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Original Research Article

An evaluation of tuberculosis surveillance system in a health district in Ghana

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ABSTRACT

Background: Tuberculosis remains a major global health problem. It is one of the top 10 causes of death worldwide. In Africa, there were estimated 2.7 million new cases of tuberculosis and 450 thousand deaths in 2014. In Ghana, incidence rate of TB was estimated to be 152 per 100,000 populations in 2017 according to the WHO estimates. We evaluated a health district (Ejisu-Juaben) Tuberculosis surveillance system to describe its operations, attributes, determine its usefulness and whether its objectives were being met.
Methods: This descriptive study was conducted using the Center for Disease Control and Prevention updated guidelines for evaluating public health surveillance systems and the Ghana Health Service Standard Operating Procedures for priority diseases and conditions (2012). Study participants who were purposively sampled were interviewed with a semi-structured questionnaires and dataset from January 2016 to December 2018 were reviewed at various levels of the surveillance system. Data was collected and analyzed with Epi Info 7.2 between 1st February, 2019 and 30th April, 2019.
Results: The surveillance system was useful and partially met its objectives and targets. It was well structured, simple, stable, flexible and of good data quality. It was also averagely acceptable and representative. However, it recorded poor sensitivity of 15.12% and poor predictive value positive (PVP) of 12.27% in 2018. The yearly total cost of operation of the TB surveillance system was ¢79,950.76 ($16,316.44 USD).
Conclusions: The surveillance system was useful and met its objectives partially. The sensitivity, PVP, acceptability and representativeness need improvement in order to justify its relevance.

Keywords: Ejisu- Juaben, Evaluation, Ghana, Surveillance, Tuberculosis

INTRODUCTION

Tuberculosis, primarily a disease of the lung (pulmonary) is caused by *Mycobacterium tuberculosis*. It is transmitted from a sick TB patient as a droplet infection through coughing and sneezing.[1] Inhalation of these droplets by an uninfected person may cause infection. A number of factors like HIV infection, smoking, and excessive alcohol drinking make people more susceptible to TB infections.[2,3]

Tuberculosis (TB) remains a major global health problem.[4,5] It causes ill-health in millions of people each year and is one of the top 10 causes of death worldwide.[5,6] Globally, an estimated 10 million people fell ill with the disease in 2017, resulting in an estimated 1.3 million

deaths among HIV negative persons and an additional 300,000 mortality among HIV-positive persons.[5] TB affects all countries and age groups. In 2017, best estimates were that 90% of cases were adults (aged ≥15 years), 64% were male, and 9% were people living with HIV (72% of them in Africa).[5] In Africa, there were estimated 2.7million new cases of tuberculosis and 450000 deaths in 2015. Nigeria and South Africa were the major contributors to this burden.[4]

In Ghana, incidence rate of TB was estimated to be 152 per 100,000 populations in 2017 according to the WHO estimates. The total cases notified within same year period was 14,550 with an associated mortality rate of 36 per 100,000 population.[7] In Ejisu-Juaben municipality (EJM), the number of cases of TB registered dropped from 83 in 2016 to 73 in 2018 with case detection rates of 46.6% and 40.5% respectively which are far below the national target of 70%.[8] The case fatality of TB in the municipality was 3.6% in 2016 with only 50% TB cases screened for HIV. This worsened the TB/HIV co-infection management and outcomes.[9]

Public Health Surveillance-defined as the systematic collection, analysis, interpretation, dissemination, and application of health data to a public health problem is seen as an important step in disease prevention and control with TB, not being an exception.[10] TB surveillance is expensive in terms of both personnel and logistics; therefore, regular evaluation of its usefulness and attributes is essential especially the Ejisu-Juaben TB surveillance system that has never been evaluated since its establishment.

This evaluation study was therefore carried out to review the performance of the existing TB surveillance system in the EJM, identify its challenges and propose recommendations to help improve its operations and efficiency.

METHODS

Study site

EJM (split into Ejisu and Juaben Municipalities in late May, 2018) was one of the municipalities in the Ashanti region of Ghana with its capital at Ejisu. The 2000 National Population Census put the population of the Municipality at 124,176 comprising 59,286 males with an average growth rate of 2.5% per annum. The municipal area has eighty-four (84) settlements out of which five (5) were classified urban. Health care in the EJM was delivered through 29 public and private health facilities made up of eight (8) Hospitals (both public and private) and four (4) Health Centers. For purposes of health administration, the health directorate divided the municipality into five sub-municipalities namely Ejisu, Onwe, Juaben, Bomfa and Achiase. Aside the major urban settlements, majority of the road networks at the sub-municipality are untared, making accessibility to major hospitals a bit difficult.

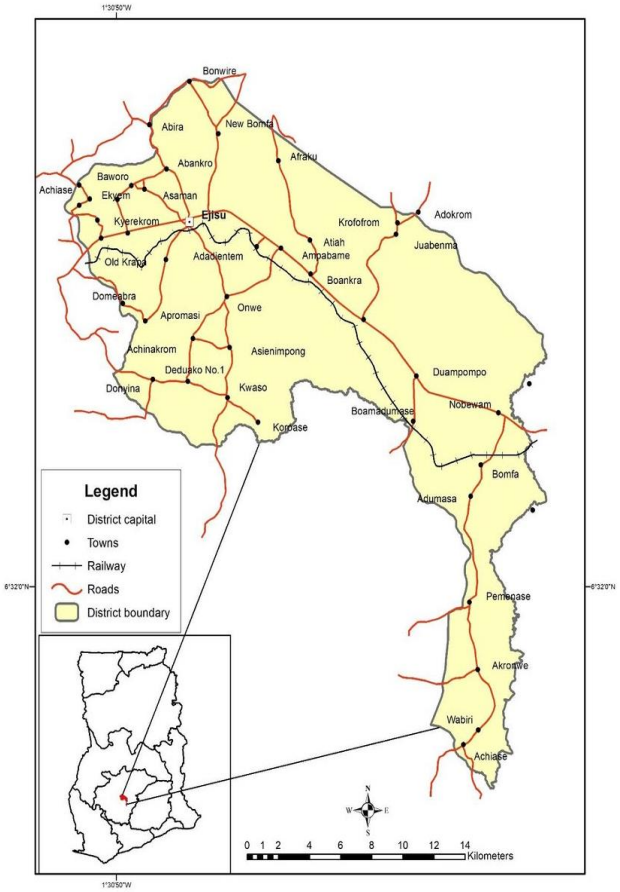

Figure 1: Map of study site, Ejisu Juaben municipality.

Study design and study type

This was a descriptive study that involved the collection of both quantitative and qualitative data. We used the Center for Disease Control and Prevention (CDC) updated guidelines for evaluating public health surveillance Systems and the Ghana health service standard operating procedures for priority diseases and conditions (2012) to conduct this survey.[11,12]

Study participants and sampling

The study participants were 30 stakeholders in the Ejisu-Juaben TB surveillance system who were recruited purposively based on their involvement in and relevance to the TB surveillance system. They were identified at the Ejisu-Juaben Municipal Health Directorate (EJMHD) and five health facilities that were serving as TB treatment centers in the municipality. Five participants were recruited from each of the TB treatment centers through simple balloting of names. At each facility, the cadres of staff included medical officers, physician assistants, pharmacist/pharmacy technicians, disease control

officers, community health nurses, x-ray technicians and health information officers. Over-the-counter chemical sellers and community based surveillance volunteers were also interviewed to document their experiences with the operations of the system.

Data sources and collection

A semi-structured questionnaire was administered by interviewer to health staff (stakeholders) involved in the TB surveillance activities. Again, we extracted data from records such as cough registers, laboratory and x-ray request forms, laboratory registers, treatment cards, facility TB registers, Municipal TB register, monthly and quarterly TB reports and District Health Information Management System 2 (DHIMS II) database. The TB annual reports (2016-2018) for EJMHD were also reviewed. The quality of data was determined by comparing entries in the facility TB registers with those in the Municipal TB registers and DHIMS. Data were collected between 1st February, 2019 and 30th April, 2019.

Data analysis and security

Data obtained were entered into Microsoft Excel 2016 and transported to Epi Info version 7.2 for analysis to generate frequencies and percentages. Incidence for 2018 was calculated using projected municipal population from the national population census data of 2010 for the Municipality. Attributes that we assessed included simplicity, timeliness, representativeness, flexibility, acceptability, predictive value positive (PVP), sensitivity and usefulness. For sensitivity, positive predictive value and timeliness, frequencies and percentages were used. Attributes with scores greater than 60% were ranked as good, those between 51% and 60% were ranked as average and those below 50% were ranked poor. Data were stored under laptops with passwords with only the lead investigator having full access.

Ethics

Approval for this study was granted by the public health training programme, run by both the Ghana Health Service and the Ghana College of Physicians and Surgeons. Permission was officially sought from the Ejisu-Juaben Municipal Director of Health Services to assess the surveillance system and for the use of the data. Verbal consent was obtained from interviewees without any form of coercion.

RESULTS

Purpose and operations

Stakeholders knew that TB surveillance is part of the Integrated Disease Surveillance and Response framework that classify TB as a notifiable disease with the legal mandate of data collection vested in the national tuberculosis control program (NTP).

Case definitions[1]

The following case definitions were used at the various facilities.

Suspected case: Any person with a cough of 2 weeks or more.

Confirmed case: Smear-positive pulmonary TB: a) a suspected patient with at least 2 sputum specimens positive for acid-fast bacilli (AFB), or b) one sputum specimen positive for AFB by microscopy and radiographic abnormalities consistent with active PTB as determined by the treating medical officer, or c) one positive sputum smear by microscopy and one sputum specimen positive on culture for AFB.

Smear negative PTB: a patient who fulfills all the following criteria. Two sets taken at least 2 weeks apart of at least two sputum specimens negative for AFB on microscopy, radiographic abnormalities consistent with PTB and a lack of clinical response despite one week of a broad spectrum antibiotic, a decision by a physician to treat with a full course of anti-TB chemotherapy, or a patient who fulfills all the following criteria: severely ill, at least two sputum specimens negative for AFB by microscopy, radiographic abnormalities consistent with extensive pulmonary TB (interstitial and miliary), a decision by a physician to treat with a full course of anti-TB chemotherapy, or a patient whose initial sputum smears were negative, who had sputum sent for culture initially, and whose subsequent sputum culture result is positive.

Objectives and targets of the surveillance system

The objectives of the TB surveillance system are to detect early persons with infectious lung disease and treat promptly to improve chances of clinical improvement and reduce transmission of TB. It is also to improve percentage of TB cases confirmed by microscopy. The municipal health directorate's performance targets were: smear positive case detection rate of at least 70%; treatment success rate of at least 90%; offer routine HIV testing to 100% of TB clients; attain cure rate of at least 85% of sputum positive TB clients; reduce the TB adverse treatment outcome to below 2%; and finally put at least 80% of all TB/HIV co-infected clients on co-trimoxazole treatment.

Data collection, analysis and flow within the TB surveillance system

At the community level, community based surveillance volunteers and over-the-counter medicine sellers have been trained to identify those presenting with signs and symptoms of TB using simple case definitions. They referred suspected cases to the health facility for further screening and care and document same in their community based surveillance (CBS) registers. The

disease control officers at the sub-municipality reviewed these records on monthly visits to the community.

Data collection at the facility level involved clients who reported to the hospital with whatever condition. They are screened with a predetermined screening tool by the task shifting officer or TB focal person. A single task shifting officer was available in the entire EJM stationed at Ejisu Government Hospital. Other cadres of staff like the disease control officers, enrolled nurses, etc. perform this function in the other facilities to various degrees. The Ejisu, Onwe and Juaben Government Hospitals actively use the TB screening tool. There were no evidence of its use at Bomfa and Achiase Health Centers.

All suspected cases of TB were referred to the nearest TB diagnostic center for confirmation either within or outside the health facility it was suspected from depending on their capacity. Suspected TB cases were confirmed with sputum microscopy tests. The laboratory keeps records of all the sputum screening in the laboratory TB register which is periodically reviewed by the regional TB focal person/team on monitoring. All confirmed cases in the facility are registered in TB register. Patient information captured included the name, age, sex, address of location, address of contact person, sputum microscopy results (at presentation, at 2nd and 5th months of treatment), x-ray findings, patient classification, disease classification, treatment outcome and HIV status. A treatment card was subsequently filled for each case and a unique identifier given. Home verification and treatment supporter was usually demanded before initiation of treatment. Follow up sputum microscopy was carried out at 2 and 5 monthly to monitor progress of treatment.

Information flow/dissemination within the system

All the information on TB cases in the facility registers are transferred into the municipal TB register by the municipal TB coordinator on monthly basis after receipt of such reports from the facilities. These could be through the Whatsapp or hard copies. These data are analyzed quarterly and submitted to the regional TB unit via Whatsapp and DHIMS 2 entries. The regional TB coordinator on quarterly basis aggregated and analyzed all the data from the Metropolitan/municipal/district health directorates within the region for onward submission to the National TB control Programme electronically. The NTP subsequently shared the data with World Health Organization and the feedback follows the same loop downwards.

The flow chart in Figure 2 shows how data is transmitted from the community to the international levels and vice versa.

Resources used for system operations

The TB surveillance system is run alongside other surveillance systems in an integrated manner. It shares resources allocated to all surveillance activities in the municipality both in terms of personnel, facilities and logistics. Majority of its budget is funded by the Global Fund through the NTP, which has been dwindling for some years now. The Government of Ghana pays the monthly salaries of all the workers in the government facilities.

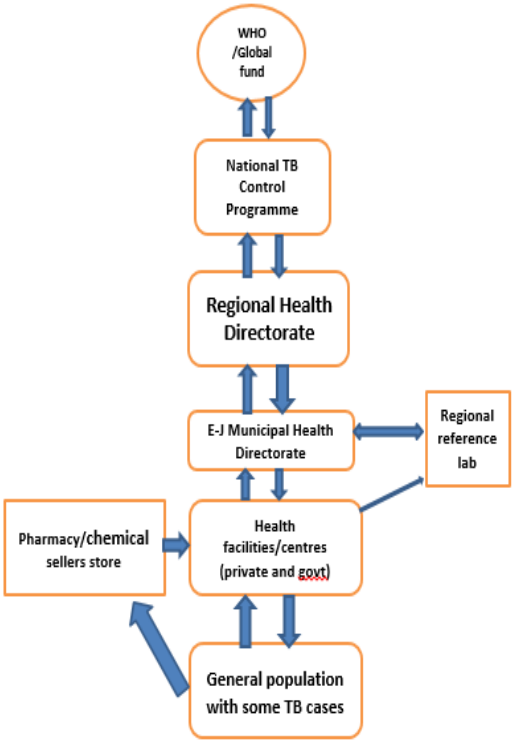

Figure 2: Flow chart of the health district (Ejisu-Juaben Municipal) TB surveillance system.

The estimated yearly costs on personnel and conducting various TB surveillance activities in the Ejisu-Juaben municipality were ¢47,789.76 ($ 9,753.01) and ¢9,060.00 ($ 1,848.98) respectively. The yearly material cost needed for the system's operations was ¢23,101 ($4,714.49). The estimated total cost of operation annually was ¢79,950.76 ($16,316.44). Details of these estimates are shown in the Tables 1-3.

Performance of the system

Usefulness of the system

The introduction of the screening tool at outpatient department, wards, HIV and diabetes clinics, etc. was to help improve case detection. A task shifting officer was employed at the OPD to help execute the screening of the clients at Ejisu Government Hospital. Cure and treatment success rates have been over 90% and 95% in 2016 and 2017, above national targets of 85% and 90% respectively. Table 4 shows the expected and actual performance for some of the TB surveillance indicators for the EJM from 2016-2018.

Table 1: Estimated monthly personnel cost of operating the Ejisu Juaben Municipal TB surveillance system, 2016-2018.

Level	Personnel	Number available	Cost of an hour of work based on salary (GHS)	Approx. time spent on TB related work per week (hrs)	Time spent on system per month (hrs)	Personnel time per month (person-hrs)	Total cost per month (GHS)
Community	CBSV	50	-	-	-	-	Nil
Health Facilities	Institutional TB coordinators (DCOs)	5	18.59	2	8	40	743.6
	CHN/CHO	40	9.06	0.5	2	80	724.8
	Doctors	5	32.50	1	4	20	650.0
	pharmacist	3	19.89	0.5	1	3	59.67
	Physician assistants	10	11.88	1	4	40	475.2
	Pharmacy Technician	6	13.96	1	4	24	335.04
	X-ray technicians	2	8.71	1	4	8	69.68
	Biomedical scientist	4	19.89	1	4	16	318.24
	Laboratory Assistant	3	13.05	1	4	12	156.6
	Health information officers (Technical officer)	3	13.96	1	4	12	167.52
Municipal Health Directorate	MDHS	1	37.50	1	1	1	37.50
	MPHN	1	30.81	1	1	1	30.81
	Municipal TB coordinator (DCO)	1	18.59	2	8	8	148.72
	Health Information officer (technical officer)	1	13.96	0.5	2	2	27.92
	Disease control officer	1	18.59	0.5	2	2	37.18
Total		136					3,982.48

Source: Field data, 2018

Table 2: Estimated yearly cost of conducting various TB surveillance activities in the Ejisu Juaben Municipality.

Activity	Quantity/No. of persons	Frequency	Unit cost/GH₵	Total yearly cost (GHS)
Regional quarterly review meeting	10	4	600	2400
Municipal biannual review meetings	20	2	640	1280
Meeting with CBSV	50	1	500	500
Contact Tracing	15	5	20	1500
Defaulter tracing	2	5	20	200
Training for CHOs in TB case detection and management	20	2	5	1100
District monitoring and supervision	4	4	20	2080
Total				9,060

Source: Field Source, 2018

Table 3: Estimated yearly cost on materials and logistics for the Ejisu Juaben Municipal TB surveillance system.

Items	Quantity	Cost /per unit GHS	Total Yearly Cost (GHS)
Photocopies of forms, registers, cards, etc.	-	-	1,547
Reagents	-	15,000	15,000
Sputum containers	1500	1	1500
X-ray papers/printing	234	15	3510
Cardboards/cabinets for storage of files	5	250	1250
Files for keeping records(2per facility)	10	18	180
Pens (2 per month per facility)	120	1	108
Ruler (1 per facility)	5	2	6
Total			**23,101**

Source: Field data, 2018

Table 4: Expected and achieved targets for some TB surveillance indicators for Ejisu Juaben Municipality, 2016-2018.

Indices	National targets (%)	2016 (%)	2017 (%)	2018 (%)
No. of cases registered		83	95	73
Case detection rate (new smear positives)	70	46.6 (83/178)	54 (95/177)	40.5 (73/180)
Cure rate	85	98.0	94.3	*
Treatment success rate	>90	96.4	95.7	*
Default rate	<1	0	0	*
Fatality rate	<1	3.6	3.2	*
Treatment adverse rate	<10	3.6	4.2	*

*will be due for evaluation or calculation ending of 2019.
Source: Field data, 2018

Sensitivity

The total number of cases detected in 2018 was 75 whiles the expected number cases to be detected was 290 per 100, 000 population.[13] Using a total estimated population of 170,909 in 2018, the expected cases to be detected were 496 cases

Sensitivity =75/496×100

Sensitivity = 15.12 % for 2018

PVP

Number of cases confirmed at the laboratory over 3 year period= 254

Number of cases referred to the lab over the period=2070

PVP = Number of suspected cases confirmed at the lab (new smear positive cases)

Total number of new suspected cases referred to the lab,

PVP = 254 / 2070 ×100 = 12.27%

Data quality

The completeness of data was 70.5% and 91.5% accuracy for the TB system in the municipality. Table 5 shows completeness of specific variables in the TB registers.

Timeliness

The average duration between developments of symptoms to reporting to health facility was 27.8 days, from contact with clinician to confirmation of disease was 4.6 days and from confirmation to reporting at the municipal health directorate was 38.4 days.

The average rate of reporting and percentage timeliness for the Ejisu-Juaben Municipality was 98.3% and 97.2% respectively.

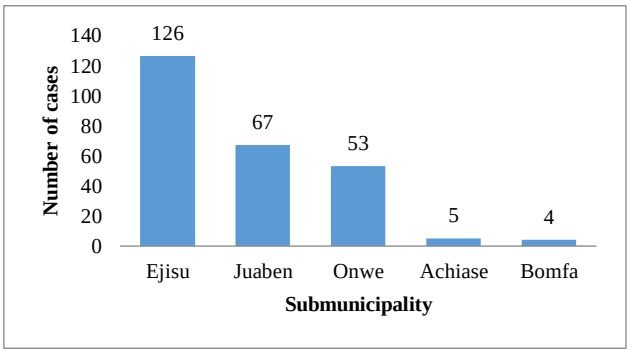

Figure 3: Geographic distribution of TB cases in Ejisu Juaben Municipality, 2016-2018.

Table 5: Percentage completeness of specific variables in the TB registers for the various TB treatment centers and municipal health directorate, Ejisu-Juaben Municipality, 2016-2018.

Variables/Sub-municipal	Ejisu (n=126)	Juaben (n=67)	Onwe (n=53)	Achiase (n=5)	Bomfa (n=3)	Municipal (n=254)
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Age	126 (100.0)	67 (100)	53 (100)	5 (100)	3 (100)	254 (100)
Sex	126 (100.0)	67 (100)	53 (100)	5 (100)	3 (100)	254 (100)
Address of patient	125 (99.2)	67 (100)	51 (96.2)	5 (100)	2 (66.7)	250 (98.4)
Address of contact person	120 (95.2)	67 (100)	53 (100)	5 (100)	3 (100)	247 (97.2)
Disease classification	126 (100)	67 (100)	53 (100)	5 (100)	3 (100)	254 (100)
Type of patient	125 (99.2)	63 (94.0)	53 (100)	5 (100)	3 (100)	248 (97.6)
Chest x-ray	40 (31.8)	27 (40.3)	8 (15.1)	5 (100)	0 (0)	53 (20.9)
First sputum smear	90 (71.4)	66 (98.5)	48 (90.6)	5 (100)	3 (100)	211 (83.1)
Second sputum smear	22 (17.8) *123	20 (30.8) *65	21 (42) *T=50	4 (80)	1 (33.3)	42 (17.1) *T=245
Last sputum smear	14 (12.5) *112	15 (25) *60	19 (38) *50	1 (20)	1 (33.3)	185 (81.9) *T= 226
Treatment category	122 (96.8)	67 (100)	53 (100)	5 (100)	3 (100)	232 (90.9)
HIV Result	125 (99.2)	66 (98.5)	50 (94.3)	5 (100)	3 (100)	73 (28.7)
Date HIV Screening	124 (98.4)	65 (97.0)	50 (94.3)	5 (100)	3 (100)	250 (98.4)
Receiving enablers package provided	29 (23.0)	17 (25.4)	5 (9.4)	5 (100)	1 (33.3)	68 (26.8)

*Expected total eligible clients as at the time of evaluation; Source: Field data, 2018

Representativeness

Majority of the cases were within the age group of 45-54 years (27.9%). Three cases representing 1.2% of the total cases were <15 years. The elderly, sixty-five years and above were 25 (9.8%) and more males were affected 167 (65.7%). Cases were reported throughout the three year period under review with most cases detected in 2017 (97 cases). Only one private health facility had contributed to the detection of cases over the period under review and had data to show on TB activities. Figure 3 below shows the geographic distribution of the cases detected from 2016-2018.

Simplicity

The system has a simple case definition that is widely known by majority of the users of the system (93.3%). The flow of information from one level to the other in the system was not complicated. Almost a half of respondents (43.3%) reported to only one office for the next higher level whiles the rest report to two offices at the next level. The tools for registration and reporting are simple and easy to use and it takes an average of 6-10 minutes for most stakeholders (46.7%) to fill TB suspected case forms.

Flexibility

The Ejisu-Juaben surveillance system was seen as flexible by most of its users. The case definition in vulnerable populations like those with HIV was updated to be cough of more than 24 hours and it got on smoothly with the users. Again, the introduction of GeneXpert for MDR diagnosis and the screening tool seamlessly got on board without much difficulty. HIV and TB surveillance activities were also being run well in an integrated manner now.

Stability

There was not frequent attrition of the staff working within the surveillance too as over 60% of respondents affirmed the rate of change/attrition of their former co-workers was more than three years. Logistics were generally provided for the system to run. However, limited funding for contact and default tracing occasionally occurred. The remuneration of the formal staff of the system was paid throughout the period under review.

DISCUSSION

Usefulness

The TB surveillance system in the Ejisu-Juaben Municipality was found to be useful by providing data to assess and monitor the TB control Programme. It was able to detect cases throughout the period under review and has been able to perform above targets in terms of the cure and treatment outcome rates. This is similar to the findings of Kasu in his evaluation of TB surveillance system in Akatsi.[14] Again, the TB system had contributed to improved case management evidenced by the

consistently zero default rate. This is partly a reflection of the confidence the client have in the system in terms of provision of adequate and quality care. More so, the system has helped improve the HIV care by ensuring the screening of almost all TB cases for HIV as a result of the integration of the TB surveillance system with that of HIV. This has contributed to the improved case detection among those with HIV/AIDS and is consistent with country wide finding as the proportion of TB clients counseled and tested for HIV has risen steadily from 17% in 2006 to 82.7% in 2015.[15] The system has also informed management in resource allocation and management evidenced by the engagement of a task shifting officer.

Poor sensitivity

Sensitivity of the Ejisu-Juaben TB Surveillance system was found to be poor for all the years under review. The poor sensitivity of this system was similar to the findings of Frimpong-Mansoh et al in their evaluation survey of TB surveillance system in the Ashaiman municipality of Ghana (27.2%).[16] The poor sensitivity is realty a worrying trend and it may reflect the inability of healthcare workers to do extensive contact tracing to screen community members. The low usage of the screening tool at the Bomfa and Achiase could have contributed to the poor sensitivity too.

Poor PVP

With a poor PVP of 12.27%, the EJMHD would be spending more resources on samples or cases not qualified and hence would make the TB system expensive to run. The poor PVP is similar to the situation in the entire country with the current actual smear positive cases detected by the surveillance system being 30 per 100,000 populations instead of the expected 111 per 100,000 populations according to the 2013 TB prevalence survey in Ghana.[13] It is surprising that despite the high knowledge of case definition among stakeholders, PVP was low.

Good data quality

The high data completeness and accuracy levels could be a clear pointer to the commitment level of the personnel involved in the day to day running of the system and a good integration between the HIV and TB care. The TB surveillance system has no major data quality issues due to systematic data validation for accuracy and completeness at the municipal level and periodic data review during supervisory monitoring visits. Quality data characterizes a number of TB surveillance systems in Africa as documented by Heidebrecht et al in Cape Town and Greene in Sierra Leone.[17,18]

Poor timeliness

Timeliness of reporting was varied. Taking approximately a month to report TB symptoms to a health facility was not good. The period is long enough to facilitate massive transmission of the disease to contacts unknowingly. The mean number of days from presentation to confirmation (4.6 days) was a reflection of two treatment centers that do not have diagnostic units and hence is taking them longer days to get their diseases confirmed. Onwe Government Hospital has a TB diagnostic unit but only one laboratory scientist who can examine the TB slides, and hence in his absence, the confirmation usually delays. The average rate of reporting and notification was however good (above 90%) which is converse to the situation in Nigeria as reported by Aruna et al in 2018 where notification is very low, a reflection of weakness in recording and reporting within public systems or lack of knowledge about mandatory TB case notification among health service providers.[19]

Average acceptability

The TB surveillance system of the Ejisu-Juaben municipality can be said to be of average acceptability. This is evidenced by the high reporting rate and percentage timeliness of reporting to the municipal health directorate in the government facilities mainly. Limited involvement of the private facilities remains a challenge.

Average representativeness

The surveillance system was generally averagely representative. The percentage of children under 15 years diagnosed with TB for the three years under review was only 1.2%, far less than 8-10% of the national estimates.20 The male gender was more affected which was consistent with the national findings by National Tuberculosis Control Programme.[20] The remote areas like Achiase and Bomfa sub-municipals without diagnostic units makes case identification a bit difficult in those facilities. Not surprisingly, Achiase could detect only few cases throughout the three years under review, a similar finding documented by Adomako et al in their evaluation of the TB surveillance system of the Ga West Municipality in the Greater Accra Region.[21]

Good stability

The TB surveillance system was robust to withstand the numerous challenges of dwindling finances, power outages, diagnostic tool breakages, etc. The system's heavy dependence on external funding is potential source of instability.

CONCLUSION

The tuberculosis surveillance system was found to be good, well-structured and useful. It had contributed to improved clinical practice and informed resource allocation and management. It was found to be simple, stable, flexible and average acceptability. Data quality as a whole was good. There is the need for improvement on the sensitivity, PVP and representativeness.

We recommend that NTP with the help of the EJMHD should set up a diagnostic unit at Bomfa and Achiase sub-municipality, ensure the usage of the screening tool at Bomfa and Achiase sub-municipalities and organize community durbars to educate the populace on the need for early reporting to the hospital to minimize transmission and improve treatment outcome. Health facilities should conduct periodic on the job training for health staff on TB diagnosis and management. Finally, the EJMHD should ensure the participation of private facilities in TB surveillance by collaborating with Health Facility Regulatory Agency to make it a requirement for renewal of certificate for operating health facilities.

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