Measle Outbreak investigation, Bale Zone, Oromia Region, Ethiopia

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Abstract

Purpose

Measles is still an important cause of childhood morbidity and mortality even in developed countries. It is a leading cause of vaccine-preventable deaths among young children. The Bale zone reported a measles outbreak on 1/15/2019. This study was conducted to describe the magnitude of the measles outbreak in the Bale Zone.

Methods

We conducted a descriptive cross-sectional study from September 20 to November 15, 2019, by reviewing the line lists of the cases. We checked the data for completeness and analyzed using epi-info version 7 and Microsoft Office Excel 2016.

Results

A total of 2753 measles cases with attack rate (AR) 201 per 100,000 population and 7 death (0.25% case fatality rate) were reported during this confirmed outbreak (all five samples positive for measles IgM test). Males (0.21%) and females (0.19%) were almost equally affected. The AR was 736 per 100,000 population among 9 months-4 years age groups followed by an age group less than 9 months (682 per 100,000 population). Most of the cases were unvaccinated (74.9%).

Conclusion

The majority of the cases were unvaccinated and 9 months to 4 years followed by less than 9 months of age groups. We recommend strengthening the routine immunization and surveillance to prevent the occurrence of the measles outbreak.

Introduction

Measles is an acute infectious disease caused by the *Morbillivirus* genus in the family of Paramyxoviridae. Transmission is via aerosolized droplets from person-to-person or by direct contact with the nasal and throat secretions of infected persons. When the measles virus is introduced to a non-immune population, nearly 100% of individuals will become infected and develop clinical illness[1], [2]. The incubation period is approximately 10–12 days from exposure to the onset of fever and other nonspecific symptoms and 14 days (with a range of 7–18 days), from exposure to the onset of rash. Measles can be transmitted from four days before rash onset (i.e., one to two days before fever onset) to four days after rash onset[3].

Measles is remaining a public health problem especially, for childhood morbidity and mortality. It contributes 8% to the under-five age group death worldwide [2]. According to the CDC report, estimated global measles morbidity and mortality have increased since 2017. Most of the measles-related deaths are in children under the age of 5 [4]. Measle contributes 2% for the under-five children's death in Ethiopia [3].

Measle is among the vaccine-preventable diseases. Newborns get passive immunity from the mothers and protected until 5 to 9 months of age [2]. When children are correctly administered 0.5 ml of potent measles vaccine subcutaneously, serologic studies have shown that seroconversion is 85% at 9 months and above 95% after 12 months of age [2], [3], [5]. Measles is highly contagious, so 95% of the population must be immunized to prevent outbreaks [4].

Ethiopia has established the National Immunization Programme in the 1980s and currently delivers service through static and outreach sites nationwide [3]. According to the administrative report, the measles coverage (MCV1) in Ethiopia was 94%, 93% and 88% in 2016, 2017 and 2018 respectively [6], [7]. The second opportunity for measles immunization is required to protect those children who have never been vaccinated and those who were vaccinated but did not develop immunity[3]. In Ethiopia, the MCV2 introduction was launched on 11 February 2019 at Wolenchety HC, Bosete Woreda of Oromia Region [8]. Despite the above effort conducted to achieve the measles elimination program by the government measles outbreak reported from the Bale zone on 1/15/2019. This study aimed to describe the magnitude of the measles outbreak by person, place and time.

Materials And Methods

Study setting

Bale zone is one of the zones of Oromia region found at the southeast Ethiopia 430km from Addis Ababa. The zone had a total population of 1,965,937 in 2019 and 18 Woreda and two towns. Geographically, 14% and 64% of the zone are highland and lowland respectively. In 2019 there are five Hospitals, 82 health centers and 381 health posts in the Bale Zone. All health facilities give measles immunization services.

Study design and population

We conducted a cross-sectional study design from September 20 to November 15, 2019. Study population was all measles cases reported during the outbreak period. Study subjects were all cases reported to the Bale Zone health Department during the outbreak period by the line list with complete data.

Source of data and analysis procedure

Data were collected by prepared extraction format from the line list. Demographic information such as age, sex, resident, and other information like date of onset, date of visit to health facilities, outcome, and

vaccination status were collected from the line list. Then, entered, checked for completeness and analyzed using Epi-Info7 and Microsoft Office Excel 2016.

Case definition

Confirmed measles case is suspected case with laboratory confirmation which is positive for IgM antibody or epidemiologically linked to confirmed cases in an outbreak[3].

Suspected measles case: Any person with fever and maculopapular generalized rash and cough, coryza or conjunctivitis (red eyes) OR any person in whom a clinician suspects measles [3].

Community case definition: Any person with rash and fever [3].

Results

A total of 2,753 measles cases with seven death were from the 13 districts and two towns of Bale Zone, Southeast Ethiopia. Sample was collected from five suspected measles cases from these three cases were positive for IgM test. Thus, others cases are epidemiologically linked and clinically compatible. The overall attack Rate (AR) and Case Fatality Rate (CFR) of the outbreak was 201 per 100,000 population and 0.25% respectively. Among the total measles cases 1478 (53.7%) were male and the attack rate was 212 and 189 per 100,000 population for male and female respectively.

Among the total cases 1416 (51.4%) were 9months-4year aged children with attack rate 736 per 100,000 population and followed by the age groups 5-15years 673 (24.4%) with attack rate 157 per 100,000 population. However, the attack rate of age groups less than 9months aged were 682 per 100,000 population. (Table 1). From the total reported cases, 1835(66.7%) cases were unvaccinated, 226 (2.8%) illegible and 6.7% unknown vaccination status for measles vaccination.

Table 1

Distribution of measles cases by age groups Bale Zone, Oromia Region, Ethiopia, September 20 to November 15, 2019.

Age groups	Number of cases	Death	Population	AR per 100,000	CFR%
Less than 9 months	226	1	33112	682	0.44
9months-4 years	1416	1	192274	736	0.071
5-15 years	673	4	427,640	157	0.59
Greater than 15 years	439	1	718,630	61	0.23

The measles cases reported from 13 districts and two towns of Bale Zone. Among all cases 1103 (40.1%) reported from Gindhir districts followed by 364 (13.2%) cases reported from Gindhir town. The Attack Rate was 1296 per 100,000 population at Gindhir town followed by the 655 per 100,000 population at Gindhir district (Figure 1). The index cases were developing the signs and symptoms on 11/20/2018 and

seen at health facility after three days in Gindhir district. The district health office notifies the cases to the next level on 1/15/2019. The outbreak was rises gradually with multiple peaks and reach the highest peak on 2/12/2019 and start to decline with up and down. The team deployed to the field for the intervention after one month of the case notification by the district health office (Figure 2).

Discussion

This study was conducted to describe the magnitude of the measles outbreak in the Bale Zone, Southeast Ethiopia. The measles Outbreak was confirmed after sample collected from five suspected cases and all were positive for the IgM antibodies test. The other cases were epidemiologically linked and clinically suitable.

The overall attack rate (AR) of this outbreak was 201 per 100,000 population. This finding was higher than the measles outbreak investigations conducted in Simada district, Amhara region (41/100,000) [9], Artuma Fursi district, Amhara region (11.8/100,000)[10] and Guji Zone, Oromia region (81/100,000)[11]. This may be due to the delayed response to the outbreak and high susceptible population which may have contributed to the faster spread of measles infection. However, the attack rate of this outbreak is lower than the measles outbreak investigation studies conducted in Sekota-zuria district, Amhara region[12], Jarar zone, Somali region[13], Kaffa zone, SNNP Regional state[14],and Kebridar town, Somali region[15]. The case fatality rate of this outbreak was 0.25%. This finding is almost consistent with the studies conducted in Guji Zone, Oromia regiion[11] and Kaffa zone, SNNP Regional state[14]. However, lower than the studies conducted in the Artuma Fursi district, Amhara region (11.8/100,000)[10], Simada district, Amhara region (41/100,000)[9] and Jarar zone, Somali region[13]. This may be due to well case management in this measles outbreak or there might be unreported community death.

This measles outbreak was almost equally affected both males and females with an attack rate of 0.2% and 0.3% respectively. This finding is consistent with the measles outbreak investigation studies conducted in Guji Zone, Oromia regiion[11], Jarar zone, Somali region[13], Simada district, Amhara region (41/100,000)[9], Sekota-zuria district, Amhara region[12] and Kaffa zone, SNNP Regional state[14]. This finding implies both sexes almost equally affected by measles infection.

The other important finding of this study is the attack rate among age groups. The highest attack rate (736/100,000 population) was observed among the age group 9month to 4years followed by the age group less than 9months age (682/100,000 population) which is ineligible for the measles vaccination. This finding consistent with the study conducted in the Northwest Zone of Tigray region which showed that infants less than 9months were affected by the measles infection [16]. This finding creates concern for the policymakers about the age groups at which the measles vaccine should be starting.

The finding of this study indicates that the cases were lately notified by the district health office to the next level. Additionally, the team deployed to the field after a month of the notification of the cases by the district. This finding indicated that a weak surveillance system in the district at each level starting from the health facility to health office.

Most of the cases were unvaccinated (74.9%). This finding was similar to studies conducted in Sekotazuria district, Amhara region[12], Jarar zone, Somali region [13], Guji Zone, Oromia region[11], Kaffa zone, SNNP Regional state [14]. Our finding indicates that there is an unvaccinated individual which increases the risk of measles outbreak. This finding implies that there should be strengthened immunization coverage.

Abbreviations

AR
Attack Rate
CDC
Communicable Disease Control
CFR
Case Fatality Rate
MCV
Measle Vaccination Rate.

Declarations

Ethical approval

Since we used secondary data ethical clearance was not mandatory but we had obtained relevant supportive letter from Bale Zone Health Department Office with reference number EFGB/14463.

Consent for publication

Not applicable

Data availability

The data supporting our findings are available from the corresponding author upon request.

License for Publication

Not applicable

Competing interests

None declared

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Figures

Figure 1

Distribution of measles cases by districts, Bale Zone, Oromia Region, Ethiopia, September 20 to November 15, 2019.

Figure 2

Distribution of measles cases by date of sign and symptoms onset, Bale Zone, Oromia Region, Ethiopia, September 20 to November 15, 2019.