

# Measles outbreak investigation report western area

## Introduction

Measles is a febrile rash illness by a Morbillivirus of Paramyxovirus family. It is transmitted from human to human by airborne droplets. It is fourth leading cause of mortality in children <5years in many African countries. In the pre-vaccine era an estimated 130million cases occurred each year. At the World Health Assembly in 2005, an ambitious global goal for measles control was established as part of the Global Immunization Vision and Strategy document<sup>1</sup> that is, to achieve a 90% reduction in measles mortality by 2010 compared with 2000.<sup>1</sup>

As of 2007, four of the six WHO regional offices have a measles elimination goal (AMRO, EURO, EMRO, WPRO) and two have a mortality reduction goal (AFRO, SEARO). It is in these latter two regions where most of the global measles deaths occur. Worldwide, since the year 2000, the estimated number of measles deaths has been reduced by 68%. However, despite this remarkable progress in controlling measles, there were an estimated 17million cases and 242 000 deaths in 2006.<sup>2</sup> Approximately 145 700 people died from measles in 2013 and most of them were young children <5years age group.<sup>3</sup>

In 2005, the resolutions WHA58.3 adopted IHR (2005). IHR (2005) entered into force on 15 June 2007 in accordance with Article 59, replacing IHR (1969). IHR (2005) is legally binding for WHO 194 Member States including all 46 WHO Member States in the African region. Endorsement of the International Health Regulations (2005) highlighted the importance of timely detection and response to events that are of potential international public- health concern<sup>4</sup> including measles.

Clinical case definition of measles is any person in whom a clinician suspects measles OR Any person with fever and generalized maculopapular (i.e. non-vesicular) rash, and cough or coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes). A suspected outbreak of measles is defined as the occurrence of five or more reported suspected cases of measles in one month per 100 000 population living in a geographical area (e.g. district/ block).<sup>5</sup> A confirmed measles outbreak is defined as the occurrence of three or more confirmed measles cases (at least two of which should be laboratory-confirmed; IgM positive) in a health facility/district/block (approximate catchment population of 100 000) in a month.

In susceptible children with Vitamin A deficiency and malnutrition measles may result in severe illness and associated bacterial illness. In children with Vitamin A deficiency it can lead to corneal scarring and blindness, in older children & adults it can lead to Encephalitis leading to chronic disability or death, it can also lead to severe pneumonia and diarrhea leading to high morbidity & mortality especially in developing countries like Africa. Outbreaks with high case fatality rates have been reported across the globe in areas with low immunization coverage and where the pool of susceptible population (unvaccinated or uninfected) increases.

According to Sierra Leone MoHS National EPI policy the measles vaccine is given after the age of 09months. When the vaccine is given

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at 9months the sero-conversion is 85 % when it is given at 12months sero-conversion is 90% and after 15months it is 95%. MoHS is taking appropriate steps to introduce the second measles dose in routine vaccination schedule after 15months of age.

## Background

After the implementation of IDSR in Western Area the DHMT was systematically collecting, analyzing and interpreting the surveillance information received from 116 PHUs. There was a considerable rise in suspected measles cases seen over the last 11 weeks (36-46). The samples were collected and sent to lab for laboratory confirmation. During the EVD outbreak the reference lab for western area (CPHRL LAKKA) was not testing the measles samples due to some technical reasons like deficiency of lab reagents etc. There was a huge backlog of samples that was accumulated at DPC and it was just recent (19 November 2015) that the results were out from lab to all districts including western area. Western Area received results of samples that were sent to lab from September till November. There were a total of 14 samples of suspected measles cases sent to lab from 10 September till 19 November 2015. Out of these 14 samples results for 11 samples was out and out of those 11 results 08 were IgM positive for measles antibodies giving a sample positivity rate of 72%. The result of 03 samples is still pending.

## Phemc meeting

Soon after receiving the lab results the DMO for Western Area convened the Public Health Emergency Management Committee meeting. The committee assessed the situation and after using the IHR (2005) decision instrument the outbreak was notified to National Level considering its impact on public health. It was decided to review the existing resources to determine the need for additional resources. The DMO then formulated individual committees & sub committees for specific response activities. The district rapid response team was made alert and was asked to gather additional information from the reporting health facilities in order to have much clear evidence. It was decided that after a couple of days when the individual committees

will finish the tasks of assessment and detailed analysis another PHEMC meeting will be held to monitor the situation and plan for final public health response.

### Descriptive epidemiology

The DHMT with technical support from World Health Organization started analyzing the data. Basic descriptive epidemiology was applied and available data was analyzed in terms of time, place & person to get the clear view of the situation.

#### Analysis by time

Following graph shows the # of suspected measles cases that were reported through IDSR system along with those that were investigated by the DSOs (Figure 1).

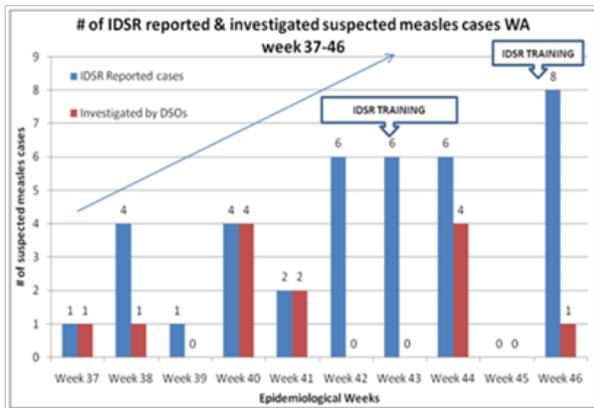


Figure 1 # of suspected measles cases that were reported through IDSR system along with those that were investigated by the DSOs.

The graph shows the # of suspected measles cases reported through IDSR from week 37-46 & those which were investigated. A total of 35 suspected cases were reported while 13 were investigated by DSOs. This difference in reported vs investigated cases can be attributed to the IDSR training rounds that were carried out from week 42 till week 46. During the trainings the DSOs were involved in facilitating the trainings resulting in non-response to the cases. The graph also shows considerable improvement in reporting as the IDSR trainings were cascaded showing improvement of health care providers in detecting the suspected measles cases and reporting them immediately to DHMT.

Following graph shows the number of samples that were sent to DPC for onward submission to CPHRL and the samples that tested positive. Current protocol is that district investigates the cases, collects the samples and submits to DPC. DPC then assigns the EPID # to the cases and submits the samples to the CPHRL (Figure 2).

The graph shows that the from week 37 till 46 a total of 13 samples were sent to lab out of which result came out for 11 samples out of which 08 were positive. The overall sample positivity rate remained quite high which was 72%. In week 37 & 38 the positivity rate was 100%, in week 40 it was 75% and in weeks 41 & 44 it was 50%.

Following graph shows the time taken by district RRTs to respond to alert after initial notification from the health facilities: (Figure 3).

The analysis shows that 87.5% of the alerts were investigated within 24hours of initial notification while 12.5% (1) of investigations were within 24-48hours timeframe. It shows excellent capacity

of district rapid response teams to respond to immediate notifiable diseases including measles.

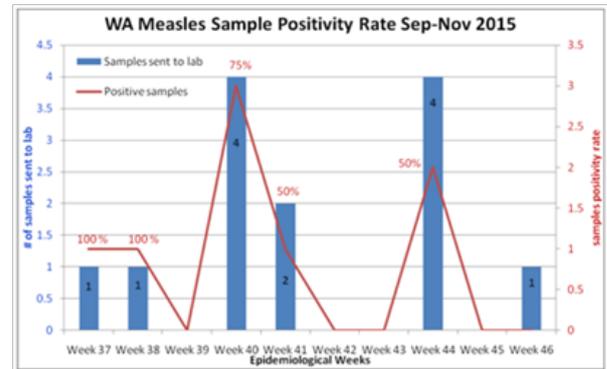


Figure 2 WA Measles Sample Positivity Rate Sep-Nov 2015.

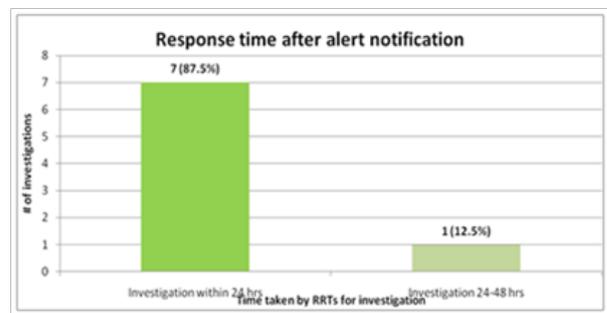


Figure 3 Response time after alert notification.

Following graph shows the delay in days for feedback of lab results after the initial submission of samples: (Figure 4).

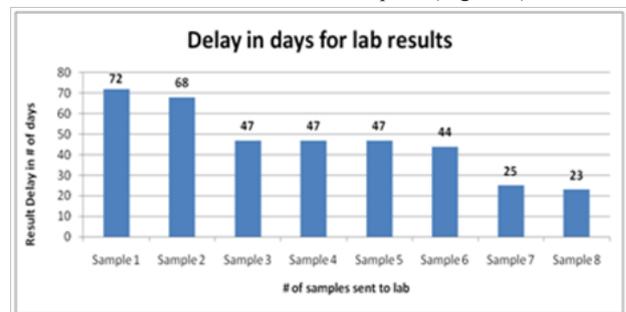


Figure 4 Delay in days for feedback of lab results after the initial submission of samples.

There was considerable delay in lab results after the initial submission of samples. Maximum delay was of 72 days while minimum delay was of 23 days.

#### Analysis by person

Following graph shows the analysis of positive cases by age groups: (Figure 5).

The graph shows various age groups those were affected. It is clear <5years children were most affected 62.5% (5) followed by children between 5-10years 25% (2) and least affected were children between 10-15years age group 12.5% (1).

Following graph shows the analysis of positive cases by sex groups: (Figure 6).

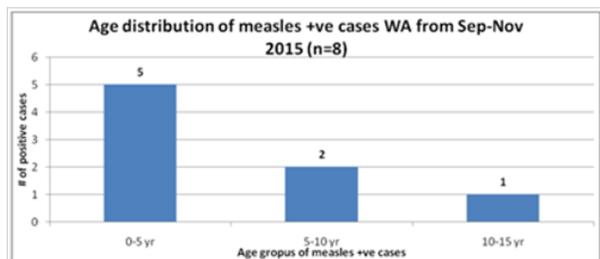


Figure 5 The analysis of positive cases by age groups.

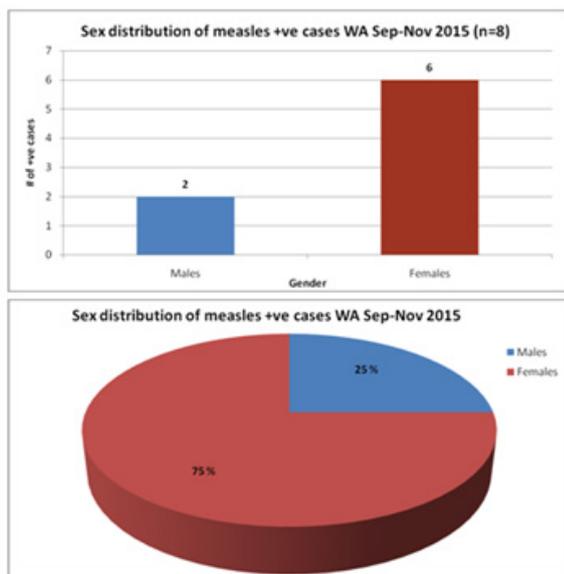


Figure 6 Analysis of positive cases by sex groups.

It is evident that females are affected more than the males. 06 (75%) out of 08 positive cases are females while 02 (25%) are males. The prevalence of measles is more in females as compared to males. Further analytical studies are required to explore the cause.

Following graph shows the vaccination status of the measles positive cases according to information available on case investigation forms (Figure 7).

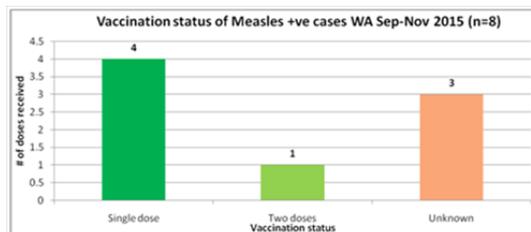


Figure 7 Vaccination status of the measles positive cases according to information available on case investigation forms.

The analysis showed that 04 (50%) of the 08 positive cases had received single dose of MCV, 01 (12.5%) had received two doses while the vaccination status of 03 (37.5%) positive cases was unknown. The unknown vaccination status was due to unavailability of vaccination cards and parents difficulty in recalling about the MCV vaccine. For the case who received two doses of MCV can be due to receiving additional dose during SIAs.

**Analysis by place**

The data showed that 06 wards in Western Area were affected by the outbreak. Out of these 06 wards 05 are in Western Urban (350,351,352,356 & 382) while one ward in Western Rural was affected (344). Following table shows the individual wards, reporting health facilities, ward population and attack rates: (Table 1).

Table 1 The individual wards, reporting health facilities, ward population and attack rates

District	Ward	Name of HF	Population	Reported cases	AR %
Western Urban	350	Koya Town CHC	10,093	1	0.009
Western Urban	351	Wellington CHC	34,460	1	0.002
Western Urban	352	Phillip Street MCHP	28,566	1	0.003
Western Urban	356	Approved School	38,696	1	0.002
Western Urban	382	Gray Bush CHC	11,191	1	0.008
Western Rural	344	Newton CHC	8,521	3	0.03
TOTAL			131,527	8	0.006

The highest attack rate (0.03%) was seen in ward 344 which falls in western urban. The reporting health facility was Newton CHC and 03 positive cases were reported and all were from same location which was Catholic Farm Newton. Rest all the locations were from Western Urban with single positive case reported.

Following spot map shows the wards from where the measles cases were reported (Figure 8): Following table summarizes the locations from where the cases were reported: (Table 2). Following table shows the attack rates among various age groups: (Table 3).

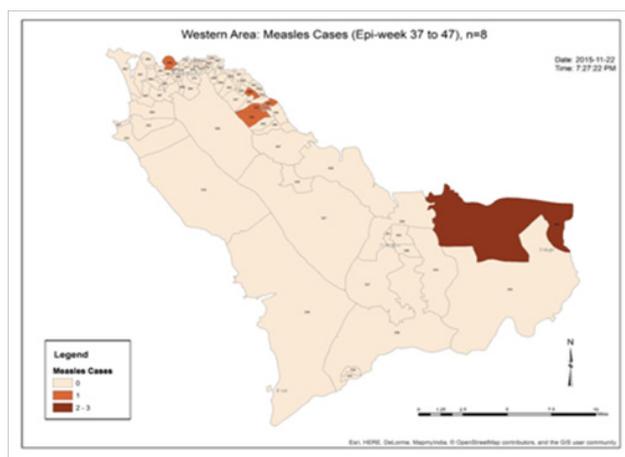
The highest attack rate was in 5-9year age group which 0.010 % was followed by 10-14years which was 0.006 % and lastly 0-5years which was 0.002%. (Total population at risk in all 06 affected wards is 131,527. The estimate for 0-5year age group was taken to be 17.7%, for 5-9years was 14.91% & for 10-14years it was 11.53%. These population estimates are taken from MoHS Child Health/Expanded Programme on Immunization Comprehensive EPI Multiyear Plan 2012-2016 and from Demographics of Sierra Leone).<sup>6</sup>

**Table 2** Locations from where the cases were reported

Ward #	Reporting health facility	Address of positive case	# Of cases reported
350	Koya Town CHC	14 Taylor Street Wellington	1
351	Wellington CHC	1 Upper Taylor Street	1
352	Phillip Street MCHP	Phillip Street	1
356	Approved School	3 Sawyer Terrace	1
382	Gray Bush CHC	21 King Sillah Street	1
344	Newton CHC	Catholic Farm Newton	3

**Table 3** Attack rates among various age groups

Age groups	Population	Cases	Attack rates
0-5 years	23,280	5	0.002
5-9 years	19,597	2	0.01
10-14 years	15,125	1	0.006

**Figure 8** Shows the wards from where the measles cases were reported.

## Actions taken & way forward

### MCH week activities

The upcoming MCH Week from 26-30 November is targeting 9 months children who had not received MCV 1 in routine immunization (defaulters) and will also target all children 15-23 months as an initial process of introduction of Measles Second Dose into the routine schedule.

### Ring vaccination campaign

DHMT is planning to target all children between 10-14 months and 2 years to 15 years age group in ring vaccination activities immediately after the MCH week. The ring vaccination will target the selective locations based on the risk assessment. The logistics required for this activity are being estimated and DPC will be informed soon about the resources required to carry out the activity.

## Intensified surveillance & notification

All the Health Facilities In charges in western area were given briefing during the training for MCH week. All health facilities were asked to remain vigilant. Following actions were taken:

- Case definition was again shared with all health facilities.
- Lab results were shared with all health facilities.
- The facilities reporting measles cases were asked to start compiling the line lists. The line list forms were already distributed during the IDSR training.
- The facilities were again reminded to immediately notify any suspected measles case to DHMT and fill the case based reporting form.

Information was also shared with WHO WAERC Team and following support was requested from all EPIs:

- If possible, conduct visits to schools, hospital emergency rooms and other health facilities (both public & private), plus selected pediatricians for case finding, especially in urban areas.
- Conduct active case searches in affected communities to search for additional cases.
- Conduct active case searches in the PHUs by looking at the OPD registers to find any missing case having signs & symptoms of measles.

## Case management

For appropriate case management Vitamin A capsules were made available to all health facilities especially the facilities reporting the cases. Apart from that antibiotics for treatment of complicated cases were also made available.

## Enhanced social mobilization

Social mobilization activities should also be enhanced as it is integral part of outbreak response to do risk communication to the affected communities. Communicating advice and guidance is the most important public health tool in managing risk. Following points should be remembered:

- Communities should be well informed about the ongoing outbreak. Local powerful channels (radio, tv, newspapers) should be used when necessary.

- II. Development of simple community education messages including signs & symptoms of measles, modes of transmission and persons at risk by Social Mobilization desk for the affected communities. Simple lay case definition of measles in local language should be made available to the communities (warm body & kro kro with red eyes or running nose or cough). The messages should be culturally sensitive, clear, concise, sensitive to local traditions & should address the beliefs about the disease.
- III. Communities should be well informed how & where to seek medical care in case of potential suspect in and around their houses.
- IV. Communities should also be well informed about the static sites for ring vaccination so that they could bring all children 5-15years during the ring vaccination.
- V. Regular meetings with community stake holders like ward councilors, task force, CHW, religious leaders , traditional healers etc to find out additional cases.
- VI. IEC materials like posters, fliers & pamphlets should be developed and displayed in the affected communities (Annex 1,2).

## Acknowledgements

None.

## Conflict of interest

The author declares no conflict of interest.

## References

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