The Pan African Medical Journal

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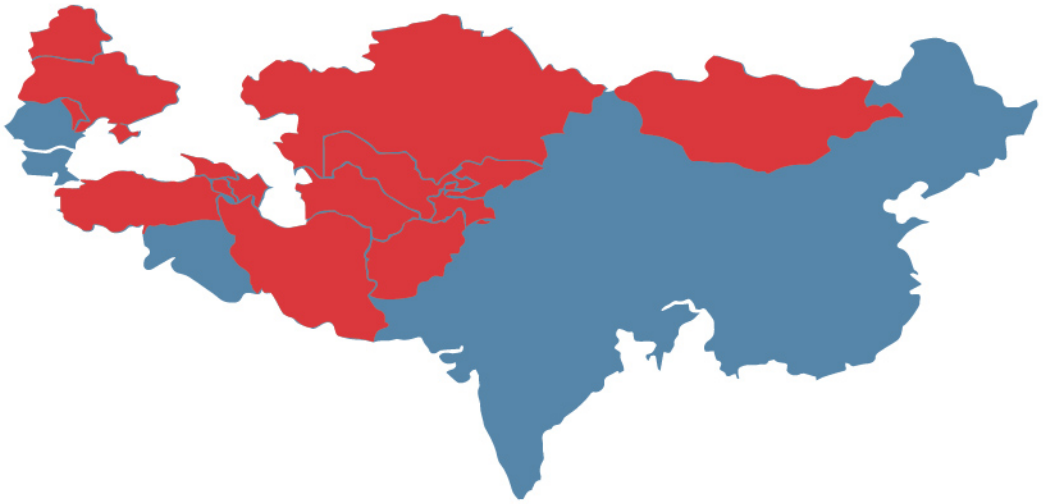
Learning from Practice: Public Health Teaching Case Studies from Eastern Europe and Central Asia



ISSN: 1937 – 8688

An Open Access Journal published by **The PAMJ**

EMPHNET
The Eastern Mediterranean Public Health Network

PanAfrican Medical Journal

Measles outbreak investigation in Female prison Herat province, Afghanistan April 2024

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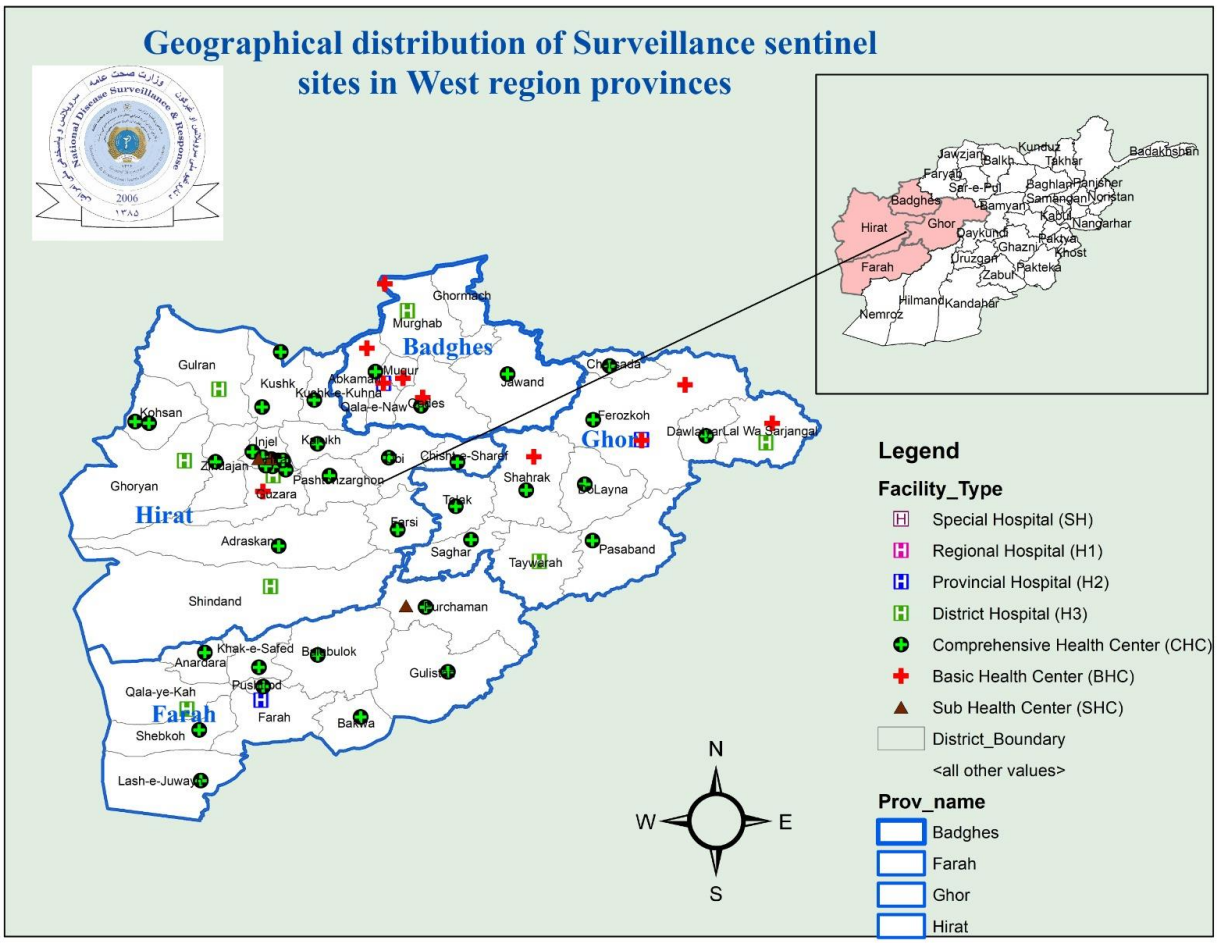
Overall Objective of Case Study

The overall objective of this case study is to equip fellows of field epidemiology knowledge and skills to effectively conduct, analyze, and interpret data from measles outbreaks in densely populated settings, such as camps and prisons.

Learning Objectives:

At the conclusion of the case study, participants will be able to:

1. Explain the Epidemiology of measles outbreak
2. Analyze data to understand the tables, curves and use Microsoft Excel to create an epidemic curve.
3. Describe the steps taken to investigate a measles outbreak
4. Understand the role of local and global health organizations in measles control.
5. Propose effective prevention and control measures for measles outbreaks.



Introduction

Measles is a viral disease that spreads quite easily. When an infected individual breathes, coughs, or sneezes, it can spread quickly. Severe illness, complications, and even death may result from it. Measles can affect anyone but is most common in children. After affecting the respiratory system, measles spreads to other parts of the body. A high temperature, cough, runny nose, and body-wide rash are among the symptoms.

The best defense against contracting the measles or infecting others is vaccination. Your body can fight off the infection with the help of the safe vaccine. Before the measles vaccine was developed in 1963 and became widely used, there were believed to be 2.6 million annual deaths from large epidemics that happened around every two to three years.

Notwithstanding the availability of a reliable and affordable vaccination, a projected 128 000 persons died from measles in 2021, the majority of them were children under the age of five.

56 million deaths were successfully avoided between 2000 and 2021 thanks to increased vaccination campaigns carried out by nations, the World Health Organization, the Measles & Rubella Partnership (previously the Measles & Rubella Initiative), and other international partners. Measles deaths were reduced by vaccination from 761 000 in 2000 to 128 000 in 2021[1].

In 2023, 25,940 cases with 64 deaths have been identified by the surveillance system in Afghanistan. While in the western region, 744 measles cases with 3 death cases have been reported [2].

Communicable diseases such as measles spreads very quickly in closed areas such as camps and prisons. Because there is less space and closed contacts among the member's special prison. Herat province, with a population of about 4 million people is in western of Afghanistan and its female prison is in the central of city with 320 prisoners including 79 children and 241 females.

Question 1. What is the main mode of transmission for measles, and why is it so easily spread in confined settings like prisons?

Question 2. What role does vaccination play in controlling the spread of measles, and how effective has it been globally?

Question 3. What was the estimated annual number of measles deaths before the vaccine was introduced in 1963?

Question 4. What was the number of reported measles cases and deaths in Afghanistan in 2023, and how does it compare to the western region specifically?

Question 5. Why are children particularly vulnerable to measles, and how does the disease typically progress in their bodies?

Question 6. How can surveillance systems help control outbreaks like the one in Afghanistan, and what role do organizations like WHO play in such efforts?

Question 7. What are the implications of measles outbreaks in confined areas like the Herat female prison, and what measures can be taken to prevent future outbreaks?

Part 1. Story

On 31st March 2024 at 1:30 PM National Disease Surveillance Response (NDSR) of Herat province received a report of suspected measles cases by OPD doctor from female Herat prison. On time this issue was shared with emergency preparedness response committee and other stakeholders.

Next day one epidemiologist, one medical doctor and one lab technician (female staff team) assigned to investigate and response to this outbreak. when team arrived at the mention area they had a short meeting with health staff of prison. Subsequently according to case definition of surveillance(case-patient as a person with an acute febrile rash illness and either a laboratory confirmation of a measles infection or a direct epidemiologic linkage to another laboratory-confirmed case-patient)10 suspected cases were detected with signs and symptoms such as fever, cough, rash, runny nose and kolpik spot then Isolated them in a separate and room. Also, five blood specimens were collected and sent to Herat Regional Reference laboratory (HRRL) and the result of all of them were later reported positive. Measles-specific immunoglobulin M (IgM) was detected in the laboratory using enzyme immunoassays (EIA) or measles viral RNA was detected using RT-PCR and defined maximum 2 incubation period until 11th May 2024 [3]. Due to shortage and ineffective dugs in the female prison one of them become complicated and referred to Herat regional hospital for advanced treatment. It is mentionable NDSR department coordinated with WHO and received two pneumonia kits and submitted it to health staff of female prison for treatment of cases. Based on the research conducted in the prison, 23% of the children had received both measles vaccination rounds, while 22% had received only one dose. Notably, 55% of the children were unvaccinated. Following the completion of two incubation periods from the last reported measles case, a comprehensive vaccination campaign was conducted in the Female this prison by the immunization (EPI) team. As a result, all the children were successfully vaccinated against measles.

Question 8. Who was Involved in investigating an Outbreak in a prison?

Question 9. What are the Benefits of early outbreak detection?

Question 10. What is the case definition of measles used in the investigation?

Question 11. What diagnostic methods were used to confirm the presence of measles in the collected blood samples?

Question 12. What impact did the two incubation periods and the subsequent vaccination campaign have on the measles transmission risk in the Female Herat Prison, considering the high percentage of unvaccinated children before the intervention?

Question 13. What is the (EPI), and what role does it play in controlling measles outbreaks, particularly in high-risk settings like prisons?

Part 2. Methods:

According to the guidelines of WHO there ten steps for outbreak investigation:

1.Detect and confirm the outbreak and agent

2. Rapid Response Team (RRT)

3. Define cases

4. Identify cases and obtain information

5. Descriptive epidemiological investigation (time, place, person)

6. Additional studies (environmental, risk assessments, laboratory)

7. Interview cases and generate hypotheses

8. Evaluate the hypotheses

9. Inform risk managers and implement control measures

10. Communicate findings, make recommendations and evaluate the outbreak response. [4]

Considering above steps, we investigated our measles outbreak in Herat female prison.

Question 14. What was the outcome for the patients with complications due to the measles outbreak?

Question 15. How did the NDSR department respond to the shortage of medical supplies in the prison?

Question 16. What was the defined maximum incubation period for the measles cases, and how long was surveillance extended?

Part 3. Results:

From 320 prisoner 10 cases infected with measles of who 5 (50%)were male (4 is under 5 years old and 1 is over five years old), 5 (50%)females (2 is under 5 years old and 3 is over five years old) Median age of cases was (3 year),and interquartile range (IQR) of (9 year) the case age range between (2month-20 year), and attack rate was (3.1%). This outbreak occurred in female Herat prison that started on 25th March 2024 and the peak of this outbreak was on 27th March 2024. Five blood specimens were collected the HRRB reported that IgG and IgM of them were positive.

Table: Signs and Symptoms of investigated cases

Signs and Symptoms	Cases	Percentage
Fever	10	100%
Runny nose	9	90%
Maculopapular rash	10	100%
Cough	8	80%
Koplik spot	9	90%

Question 17. What was the attack rate of measles in the Female Herat Prison outbreak, and how is it calculated?

Question 18. What was the age distribution of the measles cases, and what does the IQR (Interquartile Range) indicate about the outbreak?

Question 19. What were the most common clinical signs and symptoms observed in measles cases, and how prevalent were they?

Case ID	Age	Age Unit	Sex	Province	Region	Health Facility	date of onset		
1	03	Year	Male	Herat	West	femal prison	26	3	2024
2	01	Year	Male	Herat	West	femal prison	27	3	2024
3	20	Year	Female	Herat	West	femal prison	27	3	2024
4	07	Month	Female	Herat	West	femal prison	30	3	2024
5	10	Month	Male	Herat	West	femal prison	29	3	2024
6	05	Year	Female	Herat	West	femal prison	28	3	2024
7	10	Year	Female	Herat	West	femal prison	28	3	2024
8	03	Year	Female	Herat	West	femal prison	26	3	2024
9	10	Year	Male	Herat	West	femal prison	25	3	2024
10	3	Year	Male	Herat	West	femal prison	27	3	2024

Question 20. Can you show the sex distribution by pie chart and age distribution by bar chart from information above?

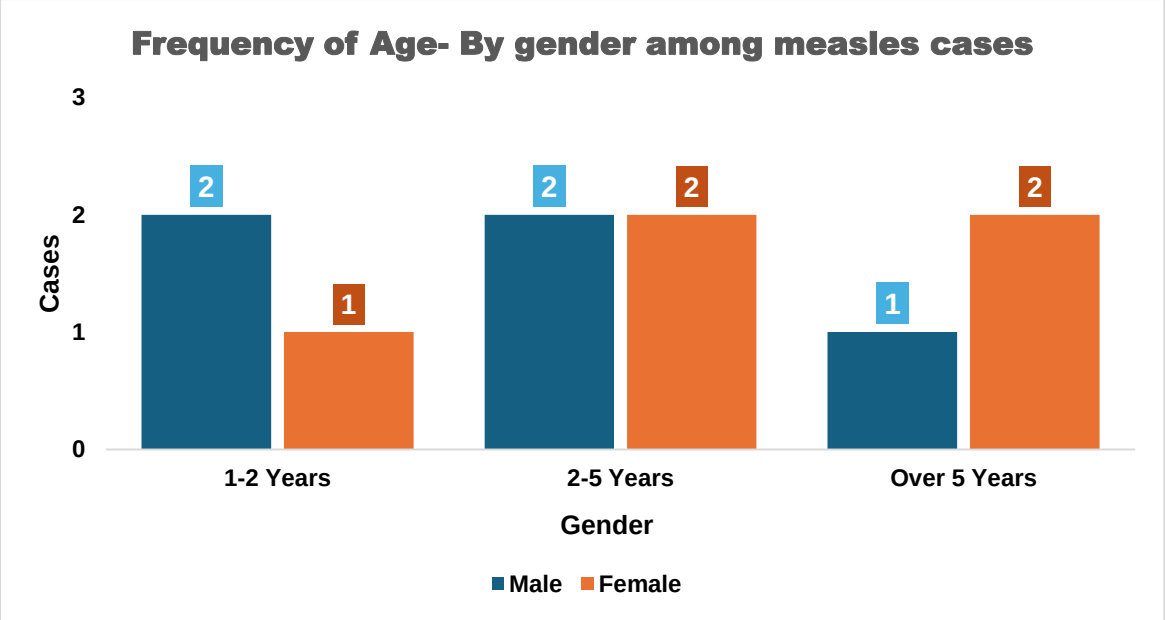


Figure1: Frequency of Age- By gender among measles cases

Question 21. Can you construct the epidemic curve (epi-curve) of the measles outbreak based on the information provided above?

Part 4. Discussion:

The result of this outbreak shows male, and female is equal. The most common signs and symptoms are fever and rash 100% was available in all cases. The data show this outbreak.

happened among the children and probably had outside contacted of prison. It suggests that this agent of measles by someone had introduced from outside or was transmitted by any visitor in the prison. This outbreak needs further investigation because of the fact that their children live with their mothers, routine immunization in women's prisons needs to be increased.

Question 22. What evidence suggests that the measles outbreak in the Female Herat Prison might have been introduced from an external source?

Question 23. How does the equal distribution of measles cases between males and females in the outbreak inform public health interventions?

Question 24. What are the implications of children living with their mothers in prison for measles control, and what preventive measures could be implemented?

Part 5. Conclusion:

The measles outbreak in the female Herat prison serves as a critical reminder of the risks posed by infectious diseases in confined settings. By addressing immunization gaps and strengthening preventive measures, future outbreaks can be mitigated, protecting the health of inmates and their children.

Question 25. How can immunization gaps in confined settings, such as prisons, be identified and addressed to prevent future outbreaks of infectious diseases like measles?

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