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## Clusters of measles outbreaks in a special group of the Midlands population, Zimbabwe

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**Objective:** To determine the magnitude of the measles resurgence and identify factors contributing to the persistence of the disease in the affected population.

**Design:** An exploratory and descriptive study of measles cases recorded or detected in August and September 1996 in Gokwe North.

**Setting:** Gokwe North District, Health Institutions and the community.

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**Subjects:** All cases of measles noticed during the study period.

**Main Outcome Measures:** Specific characteristics of the affected group of population and factors associated to the persistence of the measles disease in the area.

**Results:** Of the 66 cases reviewed, 50 (76%) were members of Apostolic Faith Families (AFF). A case fatality rate of (73%) was observed in general. The AFF accounted for 83% of all deaths while those not vaccinated for measles represented 95% of measles related deaths. The proportional case fatality rate showed a marked excess mortality among the unvaccinated largely represented by the AFF (95.4%) compared to 40% for the vaccinated cases.

The remarkable secondary cases in the AFF provide evidence that the level of contact determines the acuity of the acquisition of the disease, which is also influenced by the intensity of exposure. The significant inverse correlation between the measles fatality and the young age of cases is again evidenced, especially among unvaccinated cases.

**Conclusions:** The measles epidemics recently experienced in the Midlands Province were limited to the AFF and unvaccinated children. The restriction of measles among the non-users of EPI services attest indirectly of the safety acquired from the measles vaccines by the general population participating in EPI activities. In the presence of these groups of population resisting EPI, there is a great need to accelerate and to reinforce EPI activities among the usual users with special attention to areas bound to risk of infection due to the presence of the AFF.

## Introduction

Over the past two years, the Gokwe districts in the Midlands Province have implemented aggressive measles control activities, targeting children aged nine months to 10 years. These included massive and extensive vaccination programmes and intensive training of health workers on the management of Expanded Programme on Immunization (EPI) diseases with particular emphasis on measles disease.

Unfortunately, the monitoring and supervision of the EPI management and EPI diseases surveillance has remained poor due to basic logistic and management problems, which the health managers in Gokwe have over the year failed to overcome.

Recently, cases of measles have been reported in many parts of Zimbabwe, suggesting a widespread measles disease resurgence, despite the measles vaccination supplementary programmes which were carried out countrywide in the past.

In Midlands Province, 662 measles cases were reported from Health Institutions (HI) through the Health Information System (T5). Gokwe districts, North and South, known as measles prone Districts in the Midlands Province, were closely monitored. An active case investigation study was carried out in Gokwe North.

The present paper outlines the findings of the investigation study conducted as part of the control strategy developed to contain the spread of the disease.

The objectives of the investigation study were:

- To determine the magnitude of the measles resurgence in the Gokwe population.
- To establish the specific characteristics of the population affected by the disease.
- To identify the factors contributing to the persistence of measles in the area.

## Materials and Methods

An exploratory and descriptive study was carried out in Gokwe North, covering a two month period, August and September 1996. The cases reported through both the

community and HI, were investigated at two levels. Firstly, by the local extension worker or health staff of the area and at a second stage, the district and provincial investigation team. Fourteen of the 17 health centres in Gokwe North were visited and investigated.

A review of the health centre records (Outpatient Registers, Measles Surveillance Forms) to collect all measles cases and deaths registered was conducted.

A follow up investigation for each case or death and collection of socio-anthropologic characteristics as well as the medical history of each case in the community was carried out to complement the health centre investigation, and especially to check on cases reported through the Community operated Morbidity/Mortality Surveillance System (CMSS).

The CMSS consists of extensive surveillance of the prevailing morbidity/mortality in the community with the assistance of members of the community who organize and agree to the report all cases of disease and deaths occurring in their location to the extension Environmental health Technician (EHT), the health centre nurses or simply to the Village Community Workers (VCW).

Two measles case definitions were used: a case presenting with fever, rash and cough, or running nose or red eyes, for the lay person in the community. For the professionals, a measles case would be a case presenting with a history of a generalized blotchy rash lasting three or more days and history of fever and history of any of the following: cough, running nose, red eyes as recommended by the Zimbabwe Expanded Programme on Immunization.<sup>1</sup>

In order to avoid a falsification of the fatality resulting from measles, cases found suffering from measles during the investigation were not entered in this study. The estimate of the case fatality rate is based on cases who survived or died within 30 days after the onset of the disease.

## Results

This study found much more evidence of occurrence of measles in the community than reported by Health Institutions (HI).

Sixty six cases of measles were recorded from the HI and from the community during the study, against 59 from the T5 system alone, including surveillance reports which did not present for treatment, in Gokwe North for the period under investigation. Of these, no deaths were recorded in the HI but 8 measles related deaths were detected or noticed through the CMSS.

For the cases where the age could be specified, the overall mean age of cases was 6,7 years old (Standard Deviation (SD) 0,7).

The cases who survived had a mean age of 7.8 years old (SD:5.8), while the specific mean age for the deaths was markedly lower: 3.5 (SD: 3.92). The median age recorded was 7.5 years, with the youngest case aged eight months and the oldest 15 years old.

Fifty cases (76%) reported by both sources occurred in the population of Apostolic Faith Followers (AFF) and who did not seek conventional modern treatment care, due to religious convictions.

The vaccination status of 61 (92%) cases was established; of them, 56 (92%) cases were not vaccinated for measles. AFF constituted 93% of the unvaccinated. Forty eight (83%) of all measles related deaths reported or registered during the investigation originated from families of AFF and were all unvaccinated.

The association of belonging to AFF with measles related deaths is shown in Table I. The AFF status was significantly related to measles related deaths (OR=4.00, 95%CI: 1.04 to 15.84).

Available records indicate that 42 or 95% of all measles related deaths were not vaccinated. For the cases with established immunization status, the case fatality rate (CFR) increased to 86% compared to the overall CFR of 73% observed in the general study population (Table I).

Table I: Association of belonging to AFF and vaccination on one hand and measles related deaths on the other.

	Died	Survived	OR	Exact* 95% CI	Fisher's 2 tail p value
F+	40	10	4.00	1.01 to 15.58	0.027
F-	8	8			
acc	2	3	0.06	0 to 0.80	0.015
unacc	42	4			

\*Computed using statcalc in Epi Info version 6.

F: Odds ratio.

CI: Confidence Interval.

F+: Belonging to the Apostolic Faith Families.

F-: Not belonging to the Apostolic Faith Families.

acc: Vaccinated.

unacc: Unvaccinated.

Significant difference was noticed between the specific proportional case fatality rates of cases grouped by vaccination status. The unvaccinated cases depicted a relative excess mortality with a CFR of 95.4%, as described by Aaby *et al*<sup>2</sup> in communities with comparable conditions of measles exposure, for only 40% among the vaccinated. The AFF account for 95.2% of the mortality observed in the

unvaccinated cases. The protective effect of the vaccination was significant (OR= 0.06, 95% CI: 0 to 0.80) as shown in Table I.

The incidence of measles rose sharply in the AFF families after the AFF congress held in the Sanyati District, Mashonaland West Province. Whenever a measles related death occurred in a family, close siblings exposed to the index case developed severe measles which, in almost all cases, resulted in the deaths of one or more children in the same family.

## Discussion

Although records on the index case and exposure were not adequately collected, the increased mortality in homes where early index cases died suggests that the measles transmission and mortality were largely influenced by demographical and behavioural characteristics as hinted by some other studies.<sup>3,4</sup>

The first measles case and death occurred at the point of the AFF congress. This was followed by more cases and deaths among close relatives in the same families back in Gokwe after the congress, implying that the index site of the measles acquisition was the AFF congress value. This also provides evidence of high attack rates proportional to the level of contact which here would seem to be a function of the family size (family children's density), as confirmed by the extremely high secondary attack rate in the AFF families.

In the absence of cases from the HI, the investigation led to cases within the community, which in more than 95% involved AFF. The extremely high CFR found here is, therefore, understood and even expected. The AFF life style potentializes the activation of predisposing and contributing factors to measles cases and death.

Our study has not covered all standard parameters (time span from disease onset to death, severity of disease for age, adequate mode of secondary attack by age or sex) reporting epidemics of this nature, as it was difficult to extract relevant information from the community, especially from AFF, during such a rapid case investigation study. It is presumed that many cases of the disease under investigation were not captured by either source given the prevailing habit of case hiding by the AFF.

The important point to note is the high vulnerability of the children from this population and the remarkable restriction of the cases (epidemic) in the same population. Indirectly, this attests to the high levels of protection against the measles infection among other children, receptive to measles vaccination.

Overall, Gokwe districts have reduced the measles incidence by more than 90%<sup>5</sup> as was expected after the implementation of the measles control strategy based on massive measles vaccination campaigns<sup>6</sup> which resulted in some children among the receptive population getting two or three doses of measles vaccine. Such strategy, indeed, is known to have contributed decisively to the reduction of the measles incidence levels and successfully eliminated the measles transmission in the recipient population.<sup>7,8</sup>

This is also attested to by the complete inversion of the relative risk of measles in Gokwe resulting from the abovementioned programme.<sup>4</sup> Indeed, the administration of

live measles vaccine to children already immune to measles as a result of either previous vaccination or natural disease is totally inoffensive and carries no single evident risk<sup>9</sup> but adds to the recipient's protection against measles disease, as evidenced here.

From the findings of this investigation study, the measles case fatality rate is much higher in the community than reported by HI, in contrast to what is usually found in other studies in populations that utilize health care service.<sup>10</sup> The AFF do not utilize modern health facilities, hence do not contribute to HI based records.

The objection of modern health care services combined with the lack of boosted (or vaccine induced) immunity against measles and the age at the infection are all factors concurring toward the high toll of morbidity and mortality affecting the community of AFF. It remains highly vulnerable to measles as the measles infectivity level exceeds easily the herd threshold natural immunity, which more likely is low in such a population.

This study found an inverse correlation between the measles fatality and the age of affected cases especially in unvaccinated children as described by Gordon *et al*<sup>11</sup> and also by McGregor in The Gambia.<sup>12</sup>

### Conclusions.

As the community is most affected by measles, measles outbreaks in Zimbabwe would be best monitored through a CMSS and any study addressing the issue would benefit and may discover more from a community oriented research method. The close interactions among AFF families during their gatherings increase the potential transmission of the measles infection in their homogenous population of unvaccinated children.

In the light of our study, the purported outbreaks of measles in Zimbabwe need to be qualified in order to enable proper action and resource mobilization. Indeed, the country is not in the real turmoil of measles outbreaks as may be understood by the epidemiological definition of epidemic at country level.

There are clusters of cases epidemiologically linked and fortunately very much limited to a population group with many common features, all opportune for the emergence of measles disease.

As measles continues to exact a high toll on infant mortality in this country, mainly in the AFF population, which is fully aware of the fatal risk they take for their children, stern enforcement measures and strategies are sought to constrain the group to comply with public health requirements.

This study has given an epidemiological insight into the community hidden measles occurrence. It calls for more extensive and in depth research to study socio-cultural and demographic factors surrounding the children's morbidity and mortality, focussing on fatal conditions such as measles, at community level.

There is need to determine the long term safety (protection) of the general target population which, though on board with the preventive and curative health programme, remains continuously exposed to infectious diseases harboured by the non modern health care users.

It is recommended that regular and direct population surveys be conducted to obtain valid data, to assess and confirm the actual prevalence of such a persistent disease and its incidence as a complement and validation of the institutional records collection.<sup>13</sup>

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