

Rubella Outbreak Investigation in Wombera and Dibate District, Metekel Zone, Benshangul Gumuz Region, January, 2013

Negga Asamene Abera*, Rajiha Abuboker, Amete Mihret and Degefu Beyene

Ethiopian Public Health Institute

*Corresponding author

Negga Asamene Abera, Ethiopian Public Health Institute, Gullele sub city, Arvegnoch Avenue, P.O box 1242, Ethiopia, E-mail: neggaasamene@gmail.com

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Abstract

Background

Rubella or German measles was considered as a mild and benign viral disease of childhood until 1941 when Norman Gregg, an ophthalmologist reported an epidemic of congenital cataracts associated with other congenital defects in children born to the mothers who had rubella during their pregnancies. It presents as a mild febrile rash illness in adults and children. The objective of the investigations was to evaluate the level of intervention and to identify the possible root of introduction of the disease and to check the possible reason of expansion in the district.

Materials and Methods

Discussions with regional, zonal and district health office staffs and health facility heads were made structured questionnaires, In-depth interviews and discussion with the index cases was conducted in both districts. And 15 blood and throat samples were collected from the suspected cases.

Results

Since the outbreak, two districts reported 6,820 cases with no deaths. Of the cases, 49% were male while the rest 51% were females. In Dibate District four Kebeles were affected while 19 Kebeles in wombera. The crude attack rate in Dibate was 0.3% while in Wombera was 8.8%. Both sexes were equally affected. From all Cases and controls 80(83%) of them were student. About 94% of them had rash. Of the cases 71% had developed conjunctivitis. Only 15% and 31% of the cases were developed Arthralgia and Lymphadenopathy respectively. Compared to controls; cases that had contacts with patients were developed the infection (AOR=4.6; 95%CI: 1.89-11.51). Of processed samples, 57% were Rubella IGM positive.

Conclusion

Considering the indicated cases and also incubation period, it is likely the disease is introduced on late November. Taking in to account the observed risk factor; majority of the cases and attending family members didn't know how to protect themselves as well as mode of spread. This may attribute to the expansion of the diseases. The outbreak may persist longer period.

Keywords: Rubella, Dibate and wombera districts, Benshangul Gumuz, Ethiopia

Abbreviations

CRS- Congenital rubella syndrome

WHO- World Health Organization

EPHI- Ethiopian Public Health Institute

Background

Rubella or German measles was considered as a mild and benign viral disease of childhood until 1941 when Norman Gregg, an ophthalmologist reported an epidemic of congenital cataracts associated with other congenital defects in children born to the mothers who had rubella during their pregnancies [1,2]. It usually

presents as a mild febrile rash illness in adults and children; however, 20%-50% of infected persons are asymptomatic [3]. Rubella can have severe adverse effects on the fetuses of pregnant women who contract the disease during the first trimester of pregnancy, causing a wide range of congenital defects known as congenital rubella syndrome (CRS) [4]. As per the World Health Organization (WHO) estimate worldwide more than 100,000 children per year are born with CRS [5]. WHO established the Measles and Rubella Laboratory Network (Lab Net) in 2003 to promote case identification and confirmation [6]. Special surveillance investigations in developing countries in Africa, the Americas Asia, Eastern Europe and the Eastern Mediterranean have documented incidence rates of CRS ranging from 0.4 to 4.3 per 1 000 live births [7,8]. Rubella outbreaks are worldwide in

distribution and tend to occur in epidemics, in non-immunized populations every 6 to 8 years [9].

Study conducted in Addis Ababa showed that overall prevalence of the natural IgG antibody against Rubella was found to be 94%. The incidence of congenital rubella infection may be low in Ethiopia [10]. Wombera district reported the rubella outbreak and responding to it since Nov 20, 2012. After a month and half Dibate district also reported the same cases which was later confirmed as rubella outbreak.

Both districts were managing the case with antibiotics, Vitamin A supplementation and fever therapy. Concerning management of pregnant women Wombera district started counseling them and waiting the national and regional guidance for decision

Materials and Methods

Study site

Benshangul Gumuz region is one of the nine regions of Ethiopia with 20 districts and three zones. Wombera and Dibate district are among the twenty districts of the region found in Metekel zone. Wombera district has total populations of 71,642 while Dibate has 79,588 populations. Wombera is located in the South -Western part of the country bordering with Sherkole district of Assosa Zone, Yaso district of Kamashi zone, Bulen and Guba district of the same Zone and Guangua district of Amhara Region. Wombera has 39 Kebeles and some of them located in the high land parts of the district while Dibate district has 30 kebele which are almost all are semi high land.

Both districts are linked by one all weather road which started from the zonal city Gilgelbeles and also other road from Chagni city of Guangua district. Wombera district reported the outbreak and responding to it since Nov 20, 2012. The district and the regional team investigated the outbreak and the outbreak was confirmed by national polio and Measles laboratory. After a month and half Dibate district also reported the same case which was also reported to be rubella outbreak. We discussed with regional, zonal and district health office staffs, health office and health facility heads and we took the line list and daily summary of the cases. We

collected data using structured questioners, In-depth interviews and discussion with the index cases in both districts for the second time conformation 15 blood samples and throat samples were collected from some of the suspected cases.

Results

Descriptive Epidemiology

Since the start of the outbreak, the district reported 6,820 cases, both line list and weekly summary, with no deaths in both Districts. Among the suspected and confirmed cases, one pregnant woman was positive for rubella and from 15 suspected cases blood sample was taken. Line listing was changed to daily epidemic summary report after 3000 suspected case report in Wombera and 97 cases in Dibate with a total line list of 3,236 Rubella cases. Wombera Districts was mostly affected Districts with 3,139(97%) cases and no deaths. Of the cases 1583(49%) were male while the rest 1,653 (51%) were females. In Dibate Districts four Kebeles were affected while 19 Kebeles in wombera and the Crude attack rate of Dibate was 0.3% and in Wombera Districts the crude attack rate were 8.8% both sexes were equally affected. All cases were outpatient and there was no death report in both Districts.

Among interviewed cases and controls 80(83%) of them were student, 12 Children, one teacher and the remaining three were house wives. Of the total cases 45 (94%) of them had rash and on 45(94%) of the cases the rash was first appeared on their face. Of the cases 34(71%) had developed conjunctivitis. Only 7(15%) and 14(31%) of the cases were developed Arthralgia and Lymphadenopathy respectively. Of all cases 41 (87%) of them were not visited other village or Districts in the last one month and none of them were not attend any especial ceremony at the same month. All controls and cases were not sick of rash like illness before which indicates they are not naturally immuned. Forty three (90%) of the cases were not treated with antibiotics and not know how they can protect themselves from the diseases and source of infections at the time of interview respectively. Of the total cases and controls interviewed about the consequences of the diseases up on the pregnant women 71(74%) of them are not aware of it as a result of this 22(23%) were replied that she will not be damaged rather the fetus will be aborted Males and females were equally affected (**Table 1.1**).

Table 1.1 Rubella cases distribution by sex and district-Benshangul gumuz, 2013

Districts	Pop	Population by Sex		Total Cases	Case by sex		CAR	Sex Specific AR	
		M	F		M	F		M	F
Dibate	82,920	41575	41345	97	45	52	0.1	0.1	0.1
Wombera	74251	36104	38147	3139	1538	1601	4.2	4.3	4.2

During the illness the 36(75%) of case had fever and in contrast only 7 (15%) were shown Arthralgia (**Table1:2**)

Table 1:2 major clinical presentation of the case in Wombera, Benshangul Gumuz region, 2013

Clinical presentation	Yes n (%)	No n (%)
Arthralgia	7(15%)	41(85%)
Cough	28(58%)	21(42%)
Inching	30(63%)	16(37%)
Fever	36(75%)	12(25%)
Lymphadenopathy	15(31%)	33(69%)
Redness of eye	29(63%)	17(37%)

a) Surveillance in wombera district during the out break

The district received report of four cases with symptom of rash with fever cases on November 20, 2012 from Gesengesa health post which is located some 30 KM from the city of the district called Debrezeit. The district health office discussed on the situation on 21/11/2012 and sent one team on Nov 22/ 2012 to investigate the situation. The team tried to see the cases and reported all cases have rash with itching and also developed fever. With an assessment of cases with suspected measles, the team started case management using measles guideline and collected and sent the first ten samples to EPHI on November 29/2012.

Mean while the district reported the situation to the zone on the same date (Source: - investigation team member). The zone informed the region on the same date (Source:- zonal health office head).

The laboratory result of 10 samples reveals 3(30%) of it were found to be positive for rubella IGM and all are negative for Measles). Case reports started to build in the same weeks from other Kebeles of the district. In the mean time the regional health office sent first regional team to Wombera after one week to investigate the situation. The generated report was still rash which is itching and fever cases and line listing was strengthening. The diseases expanded to other Kebeles and the district mobilized health workers to support Health extension workers. The second regional investigation composed of epidemiologist from WHO, PHEM surveillance officer and Clinician from Pawi hospital were mobilized on December 20, 2012 with consultation of the national PHEM office to get more information to confirm the outbreak and rule out other possible diseases like diseases, dengue and others. The team collected more information investigating 103 cases, collecting 21 serum samples. Samples collected and sent to National laboratory on December 22/2012. Result released to both partners after four days. Among 21 samples 17 (81%) were rubella IgM positive. Based on the clinical findings and also the lab finding, the Rubella outbreak was confirmed and declared in the districts. Mean while the outbreak expanded to 19 Kebeles (49% of the district) which are located in the highland part of the district not affecting the other lowland Kebeles.

Data compilation and analysis

Line listed cases were entered to computer up to 12/17/2012 registering 3141 suspected case with no death report. After that data were registered in paper form. Some of these data's were found to be cumulative suspected cases and some are by age category.

Line listing was changed to daily epidemic summary report after 3141 suspected case report by the advice of national PHEM office. Weekly summary of suspected case report showed slight decrement of cases with abating of expansion to other Kebeles during the investigations.

Reporting at district level

The district is sending message report by cumulative suspected cases by age category every evening to the zone and region (verified from the Mobile Memory card) which was continued and copied to our team until we left the district.

Suspected cases report by age category

Among the 6,549 suspected and confirmed cases only 4590 cases were organized by age category and 4,576 cases by sex. The finding shows 12.2 % of the cases are below 5 years of age while 68.1% are age of 5 to 14 years old.

A total of 4576 suspected case were registered by sex and age. Among them 2371 (51.8%) are female.

b) Case management and health education

The region and the district have rapid response team and are in a position to investigate any outbreak. The district initiated case management as per the measles guideline. From the discussion with district health office staffs and the line listed case report indicated all cases were managed by Vitamin A, Antibiotics-Cotrimoxazol.

Later on the district changed antibiotics management protocol but persisted in Vitamin A supplementation. The district discontinued Vitamin A supplementation after they observed the shortage. The district feels discomfort to discontinue treatment with antibiotics and vitamin A due to fear the community's disappointment (decrease health facility visit of patient). The district counseled pregnant women indicating all.

Consequences

They identified childbearing women (17,000) for possible intervention which was not yet settled till this report was compiled. C.Tracking index cases and in-depth interview the team went through the line listed which was communicated to the region and also line list found at the district level. To identify the presumed index cases taking the registered date of onset of rash and also a case this was treated with the same complaints. A total of three cases from Gesengesa kebele were identified and conducted in depth interview.

Dibate district

Surveillance:-The district received report of four cases with symptom of rash with fever cases on 24/12/2012 from Berber health center which is located some 40 KM from the city of the district called Dibate. The district health office discussed on the situation sent one team on same day to investigate the situation. The team tried to see the cases and reported all cases have rash with itching and also developed fever. With an assessment of cases with suspected measles, the team started case management using measles guideline and also collected 5 samples sent to within the same week. The presumed index cases developed rash and fever on 24/12/2012. The laboratory result of all serum samples were found to be positive for Rubella IgM and declared rubella outbreak. Sample sending stopped. The district line listed the cases until 97 case reports and changed to daily epidemic report.

Since the outbreak the district reported 271 cases with no deaths. Among the cases, 84(31%) are under four years of age, 156(57.6%) of the cases are age of 5 to 14 years while 30(11.1%) are 15-44 age category.

Among the cases 54.2% of the cases were female. The outbreak covered 5 (17%) kebele from a total of 29 kebele.

Daily case report decreasing and in the same pattern weekly summary data of the district showed slight decrement of case report

reaching pick on week 3. (NB week 4 data includes 3 days report)

Case registration and reporting

After line listing the district stopped registering cases by kebele and gote but reporting the epidemic summary of cases.

Outbreak /Case management and health education

The district has rapid response team and is in a position to investigate any outbreak. The district initiated case management as per the measles guideline. From the discussion with district health office staffs and the line listed case report indicated all cases were managed by Vitamin A, Antibiotics-Cotrimoxazol. The district feels discomfort to discontinue treatment with antibiotics and vitamin A due to fear of the community's disappointment not getting medication visiting health facilities. Health education initiated but not in organized way to cover all kebele and gote. No 1 to 5 organizational structures to use for health education.

In-depth interview with presumed index

cases From the line listed case report the team identified three cases in these Districts and interviewed.

Laboratory investigations

Among the interviewed cases, 15 serums and 12 throat swabs samples were collected. The serum samples were processed at National polio laboratory. Among the 15 serum samples 6 (40%) samples were Rubella IGM positive, 4(27%) are indeterminate and the rest 5(33%) were negative

Analytical Epidemiology

To identify the possible determinant conducted un much cases control study and interviewed 48 Rubella cases (mean age: 11 years) and 48 controls (mean age: 13 years) (Table 1.3). We did bivariate and Multivariate analysis association (Table 1:4 and 1.5).

Table 1:3 Socio-demographic information of cases and control Metekel zone, Benshangul, 2013.

Descriptive Variables		Cases		Controls	
		Number	Percent	Number	Percent
Sex	Male	25	52	26	54
	Female	23	48	22	46
District	Dibate	22	46	19	40
	Wombera	26	54	29	60

Majority 33(64.7%) of the cases had contact history while only 18(35.5%) of the controls had contacts. It was found that contact was associated with Rubella infection (COR=3.7; 95%CI: 1.57-8.53). Forty five (54.2%) of the cases were sleeping with other person but only 38(45.8%) of the controls were sleeping with other person. Compared to controls that sleeping with other people were more likely to develop the infection (COR=3.9 (95%CI: Majority 40(56.3%) of cases had family size greater than or equals 5 while 31(43.7%) of controls had family size >= 5 and it was statistically associated with rubella infections (COR=0.36; 95%CI: 0.13-0.95) (Table 1.4).

Table 1:4 Bi-variate analyses for different exposures-Benshangul Gumuz Metekel zone, 2013

Exposure		Case (%)	Control (%)	COR(95% CI)
Contact with Patient	Yes	33(64.7)	18(35.3)	3.7(1.57-8.53)* 1.00
	No	15(33.3)	30(66.7)	
Do you heard about this rash outbreak	Yes	43(50.0)	43(50.0)	1.0(0.20-3.70) 1.00
	No	5(50.0)	5(50.0)	
How many rooms do your home has	<3	27(55.1)	22(44.9)	0.5(.20-1.23) 1.00
	>3	13 (38.2)	21 (61.8)	
Are you sleeping with other person	Yes	45(54.2)	38(45.8)	3.9(1.01-15.38)* 1.00
	No	3(23.1)	10(76.9)	
Do you have visited other villages in the last two weeks	Yes	6(66.7)	3(33.3)	2.1(0.50-9.12) 1.00
	No	42(48.3)	45(51.7)	
Number of Family living together	<5	8(32.0)	17(68.0)	1.00 0.36(0.13-0.95)*
	>5	40(56.3)	31(43.7)	

The final Analysis was done using multivariate Binary logistic regression model. All variables which showed significant association during bivariate analysis such as contact history, sleeping with others and family size were included, but only contact history with the same sign illness and sleeping with others were found to be determinants of the disease. Compared to controls; cases who had contacts with patients were more likely to develop the infection (AOR=4.6; 95%CI: 1.89-11.51) and also sleeping with other person was showed statistically significant association (AOR=6.1; 95%CI: 1.44-26.26) while family size had no association (Table 1.5).

Table 1:5 Determinants of Rubella infection in -Benshangul Gumuz Metekel zone, 2013

Exposure		Case (%)	Control (%)	COR(95% CI)	AOR(95% CI)
Contact with Patient	Yes	33(64.7)	18(35.3)	3.7(1.57-8.53)* 1.00	4.6(1.89-11.51)* 1.00
	No	15(33.3)	30(66.7)		
Are you sleeping with other person	Yes	45(54.2)	38(45.8)	3.9(1.01-15.38)* 1.00	6.1(1.44-26.26)* 1.00
	No	3(23.1)	10(76.9)		
Number of Family living together	<5	8(32.0)	17(68.0)	1.00 0.36(0.13-0.95)*	1.00 0.4(0.15-1.24)
	>5	40(56.3)	31(43.7)		

Discussion

As described above the main clinical features of the examined cases include macular rash starting from the face, spreading to the neck and trunk and in some cases to the rest of the body. The rash in some cases is preceded by prodromal symptoms such as fever, headache and malaise. It is non-blanching and is associated with itching in most cases (same as the first team report). The illness is not found out to be complicated with pneumonia, diarrhea or other diseases.

None of the patients both in the cases examined by the team or the cases in the line list needed to be hospitalized.

Most examined patients have cough, nasal congestion, arthralgia and red eyes.

There was no death reported. The physical examination revealed presence of lymphadenitis: post auricular, anterior and posterior cervical and sub occipital. There were throat changes in some of the patients (erythematous throat).

Though differential diagnosis of macular rash is numerous ranging from drug eruption to bacterial and viral infections, clinically, considering the features of the rash, its spread and associated signs and symptoms and its being highly contagious. All cases were ruled out for Measles by the national polio laboratory and the result was found negative.

From 31 of the earlier samples processed at EPHI national polio laboratory, 20 (66.7%) of it was found to be positive to rubella virus IgM while all are negative for measles. The disease spared mainly the lowland Kebeles of the Districts which may be related to the cold sensitive nature of the virus. Parvovirus B19 is difficult to differentiate clinically from rubella. Parvovirus B19 is the virus that causes erythema infectiosum (also known as fifth disease or slapped cheek syndrome, particularly common in children). It is a self-limiting illness which, in addition to a bright red rash on the cheeks, may cause a red, lacy rash on the rest of the body. People who had contact had with patients of rash were affected 3.8 times than did not have contact this could be the nature of the diseases transmission.

In adults, parvovirus can cause rash, fever, and joint inflammation that can be indistinguishable from rubella. Parvovirus B19 can have harmful effects on the fetus, and pregnant women with a rubella-like rash should also be tested for parvovirus B19 infection.

In the same pattern Dengue and Rosella Infantum can cause such rash with fever. As cases didn't present with hemorrhagic complaints, dengue can be ruled out but still needs to be ruled out by laboratory investigation. In the same way, both Paro Virus and

rubella presented with same clinical picture. As the samples were not tested for Paro virus, it is difficult to rule out. Despite the fact that cases were reporting from different regions, such widespread outbreak limited in some district, expanding to a number of villages (kebele) is not reported in the country. The team tried also to check weather malnutrition and change in living condition contributed for this large scale outbreak but the findings revealed there is no change in the feeding pattern, no malnutrition patient observed and also no changes in water supply as well as the living quarter. Some information from patients and parents of the patients are distorting as there is already memory bias (the outbreak started two months ago and they are producing different scenario and some forgot exactly the time of sickness).

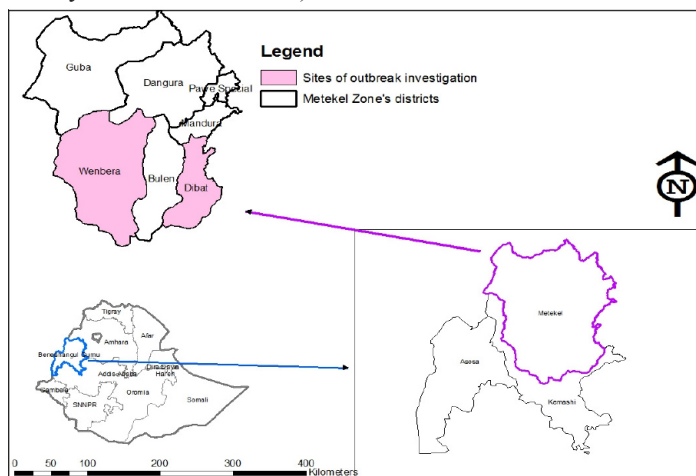


Fig 1:1 Map of wombera and Dibate districts Benshangul Gumuz, Ethiopia, 2013

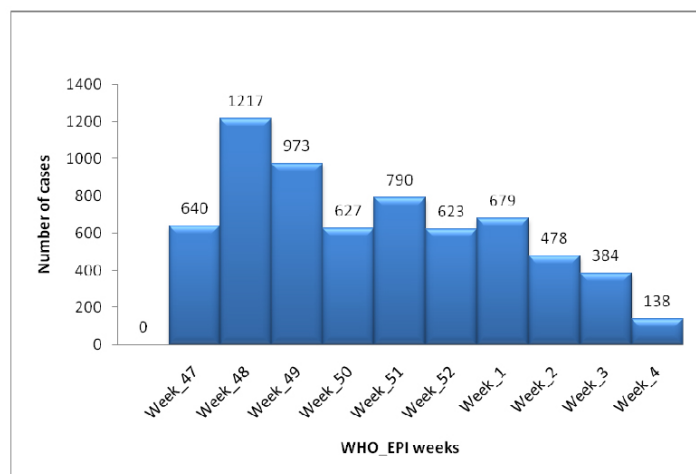


Figure 1:2 suspected rubella case report, Wombera district, Metekel zone, BG by WHO epidemic week, 2012-13

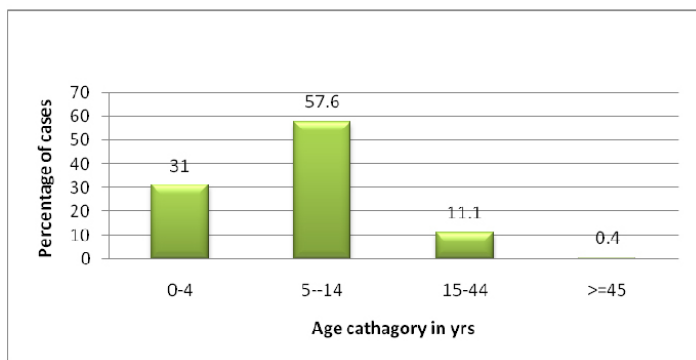


Fig 1:3 Suspected Rubella cases report by Age category Dibate Districts, Metekel zone, Benshangul Gumuz Region, Dec 2012 -Jan 2013 (N=271).

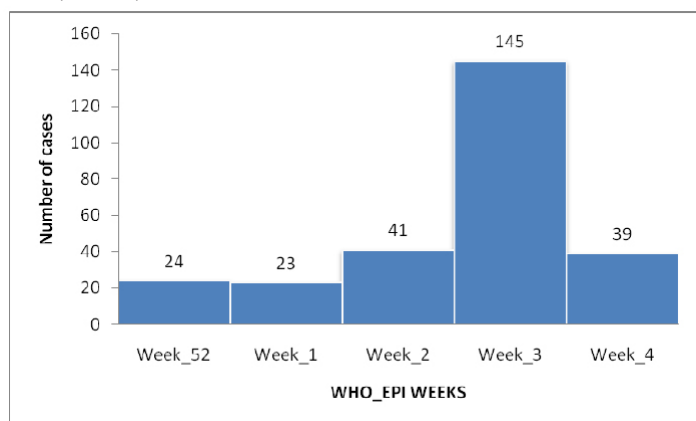


Fig 1:4 Suspected Rubella cases report Dibate Districts, metekel zone, benshangul region, Dec 2012-Jan 2013

Conclusions And Recommendations

The time of introduction to wombera district couldn't be ascertained as it is clearly discussed on case number one of wombera. But taking in to consideration of the incubation period 3-4 weeks, and also the date of onset (Oct 28, 2012) of the presumed index case, the disease may be introduced to the district around late September. Despite the detail discussion in wombera, it is found difficult to indicate the first case who supposed to introduce for the district. Concerning the Debate case, the father of the child, among the index cases, can be suggested to introduce the disease but we still couldn't ascertain this as four cases developed the rash within one week (incubation period is long). Considering the indicated cases and also incubation period, it is likely the disease is introduced on late November 2012. Considering the observed risk factor, majority of the cases and attending family members didn't know how to protect themselves as well as mode of spread. This may attribute to the expansion of the diseases. The Altitude of the wombera district may facilitate the transmission (needed to be investigated the virulence of the virus at highland environment) but the observed Market place for all highland Kebeles are Debrezeit and Gesenges Kebeles at which highlanders (farmers) who are coming to trade each other may contribute to the spread.

Closure of schools at this moment is found to be not advisable as the outbreak is already spread for more than 2 months and also asymptomatic cases may be present in the community.

Total case report from wombera and Debate are decreasing from week to week. This may not warrant control in short period (nature of the disease). As literature is suggesting, such Rubella outbreak may persist longer period and also indicates the possible wider outbreak which indicates the country has to work on how to handle the surveillance as well as the outbreak management.

All the findings are leading to investigate additional viruses which can be confirmed, sub typing of the Rubella Virus.

Closure of school in early time of infection and isolation of cases is important to avoid the spread of the disease through contact a Continuous sample sending to National Polio and measles laboratory as measles guideline should be maintained not to miss measles.

The cases should be managed as per the draft paper of Rubella Case management written during outbreak investigation and wait the Rubella guideline.

To produce Rubella case and outbreak management guideline for the country.

Investigation on the virus itself effect in the high land and low land geographical location.

Investigation and document the genotyping of the circulating strain type should be made.

Conducting cohort study on "Pregnant women and Possible CRS" should be initiated.

Support the Zone with finance and drug should be strengthening since the outbreak may expand to other neighboring district.

Declaration

Ethical Issues since this is an outbreak investigation. No formal Ethical procedures needed in our country once the district suspects an outbreak which is beyond its capacity it reports to the next higher level which is region then the regional Health Bureau was requested an assistance for the epidemiological investigations based on this group of professionals went to the area and did the investigation by default it is consensus permission this applies all outbreak investigation in our country because it is part of the prevention and control measures taken to stop the disease from spread within the country and globally.

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