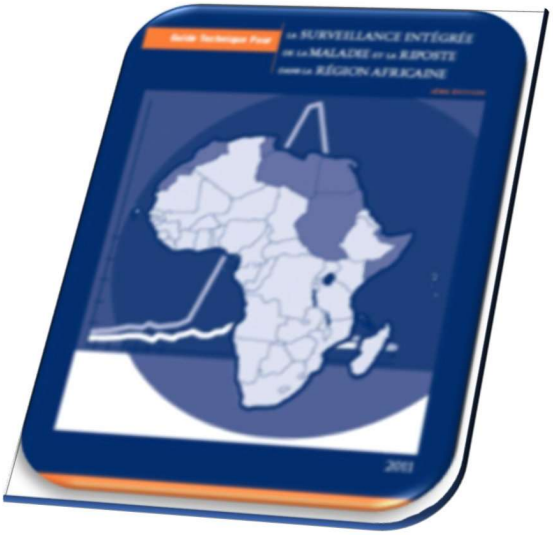
INTEGRATED DISEASE SURVEILLANCE AND RESPONSE TECHNICAL GUIDELINES

THIRD EDITION



MODULE 3: ANALYSE AND INTERPRET DATA

MARCH 2019

SECTION 3: ANALYSE AND INTERPRET DATA

3. ANALYSE DATA

It is not enough to only collect, record and report numerical information about illness, death and disability from the catchment area; the data must also be analysed at each level where it is collected. Organizing and analysing data is an important function of surveillance. Analysing data provides the information that is used to take relevant, timely and appropriate public health action. Analysis of surveillance data allows for:

(a) Observing trends over time and alerting health staff and relevant stakeholders about emergent events or unusual patterns.

(b) Identifying geographical areas at higher risk.

(c) Characterizing personal variables such as age, gender or occupation that place a person at higher risk for the disease or event.

(d) Monitoring and evaluation of Public Health interventions.

In general, analysing routine surveillance data should address the following questions:

(a) Have any priority diseases or other public health events of concern been detected during the reporting period (this week, for example)? Is an outbreak or unusual public health event suspected?

(b) Of the cases, deaths or events detected, how many were confirmed?

(c) Where did they occur?

(d) How does the observed situation compare to previous observation time periods this year or the previous year? For example, when compared to the start of the reporting period, is the problem increasing?

(e) Are the disease trends stable, improving or worsening?

(f) Is the reported surveillance information representative enough of the reporting site's catchment area? Out of all the sites that should report, what proportion has actually reported?

(g) How timely were the data received from the reporting sites?

(h) What period (seasonality) is it occurring?

(i) Who is affected? Which occupational groups are most at risk?

Each site that collects or receives data should prepare and follow an analysis plan for analysing routine surveillance information (refer to Annex 3A of this section).

This section describes how to receive surveillance data and analyse it by time, place and person. The analysis may be done electronically or manually. Methods for carrying out the analysis and steps for interpreting and summarizing the findings are also included. Information in this section can be applied at the national, district, health facility and community levels.

3.1 Receive, handle and store data from reporting sites

The routine flow of surveillance data is usually from reporting sites to the next level, up to the central level. A reporting site is a site which reports about surveillance and outbreak data to the next level. This includes all health facilities (public, private and quasi-governmental, faith-based), standalone laboratories, and PoE. A reporting site also contains event reports from community surveillance and response.

At the health facility level, both inpatient and outpatient services are surveillance sites. The information collected from the site is compiled in standard forms (Weekly and Monthly IDSR Summary Reporting Forms, Case-based Investigation forms, Line listing forms, etc.), analysed and then forwarded to the district health management team. In areas where there is already an eIDSR system, data is entered using a mobile phone or a computer, and the district health management team can access compiled information from a computer (*Refer to Section 9 on eIDSR on more countries specific examples)*. In some countries, a sub-district team collects the data from the communities and health facilities in its catchment area and forwards it to the district team. Districts merge, aggregate and send their data and reports to provinces, regions or states and subsequently to the central health authorities.

Adequate data protection and security must be ensured. Care must be taken not to leave documents containing personal health information related to notifiable conditions on work desks or anywhere they may be visible to unauthorized persons. Hard copies of identified notifiable conditions should be stored in locked cabinets in a secure location. Data which is stored in a computer should be password protected with appropriate restricted access. Network hardware and any back up or copies of notifiable conditions data must be password protected and stored in a secure location.

3.1.1 Receive data

Make a careful record of all data received from the reporting site. The surveillance team at each level or reporting site where data is received should:

(a) Acknowledge receipt of the data/report.

(b) Log into an appropriate logbook any data set or surveillance report received from any reporting site (Refer to Annex 2G in Section 2).

(c) Record in the log the date the data was received, what is the report about and who is the sender.

(d) Verify whether the data set arrived on time or was late.

(e) Check the completeness of the data set or reports, that is, the number of data sets/reports as against the number of expected data sets or reports

(f) Review the data quality:
   (i) Verify whether the form (hard copy or electronic file) is filled out accurately.
   (ii) Ensure that the form is filled completely (for example, no blanks).

(g) Check to be sure there are no discrepancies on the form. Verify from the reporting site (by phone, e-mail or text message) and correct any discrepancies.

(h) Merge the data and store them in a database.

(i) For electronic surveillance refer to the section 9 on eIDSR.

3.1.2 Enter and clean the data

At each level where data is received (health facility, district, province or national), the surveillance team should always liaise with the Health Information System focal person to extract the priority IDSR diseases from the register and enter correctly into aggregated IDSR reporting forms while listing data from all the reporting sites. Troubleshooting and cleaning data prior to analysis is an important data management practice. Disease trends and maps will not be accurate if information about number of cases, time of onset, or geographical location of cases is missing. Use opportunities during supervisory visits to sensitize clinicians and laboratory staff about the importance of quality practices for recording patient information in patient logbooks/register or reporting forms. Emphasize that patient logs are sources of data for reporting public health information and may play a role in detecting an unusual event or otherwise undetected public health problem.

Ensure that health facility personnel know the algorithm for reporting including reporting levels. Also ensure that there are recording logbooks, including recording logbooks of rumours. The registers which are normally used in most countries are the OPD and IPD registers, and the surveillance officer should always liaise with the health information focal person, to extract the priority disease of IDSR from the registers.

Data may be recorded and aggregated either manually or electronically if a computer is available. Regardless of the method, use the following practices:

(a) Update aggregate totals for each week or month that data was received.

(b) Record a zero when no cases were reported. If a space which should have been filled in is left blank/dash/not applicable, the next level may have an incorrect picture of the situation. They will not know if data is missing or if no cases were reported. Zero reporting allows the next level to know that surveillance did not detect a case of the particular disease or condition.

(c) Ensure that weekly totals include only those cases or deaths actually reported for that epidemiological week (Monday to Sunday). Late reports from previous weeks should be entered with the relevant week and totals updated accordingly.

(d) Avoid duplicate entries by using the report or case record unique identifier to prevent, and also check for, multiple entries of the same records.

(e) Establish frequent contacts with the reporting sites in order to clarify issues of missing information/errors and address inconsistencies detected in the reporting.

(f) Ensure consistency and harmonization of data.

(g) Ensure that update of information on laboratory results is done by linking to the respective case record unique identifier.

Once the data has been received and entered into the aggregate forms, review it carefully to ensure that no mistakes were made during entry. Since surveillance data informs decisions about disease control and prevention actions, there are important ethical, social and economic consequences if data is not entered and managed correctly or on time.

During an outbreak, ensure that data is collected using a line list.

3.2 Analyse data by time, place and person

Findings from data analysis may trigger investigations and subsequent response to an outbreak, condition, or public health event. Data should be analysed by time, place and person (refer to Table 3.1).

Table 3.1: Types of analysis, objectives, data display tools and methods

Type of analysis	Objective	Method	Data Display Tools
Time	Detect abrupt or long-term changes in disease or unusual event occurrence, how many occurred, the seasonality and the period of time from exposure to onset of symptoms.	Compare the number of case reports received for the current period with the number received in a previous period (days, weeks, months, quarters, seasons or years).	Record summary totals in a **table** or on a **line graph** or **histogram or sequential maps.**
Place	Identify where cases are occurring (for example, to identify high-risk area or locations of populations at risk for the disease).	Plot cases on a map and look for clusters or relationships between the location of the cases and the health event being investigated. (for example, cases near a river, cases near a market)	Plot cases on a spot map of the district or area affected during an outbreak. Dot density analysis can also be used to depict the number of cases by geographical location. **NB:** The information can also be presented in a table or a bar chart, but plotting cases in a map will assist in quick assessment and allow prompt
Person	Describe reasons for changes in disease occurrence, how it occurred, who is at greatest risk for the disease, and potential risk factors.	Depending on the disease, characterize cases according to the data reported for case-based surveillance such as age, sex, place of work, immunization status, school attendance, and other known risk factors for the diseases.	Extract specific data about the population affected and summarize in a **table or a bar chart or a pie chart**

3.2.1 Analyse data by time

Data from this type of analysis is usually shown on a graph. The number or rate of cases or deaths is placed on the vertical or y-axis. The time period being evaluated is placed along the horizontal or x-axis. Events that occurred that might affect the particular disease being analysed can also be noted on the graph.

Graphs can show how many cases and deaths have occurred in a given time. It is easier to see changes in the number of cases and deaths by using a graph, especially for large numbers of cases or showing cases over a period of time.

Graphs are made with lines (a trend line) or bars (a bar graph or histogram) to measure the number of cases over time. How to ***make a graph*** is described in Annex 3B of this section.

Figure 3.1: Example of line graph: Weekly trend of reported Cerebrospinal Meningitis cases, Gondwana County, Epidemiological weeks 1-9, 2017

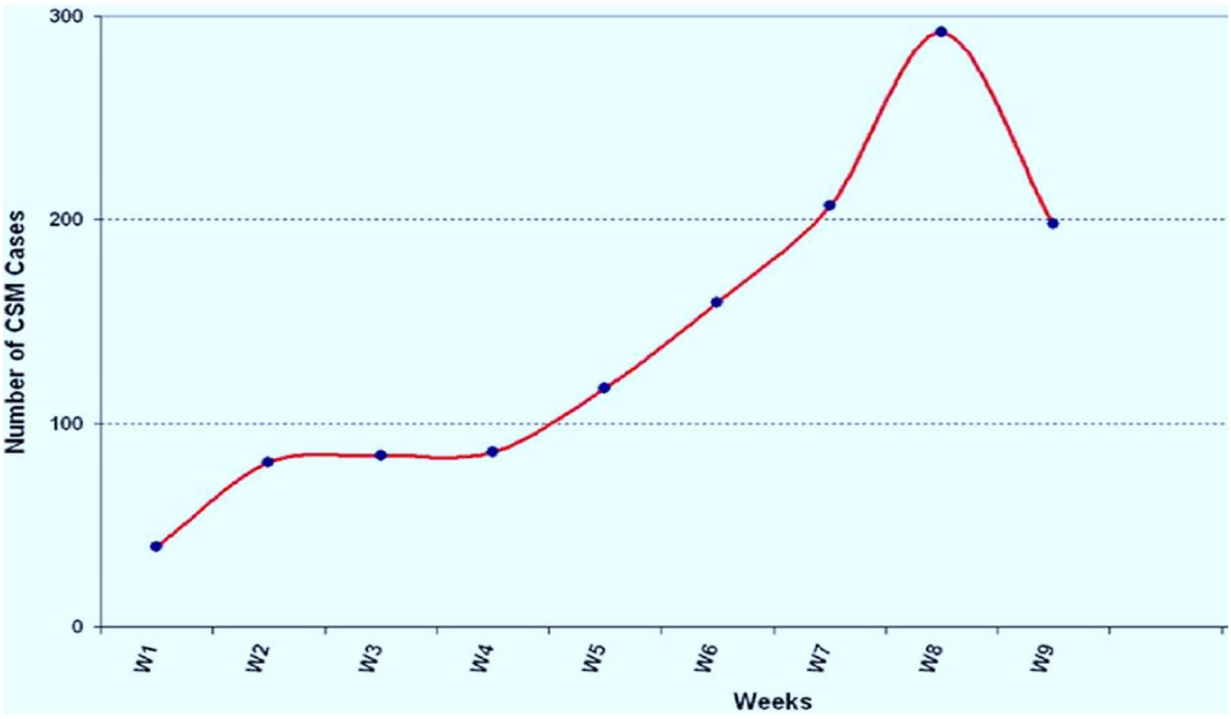


Figure 3.2: Trend line by week, Burkina Faso

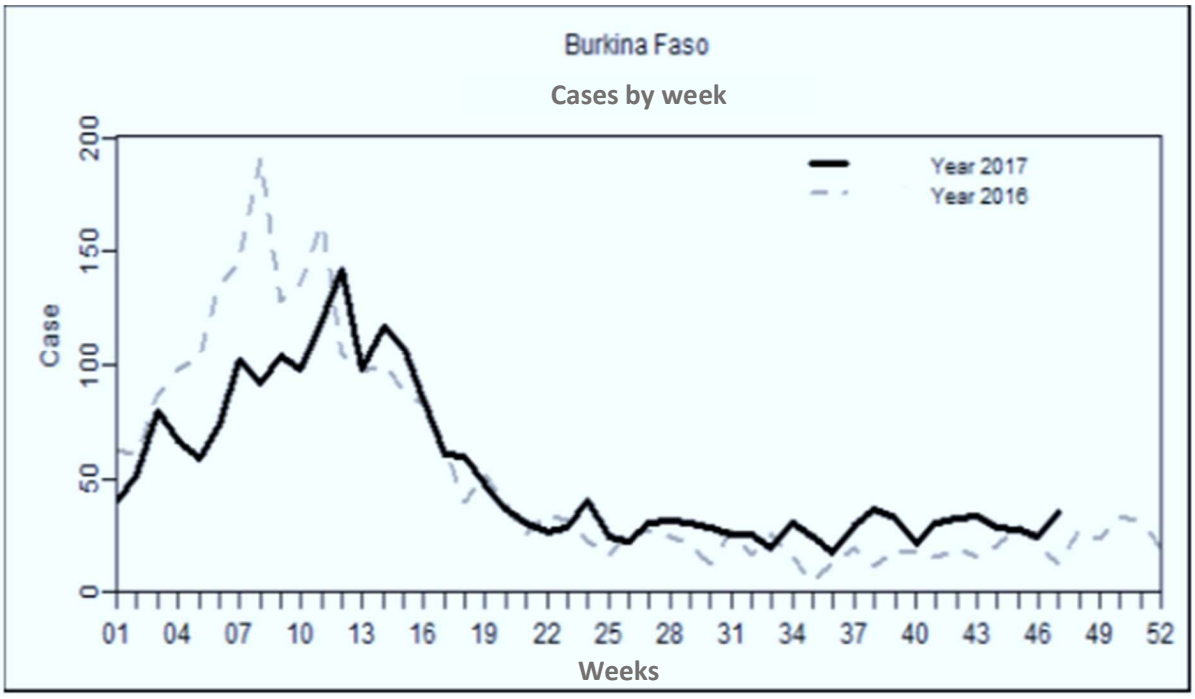
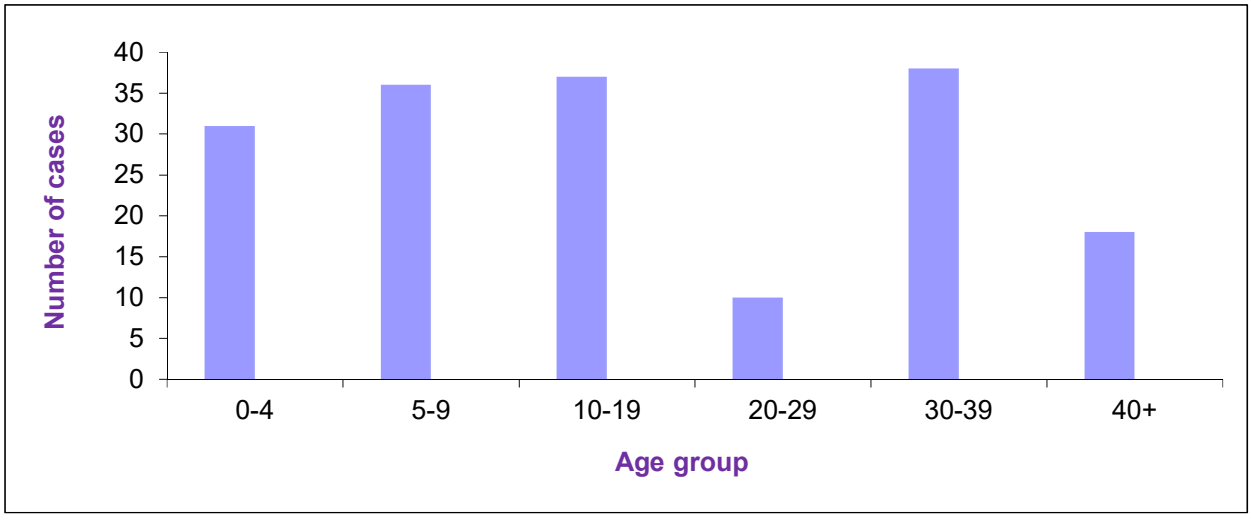


Figure 3.3 Example of a bar graph: Example: Age distribution of diarrhoeal cases during an outbreak in Town X, 2004



Using a histogram

Prepare a histogram using data from the case reporting forms and line lists. Plot cases on the histogram according to the date of onset. As the histogram is developed, it will demonstrate an epidemic curve. The title of the graph should include the name of the geographical location being described.

Highlight significant events on the histogram with arrows. For example, review the log of reported outbreaks to highlight the dates when:

(a) Onset of the first (or index) case occurred

(b) The health facility notified the district

(c) The first case was seen at the health facility

(d) The district began the case investigation

(e) The laboratory confirmed the outbreak

(f) A response was initiated

(g) The district notified the higher level

The results of this analysis allow users of this information to look back at the outbreak and answer questions such as when patients were exposed to the illness, the length of the incubation period, type of the source, duration between detection and confirmation of the outbreak and transmission pattern of the illness and likely time of exposure to the causative agent.

Figure 3.4 Example of histogram (epidemic curve): Reported cholera cases, District A, Epidemiologic week 1–31, 2016

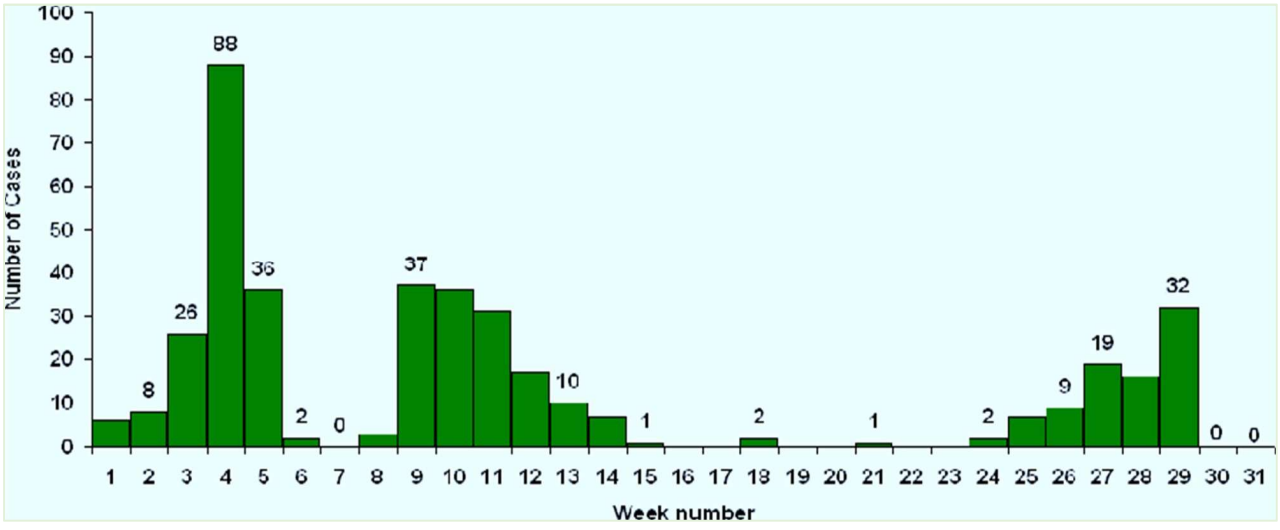
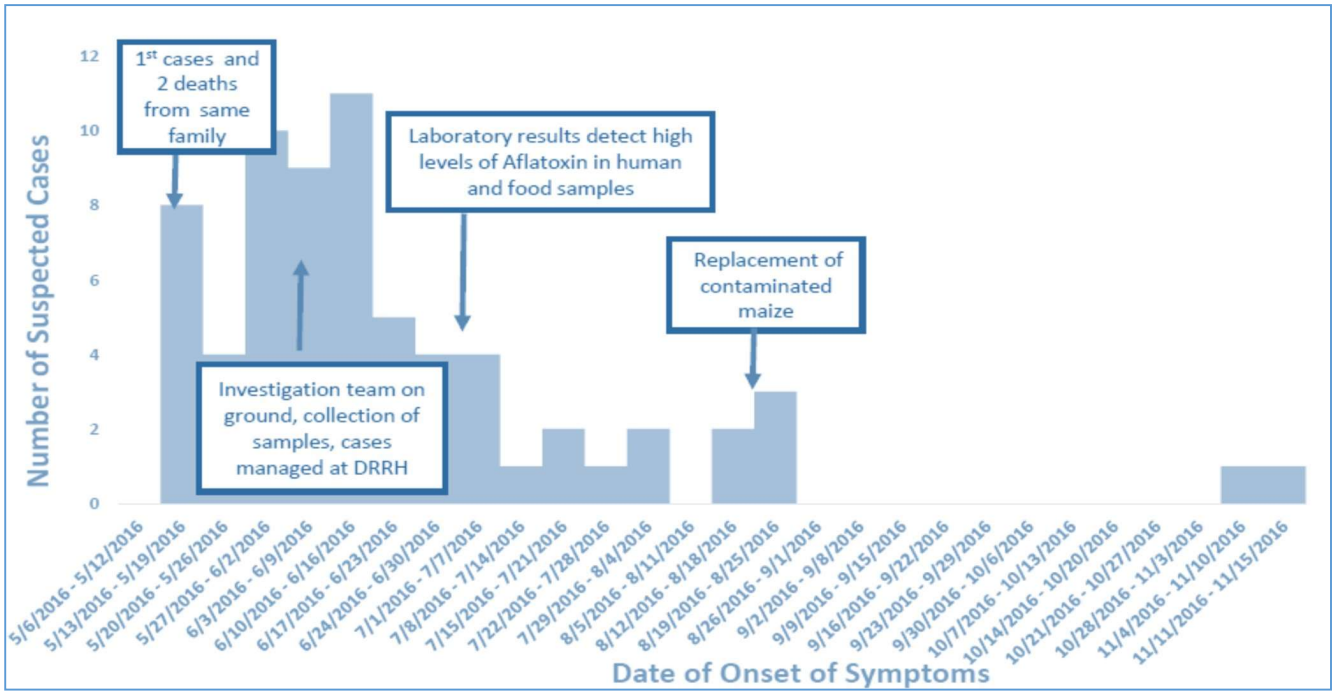


Figure 3.5: Cases of Aflatoxicosis by date of onset of symptoms, Dodoma and Manyara Regions, Tanzania, 2016



3.2.2 Analyse data by place

Analysing data by place provides insight about where a disease is occurring. Establishing and regularly updating a spot map of cases for selected diseases can give ideas as to where, how, and why the disease is spreading. The dot density will give the total number of cases per defined geographical area.

Use the place of residence on the case reporting forms or line list to plot and describe:

(a) Clusters of cases occurring in a particular area.

(b) Travel patterns that relate to the method of transmission for this disease.

(c) Common sources of infection for these cases.

Use manual methods or open source Geographic Information System (GIS) software, such as Health Mapper, QGIS, or Geographic Information Software (GIS) to create maps to use as part of routine analysis of disease surveillance of data. On a map of the area where cases occurred, mark the following:

(a) Roads, water sources, location of specific communities and other factors related to the transmission risk for the disease or condition under investigation. For example, a map for neonatal tetanus includes locations of traditional birth attendants and health facilities where mothers deliver infants. Location of the patients' residences or most relevant geographical characteristic for this disease or condition (for example, by village, neighbourhood, work camp, or refugee settlement). Another example is when mapping young patients during a meningitis outbreak; remember to locate the school that the patients attend or other locations as appropriate to the disease or condition being investigated. Please see section 11, for disease-specific guidelines for specific recommendations for analysing data by place.

Figure 3.6: Example of district spot map showing location of suspected and confirmed cases

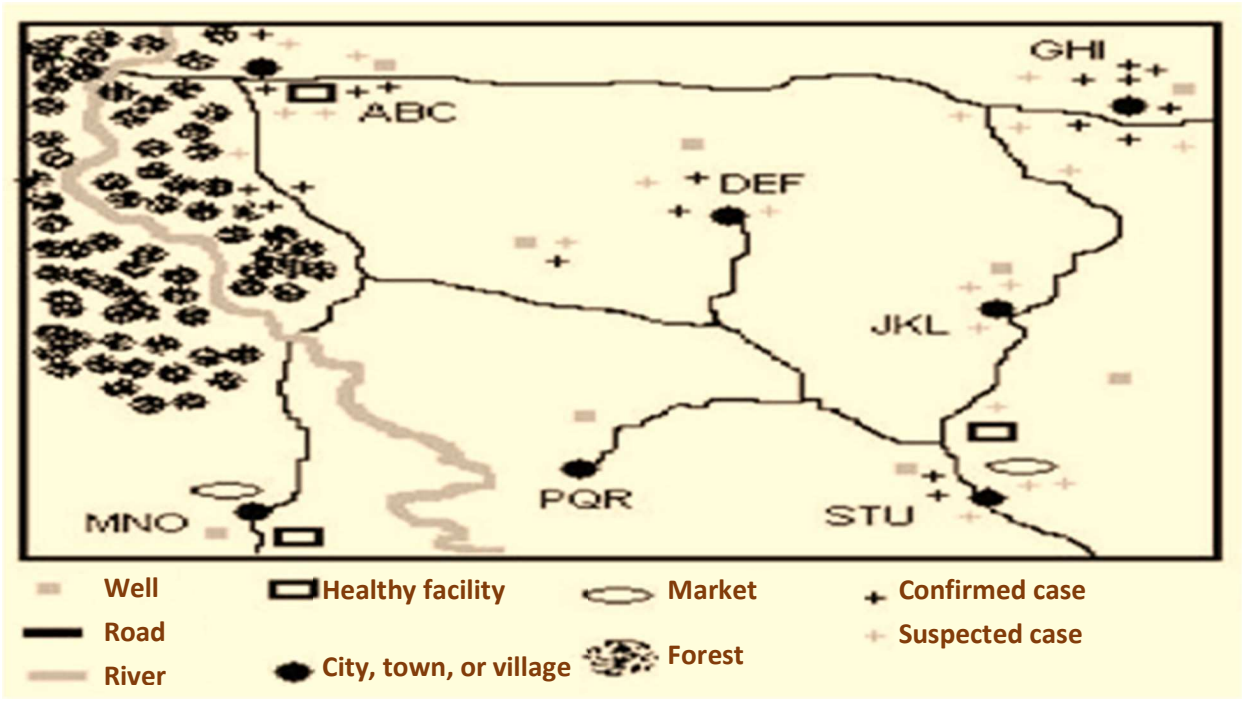
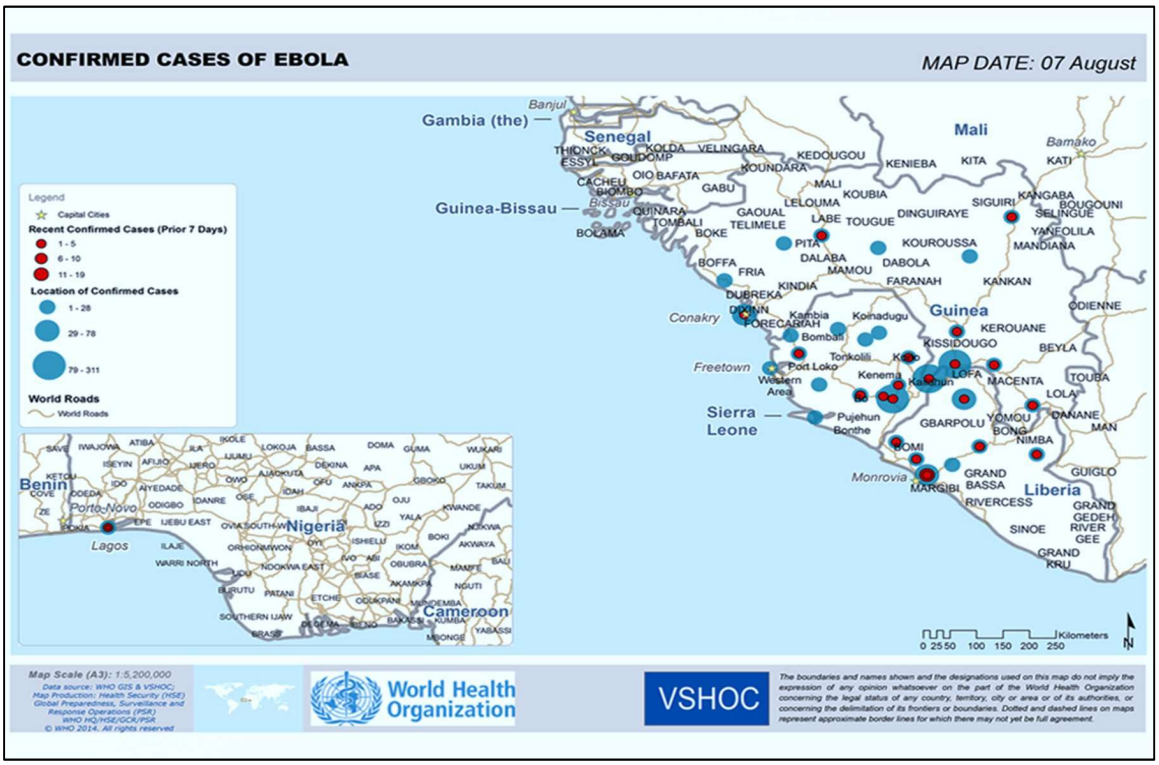


Figure 3.7 Example of a spot map using a GIS software showing concentration of cases along one particular area



3.2.3 Analyse data by person

Analysis by person describes the population with the condition as well as those at risk of contracting the condition or being exposed to factors associated with it. These factors may reveal important clues to understanding the disease, why it occurred and how to control it, thus preventing further spread. Make a distribution of the cases by each of the person variables in the reporting form. For example, compare the total number and proportion of suspected and confirmed cases by:

(a) Age group
(b) Sex
(c) Occupation
(d) Urban and rural residences
(e) Vaccination status
(f) Risk factors
(g) Outcomes
(h) Final classification

Use disease-specific information to decide which variables to compare. For example, if information has been collected about a malaria outbreak, specify the age groupings that are targeted by the National Malaria Programme. Compare the age groupings of cases detected in young children (aged 2 months to 59 months) cases in older children (aged 5 to 14 years) and cases in adults (age 15 and over).

Analysis by person is usually recommended for describing the population at risk. This analysis is easiest when the data is case-based.

Identifying numerators and denominators

A simple count of cases does not provide all of the information needed to understand the impact of a disease on the community, health facility or district. Simple percentages and rates are useful for comparing information reported to the district. The first step in analysing data by person is to identify the numerator and denominator for calculating percentages and rates.

(a) The *numerator* is the number of specific events being measured (such as the actual number of cases or deaths of a given disease, for example the number of cases of measles that occurred during the year in school-aged children).

(b) The *denominator* is the number of people in the population in which the cases or deaths of a given disease occurred, or the population at risk.

Using simple percentages

Simple percentages can be calculated to compare information from populations of different sizes. For example:

Health facility	Number of measles cases this year in school-aged children
A	42
B	30

By looking only at the number of reported cases, it appears that a higher occurrence of measles cases occurred in health facility A. But when the number of reported cases at each health facility is compared to the total number of school-aged children living in each catchment area, then the situation becomes clearer.

Health facility	Number of school-aged children living in the catchment area
A	1 150
B	600

By calculating the incidence (that is, number of new cases) of measles cases during the last 12 months in school-aged children, the district officer can compare the impact of the illness on each facility. The numerator is the number of new cases that occurred over one year. The denominator is the number of school-aged children at risk in each catchment area. The measure obtained is called incidence rate or attack rate. In this example, the incidence rate is higher in health facility B than in health facility A.

Health facility	Incidence of measles per 100 school-aged children during last 12 months
A	4%
B	5%

3.2.4 Make a table for analysis by person

For each priority disease or condition under surveillance, use a table to analyse characteristics of the patients who are becoming ill. A table is a set of data organized in columns and rows. The purpose of a table is to present the data in a simple way. For surveillance and monitoring, use a table to show the number of cases and deaths from a given disease that occurred in a given time.

To make a table:

(a) Decide what information you want to show on the table. For example, consider analysis of measles cases and deaths by age group.

(b) Decide how many columns and rows you will need. Add an extra row at the bottom and an extra column at the right to show totals as needed. In the example, you will need a row for each age group, and a column for each variable such as age group or cases and deaths.

(c) Label all the rows and columns, including measurements of time. In the example below, the analysis is done yearly. Analysis by person is also recommended for analysis of outbreak data.

(d) Record the total number of cases and deaths as indicated in each row. Check to be sure the correct numbers are in the correct row or column.

Age group	Number of reported measles cases per year	Number of deaths per year
0–4 years	40	4
5–14 years	9	1
15 years and older	1	0
Age unknown	28	0
Total	**78**	**5**

3.2.5 Calculate the percentage of cases occurring within a given age group

When the summary totals for each age group are entered, one analysis that can be done is to find out what percent of the cases occurred in a given age group. To calculate this percentage:

(a) Identify the total number of cases reported within each age group from the summary data for which time or person characteristics are known. (For example, there are 40 cases in children 0 - 4 years of age.)

(b) Calculate the total number of cases for the time or characteristic being measured. (In this example, there are 78 cases whose age is known.)

(c) Divide the total number of cases within each age group by the total number of reported cases. (For example, for children aged 0 -4 years, divide 40 by 78. The answer is 0.51.)

(d) Multiply the answer by 100 to calculate the percent. (Multiply 0.51 X 100. The answer is 51%.)

Age group	Number of reported cases	Percentage of reported cases in each age group
0–4 years	40	51%
5–14 years	9	12%
15 years and older	1	1%
Age unknown	28	36%
Total	**78**	**100%**

3.2.6 Calculate the attack rates

The attack rate is the measure of frequency of morbidity, or speed of spread, in an at-risk population. An attack rate describes the risk of getting the disease during a specified period, such as the duration of an outbreak. Attack rate is defined as the frequency with which an event (such as a new case of illness) occurs in a population at risk over a specified period, and is usually calculated in an outbreak scenario. It is expressed per population at risk; for example: 4.5/100 000 population.

$$\frac{\text{No. new cases during specified period}}{\text{Size of population at risk at start of that period}} \qquad (\quad h \quad 100\% \quad 1000)$$

Example:

16 cases of cholera in village with a population of 800. Attack rate =16/800 =0.02

0.02 x 100 = 2.0, that is, 2 cases per 100 population = 2.0%

During an outbreak, this data will need to be updated frequently (often daily) to see if the information being received changes the ideas regarding the causes of the outbreak.

3.2.7 Calculate a case-fatality rate

A case-fatality rate helps to:

(a) Know the proportion of deaths among cases.

(b) Indicate whether a case is identified and managed promptly.

(c) Indicate any problems with case management once the disease has been diagnosed.

(d) Identify a more virulent, new or drug-resistant pathogen.

(e) Indicate poor quality of care or no medical care.

(f) Compare the quality of case management between different catchment areas, cities, and districts.

(g) Assess health seeking behaviours.

(h) Identify underlying conditions to severe diseases, for example, immune deficiency.

(i) Public health programmes can impact the case-fatality rate by ensuring that cases are promptly detected and good quality case management takes place. Some disease control recommendations for specific diseases include reducing the case-fatality rate as a target for measuring whether the outbreak response has been effective.

To calculate a case-fatality rate:

1. Calculate the total number of deaths. (In the example of the measles data, there are a total of 5 deaths.)
2. Divide the total number of deaths by the total number of reported cases. (For example, the total number of reported cases is 78. The number of deaths is 5. So divide 5 by 78. 5 ÷ 78 is 0.06.)
3. Multiply the answer times 100 (0.06 X 100 equals 6%).

Age group	Number of reported cases	Number of deaths	Case-fatality rate
0–4 years	40	4	10%
5–14 years	9	1	11%
15 years and older	1	0	0
Age unknown	28	0	0
Total	78	5	6%

Please see the disease-specific guidelines in section 11.0 for recommendations about the essential variables to compare for each disease.

3.3 Compare analysis results with thresholds for public health action

Thresholds are markers that indicate unusual situation and require that something should happen or change. They help surveillance and programme managers answer the question, "When should I take action, and what will that action be?" Information on establishing thresholds is in Section 4.1 of this guide.

Thresholds are based on information from two different sources:

(a) In some instances, there might already be a situation analysis which has been done to describe the risks for occurrence of a particular disease, and who the people at risk might be and there is already a described action that needs to be done once the risks have been identified to prevent a wider outbreak.
(b) International recommendations from technical and disease control programme experts.

These guidelines discuss two types of thresholds: an alert threshold and an epidemic threshold. Not every disease or condition uses both types of thresholds, although each disease or condition has a point where a problem must be reported and an action taken.

An *alert threshold* suggests to health staff and the surveillance team that further investigation is needed. Depending on the disease or condition, an alert threshold is reached when there is one suspected case (as for an epidemic-prone disease or for a disease targeted for elimination or eradication) or when there is an unexplained increase for any disease or unusual pattern seen over a period of time in weekly or monthly summary reporting.

Action *(epidemic) threshold* triggers a definite response. It marks the specific data or investigation finding that alerts an action beyond confirming or clarifying the problem. Possible actions include communicating laboratory confirmation to affected health centres, implementing an emergency response such as an immunization activity, community awareness campaign, or improved infection control practices in the health care setting. Several thresholds have been proposed for action based on disease surveillance findings. For rare diseases or diseases targeted for eradication, detection of a single case suggests an epidemic. In such situations, one case is unusual and is a serious event. This is because these rare or targeted diseases have the potential for rapid transmission or high case-fatality rates.

In other situations, a number of cases will trigger a response. For example, the epidemic threshold for bacterial meningitis in countries of the meningitis belt is 10 suspected cases per 30 000 - 100 000 inhabitants per week and under 30 000 inhabitants is five suspected cases in one week or doubling of the number of cases in a three-week period (minimum of two cases in one week), and the alert threshold is three suspected cases per 30 000 - 100 000 inhabitants per week and under 30 000 inhabitants is two suspected cases per week or an increased incidence compared to previous non-epidemic years (Source: *Weekly Epidemiological Record No 51/52, 577-588, 19 December 2014(http://www.who.int/wer)*.

The epidemic threshold for malaria in some countries is 3rd Quartile of confirmed malaria cases for the past five years; alert threshold is 2nd quartile/Median of confirmed malaria cases.

In practice, the national level is responsible for communicating the thresholds for priority diseases to all reporting sites in the health system. This facilitates use of surveillance information for action at the level where it is collected. Periodically, surveillance thresholds are assessed and reset at national or international levels according to the observed trends of the diseases, events or conditions under surveillance.

Suggested thresholds for taking action in specific diseases or conditions are discussed under section 11.0.

3.4 Draw conclusions from the findings to generate information

(a) Routinely (weekly, monthly or quarterly) gather or present the graphs, maps and tables and meet with the district health team or relevant stakeholders to review analysis results and discuss the findings.

(b) Systematically review the findings following the district's analysis plan (see Annex 3A) if one has been prepared

(c) Make sure you also correlate the analysis you have done with other data sources, like from animals (domestic or wildlife), or the environment to assist in correct interpretation of your findings. For example, if you have seen a number of human rabies cases, it will be important to get information from the animal sector on the status of any current bite investigations, quarantined animals, or dogs vaccinated.

(d) Consider quality of the data when interpreting results for example:
   (i) missing data values (completeness per month, per event).
   (ii) inconsistencies (between linked data elements — validation).
   (iii) arithmetic errors (in correlation and aggregation).
   (iv) obvious fluctuations (sharp increase or decrease per month, per event).

It is important in a system where eIDSR has been established to ensure that there are features to improve data quality and these might include:

(a) Data input validation
(b) Maximum and Minimum values
(c) Validation rules
   (i) At a minimum, review the findings to:
      - Assess whether the situation is improving or not, and
      - Make a comparison of the observed data to the expected data
      - Consider possible explanations for an apparent increase in cases
      - Has there been a change in the number of health facilities reporting information?
      - Has there been a change in reporting procedures or surveillance system?
      - Has there been any change in the case definition that is being used to report the disease or condition?
      - Is the increase or decrease a seasonal variation?
      - Has there been a change in screening or treatment programmes, or in community outreach or health education activities that would result in more people seeking care?
      - Has there been a recent immigration or emigration to the area or an increase in refugee populations?

- Has there been any change in the quality of services being offered at the facility (for example, lines are shorter, health staff are more helpful, drugs are available, clinic fees are charged)?
- Is there an increase or improvement in laboratory testing/diagnostic procedure?
- Is there an increased awareness of disease in the public? For example, mass vaccination campaign and awareness of a particular disease will lead to an increase of cases presented to the facility
- Backlog of cases being reported which were supposed to be reported earlier?

3.5 Summarize and use the analysis to improve public health action

Prepare and share with all stakeholders including affected communities who need this information, a concise action-oriented summary reports of the surveillance findings. Use simple tables, graphs and maps, with clear and short description, interpretation, comments and recommendations.

Make statements that describe the conclusions you have drawn from the surveillance data analysis results. Use them to take action to:

(a) Conduct an investigation to find out why there is an increase/decrease in the number of cases.
(b) Collaborate with specific disease reduction programmes to intensify surveillance if an alert threshold has been crossed.
(c) Carry out advocacy with political leaders and the community for more resources if a lack of resources is identified as a cause for the increased number of cases.

Information sharing is an important surveillance function and a powerful mechanism of coordination. It motivates the staff who send reports and builds partnership through the transparency that information-sharing displays. Thus, it is important to share analysis results and provide feedback on time. Please refer to sections 7 and 8 of these guidelines for information and examples about communication and sharing feedback.

3.6 Annexes for Section 3

Annex 3A Make a plan for routine analysis of surveillance information and an example of analysis plan for cholera in Country A, 2017.

Annex 3B How to manually make a line graph.

Annex 3A: Make a plan for routine analysis of surveillance information

A minimum plan for routine analysis of surveillance information should include the following information which could be presented as tables, graphs and maps.

1. Calculate completeness and timeliness of reporting. Monitoring whether surveillance reports are received on time and if all reporting sites have reported is an essential first step in the routine analysis of the surveillance system. This assists the district (or other level) surveillance team in identifying silent areas (areas where health events may be occurring, but which are not being reported) or reporting sites that need assistance in transmitting their reports. It also depicts how representative the data is for the specific level.
2. Calculate district (or other level) totals by week (or by month). Update the total number of reported cases and deaths for the whole year. This is summary information that helps to describe what has happened in the particular reporting period.
3. Prepare cumulative totals of cases, deaths and case-fatality rates since the beginning of the reporting period.
4. Use geographical variables (such as hospitals, residence, reporting site, neighbourhoods, village and so on) to analyse the distribution of cases by place. This is information that will help to identify high-risk areas.
5. Analyse disease trends for at least the diseases of highest priority in your district. Monitor the trends for cases, deaths, and case fatality rates to identify any unusual increases or disease patterns.
6. Data validation and quality analysis. Establish a data validation team at all levels. Meetings should be held periodically to review reports. All reports submitted must be checked for consistency with various sources.

An example of a product from an analysis plan for routine surveillance information is on the next page.

Example of data analysed for cholera in Country A, 2017				
	Distribution by Time			
Onset week	**Total**	**Outcome**		**Case-fatality rate**
		Alive	**Deaths**	
26	**23**	16	7	30
27	**97**	92	5	5
28	**88**	87	1	1
29	**21**	19	2	10
32	**11**	11	0	0
33	**11**	9	2	18
Total	**251**	234	17	7
Distribution by Place				
District	**Total**	**Outcome**		**Case-fatality rate**
		Alive	**Deaths**	
District 1	**1**	1	0	0
District 2	**92**	86	6	7
District 3	**158**	147	11	7
Total	**251**	234	17	7
District		**Population**	**Cases**	**Attack rate per 100 000**
District 1		179888	92	**51**
District 2		78524	158	**201**
Distribution by Person				
Age Group	**Total**	**Outcome**		**Case-fatality rate**
		Alive	**Deaths**	
0-4	**37**	35	2	5
5-9	**55**	50	5	9
10-14	**30**	28	2	7
15-19	**23**	23	0	0
20-24	**28**	27	1	4
25-29	**26**	24	2	8
30-34	**12**	11	1	8
35-39	**8**	6	2	25
40 +	**32**	30	2	6
Total	**251**	234	17	7
Sex	**Total**	**Outcome**		**Case-fatality rate**
		Alive	**Deaths**	
Female	**122**	114	8	7
Male	**129**	120	9	7
Total	**251**	234	17	7

Annex 3B: How to manually make a line graph

How to make a line graph	
1.	Decide what information you want to show on the graph.
2.	Write a title that describes what the graph will contain (for example, *monthly totals for inpatient cases and deaths due to malaria with severe anaemia*).
3.	Decide on the range of numbers to show on the vertical axis. • Start with 0 as the lowest number • Write numbers, going up until you reach a number higher than the number of cases • Chose an interval if the numbers you will show on the vertical axis are large.
4.	Label the vertical axis, explaining what the numbers represent.
5.	Label the horizontal axis and mark the time units on it. The horizontal axis is divided into equal units of time. Usually you will begin with the beginning of an outbreak, or the beginning of a calendar period, such as a week, month or year.
6.	Make each bar on the graph the same width.
7.	Mark the number of cases on the graph or histogram. For each unit of time on the horizontal axis, find the number of cases on the vertical axis. Fill in one square for each case, or for some number of cases in the column for the day on which the patient was seen. Show deaths by using a different pattern of lines, or a different colour. If you are making a line graph, instead of making a bar or filled-in squares, draw a cross or make a point where the horizontal and vertical lines cross. Connect the points on the graph to show the trend going up or down over time.