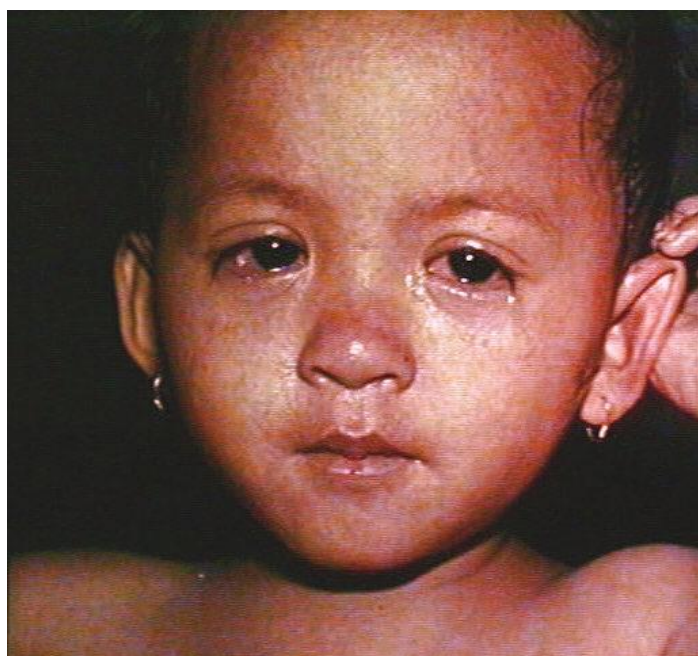


# **GUIDELINE FOR MEASLES CASE-BASED SUREVILLANCE AND OUTBREAK INVESTIGATION**



**EXPANDED PROGRAMME ON IMMUNIZATION**

**Ministry of Health**

**Government of Pakistan**



## PREFACE

Measles is one of the leading cause of childhood morbidity and mortality among vaccine preventable diseases in the globe as well as in Pakistan. Even today more than one quarter of our children still remain without protection against measles. According to the CES 2006, only 63% children aged 12 – 23 months received a valid dose of measles vaccine.

Pakistan endorsed the measles mortality reduction goal set at the UN special session on Children in May 2002 and World health assembly in 2003. Country reaffirmed its commitment through endorsing the recommendations of WHO/EMRO regional technical consultative group and the “Cape Town Declaration on Measles” in October 2003. The goal is to make sustainable reduction in annual measles deaths by 50% before the end of 2006 compared to 1999 estimates. We are committed to achieve 90% coverage among children with measles vaccine by the end of 2010 and achieve measles elimination status by the same period following joint WHO-UNICEF strategy.

As a part of the ongoing strategy to achieve the goal for measles elimination by 2010 Government of Pakistan through EPI program has successfully conducted a nationwide Measles Catch-up Campaign in 2007 – 2008. This was the largest ever childhood immunization campaign in the globe targeting approximately 65 million children and achieving more than 95% coverage. This tremendous success could be achieved through sincere and concerted efforts of all health managers, policy makers, thousands of vaccinators and volunteers and of course enthusiastic participation of the parents as well as all sections of the community. I also gratefully acknowledge the support from different development partners like UNF, WHO and UNICEF and share our pride with them.

After achieving a satisfactory level of population immunity among the susceptible through this campaign, it is expected that the disease burden will significantly reduce which is already being observed by the experts. But since other rash-febrile illness (e.g. rubella) is common in our country, it is imperative to confirm each and every suspected measles case by laboratory investigation. Federal EPI with support from WHO has arranged to undertake these investigations in the National Measles Laboratory in NIH, Islamabad totally free of cost. A strong case-based surveillance for measles will give us this opportunity to realize disease burden in the country. Case-based surveillance will also help us to understand the current epidemiology of measles, shortcoming of our program and also guide us in planning and undertaking appropriate strategies to achieve our goal of measles elimination by 2010.

I am very happy that the guideline for measles case-based surveillance and outbreak investigation is developed by EPI. I would like to congratulate the Federal EPI team for being able to complete this manual within a very short time. I am also expressing my gratitude to World Health Organization for their valuable technical support in preparation and publishing this guidebook.

I am sure this guideline will help us to set a standard surveillance system and investigation procedure for measles cases and outbreaks and will contribute a lot in our measles elimination efforts.

I sincerely hope that our health managers and other concerned disease control personnel will read this manual and it will help them to undertake their duties more efficiently and adequately.

Finally, I wish to offer my sincere thanks to everybody concerned, who are engaged in saving the children from the menace of measles and other vaccine preventable diseases.

Date: August 2008

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## **INTRODUCTION AND OBJECTIVES**

In the effort to eliminate measles, intensified surveillance helps to identify and investigate outbreaks, to predict outbreaks through the identification of geographic areas and age groups at risk, and to evaluate vaccination strategies in order to improve measles control efforts.

This measles surveillance system will be built on the existing monthly VPD surveillance system and AFP surveillance system, with appropriate modification and revision using the strength and opportunities of the both systems.

The National Measles Catch-up Campaign reduced the number of susceptible persons. It is imperative to implement improved case-based measles surveillance system with the objective to:

- Estimate disease burden
- Detect and characterize cases
- Investigate outbreaks
- Identify populations at risk
- Monitor program activities
- Evaluate and guide policy

The surveillance system will have two components:

- Weekly routine reporting
- Outbreak detection and investigation

## **WEEKLY ROUTINE REPORTING**

This is health facility based, weekly reporting system. All government health facilities and those private health facilities that are included in AFP passive surveillance system will report all suspected measles cases (based on measles case definition mentioned below) appear in the facility on weekly basis using weekly VPD surveillance report, Health facility (Form B). This is to be noted that, currently existing currently existing VPD surveillance report which is monthly and known as Form B will be used for the purpose with required modification. One important difference is, from now on this report is to be made weekly instead of monthly and Form A will be no more in use.

District Surveillance Coordinators (DSC) and/or WHO Surveillance Officer will cross-match the measles cases data obtained through active surveillance from AFP active surveillance sites for verification of facility reports.

Report to be compiled and submitted to the EDO (Health) office from facilities by Saturday of every week. District report will be prepared by compiling all facility reports and to be sent to the provincial EPI office electronically and/or hard copy by Tuesday. Provincial/Area EPI office will send their compiled report to the Federal EPI, NIH electronically by Thursday. Province/district weekly compilation report form to be used by districts and provinces for reporting.

Blood specimens will be collected in the health facilities from all suspected cases (unless outbreak is detected – see below). Laboratory testing will be done in WHO accredited National Measles Laboratory, NIH Islamabad to confirm presence of measles or rubella antibodies. Shipment of samples will use the same courier service as for AFP specimens.

### **Identification of measles suspected case (Case Definition)**

A suspected measles case is defined as:

- Any person with generalized maculo-papular rash and fever plus one of the following: cough or coryza (runny nose) or conjunctivitis (red eyes) or
- Any person in whom a clinician suspects measles

Patients with history of measles (satisfying case definition) within past one month should also be reported as suspected measles case. Hence, it is important for physicians to routinely ask patients (or parents) who presents with common complications of measles e.g. pneumonia, diarrhea, otitis media, corneal scarring and malnutrition about history of rash illness.

### **Action points for all suspected cases (health facility level)**

- Record patient's details in the Part 1 of the Measles Case Investigation Form (CIF)
- Arrange collection of blood specimen (3-5 ml) for IgM test using a sterile syringe

- Label specimen (the syringe containing the specimen) with name of the case and date of specimen collection. Pack the specimen containing syringe in a zip-locked plastic pack and the CIF in a separate plastic pack
- Sent specimen to EDO (Health) office in reverse cold chain (02 to 08<sup>0</sup>C) along with CIF on the same day of collection
- At the end of week (Saturday), compile all suspected cases in Weekly VPD Surveillance Report for Health Facility (Form B) and send to EDO (Health) office. **IF NO CASES FOUND DURING THE WEEK, ZERO REPORT MUST BE SENT**

Note: District Surveillance Coordinators (DSC) will put the date of specimen sent to the lab and also will allocate a unique EPID number in the CIF for each suspected case with the following format:

*PAK/Province Code/District ID/Year/Msl/Case Serial # # # #*

Msl stands for Measles. Country, province and district code/identification are the same as used for AFP surveillance. Year to be written in two digit. Four digit serial case number will be an incremental number per year for each district.

#### **Action Points (District Level)**

- Assign EPID Number to all suspected cases
- Receive specimen from health facilities and arrange separation of serum from the whole blood and storage
- Fix the sticker with case ID and date of collection on the specimen tube
- Arrange transportation of specimen to National Measles Laboratory, NIH, Islamabad in reverse cold chain
- Gather weekly reports from all reporting health facilities
- Prepare weekly district compilation line list (Province/District Weekly Compilation Report form)
- Check for outbreaks (see below in Outbreak Investigation)
- Analyze data (see below in Reporting)
  - Epidemiology
  - System indicators
- Send district compilation line list and reports to provincial EPI office

## **OUTBREAK DETECTION AND INVESTIGATION**

The second component of the surveillance system is outbreak detection and investigation.

### **Trigger for investigation of measles outbreaks**

DSCs with assistance of SO-WHO will review weekly compilation reports and identify clustering of cases for possible outbreaks. An outbreak investigation will be triggered by:

- More than 05 suspected measles cases from one first level health care facility (RHC and below) in one week OR
- More than 05 suspected measles cases in a higher level facility coming from a single geographical area in one week OR
- Report of more than 05 suspected measles cases in one area in a week by any trained health worker (vaccinator, LHS, LHW etc.)

During their routine domiciliary visits, if a health worker observes more than 05 cases satisfying measles case definition in one area; s/he should immediately notify local health facility in-charge, who will then notify the EDO (Health) and DSC/SO-WHO to confirm the outbreak and initiate outbreak investigation.

The trigger initiates preliminary phase of case identification. During this phase, DSCs will try to confirm the existence of an outbreak.

### **Definition of Measles Outbreak**

In this initial stage of system implementation, an outbreak will be defined as more than 05 suspected measles cases satisfying case definition including at least one laboratory confirmed measles case in the identified area during the recall period of 30 days prior to investigation. If this condition is satisfied, an outbreak is to be declared and investigated.

After declaration of an outbreak EDO (Health)/DOH will form an outbreak investigation team under the leadership of the District Surveillance Coordinators (DSC) and the investigation will be done according to guideline.

### **Outbreak Investigation**

#### **Action Points during Outbreak Investigation**

- Identify geographical area with cases reported through weekly routine reporting system
- Form investigation team: Outbreak investigation team to be formed by EDO-Health/DOH comprising following members,
  1. DSC/SO-WHO
  2. Officials from local health facility

3. DSV/TSV
  4. Medical Technician/Nurse for specimen collection
  5. Local vaccinator, LHW and other health staff as necessary
- Perform house-to-house case finding. Find and line list all suspected measles cases in the area by house to house search having active rash and those had rash onset with in past 30 days. Record all identified suspected measles cases (alive or dead) in the Outbreak Line-list Form and assign unique EPID number to each case.
  - Arrange collection of blood specimen from at least 5 cases unless already done. Also collect oral or throat swabs from 5 cases having active rash during house-to-house case finding. Label the specimens, fill in the CIF and send in reverse cold-chain to National Measles laboratory in Islamabad
  - Ensure proper case management: Offer Vitamin A to all suspected measles cases and check for complications. Refer to health facility if complications present.
  - Identify and list all unvaccinated children aged 9 months to less than 13 years in the area. Arrange vaccination for them on the same day or on a later day.
  - Follow-up visit after 30 days

#### Procedures for house-to-house investigation

- Team will visit every household in the identified area (village, section of town, etc.).
- They will ask whether there is an active suspected measles case or if there has been any suspected measles case in the household in the past 30 days. Signs and symptoms of the cases to be verified and matched with the case definition.

In a village setting, the whole village should be investigated. In a town setting, at least 30 households after the last case should be investigated.

#### **Proper case management during outbreaks**

- It is imperative that during outbreak situations proper case management is ensured in order to minimize measles related deaths and measles related complications.
- The treatment of measles patients with Vitamin A will dramatically reduces their risk of deaths. Two doses of Vitamin A will be given to all identified cases (active and old) during house-to-house investigation, unless it was already received as part of the treatment in the health facility. One dose to be given by the health worker on the day of investigation and the 2<sup>nd</sup> dose to the parents advising to give



on next day. The therapy will be given regardless of previous vitamin A prophylaxis.

- **WHO Recommended Vitamin A Schedule for Measles Treatment**

<b>AGE</b>	<b>On the spot dose</b>	<b>Next Day Dose</b>
< 6 months	50,000 IU	50,000 IU
6-11 months	100,000 IU	100,000 IU
>= 12 months	200,000 IU	200,000 IU

If the investigation team observes complications, the patient should be referred to the nearest health facility for specific treatment of these complications.

### **Follow-up**

In outbreak investigation the follow-up of cases should be performed after 30 days of the primary investigation. The objective will be to find:

- Outcome of cases (death or alive)
- Complications
- Whether the outbreak is still continuing in the same area

## SPECIMEN COLLECTION

### Blood specimen

Blood specimen to be collected for Measles IgM confirmation from all suspected measles cases appearing in health facilities and in case of outbreak situation, only from 5-10 cases in an outbreak. During an outbreak situation, attempt should be made to bring the selected cases to the nearest health facility for specimen collection. However, if the area is remote and the team equipped both with human as well as logistical resources, blood samples can be taken during house-to-house visits.

*When to collect:* blood specimen to be collected from cases during 4<sup>th</sup> to 28<sup>th</sup> days of rash onset. A suspected measles case is not eligible to collect blood specimen before the 4<sup>th</sup> day and after the 28<sup>th</sup> day of rash onset as the chance of detecting Measles IgM is less.

*Collection & storage:*

*At health facility level:*

- Collect 3-5 ml venous blood under aseptic condition in a sterile disposable syringe
- Recap the syringe, label it with patient's name and date of collection and put in the cold chain (vaccine carrier with frozen ice pack) for transporting to the EDO (Health) office
- If transportation is not possible on the same day, store the whole blood in the same syringe in a refrigerator keeping it vertical needle end down. Whole blood can be stored at 4-8 °C for up to 24 hours. **DON'T FREEZE THE WHOLE BLOOD.**
- Next day, send the specimen in the same syringe to the EDO (Health) office in reverse cold chain (in a vaccine carrier with frozen icepack).



*At district level, EDO (office):*

- On receipt of specimen from the facility, if the blood is already clotted and the serum is separated at the top and the clot is not broken, then just take the serum from the top using a pipette and put in the tube of the supplied specimen kit. If the

blood is not clotted yet or the clot is broken then take the blood in a sterile centrifuge tube (using a pipette or directly pouring in from the syringe) and then centrifuge the whole blood at 3,000 rpm for 5 minutes to separate the serum. Please note that, blood from the syringe should not be transferred to the tube by pushing the plunger as it may cause haemolysis. Ideally, the plunger of the syringe should be removed and the blood should be taken out from the back of the syringe.

- If centrifuge is not available<sup>1</sup>, blood should be kept in the refrigerator until there is complete retraction of the clot from the serum. And then carefully remove the serum and transfer aseptically to a sterile labeled tube of specimen kit
- Fix the sticker on the specimen tube with case ID and date of collection
- Serum can be stored at 4 – 8 °C for more than 48 hours

### Throat swab

Oral or throat swab should be collected for virus isolation and genotyping from at least 5 cases having active rash from each outbreak. This is not a diagnostic test so only cases with clear measles symptomatology during rash phase should be swabbed.

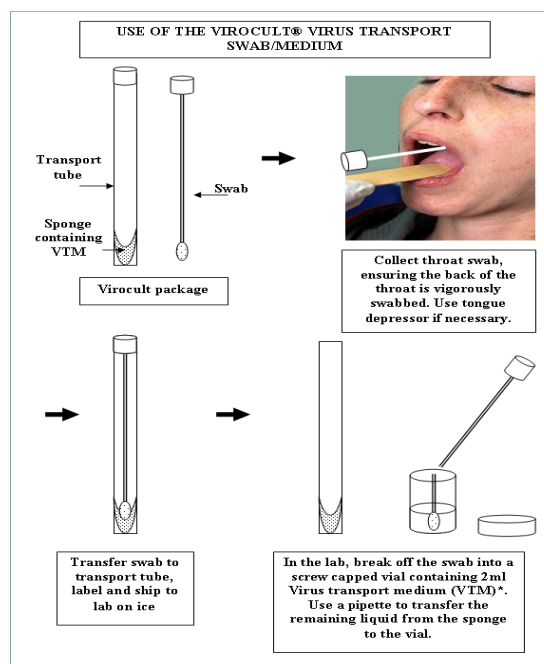
*When to collect:* from cases having active rash.

*Collection & storage:*

- Depress the tongue with tongue depressor
- Collect throat swab specimen by rubbing the wall of the throat by swab
- After removing the swab from the throat, immediately put in to the tube containing Virus Transport Medium (VTM)
- Properly label the tube containing throat swab with patient's name and date of collection

*Transportation of specimen to the laboratory:*

- All specimens (blood and throat swab) should be sent in reverse cold chain to National Measles Laboratory, NIH Islamabad through EDO (Health) office.



- Complete Part 1 of the measles CIF form after collection of specimen
- Put specimens in zip locked plastic bags
- Place ice packs at the bottom and along the sides of the cold box (designated vaccine carrier)
- Place the specimen in the center and place more ice packs at the top
- Place the CIF in a separate plastic bag and tape to the inner top of cold box. Close the box and send to the laboratory through courier
- Inform the concerned laboratory personnel about the dispatch of sample over telephone

## REPORTS

The facilities should compile weekly report on Saturday and that to be reached to EDO (Health) office on the same day. District should compile weekly data under the supervision of DSC/SO-WHO and to be sent to provincial/area EPI office by Tuesday either by e-mail or fax. After compilation of all district data provincial/area EPI office should send the report to the Federal EPI office by Thursday by e-mail.

Each district will perform a simple analysis on this data as well as monitor surveillance indicators. SO-WHO will assist the DSC in this process and verify data by comparing with number of cases from their weekly active surveillance reports from facilities.

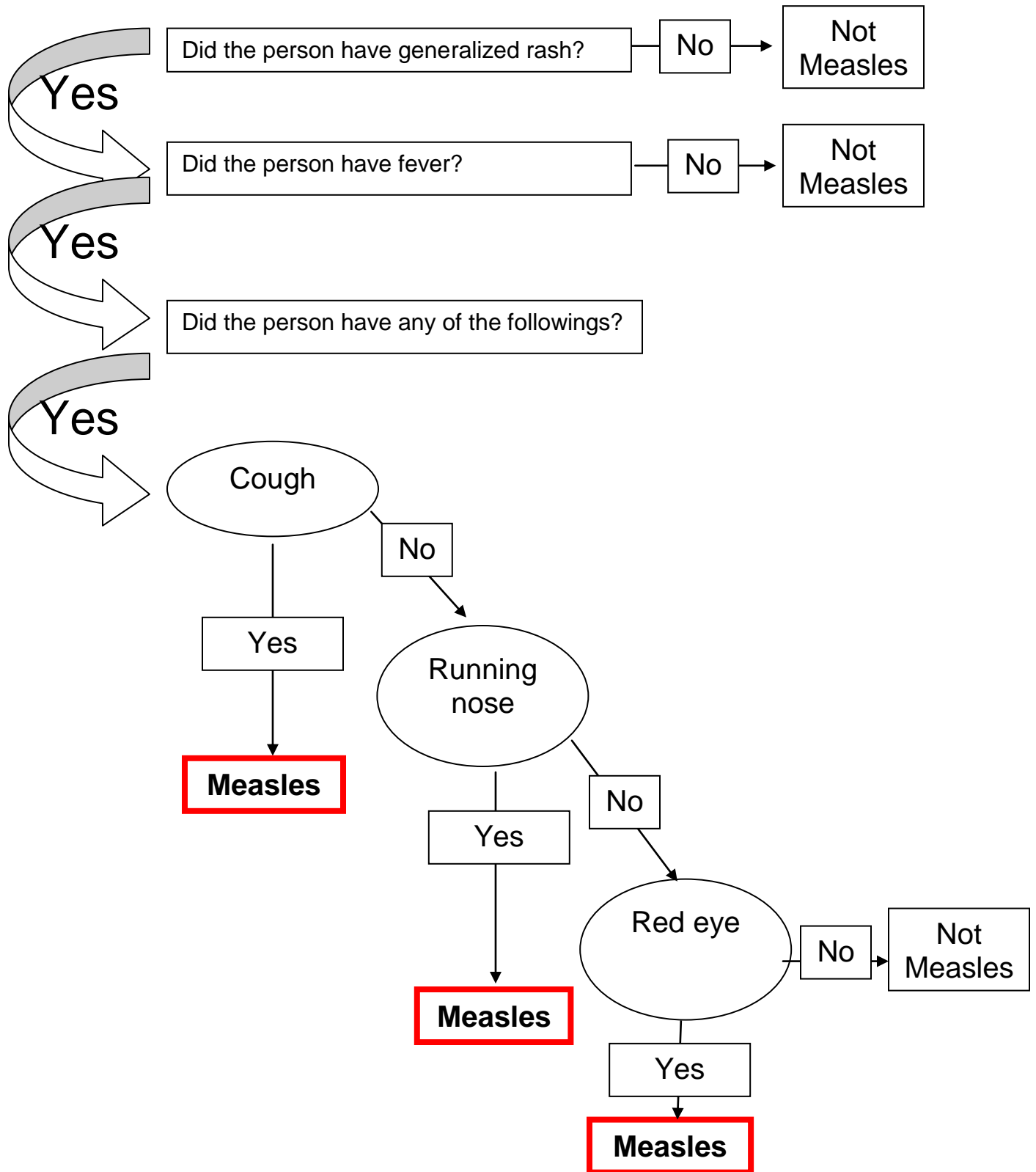
Each district should also send a monthly summary of measles outbreak investigation (if any) to the provincial EPI office mentioning:

- Number of outbreaks notified
- Number of outbreaks investigated
- Line list of outbreak cases
- And for each outbreak,
  - Epidemic curve showing number of cases with rash onset by date, superimposed display of date of notification, date of investigation, date of specimen collection and date of investigation began
  - Number of laboratory confirmed, epidemiologically confirmed and discarded cases
  - Age and vaccination status of cases
  - Serological and virological results as well as other descriptive details
  - Routine measles coverage in the area

## MEASLES SURVEILLANCE INDICATORS

1. **Reporting:** At least 1 suspected measles case (which is confirmed by laboratory as 'not measles') to be reported annually against per 100,000 population. Suspected measles cases which are confirmed by laboratory or epidemiologically linked with a laboratory confirmed case should be excluded from the numerator
2. **Specimen collection:** Specimens adequate for detecting measles IgM should be collected from at least 80% of suspected measles cases and tested in a proficient laboratory, excluding from the denominator any cases that are epidemiologically linked to a laboratory-confirmed case.
3. **Virus detection:** Sufficient sample should be collected for virus detection in a proficient laboratory from 80% of identified transmission chains (outbreaks). The numerator is the number of transmission chains with sufficient sample for virus isolation and the denominator is the number of identified transmission chains during the same period.
4. **Adequacy of Investigation:** At least 80% of all reported suspected cases should have had adequate investigation (completing CIF) within 48 hours of notification. The numerator is the number of suspected cases for which an adequate investigation was carried out within 48 hours of notification, and the denominator is the total number of suspected measles cases.
5. **Completeness of weekly reporting:** At least 80% completeness of weekly reporting by each districts. The numerator should be the number of health facilities send weekly report to EDO (Health) office and the denominator will be the number of health facilities expected to report.
6. **Timeliness of weekly reporting:** At least 80% timeliness of weekly reporting by each district. The numerator should be the number of health facilities from where weekly report (including zero report) reaches the EDO (Health) office by Tuesday of next week and the denominator will be the number of health facilities expected to report by the same time.

### Measles case definition algorithm



### Measles Case Investigation Form

(1st copy to be sent to laboratory with specimen, 2nd copy to EDO (Health) office and 3rd copy to be kept in the reporting health facility)

<b>PART I : For Use by Reporting Facility and EDO</b>	
Name of Reporting Health Facility: _____	
Address of Health Facility: _____	
Union Council: _____	Tehsil/Taluka/City: _____
District: _____	Province/Area: _____
Date Patient Visited Hospital: ____/____/____	
Case ID number: (to be filled at district)	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">PAK</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="margin: 0 10px;">Msl</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> </div>
Patient's Name : _____ Sex: Male _____ Female _____	
Father's Name: _____	
Date of Birth : ____/____/____ Age: Years _____ Months _____	
<b>Address of Patient :</b>	
Village/Street/Mahalla _____	
Union Council: _____ Tehsil/Taluka/City: _____	
District: _____ Province/Area: _____	
Date of Rash onset: ____/____/____	
Number of Measles vaccine doses received (circle):	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>Nil</span> <span>One</span> <span>Two</span> </div>
Date of last dose of measles vaccination: ____/____/____	
Type of specimen (circle):	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>Oral swab</span> <span>Throat swab</span> <span>Blood</span> </div>
Date of Specimen Collection : ____/____/____	
Date of Specimen Sent to Lab : ____/____/____	
Lab Result to be Sent to: (EDO-H, DSC/SO-WHO, Provincial and Federal officials) and	
Name : _____	
Address: _____	
Telephone/FAX: _____ Email: _____	
Name of person completing the form: _____	
Designation: _____	
Signature: _____	Date: ____/____/____

<b>PART II: For Use by Receiving Laboratory</b>	
Type of specimen (circle):	<div style="display: flex; justify-content: space-around; border: 1px solid black; padding: 2px;"> <span>Oral swab</span> <span>Throat swab</span> <span>Blood</span> </div>
Date specimens received at lab: ____/____/____	
Lab Number: _____	
Condition of specimen:	Quantity Adequate: Yes No Yes No Yes No
	Cold Chain OK: Yes No Yes No Yes No
Specimen Received by:	
Name: _____	
Designation: _____	
Date of Lab Test done: ____/____/____	
Type of test done:	_____
Test result:	_____
Comment:	_____
Report sent by: Name: _____	Signature: _____
Designation: _____	Date: _____

<b>Part III - 30-day Follow up (to be filled for outbreak cases)</b>	
Date of Follow Up : ____/____/____	
Outcome:	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Alive</div> <div style="border: 1px solid black; padding: 2px;">Dead</div> </div>
Reported by: Name: _____	Signature: _____
Designation: _____	Date: _____



**Weekly VPD Surveillance  
Province/District Compilation Report**

# of Report received:\_\_\_\_\_

**Year:** \_\_\_\_\_

**Childhood TB:**\_\_\_\_\_

[illegible]

**EDO (Health)/Provincial Manager - EPI:**

**Name:**

**Designation:**

**Notes:**

\*Reporting unit: For district level compilation, 'Reporting unit' will be respective reporting health facility. For Provincial level compilation, 'Reporting unit' will be respective reporting district.

\*\*Type of case means AFP, Measles, NT, Pertusis, Diphtheria, Childhood TB etc.

\*\*\*Case epid number: Only applicable for AFP and Measles cases. To be filled at district level

\*\*\*\*Date of investigation: Only applicable for AFP, Measles and NT cases. To be filled at district level from CIF

\*\*\*\*\*Date of specimen collection: Only applicable for AFP and Measles cases. To be filled at district level from CIF

Village/Mahalla:  
District:  
Date of investigation:

Tehsil/Taluka:  
Province/Area:  
Investigation done by:

[illegible]