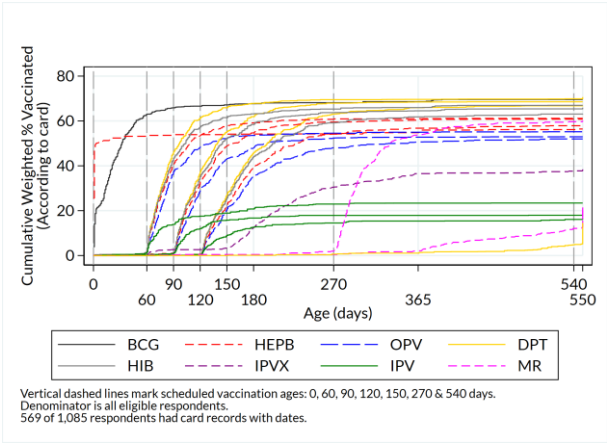
Annex C: Example of monitoring age of vaccination using survey data



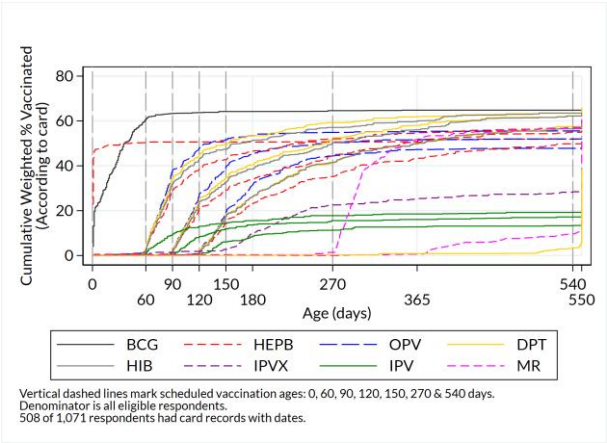
12-23 months



24-35 months



12-23 months



24-35 months

Note: Cumulative percentages are limited by the proportion of respondents with vaccination HBRs showing dates of vaccination. HEPB = Hepatitis B birth dose. HIB = *Haemophilus influenzae* type b. IPV = Inactivated poliovirus vaccine. OPV = oral polio vaccine. DPT = diphtheria-tetanus-pertussis containing vaccine. MR = measles and rubella vaccines.