

Making surveillance work

Module 4: Data management



DEPARTMENT OF VACCINES AND BIOLOGICALS



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(WHO/V&B/01.08) written by Mark Grabowsky and revised by
Philippe Duclos

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Module 3: Logistics management (WHO/V&B/01.10)
written by Marcus Hodge, Mojtaba Haghgou and Maureen Birmingham

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written by Annemieke van Middelkoop and Anthony Burton

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World Health Organization

Department of Vaccines and Biologicals

CH-1211 Geneva 27, Switzerland

• Fax: + 41 22 791 4227 • Email: vaccines@who.int •

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1. Introduction

1.1 Why a module on data management?

Do you use routinely collected information to make decisions? Do you think that the information produced by your office reflects exactly what was reported?

Think again ... Could data be lost in your office - misplaced or just not processed? Is it possible that your office introduces errors into the data? Do you struggle to get results when you need them? These are *not* uncommon problems. They *can* be avoided by applying good data management practices.

Much has been written about disease surveillance and how to conduct surveillance. Little attention, however, is given to the routine aspects of managing data, a process critical to the success of any surveillance system.

1.2 For whom is this module intended?

This module was written for the programme manager or epidemiologist responsible for a disease surveillance system. It should help you to evaluate and improve your current data management practices.

1.3 What is not included in this module?

This is *not* a module on designing or setting up a surveillance system. It does *not* address the crucial issue of information requirements and the consequent data collection tools and methods. It does *not* describe ways of analysing data and putting the results to use. And it does *not* discuss how to evaluate your surveillance system.

1.4 What *is* in this module?

This module focuses on managing the data in an existing surveillance system - the routine activities that must be undertaken to ensure that the data are available in a timely manner without any loss, duplication or unnecessary modification. Details of what can and cannot be expected from a data manager are provided - this may prove useful in the appointment, supervision and evaluation of such a manager. The final section contains a sample handbook with instructions for the management of data on vaccine-preventable diseases (VPDs). This can serve as a model for compiling a handbook for the data of any surveillance system.

1.5 Examples in the module

Since this module has been produced by the Vaccine Assessment and Monitoring unit, all the examples given are of VPDs. The data management techniques, however, are applicable to all disease surveillance systems.

2. The data

2.1 Many kinds of data

As a programme manager, you need to be well informed in order to make appropriate decisions. You will probably want information on:

- population size and distribution;
- incidence of VPDs;
- immunization coverage;
- policies - immunization schedules, case definitions, safety guidelines;
- resources - finance, personnel, equipment, vaccine supplies.

The information is most useful to you if it is readily available. This requires data management. Although the module concentrates on the data management of disease data, the principles and functions are equally applicable to other kinds of data as listed above.

2.2 Who provides the data?

Where do you obtain your information? Is it generated by your own programme as part of its surveillance and monitoring activities? Or does some external organization make it available? For example, you probably obtain your population data from the national census department. Whether the data are self-generated or externally generated, *your* programme should collect and process them so that they are in a format appropriate for *your* needs.

In your organization, who is responsible for producing information? You may be in charge of the programme but another unit may be responsible for all data collection and processing. Good communication is critical to the success of such a division of responsibilities. You should regard the person responsible for *your* information as a member of *your* team. This person should be kept informed, invited to relevant meetings, and given feedback regarding the data.

2.3 The flow of data

The collection of surveillance data generally involves sending data from the most peripheral level to more central levels. In the hierarchical model the data pass through consecutive levels, whereas in the broadcasting model the data are sent simultaneously to multiple more central levels. Which model is appropriate depends on the surveillance objective as well as on the availability of data management resources at each level.

The data sent from a particular level should correspond with the expectations at the receiving level. This applies to whether the data are case-based or aggregate totals, whether the data contain only newly reported cases or all reported cases, and whether the data are paper-based or in electronic format. In the latter case, consideration has to be given to the software used and to the specifications of variables. Cooperation between the two levels is required to achieve this data compatibility.

2.4 The use of data

Many people and considerable efforts are involved in the collection of data and their conversion into information. If the data are not used to make decisions and plan actions perhaps they do not need to be collected at all.

Data may not be presented to you in a format that allows you to make the necessary decisions. As a programme manager *you* are responsible for determining your information needs, and this includes specifying the format that best suits your purpose.

3. Managing the data

3.1 Principles of data management

The objective of all disease surveillance activities is to take action that will help to control the disease under surveillance. Appropriate action requires appropriate information, which is a function of complete and accurate data as well as correct interpretation.

Data management tasks should therefore be driven by the following three principles.

- **Production of complete data**

From a data management perspective the data are complete if all reported cases of the disease *and* all the required details of each case are available.

Example: Only half the health facilities in a district submit forms with the number of vaccinations administered. The reported number of vaccinations for the district is thus incomplete. Using the target population for the entire district would give a vaccination coverage figure that underestimated the true coverage. This could result in inappropriate action, i.e. trying to find out why the coverage is so low rather than why health facilities do not send in the data.

- **Production of accurate data**

The data should reflect reported details correctly.

Example: Reported measles cases from each district are added up to obtain provincial totals. However, the total cases immunized and not immunized are inadvertently interchanged on the final report. This may lead to an erroneous conclusion, i.e. that there is a problem with the vaccine, and to inappropriate action.

- **Production of timely data**

The data should be available in time to allow effective action to be taken. The meaning of “in time” depends on the objective of the surveillance activity.

Example: For resource allocation and policy-making at the national level it may be perfectly acceptable if the data on acute flaccid paralysis (AFP) are received two or three months after onset. The district, however, needs to be informed of cases soon after diagnosis to ensure that the appropriate investigations are undertaken.

3.2 Data management functions

Data management is a *routine* process that consists of the following four basic functions.

- **Systematic collection of the data**

You must have a list of all your reporting units, i.e. all sources that should send their data to you, with the relevant contact details.

Make sure that you receive data from all your reporting units according to schedule. This can only be expected if you have told them what data to send, in what format, to whom, how often and by when.

Use a *data received chart* to record which reporting units have sent in their data and when you received the data. Displaying this chart on a wall, rather than in a file or on computer, makes it easily accessible to all interested persons in the office.

Monitor the timeliness of reporting, i.e. the percentage of reporting units that have sent in their data for a specific period by the due date. Timeliness for a specific reporting period is calculated immediately after the due date.

Remind reporting units to send in their data if you have not received any by the due date. If possible, provide assistance to a reporting unit that is unable to send its data. You may need good negotiating skills if the reporting unit does not give priority to processing and sending its data!

Immediately on receipt, check the data for readability. If, for example, the data are faxed as a line list, make sure that the copy is legible and that all details are on the page. Data that are sent in as a computer file may have become corrupted during transit. In the event of such problems, contact the reporting unit in question and ask for a readable copy of the data to be sent.

Check the data received for completeness and validity. If the data are on computer, your system should have a *Clean* procedure that searches through the file for possible errors and lists them. Missing details or obvious errors, such as the date of onset being 31/12/1999 and the date of notification 02/01/1999, should be referred to the appropriate reporting unit for correction. Even if it is clear what the correction should be, it is important that a reporting unit be made aware of possible errors in its own data.

Ensure that you receive all follow-up data, such as the 60-day follow-up examination results and laboratory investigation results of AFP cases. Contact the appropriate reporting unit or laboratory for any information that is missing after the prerequisite time has elapsed.

- **Orderly consolidation of the data**

All data collected should be regularly consolidated into a format suitable for analysis. In order to do this successfully it is necessary to organize them systematically as from the moment of receipt.

The receipt of incoming data should be recorded **immediately** in a *data processing register*. This is useful for subsequently checking that all data received have been processed. It is very easy to misplace forms (or disks) under a pile of unrelated paperwork and thus effectively to lose them to the surveillance system.

Any queries that have been referred to reporting units should be recorded in the *data processing register*. When each query has been answered, this should also be recorded in the *data processing register*. By **immediately** recording each completed step in this way you have a record of what has been done and what still needs to be done with the data from each reporting unit at any time.

You should have a system for temporarily storing the data at different points in the process. For paper forms you should consider having the following four in-trays:

- new* - forms that have been received and registered;
- queries* - forms with queries that need to be sorted out;
- process* - forms that are ready for processing;
- file* - forms that have been processed and are ready for filing.

Computer files are more easily lost than paperwork. It is critical to have a system for saving and processing these files. A systematic file-naming convention is essential.

There are many ways of organizing data. *How* they are organized is less important than that they *are* organized. The system should be appropriate for the environment in which the data are processed and should minimize the possibility of loss and incomplete processing of the data.

For **case-based** data that are to be processed **without the use of a computer**, transfer the critical items of information from each case investigation form or follow-up form to a line list. The data can be tabulated fairly easily from this list. The required output determines what items of information should be on the list.

For **aggregate** data that are to be processed **without the use of a computer**, a cumulative totals sheet can be compiled to record the critical numbers per reporting site per reporting period. The appropriate addition of these totals will provide the required tabulations.

If the **data are to be entered on computer** you should have a system that makes data entry as easy as possible, e.g. the data entry screen should look very similar to the form from which the data are obtained. During data entry the system should check for errors of validity, such as dates in the reverse order of what might be expected.

If **data are received on computer files** the data for each reporting unit could be saved in a separate folder or directory. All editing of such data should be done in the folders. In order to consolidate the data, the system should read the appropriate files in each folder and save them to a single file, ready for analysis.

Edit the data as soon as corrections are available. The corrections should be made on the original paper source (with details such as who provided the modification and when) as well as on the version used for analysis (line list, cumulative totals sheet or computer file).

Fully processed data should be signed off in the *data processing register*. Make sure that all data received have been processed. Also check that data have not been processed twice by mistake: “complete data” means 100% of cases, not 110%!

When the data have been processed, the paperwork (case investigation forms, monthly reports) must be filed, not discarded. They represent your source of information and should be kept for at least two years after the final report on the data has been published. Staple follow-up or updated reports to the corresponding original report. The filing system should be designed for easy retrieval of the data in the event of a subsequent query. It is advantageous if the filing activity is not time-consuming.

Ensure that the consolidated data are always available for analysis. Procedures should be in place to minimize the risk of losing them. Make frequent copies of the data: back up computer data on an external medium, and photocopy line lists and cumulative totals sheets. Use antivirus software to prevent data corruption by computer viruses. Take care not to allow the computer disk to become too full, since this may cause problems with the data.

Develop office rules or procedures to ensure that the person responsible for the data is the only one allowed or able to modify the data. However, other members of the team should have access to the data in case they need or desire this. One approach is to make regular up-to-date copies and to provide clear instructions on where to obtain them.

- **Regular production of reports**

Reports of the data should be produced on a regular basis in accordance with a standard format. The production of these reports should require a minimum of effort. If the data are on computer a program should produce the required output automatically. If the data are paper-based, templates should be developed for the transfer and addition of the relevant numbers from the line lists or cumulative totals sheets. Use graphs and maps to display the most important results. Indicate the date of compilation as well as the completeness of reporting at the time of compilation on the output.

All results should be carefully checked. If the numbers have had to be retyped, check them against the original output. Double-check all calculations. Check that the results are consistent with those published in a previous report. Any discrepancies should be followed up and explained or corrected.

Make sure that your results correspond with those published by a more central level. Inform the more central level if there are discrepancies. It *is* possible for the data management practices at the more central level to be less than perfect!

- **Prompt dissemination of reports and data**

Send reports with the latest results to the persons who make or influence decisions, to all who participate in the surveillance process and to other interested parties or organizations. Compile and maintain a distribution list. Use the most appropriate method of distributing reports. Putting reports on a web site or emailing them may require the least effort. For recipients without email facilities, however, paper copies of reports should be mailed or faxed.

Forward the data to the more central level in the required format and in accordance with the reporting schedule. Ensure that you possess the contact details of the person to whom the data have to be sent. If there is a delay in sending the data, inform the more central level of the circumstances.

3.3 Avoiding crises

A situation resulting in the data not being available when needed represents a data management crisis. The data manager may have left suddenly or the computer may have been stolen. What can be done to prevent such events from turning into crises?

- Appoint a *backup data manager*, another member of staff who should familiarize himself or herself with the data management procedures and the whereabouts of documentation.
- Ensure that *backups of the data* are made regularly on a medium external to the computer or that copies are made of line lists and cumulative totals sheets. These backups and copies should be kept in a safe place, e.g. in a locked cupboard, possibly even off the premises.
- Ensure that all *procedures are adequately documented* and that the documentation is easily accessible. Update the documentation whenever changes are made - it is clearly not desirable to discover during a crisis that the documented procedures describe a system no longer in use.

In addition, if a computer-based system is used the following measures should be adopted.

- Make a *copy of all software*, for example the information for action (IFA) system, Epi Info and Epi Map. Keep the copies in a safe place. If somebody requests a copy, make an extra one. Do not give away your only backup copy, as it will probably not be returned!
- Make sure that a *menu-based system* is developed to manage the data. A menu-based system allows one to perform the routine computer procedures without having to know the intricacies of the system. This facilitates a smooth transition if somebody has to take over from the data manager in a crisis.
- Make sure that programs are developed to generate all routine output, i.e. *automate what can be automated*. At the best of times this ensures that output is obtained quickly using standard procedures. At the worst of times it avoids major delays while the replacement person works out the appropriate steps in producing the output.
- Make sure that *antivirus software* is available on the computer. Access to the Internet increases the chances of computer viruses infecting your computer and possibly damaging or even deleting critical files. Your antivirus software should be regularly updated to ensure that it recognizes the latest computer viruses, which appear almost daily.

If a new procedure is to be implemented, for example if a paper-based system is to be replaced by a computer-based system:

- *Run both systems in parallel* until you are satisfied that the new system is better than the old one.

4. Who should manage the data?

4.1 Somebody must be responsible for data management

Disease surveillance units seldom have a person with the title of data manager or even somebody whose sole responsibility is managing the data, and indeed this is unnecessary. What is required is that somebody suitable be specifically allocated the responsibility of data management and provided with the necessary time and training for assuming this responsibility. Without a designated data manager, whether or not this title is used, for a surveillance system, it is not possible to create and maintain the organized environment required for smooth data flow.

4.2 Characteristics required for data management

Data management consists of performing routine tasks according to specified procedures. It requires a dependable person who can devote his or her time to the job and thereby ensure the regular availability of the data. No highly specialized skills are necessary but the person concerned should be neat and methodical as well as comfortable in working with data, numbers and computers.

Good data management requires alertness, i.e. a good eye for detecting problems. This can only come about if the data manager understands all the elements of the surveillance system.

The characteristic that best identifies a good data manager is a strong sense of ownership of the data. The person is likely to be elated if missing data are finally traced and to feel dejected if follow-up data are not available. When problems occur, perseverance driven by the sense of ownership distinguishes the excellent data manager from the mediocre one.

4.3 What lies outside the data manager's role?

Often more is expected from a data manager than is reasonable. The data manager is not an epidemiologist, a biostatistician or a computer programmer, unless, of course, the data management responsibility has been given to such a qualified person or if the manager has been taught some of these skills.

Various roles in surveillance and the appropriate responsible persons are indicated below. The list is not exhaustive but puts the data manager's role in perspective. The persons available to take on these responsibilities are limited here to the programme manager, the epidemiologist, the data manager and the computer programmer. In practice, however, some of these roles can be assigned to personnel such as data typists or system analysts.

Role	Responsibility of
Defining information needed for decision-making	Programme manager
Determining data items and methods of collection	Epidemiologist
Designing report forms	Epidemiologist
Defining data flow	Epidemiologist
Defining storage and processing mechanisms	Epidemiologist
Deciding on analyses to provide required information	Epidemiologist
Deciding on how to present results	Epidemiologist
Developing or modifying a computer system	Programmer
Receiving and checking data	Data manager
Consolidating data	Data manager
Producing routine reports	Data manager
Disseminating reports and data	Data manager
Performing additional ad hoc analyses	Epidemiologist
Interpreting results	Epidemiologist

4.4 What can be expected from the data manager?

The data manager should be held accountable for the integrity of the surveillance data and should produce and distribute routine reports and information. All tasks should be done according to specifications.

As the data manager gains familiarity with the disease under surveillance and the broader surveillance framework, and becomes more adept at using the software, he or she is more likely to make useful contributions over and above routine data management. For example, with appropriate training on the use of analytical, mapping and graphics software, the data manager may be able to produce ad hoc reports on request.

4.5 What can the data manager expect from the rest of the team?

The data manager should expect clear instructions on what tasks he or she is required to perform. These instructions can be compiled in the form of a handbook as described in section 5.

Training should be provided in all the areas required for the data manager to perform his or her tasks. This may include training on basic computer skills such as file management and emailing. It should certainly include developing an understanding of the specific surveillance system.

The data manager should be included in discussions of results, should be informed about changes affecting the data, should feel free to offer comments and should be given whatever support is required. In other words the data manager should be considered a full member of the surveillance team.

5. A sample handbook for the data manager

This section presents the types of materials and information that should be provided to the person responsible for data management in an imaginary country, Rondonia. In order to be brief the handbook focuses on data management for one surveillance system only, namely that of VPDs. In practice the data manager is likely to be responsible for a wider range of data. All aspects of the surveillance system described here are for the purposes of illustration only.

5.1 Responsibilities

As a member of the national immunization team, you are responsible for managing the data of reported cases of VPDs in Rondonia. You are expected to collect the relevant data, enter them on computer, make sure that they are complete and accurate, and provide results on a regular basis.

It is also your responsibility to ensure that your office obtains the appropriate population estimates each year so that incidence rates can be calculated.

You are required to maintain a list of people and organizations to whom the immunization report is sent four times a year. You are also responsible for distributing the report.

5.2 Description of the surveillance system

- **Background**

One of the main activities of the immunization system is to immunize all children against VPDs. Data on these diseases are collected for two purposes:

- (1) to monitor whether the occurrence of these diseases is decreasing over time;
- (2) to detect outbreaks of the diseases so that appropriate action can be taken.

- **Data flow (Annex 1)**

The number of cases of diphtheria, pertussis, tetanus and measles diagnosed at all public health facilities (hospitals and clinics) throughout Rondonia are recorded monthly on standard forms. These are forwarded to the district health office, which summarizes all the data for each month on a single form. This form is then sent to the national level. Once a year the data are reported to WHO.

The data are analysed and a report is compiled four times a year. This is distributed to the districts and health facilities for their information and action.

- **Contacts (Annex 2)**

The names and contact details of the surveillance officers in the six districts of Rondonia are shown in Annex 2. These officers are responsible for sending the district data to your office every month.

In addition, population estimates can be obtained from the Department of National Statistics (Mr R. Uwel, Telephone: 787 1211).

- **Reporting forms (Annexes 3, 4)**

Health facilities record the numbers of cases diagnosed on form VPD-1 (Annex 3).

Districts summarize the monthly information on form VPD-2 (Annex 4). This form comes to the national office.

- **Output format (Annex 5)**

The office produces a quarterly report on the activities of the immunization system. Included in each issue of the report are a table and graphs as shown in Annex 5. The template for this output is in VPD.DOC.

- **Computer system**

The computer system used for entering the data on cases and population is known as IFA. It can be accessed via the IFA icon on your computer desktop. IFA is fully menu-driven with options for entering, cleaning and analysing the data. If you have any problems or want to know more about the system, contact Mrs R. Ewefit in Computer Support Services (Extension 1123).

5.3 Duties

- **Checks to perform**

Make sure that you receive data from each district. For this purpose, immediately record the date you receive on the *data received chart* (Annex 6). Districts have been requested to send in their data by the end of the month following the reporting month. Contact any office from which you have not received data by that time. Each office should send in a form even if no cases of the diseases were diagnosed during the month.

Also immediately record the receipt of data in the *data processing register* (Annex 7). Document the completion of all steps in this register. This serves as a check that all data received have been fully processed.

As soon as you receive a form, check that *all* items on it have been filled in and that the entries are readable. Contact the relevant district officer immediately if there are any queries.

Check whether the form contains the data for a new month (to be entered as a new record on the computer) or whether an update is provided for an existing month (in which case the existing record has to be edited).

During data entry, the program will automatically indicate if numbers do not add up to the totals on the form. This could reflect an error in recording *or* an error in obtaining the total. The district office has to provide the corrected figures.

When you have entered the data for a particular month, run the *Clean* option on the computer. This lists the following problems that must be corrected or explained:

- multiple records for the same district and the same month and year;
- districts with no data for a particular month;
- records with errors in addition.

- **Filing system**

You have four in-trays in which to organize the forms during processing: *new*, *queries*, *data entry* and *file*.

When you have entered the data on computer, the forms must be filed in the appropriate district file. They should be filed in chronological order with the most recent month on top. If a district has sent in updated information for a particular month the form should be stapled on top of the original form.

- **Tasks by calendar**

On the last day of the month:

- check that data for the previous month have been received from each district, and follow up if necessary;
- calculate the timeliness of reporting;
- check forms for obvious errors and follow up;
- enter data on computer and make backup.

During the next two weeks (by 15th of each month):

- edit the data as corrections become available, making a backup each time;
- run the *Clean* option to see whether there are any further problems;
- run the *Analysis* option to produce the figures required for the standard report;
- update the report using VPD.DOC and make sure that you check all figures on the final printout.

At the end of May, August, November and February:

- send a copy of the immunization and VPD report to all people and organizations on the distribution list.

As required:

- update the distribution list for recipients of the immunization and VPD report in accordance with requests.

By the end of each year:

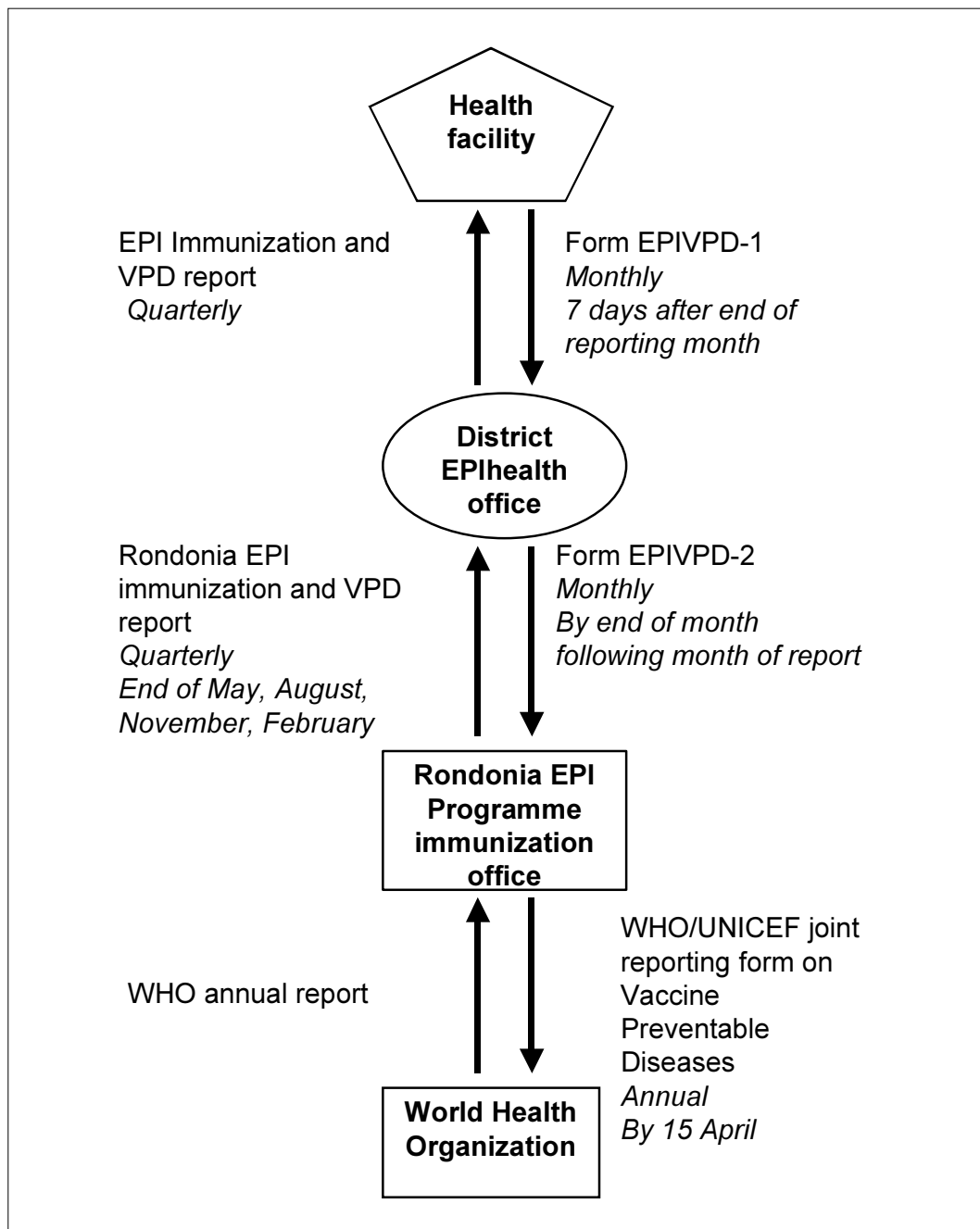
- obtain population estimates by district for the following year from the Department of National Statistics;
- enter these estimates into the population file on computer.

- **Comments and suggestions**

As you become familiar with the data and the system you may think of ways of improving aspects of data management. Feel free to discuss your suggestions with the national staff in charge of the immunization system. Any changes that are agreed on should be documented.

Annex 1:

Data flow for vaccine-preventable diseases



Annex 2:

Names and contact details of surveillance officers and programme managers

District Address	Surveillance officer Tel. Fax Email	Programme manager Tel. Fax Email
South-east PO Box 125 Main City 1400	Mrs E. Seppi 011 - 123 4567 011 - 123 4599 seppie@epi.sep	Dr Y. Knot 011 - 123 4569 011 - 123 4599 knoty@epi.sep
Northern 15 High Street Torpedo 2100	Ms M. Tudoo 021 - 321 8800 021 - 321 8899 tudoom@epi.np	Mr P. Rose 021 - 321 8805 021 - 321 8899 rosep@epi.np
Western PO Box 45 Middleton 3600	Mr T. Westaway 031 - 448 7345 031 - 448 7399 westt@epi.wp	Dr B. Dunn 031 - 448 7351 031 - 448 7399 dunnb@epi.wp
Far Eastern PO Box 12 Heddon 4500	Mrs G. Whiz 041 - 789 2211 041 - 789 2299 whizg@epi.fep	
North-west 55 South Street Total City 5100	Mr T. Pott 051 - 245 8123 051 - 245 8199 pottt@epi.nwp	Mr F. Moni 051 - 245 8122 051 - 245 8199 monif@epi.nwp
Central PO Box 40 Halfway 6000	Mrs R. Arre 061 - 787 1231 061 - 787 1299 arrer@epi.cp	Dr H. Astie 061 - 787 1228 061 - 787 1299 astieh@epi.cp

Annex 3:

Numbers of diagnosed cases of vaccine-preventable diseases

(Form VPD-1)

Name of facility (clinic, hospital) _____

Cases of vaccine-preventable disease diagnosed during _____ of _____
(month) (year)

Diphtheria cases _____ Neonatal tetanus cases _____

Pertussis cases _____ Total tetanus cases _____

Measles cases:

Age group	Immunization status			
	Immunized	Not immunized	Unknown	Total
Under 1 year				
1-4 years				
5-14 years				
15+ years				
Unknown				
Total				

Name of person completing this form _____

Telephone number _____

Date _____

*Please complete and send this form to your district health officer
within 7 days after the end of the month of report.*

*If no cases of these diseases were diagnosed during the month,
please submit this form indicating zero cases.*

Thank you.

Annex 4:

Summary of monthly information on vaccine-preventable diseases

(Form VPD-2)

Name of district _____

Cases of vaccine-preventable disease diagnosed during _____ of _____
(month) (year)

Total number of facilities _____

Number of facilities that sent in a report (including zero reports) _____

Diphtheria cases _____ Neonatal tetanus cases _____

Pertussis cases _____ Total tetanus cases _____

Measles cases:

Age group	Immunization status			
	Immunized	Not immunized	Unknown	Total
Under 1 year				
1-4 years				
5-14 years				
15+ years				
Unknown				
Total				

Name of person completing this form _____

Telephone number _____

Date _____

*Please complete and fax this form to:
Coordinator, Immunization Services, Rondonia Ministry of Health
(Tel: 061 777 1234; Fax: 061 777 9999)
by the end of the month following the month of report.*

Thank you.

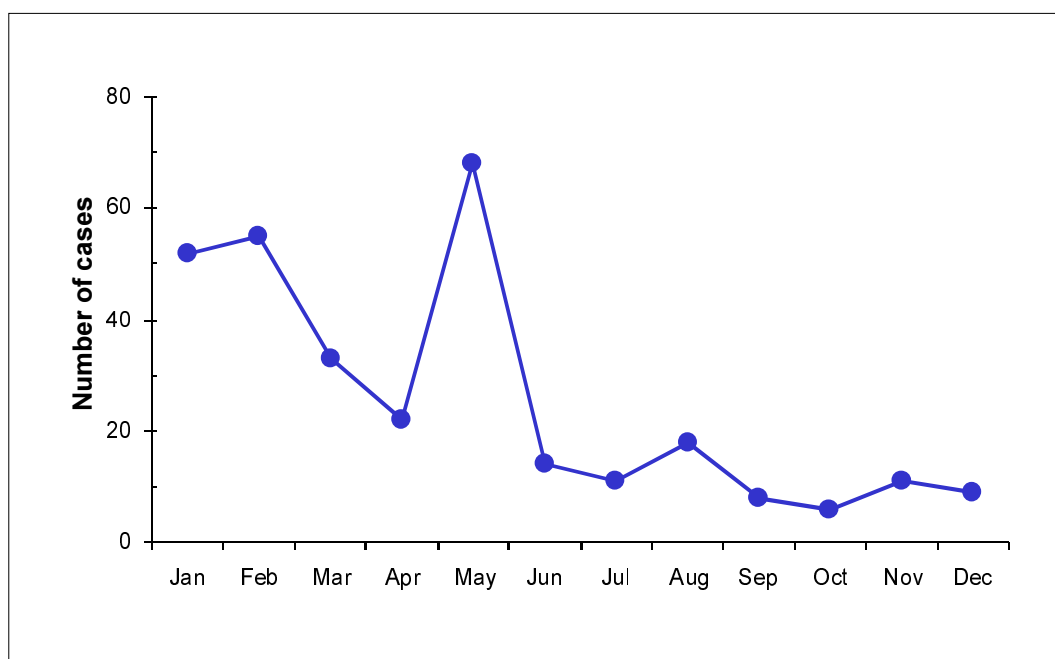
Annex 5:

Table and graphs in quarterly report on immunization activities

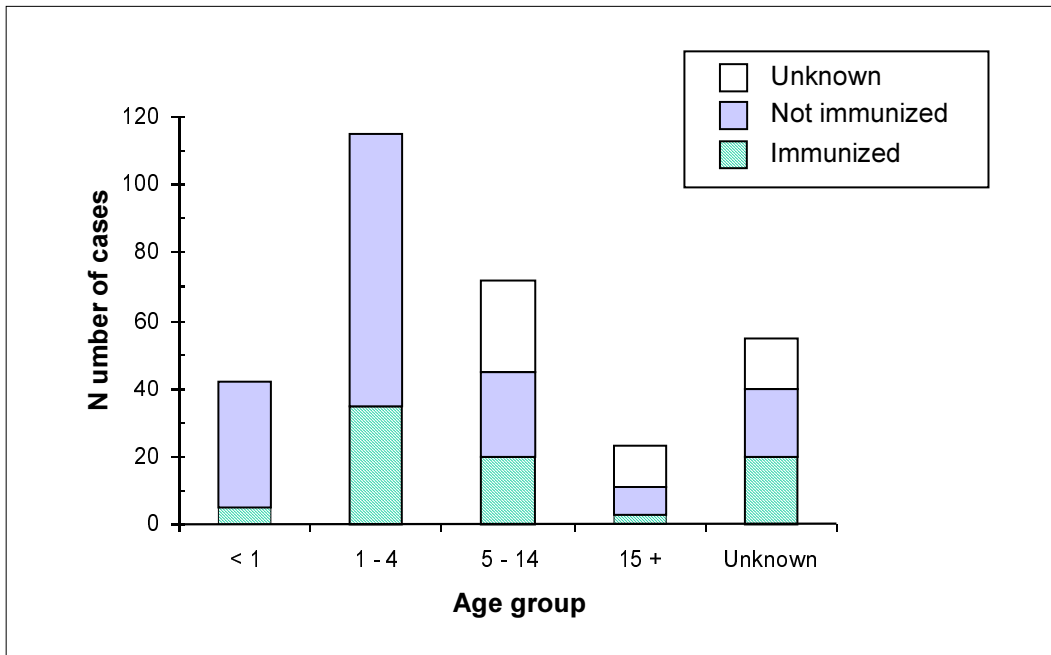
Cases of vaccine-preventable diseases, 1997-1998 (as of 15 February 1999)

District	1998 population	% of facilities reporting	Diphtheria		Pertussis		Neonatal tetanus		Total tetanus		Measles	
			1997	1998	1997	1998	1997	1998	1997	1998	1997	1998
Central	180 000	91%	5	3	18	5	2	8	7	10	109	67
Far Eastern	84 000	92%	0	1	4	3	2	1	5	7	212	35
Northern	144 000	100%	2	12	12	2	1	15	2	21	87	29
North-west	240 000	80%	4	1	24	3	0	5	2	6	54	58
South-east	66 000	100%	1	3	2	0	0	1	1	3	76	41
Western	126 000	100%	0	0	3	0	0	0	1	2	111	77
Rondonia	840 000	94%	12	20	63	13	5	30	18	49	649	307

Reported measles cases by month in 1998, Rondonia(as of 15 February 1999)



**Measles cases by age group and immunization status,
Rondonia 1998 (as of 15 February 1999)**



Annex 6:

Data received chart for vaccine-preventable diseases

District	January	February	March	April	May	June	July	August	September	October	November	December
Central	28/2	27/3	13/5	28/5	26/6	22/7	23/8	25/9	21/10	28/11	24/12	28/1
Far Eastern	15/2	15/3	15/4	15/5	15/6	15/7	15/8	15/9	15/10	15/11	15/12	15/1
Northern	3/3	5/4	3/5	2/6	1/7	3/17	3/18	2/10	3/1/10	30/11	29/12	30/1
North-west	21/2	17/3	19/4	28/5	30/6	2/8	30/8	1/10	22/10	28/11	2/1	28/1
South-east	2/3	5/4	2/5	1/6	2/7	2/8	1/9	30/9	29/10	30/11	30/12	29/1
Western	26/2	28/3	3/5	27/5	30/6	1/8	29/8	25/9	25/10	25/11	4/1	31/1
% reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
% timely	67%	67%	33%	67%	67%	50%	83%	67%	100%	100%	67%	100%

Annex 7:

Data processing register for vaccine-preventable diseases, January to March 1998

District	Date received	Reporting month	Facilities reported	Checked	Entered (record #)	Filed	Comments
Far Eastern	15/2	January	23/5	?	73	?	
North-west	21/2	January	12/15	?	74	?	
Western	26/2	January	20/20	?	75	?	
Central	28/2	January	32/35	?	76	?	? Measles total sorted out 14/3
South-east	2/3	January	20/20	?	77	?	
Northern	3/3	January	12/15	?	78	?	Will send update - received 20/3
Far Eastern	15/3	February	23/25	?	79	?	
North-west	17/3	February	14/15	?	80	?	
Northern	20/3	January update	15/15	?	78	?	