

Tuberculosis surveillance system evaluation: case of Ga West municipality, Ghana, 2011 to 2016

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SUMMARY

Background: Evaluate the Tuberculosis (TB) surveillance system in the Ga West Municipality to determine if it is achieving its objectives, and to assess its attributes and usefulness.

Design: Descriptive analysis of primary and secondary data

Data source: Stakeholder interviews and record reviews on the objectives and operation of the surveillance system at all levels of the system.

Intervention: We evaluated the system's operation from 2011-2015 using the Centers for Disease Control and Prevention (CDC) updated guidelines for evaluating public health surveillance systems and the World Health Organization (WHO) TB surveillance checklist for assessing the performance of national surveillance systems.

Results: The TB surveillance system in the municipality was functional and operated at all levels for timely detection of cases, accurate diagnosis, and case management. The system improved management of TB/HIV co-infections. The average time taken to confirm a suspected TB case was one day. The registration of a confirmed case and subsequent treatment happen immediately after confirmation. The municipality detected 109 of 727 TB cases in 2015 (case detection rate=15%). The positive predictive value (PPV) was 6.4%. There was one diagnostic centre in the municipality. Private facilities involvement in TB surveillance activities was low (1/15).

Conclusion: The Tuberculosis surveillance system in the Ga West Municipality is well structured but partially meeting its objectives. The system is timely, stable and acceptable by most stakeholders and useful at all levels. It has no major data quality issues. Private health facilities in the municipality should be well incorporated into TB surveillance.

Keywords: tuberculosis, evaluation, surveillance system, system attributes, Ga West

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INTRODUCTION

Tuberculosis (TB) is an infection of the lungs and other organs caused by *Mycobacterium tuberculosis*. TB is transmitted from person-to-person by droplet infection through coughing, sneezing, or spitting.¹ Tuberculosis ranks alongside Human Immunodeficiency Virus (HIV) infection as a leading cause of death globally with an estimated 9.6 million new cases occurring globally and 1.5 million deaths in 2014.² In 2014, HIV-associated TB deaths accounted for 25% of all TB deaths and one third of the estimated 1.2 million deaths from HIV/AIDS.³ In Africa, there was an estimated 2.7 million new cases of tuberculosis with 760,000 deaths in 2014 (which includes an estimated 310,000 TB deaths among HIV positive people).⁴ In Ghana, TB mortality rate was considered high at 38 per 100,000 people in 2014.⁵

The Ga West Municipality recorded high TB fatality rates of 7.3% in 2012, 2.1% in 2013, and 1.7% in 2014.⁶ Less than two-thirds (63%) of the estimated 9.6 million new cases of TB were reported to World Health Organization in 2014.² Thus, globally, about a third of the new cases went undiagnosed or were not reported. In Africa the case detection rate for all forms of TB was as low as 48% in 2014.⁴ A tuberculosis prevalence survey conducted in 2013 revealed that there were 286 cases per 100,000 population in Ghana which was higher than WHO estimates of about 92 per 100,000 population.⁵ This finding showed that there were more undetected cases than previously estimated.

The problem of low case detection has been a priority of the Ghana Health Service (GHS) and Ghana's National

Tuberculosis Control Programme (NTP).⁷ The case detection rate for the Ga West Municipality for the year 2014 was as low as 11%.⁶ This implies that the municipality could not identify several cases to put on treatment and thus break the chain of transmission.

Ghana's National Tuberculosis Control Programme (NTP) has the objectives of early detection of persons with infectious lung disease to improve chances of cure and reduce transmission of TB, and improve percentage of TB cases confirmed by microscopy.⁸ The objectives for the TB surveillance system in the Ga West Municipality are to increase case detection with innovative methods to meet national target of 70%, achieve at least 85% treatment success rate of smear positive TB cases, maintain under 1% defaulter rate, reduce fatality rate to under 1% and screen all TB clients for HIV for prompt referral into care.⁷ We therefore evaluated the Tuberculosis surveillance system in the Ga West Municipality: determine if the system is achieving its objectives; describe its attributes; and assess its usefulness.

METHODS

We evaluated the TB surveillance system's activities in Ga West Municipality in the Greater Accra Region of Ghana from 2011 to 2015. Ga West Municipality is one of the sixteen (16) districts in the Greater Accra Region with projected population of 245,224 in 2015.⁹ The Ga West Municipal Health Directorate (GWMHD) is the highest administrative authority which represents the Ghana Health Service (GHS) in the municipality.

Data Collection and Analysis

The TB surveillance system was evaluated using the CDC updated guidelines for evaluating public health surveillance systems and the WHO TB surveillance checklist for assessing the performance of national surveillance systems.^{10,11,12} The CDC updated guideline provides the steps in evaluating a surveillance system and WHO TB surveillance checklist provides benchmarks for assessing the performance of national surveillance systems. Data were collected from stakeholders involved in tuberculosis surveillance in the Ga West municipal TB Unit, facility TB units, and TB laboratory, Greater Accra Regional Public Health Division, and the National Tuberculosis Control Program using a semi-structured questionnaire comprising both close-ended and open-ended questions. In all, 40 stakeholders were purposively sampled based on their involvement in and relevance to the TB surveillance system. The following stakeholders were engaged: The Ga West Municipal Director of Health Services; the Ga West Municipal TB coordinator and three other members of the Municipal Health Management Team (MHMT) including the District Pharmacist, the District Health Information Officer and District Health Promo-

tion Officer; two medical officers in both public and private facilities; three physician assistants; four facility TB coordinators at all surveillance levels; three public health nurses; two laboratory heads; four DOTS corner nurses; five TB patients and three contacts of TB patients. Others were two managers and two monitoring and evaluation officers of the National Tuberculosis Control Program, the head of National Disease Surveillance Department, the Greater Accra Regional Health Director, the Deputy Director of Public Health Division of Greater Accra Region, the Greater Accra Regional TB coordinator and the Monitoring and Evaluation Officer for TB at the regional level.

The data gathered include purpose and objective of the system, knowledge of the case definition, use of the case definition and the availability of copies of case definition in the facilities and working areas. The indicators and datasets required to measure those indicators, data sources, methods of data collection/tools for data collection, data storage and methods of data analysis were also assessed. Data were also gathered on the flow of information, reporting mechanisms, frequency of reporting and levels of reporting, target audience, feedback mechanism and actions taken following reports. Indicators required for TB/HIV surveillance systems integration were also assessed.

Data sets at the facility, municipal and regional levels were reviewed and analysed. The sources of data reviewed were facility TB registers, district TB register, case-based forms, monthly and quarterly TB reports, laboratory registers and reports and the District Health Information Management System (DHIMS). Data analysis was done using Epi Info version 7.2.5 to assess performance indicators and attributes. The results were presented in the form of frequencies, proportions, and rates.

The performance of the system was assessed by indicating its level of usefulness. This was done by reviewing the objectives of the system and the responses from stakeholders to determine if the surveillance system was used to: detect, treat and handle contacts of affected persons appropriately, provide estimates of morbidity and mortality related to TB, detect the trend of TB in the municipality, and improve clinical and behavioural practices to help policy makers to make informed decisions regarding TB prevention and control in the municipality. We described the attributes of the surveillance system namely: simplicity, flexibility, data quality, acceptability, sensitivity, positive predictive value, representativeness, timeliness and stability. For simplicity, the structure as well as the ease of operation of the system was assessed by examining the case definition and its application, flow of data and lines of response in the system. For flexibility,

we described how the surveillance system had easily adapted to changing needs or operating conditions.

Thus, how the system had responded to new demands such as additional data sources, change in tools, and other health-related events, with little additional resources. The data quality of the system was assessed by describing the accuracy, completeness and validity of the data recorded in the TB surveillance system. The percentage of blank responses to the items on the surveillance forms and registers was determined. For acceptability, the willingness of persons and organizations to participate in the surveillance system was described. This was done by conducting interviews at the various sectors and levels of reporting in the surveillance system as well as reviewing surveillance data and report forms. The sensitivity of the system was assessed by determining the proportion of TB cases detected by the surveillance system. We also assessed the ability of the system to monitor changes in the number of TB cases over time.

The positive predictive value (PPV) was assessed by determining the proportion of reported TB cases that actually had TB infection. This was done by calculating the percentage of suspected new TB cases referred to the laboratory that had sputum smear positive results. For representativeness, we assessed how the surveillance system accurately described the distribution of TB in the municipality by time, place and person. Timeliness was assessed by determining the average time spent between reporting levels in the surveillance system against expected timelines. The time it took to complete the important steps in the surveillance systems was also determined. For stability of the system, we assessed the ability of the system to collect, manage and provide data properly without failure.

Ethical Considerations

The Director of the Diseases Surveillance Department of the Ghana Health Service granted approval for the access and use of the data for this review. Permission was officially granted by the Greater Accra Regional Director of Health Services, the Ga West Municipal Director of Health Services and the National TB Control Programme. Verbal consent was obtained from participants. All extracted data were anonymized and did not have any individual identifiers. Authorized persons solely had access to the data which was held in password-protected computers. Hardcopy data was kept under lock and key.

RESULTS

Purpose of the system

The Tuberculosis surveillance system is part of the general framework of the Integrated Disease Surveillance and Response (IDSR) system which operates within the

decentralized government health service delivery in Ghana.

The purpose of the system is to provide data as evidence base for the action of policy makers for the control and elimination of TB in the country. The legal authority for data collection at all levels of the surveillance system resides in the National Tuberculosis Control Programme (NTP) of the GHS whose mandate is to provide leadership for the health sector response to fight tuberculosis in Ghana. In the Ga West Municipality this authority resides in the Municipal Director of Health Services.

The municipality has the following health facilities: 1 hospital, 2 health centres, 4 community clinics, 12 operational Community-Based Health Planning and Services (CHPS), 62 outreach points and 15 private facilities (11 private clinics and 4 maternity homes). However, the TB surveillance system in the municipality has one diagnostic center (the Municipal Hospital), 12 public treatment centers and 1 private treatment center (Rama Maternity home). The Ga West Municipal Health Directorate (GWMHD) runs both active and passive surveillance systems for Tuberculosis.

Operation of the system

Diagnostic procedure and data collection

The TB surveillance system is well structured with standardized data collection tools. Within the communities, health officials conducted health education and community sensitization on TB. This was mostly done in churches, mosques, schools, and market places. Patients were screened at the OPDs with a new TB screening questionnaire, especially those in the at-risk populations namely pregnant women, people living with HIV, persons living with diabetes mellitus, children under five years, alcohol abusers, contacts of known TB patients, and the elderly. Those who were strongly suspected were registered into the suspect register and subsequently sent to the laboratory for confirmation. Suspicion of TB was based on the case definition. Copies of the TB case definition were available in all facilities assessed and there was adequate knowledge and use of the case definition. The TB laboratory request form (TB05) was filled for the sputum examination. TB laboratory register (TB04), kept at the laboratory was used for recording patient sputum exam results. A confirmed case was then registered by the facility TB coordinator into the facility TB register, TB03. The coordinator then filled the TB treatment card (TB01) for each registered case.

Each confirmed case was given a unique district number after the facility TB coordinator had consulted the municipal TB coordinator. The patient was then put on treatment and counselled with his/her selected treatment sup-

porter. A treatment support card was given to the treatment supporter for recording daily drug intake by the patient. The average time taken to confirm a suspected case of TB was one day.

Registration of a confirmed case and subsequent treatment usually happened immediately after confirmation. TB 07A (adult) was the form used for preparing quarterly reports on TB case registration for patients 15 years and older, whereas TB 07P (paediatric) was used for patients younger than 15 years. TB 08A and TB 08P were used for preparing quarterly reports on treatment results and outcomes. The data on these forms (TB 07 and TB 08) were aggregate data. They were filled at the DOT centres and also at the district/municipal level.

All the information on TB cases in the facility registers were then transferred into the municipal TB register by the municipal TB coordinator and these data were analysed quarterly and submitted to the regional TB unit. The regional TB Monitoring and Evaluation (M&E) officer in turn transferred data from the districts/municipalities onto an excel spread sheet, analysed the data and electronically transmitted the data quarterly to the National TB Control Programme.

Minimum data and variables

All TB patients (all case types) from all parts of the municipality as well as patients referred from other districts are included in the municipal TB surveillance data. Patient information captured include: The name, age, sex, date of registration, unit (facility) TB number, district TB number, residential address and telephone number of patient and of contacts, bacteriological results, X-ray findings and HIV status. Patient classification based on past history are recorded as New case, Transfer in, Relapse, Treatment failure, Return after default and chronic or MDR TB. Other data include disease classification (based on anatomical site of disease – pulmonary or extra pulmonary) and treatment category.

Data (information) flow/dissemination

Hard copy data are transmitted from the facility level directly to the district level without going through the sub-districts/sub municipalities. This is done monthly by the facility TB coordinators or focal persons. From the district level data are transmitted to the regional level quarterly (hardcopy) by the municipal TB coordinator. Data are sent from the regional level electronically to the national level quarterly by the regional TB Monitoring and Evaluation (M & E) officer. The regional and national levels also receive data from some NGOs when necessary.

The municipal hospital TB coordinator also sends monthly report to the hospital statistical department which in turn sends data to DHIMS monthly. The DHIMS forms for data entry were quite different from the NTP forms but that was corrected in 2015. The municipal hospital TB coordinator receives data on the drugs given to patients, from the health centres, clinics, and CHPS. The NTP indicated that they previously received only quarterly reports from the regions but since July 2015, they started using data from DHIMS entered by hospital health information officers and district/municipal TB coordinators.

They also indicated that in future, they will no longer accept data that are not sent into DHIMS. Training on data entry into DHIMS has been ongoing since July 2015. The NTP analyses all the data and reports it receives and then shares the information with WHO and The Global Fund.

Figure 1 shows how data are transmitted from one level to another within the TB surveillance system from the community level to the international level.

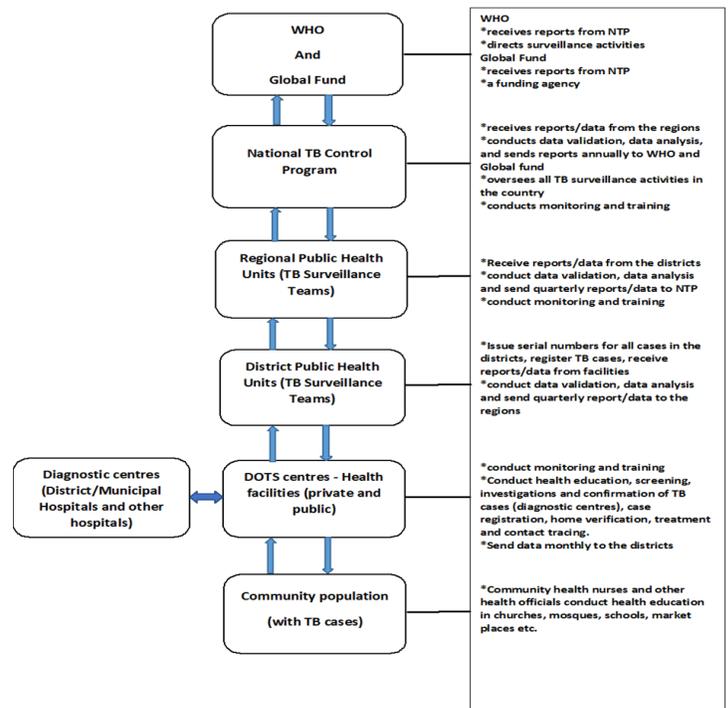


Figure 1 Surveillance data communication flow chart.

We evaluated the TB surveillance system in the Ga West Municipality. The objectives for the TB Surveillance system in the Ga West Municipality are to increase case detection with innovative methods to meet national target of 70%, achieve at least 85% treatment success rate of

smear positive TB cases, maintain under 1% defaulter rate, reduce fatality rate to under 1% and screen all TB clients for HIV for prompt referral into care. Only one of these five objectives was met in the year 2015 (the system was able to achieve a treatment success rate of 89.6%).

The system is well structured with standardized data collection tools. The system has specific roles assigned to different stakeholders and with good channels of communication. This was demonstrated in the systematic flow of data and information as well as feedback. This is similar to other TB surveillance systems in Ghana and Africa.^{13,14,15} A public health surveillance system is useful if it contributes to the prevention and control of adverse health-related events and also contributes to performance measures.¹⁶ The TB surveillance system was found to be useful at all levels in detecting and treating cases. The new TB questionnaire introduced in 2014 has increased case detection in the Ga West Municipality. TB/HIV coinfections are now being managed well at the facilities as a result of integration of the TB surveillance system with that of HIV. This is similar to the situation in the entire country. The proportion of TB patients tested for HIV in 2008 when TB/HIV activities were introduced in the country increased by fourfold in five years.⁵ The TB surveillance system in the Ga West Municipality was found to be simple, flexible, timely, stable and with no major data quality issues. However, the sensitivity of the surveillance system is low (a case detection rate of 15%), similar to findings in another study in the Nkwanta South District in Ghana.¹⁴ Even though this is an improvement over the previous year's rate (11%),⁶ there is still more work to be done as far as case detection is concerned.

The Ga West Municipal Health Directorate (GWMHD) and all stakeholders should ensure increased and appropriate use of the new TB screening tool at the various health facilities to help increase case detection and encourage more contact tracing. There is also the need to expand laboratory network and intensify advocacy, communication and social mobilization activities. This low case detection rate is a reflection of the situation in Ghana and Africa as a whole.^{5,17} The actual TB case detection rate (all forms) in Ghana for 2015 was 33% which compares poorly with the Ethiopian system which achieved a case detection rate of 71% (2015).^{5,15,18,19,20} There might be valuable practices for improved case detection that Ghana could adopt from Ethiopia.

The PPV for the surveillance system in the municipality was low (6.4%) and this must be addressed. PPV is important because a low value means that non-cases might be investigated and a high PPV will lead to prudent use of resources. The PPV can be improved if proper screening is done prior to testing for TB.

This PPV is lower compared to the general situation in outpatient departments of health care facilities in Ghana where the percentage sputum smear positive cases among those tested was 8.6% and in Uganda where the percentage sputum smear positive cases among chronic coughers in a peri-urban setting was 18%.^{13,21}

The representativeness of the surveillance system for the municipality is also low. There is only one TB laboratory in the Ga West Municipality. Hence some suspected TB patients who stay very far from the diagnostic centre may not go for confirmation at all due to long distances and financial difficulties. Some of these patients may resort to herbal medicine to treat their chronic cough and therefore may not be captured by the system - reducing its representativeness. Additional diagnostic centres will increase accessibility to TB laboratory. Hence smaller health facilities should be provided with adequate diagnostic equipment and skilled personnel to improve laboratory confirmation of TB. Household contact tracing and active case finding will also help to diagnose and treat large numbers of high-risk populations in the municipality at an earlier stage of disease, which will ultimately help to improve the representativeness of the system and reduce morbidity and mortality.^{13,22} A case of TB in a child is a sentinel event because it represents recent transmission of TB in a community.⁵ However, the contribution of children to the total tuberculosis caseload is poorly documented, especially in countries with a high burden of disease.²³

Among new TB cases, the percentage of children (<15 years) is between 5-15% in low- and middle-income countries and <10% in high-income countries.²⁴ In Ghana, cases among children constitute approximately 5% of all notified TB cases. Only 2.8% (3 cases) in the Ga West municipality in 2015 were among children compared to 13% in Southern Ethiopia.¹² All these three cases were children living with HIV, with a high index of suspicion for TB. Health providers should be encouraged to pay more attention to TB diagnosis in children.

The NTP has been operating in partnership with civil society organisations and the private sector under the umbrella of the Stop TB Partnership Ghana, to perform case finding and treatment support activities.⁵ This has contributed to increased access to TB services and has also helped improve support for patient care in the country. However, the Ga West municipal TB surveillance system is not wholly acceptable due to the low participation from the private health facilities within the municipality. This is due to lack of effective models for involving the private sectors in the DOTS. Since TB care is free, the private healthcare providers do not want to venture into it but if effective models are put in place to provide adequate support in the form of logistics needed for the diagnosis and

treatment of TB, they may be encouraged to participate actively in TB surveillance in the municipality. Hence private health facilities in the municipality should be well incorporated into TB surveillance and collaborate with the GWMHD to intensify TB surveillance activities.

DISCUSSION

We evaluated the TB surveillance system in the Ga West Municipality. The objectives for the TB Surveillance system in the Ga West Municipality are to increase case detection with innovative methods to meet national target of 70%, achieve at least 85% treatment success rate of smear positive TB cases, maintain under 1% defaulter rate, reduce fatality rate to under 1% and screen all TB clients for HIV for prompt referral into care. Only one of these five objectives were met in the year 2015 (the system was able to achieve a treatment success rate of 89.6%).

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CONCLUSION

The Tuberculosis surveillance system in the Ga West Municipality is well structured with standardized data collection tools. The system is partially effective in meeting its objectives. It is useful at all levels. The system is simple, flexible, timely, stable and acceptable by most stakeholders (with exception of private facilities). It has no major data quality issues. However, the sensitivity, PPV and representativeness of the TB surveillance system in the municipality were low and they should be improved.

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