

## Immunization coverage: children

### Rationale

- Vaccination programs are one of the priority interventions in all countries. All children should have all vaccinations everywhere.
- More vaccines are added to the schedules in many countries, as they become available.

### Experience and evidence

- Experience
  - Hundreds of national surveys have been conducted using fairly standardized approaches including DHS, MICS, national immunization coverage surveys, socioeconomic surveys: extensive since the late seventies.
  - Economic surveys tend to use very short sets of questions and may not including retrieval of the child health card during the interview. This affects the comparability of such immunization coverage estimates.
  - WHO has developed a standard instrument which includes the questionnaire and full instructions for a stand-alone immunization coverage survey.<sup>1</sup>
- Evidence
  - There have been a few studies to ascertain the quality of survey data. Some have focused on the quality of mother's recall and generally the results do not indicate systematic biases<sup>2</sup>. The results showed fairly good accuracy of mother's recall of specific vaccinations though reliability may vary depending on a range of survey related factors and the changing complexity of vaccination schedules.
  - A few studies with serological testing have assessed seroconversion, such as following tetanus or measles vaccination. The results of these studies however assess both the accuracy of the recorded or reported vaccination as well as the efficacy of the vaccine. It is noted that the latter is usually below 100%. Biomarkers of seroconversion are potentially useful to estimate population level protection but may not serve particularly well to validate vaccination program performance or coverage<sup>3</sup>.
  - Comparisons have been conducted between health facility based estimates and population survey data. Quality issues are more likely to occur with the health facility-based estimates. In general, however, there is reasonable consistency between the two methods.

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<sup>1</sup> WHO. Immunization coverage cluster survey – reference manual. WHO/IVB/04.23. Geneva. 2005.

<sup>2</sup> Cutts FT, Izurieta HS, Rhoda DA. Measuring coverage in MNCH: design, implementation, and interpretation challenges associated with tracking vaccination coverage using household surveys. *PLoS Med.* 2013;10(5):e1001404

<sup>3</sup> Fortuin M, Maine N, Mendy M, Hall A, George M, et al. (1995) Measles, polio and tetanus toxoid antibody levels in Gambian children aged 3 to 4 years following routine vaccination. *Trans R Soc Trop Med Hyg* 89: 326–329.

- *Plausibility*: Hundreds of survey applications have shown consistency of results in space and over time in multiple settings. This includes comparability of results across populations.

### Short / core module

- The standard survey module has been developed by WHO's EPI coverage surveys and DHS , and is used by DHS, MICS and many other surveys. It has been almost unchanged in several decades.
- There is no short module to obtaining accurate immunization information. The only option would be to focus on selected vaccines but this will have little impact on the length of the module.
- Respondents are women 15-49 years of age and questions are asked about their own children (and about other children that they for whom they are the primary caretakers). The information is collected for all children under age 5, although most analyses focus on children age 12-23 months to better reflect children who have reached the age by which they should be fully vaccinated. Information is not collected for children who are deceased.
- Information on vaccination coverage is obtained in two ways—from health cards and from mothers' verbal reports:
  - Health card: all respondents mothers are asked to show the interviewer the health cards that recorded the child's immunisation history. If the card is available, the interviewer copies the dates of each vaccination.
  - Mother's recall: If the mother is not able to present a card for a child, she is asked to recall whether the child had received BCG, polio, DPT or pentavalent, and measles vaccines. If she indicated that the child had received the polio or DPT-HB/DPT-HB-Hib vaccines, she was asked about the number of doses that the child received. For mothers who showed a card, if a vaccination was not recorded on the card, the mother is also asked to recall whether that particular vaccination had been given.
- Immunization coverage rates at 12-23 months are usually disaggregated by sex, place of residence, and socioeconomic status. The numbers of children in this small age group are usually small, and disaggregating by variables with too many categories is not possible.
- Indicators
  - Proportion of children aged 12-23 months who have received a specific vaccination: three doses of pentavalent / DTP / PCV / Rotavirus / polio (first, second third dose); measles; BCG; fully immunized
- Questions / module

**SECTION 5. CHILD IMMUNIZATION AND HEALTH AND CHILD'S AND WOMAN'S NUTRITION**

501	ENTER IN THE TABLE THE LINE NUMBER, NAME, AND SURVIVAL STATUS OF EACH BIRTH IN 2005 OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, USE LAST 2 COLUMNS OF ADDITIONAL QUESTIONNAIRES).																																																																																																																																																																	
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503	FROM 212 AND 216	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 573)	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 573)	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO TO 503 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE, OR IF NO MORE BIRTHS, GO TO 573)																																																																																																																																																														
503A	Did (NAME) receive vitamin A like this during the last 6 months? (SHOW CAPSULES)	YES ..... 1 NO ..... 2 (SKIP TO 504) ← DON'T KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 504) ← DON'T KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 504) ← DON'T KNOW ..... 8																																																																																																																																																														
503B	Where did (NAME) the get the drops? During the campaign with other children, during a sick visit or during a routine/healthy visit?	VAC. CAMPAGIN ..... 1 SICK VISIT ..... 2 HEALTHY VISIT ..... 3	VAC. CAMPAGIN ..... 1 SICK VISIT ..... 2 HEALTHY VISIT ..... 3	VAC. CAMPAGIN ..... 1 SICK VISIT ..... 2 HEALTHY VISIT ..... 3																																																																																																																																																														
504	Do you have a card where (NAME'S) vaccinations are written down? IF YES: May I see it please?	YES, SEEN ..... 1 YES, NOT SEEN ..... 2 (SKIP TO 508) ← NO CARD ..... 3	YES, SEEN ..... 1 YES, NOT SEEN ..... 2 (SKIP TO 508) ← NO CARD ..... 3	YES, SEEN ..... 1 YES, NOT SEEN ..... 2 (SKIP TO 508) ← NO CARD ..... 3																																																																																																																																																														
506	<p>(1) COPY VACCINATION DATE FOR EACH VACCINE FROM THE CARD.                  (2) WRITE '44' IN 'DAY' COLUMN IF CARD SHOWS THAT A VACCINATION WAS GIVEN, BUT NO DATE IS RECORDED.                  (3) IF MORE THAN TWO VITAMIN 'A' DOSES, RECORD DATES FOR MOST RECENT AND SECOND MOST RECENT DOSES.</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">LAST BIRTH</th> <th colspan="3">NEXT-TO-LAST BIRTH</th> <th colspan="3">SECOND-FROM-LAST BIRTH</th> </tr> <tr> <th>DAY</th> <th>MONTH</th> <th>YEAR</th> <th>DAY</th> <th>MONTH</th> <th>YEAR</th> <th>DAY</th> <th>MONTH</th> <th>YEAR</th> </tr> </thead> <tbody> <tr> <td>BCG</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>POLIO 0 (POLIO GIVEN AT BIRTH)</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>POLIO 1</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>POLIO 2</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>POLIO 3</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>DPT-HBIB 1</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>DPT-HBIB 2</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>DPT-HBIB 3</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>DPT-HB1</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>DPT-HB2</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>DPT-HB3</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>MEASLES</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>VITAMIN A (MOST RECENT)</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> <tr> <td>VITAMIN A (MOST RECENT)</td> <td></td><td></td><td></td> <td></td><td></td><td></td> <td></td><td></td><td></td> </tr> </tbody> </table>				LAST BIRTH			NEXT-TO-LAST BIRTH			SECOND-FROM-LAST BIRTH			DAY	MONTH	YEAR	DAY	MONTH	YEAR	DAY	MONTH	YEAR	BCG										POLIO 0 (POLIO GIVEN AT BIRTH)										POLIO 1										POLIO 2										POLIO 3										DPT-HBIB 1										DPT-HBIB 2										DPT-HBIB 3										DPT-HB1										DPT-HB2										DPT-HB3										MEASLES										VITAMIN A (MOST RECENT)										VITAMIN A (MOST RECENT)									
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NO.	QUESTIONS AND FILTERS	LAST BIRTH	NEXT-TO-LAST BIRTH	SECOND-FROM-LAST BIRTH
		NAME _____	NAME _____	NAME _____
507	Has (NAME) received any vaccinations that are not recorded on this card, including vaccinations received in a national immunization day campaign?  RECORD 'YES' ONLY IF RESPONDENT MENTIONS BCG, POLIO 0-3, DPT-HBIB 1-3, DPT-HB 1-3 AND/OR MEASLES VACCINES.	YES ..... 1 (PROBE FOR ←) VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 506) (SKIP TO 516) ← NO ..... 2 (SKIP TO 516) ← DONT KNOW ..... 8	YES ..... 1 (PROBE FOR ←) VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 506) (SKIP TO 516) ← NO ..... 2 (SKIP TO 516) ← DONT KNOW ..... 8	YES ..... 1 (PROBE FOR ←) VACCINATIONS AND WRITE '66' IN THE CORRESPONDING DAY COLUMN IN 506) (SKIP TO 516) ← NO ..... 2 (SKIP TO 516) ← DONT KNOW ..... 8
508	Did (NAME) ever receive any vaccinations to prevent him/her from getting diseases, including vaccinations received in a national immunization campaign?	YES ..... 1 NO ..... 2 (SKIP TO 516) ← DONT KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 516) ← DONT KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 516) ← DONT KNOW ..... 8
509	Please tell me if (NAME) received any of the following vaccinations:			
509A	A BCG vaccination against tuberculosis, that is, an injection on the right arm or shoulder that usually causes a scar?	YES ..... 1 NO ..... 2 DONT KNOW ..... 8	YES ..... 1 NO ..... 2 DONT KNOW ..... 8	YES ..... 1 NO ..... 2 DONT KNOW ..... 8
509B	Polio vaccine, that is, drops in the mouth?	YES ..... 1 NO ..... 2 (SKIP TO 509E) ← DONT KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 509E) ← DONT KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 509E) ← DONT KNOW ..... 8
509C	Was the first polio vaccine received in the first two weeks after birth or later?	FIRST 2 WEEKS . . . 1 LATER ..... 2 DONT KNOW ..... 8	FIRST 2 WEEKS . . . 1 LATER ..... 2 DONT KNOW ..... 8	FIRST 2 WEEKS . . . 1 LATER ..... 2 DONT KNOW ..... 8
509D	How many times was the polio vaccine received?	NUMBER OF TIMES ..... <input type="text"/> DONT KNOW ... 8	NUMBER OF TIMES ..... <input type="text"/> DONT KNOW ... 8	NUMBER OF TIMES ..... <input type="text"/> DONT KNOW ... 8
509E	A DPT-HB vaccination, that is, an injection given in the thigh or buttocks, sometimes at the same time as polio ?	YES ..... 1 NO ..... 2 (SKIP TO 509G) ← DONT KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 509G) ← DONT KNOW ..... 8	YES ..... 1 NO ..... 2 (SKIP TO 509G) ← DONT KNOW ..... 8
509F	How many times was a DPT-HB vaccination received?	NUMBER OF TIMES ..... <input type="text"/> DONT KNOW ... 8	NUMBER OF TIMES ..... <input type="text"/> DONT KNOW ... 8	NUMBER OF TIMES ..... <input type="text"/> DONT KNOW ... 8
509G	A measles injection or MMR that is, a shot in the arm at the age of 9 months or older - to prevent him/her from getting measles?	YES ..... 1 NO ..... 2 DONT KNOW ..... 8	YES ..... 1 NO ..... 2 DONT KNOW ..... 8	YES ..... 1 NO ..... 2 DONT KNOW ..... 8

### Additional indicators

- Vaccination coverage by 12 months: survey coverage by age 12 months is most comparable facility data based estimates of immunization coverage which focus on vaccinations given to infants. Information on dates of vaccination is obtained from the vaccination card or if there is no written record, from the mother. For children whose information is based on the mother's report, the proportion of vaccinations given during the first year of life was assumed to be the same as for children with a written record of vaccinations. Using the age

cohorts 12-23, 24-35, 36-47, and 48-59 months a time trend in vaccination status by 12 months can be obtained.

- Drop out rates (DTP1 – DTP3, DTP1 – measles): dropout of vaccination between first and third DTP vaccination, or DTP1 and measles vaccinations

### Main Indicator definitions

Name	Numerator	Denominator
Immunization coverage among 12-23 months old by vaccine (pentavalent / DTP / PCV / Rotavirus / polio / BCG / measles)	Number of children 12-23 months who have received the relevant vaccinations	Total number of children 12-23 months
Proportion of children aged 12-23 months who have received all recommended vaccinations	Number of children 12-23 months who have received all recommended vaccinations	Total number of children 12-23 months
Proportion of children 12-23 months (or older) who have received the specific vaccinations by age 12 months	Number of children who received the specific vaccination by 12 months	Total number of children 12-23 months
Proportion of children 12-23 months who dropped out of vaccination between first and third DTP vaccination (or DTP1 and measles vaccinations)	Difference between DPT3 and DPT1 coverage	DPT1 coverage