Measles outbreak investigation in west Hararghie zone of Oromia region , Ethiopia ,2007

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Abstract

Background

This epidemic investigation was conducted in West Harargie zone of Oromia Region, Ethiopia. The zone had a total population of 1,900,412 in 2007. Measles catch-up SIAs were conducted in 2002 followed by 2 rounds of follow up SIAs in 2005 and 2007 (with 93% administrative coverage in both rounds). The measles routine immunization administrative coverage has shown an improvement from 34% in 2002 to 71% in 2007. With an improving surveillance system there was no adequate documentation of measles outbreaks and mortality due to measles throughout the country. This paper describes the findings of an investigation of a confirmed measles outbreak in this zone between WHO epidemiological weeks 2 and 29 of 2007

Methods

A household retrospective surveys was conducted in 7 Woreda of west Harargie zone of Oromia region from 1August to 3 September 2007. A house-to-house search for measles cases was conducted in each village of the 8 Woredas where the measles epidemic was reported (from January to June of 2007). Guardian of the cases (ascertained based on the WHO cases definition) were interviewed based on the questionnaire. Data was collected by trained health workers. The data was checked by WHO surveillance officer. EPI2000 and SPSS statistical packages were used for data analysis. The investigation team carried out a time, place and person analysis, and estimated the case fatality rate, X^2 test used whenever necessary.

Results

A total of 718 cases were identified and interviewed during the survey period; of which 54% are males and the same percentage is under age of five years old. 84.4 % of the cases were from 3 Woredas. Among the investigated patients, 579 (80.6%) were unvaccinated for measles, 96 (13.2 %) reported to have received at least one dose of measles vaccine. There were a total of 48 (6.7%) deaths and the cases fatality rate was highest between 12 and 23 months of age and in subjects older than 14 years. the case fatality rate is higher among the non vaccinated children.

Conclusions & recommendations

Despite availability of measles vaccine unvaccinated children are dying and the notification efficiency is still low. The routine surveillance system picks only fewer deaths than found by the outbreak investigation report. The surveillance system needs to be expanded up to community level and the outbreaks need to investigate appropriately and fully to document all cases and deaths. Late out break response immunization didn't help. Early Intensified routine and selective immunization might have a better result with lesser cost.

Introduction

Following the adoption of the measles mortality reduction goals in the African Region, Ethiopia implemented the strategies of improving routine immunization coverage, conducting supplemental immunization activities to provide a second opportunity for measles immunization, and established case based surveillance (1,2). Since 2002, when these strategies were first implemented, remarkable progress has been attained with measles control. However, the routine immunization and supplemental immunization coverage levels were not high enough to provide herd immunity to interrupt transmission of measles virus.

There was a big outbreak of measles in west Harargie zone in 2007 that lasted for around 26 weeks. West Harerghe is one of the 17 zones of Oromia Region, is administratively divided in 14 Woredas and had a total population of 1,900,412 in 2007(3,4). Measles catch-up SIAs was conducted in 2002 targeting children 6 months to 14 years of age and had a reported administrative coverage of 101%, followed by 2 rounds of follow up SIAs in 2005 and 2007 targeting children from 6 months to 59 months of age and had a 93% administrative coverage in both follow up SIA rounds. The measles vaccine routine immunization administrative coverage in West Harerghe has shown an improvement from 34% in 2002 to 71% in 2007(4). Despite the high SIA coverage and improving routine immunization we had a report of continued epidemic in different parts of the zone for which the magnitude and cause of the epidemic was not clearly described by the routine surveillance.

This community survey was to describe the magnitude and probable cause of the confirmed measles outbreak reported in West Harerghe zone between epidemiological weeks 2 and 29 in 2007.

Methodology

The Ethiopian measles surveillance guidelines define confirmed measles outbreaks as the occurrence of 3 lab confirmed measles cases reported from the same district or from the same catchment area of a health facility with onset of rash within a period of a month(4). Once an outbreak is confirmed, the additional collection of blood specimens is stopped and the concept of epidemiological linkage is used to confirm additional cases reported from the same district (or adjacent districts with plausibility of transmission) with onset of rash within 30 days. These cases are expected to be reported through a line listing as part of the outbreak investigation reports. Through a case based system we had 4 confirmed epidemics I 4 districts of West Harargie zone with a total reported cases of 117 and 24 of them were laboratory confirmed.

A retrospective, community-based outbreak investigation was conducted from August 1st to September 3rd 2007 in the 7 Woredas of West Harerghe zone (*Anchar, Chiro, Daro Lebu, Gemechis, Guba Koricha, and Habro).*

The investigation included interviews with the district health management teams, hospitals, health centers and communities and conducting discussions with the staff of the health institutions and community leaders. A house-to-house search for measles cases was conducted in each village of the Woredas where the measles epidemic was reported from January to June of 2007. All households were visited and were asked whether any household members had had

measles. In households in which a measles case was identified, patients (or guardians, in the case of children less than 10 years old) were interviewed after verbal consent was obtained, and a questionnaire was completed for each case that fulfill the WHO cases definition of measles(1,2) from 14 Jan to 30 July 2007 . The team collected information on age, address, date of onset, date of admission, immunization status, and the outcome of the illness within a month of onset of rash. Information on vaccination status was obtained from caretaker history as written documentation of vaccination history was not available for most cases.

Data collection was done by health workers and health extension workers who have training on measles surveillance under the supervision of WHO medical surveillance officer and got orientation on how to ascertain measles cases and deaths based on the case definitions and be able to fill the case investigation form correctly.

The outbreak had earlier been confirmed in each of the Woredas through the appropriate collection of specimens and laboratory testing which resulted in the finding of at least 3 measles IgM positive cases from each of the Woredas according to the African regional and national surveillance guidelines. (1, 2)

Definition of terms:

A suspected measles case was defined as illness characterized by fever, rash, and either cough, or coryza, or conjunctivitis, with rash onset in the period from January 14 to 30 July 2007 in the mentioned Woredas, and measles death was a death occurring within 30 days after rash onset in a measles patient(1,2).

The data analysis is solely from the cross sectional survey, EPI2000 and SPSS statistical packages were used for data analysis. The investigation team carried out a time, place and person analysis, and estimated the case fatality rate and X^2 statistical test was used when necessary.

Results

In the 2007 outbreak a total 718 cases of measles from 7 Woreda were investigated during the survey period, of which 53.9 % were male. The age of patients ranged from 3 months to 65 years (mean, 68 months and median 48 months)

Most of the cases are from 3 Woredas (Habro, Guba Koricha and Daro lebu) which accounts for 84.4 % of the entire cases table 2.

The epidemic started in the second epidemiologic week of 2007 and ends in the 29^{th} week, the peak was at the 10^{th} week, unlike many of the epidemics that occurred after the catch up campaigns, it was prolonged fig 2.

Among the investigated patients, 579 (80.6%) were unvaccinated for measles, 96 (13.2 %) reported to have received at least one dose of measles vaccine.

A total of 48 (6.7%) measles deaths were reported to have occurred within 30 days after rash onset. The mortality rate was highest between 12 and 23 months of age and in subjects older than 14 years. (table4). No significant difference by sex was observed in CFR ($X2=0.002$, $P>0.98$).

Vaccinated children are less likely to die than those who are unvaccinated and whose vaccination status is unknown. The case fatality is very high in those whose

vaccination status is unknown. Individuals who died with unknown vaccination status are young adults in the age group between 15-37 years, (table5)

Figure1: Spot map of measles cases East Harargie zone Oromia region, Ethiopia 2007

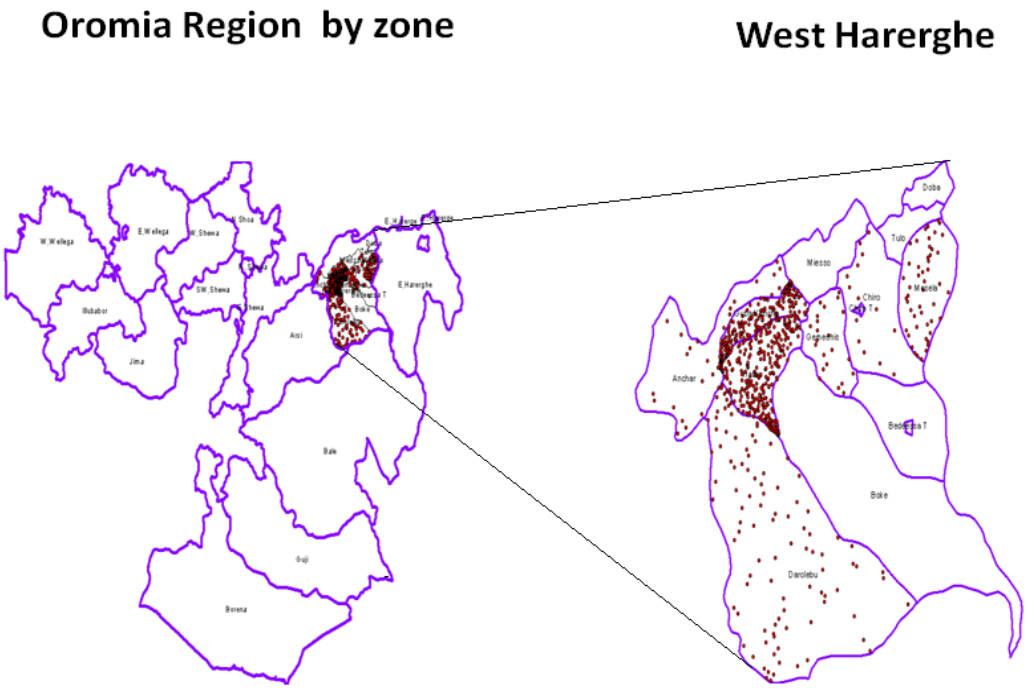

Table1: Age and vaccination status of measles cases. West Harargie, Oromia Region, Ethiopia. 2007

	Vaccination status							
	not vaccinated		1+ doses		unknown		Total	
Age group	No	%	No	%	No	%	No	%
0-11 month	61	92.40%	5	7.60%	0	0.00%	66	9.2%
12-59 months	267	82.90%	50	15.50%	5	1.60%	322	44.8%
5-9 years	142	73.20%	36	18.60%	16	8.20%	194	27.0%
10-14 years	70	79.50%	2	2.30%	16	18.20%	88	12.3%
15+ years	39	81.30%	3	6.30%	6	12.50%	48	6.7%
Total	579	80.60%	96	13.40%	43	6.00%	718	100.0%

Table 2: Distribution of measles cases and their outcome by Woreda, East Harargie zone Oromia region, Ethiopia 2007

	Alive		Died		Total	
Woredas	No	%	No	%	NO	%
Anchar	24	88.9%	3	11.1%	27	3.8%
Chiro	14	100.0%	0	0.0%	14	1.9%
Daro Lebu	89	87.3%	13	12.7%	102	14.2%
Gemechis	20	90.9%	2	9.1%	22	3.1%
Guba Koricha	215	98.2%	4	1.8%	219	30.5%
Habro	259	90.9%	26	9.1%	285	39.7%
Messela	49	100.0%	0	0.0%	49	6.8%
Total	**670**	93.3%	**48**	**6.7%**	718	100.0%

Figure2 : The epidemic curve that shows the trend of the epidemic in East Harargie zone of Oromia region Ethiopia, 2007, from survey data (N=718)

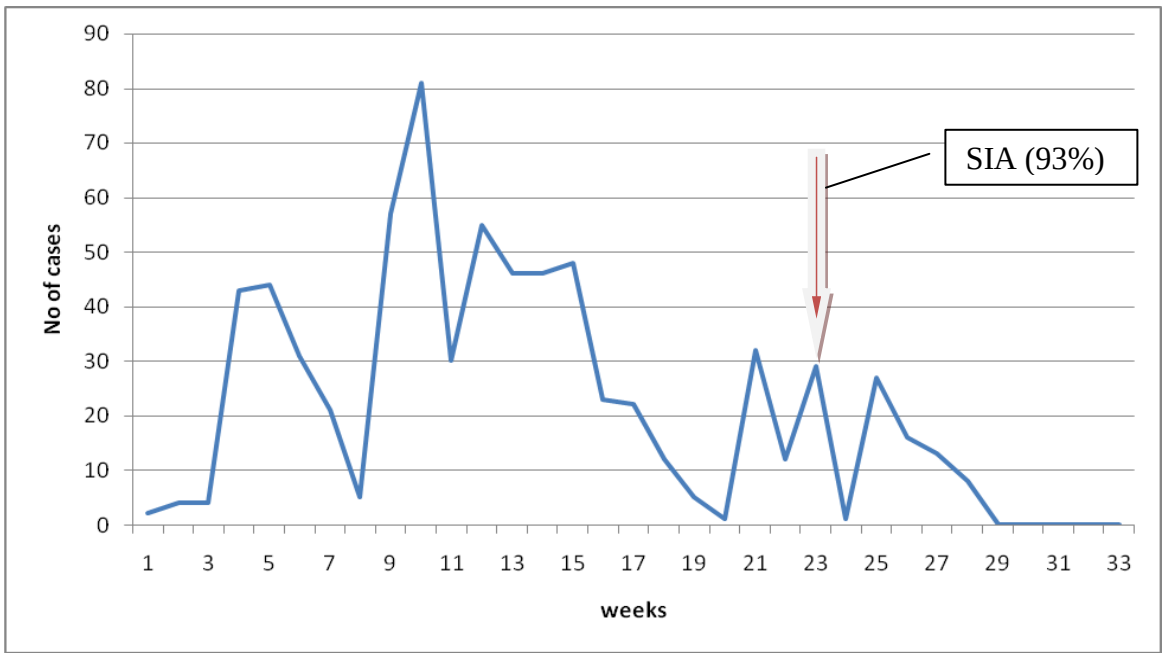

figure 3: Age by Vaccination status of measles cases. West Harargie zone, Oromia region, Ethiopia 2007.

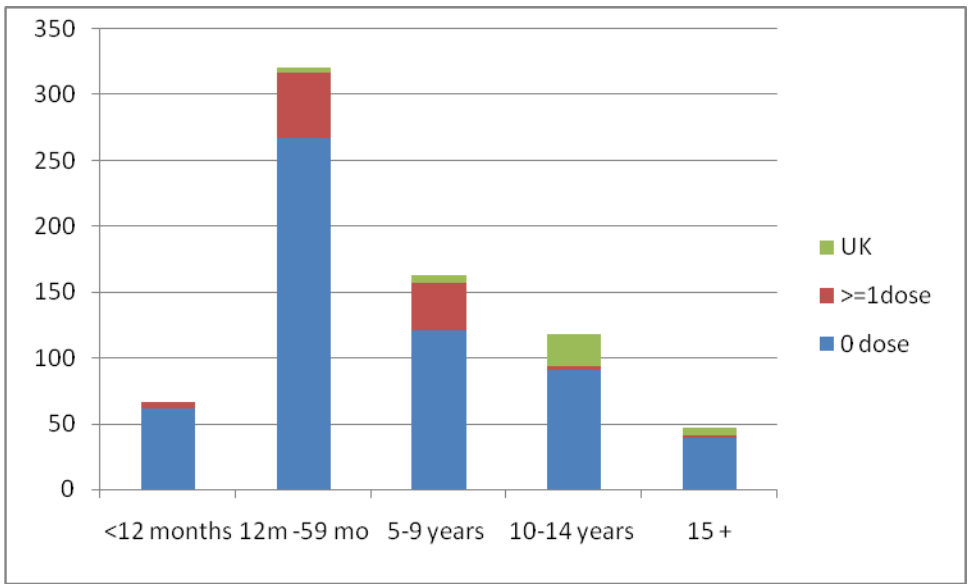

Table 4. Outcome of outbreak cases by age groups in west Harargie zone of Oromia region Ethiopia, 2007

	OUTCOME					
	Alive		Died		Total	
Age groups	No	%	No	% died	No	%
0 - 11 m	63	95.5%	3	4.50%	66	9.2%
12-23 m	82	86.3%	13	13.70%	95	13.2%
23-35 m	92	92.9%	7	7.10%	99	13.8%
36-59 m	117	91.4%	11	8.60%	128	17.8%
5-9 yrs	189	97.4%	5	2.60%	194	27.0%
10-14yrs	103	96.3%	4	3.70%	107	14.9%
15 + yrs	24	82.8%	5	17.20%	29	4.0%
Total	670	93.3%	48	6.70%	718	100.0%

Table5: Outcome of measles patients by reported vaccination status in West Harargie zone of Oromia Ethiopia 2007.

	OUTCOME					
	Alive		Died		Total	
Vaccine dose	No	%	No	% died	No	%
Unvaccinated	541	93.4%	38	6.60%	579	81.0%
1 or more doses	95	100.0%	1	1.10%	95	13.3%
Unknown / missing	31	77.5%	9	22.50%	40	5.6%
Total	**667**	93.3%	**48**	**6.70%**	**715**	100.0%

Discussion

The age distribution of cases has shown a dramatic change from that of pre-catch up campaign era (5, 6) The Mean and median age of measles patients has shifted to the right and the Epidemiology is changing, that means the proportion of older children is higher than it used to be before the catch up campaign more over some previously immunized children have been infected. This changing epidemiology is probably due the improved routine immunization and SIAs (7, 8). The change in the age distribution of measles cases after the catch up campaign was in conformity with other studies. There is no significant difference in the sex distribution of measles cases in this zone. ($X2=0.002$, $P>0.98$)

The epidemic curve of west Harargie epidemic is a typical curve of propagated epidemic which results from person to person transmission (9). The number of cases reported was maintained at high level from 8th to 19th WHO epidemiologic week (more than 10 weeks) this shows the accumulation of susceptible in the community as a result of low level of

routine immunization and most probability non optimal SIAs.

The outbreak response immunization at the 20th week was done. This immunization conducted long after the epidemic stated and it was at the time the epidemic was declining. As a result the outbreak response immunization didn't help to avert cases and deaths significantly (10)

More than 80% of the cases were not vaccinated, this indicate the cause of the epidemic is failure of vaccinating children with at least one dose of measles vaccine (10). Unlike other major illnesses that cause sickness and kill large numbers of young children, measles can be prevented through use of a safe, highly effective, and inexpensive vaccine (9,). Unfortunately, in many of the cases in this rural community of west Harargie, large numbers of children remain unvaccinated.

Our investigation revealed that 6.7 % of measles case died within 30 days after rash onset. Unlike the usual routine reports from Ethiopian case based data (WHO unpublished report) we observed unacceptably high mortality. The CFR found in our investigation was 5-fold higher than that reported through routine surveillance. It is known that the case fatality rate during epidemics is higher than during the routine surveillance (11), but there are reports which are even higher than our report from some countries of West Africa and parts of Ethiopia (11-16)

If we want to know the cases fatality rate of measles, the cases of interest are those who have had measles and have survived the following one month rather than current cases (17); however data for reports of the case fatality in many parts of the country are usually obtained during searching for additional cases to treat them, before the epidemic is closed. As death may occur any time between the first and 30th day after the onset of rash, all deaths may have not been reported, and this might be the cause of low case fatality rate in many of previous reports in the country.

the case fatality rate is high in unvaccinated children, and also remained high in the adolescent and young adult age groups (15-37 years) moreover many of the deaths in this age group have unknown immunization status. Even if we assume that all cases are unvaccinated, we don't expect this high number of deaths in this age group, unless there is an underlying illness that was complicated by measles and result in high case fatality rate. The most probable underlying illness in this age group might be HIV/ AIDS and other immunosuppressive illnesses. It is proved that, measles on patients who have underlying immunosuppressive illnesses including malnutrition is very fatal. Reports have shown that measles can cause death up to 70 % of cancer and 40% of HIV positive adult patients (19).

Parents in rural area often preferred to keep the child at home and they purchase treatment outside of a health-care facility, rather than to seek treatment at a health-care facility (18). In our survey many of the patients didn't visit modern health facility and most probably died at home, this shows that mothers are still hiding their children when they have measles. This implies we didn't get adequate desired change in health seeking behavior of the community when their child catches measles.

Conclusion and recommendation

The Ethiopian measles surveillance system is based on fairly quality case based surveillance system; but all the cases investigated by the survey in west Hararghie was not captured by the routine surveillance system, there were more cases by the survey than the routine surveillance system. This tells us the investigation of all epidemics is mandatory.

The probable cause of the epidemic is failure of vaccinating children and is unlikely to be vaccine failure, we need to do a lot of work to improve routine immunization and quality of SIAs

Outbreak response immunization was very late and didn't help much to avert cases and deaths, it should be conducted based on the risk of extended out break and should be conducted as early as possible covering the high risk age group

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