# 6 Monitoring and surveillance

## *About this module…*

This module explains how to collect and report data for the monitoring of immunization services and the surveillance of vaccine-preventable diseases and adverse events following immunization (AEFI). Monitoring and surveillance are included together since data from both are usually reported in a summary form forwarded to central levels. The process of recording the data is described first. This is followed by a description of the summary reporting process and the ways in which these data can be analysed and used.

Monitoring of immunization services helps to improve performance and identify and solve any problems of access and utilization detected in communities with high numbers of unimmunized children. Surveillance of vaccine-preventable diseases helps guide disease control activities by detecting outbreaks, identifying high-risk groups or areas and monitoring the impact of immunization services. Surveillance of AEFI cases helps to identify the causes of adverse events and, if needed, triggers a review of proper vaccine handling and administration.

Examples in this module focus on infants, but the methods can be applied to older age groups. The examples show paper-based recording and reporting, but data collection principles apply to other modalities. While the use of electronic tools for district data monitoring is encouraged by WHO, their implementation and instructions for use will depend on national or central authorities and objectives.

# Contents

# 1 Tools for monitoring

Every health facility needs a system of recording data for monitoring immunization services. Systematically and regularly recording the vaccinations given at each session ensures that services meet coverage targets (see Section 3 of this module), identifies defaulters and helps to actively follow up all those who need to complete their vaccinations.

The tools required for effective monitoring were introduced in Modules 4 (*Microplanning for reaching every community*) and 5 (*Managing an immunization session*) and are discussed in more detail here. They are:

- the immunization register
- the immunization card
- the tally sheet
- the defaulter tracking list.

## 1.1 The immunization register

The immunization register is used to record the immunizations received by each child. It is a book or a form that stays in the health facility. Its main purpose is to keep track of the immunization services provided to each infant over time. It lists each infant on a separate line and is important for several reasons:

- It is the health facility's primary source of information on a child's immunization status and needed vaccinations. This information is particularly helpful if an infant attends for a follow-up visit without their immunization card.
- It helps identify infants who miss scheduled vaccinations and who need to be added to the defaulter tracking list.
- It is a source of data for monthly and other reports.

Health facilities may keep separate registers for each community that they serve; they may also use specific registers for outreach activities and/or children who present from outside their catchment area.

### What information is commonly included in the immunization register?

An immunization register usually includes the following information:

- unique identification number
- registration date (usually the date of the first visit)
- name of infant
- infant's birth date
- infant's sex
- name, address and phone/mobile number of caregiver(s)
- dates and doses of vaccinations and vitamin A supplementation given (if applicable)
- protected at birth (PAB) status, which indicates whether or not the infant was protected for neonatal tetanus.

The immunization register can also be used as a birth register. As soon as an infant is born in the community, their name can be entered in the register even before receiving any vaccinations. This will help to follow up new infants along with older ones on the defaulter tracking list.

Two different infant immunization register examples are shown in Figure 6.1.

- With both examples, a new month can be started at the top of the next page even if there are some lines left on the current page. For example, on 31 January there may be five lines blank on the current page but on 1 February registration of new infants should start at the top of the next page. This will make it easier to find infants returning without their immunization cards and to compile defaulter tracking lists (see Section 1.4 of this module).
- The first example (A) is organized by vaccine and the doses required for the series. With this format, it is easy to see whether an infant is fully immunized with each antigen.
- The second example (B) is organized by vaccines that are usually given in the same visit when following the example immunization schedule. With this format, it is easy to see which doses are needed each time an infant comes to a session. It is also easy to see which infants have missed vaccinations and need to be included in the defaulter tracking list (see Section 1.4 of this module).

These are suggestions. Any format used should match national guidelines and be coordinated with the method used to track defaulters, as described in Section 1.4 of this module.

## Figure 6.1 Infant immunization register examples

Note that these examples are for a 4-dose OPV, 2-dose RV and 3-dose PCV schedule. The register format always depends on the vaccines that are included in the national immunization schedule.

### A. Format organized by vaccine series

Village: Name of health facility:

MONTH and YEAR:

| ID No | Registration date[a] | Name of infant/child | DOB[b] | Sex | Name of mother/ caregiver | Address and mobile/ phone number | PAB from NT* (Y/N) | BCG | HepB (<24h or >24h)** | polio (OPV &/or IPV) | | | | RV | | pentavalent | | | PCV | | | MCV1 | MCV2 | Vit A | | | Remarks – completed/ died/ moved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | OPV0 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | | | 1 | 2 | 3 | |
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[a] Usually date of first visit
[b] DOB: Date of birth
* Protected at birth from Neonatal tetanus – ask mother at penta1 contact
** Only 1 birth dose of HepB is required; write if given <24h or >24h after birth

### B. Format organized by immunization contact and doses of all vaccines required at each contact

MONTH and YEAR:

| ID No | Registration date[a] | Name of infant/child | DOB[b] | Sex | Name of caregiver | Address and mobile/ phone number | Birth doses | | | PAB from NT** (Y/N) | 1st doses | | | | 2nd doses | | | | 3rd doses | | | MCV1 | MCV2 | Vit A | | | Remarks – completed/ died/ moved |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | OPV 0 | BCG | HepB (<24h or >24h)* | | RV1 | polio1 | PCV 1 | penta1 | RV2 | polio2 | PCV 2 | penta2 | polio3 | PCV 3 | penta3 | | | 1 | 2 | 3 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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[a] Usually date of first visit
[b] DOB: Date of birth
* Only 1 birth dose of HepB is required; write if given <24h or >24h after birth
** Protected at birth from Neonatal tetanus – ask mother at penta1 contact

### How to complete an immunization register

Infants should be registered as soon as they arrive at the health facility or outreach site. Fill in all information except the space provided for vaccinations. Vaccinations should be marked only after being administered.

Use a unique identification number on the register for each infant and write the same number on the immunization card. A unique identification number is easier to locate in the register if the immunization card is available during follow-up appointments.

Do not create a new entry in the register each time the mother brings the infant for immunization. Ask the caregiver for the immunization card and look for a corresponding entry in the register. If the immunization card is not available, ask the caregiver for the child's name, age and the month and/or other details of the first immunization, then locate their line in the register.

For every new infant (never immunized), create a new entry in the register and a new immunization card. For an infant who has come to the health facility for the first time but has received immunizations in another facility, create a new entry in the register, ask for the immunization card and write immunizations that the infant has already received in the register. If there is no immunization card, review the vaccines the child should have received (by age according to the national immunization schedule) with the caregiver and record the ones they can recall being given. If the caregiver is not able to recall the vaccines given, the immunization schedule should be started again (see Module 5, Section 3 on assessing eligibility for immunization).

### Key points

- **Fill in all information on the register line for each infant.**
- **Mark vaccinations in the register only after they are given to the infant.**
- **When an infant returns for a follow-up visit, find the register line for the infant using the immunization card (or the infant's name and age and/or month of first vaccination if the card is not available).**

## 1.2 The immunization card

The infant immunization card is used to record the immunizations a child has received. It may be a separate document or part of a general infant or mother/child health record, such as a Road to Health Card or Child Health Booklet, and is important for several reasons:

- it serves to remind caregivers to return to the clinic for the next dose(s) of vaccine(s)
- it helps the health worker determine an infant's immunization status

- it is useful when health workers conduct coverage surveys.

The specific format of the immunization card depends on the vaccines that are included in the national immunization schedule. Examples of immunization cards are available from the vaccination card repository at www.immunizationcards.org.

## Key points

- **Remember that the immunization card may be the only record of immunization status available for health workers if registers are not well maintained or if families move from one health facility to another.**
- **Each infant should have a card with vaccinations marked correctly.**
- **Review Module 5 for the process of filling and explaining the card to caregivers during the immunization encounter.**

### What information is commonly included on an immunization card?

An immunization card usually includes the following information:

- unique identification number (which is the same number written in the immunization register as shown in Figure 6.1)
- infant's name
- infant's birth date
- infant's sex
- name and address of caregiver(s), including mobile/phone number if available
- date, dose and lot number of each vaccine given
- date and dose of vitamin A supplementation given, if applicable
- PAB status (infant protection at birth from neonatal tetanus)
- date, dose and lot number of each TT vaccine given to the mother (optional; see Annex 6.1)
- due date for next immunization(s)
- country immunization schedule (optional)
- growth monitoring chart (optional).

The infant's caregiver should be reminded to keep the immunization card in a safe place and to take it to all immunization and other health care visits.

### How to use an immunization card

Complete the card by writing down the date for each vaccine administered or vitamin A supplement given. Include doses of TT given to the mother if she is eligible and the card has space to enter it (this will depend on national protocol and there may be a separate women's immunization card).

Mark the next appointment date on the card and tell the caregiver when and where to return for the next vaccination.

### Key points

- **Remember to mark the next appointment date on the immunization card. Make sure that the appointment corresponds to a planned immunization session.**
- **Inform the caregiver of the next appointment verbally as well as in writing on the card.**
- **Always return the immunization card to the caregiver.**
- **Remind the caregiver to keep the immunization card in a safe place and to take it to all health care and immunization visits.**

## 1.3 The tally sheet

Tally sheets are forms that are marked every time a health worker administers a dose of vaccine. They are used to monitor performance and complete monthly reporting. Ideally, a new tally sheet should be used for each session, but weekly or monthly sheets are also found in some programmes. An example is shown in Figure 6.2.

### What information is commonly included on a tally sheet?

Tally sheets record vaccinations actually given by marking them after an infant receives a dose. The dose is recorded in the immunization register and on the immunization card and the caregiver is informed of which vaccinations were given (see Module 5, Section 2 for more on communicating with caregivers).

### How to use a tally sheet

Mark the tally sheet next to the dose received (there are various ways of making tally marks, for example: □ or 𝍸 ). Tally sheets with preprinted symbols that can be marked through may help to ensure more accurate counting of totals for reports (for example, a line can be drawn through each "0" in Figure 6.2 after each dose given). If

preprinted sheets are not used, all vaccinators in a health facility should use the same type of tally marks to make it easier to count the totals.

In Figure 6.2, after vaccinating an infant (who is by definition less than one year of age), place the mark in the column headed "Age <1 year". After vaccinating an older child, place the mark under "Age >1 year".

## **Figure 6.2** Tally sheet example

The specific format of the tally sheet depends on the vaccines that are included in the national immunization schedule. HPV and other vaccines given to older age groups may be recorded on separate tally sheets.

| **Immunization session tally sheet** | | | | | |
|---|---|---|---|---|---|
| Name of health facility: | | | | Date of session: | |
| Place of session: | | | | Type of session: fixed/outreach/mobile | |
| Name of staff completing tally: | | | | | |
| **Vaccine** | | **Vaccine lot #** | **Scheduled vaccinations (done on time)** | | **Delayed vaccinations (done when late/overdue)** |
| | | | Age <1 year | | Age >1 year |
| | | | tally | total | tally | total |
| BCG | | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | | |
| HepB (<24h or >24h) | | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | | |
| polio (OPV &/or IPV) | OPV0 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | | |
| | polio1 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | polio2 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | polio3 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | polio3+ | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| RV | RV1 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | | |
| | RV2 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | | |
| pentavalent | pentavalent1 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | pentavalent2 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | pentavalent3 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| PCV | PCV1 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | PCV2 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | PCV3 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | | | Age 9–12 months | | Age >12 months | |
| MCV1 | | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | | | Age 15–18 months | | Age >18 months | |
| MCV2 | | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| | | | Age <1 year | | Age >1 year | |
| Vitamin A | | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | |
| **Women** | | | **Pregnant women** | | **Non-pregnant women** | |
| TT1 | | | 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 | |
| TT2 | | | 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 | |
| TT3 | | | 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 | |
| TT4 | | | 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 | |
| TT5 | | | 00000 00000 00000 00000 00000 00000 | | 00000 00000 00000 00000 00000 00000 | |
| TOTAL TT | | | | | | |
| TOTAL TT2+TT3+TT4+TT5 | | | | | | |

| **HPV immunization session tally sheet** | | | |
|---|---|---|---|
| Name of health facility: | | | Date of session: |
| Place of session: | | | Type of session: fixed/outreach/mobile |
| Name of staff completing tally: | | | |
| | | **Scheduled vaccinations (done on time)** | **Delayed vaccinations (done when late/overdue)** |
| | **Vaccine lot #** | Girls aged 9–13 years | Girls aged >13 years |
| HPV1 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 |
| HPV2 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 |
| HPV3 | | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 | 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 |

If a dose of vitamin A is given, mark it on the tally sheet.

At the end of each immunization session, add up the number of marks recorded during the session. This gives the total number of immunizations given with each antigen and each dose in its series. Keep the tally sheet for the supervisor to review. Table 6.1 describes some common errors in tallying.

**Table 6.1** Common mistakes in tallying

| Mistake in tallying | Possible problem that may occur | Correct practice |
|---|---|---|
| Tallying before the vaccination is given | The child may not receive the vaccination | Give the dose first then mark it on the tally sheet |
| Tallying at the end of a session according to number of doses contained in the used vials | Wasted doses may be counted | Tally each dose given (as above) |
| Tallying all vaccines under one age group (to include those outside the targeted age) | Will result in inaccurate coverage data | Separate tally for under 1 and over 1 year old |

## 1.4 The defaulter tracking list

The term "defaulter" refers to individuals who miss scheduled vaccinations for any reason, including health facility problems, such as cancelled sessions or vaccine stock outs. Defaulters need to be followed up and mobilized to attend the earliest available session, since the goal is to complete any missed vaccinations. A tracking list, such as the one shown in Figure 6.3, should be filled in after each immunization session or at least monthly as described below. It should be given to the person(s) tasked with finding defaulters.

### What information is commonly included on a defaulter list?

A defaulter tracking list usually includes the following information:

- infant's name
- caregiver's name
- caregiver's contact information, including phone/mobile number(s)
- infant's age in months
- vaccinations needed.

**Figure 6.3** Defaulter tracking list example

Date:

Health centre name: Community name:

| | **Infant's name** | **Caregiver's name** | **Caregiver's contact information** (include phone/mobile number if available) | **Infant's age in months** | **Vaccinations needed** |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |

Defaulters can be listed by reviewing different immunization records. Two suggested methods are:

### Listing defaulters using the immunization register

At the end of each month, review the immunization register to identify infants who may have failed to receive vaccinations when due. For example, in March check to see that any infant who received a pentavalent1 dose in February returned for pentavalent2 (in March) when it was due. Add the names of any infants who missed vaccinations to the defaulter tracking list. Names should be listed for tracking and follow-up as soon as possible after a missed appointment.

Figure 6.4 shows a completed example of the register shown in Figure 6.1 (A). Note that looking at each line helps visualize which infants have missed vaccinations and so should be added to the defaulter tracking list.

## Figure 6.4 Infant immunization register example for defaulter tracking

In this example, the immunization register is reviewed regularly so that any child who misses an appointment can be added to the defaulter tracking list as soon as possible. The notes below review register lines individually.

Village: Here

Name of health facility: Your health facility

MONTH and YEAR: Jan 2013

| ID No | Registration date[a] | Name of infant/child | DOB[b] | Sex | Name of caregiver | Address and mobile/ phone number | Birth doses | | | PAB from NT** (Y/N) | 1st doses | | | | 2nd doses | | | | 3rd doses | | | MCV1 | MCV2 | Vit A | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | OPV0 | BCG | HepB (<24h or >24h)* | | RV1 | polio1 | PCV 1 | penta1 | 3I6 | polio2 | PCV 2 | penta2 | polio3 | PCV 3 | penta3 | | | 1 | 2 | 3 | |
| 511 | 3/1 | Baby One | 1/1/13 | F | Mom One | Nearby St, ph 555667 | 1/1 | 1/1 | 1/1, <24h | y | 15/2 | 15/2 | 15/2 | 15/2 | 15/3 | 15/3 | 15/3 | 15/3 | 18/4 | 18/4 | 18/4 | 21/10 | | 21/10 | | | |
| 512 | 10/1 | Boy Two | 5/1/13 | M | Mother Two | Far St, ph 555551 | 10/1 | 10/1 | 10/1, >24h | y | 21/2 | 21/2 | 21/2 | 21/2 | 21/3 | 21/3 | 21/3 | 21/3 | | | | | | | | | defaulter tracking done – moved out of area |
| 513 | 10/1 | Girl Three | 7/1/13 | F | Father Three | Middle Rd, ph 333335 | 10/1 | 10/1 | 10/1, >24h | y | 21/2 | 21/2 | 21/2 | 21/2 | 21/3 | 21/3 | 21/3 | 21/3 | 25/4 | 25/4 | 25/4 | 31/10 | | 31/10 | | | |
| 514 | 10/1 | Baby Girl Four | 10/1/13 | F | Mama Four | Square St, ph 111117 | 10/1 | 10/1 | 10/1, <24h | n | 21/2 | 21/2 | 21/2 | 21/2 | 21/3 | 21/3 | 21/3 | 21/3 | 25/4 | 25/4 | 25/4 | 21/10 | | 21/10 | | | |
| 515 | 17/1 | Boy Five | 6/1/13 | M | Mum Five | Round Rd, ph 777559 | 10/1 | 10/1 | 10/1, >24h | n | 21/2 | 21/2 | 21/2 | 21/2 | 21/3 | 21/3 | 21/3 | 21/3 | 25/4 | 25/4 | 25/4 | | | | | | |
| 516 | 17/1 | Baby Boy Six | 17/1/13 | M | Dad Six | Circle St, ph 666553 | | | | | | | | | | | | | | | | | | | | | newborn moved out of catchment |
| 517 | 17/1 | Girl Seven | 5/11/12 | F | Mom Seven | Line Rd, ph 221255 | 5/11/12 | 5/11/12 | 5/11/12, <24h | y | 17/1 | 17/1 | 17/1 | 17/1 | 21/3 | 21/3 | 21/3 | 21/3 | 23/5 | 23/5 | 23/5 | 22/8 | | 22/8 | | | |
| 518 | 17/1 | Girl Eight | 16/1/13 | F | Mama Eight | Park Pl, ph 332211 | 17/1 | 17/1 | 17/1, >24h | y | 21/2 | 21/2 | 21/2 | 21/2 | 21/3 | 21/3 | 21/3 | 21/3 | 25/4 | 25/4 | 25/4 | 31/10 | | 31/10 | | | |
| 519 | 24/1 | Baby Nine | 19/1/13 | M | Mother Nine | City Lane, ph 991119 | 24/1 | 24/1 | 24/1, >24h | y | 7/3 | 7/3 | 7/3 | 7/3 | | | | | | | | | | | | | defaulter tracking done – family declined |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |

[a] Usually date of first visit
[b] DOB: Date of birth
* Only 1 birth dose of HepB is required; write if given <24h or >24h after birth
** Protected at birth from neonatal tetanus – ask mother at penta1 contact

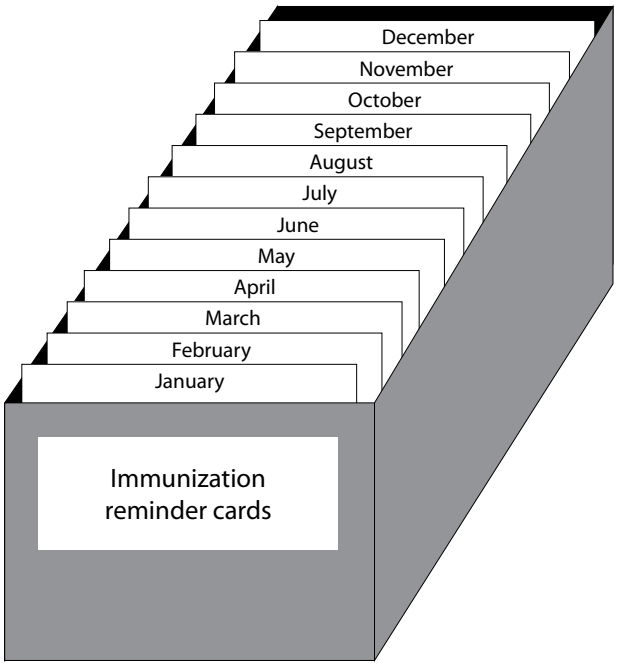
Note that:

- This example is typed for clarity. A handwritten register may be used.
- This is a register for a single village. Addresses may need to be written in more detail if more than one village is included in the same register.
- It shows the first page for a specific month: January 2013. The identification numbers are continued from the previous year and this is why the ID No column starts with the number 511.
- ID No 511 was born on 1/1/13 but added to the register on 3/1.
- ID No 512 did not return after receiving his second doses. He was added to the defaulter tracking list and found to have moved out of the catchment area.
- ID No 515 has not received a dose of the measles vaccine (MCV1) and is still under defaulter tracking.
- ID No 516 was born at home and registered after the health worker was notified by a community volunteer. Defaulter tracking found that the family subsequently left the catchment area.
- ID No 517 received birth doses in the hospital on 5/11/12 but then presented at irregular intervals for follow-up. She is now up-to-date.
- ID No 513, 514 and 518 are up to date according to the example immunization schedule used in this module.
- ID No 519 did not return after his first doses. Defaulter tracking found that the family declined any further immunizations.
- The last line is blank since the next infant was added in February, which starts on a new page (not shown).

### Listing defaulters using reminder cards

Reminder cards are copies of infants' immunization cards that can be filed in a box by the month when the next vaccination is due (see Figure 6.5). For example, when an infant receives pentavalent1 in January, mark it on the reminder card and place the card behind the February divider, since this is when pentavalent2 is due. In February, if the infant receives pentavalent2, update the reminder card and place it in the March section when pentavalent3 is due. If the infant does not come for pentavalent2 in February, or does come but does not get vaccinated (due to stock-outs or other reasons), the card will remain in February. At the end of each month, review all the reminder cards remaining and add the names of the infants who have missed vaccinations to the defaulter tracking list.

**Figure 6.5** Box for filing reminder cards




### How to use the defaulter tracking list

The defaulter tracking list will be effective only if every infant receives vaccinations that are overdue. Listing defaulters regularly every month makes it easier to find them and follow them up. To follow up defaulters, caregivers may be contacted directly (for example by phone or text messaging) or with the help of other community members. Module 7 (*Partnering with communities*) gives more detail on working with communities.

# 2 Tools for surveillance

Just as every health facility needs a system of recording immunization data for monitoring, it also needs a system of recording surveillance data on vaccine-preventable diseases and adverse events following immunization (AEFIs).

National- or central-level authorities should provide a list of diseases, the forms to be completed and a protocol describing how cases should be reported.

AEFI reporting is included routinely in summary reports, but may also require immediate notification by phone to relevant managers and authorities as directed by national or central-level guidelines (see Section 2.3).

The main tools used for surveillance in health facilities are:

- the vaccine-preventable diseases or integrated communicable diseases tally sheet
- the disease-specific case investigation report form
- the line list
- the AEFI report form.

## 2.1 The vaccine-preventable disease tally sheet

Vaccine-preventable disease cases should be tallied when they are seen at a health facility or outreach site. The total number for each type of disease should be added for reporting to central levels. This is often done monthly in a summary form. An example monthly summary form is shown in Figure 6.10 and discussed in Section 3 of this module. Copies of the second page of the form in Figure 6.10 may be made for daily or weekly tallies at health centre and outreach sites and then be compiled for the monthly report.

### What information is commonly included in a vaccine-preventable disease tally sheet?

The vaccine-preventable diseases included in the tally should match the list of diseases that must be reported to national or central authorities. A case definition for each disease on the list should be obtained from national or central level to help make the reporting more accurate. Age, sex and vaccination status of the patient are usually required. Health centre consultation registers should be adapted as needed to allow space for this and/or other information required by national authorities.

### How to use a vaccine-preventable disease tally sheet

If cases of vaccine-preventable diseases are tracked in curative service tally sheets daily or weekly, take the numbers from the matching lines on these sheets to calculate the monthly tally, which is then used in the monthly summary report. If curative service visits are entered in a register without being added to tally sheets, review the consultation register for the total number of cases of each vaccine-preventable disease each month. If no consultation register is kept or if curative care for cases is done within immunization services, keep line lists for vaccine-preventable diseases as described in the next section and tally them for the monthly summary.

Use the tally to review trends in cases of specific reportable diseases, and proceed with reporting as required by country policy. Some diseases may need to be reported immediately on a case-by-case basis.

## 2.2 The disease-specific case investigation report form

Certain vaccine-preventable diseases require immediate investigation and reporting to the next higher level. National guidelines should specify which diseases should be investigated and reported on disease-specific forms if health centre staff identify a suspected case. Case definitions should be included in national guidelines. Staff should have access to forms showing all the information they need to aid in completing the disease-specific report. Figure 6.6 shows an example for a suspected case of neonatal tetanus.

### What information is commonly included in a disease-specific case investigation form?

The information needed will vary by disease but, in general, the following minimum information is needed:

- patient's name, date of birth, age and sex
- patient's address (of their caregiver for children) and mobile/phone number if available
- patient's immunization status with dates of relevant vaccine doses
- mother's immunization status, if relevant (for example, in suspected cases of neonatal tetanus)
- other risk factors for the suspected disease, if relevant
- description and start date of symptoms of suspected disease
- laboratory results, if relevant

- treatment and outcome
- conclusions about the case; for example, suspected, confirmed, discarded or unable to classify.

### How to use a disease-specific case investigation form

Investigation is done face-to-face with the patient and caregiver in the home, community and/or hospital. High-quality information is needed since district and higher levels use this type of report to decide whether public health action is necessary. All questions on the form should be completed and promptly sent to the person responsible for evaluating the reports and deciding whether further action is needed. Cases should be tallied for monthly summary reports along with other vaccine-preventable diseases.

**Figure 6.6** WHO neonatal tetanus case investigation report form

Investigator's name: Investigation date:

**Case identification and household location**

Name of respondent: Relationship to baby:
Address of respondent:
Baby's date of birth: __/__/__ Baby's date of death: __/__/__
Age at death in days: _____ Sex of baby: Male: ☐ Female: ☐
How many pregnancies has the mother had (regardless of outcome, including this one)?

**Mother's immunization status**

Does the mother have an immunization card? Yes: ☐ No: ☐
Immunization history by: Card: ☐ Memory: ☐ Both: ☐ Unknown: ☐
How many TT doses did the mother receive during the last pregnancy:
How many TT doses did the mother received before the last pregnancy (on any occasion):
If by card, give dates: 1. __ /__ /__ 2. __ /__ /__ 3. __/__/__ 4. __/__/__ 5. __/__/__

**Mother's antenatal care history**

How many antenatal care visits were made during this last pregnancy?

**Delivery practices**

Place of delivery? Health facility: ☐ Home: ☐ Outside: ☐ Other: ☐ Unknown: ☐
Who assisted with the delivery? Doctor: ☐ Midwife: ☐ Nurse: ☐ TBA: ☐
Relative: ☐ Nobody: ☐ Other: ☐ Unknown: ☐
On what surface was the baby delivered?
What was used to cut the cord?
Was any substance put on the cord stump? Yes: ☐ No: ☐
If yes, specify:

**Baby's signs/symptoms – ask respondent to describe in open-ended questions and record the findings below. Do not ask the questions literally.**

Did the baby suckle normally for at least the first 2 days of life? Yes: ☐ No: ☐ Unknown: ☐

Did the baby stop suckling after the first 2 days? Yes: ☐ No: ☐ Unknown: ☐

Baby's age at which illness was suspected by the mother/informant: Days: ___ Unknown: ☐

Did the baby have the following signs:

- Spasms when stimulated by touch, sound or light? Yes: ☐ No: ☐
- Developed "pursed lips" and/or clenched fists? Yes: ☐ No: ☐
- Become rigid or stiff as illness progressed? Yes: ☐ No: ☐
- Had tremors, fits or stiffness? Yes: ☐ No: ☐

Ask the mother to describe the baby's illness, and record the responses on the back of this form.

**Treatment and outcome**

Was the sick baby taken to a health facility? Yes: ☐ No: ☐ Unknown: ☐

If yes, give name of health facility:

What was the final outcome for the baby? Alive: ☐ Dead: ☐ Unknown: ☐

Final diagnosis by the health facility:

Visit the health facility if there is doubt whether the case died of neonatal tetanus.

**Case response**

Has the mother received TT since the birth of this baby? Yes: ☐ No: ☐ Unknown: ☐

Did other women in same locality receive TT in response to the case? Yes: ☐ No: ☐ Unknown: ☐

**Conclusion**

What does the respondent say was the cause of the baby's death?

On the basis of the evidence, was this a case of neonatal tetanus?

Confirmed case: ☐ Suspected case: ☐ Discarded case: ☐ Unable to classify: ☐

Comments:

## 2.3 The line list

During specific disease outbreaks, suspected cases may need to be listed individually, with details of the history including immunization status and management of each patient. This information is sometimes required to provide data for the vaccine-preventable disease tally, as discussed in Section 2.1. It is more often needed for surveillance where information has to be collected and reported, sometimes immediately by phone, to guide prompt outbreak control response.

### What information is commonly included in a line list?

A line list usually includes the following information:

- unique case identification number

  Note: This number is used to put the cases in order; for example, "1" for the first case that you register, "2" for the second, and so on. The same number should be used on follow-up visits for the same case. Do not enter the same case more than once even if the patient returns to the health facility for follow-up. This number is not linked to the immunization register or the AEFI cases (see Section 2.4) in any way.

- patient's name
- patient's address (of her/his caregiver for children) and mobile/phone number if available
- patient's date of birth
- patient's sex
- date of onset of symptoms
- date of first presentation to the health facility
- vaccination status
- relevant symptoms (based on the standard case definition of the disease)
- date and results of any laboratory confirmation tests (also based on the standard case definition
- treatment given (may not be required for all diseases)
- final diagnosis and outcome.

Figure 6.7 shows an example line list for suspected measles cases.

### How to use a line list

After determining that a case meets the standard case definition of a reportable disease, start with the case identification number and fill in all the items across the line for that case. The format of the line list may vary by disease and disease control activity requirements, but the column headings should be a guide to filling it in correctly.

## **Figure 6.7** Health centre level measles line list example

Line list – Measles suspected cases

| Health centre: | Date list started: |
|---|---|
| District: | Date list ended: |

| Case ID # | Name | Address/contact details | # measles vaccine doses received | Possible source of infection* | Date of birth | Sex | Date of rash onset | Date of first visit to HC | Symptoms (Y or N) | | | | Lab specimen (date) | Lab specimen results | Outcome** | Final classification*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Fever | Cough | Coryza | Conjunctivitis | | | | |
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* Possible source of infection = contact/relationship &/or Case ID #
** Outcome: R = recovery; S = recovery with sequelae; M = mortality
*** Final classification: C = clinically confirmed; E = confirmed by epidemiologic linkage; L = laboratory confirmed; D = discarded

## 2.4 The AEFI report form

AEFIs need to be reported individually and tallied for the monthly summary report (see Section 3). The WHO definitions of AEFI and AEFI categories are given in the box below. With investigation, an AEFI should fall into one of the five categories. Investigation is usually carried out based on an initial health facility report of a suspected AEFI (discussed further below).

### WHO definition of AEFI and AEFI categories

**Adverse event(s) following immunization (AEFI) are defined as "any untoward medical occurrence that follows immunization and which does not necessarily have a causal relationship with the usage of the vaccine." The adverse event may be any unfavourable or unintended sign, abnormal laboratory finding, symptom or disease.**

**AEFIs are grouped into five categories:**

1. **Vaccine product-related reaction:** An AEFI that is caused or precipitated by a vaccine due to one or more of the properties of the vaccine product itself.

   ***Example:*** *Extensive limb swelling following DTP vaccination.*

2. **Vaccine quality defect-related reaction:** An AEFI that is caused or precipitated by a vaccine that is due to one or more quality defects of the vaccine product, including its administration device as provided by the manufacturer.

   ***Example:*** *Failure by the manufacturer to completely inactivate a batch of inactivated polio vaccine leads to cases of paralytic polio.*

3. **Immunization error-related reaction:** An AEFI that is caused by inappropriate vaccine handling, prescribing or administration and thus by its nature is preventable.

   ***Example:*** *Transmission of infection by contaminated multi-dose vial.*

4. **Immunization anxiety-related reaction:** An AEFI arising from anxiety about the immunization.

   ***Example:*** *Vasovagal syncope (fainting) in an adolescent during/following vaccination.*

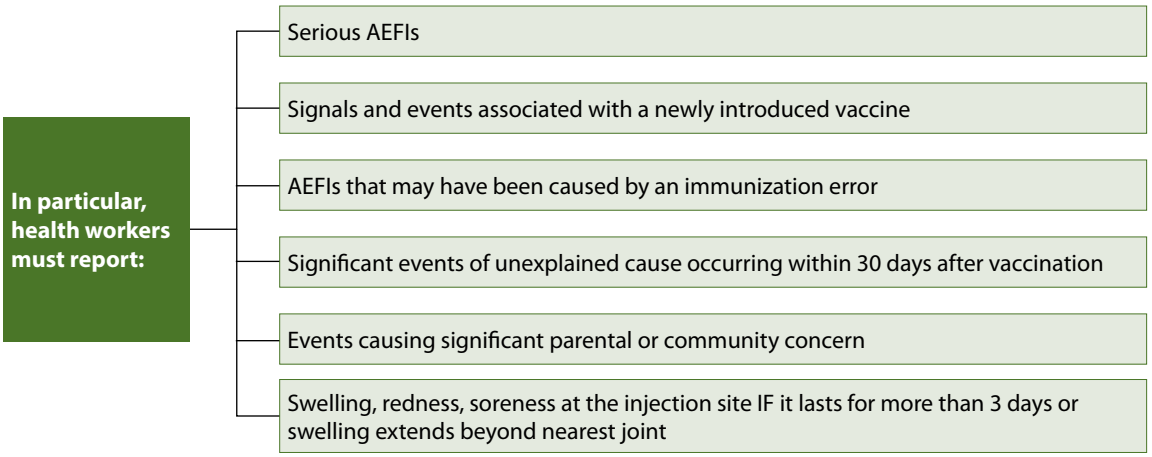
5. **Coincidental event:** An AEFI that is caused by something other than the vaccine product, immunization error or immunization anxiety.

   ***Example:*** *A fever occurs at the time of the vaccination (temporal association) but is in fact caused by malaria. Coincidental events reflect the natural occurrence of health problems in the community with common problems being frequently reported.*

National or central authorities should provide a list of suspected AEFIs that must be reported immediately by telephone to a manager who has the responsibility to investigate them. Figure 6.8 gives a guide on what to report immediately from health facility level. In general, any AEFI that is of concern to the parents or to the health worker should be reported. Note that serious AEFIs (as given in Figure 6.8) are those that are life threatening or result in hospitalization, disability or death.

The objective of AEFI surveillance is to detect, understand and communicate so as to prevent future problems. It is important to avoid blaming the vaccine first. AEFIs may occur in any setting, since there is no perfect vaccine and it is not possible to predict reactions. Health workers should not hesitate to report AEFIs for investigation.

**Figure 6.8** General guide for AEFI reporting from health facility level




### What information is commonly included in an AEFI report?

An AEFI report usually contains the following information at a minimum:

- AEFI reporting identification number

  Note: This number is used on the AEFI reporting form. The same number should be used on follow-up visits for the same case. This number is not linked to the immunization register or the line list in any way.

- patient's address (of her/his caregiver for children) and mobile/phone number if available
- reporter's address and mobile/phone number, if different from those of the patient or caregiver
- patient's date of birth
- patient's sex

- date and time of onset of AEFI
- description of the event and the outcome from the patient or reporter
- details of all vaccines given and diluents used, including generic and brand name, batch number and time of vaccination.

Figure 6.9 shows an example AEFI report format.

### How to use an AEFI report

Once aware of a possible AEFI that must be reported and investigated, record the minimum information listed above and contact the person given the responsibility to follow up these cases, according to national and health centre procedure.

Tally the AEFI reports for the monthly summary by type. The example given in Section 3 of this module asks for the total number of serious and non-serious events during the month. National authorities should provide guidance on which AEFIs should be included in which category in summary reports.

## Figure 6.9 WHO AEFI report form

**AEFI Reporting ID Number:**

**REPORTING FORM FOR ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI)**

| ***Patient name*:**<br>***Patient's full address* :**<br><br>Telephone:<br>Sex: ☐M ☐F<br>***Date of birth (DD/MM/YYYY)*:** __ __ / __ __ / __ __ __ __<br>*OR Age at onset:* ☐☐*years* ☐☐ *months* ☐☐☐ *days*<br>*OR Age group:* ☐*< 1 year* ☐ *1 to 5 years* ☐ *> 5 years* | ***Reporter's name:***<br><br>Institution/designation, department & address:<br><br>Telephone & e-mail: |
|---|---|

**Health facility (or vaccination centre) name:**

| ***Name of vaccines received* | ***Date of vaccination* | ***Time of vaccination* | Dose (e.g. 1st, 2nd,etc.) | ***Batch/lot number* | Expiry date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
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| | | | | | |

| ***Adverse event (s):*** | Describe AEFI (signs and symptoms): |
|---|---|
| ☐ Severe local reaction ☐ *>3 days* ☐ *beyond nearest joint*<br>☐ Seizures ☐ *febrile* ☐ *afebrile*<br>☐ Abscess<br>☐ Sepsis<br>☐ Encephalopathy<br>☐ Toxic shock syndrome<br>☐ Thrombocytopenia<br>☐ Anaphylaxis<br>☐ Fever ≥38°C<br>☐ Other (specify).....<br>Date & Time AEFI started (DD/MM/YYYY):<br>__ __ / __ __ / __ __ __ __ ☐☐ Hr ☐☐Min<br>Was the patient hospitalized? ☐Yes ☐No<br>Date patient notified event to health system (DD/MM/YYYY):<br>__ __ / __ __ / __ __ __ __ | |

***Outcome:***

☐ Recovering ☐ Recovered ☐ Recovered with sequelae ☐ Not recovered ☐ Unknown

☐ Died If died, date of death (DD/MM/YYYY) __ __ / __ __ / __ __ __ __ Autopsy done: ☐Yes ☐No ☐Unknown

Past medical history (including history of similar reaction or other allergies), concomitant medication and other relevant information (e.g. other cases). *Use additional sheet if needed:*

*First decision making level to complete:*

| Investigation needed: ☐ Yes ☐ No | If yes, date investigation planned (DD/MM/YYYY):<br>__ __ / __ __ / __ __ __ __ |
|---|---|

*National level to complete:*

| Date report received at national level (DD/MM/YYYY):<br>__ __ / __ __ / __ __ __ __ | AEFI worldwide unique ID: |
|---|---|
| Comments: | |

** Compulsory field*

# 3 Monthly summary reports

The immunization monitoring and vaccine-preventable disease and AEFI surveillance data collected with the tools described in Section 2 need to be consolidated into a summary form, either manually or electronically, for transmission from the health facility to the district level. Districts compile data for use by and transmission to the next level, and eventually to central level. At each level the data should be analysed and used to improve the programme, as discussed in Section 4. The format of the summary report should be defined at national or central level and should be standard for all health facilities. The frequency of reporting should also be determined by national authorities. This section discusses a monthly report, but reports may be done weekly, quarterly and/or annually based on local requirements. A monthly summary report example is shown in Figure 6.10.

Copies of reports with dates and signatures are sent to the next central level and the originals stored at the health facility (see Section 3.5).

Health workers should ensure that reports are:

- **Complete.** All sections of the summary reports should be filled in and no parts left blank. All reports due from different services and/or outreach sites should be received and their data included in the summary report.

- **Timely.** All summary reports should be submitted to the next level before the assigned deadline. Summary reports completed and submitted on time help to ensure prompt and effective disease control response.

- **Accurate.** All summary reports should contain figures that correspond to the actual figures from the health facilities and that are double-checked for correct calculations and totals.

District, province and national levels should keep track of the completeness and timeliness of reporting by more peripheral levels and remind them of missing or late reports. Timeliness and completeness of reporting should be used as an indicator for measuring the performance of health facilities.

## 3.1 Immunization programme monitoring data

In Figure 6.10, page 1 is a summary of immunization programme monitoring data. The vaccine tally is the source of data for completing this part of the summary report. Monthly totals should be entered into the corresponding sections of the form.

Selected programme information can be presented in graph form for display in the health facility; see Section 4 of this module.

## **Figure 6.10** Monthly summary report example, page 1

**Health facility:** _____ **District:** _____ **Month/Year:** _____

**Sessions planned:** _____ **Sessions held:** _____ **Infant population:** _____

| No | Date | Place of session | Session type[a] | Infants PAB** from NT | Vaccinations and Vit A given to children <1 year of age | | | | | | | | | | | | | | | | | | Vaccinations and Vit A given to children >1 year of age | | | | | | | | | | | | MCV2 | | Others |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | BCG | HepB | | polio (OPV and/or IPV) | | | | | RV | | PCV | | | pentavalent | | | MCV1 | Vit A | Others | polio (OPV &/or IPV) | | | | PCV | | | pentavalent | | | MCV1 | Vit A | | Age 15–18 months | Age >18 months | |
| | | | | | | <24h | >24h | OPV0 | 1 | 2 | 3 | 3+*** | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | | | | 1 | 2 | 3 | 3+** | 1 | 2 | 3 | 1 | 2 | 3 | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Total** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

* Session type: fixed or outreach
** Protected at birth from neonatal tetanus (based on TT vaccination status of mother)
*** Combination IPV/OPV schedules may require a final dose of OPV with IPV – follow the national schedule

| No | Date | Place of session | Session type | HPV for girls aged 9–13 years | | | HPV for girls aged >13 years | | | Vaccination given to pregnant women | | Vaccination given to non-pregnant women | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | HPV1 | HPV2 | HPV3 | HPV1 | HPV2 | HPV3 | TT 1 | TT 2+[b] | TT 1 | TT 2+[b] |
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
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| 9 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |
| **Total** | | | | | | | | | | | | | |

[b] TT2+ = TT2+TT3+TT4+TT5

**Figure 6.10 (continued)** Monthly summary report example, page 2

| Compiled vaccine-preventable diseases report | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Target diseases | Total | Age | | | Sex | | Vaccination status | | | | | | Number of deaths |
| | | <1 year | 1–4 years | >5 years | M | F | Doses | | | | | Vaccination status unknown | |
| | | | | | | | 0 | 1 | 2 | 3 | 3+ | | |
| Polio/AFP | | | | | | | | | | | | | |
| Measles | | | | | | | | | | | | | |
| Diphtheria | | | | | | | | | | | | | |
| Pertussis | | | | | | | | | | | | | |
| Neonatal tetanus | | | | | | | | | | | | | |
| Other tetanus | | | | | | | | | | | | | |
| Other diseases* | | | | | | | | | | | | | |

| Stock report | | | |
|---|---|---|---|
| **Item** | **Start balance**** | **Received**** | **End balance**** |
| RV | | | |
| OPV | | | |
| PCV | | | |
| Pentavalent | | | |
| BCG | | | |
| Measles | | | |
| Others (vitA, YF) | | | |
| AD syringes (BCG) | | | |
| AD syringes (others) | | | |
| Safety boxes | | | |
| Immunization cards | | | |

Adverse events following immunization (AEFI) report***
(report serious events immediately to your supervisor for further investigation)

| Type of event | Number of cases |
|---|---|
| Serious events (A) | |
| Non-serious events (B) | |
| Total AEFI (A+B) | |
| Additional comments (if any): | |

Notable activities during the reporting period
(supervisory visits, training events, social mobilization activities, etc)

Date of report:

Name of reporter:

Designation:

Signature:

* Other vaccine preventable diseases (yellow fever, JE, etc) according to region
** Enter vaccine vial size where applicable; count the number of vials and multiply by doses per vial to give the number of doses
*** Follow country policy on adverse event reporting – serious events, particularly death, usually require immediate reporting

## 3.2 Vaccine-preventable disease surveillance data

In Figure 6.10, page 2 shows a compiled vaccine-preventable diseases report in the upper left block. The vaccine-preventable disease tally and line lists are the sources of data for this part of the summary report. Monthly case totals for each vaccine-preventable disease should be entered into the corresponding sections of the form.

### Zero reporting

If there are no cases of a disease during the reporting period, the number zero should be reported in the summary. This is called "zero reporting" and is important, since it shows an absence of cases presenting to the health facility rather than a forgotten point in data collection.

## 3.3 AEFI surveillance data

The AEFI surveillance data part of the summary records any AEFI reports collected during the month. The reports should be tallied by the type of reaction (serious or non-serious in the example used here) and entered into the corresponding section of the form. The details should have been provided to the person responsible for conducting an investigation according to the immediate reporting requirements discussed in Section 2.

## 3.4 Additional information

### Vaccine usage and wastage patterns

The usage and wastage of vaccine will vary greatly from one session to another. It is useful to monitor these patterns regularly at all immunization points to improve supply and avoid stock-outs. Stock cards provide the data for this part of the summary report. The number of vaccine vials in stock at the start of the month (start balance), the number received during the month (received) and the number of vials in stock at the end of the month (end balance) should be entered into the corresponding boxes in the form.

Vaccine stock data should be recorded and reported regularly since this information may be needed at the district level. The stock data can be used in vaccine usage and wastage calculations, as shown below. Note that the formula shown uses the number of doses. The stock cards may track only the number of vials. In this case, the number of doses can be calculated by multiplying the number of vials by the number of doses per vial.

Vaccine usage rate (%) =

$$\left\{ \frac{\text{No of infants immunized during the period}}{\text{((No of usable doses + No of doses received) at the beginning of the period) – (No of usable doses in stock at the end of the period)}} \right\} \times 100$$

Vaccine wastage rate (%) = 100 – (vaccine usage rate)

### Specific problems encountered during the reporting period

A narrative description of any problems, such as stock-outs, transportation problems, cold chain failure, etc., should be added as needed to prompt review and improvement of service-related issues.

### Specific data required by national policy

This may include:

- sex of infants immunized and sex of disease cases
- tally of other interventions during immunization sessions (such as provision of mebendazole or antimalarials)
- immunization campaign activities conducted during the reporting period.

## 3.5 Data and report storage

For purposes of verification and retrieval, data must be stored at each different level. Data can be stored in hard copy or electronically. At the health facility, tally sheets, registers and reports should be stored for a specific period (on average three years) depending on national standard operating procedure. Where higher administrative levels use computers, back-ups (hard copies and/or electronic copies) must be kept to avoid data loss in the case of system failure. Stored records are also useful for supervisory visits and immunization service reviews.

## Types of data to store

The following types of data should be stored at each health facility for a period of three years or as long as required by national policy.

- Immunization registers
- Copies of vaccination cards (if applicable)
- Tally sheets
- Defaulter tracking lists
- Monthly reports
- Target population data files (information used in microplanning – see Module 4)
- Immunization monitoring charts (see next section)
- Case/outbreak charts and reports
- Supervisory visit reports
- Stock cards
- Cold chain maintenance records.

# 4 Analysis of monitoring data

Data collected and summarized in reports are useful only when analysed and interpreted regularly and used to improve service delivery. This section describes the initial analysis of monitoring data that begins at health facility level.

## 4.1 Vaccination coverage charts

Creating a chart showing doses administered and dropout rates is a simple, effective way to monitor immunization service progress. This type of chart tracks monthly progress towards immunization service goals. The number of doses administered can be compared to the number of infants eligible to receive them, and target population dropout rates can be calculated. The dropout rate compares the number of infants who completed the immunization schedule for a selected vaccine to the total number who failed to finish the course.

Every health facility should display a current monitoring chart on a wall where all staff can see it. Charts can be produced at every level of the health system by combining data manually or electronically. Figure 6.11 shows a completed monitoring chart.

**How to make a monitoring chart showing doses administered and dropouts**
Vaccine doses administered and dropout rates can be charted using the following steps (refer to Figure 6.10 and note that some of these calculations are shown in Module 4).

1. **Calculate the annual and monthly target population who should receive immunization services**

   **Annual target population = total population × % infants in population**

   Aim to vaccinate every infant in the catchment area, including those who are hard to reach. Use existing population data for infants obtained from national statistics offices, ministry of health planning sections or community censuses. If data are not available, estimate the number of infants by multiplying the total population by 3% (or the percentage of infants in the population suggested by national/central authorities, if applicable). Always use the most precise percentage available: a measured, specific percentage for calculating the number of infants is preferred.

   Data for peripheral health facility calculations are often difficult to find and more accurate targets can be set by: a) immunization staff and district supervisors, who may need to discuss and agree on target population adjustments based on local knowledge and past experience; and b) drawing the past year's results on the current year's chart in order to follow progress from year to year.

The monthly target population is the annual target population number of infants calculated above divided by 12.

**Monthly target = annual target population/12**

***Example calculation:*** *If the total population is 3900, then the annual target population of infants is 3900 × 3/100 = 117; and the monthly target is 117/12 = 10.*

**2. Label the chart and draw the ideal monthly target line**

– Complete the information on the top of the chart by adding the area and year.

– Label the left (and/or right) side of the chart with the monthly target numbers.

– Label the boxes at the bottom with the selected vaccine.

– Draw a diagonal line from zero to the top right-hand corner to show the ideal rate of progress from month to month using the cumulative monthly target numbers.

**3. Plot immunization data on the chart**

– Locate the space for the month being recorded in the row of boxes underneath the graph and enter the monthly total of vaccine given.

– Calculate the cumulative total for the current month as shown:

– Current cumulative total = current month's total doses + previous month's cumulative total doses

*Note that cumulative means the total number of doses of vaccines given in the current month plus the monthly totals for the current calendar year; for example, the cumulative number of penta3 doses given by the end of March is the total number of doses given in January plus the total number given in February plus the total number given in March.*

**4. Enter the current cumulative total on the right side of the month being recorded**

– Make a dot on the graph corresponding to the cumulative total recorded on the right side of the month being recorded; the dot should line up with the correct monthly number on the left side of the chart.

– Connect the new dot to the previous month's dot with a straight line.

– Repeat every month until the end of the year.

– Plot other immunizations given on the same chart, as needed.

**5. Calculate the total number of dropouts between the first and last dose of the same vaccine series.**

Number of dropouts = (cumulative total for the first dose) – (cumulative total for the last dose of the vaccine series)

Dropout rate (%) = (number of dropouts/cumulative total for the first dose) × 100

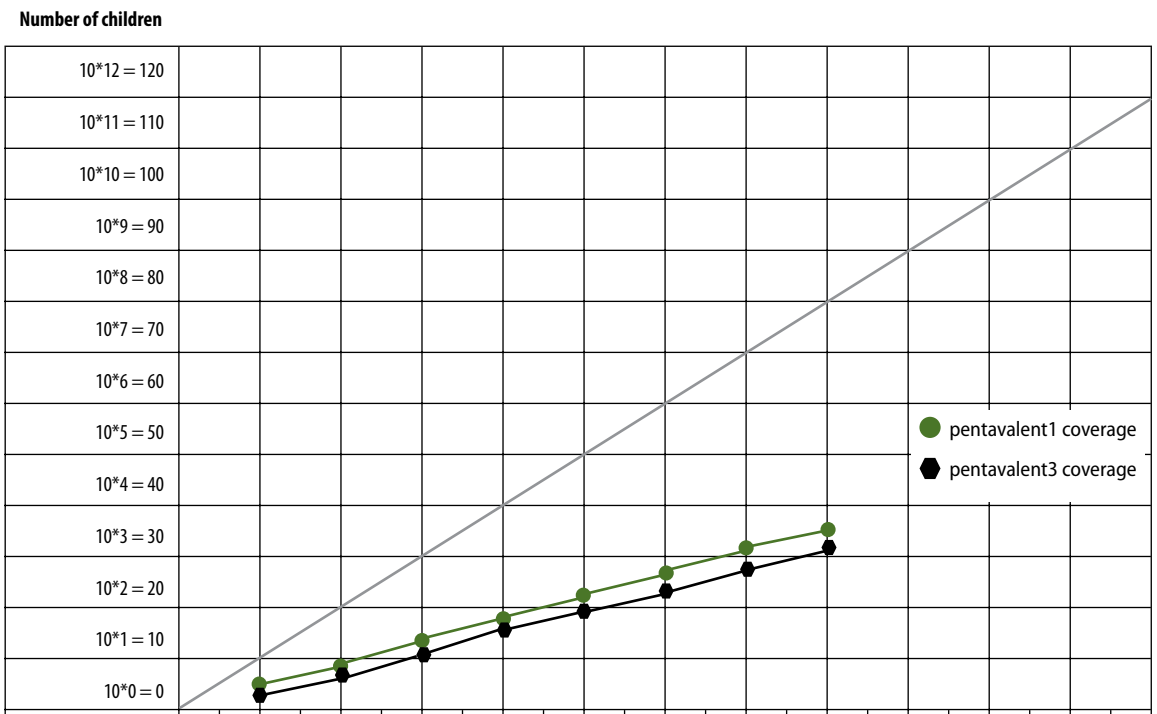
The dropout rate can be seen easily in the doses administered chart: it is the gap between the lines for the first and last dose of a vaccine.

***Example calculation:*** *If all 117 infants in the annual target population received penta1, but only 100 finished all three doses during the year, then:*

*Number of dropouts = (117) – (100) = 17*

*Dropout rate = [17/117] × 100 = 14.5%*

**Figure 6.11** Monitoring chart example showing pentavalent1 and pentavalent3 data




| *Fill in at the end of each month* | Jan | Cum Total | Feb | Cum Total | Mar | Cum Total | Apr | Cum Total | May | Cum Total | Jun | Cum Total | Jul | Cum Total | Aug | Cum Total | Sep | Cum Total | Oct | Cum Total | Nov | Cum Total | Dec | Cum Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total immunized pentavalent1 | 6 | 6 | 4 | 10 | 6 | 16 | 6 | 22 | 7 | 29 | 7 | 36 | 5 | 41 | 5 | 46 | | | | | | | | |
| Total immunized pentavalent3 | 4 | 4 | 3 | 7 | 6 | 13 | 6 | 19 | 6 | 25 | 6 | 31 | 5 | 36 | 5 | 41 | | | | | | | | |
| Dropout (DO) (Penta1–Penta3) | | 2 | | 3 | | 3 | | 3 | | 4 | | 5 | | 5 | | 5 | | | | | | | | |
| Dropout % (D)/Penta1)*100 | | 33 | | 30 | | 19 | | 14 | | 14 | | 14 | | 12 | | 11 | | | | | | | | |

## 4.2 Vaccination coverage data analysis

Full analysis requires data to be compiled by area. Figures 6.12, 6.13 and 6.14 suggest how to compile and analyse vaccination coverage data. The first part of the process shown below is also shown in Module 4, which focuses on prioritizing areas by the number of unimmunized children during microplanning. The additional calculations given in Figures 6.12 and 6.13 are included here to help define problems that cause children to remain unimmunized. Defining problems in detail helps identify potential solutions (see also Annex 3).

### How to complete the compilation and analysis table

1. List each geographic area or community served in Column a.

2. List the target population numbers for infants less than one year of age in Column b.

3. Enter the number of doses of each vaccine type administered to the target group during the preceding 12-month period in Columns c, d and e. The vaccines used for analysis will vary by programme.

4. Calculate immunization coverage as follows: Immunization coverage is the total number of infants who have received all required doses of a selected vaccine in the preceding 12 months divided by the annual target population.

**Figure 6.12** Sample format for compilation and analysis of health facility data

| **Community name** | **Compilation of immunization coverage data for the previous 12 months** | | | | | | | **Analysis of problem** | | | | | | **Prioritize – highest number of penta3 unimmunized children is #1, and so on** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual target population | Doses of vaccine administered | | | Immunization coverage (%) | | | Unimmunised (number) | | Dropout rates (%) | | Identified problems | | |
| | Children ≤1 year of age | penta1 | penta3 | MCV1 | penta1 (c/b)*100 | penta3 (d/b)*100 | MCV1 (e/b)*100 | penta3 (b-d) | MCV1 (b-j) | penta1 - penta3 (c-d)/c*100 | penta1 - MCV1 (c-e)/c*100 | Access (good, poor) | Utilisation (good, poor) | |
| a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
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Immunization coverage (%) = (number of infants with all required doses of the selected vaccine during the last 12 months)/(annual target population) × 100

***Example calculation for the table in Figure 6.12:***
*immunization coverage (%) in Column g = (infants with all required doses of pentavalent in the last 12 months in Column d)/(annual target population in Column b) ×100 = (100)/(117) × 100 = 85%*

**5.** Calculate the number of unimmunized:

Unimmunized number = (annual target population) – (doses of vaccine administered)

***Example calculation for the table in Figure 6.12:***
*unimmunized pentavalent3 in Column i = annual target population in Column b – doses of pentavalent3 administered in Column d = (117) – (85) = 32*

**6.** Calculate the dropout rate.

The dropout calculation for any vaccine is shown in Section 4.1.

***Example calculation for the table in Figure 6.12:***
*dropout rate pentavalent1 – pentavalent3 = column k = ((doses of pentavalent1 in column c) – (doses of pentavalent3 in column d))/(doses of pentavalent1 in column c) × 100 = (105) – (85)/105 × 100 = 19%*

**7.** Identify and categorize problems for each area.

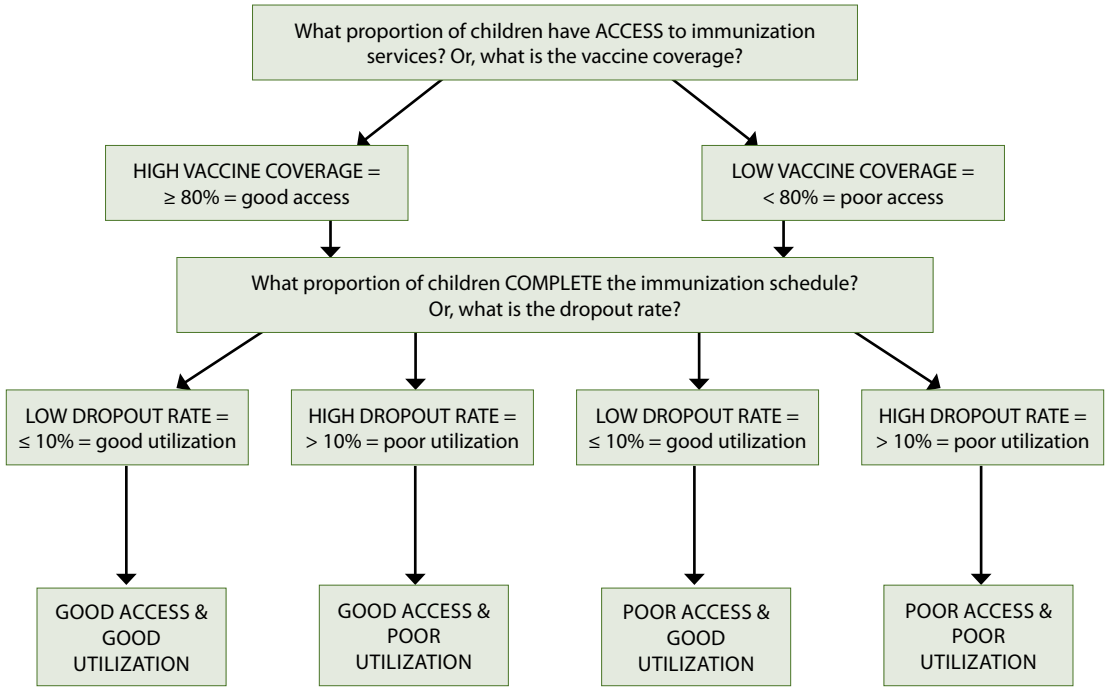
In Column m, enter the quality of access (good = coverage 80% or better; poor = coverage less than 80%) based on pentavalent1 coverage in Column f. Note that the 80% cut-off is suggested here as a general indicator and programmes may use different cut-offs to define good and poor coverage based on national policy.

In Column n, enter the quality of utilization (good = dropout rate less than 10%; poor = dropout rate 10% or more) based on the pentavalent1–pentavalent3 dropout rate given in Column k. Note that the 10% cut-off is suggested here as a general indicator and programmes may use different cut-offs to define good and poor dropout rates based on national policy.

In Column o, use your data to prioritize communities for problem solving. Rank the community that has the most unimmunized infants (not necessarily the lowest coverage) as the highest priority (#1) Figure 6.14 illustrates this principle.

## **Figure 6.13** Access and utilization problem analysis flowchart and graph

Note that coverage and dropout rates for any vaccine can be used; the choice may be set by national policy or made at more local levels




## **Figure 6.14** Prioritizing districts according to total unimmunized infants (completed example using measles vaccine coverage)

| District name | Population | Population under 1 year | Measles coverage under 1 year | Unimmunized infants | Priority |
|---|---|---|---|---|---|
| A | 100 000 | 4 000 | 50% | 2 000 | 2 |
| B | 75 000 | 3 000 | 60% | 1 200 | 4 |
| C | 120 000 | 4 800 | 70% | 1 440 | 3 |
| D | 10 000 | 400 | 20% | 320 | 5 |
| E | 250 000 | 10 000 | 75% | 2 500 | 1 |

## 4.3 Improvement of services

Problems can be broadly associated with access and utilization and the categories in Figure 6.13 indicate the different combinations of the two issues. Problems may be related to one or more communities or areas or may apply to the entire district.

Access problems result in infants missing immunization sessions and may be due to:

- sessions not being held as planned
- session site and times being inconvenient or not advertised
- cultural, financial, racial, gender or other barriers preventing access to and use of immunization services.

Utilization problems result in infants not coming back to complete the full series of immunizations and may be caused by:

- caregivers' lack of information about the complete immunization schedule
- missed opportunities for vaccination
- other problems leading to caregivers not returning due to vaccinations not being given as expected; for example supply shortages, delayed doses due to incorrect assessment of contraindications or other problems in the relationship between health workers and the community.

The table in Annex 6.1 lists commonly encountered problems. It is not exhaustive but can serve as a guide to finding solutions.

The microplanning process includes identifying possible solutions as described in Module 4. Discussion should occur at community and health facility level, and also at district or more central levels as needed. Solutions should be prioritized for implementation. Those that affect the district level should generally come before those that affect more local levels. At any level, changes are likely to be more feasible when implemented with available resources.

Supervisory visits from more central levels can also be helpful in identifying problems and solutions. Annex 6.2 shows an example checklist for such visits. Like the table in Annex 6.1, it is not exhaustive but can serve as a guide for health workers and supervisors.

# 5 Analysis of surveillance data

Just as monitoring data are useful only when they are regularly analysed for the purpose of improving service delivery, disease surveillance and AEFI data collected and summarized in reports are useful only if regularly analysed and interpreted to guide disease control activities. In fact, surveillance data may need more immediate reporting and analysis based on national policy, as discussed in Section 2. The initial analysis of surveillance data that begins at health facility level is described here.

## 5.1 Vaccine-preventable disease case number charts

The objective of surveillance is to:

- report vaccine-preventable diseases according to national protocol; reports may be required monthly, weekly or as needed for outbreak response
- understand the data collected as a guide for response.

In addition to predicting or detecting outbreaks, identifying high-risk populations or areas and monitoring the impact of immunization services, surveillance data can highlight system weaknesses, determine disease burden in a community and document circulating strains of pathogens.

Case numbers can be presented in graphs for display in the health facility. Trends in disease occurrence (usually incidence) are easy to visualize and compare to immunization data in this format. Graphs of trends that become outbreaks are also called "epidemic curves". Keeping updated graphs will allow comparisons between seasons and years and alert to any increases in the number of cases or other relevant trends.

### How to make a surveillance chart showing the number of cases per month

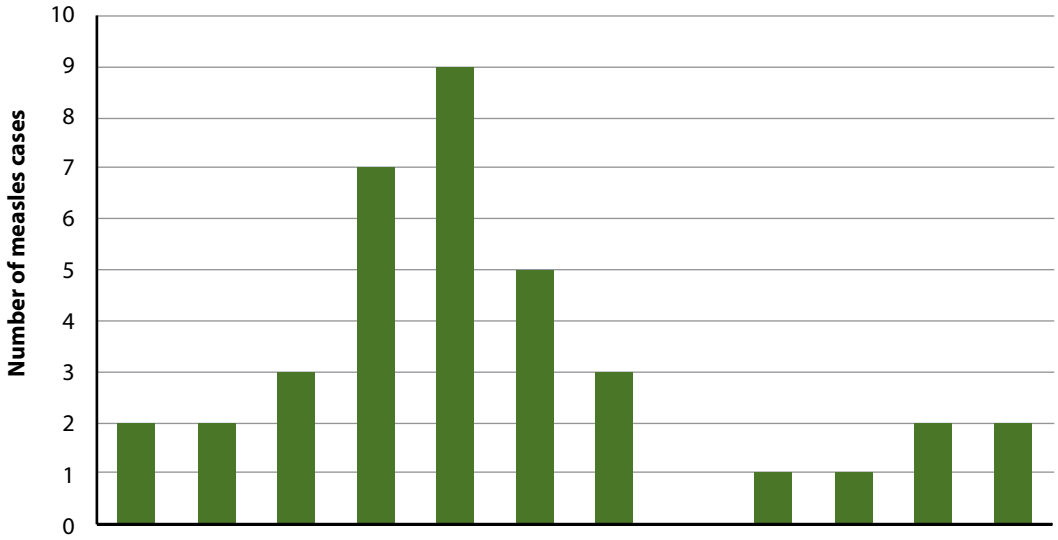
Figure 6.15 illustrates a measles surveillance chart. This example shows cases by month, but weekly or more frequent reporting may be required by local and national authorities.

1. Label the chart.
   - Complete the information on the top of the chart by adding the health facility/area name and year.
   - Label the left (or right) side of the chart with the name of the disease and number scale for cases.
   - Label the boxes at the bottom with the months.

**2.** Plot case data on the chart.

- Locate the space for the month you are recording in the row of boxes underneath the graph and enter the monthly total of cases.
- Make a dot on the graph corresponding to the number scale.
- Connect the new dot to the previous month's dot with a straight line (line graph not shown); or fill the column from 0 up to the case number for that month to make a bar chart (as shown).
- Repeat every month until the end of the time frame.

**Figure 6.15** Chart showing the number of measles cases reported per month




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of cases | 2 | 2 | 3 | 7 | 9 | 5 | 3 | 0 | 1 | 1 | 2 | 2 |

## 5.2 Analysis of vaccine-preventable disease data

Surveillance data can be used to show trends and alert to possible outbreaks, as in the example above. Further analysis of the trends may include a breakdown of cases by area or by age and sex to better identify those at high risk and to define a targeted response. This type of analysis is often conducted at district or more central levels, but can begin with individual health facility data.

High-risk or most-affected areas in the health facility catchment can be analysed simply by tracking cases on a map, as shown in Figure 6.16. Cases can be marked on the district and health centre catchment area maps prepared for microplanning, as described in Module 4.

**Figure 6.16** Example of a catchment area map showing origins/places of residence of measles cases presenting in April–May 2012

Each "×" represents one case

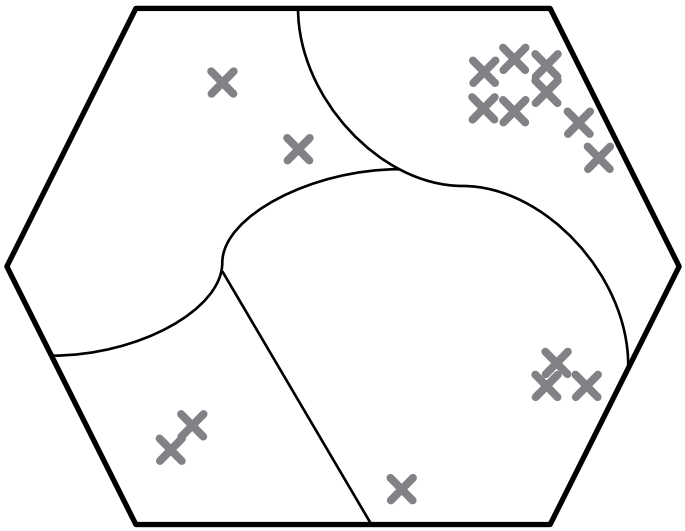


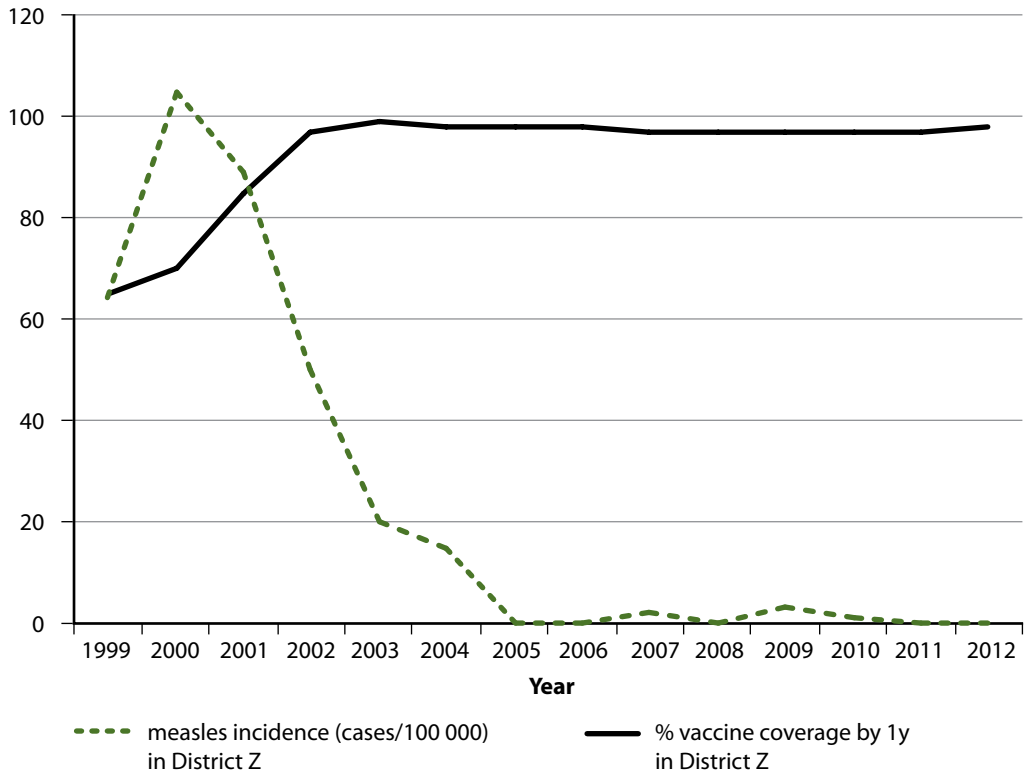
Table 6.2 shows the age and sex distribution of cases during an outbreak in a certain area. This is useful for evaluating an unidentified disease or an unusual pattern of a familiar disease, for example, measles cases occurring in older age groups.

**Table 6.2** Age and sex distribution of cases in a disease outbreak

| Age | 0–5m | 6–11m | 1–4y | 5–9y | 10–14y | 15–34y | 35–64y | 65+y | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Male** | 1 | 1 | 0 | 0 | 5 | 26 | 15 | 3 | 51 |
| **Female** | 2 | 2 | 0 | 0 | 6 | 35 | 15 | 5 | 65 |
| **Total** | 3 | 3 | 0 | 0 | 11 | 61 | 30 | 8 | 116 |

Case data can be compared with immunization data to illustrate disease patterns or evaluate the impact of control activities. This is usually done over a longer time frame and from district or higher levels using population-level measures, such as incidence. Accurately reported peripheral health facility-level data is needed throughout. Figure 6.17 compares measles case numbers (charted as incidence per 100 000 people) after immunization services were improved in a district and high coverage was maintained.

**Figure 6.17** Comparison of measles incidence and vaccine coverage over time (district-level data)



## 5.3 Analysis of AEFI data

Health facility-level AEFI reporting can be compiled at district and more central levels for analysis by specific vaccine, for comparison with expected rates of adverse events in vaccinated and unvaccinated individuals, and to facilitate investigation and response to serious AEFIs.

Analysis of multiple AEFI reports can help health authorities clarify whether observed reaction rates are higher than expected and, if so, are more likely to be related to the vaccine than to coincidence. Comparisons of reaction rates are made with published studies if possible. But studies are often not ideal for comparisons. Data from AEFI reporting are important on vaccines being used in immunization programmes. This is called "vaccine pharmacovigilance".

To help strengthen capacity to introduce vaccines in Member States, *WHO Information Sheets on Observed Rates of Vaccine Reactions* are available online. They provide details on selected vaccines that are relevant to the analysis of reported events. For further information visit the website at: http://www.who.int/vaccine_safety/initiative/tools/vaccinfosheets/en/index.html.

# Annex 6.1 Common problems associated with poor access and utilization, and possible solutions

| | Examples of common problems | Examples of solutions: activities to be included in health facility workplans |
|---|---|---|
| **Supply quantity** | Stock-outs of vaccine(s), AD syringes, diluents, safety boxes, immunization cards | • Request immediate supplies from district level.<br>• Review stock recording system (Module 4, Section 5).<br>• Review vaccine usage and wastage rates and take action (Module 6, Section 3).<br>• Review method of estimating needs (Module 4, Section 5). |
| **Supply quality** | • Expired vaccine(s)<br>• VVMs show that vaccine has reached the discard point<br>• Frozen DTP- and HepB-containing vaccines in refrigerator | • Review stock recording system (Module 4, Section 5).<br>• Review method of estimating needs (Module 4, Section 5).<br>• Review management of cold chain equipment (Module 2). |
| **Staffing quality** | Some staff are not using correct protocols/procedures | Inform supervisor and select subjects for on-the-job training/supportive supervision, for example:<br>• using AD syringes (Module 5)<br>• new vaccines (Module 1)<br>• reading vaccine vial monitors (Modules 2 and 5)<br>• implementing multi-dose vial policy (Module 2)<br>• interpersonal communication skills. |
| | Irregular supervisory visits | • Include supervisory visit schedule in district workplans. |
| **Staffing quantity** | Vacant positions; general staff shortage | • Inform supervisor and district authorities and take steps for recruitment.<br>• Request temporary assignment from district level and consider volunteers for some duties. Schedule rotation of staff in the interim.<br>• Ensure staff are available for each session (Module 4). |
| **Service quality and demand** | Poor attendance at sessions and poor utilization in some areas | • Meet with the community to discuss possible reasons for low attendance and suggested solutions (Module 7).<br>• Consult the community and change the schedule to make sessions more convenient (Module 4, Section 5 and Module 7).<br>• Check whether all planned sessions have been held. Aim to improve reliability by holding all planned sessions (Module 4).<br>• Screen all infants for immunization whenever they visit the health facility and give all of the vaccines they are eligible to receive (Module 5, Section 3).<br>• Review use of true contraindications to ensure that infants are not missed (Module 5, Section 3).<br>• Consider conducting a missed opportunities study to understand the reasons for low utilization. |
| | Mothers lose or do not bring the immunization cards | • Set up a defaulter tracking system to keep complete records (register, reminder cards) at the health facility and take these along during outreach sessions (Module 6, Section 1).<br>• Provide new cards and update from other records – do not restart schedule because of lost cards if the vaccinations given are recorded in the register (Module 6, Section 1). |
| | Parents fear adverse events and/or there are rumours that Injection practices are not 100% safe | • Inform parents about benefits of immunization and reassure them about vaccine safety (Module 1).<br>• Review safe injection practices: ensure AD syringes supply and use safety boxes and safe disposal practices (Module 3).<br>• Meet community to discuss rumours (Module 7, Section 4).<br>• Review information on AEFI (Modules 1 and 6) and how to report AEFI cases (Module 6, Section 2).<br>• Arrange information brief sessions with media, leaders, community influencers (Module 7). |

| | Examples of common problems | Examples of solutions: activities to be included in health facility workplans |
|---|---|---|
| **Service quantity and demand** | Unreliable information about catchment population | • Request a list of all households, families and newborns from each community (Module 7).<br>• Map the catchment area to include all populations (Module 4, Section 1).<br>• Compare population data from various sources including data from National Immunization Days (NID) or polio activities (use the NID <5 years population and divide by 5 for infant target).<br>• Take the newborn register during house-to-house campaigns – register all newborns found and give them an immunization card. |
| | Inaccurate coverage data | • Check record keeping and reporting systems for completeness (Module 6, Sections 1–3).<br>• Review all tally sheets and reports (Module 6, Sections 1–3) – does the numerator include all areas?<br>• Organize and complete refresher training for staff. |
| | Some areas are distant and underserved | • Discuss with supervisor and organize mobile team approach from district/province – minimum 4 sessions per year (Module 4).<br>• Discuss service with the communities and arrange adequate sessions, dates and times (Module 7). |
| | Transport not available for some outreach sessions | • Identify sessions that were not held due to lack of transport.<br>• Look for alternative means of transport, such as public transport, sharing with other programmes and/or taxis.<br>• Request a vehicle from the district/next higher level. |
| | Poor attendance at antenatal care (ANC) clinics and/or poor TT2+ coverage | • Promote the value of antenatal care, including TT immunization, during any contact with pregnant women.<br>• Inform the community about dates of ANC clinics. Find out if session timing or location is inconvenient. If so, make appropriate changes in next quarter's workplan.<br>• Use all opportunities to give TT immunization including when mothers accompany infants for childhood immunizations. |

# Annex 6.2 Immunization service supervisory visit checklist

| Question | Yes/ No | Problem observed and/or comments | Corrective action on-site | Corrective action longer term |
|---|---|---|---|---|
| Is the session organized efficiently? | | | | |
| Are immunization cards in use for every infant and pregnant woman? | | | | |
| Is the register used for recording information on each child/mother/ pregnant woman? | | | | |
| Are caregivers advised on when to return? | | | | |
| Does the health facility have a monitoring chart displayed? | | | | |
| Does the health facility have a map of the catchment area displayed? | | | | |
| Does the health facility have a workplan for the quarter? | | | | |
| Are planned sessions monitored for completeness/timeliness? | | | | |
| Is there a system for tracking defaulters? | | | | |
| Does the health facility display a spot map of measles cases? | | | | |
| Is a temperature monitoring chart in use? | | | | |
| Are the vaccines stacked properly inside the refrigerator? | | | | |
| Are there any expired vaccines inside the refrigerator? | | | | |
| Are there any vaccines with VVM reaching the discard point? | | | | |
| Do the health workers know how to read and interpret the VVM? (Ask them to describe VVM changes and what they mean) | | | | |

| Question | Yes/ No | Problem observed and/or comments | Corrective action on-site | Corrective action longer term |
|---|---|---|---|---|
| Do the health workers know when and how to perform the Shake Test? (Ask them to demonstrate how to do it) | | | | |
| Is there an adequate supply of AD syringes for the planned sessions? | | | | |
| Are AD syringes used for every immunization? | | | | |
| Is the injection technique appropriate? | | | | |
| Is each used AD syringe and needle disposed of in a safety box? | | | | |
| Are immunization posters displayed on the health facility wall(s)? | | | | |
| Is there a schedule of community meetings? | | | | |
| Are community volunteer(s) involved with immunization services? | | | | |
| Is there a stock register? | | | | |
| Does the stock register show adequate vaccines and supplies? | | | | |