

Evaluation of the Notifiable Diseases Surveillance System in Beitbridge District, Zimbabwe 2015

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Abstract

Back ground: Notifiable Disease Surveillance system serves as an early warning system for public health emergencies. Since January 2013 to August 2014, Beitbridge never submitted T2 forms to the province. Four suspected cases of rabies were reported through the generic report. The electronic District Health Information System 2, T2 forms had not been updated. This discrepancy may imply under reporting of Notifiable Diseases. The study was conducted to evaluate the NDSS in Beitbridge district. **Methods:** Descriptive cross-sectional study was conducted. Health workers in sampled health facilities were interviewed using questionnaires. Checklists were used to assess resource availability. Epi Info™ was used to calculate frequencies and proportions. **Results:** From 11 facilities, 53 respondents were interviewed of which the 59% were females. For Knowledge, 57% recalled at least 9 Notifiable diseases, 11% knew the T1 form required to notify. Respondents willing to participate in the NDSS were 87%. Responsibility to notify was placed other health workers other than themselves by 55% of the respondents. All facilities did not have completed T1 forms. T1 forms were available in 1/11 health facilities. Three outbreaks were reported using the Weekly Disease Surveillance System (WDSS). NDSS information was used for planning and mobilizing resources for indoor residual spraying. It costs an average \$12.15 to notify a single case, against \$1.50 if it was electronic. **Conclusion:** NDSS is acceptable, simple, flexible, unstable, not sensitive and useful. Reasons for under reporting were lack of forms, lack of induction and poor knowledge on the NDSS. The cost of operating the NDSS could be reduced if the system is electronic. T1 forms and guidelines for completing the forms should be distributed to all health facilities. On the job training of health workers through tutorials, supervision is recommended.

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Keywords

Evaluation, Notifiable Disease Surveillance, Beitbridge, Zimbabwe

1. Introduction

A Notifiable disease is one required to be reported to local government health officials when diagnosed, because of infectiousness, severity, or frequency of occurrence [1]. Surveillance can serve as an early warning system for impending public health emergencies; document the impact of an intervention, or track progress towards specified goals; and monitor and clarify the epidemiology of health problems. It allows priorities to be set and to inform public health policy and strategies [1]. In Zimbabwe, the Public Health Act established the Notifiable Disease surveillance system (NDSS) which identified 19 diseases as Notifiable. Some of the Notifiable diseases include Acute flaccid paralysis (AFP/polio), Anthrax, Brucellosis, Cholera, Diphtheria, Hepatitis (all forms), Meningococcal Meningitis, Rabies, SARS, Tuberculosis and Leprosy. According to act, Notifiable diseases should be reported using the TI form within 24 hours of diagnosis [2].

Any health worker who comes in contact with a suspected or confirmed case of a Notifiable disease should immediately notify the District Medical Officer by any fastest means possible within 24 hours of diagnosis. This is followed with a T1 form completed in triplicate. [3] The district compiles a summary of Notifiable diseases on the T2 form at the end of each month and summarizes all notifications for the month. The T2 form completed by the district should reach the provincial office by the 10th of the following month. The province summarizes all the districts T2 forms onto one Provincial T2 form, which is forwarded to the head office by the 24th of each month. A national summary is also produced [3] [4].

In 2013, Beitbridge district health services did not submit any T2 forms to the province despite 2 suspected cases of rabies being reported in the district. These cases were reported through the generic report. The District Health Information System (DHIS) has not been updated despite request by the province to update their T2 forms. A preliminary review of the 2013 surveillance meetings' minutes in the district has no mention of Notifiable Disease surveillance even when there is a suspected case warranting notification. The discrepancy in reporting of suspected rabies cases is a cause for concern to the district and provincial health management as this can result in untimely investigation and control of spread of diseases.

The study was conducted to evaluate the Notifiable Disease Surveillance System (NDSS) in Beitbridge district, during the period January to August 2014. The study specifically sets out to: describe the NDSS in District; assess the health worker knowledge on the NDSS; assess the usefulness of the NDSS; assess the NDSS attributes; determine the cost of running the NDSS; and to come up with recommendations to improve the NDSS.

2. Methods

A descriptive cross sectional study was conducted in selected health facilities in Beitbridge district. These were from both urban and rural facilities. The study population were nurses, environmental health technicians, health information officers and doctors in Beitbridge District health facilities. Beitbridge District Health Executive was the key informants. A minimum sample size of 59 health workers and 30 T1 forms were calculated. Only 53 health workers were recruited into the study.

Beitbridge District was purposively sampled into study because it is a referral facility and because the high volumes of patients they receive on a daily basis. Dilubadzimu clinic which is the only urban clinic was also purposively sampled into the study. Nine rural clinics were randomly selected using the lottery method. All nurses and EHTs on duty on the day of the interview, in the selected clinics were interviewed. At Beitbridge District Hospital, we randomly selected three nurse in each outpatients unit (OPD, FCH, OI clinic), and each of the admitting wards (male, female, paediatrics, labour) on the day of the interview, by lottery method. Two general medical officers were interviewed.

We used an interviewer administered questionnaires to health workers, and managers, structured from CDC updated guidelines on surveillance systems evaluation [5]. The questionnaires were used to collect information on the knowledge levels among the health workers and managers on the NDSS, assess usefulness, and attributes

(acceptability and representativeness) of the NDSS. We used a checklist to guide the review of T1 Notification Forms, and outbreak reports, minutes and graphs to assess for data quality, timeliness, and usefulness. Another checklist for resource availability was used to assess for system stability.

Data were cleaned for errors of entry and analyzed using Epi Info 7 to generate frequencies, means and proportions. Permission was obtained from the local health authorities, and the MPH field office, University of Zimbabwe. Informed written consent was obtained from the study participants. Confidentiality was assured and maintained throughout the study through the use of anonymous numbers that will be used to identify questionnaires, instead of interviewee names.

3. Results

From a calculated sample size of 59 respondents, we managed to interview 53 respondents. Four key informants were also interviewed. The health workers were from rural and urban health institutions. In the urban 2 facilities were selected and 9 rural facilities. The majority of the respondents came from rural facilities 32 (60%). The majority of the respondents were Female 31 (59%). The Median years of experience were 6 (Q1 = 4.5; Q3 = 19), 8 (Q1 = 6.5; Q3 = 12) and 3 (Q1 = 2; Q3 = 19) years for EHTs, PCN and RGNs respectively.

3.1. Description of the T1 Surveillance System

In Beitbridge district, the NDSS is paper based from the primary health care facilities hospital level. Whenever a health worker encounters a Notifiable disease, notification is done using T1 forms which are completed in triplicate, but sometimes in duplicate and sent to the district office as soon as possible. The district office is notified immediately by phone or radio for those facilities which have. Where there is no phone or radio, most of the Notifiable diseases would be notified using the weekly diseases surveillance system. Forms are then sent using public transport, or an EHT uses a motor cycle to take the forms to the district.

Forty percent ($n = 19$) of respondents mentioned that they used riders who collect specimen to report a Notifiable disease and send the forms to the district office. No Notifiable disease had been reported in the period under review, but key informants indicated that the T1 forms are completed in triplicate, and sent to the district medical office.

When the forms arrive at district, a summary is produced at health information department using T2, which is sent to provincial office, by the 10th of every month. The T2 information was available at the health information department. The district accesses the NDSS information at the health information department.

Feedback is through investigation of the reported cases by the district response team, and through supervisory visits. There is no written feedback to the health facilities. Disease surveillance meetings are held every week at the district, as part of an overall DHE meeting. Ninety one percent (91%) had received supervision within the last month from their supervisor. Sixty seven percent ($n = 71$) of the respondents mentioned that surveillance is discussed during visits (during the most recent visit or any other visit). However, a review of visitors log book shows that EPI diseases and TB/HIV issues are mainly discussed during visits which mean that Notifiable diseases are not discussed during support and supervision.

3.2. Knowledge of Health Workers on NDSS

The majority of the respondents were able to mention more than 9 Notifiable diseases (57%), correctly mention that the forms are filled in triplicate (53%) and the reporting timeframe of 24hours (57%). However the form required to notify was not known (42%) by the majority of the respondents whilst 47% mentioned the wrong form which was not the T1 form. Knowledge of the need to report NDs as it was a statutory requirement was high as reported by 65% of the respondents.

3.3. System Attributes

3.3.1. Acceptability

Forty six (87%) of respondents were willing to participate in the T1 surveillance system whilst 47 (89%) found the NDSS to be in line with their job description. Despite the majority willing to participate in the TI surveillance system and finding that it was in line with their duties the majority of the respondents place the responsibility on the EHT, 16 (30%), nurse in charge 13 (24.5) and 6% did not know whose responsibility it was to notify.

3.3.2. Data Quality

Thirty three (62%) of the respondents mentioned that the completed forms are checked for data quality before submission to next level. Of these 13 (41%) reported that it was the duty of the Nurse in charge to check the forms whilst 10 (31%) reported that anyone who did not initially notify could check the forms. There was however no T1 forms from all facilities sampled that were filled therefore data quality of the forms could not be verified.

3.3.3. Stability

In terms of material and human resources, there was a full establishment of doctors at the district hospital. Of the 11 EHTs only 7 were motorized. Only one facility had at least 1 T1 forms available. All facilities have one form of communication (radio, cellphones) or another however network is a challenge. **Table 1** summarizes stability attributes.

Table 1. Human and material resource availability, Beitbridge District, Zimbabwe, 2014.

Resources	Proportion Available	Comment
Human Resources		
Doctors	4/4	Some EHTs serve 2 or more stations. Only 7 EHTs are motorized
Nurses	187/201	
EHT	11/18	
T1 forms		All had measles, polio and tetanus case based investigation forms
At least 15 (notify 5 diseases)	0/11	
At least 1 form	1/11	
Communication and Transport	11/11	8 rural health facilities had cell phones. At Shabwe clinic the cellphone was stolen. Network was a challenge
Reference Material		
EDLIZ	11/11	
IDSR	1/11	
+ 5 case definition	9/11	

3.3.4. Flexibility

The majority of the respondents 47 (89%) had never filled a T1 form and did not know what it looked like. Amongst those that ever filled 6 (11%), four (4/6) reported that the form was flexible allowing for change and adding new diseases which are otherwise not on the form. The Public Health Act mentions that any disease that can be notified as per the declaration of the minister of health. SARS, and Influenza Subtype A (H1N1 and H1N5) have been added. A review of the T1 form shows that the T1 form has a section on diagnosis which is allows one to enter the diagnosis and comment.

3.3.5. Simplicity

All the four key informants said it was easy to orient staff in NDSS. Six health workers 6 (11%) said they have completed a T1 form before. The six who had filled the form included registered general Nurses (3) and primary care nurses (3). Of the 6 respondents who ever completed the form, 5/6 said they could complete the form in between 10 to 15minutes, whilst 1 completed the form in more than 15 minutes. All six respondents said completing the T1 form was easy. There was a full establishment of doctors at the District Hospital. Of the 11 EHTs only 7 were motorized.

3.3.6. Sensitivity

Three Malaria outbreaks have been reported in Beitbridge district from January 2013 to August 2014. None of these were reported using T1 forms however line lists were available. Six rabies cases have been reported according the DHIS2 however none of these were reported using the T1 forms.

3.4. Usefulness

The health worker perception on usefulness of surveillance data and evident on usefulness were checked. 52

(98%) of the health workers mentioned that the NDSS is useful.

3.4.1. Perceived Usefulness

The majority of the respondents 28 (53%) reported that the collected information was used at local level. The perceived use for the NDSS had the highest proportion for mobilizing resources 37 (70%) followed by planning 20 (39%) and the least use being for research 1 (2%).

3.4.2. Evident Use of NDSS

From the monthly compilation (T2) diseases such Malaria and chicken pox were notified however the T1 forms were not seen. All the 11 health facilities had spot maps, which targeted mainly vaccine preventable diseases (VPDs) and also malaria. Use of NDSS data for planning and mobilizing resources was noted for indoor residual spraying for malaria areas, in response to malaria outbreaks, after sharing information with respective stakeholders.

3.5. Cost of Notifying a Single Case

The cost of notifying a single Notifiable disease is determined by the cost of reproducing forms, the time taken to complete the form, the time and cost to send the T1 form to the next level and, the cost of calling the district offices. The paper based system is more expensive, averaging \$12.15, compared to where the mobile phone can be adapted to send T1 forms, \$1.55 (Table 2).

Table 2. Cost of operating the Notifiable disease surveillance system, Beitbridge, Zimbabwe, 2014.

Requirements	Paper Based System	Electronic-Mobile Phone
Reproducing T1 forms @\$0.05 per form	0.15	-
Salaries: (Assuming: Time to complete T1 form = 10 minutes, Time to send T1 form = 4 Hours, average salary of \$450.00)	5.00	0.50
Telephone bills (4 minutes)	1.00	1.00
Travelling expenses (Average \$6)	6.00	-
Total	12.15	1.50

4. Discussion

The findings of this study revealed knowledge attributes of the NDSS was average as evidenced by not more than fifty percent (average 48%) of the respondents knowing the required time frame (57%), being able to mention more than nine Notifiable diseases (57%), and appreciating that notifying is a legal requirement (65%). However only 11% knew the correct form used to notify. Not knowing the right form to use can have a resultant negative bearing on ability to timely notify diseases of public health importance.

Similar to our finding Maponga *et al.* (2011) found that knowledge was low amongst health workers in Sanyati District. According to Maponga *et al.* (2011) lack of knowledge can result in health workers having a low index of suspicion of cases of Notifiable diseases or failing to report Notifiable diseases, resulting in delayed investigations and control of outbreaks [6]. Bawa S.B, *et al.* (2003), in an evaluation of the Notifiable Disease Surveillance System in Nigeria, also found that knowledge was low amongst health workers with only 38% having heard about the NDSS [7].

Several studies in the African context including Zimbabwe have linked lack of knowledge to not having being trained or inducted in the surveillance system [6]-[10]. It is therefore possible that the poor knowledge revealed in this study could be due lack of training. In Nigeria, a quasi-experimental study reported by Bawa S.B., *et al.*, 2004, reported that training increased health worker awareness of the Notifiable surveillance system from 35.6% to 92%, completeness rose from 2.3% to 52%, and timeliness increased from 0% to 42.9% [10]. This study revealed that those trained were six times more likely to report having notified a Notifiable disease. This is similar to finding by Maponga who found that those trained in IDSR had greater knowledge on NDs and hence where

more likely to report [6].

In as much as reported acceptability was shown to be high amongst the health workers, it does not warrant or reflect good performance of the NDSS as seen in this study. Health workers are aware of the link between their duties and reporting as such are more likely to report willingness to participate. The same phenomenon was found in a similar study in Sanyati by Maponga *et al.* (2011) where acceptability was 100% but the performance remained low [6]. The low performance may be as result of other factors interplaying such as lack of reporting guidelines and the forms required notifying.

Despite the majority willing to participate in the TI surveillance system and finding that it was in line with their duties, a third of the respondents placed the responsibility to notify on other health professional other than themselves. In the United States Doyle *et al.* (2002) in an analytic literature review of the completeness of Notifiable Infectious Disease Reporting found that one of the reasons for not notifying was the assumption that someone else will notify [8].

Data quality could not be verified in this study as all the sampled health facilities did not have any filled T1 forms for the period under review. However quality checks were reported to be conducted mainly by the health manager of the health facility such as the nurse in charge. However this is contrary to public health act which stipulates that any other person who did not fill the form can do data quality checks [2] [3]. This ensures that in the absence of the health manager timely reporting is done.

Quality checks include checking that all the sections that ought to be filled are filled such as the date, date of onset, diagnosis and name of health facility. It also involves checking for any discrepancies in the form such if the date of onset is latter that the probable date of exposure. In terms of stability, there is nearly adequate staffing at all health facilities, except EHTs were in some instances one EHT has to cover other clinics. This impedes on timely pick up of community cases or tracing as the EHT might be required in be more than one place at time which is impossible. Only one health facilities had at least one T1 form. Ninety one percent (10/11) of the facilities did not have any T1 forms. Going round the facilities it was highlighted that health workers were not even aware of how a T1 form looked like and this explains why the majority of the respondents failed to identify the right form. It could also explain why some Notifiable diseases were reported using the weekly disease surveillance system.

Non availability of T1 forms can discourage a health worker from notifying, further delaying outbreak investigations. Apparent lack of notification forms was also observed in Nigeria by Bawa S, *et al.*, 2003, who reported that 92% of health facilities did not have notification forms [7]. Case based notification forms for vaccine preventable diseases (VPD's) such as Polio, Measles and those for TB and malaria were available at Beitbridge district and these can be realized as a strength that can be used to improve the NDSS. Their presence may explain that they were amongst the most mentioned diseases.

All health facilities visited had access to communication through telephone, mobile phone or radio. The availability of resources for use to assist health workers in detecting cases, and in communicating the outbreak to the next level has been found to affect reporting through the Notifiable disease surveillance system and thus affecting stability of the system. However some facilities had radios malfunctioning and cell phones stolen which would ultimately affect timely reporting.

A complex reporting system tends to discourage health workers from reporting. Six health workers in Beitbridge reported to they have ever filled a T1 form before. All six, respondents took less than 15minutes to fill it in and reported that it was easy. In Tsholotsho, Sibanda C., *et al.*, found that completing the T1 form was not time consuming and the form could be completed in less than 10 minutes [9]. Salim *et al.* (1996) in South Africa found that 55% of the doctors considered notifying too laborious as the form was complex and a recommendation was put forward to simply it [11].

In terms of sensitivity, the NDSS data in Beitbridge did not detect any outbreaks between January 2013 and August 2014. Outbreaks of malaria have been endemic in Beitbridge and these were notified using case specific notification forms. It is unclear how some cases of rabies reported on the DHIS were notified as the T1/T2 system did not show the pick-up. Sensitivity of a system can be compromised by health worker low index of suspicion and low knowledge levels.

Reported reasons for underperformance included lack of reporting guidelines, no induction and unavailability of forms. Lack of induction and guidelines has a bearing on the knowledge of the system amongst the health workers. A study in South Africa amongst doctors identified lack of knowledge of Notifiable conditions as a main contributor to under reporting. Factors influencing knowledge of Notifiable conditions and underreporting

were the accessibility and complexity of the notification form, lack of motivation because of poor feedback on reported cases, and a perception that it is useless to report Notifiable conditions [11]. Similar findings were also noted by Hashimi A.L. *et al.* (2014) in the Kingdom of Bahrain [12].

The cost of operating the T1 surveillance system is \$12.15 per single disease notification. The bigger chunk of the cost of notifying a disease is through transporting the T1 forms to the next level, at least \$6.00. This cost could be reduced by adapting to an electronic version, similar to the one being used for weekly disease surveillance, using mobile phones.

5. Conclusion

In Beitbridge district, the T1 surveillance system is acceptable, flexible and simple. The system is unstable, not sensitive and not useful. Reasons for under performance of the T1 surveillance system were lack of T1 forms, lack of reporting guidelines, and lack of knowledge of health workers on the T1 surveillance system. The cost of disease notification of a single case is unreasonably high, using the paper based system.

Recommendations

There is need to improve health worker knowledge on NDSS through induction and on job training. Notification forms should be distributed to all health facilities. Support and supervision should be conducted to ensure the NDS are notified using correct channels. Engage network service providers to put up boosters

The cost involved in notifying diseases could be reduced by adapting to an electronic version, similar to the one being used for weekly disease surveillance, using the available mobile phones in rural health facilities.

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