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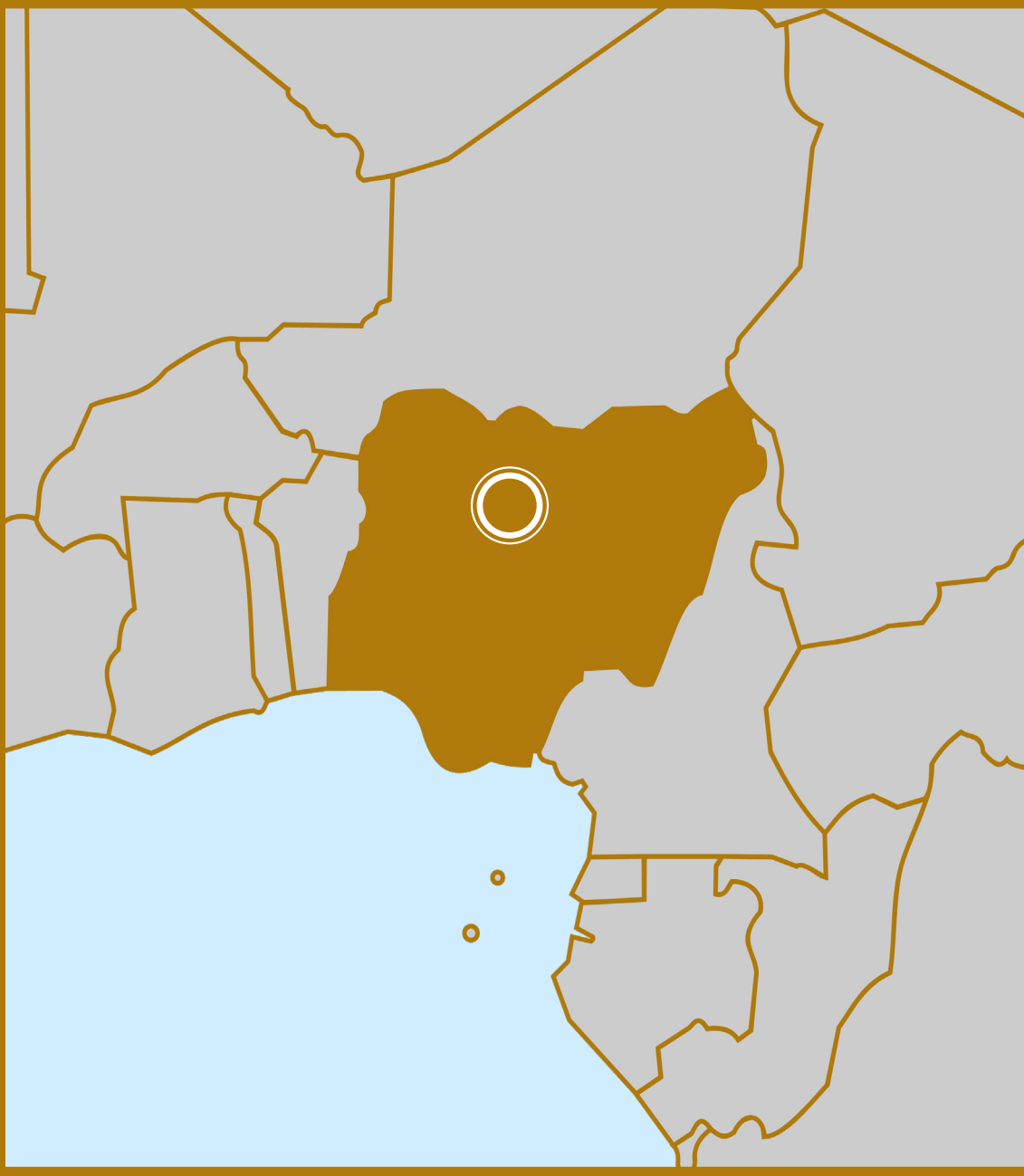
Outbreak Investigation of Measles in Kaduna State, Northwestern Nigeria, 2015

Participant Guide



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Outbreak Investigation of Measles in Kaduna State, Northwestern Nigeria, 2015

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Abstract

Sub-Saharan Africa reports repeated outbreaks of measles, a vaccine preventable disease, which is notifiable under the Integrated Disease Surveillance and Response strategy in Nigeria. Nigeria has reported several outbreaks of measles in the last three years. Poor immunization coverage and weak health systems have been related with measles. This case study is based on real events that occurred during the 2015 outbreak of measles in Kaduna state Northwestern Nigeria. This case study was based upon real events that occurred in community X in Igabi LGA of Kaduna state. However, some of the results were edited to allow the case study to be completed in a facilitated classroom session. Knowledge and practice of investigating outbreaks is a key public health function of public health workers. The purpose of this case study is to simulate outbreak investigation for teaching of postgraduate public health practitioners. The participants should have received lectures or other training on outbreak investigation without the practical experience of investigating an outbreak, but are being prepared to investigate outbreaks in the field. This case study should be taken in a classroom setting and should take two hours to complete.

How to Use the Case Study

General instructions: This case study should be facilitated by one facilitator with 8-10 participants. It should be facilitated in a classroom setting. The case study should be interactive allowing the participants to learn from each other. In some aspects group discussion and role play should be used to facilitate learning.

Audience: Residents in the Field Epidemiology & Laboratory Training Program (FELTP), Field Epidemiology Training Program (FETP), West African College of Physicians (WACP), National Postgraduate Medical College (NPMC) and Master in Public Health students.

Prerequisites: Before using this case study, participants should have received lectures in basic epidemiology, outbreak investigation and biostatistics.

Materials needed: Computers with MS Excel or graph paper, calculators, flip charts and markers.

Level of training and associated public health activity: Novices who have little or no experience with outbreak investigation in a field setting.

Time required: 2-3 hours

Language: English

Participant Guide

Goal of Case Study: To simulate outbreak investigation of measles

Learning Objectives - After completion of this case study, the participants should be able to:

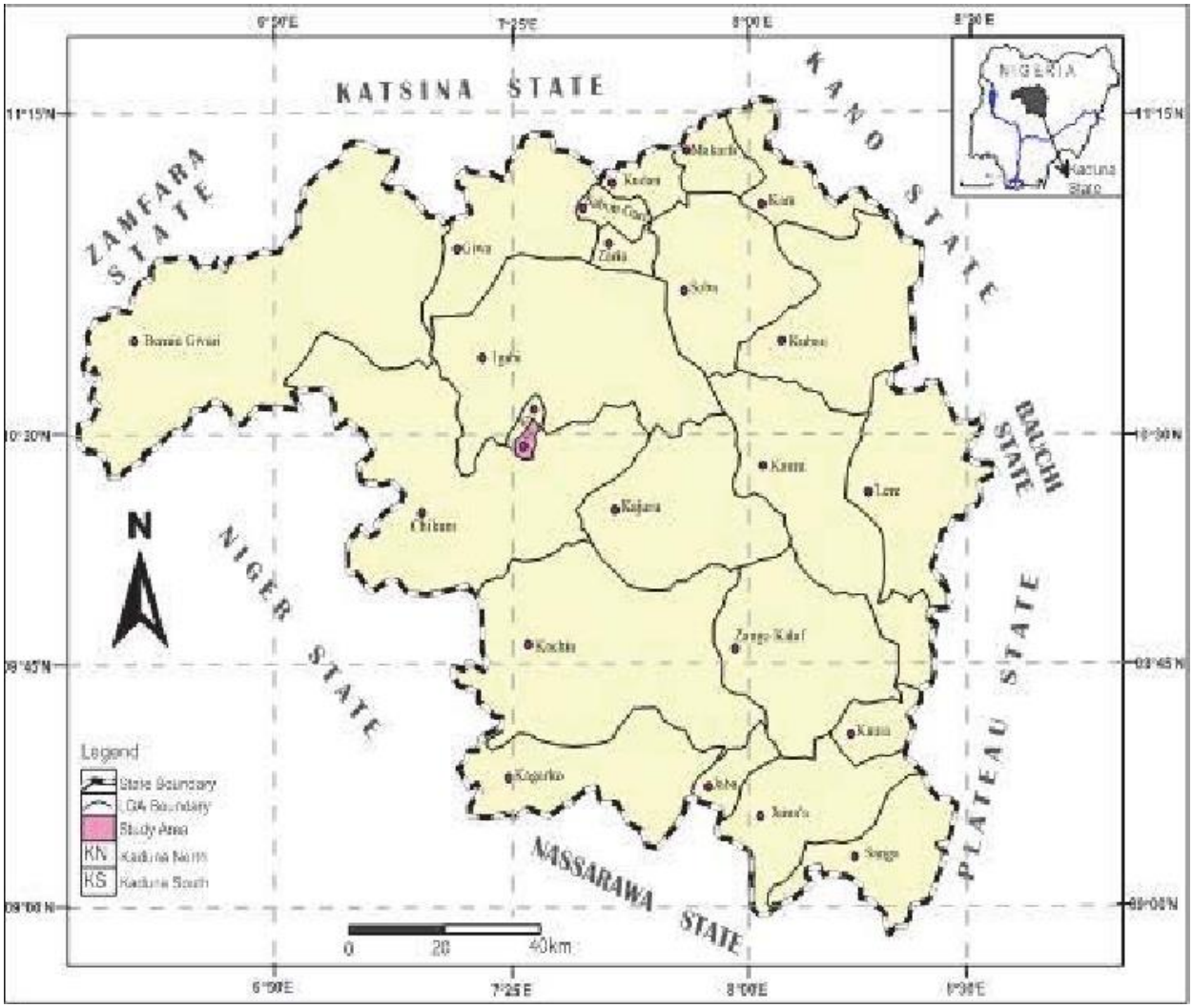
1. Identify the existence or presence of an outbreak
2. Prepare for an outbreak investigation
3. Create an outbreak case definition
4. List the steps in an outbreak investigation
5. Analyze outbreak data in person and time
6. Calculate and interpret odds ratio
7. Describe prevention and control measures in a measles outbreak
8. Describe the content of an outbreak investigation report

Introduction

Community X is located in Igabi Local Government Area (LGA) of the Nigerian state of Kaduna. Igabi LGA is bordered to the North by Giwa and Zaria LGA, to the East by Soba LGA, to the South by Chikun and Kaduna North LGA and to the West by Birnin Gwari LGA. [Figure 1] Igabi LGA is located in the central senatorial district; it has 12 wards that make up the LGA. Community X has a population of about 430,000. [1] The people are predominantly farmers and traders. There is poor infrastructure and lack of basic amenities. There are few health centres that provide health services in the ward.

Measles is a highly contagious communicable disease. Children are at high risk of developing the disease. [2] In Nigeria, there was progress in reduction of cases of measles in 2006 to 390 reported cases. However, with the inability to sustain gains of the 2006 elimination effort, there was a resurgence with 2,553 reported cases in 2012. [2] Kaduna state reported an outbreak of measles in 2013 with all LGAs affected.

Figure 1. Map of Kaduna state showing Igabi Local Government Area



Part 1

In 2014, there were reports of measles outbreaks in Kaduna state within neighboring LGAs to Igabi. On 10th February 2015, the Igabi LGA's Disease Surveillance and Notification Officer (DSNO) noticed reports of more than 5 cases of suspected measles coming from the Primary Health Care Centre in community X within a one-month period. He immediately informed the Kaduna state epidemiologist by a phone call.

Question 1. Is this an outbreak? Give reasons for your answer.

Question 2. How would you confirm the existence of an outbreak of measles?

On 15th February 2015 the state epidemiologist mobilized the residents of the Nigerian Field Epidemiology and Laboratory Training Programme (NFELTP) to investigate the suspected outbreak.

Question 3. How would you prepare for the field to investigate the outbreak?

Question 4. Who will make up members of your team? Justify your answer.

Question 5. List the steps in an outbreak investigation.

The team arrived at Kaduna state on 15th February 2015. The team was briefed by the state epidemiologist that children in Igabi LGA have been reported to have the following symptoms: fever, maculopapular rash while some also have coryza and/or conjunctivitis. The investigating team then proceeded to Igabi LGA. The LGA DSNO of Igabi LGA informed them there have been 6 additional cases reported since his last report. He also took the team to community X.

Question 6. What additional information would you want the LGA DSNO to share with you?

Question 7. Based on the symptoms given, create a working case definition for measles (suspect, probable and confirmed).

On arrival on the field the team collected a line list from the Igabi LGA DSNO and conducted an active case search. The original line list included 15 cases and the team identified an additional 30 cases from the community. The full line list is shown in Table 1. The team also took blood samples and sent those to the referral laboratory in the Northwest for confirmation of the outbreak.

Table 1. Line list of cases of measles in community X, Igabi LGA, Kaduna state

S/No	Date of onset	Age in months	Fever*	Rash*	Coryza*	Conjuctivitis*	Vaccination status
1	30/01/2015	8	1	1	2	1	Not vaccinated
2	6/02/2015	9	1	1	2	1	Not vaccinated
3	6/02/2015	10	1	1	2	1	Vaccinated
4	8/02/2015	11	1	1	2	1	Vaccinated
5	8/02/2015	10	1	1	1	1	Not vaccinated
6	8/02/2015	60	1	1	2	1	Vaccinated
7	9/02/2015	62	1	1	1	2	Vaccinated
8	9/02/2015	64	1	1	2	1	Vaccinated
9	9/02/2015	62	1	1	2	2	Vaccinated
10	9/02/2015	61	1	1	2	1	Vaccinated
11	9/02/2015	10	1	1	2	2	Not vaccinated
12	9/02/2015	8	1	1	1	1	Vaccinated
13	10/02/2015	12	1	1	2	1	Not vaccinated
14	10/02/2015	59	1	1	2	2	Not vaccinated
15	10/02/2015	54	1	1	2	1	Not vaccinated
16	10/02/2015	13	1	1	2	2	Not vaccinated
17	11/02/2015	58	1	1	2	1	Not vaccinated
18	11/02/2015	50	1	1	1	2	Not vaccinated
19	11/02/2015	48	1	1	1	1	Not vaccinated

S/No	Date of onset	Age in months	Fever*	Rash*	Coryza*	Conjuctivitis*	Vaccination status
20	11/02/2015	55	1	1	1	2	Not vaccinated
21	11/02/2015	12	1	1	1	1	Not vaccinated
22	11/02/2015	49	1	1	1	1	Not vaccinated
23	12/02/2015	13	1	1	1	2	Not vaccinated
24	12/02/2015	16	1	1	1	2	Not vaccinated
25	12/02/2015	46	1	1	2	1	Not vaccinated
26	12/02/2015	13	1	1	2	2	Not vaccinated
27	12/02/2015	35	1	1	1	2	Not vaccinated
28	12/02/2015	12	1	1	2	1	Not vaccinated
29	12/02/2015	12	1	1	2	2	Not vaccinated
30	13/02/2015	13	1	1	1	2	Not vaccinated
31	13/02/2015	14	1	1	2	2	Not vaccinated
32	13/02/2015	51	1	1	2	2	Not vaccinated
33	13/02/2015	14	1	1	2	2	Not vaccinated
34	13/02/2015	53	1	1	1	2	Not vaccinated
35	13/02/2015	40	1	1	2	1	Not vaccinated
36	13/02/2015	16	1	1	1	2	Not vaccinated
37	13/02/2015	50	1	1	2	1	Not vaccinated
38	14/02/2015	56	1	1	2	2	Not vaccinated
39	14/02/2015	32	1	1	2	1	Not vaccinated
40	14/02/2015	40	1	1	2	2	Not vaccinated
41	14/02/2015	42	1	1	1	1	Not vaccinated

S/No	Date of onset	Age in months	Fever*	Rash*	Coryza*	Conjuctivitis*	Vaccination status
42	14/02/2015	29	1	1	2	1	Not vaccinated
43	14/02/2015	36	1	1	2	1	Not vaccinated
44	15/02/2015	30	1	1	1	1	Not vaccinated
45	15/02/2015	32	1	1	2	2	Not vaccinated

*1 = Yes, 2= No

Question 8. Using the line list provided in Table 1, complete the table below showing the frequency distribution of cases by age groups.

Age (months)	Frequency	Percentage %
<9 months		
9-11 months		
12-59 months		
>59 months		
Total		

Question 9. Draw an epidemic curve using the line list provided in Table 1.

Part 2

The investigating team conducted a case-control study to determine risk factors for the outbreak of measles. They selected controls from the neighborhood of the cases using a 1:1 ratio for cases to controls. They defined a case as any child with fever and maculopapular generalised rash and cough, coryza or conjunctivitis (red eyes) in community X from 20th January to 25th February. A control was defined as any child without fever and maculopapular rash or cough, coryza and conjunctivitis in community X. They considered several risk factors for measles, including vaccination status, environmental factors like overcrowding, and contact with a suspected case of measles.

From interviewing the caregivers of the children, they found out that only 8 of the cases received measles vaccine compared to 24 of the controls. Thirty-three of the cases had history of contact with a suspected case of measles compared to 16 of the controls. Twenty-two of the cases had history of sleeping with more than 5 people in a room compared to 14 of the controls.

Question 10. Draw 2X2 tables to depict for each of the risk factors and calculate the corresponding odds ratio.

Question 11. Interpret the odds ratios calculated in the previous question.

Part 3

The investigators conducted sensitization and health education sessions in community X. They targeted caregivers of children and household heads in the community.

Question 12. Describe what prevention and control measures you would undertake in the community.

Question 13. Describe the process of rolling out prevention and control measures to the community.

The World Health Organization in collaboration with the Kaduna state Epidemiology Unit and the Igabi LGA health department conducted reactive immunization for measles in community X from 28th February to 10th March 2015. During the outbreak investigation there was an ongoing case management of symptoms and administration of vitamin A to those affected.

At the end of the investigation, the investigating team wrote a report of the outbreak of measles in community X and sent the report to the Kaduna state epidemiologist and the epidemiologist at the Epidemiology Division at the Federal Ministry of Health.

Question 14. Describe the contents of an outbreak investigation report.

Upon finalizing the outbreak response, the team convened a meeting to reflect on lessons learned during the outbreak.

Question 15. In your opinion, what went well and what did not go well in the outbreak investigation and response?

Conclusion

Measles is a highly contagious communicable disease that is vaccine preventable. The World Health Organization clinical definition for measles is any person with fever, maculopapular rash and cough, coryza and conjunctivitis. [4] Measles infection is confirmed by laboratory testing or epidemiological linkage to a confirmed case of measles. [1] Measles is a common due to low immunization coverage. The World Health Organization recommends vaccine coverage of at least 90% for reduction of measles morbidity and mortality. [2] Measles is spread by airborne droplet infection. The incubation period is 7-21 days and infection can be spread before the appearance of the characteristic rash. Persons at high risk of measles are those with vitamin A deficiency, malnutrition, and children living in crowded conditions. [4] Measles can be prevented by public education to encourage immunization with the measles vaccine. [1] Reactive vaccination was given in community A as a result of the outbreak. The outbreak was over in March 2015.

Background Reading

Measles in Heymann DL. Control of Communicable Disease Manual. 20th Edition, APHPA. 2015

Federal Ministry of Health Nigeria and WHO Nigeria. Guidelines for measles surveillance and outbreak response Nigeria. 2012

Competing Interests

The authors declare no competing interests.

Authors' Contributions

AAA, AAG and PN wrote the first draft, IIN, IUK and BO conducted the outbreak investigation, contributed to and reviewed the first draft, OA supervised the outbreak investigation and contributed to the draft. MMP, SK, JAF reviewed the first draft. All authors reviewed the final draft document.

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