Vaccine Preventable Disease surveillance

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World Health Organization

Presentation outline

- Surveillance definition
- Types of surveillance
- IDSR
- AFP surveillance

Disease Surveillance: definition

- Disease Surveillance is the systematic and ongoing regular collection of data on the occurrence, distribution and trends of a disease on an ongoing basis with sufficient accuracy and completeness to provide basis for action (disease control)

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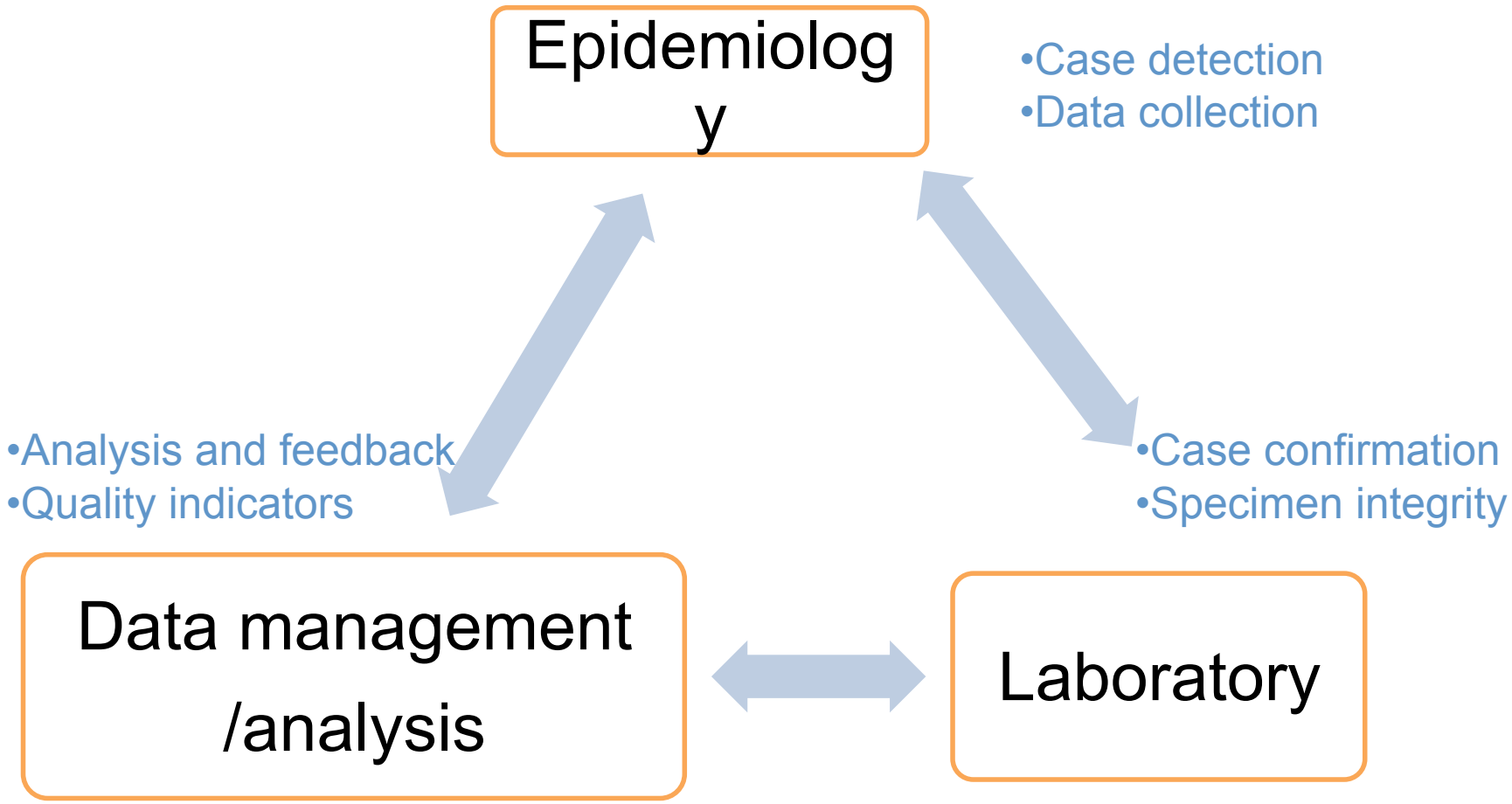
Surveillance System Model



Types of surveillance

1. Passive Surveillance
   - Routine data **sent** from peripheral level to next higher level by specified deadlines

2. Active Surveillance
   - Surveillance officers go out to **look for** cases
   - Reviewing clinical registers for cases,
   - Visiting other practitioners who are likely to see cases - herbal treatment centres to report cases e.g. AFP

Types of surveillance (2)

3. Sentinel Surveillance :
   - For rare diseases/ conditions
   - To follow trends of occurrence (**not to id every case!!)**
   - To determine impact of vaccination
   - To find out the major causative organisms
     - e.g Paediatric Bacterial Meningitis Surveillance network, Rotavirus sentinel surveillance network

Aggregate surveillance data

- A summary count of cases is provided by one or more attributes (place, age group)
- Limited further analysis … particularly by age group
  - Examples: Health Management Information System
- **Monthly / quarterly / annual reporting**
  - Integrated Disease Surveillance and Response
- Immediate / weekly / monthly reporting

Case-based surveillance data

- In the database or line listing, each record represents a case with clinical and lab data
- Usually combined with lab confirmation of suspected disease
- In the field: Completion of case report form for each case
- Data is stored and managed in such a way that > 1 variable can be analyzed at the same time (e.g. age and vaccination status)
- Allows for modifications of and additions to standard analyses

Features of VPD Surveillance

Type	Main features	Program Objective	Diseases
Case based	Active health facility and community based surveillance, lab supported, lab supported (except NNT), weekly / monthly	Eradication / elimination : to find all chains of transmission; To provide evidence for polio-free certification Mortality reduction/ elimination : to id high risk areas, or programmatic susceptibility gaps	Polio, Measles, NNT
Aggregate	Aggregated sub-nationally, monthly / quarterly / annually	To monitor disease trend, impact of vaccination, detect changing epidemiology and high risk areas/populations	Pertussis, Diphtheria

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Core functions of disease surveillance

Disease Surveillance Functions	Level		
	Peripheral (point of contact)	Intermediate	Central
Case detection and notification	++		
Case investigation / confirmation	+		++
Data collection	+	++	++
Epidemiological Analysis		++	++
Feedback		++	++
Feed forward		+	++

Indicators

Some challenges with the disease surveillance system

- Incomplete and late reporting of data
- Multiple data collection tools and duplication of resources
- Inadequate data analysis and interpretation at lower levels
- Inadequate Laboratory involvement
- Under utilization of surveillance information
- Lack of feed back

VPD control objectives

- Polio

Eradication

- MNT, Measles
- Rubella & congenital rubella syndrome, Meningitis A

Elimination

- Diphtheria
- Pertussis, Hepatitis B, Hib, Pneumococcal pneumonia, Rotavirus

Control and mortality reduction

Background on the Introduction of IDSR in the African region

- Communicable diseases are a major cause of illness, disability and deaths in Africa
- Countries have multiple disease surveillance systems targeting the same health workers at the facility and district level
- Data collected is often incomplete and is not analyzed or interpreted on time at the local level
- Delays in responding to public health emergencies lead to unnecessary loss of lives
- Hence, the 48th WHO Regional Committee for Africa adopted the IDS strategy (Harare, 1998).

What is IDSR?

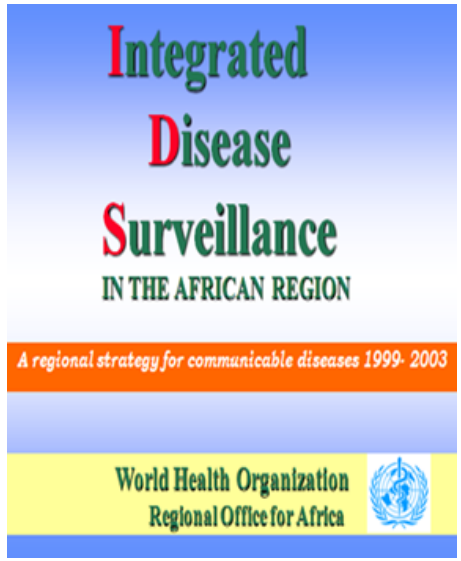
- It is a comprehensive strategy for strengthening Disease Surveillance & Response systems at all levels (Community, Health Facility, District, national)
- Promotes Rational use of resources
- Recommends use of same structures, processes & personnel
- Emphasizes on integrated Implementation of activities

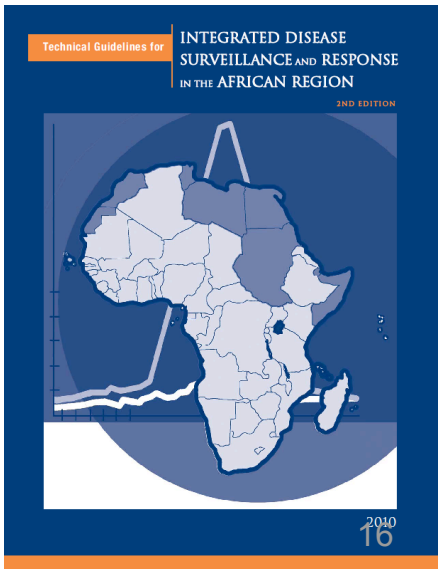
Objectives of IDSR

- To monitor trends of:
  - Priority Diseases and Events of Public Health Importance
  - Disease Determinants: Causes, Risk factors
- To early detect unusual situations:
  - Suspect epidemics and outbreaks
  - Impact of interventions: e.g declining incidence, spread, case fatality
- To facilitate evidence-based Response, Health Policy design, Planning and Management:
- To generate in formation for advocacy and resource mobilization

IDSR: Development & Milestones

- IDSR Technical Guidelines Developed – 2001
- IDSR Training modules Launched- 2002
- International Health Regulations (IHR) adopted 2005
- Revised IDSR TG 2nd Edition - 2010





Emphasis on IDSR 2001 vs 2010

IDSR Guidelines 2001	IDSR Guidelines 2010
Priority Communicable diseases	Priority Communicable diseases
	Selected Non communicable diseases
	Public Health Events of International Concern (IHR 2005)

Priority diseases, Conditions and Events for Integrated Disease Surveillance and Response - 2010

Epidemic prone diseases	Diseases targeted for eradication or elimination	Other major diseases, events or conditions of public health importance
Acute haemorrhagic fever syndrome* Anthrax Chikungunya Cholera Dengue Diarrhoea with blood (*Shigella*) Measles Meningococcal meningitis Plague SARI** Typhoid fever Yellow fever *Ebola, Marburg, Rift Valley, Lassa, Crimean Congo, West Nile Fever **National programmes may wish to add Influenza-like illnesses to their priority disease list	Buruli ulcer Dracunculiasis Leprosy Lymphatic filariasis Neonatal tetanus Noma Onchocerciasis Poliomyelitis[1] [1]Disease specified by IHR (2005) for immediate notification	Acute viral hepatitis Adverse events following immunization (AEFI) Diabetes mellitus Diarrhoea with dehydration less than 5 years of age HIV/AIDS (new cases) Hypertension Injuries (Road traffic Accidents) Malaria Malnutrition in children under 5 years of age Maternal deaths Mental health (Epilepsy) Rabies Severe pneumonia less than 5 years of age STIs Trachoma Trypanosomiasis Tuberculosis

Diseases or events of international concern

Human influenza due to a new subtype[1]
SARS[1]
Smallpox[1]
Any public health event of international or national concern (infectious, zoonotic, food borne, chemical, radio nuclear, or due to unknown condition.

[1]Disease specified by IHR (2005) for immediate notification

The IDS generic case form

Reporting health facility

Reporting district

Generic Reporting Form - from Health Facility/Health Worker to District Health Team

☐ Cholera ☐ Diarrhea with Blood/Shigella ☐ Dracunculiasis ☐ Measles ☐ Meningitis ☐ Plague ☐ Viral Hemorrhagic Fever ☐ Yellow Fever ____ Other

Completed by District: **ID number**: ____ - ____ - ____ - ____ (Prov/State - District - Year Onset - Case number)

____/____/____ Received form at District

____/____/____ Received form at National level

Name(s) of patient: _____ **Date of birth**: ____/____/____ **Age**: ____ (If DOB unknown) **years** ____ **months** (If <12 months) ____ days (NNT only)

Patient's residence: Village/Neighborhood _____ **Sex**: ☐ M=Male F=Female

Town/ City _____ **District of residence**: _____ ☐ U=Urban R=Rural **Urban/Rural**

Locating Information: If applicable. Name of mother and father if neonate or child _____

Date Seen at Health Facility:..... ____/____/____

Date Health Facility Notified District:..... ____/____/____

Date Onset:..... ____/____/____

Blankvariable #1 _____

Blankvariable #2 _____

For cases of Measles, NNT (TT in mother), Yellow fever, & Meningitis:
Number of vaccine doses received ☐ 9=unknown
For measles, TT, YF–documented by card. For meningitis, by history.

Date of last vaccination ____/____/____
(Measles, Neonatal tetanus (TT of mother), Yellow fever, Meningitis only)

In/Out-Patient: ☐ 1=In-Patient 2=Out-Patient **Outcome** ☐ 1=Alive 2=Dead 9=Unk

Final classification: ☐ 1=Confirmed 2=Probable/Compatible 3=Discarded, 4=Suspected

Person completing form: _____ **Date Sent Form to District:** ____/____/____

The IDS generic line list form

Generic line list – Reporting from health facility to district and for use during outbreaks

Health Facility: _____ Date received at district: _____

District: _____ Disease or condition: _____

CASE Id Nbr	O=out-patient I=in-patient	Name	Village, Town	Sex	Age	Date seen at health facility	Date onset of disease	Number of doses of vaccine received	Record date laboratory specimen taken	Record results of laboratory testing	Outcome A=alive D=dead	Comments

Challenges facing IDSR implementation in countries

- Delayed policy implementation
- Competing priorities
- Difficulty in communication between programmes
- Multiple surveillance data requirements by programmes
- Harmonization of various data collecting tools
- Inadequate or unwillingness to share Resources

Uses of surveillance data in vaccinology

- Determining and monitoring burden of disease
  - cases, deaths, seasonality, age groups etc
- Determining the Public Health importance of the disease- epidemic potential etc.
- Determining groups/ areas at risk/persons most vulnerable in relation to VPD epidemiology.
- Monitoring programme performance and impact of intervention (vaccine use, failures, strains)
- Surveillance information used in the design of special studies, clinical trials;
- Also in guiding programmatic action
  - -e.g. timing of SIAs

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Pre-introduction of a new vaccine

- Disease Burden Documentation through Surveillance – for Evidence based decision making. E.g.
  - Haemophilus influenzae surveillance (PBM surveillance)
  - (specific strains eg. Rota virus)
  - Epidemic (outbreak) prediction /Seasonal flu
- Strain identification
- Sero-epidemiology (susceptibility profile eg. Rubella)
- Special studies

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Post- introduction of a new vaccine

- Program performance : the impact of the vaccine
  - Monitoring trends in occurrence of disease among the vaccinated
  - Occurrence of Epidemics
  - Identifying high risk areas and groups (vaccinated or not vaccinated)

- Adverse Events Following Immunization – to avoid negative impact on the health of vaccine recipients and to Immunization Program

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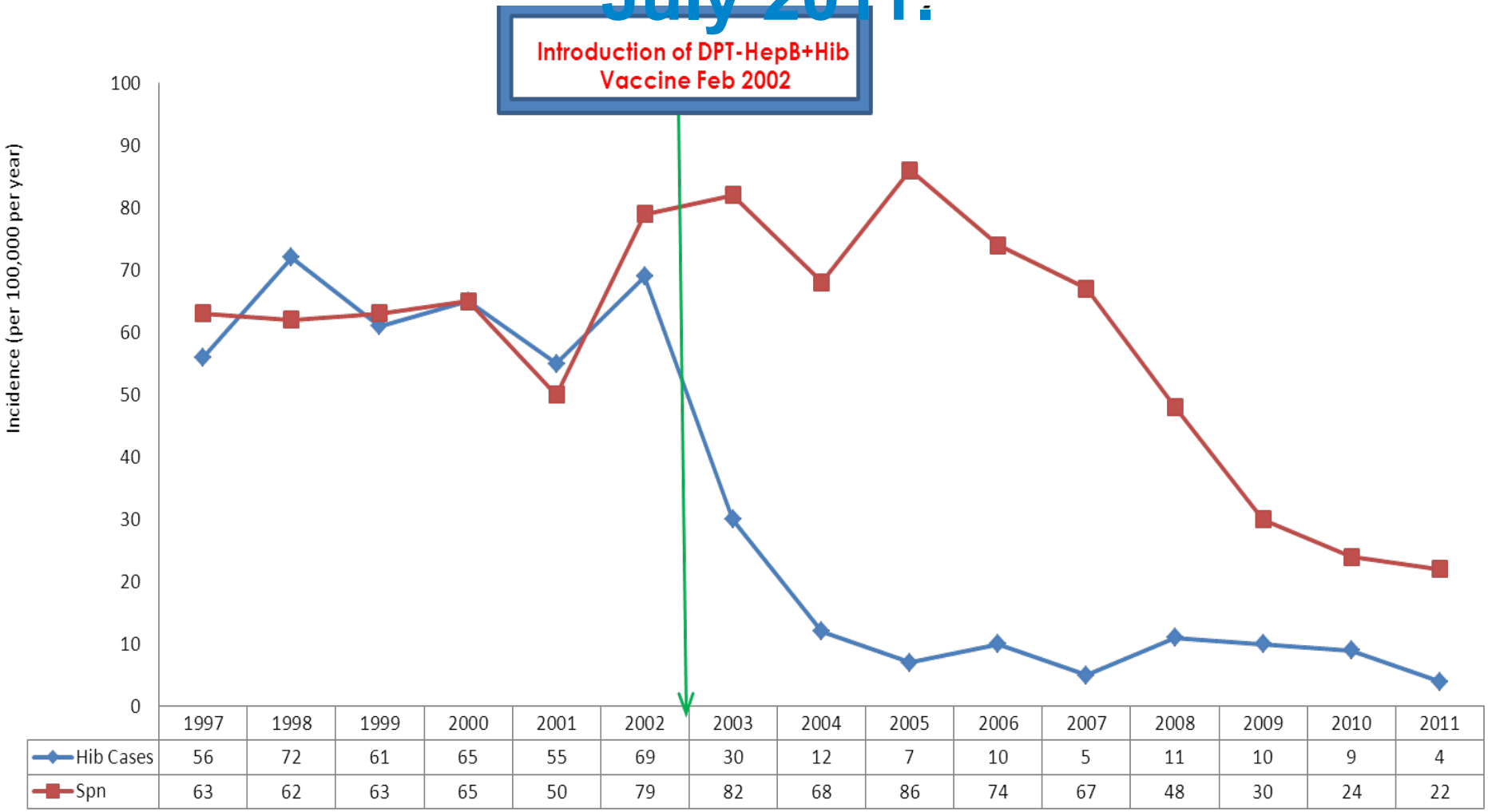
Malawi-Trends in Hib & S. Pneumonia paediatric (<5y) bacterial meningitis. 1997 – July 2011.



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Hib Cases	56	72	61	65	55	69	30	12	7	10	5	11	10	9	4
Spn	63	62	63	65	50	79	82	68	86	74	67	48	30	24	22

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Surveillance data analysis

Analysis and Interpretation with examples

- What, Where, When, Who and Why
  - How many cases/deaths occurred
  - Where the cases/deaths occurred
  - When the cases/deaths occurred
  - The population most affected e.g. age group
  - Risk factors that contributed to transmission of the disease

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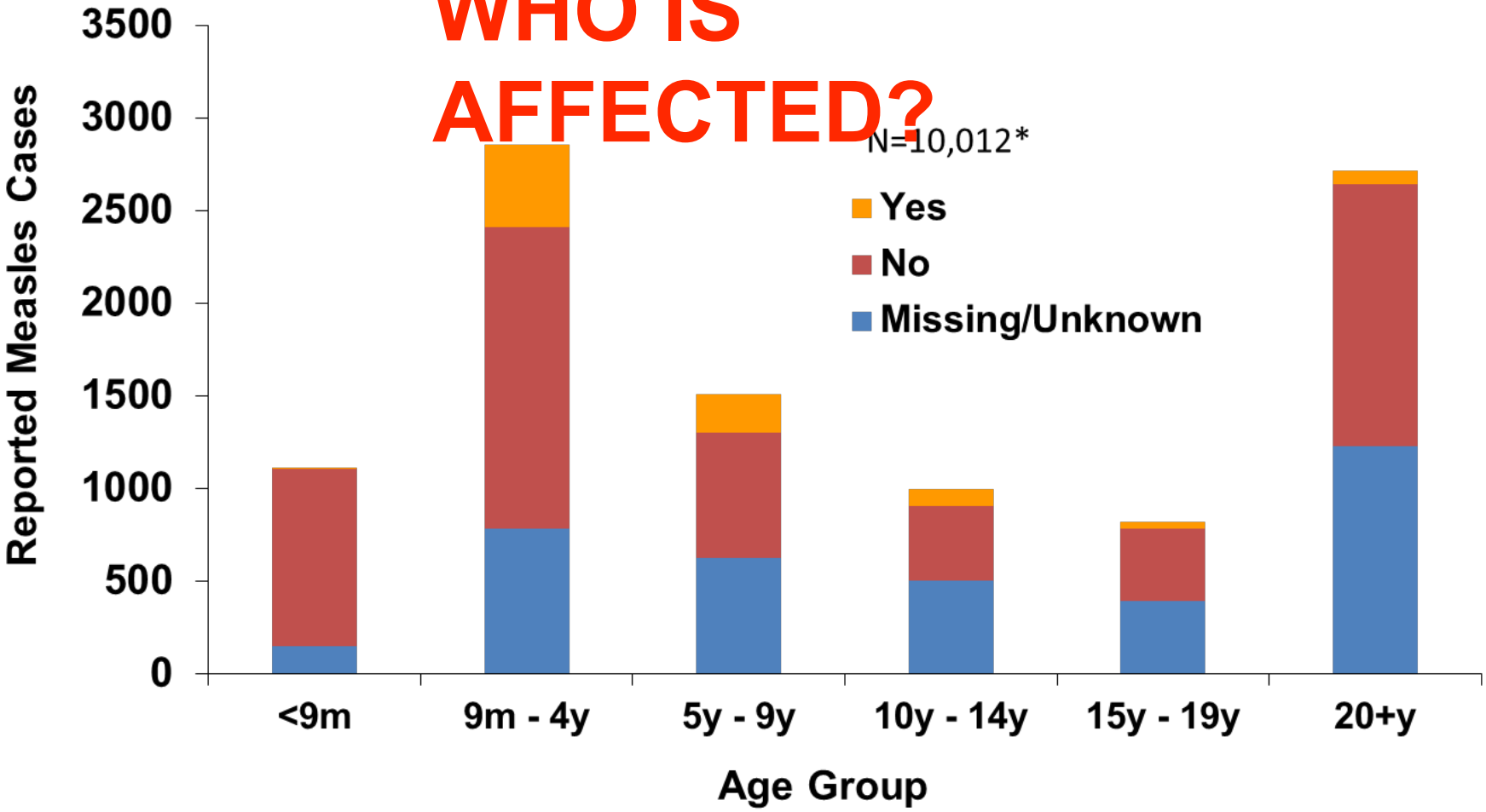
Vaccination Status by Age Group of Measles Cases, Burkina Faso, 2009

WHO IS AFFECTED?

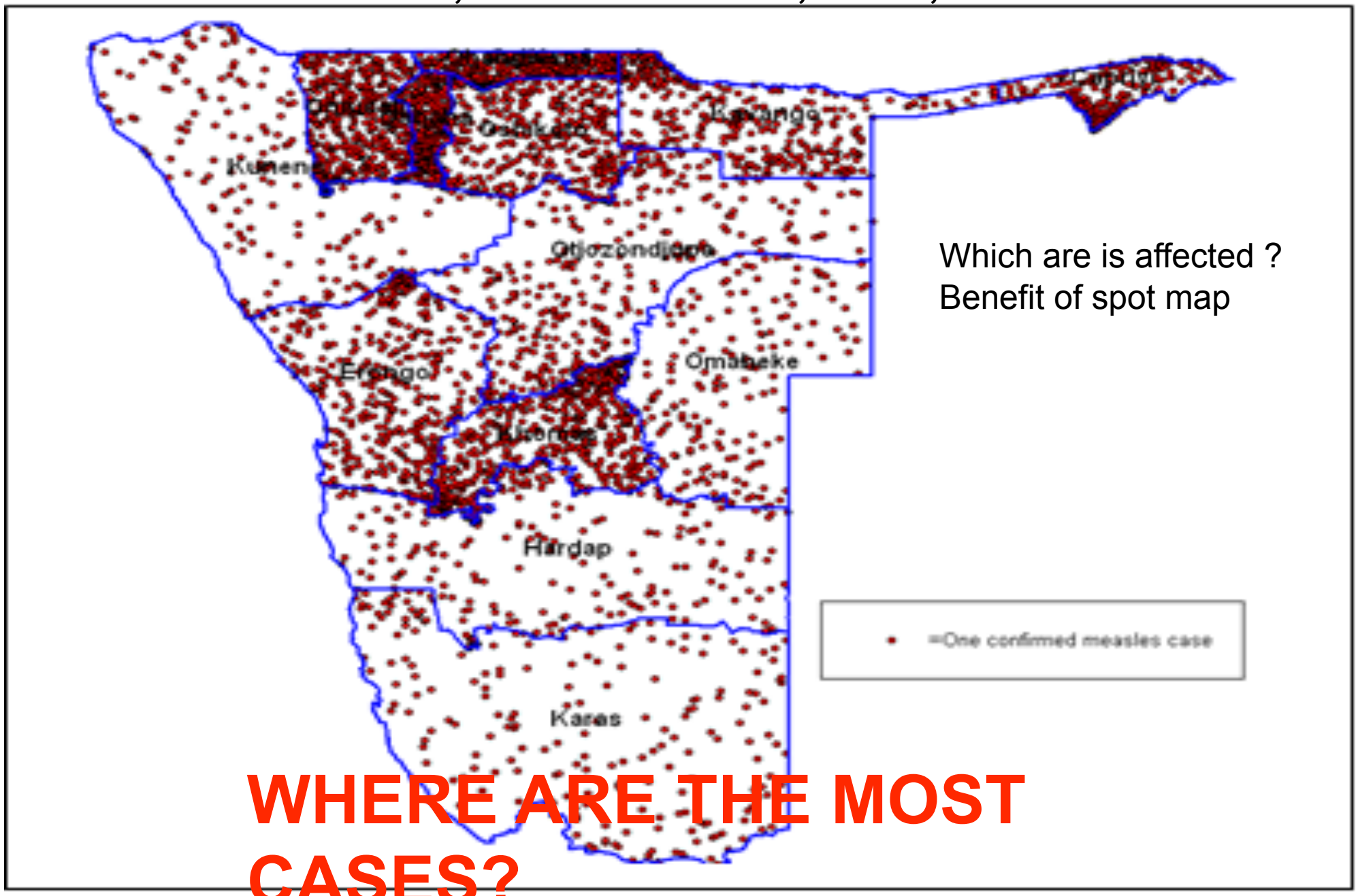


*Line listed data available from 11 districts on 20 May 2009

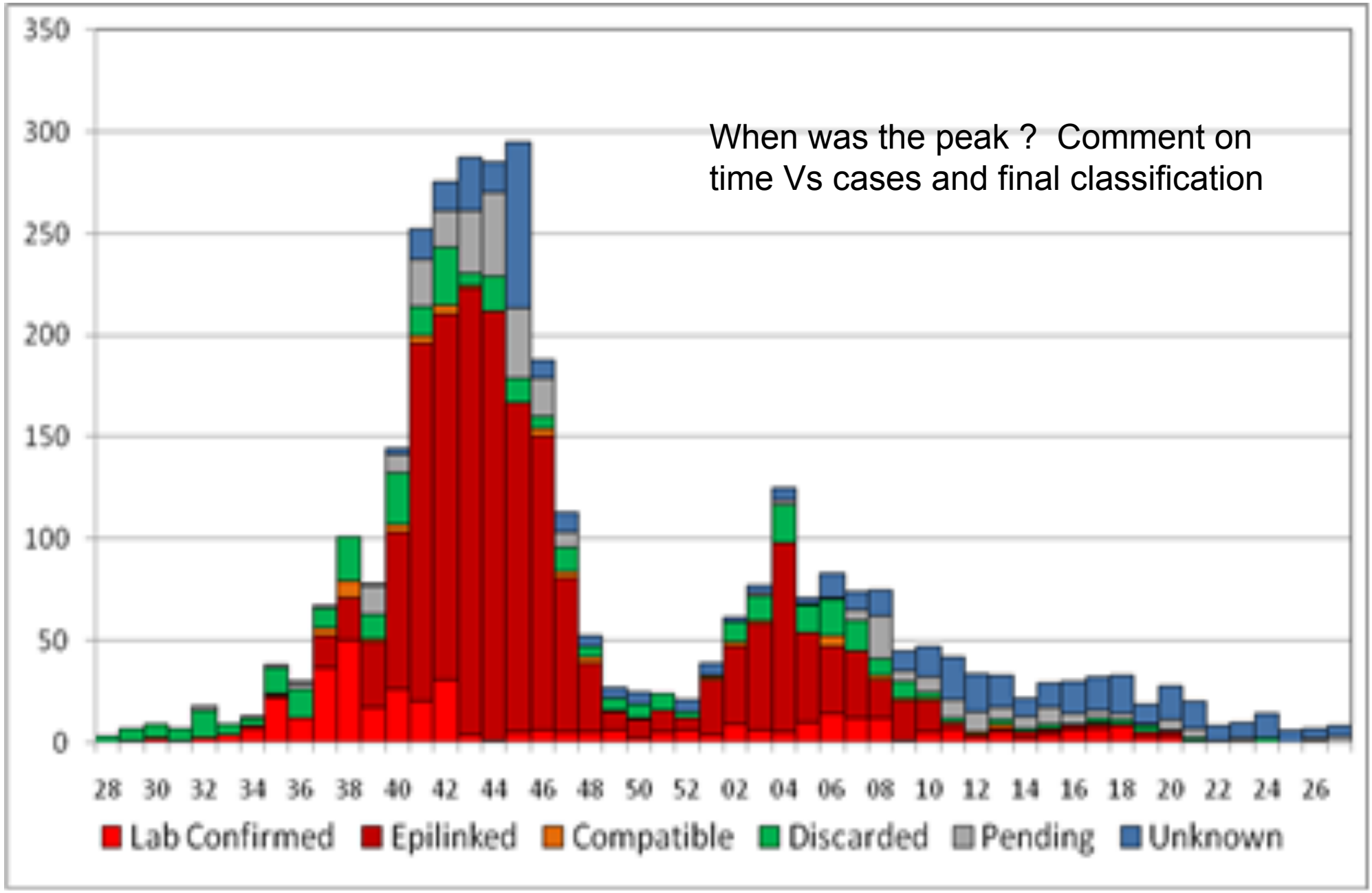
Confirmed Measles Cases by Province: SA 2006-2011

Province	2006	2007	2008	2009	2010	2011
Eastern Cape	4	6	7	80	1308	5
Free State	0	1	1	164	673	1
Gauteng	25	10	11	4109	1614	39
KwaZulu-Natal	5	3	5	421	3834	24
Limpopo	5	2	1	220	290	1
Mpumalanga	9	6	3	131	1843	4
North West	32	1	5	455	755	9
Northern Cape	5	0	2	62	375	8
Western Cape	1	2	4	215	1786	9
South Africa	86	31	39	5857	12478	100

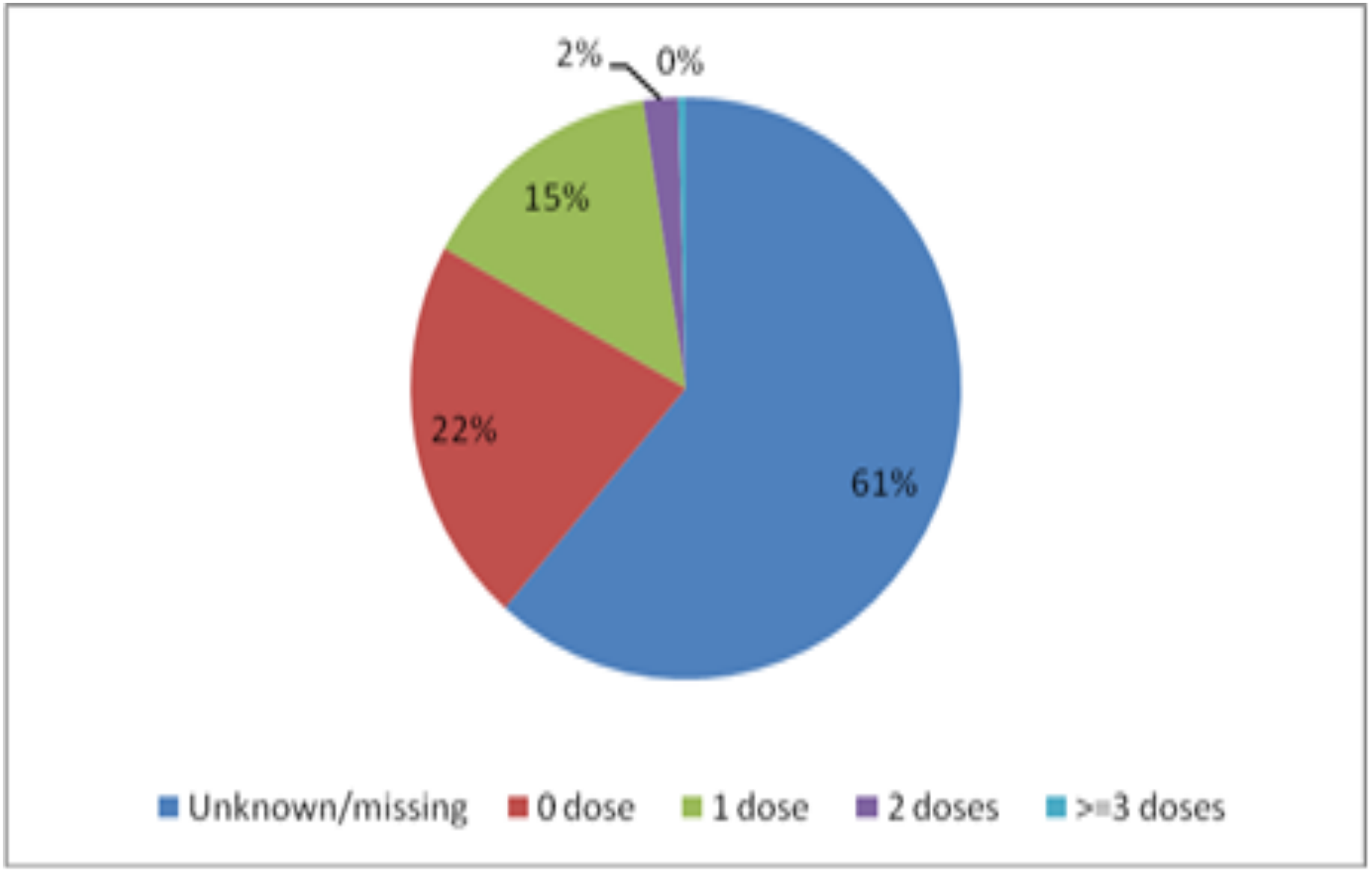
Spot map of confirmed cases of measles, Namibia 2010, 1 dot=1 case, N=2,267



Notified cases of measles by week of onset & final classification Namibia; N=3415; wk 28 09-wk 26 2010



Vaccination status of notified cases of measles, Namibia (N=3979), 2010



Feedback

- Verbal
  - Supervisory visits, telephone calls
  - Meetings: weekly, monthly, quarterly, half-yearly and annually
- Written
  - outbreak response report
  - information summary sheet
  - public health bulletin
  - newsletters / Briefing reports
  - Fact Sheets

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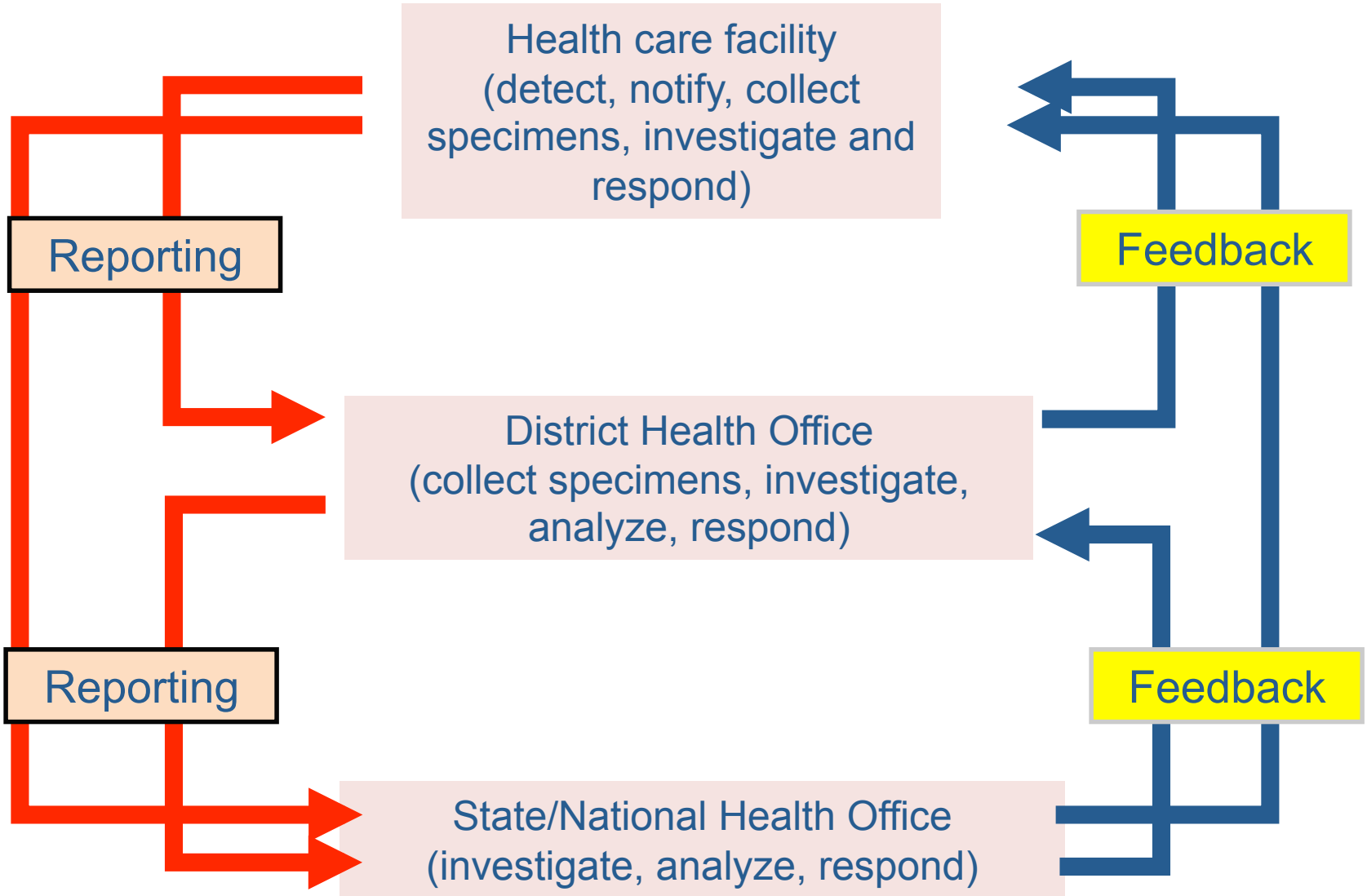
Disease surveillance flow chart



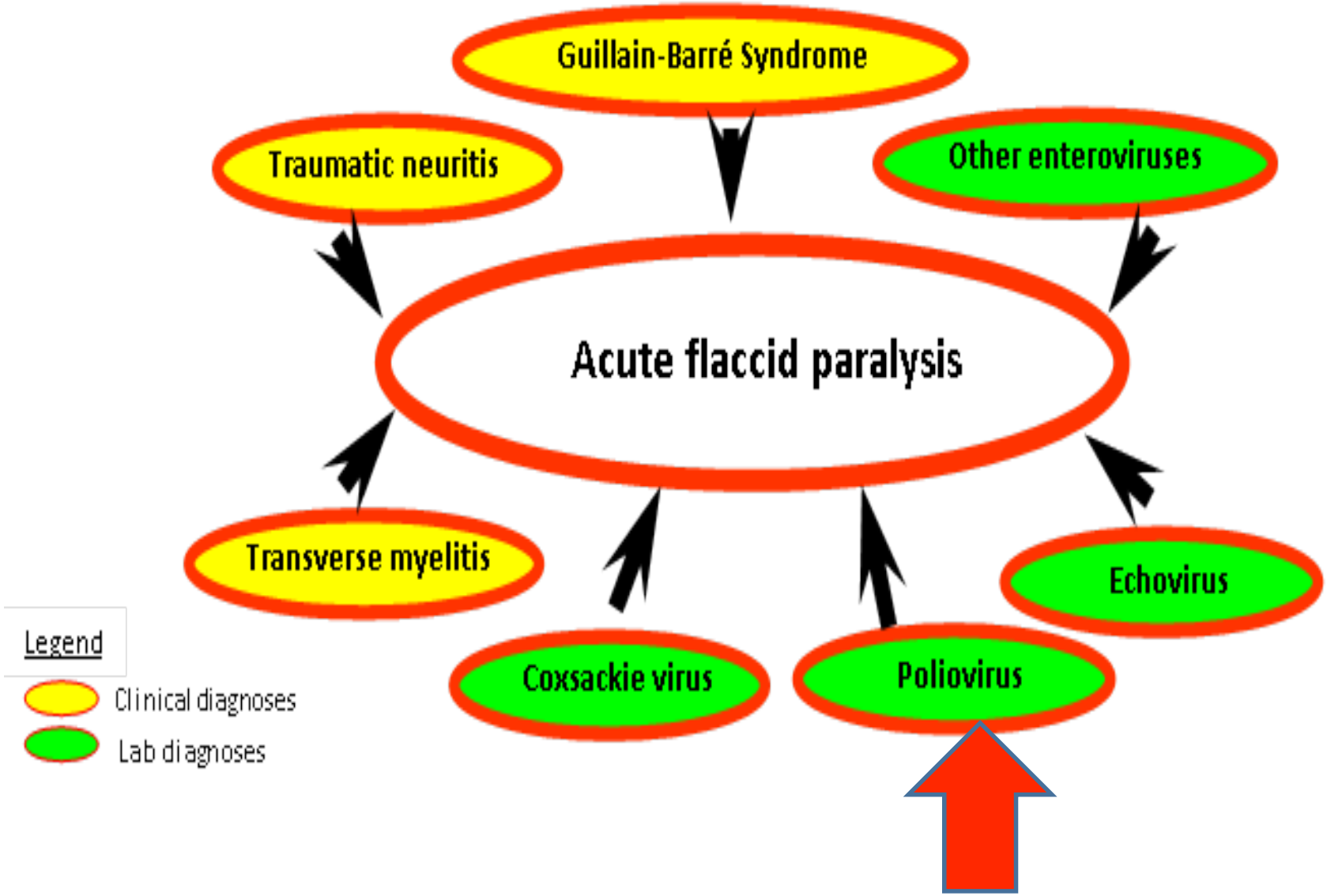
PRACTICAL EXAMPLE: AFP SURVEILLANCE

AFP Case Definition

- Any child under 15 years of age with Acute (sudden onset) Flaccid Paralysis (weakness of the limb – arm, leg or both),

- or any person of any age when paralytic illness of Polio is suspected by a clinician.

Differential Diagnoses for AFP



AFP Surveillance

- For the Polio Eradication program, crucial that AFP surveillance should not miss poliomyelitis cases
- Case definition has to catch as many cases as possible even those that are not polio:
  - High sensitivity
  - Low specificity
- All geographic areas to be covered, up to district
- All AFP cases investigated and polio excluded
- Basic minimum is 2 cases/ per 100 000 pop <15 yrs
- If we detect at least 2 cases of AFP per 100,000 under

IMPORTANT STEPS

- DETECT : Using Case Definition
- NOTIFY: TELEPHONIC to District and Province (and get EPID number)

  EPID number eg: SOA_WCP_CTM_13_10
- INVESTIGATE: Correct Specimen & Case Investigation Form (CIF) completion

Investigate

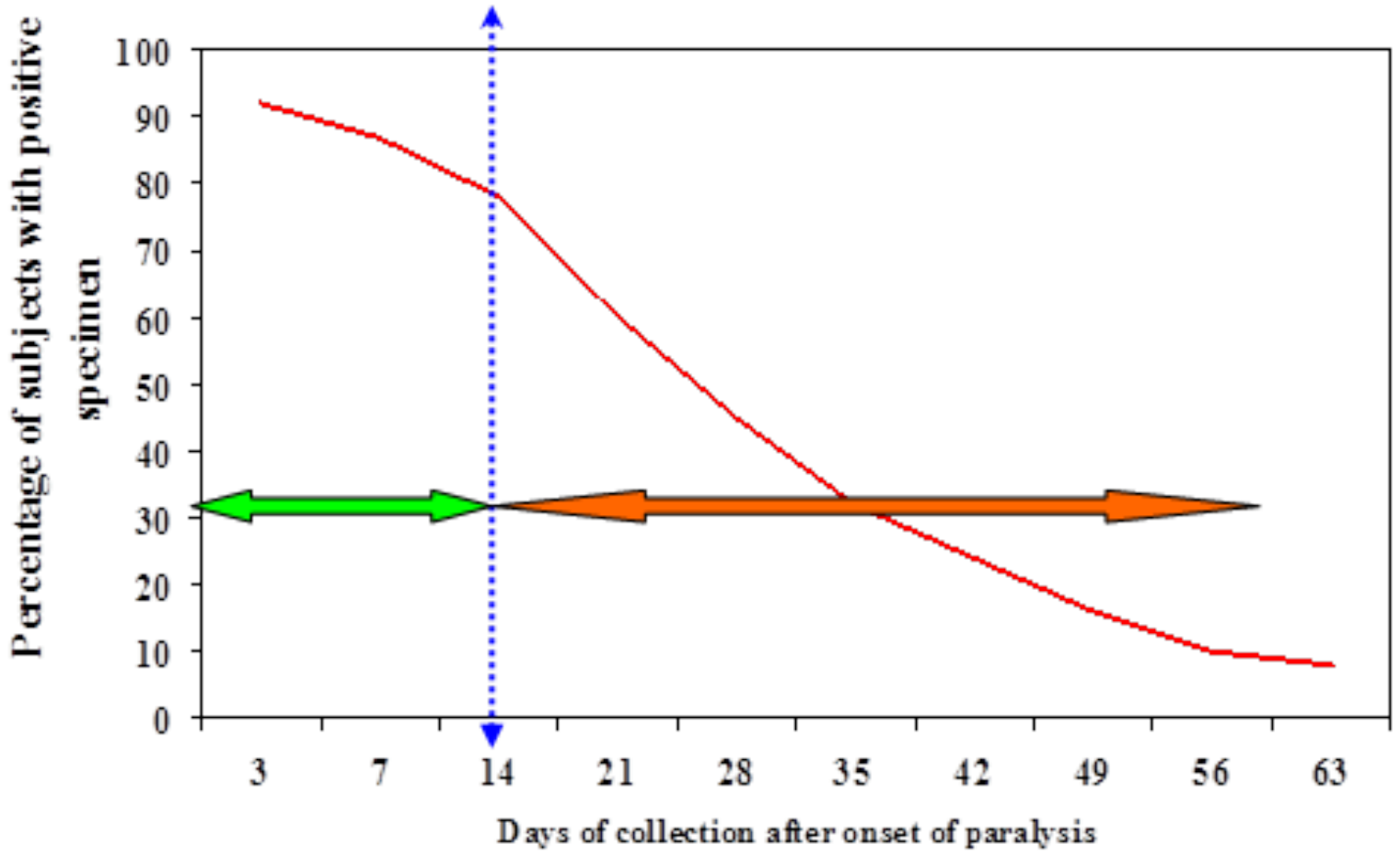
- Collect 2 stool specimens 24 to 48 hrs apart, within 14 days of onset of paralysis
- Put and seal in appropriate container
- Ship to accredited lab in reverse cold chain, arrive < 72 hrs. Copy of Case Investigation Form goes with the specimen
- If not adequately investigated: clinical notes, other diagnostic information/ results & 60 Day Follow Up

AFP surveillance: STOOL

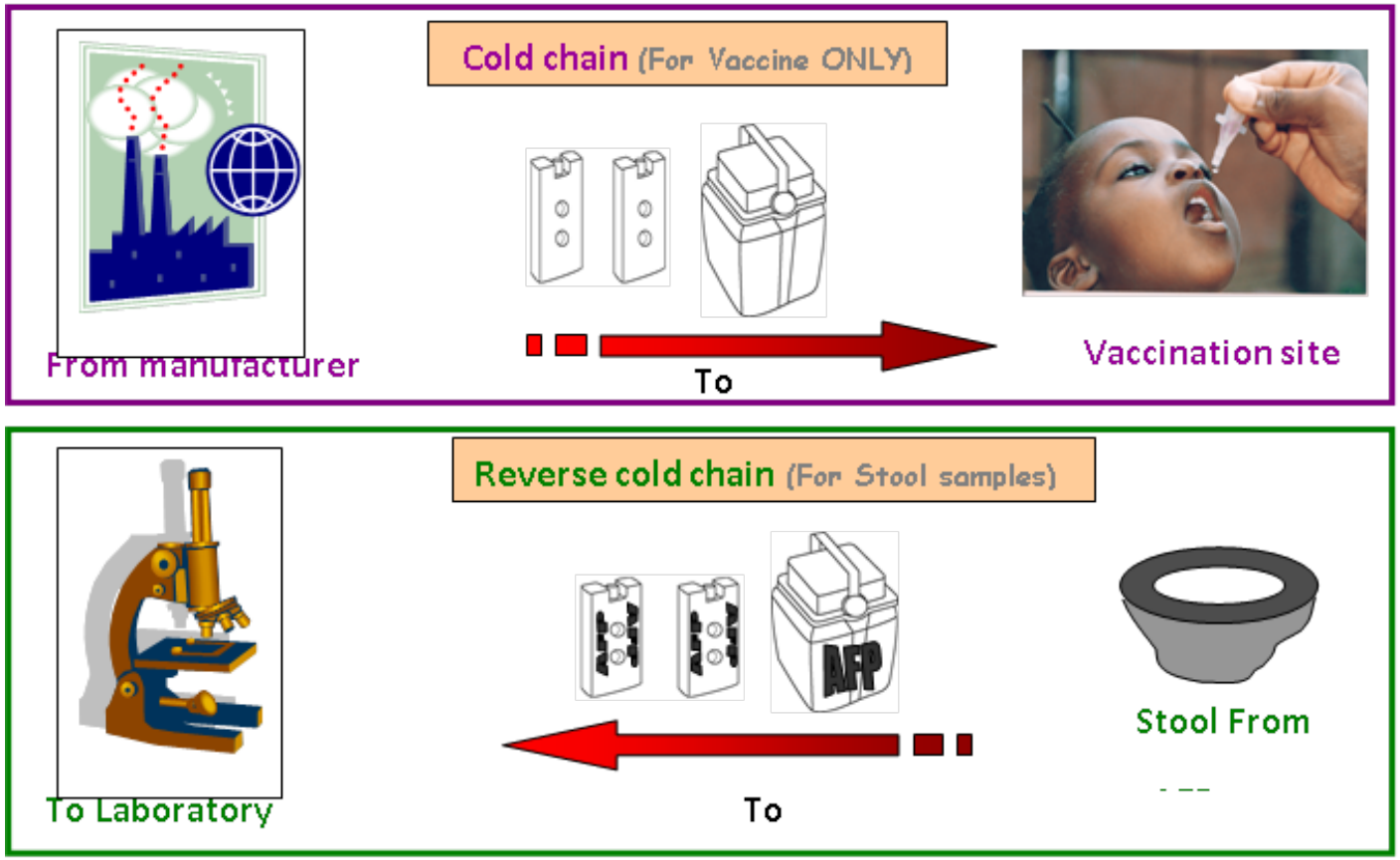
- Two stool specimens collected within 14 days since onset of paralysis and arriving at laboratory in * «Good Condition ».
- “Good Condition” means that upon arrival: There is ice or a temperature indicator (showing < 8°C) in the container, the specimen volume is adequate (>8 grams) there is no evidence of leakage or desiccation)


KWAZULU-NATAL PROVINCE
CONTAINER FOR ACUTE FLACCID PARALYSIS (AFP) STOOLS & SUSPECTED MEASLES CASES (SMC) BLOOD AND THROAT SWABS SPECIMENS ONLY. TRANSPORT SPECIMENS ON ICE.
This container with specimen should be delivered to:
National Institute of Communicable Disease (NICD) Receiving Office
1 Modderfontein Road, SANDRINGHAM, Johannesburg
NICD Tel: 011 555 0504/011 386 6361 / 6358 / 6404
Use Courier Services for transportation.
For further Information and Support, Contact:
National EPI Office at: 012 395 9453 / 9458 / 9017
Skynet Courier Services National Office: 012 803 6007 / 082 803 5261
NB: This container must be returned to the province named above
SKYNET
Skynet
CONTAINS BIOHARZARD MATERIAL
DO NOT OPEN
NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
World Health Organization
health
REPUBLIC OF SOUTH AFRICA

Polio Virus shedding in stool



Cold Chain and reverse cold chain



AFP surveillance notification process

1. Case detection using the Standard AFP Case Definition
2. IMMEDIATE AFP Case Notification/reporting
3. Prompt Case Investigation, within 48 hours of notification
4. Collection of TWO stool specimen, 24 to 48 hours apart in the first 14 days following the onset of paralysis
5. Maintaining reverse cold chain with appropriate stool storage in the dedicated carriers
6. Immediate transport of the samples to the laboratory
7. Obtaining laboratory results
8. Conducting 60 day Follow up
9. Obtaining Final classification by the NPEC
10. Providing epidemiologic situation report and sharing information

AFP surveillance indicators

Indicators	Target
1. Non-polio AFP rate in children <15 years of age Non-polio AFP rate = $\frac{\text{number of reported non-polio AFP rates < 15 years of age}}{\text{total number of children < 15 yes of age}}$ The non-polio AFP rate is an indicator of surveillance "sensitivity". If it is < 2/100 000 then the surveillance system is probably missing cases of AFP.	**≥ 2/100,000**
2. Stool Adequacy rate: Reported AFP cases with 2 specimens collected ≤ 14 days since onset.	**≥ 80%**
3. Timeliness of monthly reporting. (District surveillance routine reports to national level) % Timely = $\frac{\text{number of reports received before a specified deadline}}{\text{number of monthly reports expected}} \times 100\%$	**≥ 80%**
4. Completeness of monthly reporting. (District surveillance routine reports to national level) % Completeness = $\frac{\text{number of monthly reports received}}{\text{number of monthly reports expected}} \times 100\%$	**≥ 90%**
5. Reported AFP cases investigated ≤ 48 hours of notification	**≥ 80%**
6. Reported AFP cases with a follow-up exam at least 60 days after paralysis onset to verify the presence of residual paralysis or weakness.	**≥ 80%**

AFP surveillance lab indicators

Indicators	Target
7. Specimens arriving at national laboratory ≤ 3 days of being sent	**> 80%**
8. Specimens arriving at laboratory in «good condition ». **"Good condition"** means that upon arrival: There is ice or a temperature indicator (showing < 8°C) in the container, the specimen volume is adequate (thumb nail size or more than 8 grams) there is no evidence of leakage or desiccation.	**≥ 80%**
9. Specimens with a turn-around time ≤ 28 days The turn-around time is the time between specimen receipt and reporting of results	**≥ 80%**
10. Stool specimens from which non-polio enterovirus was isolated This is an indicator of the quality of the reverse cold chain and how well the laboratory is able to perform in the routine isolation of enteroviruses.	**≥ 10%**

CASE DEFINITIONS

Suspected measles case

Any person with fever **and** maculopapular rash (i.e. non-vesicular)

and (any one of the 3 Cs) cough, coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes)'

OR

Any person in whom a clinician suspects measles infection.

NNT case definition

New-born with history of normal sucking for first 2 days,

Onset of illness usually between 3 and 10 days after birth,

Inability to suck followed by stiffness, hyper-extended neck / body position (…….) and convulsions, often death.

Acknowledgements

- WHO IST/ESA
- Dr Balcha Masresha

Thank you