International Journal of Community Medicine and Public Health
Ali AM et al. Int J Community Med Public Health. 2021 Nov;8(11):5179-5183
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20214246

Original Research Article

The risk factors of measles outbreak in Dollo zone Somali region, Ethiopia

Abdisalan M. Ali [1]*, Mohammed A. Maalin[2]

[1]Surveillance Officer, [2]Regional coordinator, World Health Organization, Somali region, Ethiopia

Received: 25 August 2021
Revised: 05 October 2021
Accepted: 08 October 2021

***Correspondence:**
Abdisalan M. Ali,
E-mail: aflax571@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Measles is a highly contagious acute viral illness with the possibility of severe and dangerous complications. Measles occurrence is related to urbanization because of high entry of migrants and high population density; cities have become important hubs for the spread of infectious diseases. The African region is a crucial player in the global fight against measles and has made tremendous progress in its effort to immunize children and to control the disease. Despite the accessibility of safe and cost-effective vaccine, measles has remained endemic with persistent periodic outbreaks in the horn of Africa.
Methods: We reviewed the measles cases line lists in Dollo zone from January 2017 to March 2018. There was a total of 771-line listed cases in 2017 and 326 line-listed in 2018. Measles case investigations on alerts were also reviewed when there is an alert rumors verification case investigation done. The line list included variables on vaccination status, age, sex, treatment modality, date of onset the rash, date seen health facility, diagnosis, outcome (alive or dead), locations from place cases came from, contact history and travel history were reviewed.
Results: We found that the measles outbreak affected different age groups in Dollo zone and most affected age group were between the ages of 15 years to 30 years and most of the cases have no history of immunization.
Conclusions: The outbreak affected all age groups, which may show the continuous low routine immunization coverage over several years and the gathering of the susceptible population in the older age group that may have led to the current outbreak.

Keywords: Dollo, Ethiopia, Measles, Risk factors, Somali

INTRODUCTION

Measles is a highly contagious acute viral illness with the possibility of severe and dangerous complications.[1] Measles occurrence is related to urbanization because of high entry of migrants and high population density; cities have become important hubs for the spread of infectious diseases. Eleven countries including Ethiopia accounted for 66% of measles deaths in 2000.[2] However, regardless of efforts, measles outbreaks continue to occur even in countries which introduced measles mass vaccination as part of their national immunization programs, and globally an estimated 134,200 measles deaths were reported in 2015, mostly in low-income countries.[3] Measles has persisted as one of the vaccine-preventable diseases causing major mortality and morbidity in developing countries.[4] Several countries in sub-Saharan Africa, southern and central Asia have made enough progress to achieve Millennium Development Goal (MDG_4) Millennium Development Goals are eight goals which measurable targets and clear deadlines for improving the lives of most impoverished people leaders of 189 countries signed the historic millennium declaration at united nations submit in 2000 to meet this goal and eradicate poverty.[5] The African region is a key player in the global fight against measles and has made tremendous progress in its effort to immunize children and to control the disease.[6] Despite the accessibility of a

safe and cost-effective vaccine, measles has remained endemic with persistent periodic outbreaks in the horn of Africa.[7] The introduction of the measles enhanced control strategy, and mortality reduction goal has reduced mortality both developed and developing countries. In 2001, countries in the World Health Organization (WHO) African Region started applying the regional measles mortality reduction goal to reduce though increase of routine immunization, supplementary immunization, case-based surveillance and improving case management.[8]

In Ethiopia, the estimated measles incidence was 6.52 per 100,000 population in 2013 and 14.61 per 100,000 population in 2014.[9] During 2010 and 2011 there were 9756 measles cases reported.[10] Measles is a major cause of mortality in a complex emergency. Both a high vaccination coverage and high vaccine efficacy are required to prevent major epidemics of measles in complex emergencies.[11]

Countries with a high measles load and inadequate financial resources are challenged with difficult decisions related to measles control.[12] The use of supplemental immunization and routine immunization in a marginalized population requires social mobilization which can be expensive.[13,14]

In Ethiopia, about 1 million children were estimated to be unvaccinated, and 16% of the <5-year-old mortality has been attributed to vaccine-preventable diseases. Immunization is one of the national child survival strategies in the country the country targets is to achieve diphtheria-pertussis and tetanus (DPT_3)/measles vaccination coverage of 90%.[14]

Measles is one of Ethiopia's priority diseases under surveillance, and it is immediately reportable. A confirmed measles outbreak was reported from Ethiopia Somali region from February to March 2016, during which a rumor of suspected measles was reported from Dhagaxbur Hospital Jarar Zone Somali region. The zonal hospital for Somali Regional Health Bureau and partners departed to this site with the objective of confirming the existence outbreak through laboratory investigation initiating preventive measure and formulate appropriate recommendations based on the result of the investigation.[15]

The measles outbreak intensified and affected all age groups shifting to younger to older ages.[16] This study was aimed to find risk factors contributing to the measles outbreak in Dollo zone.

METHODS

Study area

The study was conducted in Dollo zone of the Somali region in Ethiopia. Dollo zone is the largest zone in the Somali region with an estimated population of 403,266 (Ethiopia Central Statistics Agency projection of 2018). The rural population is 86% and 85% lead a pastoral-nomadic lifestyle. Between 2016 and 2017 Dollo zone experienced an exceptional drought emergency mainly due to an underperforming rainy season. The subsequent years of drought lead to low yields in crops and pasture, and loss of livestock led to significant food insecurity which in turn led to high severe and moderate acute malnutrition in the population with <5-year-old children most affected. Furthermore, Dollo zone hosts internally displaced people with 48 sites with a total population of 89,694 which is at risk for outbreaks. The coverage of health and nutrition in Dollo zone insufficient and fails to meet the basic health care service. Admiratively the zone is divided into seven woredas, and all were affected by the measles outbreak.

Study design

We reviewed the measles cases line lists in Dollo zone from January 2017 to March 2018. There was a total of 771-line listed cases in 2017 and 326 line-listed in 2018. Measles case investigations on alerts were also reviewed, and also measles case-based surveillance from health facilities of Dollo zone were referred.

We reviewed the variables on the line list which included vaccination status, age, sex, treatment modality, date of onset the rash, date seen health facility, diagnosis, outcome (alive or dead), the location where the cases came from, contact history and travel history. Vaccination status of the woredas and zones were also reviewed the measles coverage in 2017.

The line lists and public health emergency management (PHEM) weekly report were cross-checked for completeness and consistency.

Laboratory investigations were done on 35 samples of first cases from three woredas, and they confirmed outbreak in the three districts of the zone. The samples were sent to the national measles laboratory. After confirming outbreak cases that were linked to confirmed cases within the district were considered as epidemiologically confirmed.

The Somali Regional Health Bureau formed a technical working group for the measles outbreak response, and the technical working group met daily. We reviewed the documents and presentations from the technical working group.

We reviewed the Health Management Information System (HMIS) data of the Somali region for the Expanded Program for Immunization (EPI) delivery service, and we also reviewed interventions done as long the outbreak going on the zone. There were several intervention activities done in the affected woredas of the zone, for example, mop-up vaccination, strengthened

surveillance activities, enhancing routine immunization, proper case management and proper referral system.

Data analysis

We used Microsoft Excel to analyze the different variables of the line lists like age, sex, vaccination history, treatment modality, contact history, travel history, specimen collected and the onset of rash.

RESULTS

Despite the limitation 86% of the line lists were complete, and 92% of variables were complete to provide a conclusion.

Table 1: Measles cases distribution with attack rate by woredas for Dollo zone, Somali region Ethiopia 2017.

Name of district	Number of cases	Total population	Attack rate/1000
Warder	301	43042	0.7
Lehelow-yucub	192	22000	0.87
Danot	172	46558	0.37
Galadi	31	126932	0.02
Bok	34	86774	0.04
Daratole	20	31346	0.06
Galhamur	21	46714	0.04
Total	771	403366	0.19

Warder woreda reported the largest number of cases, 301/771 (39%) of the total cases, 192/771 (25%) of the cases were reported from Lehelow-yucub woreda while the lowest number of cases were reported from Galhamur and Daratole woredas 21/771 (2.72%) and 20/771 (2.5%) respectively (Table 1).

Table 2: Laboratory confirmed cases by woredas for Dollo zone, Somali region Ethiopia 2017.

Name of district	Number of sample collected	Number of cases IgM confirmed	Percentage
Danot	10	6	60
Daratole	5	4	80
Warder	20	12	60
Total	35	24	68.6

Warder Woreda reported 12/24 (50%) of the confirmed cases in Dollo zone, Danot woreda had 6/24 (25%) cases and Daratole woreda had 4/24 (17%) confirmed cases (Table 2).

A total of 1700/2682 (63.4%) children were vaccinated in the first quarter and second quarter 1633/2682 (61%) children were vaccinated. In 2017 the first and second quarter were better than a third and fourth quarter, and half of the children were unimmunized in 2017 (Table 3).

Table 3: Measles coverage for under one-year old children in routine for 2017 in Dollo zone, Somali region, Ethiopia.

Quarters of 2017	Number of <1 year old vaccinated	Target of <1-year old children	Coverage
I	1700	2682	63.4%
II	1633	2682	61%
III	1156	2682	43.1%
IV	1125	2682	42%
Total	5614	10728	52.3%

Danot woreda vaccinated the largest number of children 1191/1369 (87%) of the target children in Danot woreda while Warder Woreda vaccinated the lowest number of children 409/1265 (32%) of the target children in Warder Woreda (Table 4).

Table 4: Measles coverage under one-year old children by woredas in 2017 Dollo zone, Somali region Ethiopia.

Name of district	Number of <1 year old vaccinated	Target of <1-year old children	Measles coverage
Bok	1350	2551	53%
Danot	1191	1369	87%
Daratole	467	922	51%
Warder	409	1265	32%
Galadi	1961	3732	53%
Total	5378	9839	55%

The age group, 15 years to 30 years, was most affected with 464/1097 (42.3%) cases. The second most affected age group were 5 years to 14 years which was 324/1097 (29.5%) while the lowest affected cases were reported age above 30-year age group were 21/1097 (2%) (Figure 1).

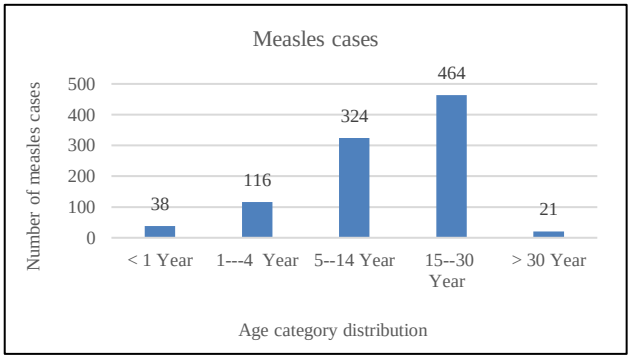

Figure 1: Age group distribution of measles cases for Dollo zone, Somali region Ethiopia January 2017 to March 2018.

The largest number of cases 130/326 (40%) were reported from Warder woreda. The second largest number of cases were reported from Danot woreda which is 107/326

(33%) cases while least woreda was Daratole and reported 4/326 cases (1.23%) (Figure 2).

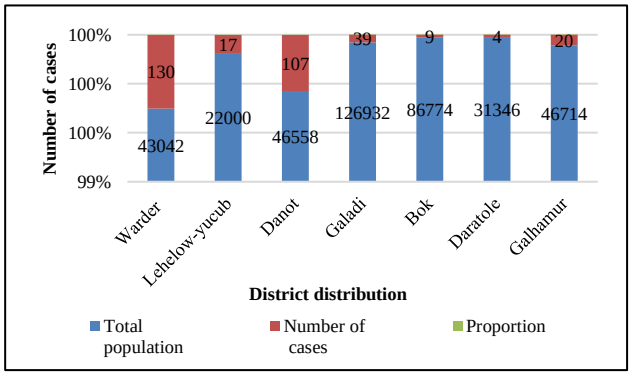

Figure 2: Measles cases distribution by district Dollo zone, Somali region, Ethiopia from January to March 2018.

In 2017 among the 771 measles cases the majority 552 (71.5%) were from internally displaced people (IDPs) while the cases from host communities were 220/771 (28.5%).

DISCUSSION

We found that measles outbreaks were commonest in IDPs as they are susceptible and had a high population density that resulted in an increased risk of measles transmission and measles outbreaks. IDPs are circumstances characterized by inadequate or no vaccination of the displaced populations before their coming into the refugee camps.[17,18] In our review, we found that Dollo zone had a low routine immunization coverage of 52.3% in 2017 which made it vulnerable to a measles outbreak and most of the IDPs had no history of vaccination.

We found that the samples collected from Dollo zone in 2017and sent national laboratory confirmed the measles outbreak in Dollo zone similarly samples collected from Amara Region confirmed the measles outbreak from 2004 through 2014.[7]

We also found that the measles outbreak affected different age groups in Dollo zone and the most affected people were aged between 15 years and 30 years and most of the cases had no history of vaccination. A high percentage of unvaccinated children were affected by this outbreak. Being unvaccinated against measles was a risk factor for contracting measles in Zaka district Zimbabwe.[19] The outbreak affected all age groups, which may show continuous low routine vaccine coverage over several years and the gathering of the susceptible population in the older age groups that may have led to the current outbreak.[8,20]

We also found low awareness of the community for routine immunization. Awareness of the community for the immunization program increases the knowledge of mothers to bring health facilities to vaccine their children. Community conversation awareness is one of the strategies for social mobilization through creating a dialogue among a community member targeting at raising awareness and behavioral change.[21,22]

We realized that cases were increasing and expanded to all kebeles of the districts in Dollo zone along the year and measles cases were reported most of the settlements similarly a review on measles situation in Ethiopia in past and present in 2003 showed that the number of measles cases reported were increased along that year.[16]

We also found that cases delayed to come health facilities for management, there was a time gap between the date seen at health facilities and date of disease onset and diseases spread and develops complications in the community.[9]

We recognize the limitation of incomplete of line lists and incomplete of variables in the line list, and some of the weeks there were no reports. Also, variables like the status of vaccination history were not complete in the line lists.

CONCLUSION

Dollo zone is at a high in risk of subsequent outbreaks with regards to continue transmission in all age group; low routine immunizations almost of the half of the children were unimmunized in 2017. We recommend conducting mass measles vaccination campaign that targets 6 months to 30 years old, to strengthen and increase routine immunization service, to enhance and increase on community awareness of routine immunization and strengthen surveillance detection in health facilities and community.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee Somali regional health bureau

REFERENCES

1. Sartorius B, Cohen C, Chirwa T, Ntshoe G, Puren A, Hofman K. Identifying High Risk Areas for Sporadic Measles Outbreaks: Lessons from South Africa. Bull World Health Organ. 2013;91(3):174-83.
2. Mersha AM, Braka F, Gallagher K, Tegegne AA, Argay AK, Mekonnen MA, et al. Measles burden in urban settings: characteristics of measles cases in Addis Ababa city administration, Ethiopia, 2004-2014. Pan Afr Med J. 2017;27(2):11.
3. Tramuto F, Maida CM, Pojero F, Colomba GME, Casuccio A, Restivo V, et al. Case-based surveillance of measles in Sicily during 2012-2017:

The changing molecular epidemiology and implications for vaccine strategies. PLoS One. 2018;13(4):1-14.
4. Getahun M, Beyene B, Ademe A, Teshome B, Tefera M, Afework A, et al. Epidemiology of laboratory confirmed measles virus cases in the southern nations of Ethiopia, 2007-2014. BMC Infect Dis. 2017;17(1):1-8.
5. Deribew A, Tessema GA, Deribe K, Melaku YA, Lakew Y, Amare AT, et al. Trends, causes, and risk factors of mortality among children under 5 in Ethiopia, 1990-2013: findings from the Global Burden of Disease Study 2013. Popul Health Metr. 2016;14(1):42.
6. Manakongtreecheep K, Davis R. A review of measles control in Kenya, with focus on recent innovations. Pan Afr Med J. 2017;27(3):15.
7. Beyene B, Ademe A, Teshome B, Tefera M, Asha A, Afework A, et al. Epidemiology of laboratory confirmed measles virus cases in Amhara Regional State of Ethiopia, 2004-2014. BMC Infect Dis. 2016;16(1):133.
8. Belda K, Tegegne AA, Mersha AM, Bayenessagne MG, Hussein I, Bezabeh B. Measles outbreak investigation in Guji zone of Oromia Region, Ethiopia. Pan Afr Med J. 2017;27(2):9.
9. Endriyas M, Solomon T, Belayhun B, Mekonnen E. Poor quality data challenges conclusion and decision making: timely analysis of measles confirmed and suspected cases line list in Southern Nations Nationalities and People's Region, Ethiopia. BMC Infect Dis. 2018;18(1):77.
10. Donadeu M, Lightowlers MW, Fahrion AS, Kessels J, Abela-Ridder B. Weekly epidemiological record: relevé épidémiologique hebdomadaire. Week Epidemiol Rec. 2009;III(47):445-52.
11. Talley L, Salama P. Short report: assessing field vaccine efficacy for measles in famine-affected rural Ethiopia. Am J Trop Med Hyg. 2003;68(5):545-6.
12. Verguet S, Johri M, Morris SK, Gauvreau CL, Jha P, Jit M. Controlling measles using supplemental immunization activities: a mathematical model to inform optimal policy. Vaccine. 2015;33(10):1291-6.
13. Driessen J, Olson ZD, Jamison DT, Verguet S. Comparing the health and social protection effects of measles vaccination strategies in Ethiopia: An extended cost-effectiveness analysis. Soc Sci Med. 2015;139:115-22.
14. Portnoy A, Jit M, Helleringer S, Verguet S. Impact of measles supplementary immunization activities on reaching children missed by routine programs. Vaccine. 2018;36(1):170-8.
15. Mohammed Y, Alemu AN. Measles Outbreak Investigation and Response in Jarar Zone of Ethiopian Somali Regional State, Eastern Ethiopia. Int J Microbiol Res. 2017;8(3):86-91.
16. Belete Akalu H. Review on measles situation in Ethiopia; past and present. J Trop Dis. 2016;04(02):2-7.
17. Mbabazi WB, Tabu CW, Chemirmir C, Kisia J, Ali N, Corkum MG, et al. Innovations in communication technologies for measles supplemental immunization activities: lessons from Kenya measles vaccination campaign, November 2012. Health Policy Plan. 2015;30(5):638-44.
18. Kouadio IK, Kamigaki T, Oshitani H. Measles outbreaks in displaced populations: a review of transmission, morbidity and mortality associated factors. BMC Int Health Hum Rights. 2010;10:5. Available
19. Pomerai KW, Mudyiradima RF, Gombe NT. Measles outbreak investigation in Zaka, Masvingo Province, Zimbabwe, 2010. BMC Res Notes. 2012;5(1):1.
20. Kurchatova A, Krumova S, Vladimirova N, Nikolaeva-Glomb L, Stoyanova A, Kantardjiev T, et al. Preliminary findings indicate nosocomial transmission and Roma population as most affected group in ongoing measles B3 genotype outbreak in Bulgaria, March to August 2017. Eurosurveillance. 2017;22(36):1-6.
21. Lakew Y, Bekele A, Biadgilign S. Factors influencing full immunization coverage among 12-23 months of age children in Ethiopia: evidence from the national demographic and health survey in 2011. BMC Public Health. 2015;15:728.
22. Pulcini C, Massin S, Launay O, Verger P. Knowledge, attitudes, beliefs and practices of general practitioners towards measles and MMR vaccination in southeastern France in 2012. Clin Microbiol Infect. 2014;20(1):38-43.

Cite this article as: Ali AM, Maalin MA. The risk factors of measles outbreak in Dollo zone Somali region, Ethiopia. Int J Community Med Public Health 2021;8:5179-83.