Texila International Journal of Public Health
ISSN: 2520-3134
DOI: 10.21522/TIJPH.2013.08.03.Art005

Evaluation of Tuberculosis Surveillance System Nasarawa State, North Central, Nigeria, 2015

Ubong A. Okon[1], M. Balogun[1], Baffa Sule[1], A. Olayinka[1,3], P. Nguku[1]
[1]*Nigeria Field Epidemiology and Laboratory Training Program, Abuja, Nigeria*
[2]*University of Maryland, Abuja Nigeria*
[3]*Nigeria Center for Disease Control Abuja Nigeria*
**Corresponding Author: itdo4christ@yahoo.com*

Abstract

Introduction: *Evaluation of a surveillance system is the systematic investigation of the merits and public health significance of a system. The objectives were to describe the process of operation of the TB surveillance system in Nasarawa state, assess its key attributes, identify gaps, and make appropriate recommendations to improve the effectiveness and efficiency of the system.*

Methods: *We used US-CDC updated Guidelines for evaluating public health surveillance systems. We identified 40 stakeholders using a purposive sampling method and conducted a key informant interview to collect relevance information on the surveillance systems attributes such as usefulness, simplicity, flexibility, data quality, predictive value, sensitivity, representativeness, acceptability and stability. We also reviewed relevant tuberculosis surveillance data on Tuberculosis cases finding from 2012 to 2014.*

Result: *A total of 8067 cases of presumptive tuberculosis were reported from 2012 to 2014 with 53% (4286) positive for all forms of tuberculosis. Age groups 15–54 constitute about 81% of all forms of TB cases in the state. The standard case definition was well-utilized. Stakeholders with the wiliness to continue with the system accounted for 97.5%, 85% of the stakeholders interviewed were able to adapt to changes, 80% of the reported data were completely and correctly filled. Sensitivity was 17.60% while the Predictive Value Positive was 20.3% and timeliness was 72%.*

Conclusion: *The Nasarawa State TB Surveillance System is still meeting its objective. TB Surveillance System is simple, flexible, acceptable to stakeholders, generates quality data however it has low sensitivity, low positive predictive value and less representative of the general population.*

Introduction

Tuberculosis (TB) is a public health problem caused by *Mycobacterium tuberculosis complex*. It is more common in developing countries and the disease is associated with poverty, poor housing statue and overcrowding [1,2,3,4]. It affects mostly the lungs and other part of the body [5,6]. TB is spread from person to person through the air containing the bacilli from the cough, sneeze or spit of an untreated PTB patient. People's ill with TB can infect up to 10-15 persons through close contact [7] Tuberculosis (TB) remains ninth leading causes of death in the world especially among HIV patients [8]. One third of the world's population is estimated to be infected with *Mycobacterium tuberculosis*, the causative agent of TB [9]. Globally in 2013, 1.5 million people died from tuberculosis out of 9 million that fell ill with tuberculosis with 50% of the death recorded among women and 360,000 deaths recorded among HIV positive patients [9]. Deaths among MDR-TB patients in 2013 were 210 000 among 480,000 who developed MDR-TB [9] In 2015, there were an estimated 10.4 million new (incident) TB cases worldwide, of which 5.9 million (56%) were among men. People living with HIV accounted for 1.2 million (11%) of all new TB cases [9]. There were an estimated 1.4 million TB deaths in 2015 including 0.4 million deaths among people living with HIV [9,10]. There was a significant decline in TB deaths with 22% between 2000 and 2015 however TB remained the top 10 causes of death worldwide in 2015[9,10]. In 2015, there were an estimated 480 000 new cases of multidrug-resistant TB (MDR-TB)

Worldwide, the rate of decline in TB incidence remained at only 1.5% from 2014 to 2015 [9,10].

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health [11]. Data disseminated by a public health surveillance system can be used for immediate public health action, program planning and evaluation, and formulating research hypotheses. The purpose of evaluating public health surveillance systems is to ensure that problems of public health importance are being monitored efficiently and effectively [12]. TB surveillance data are essential to evaluate the effectiveness of TB control programs, identify deficiencies, and design and assess interventions. Surveillance data are also critical in advocacy efforts and in acquiring and allocating resources. Inadequate data quality may impair our understanding of the true epidemiology of Tuberculosis, compromise core program functions, and undermine our ability to meet program objectives and goals. Therefore, the availability of accurate and complete TB surveillance data provides an essential tool for local, state, and national efforts to control and eliminate TB in the country. The surveillance system detects new disease patterns, outbreaks, population at risk and enhanced targeted intervention such as testing, treatment and prevention. Tuberculosis surveillance systems will also identify strength and weakness of the systems and provides recommendations for improvement.

Tuberculosis surveillance system in Nigeria is coordinated by the national tuberculosis and leprosy control program (NTBLCP). NTBLCP is the joint responsibility of the federal, state and local governments. Thus, the organizational structure of the NTBLCP extends through all the 3 tiers of government namely: Federal, state and local government. Therefore, Nasarawa State Tuberculosis and leprosy control program is responsible for tuberculosis surveillance in Nasarawa State and key personnel saddled with the responsible of tuberculosis surveillance system includes Health workers at DOTS centres, LG TBL supervisors, LG M&E/DSNO, laboratory scientists at both the State and LGA TB Diagnostic centre, State TBLCO, State Epidemiologist, State DSNO, and HMIS Officer. The NSTBLCP works closely with the State HIV control programme in the collection of data on TB/HIV dual infected individual. The programme at LGA level is integrated into the Primary Health Care (PHC) system, and the PHC workers (general health workers) at the health centres are expected to make diagnosis of smear positive TB cases and start treatment and refer them to the TBL supervisor. Tuberculosis surveillance system gathers data of TB program specific indicators which include age, sex, laboratory result, case classification, treatment outcome, TB/HIV etc. Data are collected at facility level through DSNO, LG TBL supervisors, analyse and transmitted to the State and National level on Monthly and Quarterly basis. Nasarawa State has a total of DOTS centre (Public, Private) and TB Diagnostic centre across the 13 LGAs in the State [13]. The health workers at the health facility are expected to make diagnosis of smear positive TB cases and initiate tuberculosis treatment and submit their facility TB data to the TBL supervisor. Smear negative and extra-pulmonary TB cases and children with presumptive TB are expected to be referred to a trained clinician for further diagnosis.

The Nasarawa State TB surveillance system is supported by State and Local Governments with technical and financial support by the Federal Ministry of Health and development partners, (German Leprosy Relief Association (GLRA), International Federation of Anti-Leprosy Association (ILEP), Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and World Health Organization (WHO). The State Epidemiologist and DSNO are staff of the State Ministry of Health while the LG TBL Supervisor, DSNO, and PHC workers at DOTS centers are staff of the Local Government [13]. The logistic support for TB surveillance activities for the State and LG officers was provided mainly by ILEP/ GFATM. World Health Organization (WHO) also provides monthly stipend for the LG DSNO to support surveillance activities at the LG level.

Chart TB Surveillance: The process of TB surveillance and TB Surveillance Data flow in Nigeria **of** are illustrated in Figures 1 and 2 respectively.

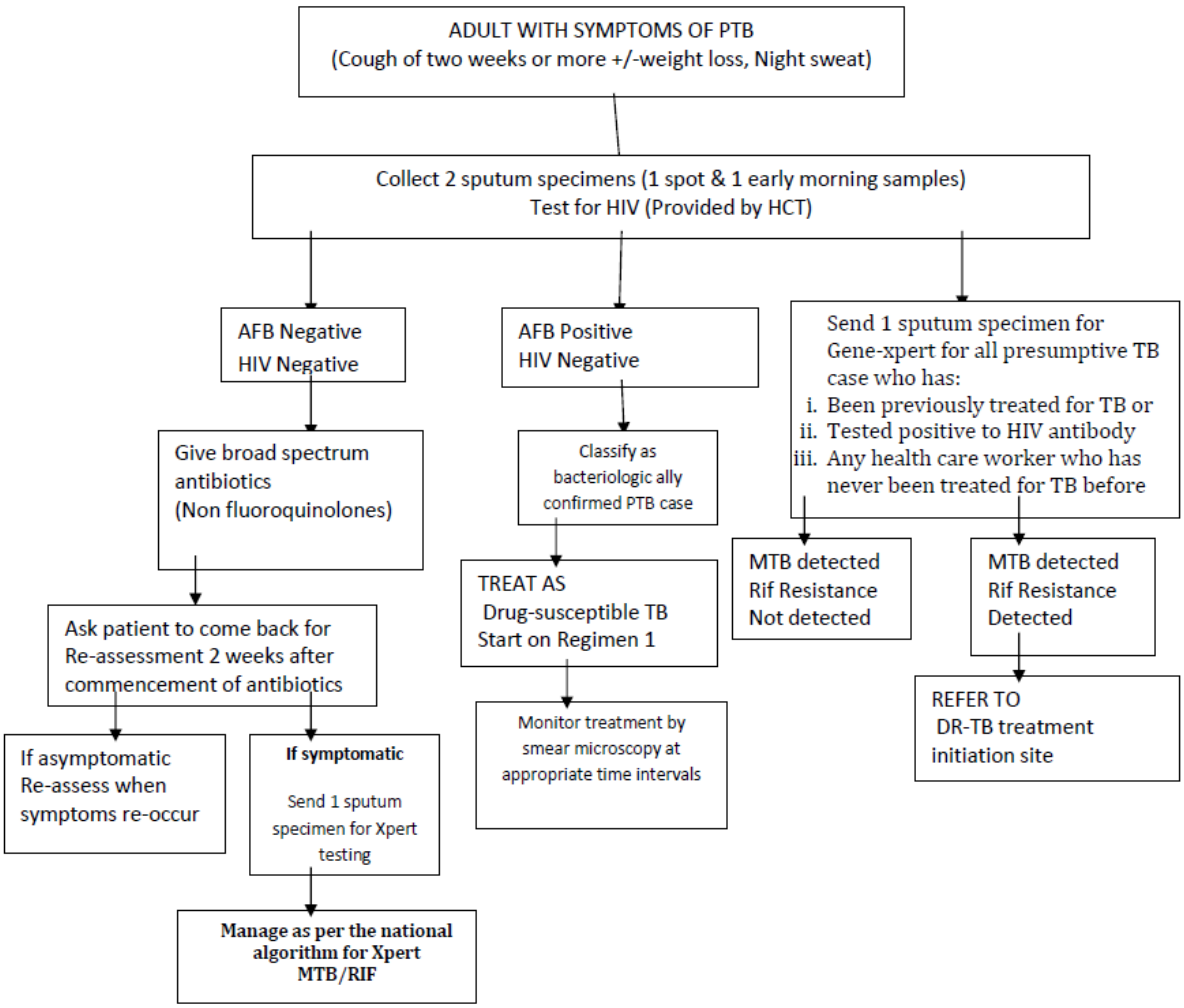

Figure 1. The TB Surveillance Process in Nasarawa State

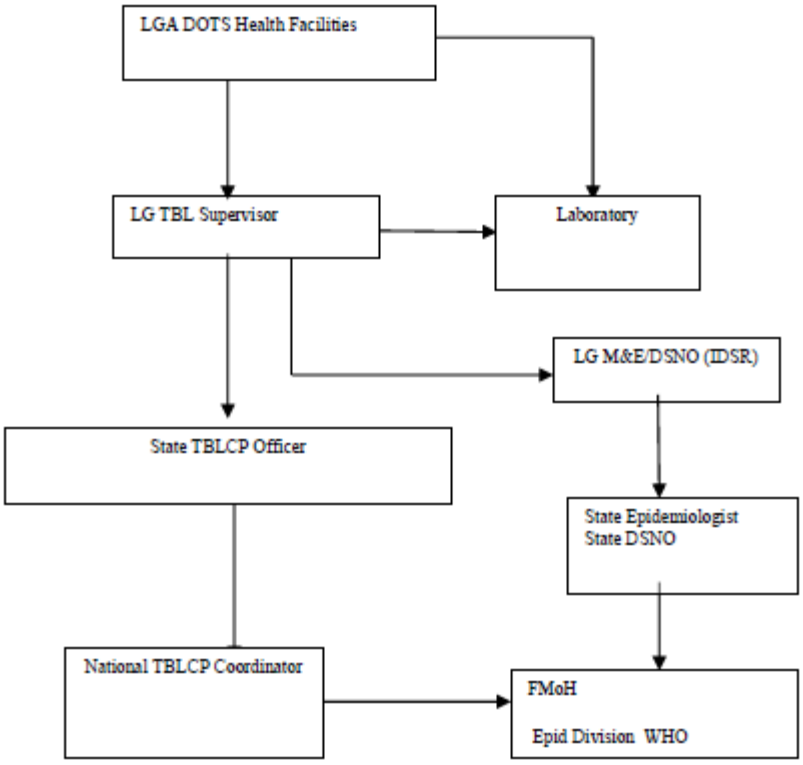

Figure 2. TB Surveillance Data Flow in Nasarawa State

We conducted the Nasarawa State Tuberculosis surveillance system evaluation to determine the public health importance and relevance of the surveillance system, describe the process of operation of the system and assess some of its key attributes, determine the effectiveness and efficiency of the surveillance system, and make appropriate recommendations to stakeholders for its improvement.

Methods

Study Area

Nasarawa State, with Lafia as its capital, is in the North-Central geopolitical zone of Nigeria. Nassarawa State has boundaries with Kaduna State to the north, the Federal capital territory to the west, Kogi and Benue States to the South and Taraba and Plateau states to the east. The state's population is 2,523,400 according to the 2016 projection. It consists of 13 LGAs and divided into three senatorial districts (North, Central and South). She has a total of health facilities scattered across its 13 LGAs. It has DOTs centres and diagnostic centres.

Study design

We did a retrospective secondary data analysis of the IDSR Malaria specific case summary data from January 2012 to December 2014. We used the Centre for Disease Control's "Updated Guidelines for Evaluating Public Health Surveillance System, 2001 [12], the "National Technical Guidelines for Integrated Disease Surveillance and Response, 3rd edition [14] and National Guide for tuberculosis and leprosy control for our evaluation [13]. We identified 40 stakeholders using a purposive sampling method and conducted a key informant interview to collect relevance information in describing the surveillance systems attributes such as usefulness, simplicity, flexibility, data quality, predictive value, sensitivity, representativeness, acceptability and stability using an unstructured questionnaire and a key informant interview guide.

Data management

Data was observed and systematically cleaned. The variables such age, date, gender, local

government, outcomes etc., were retrieved, sorted systematically and entered in Microsoft excel 2016. Data was analysed in time, place and person using Epi-info 7, Microsoft Excel 2016 and Health mapper 4.3. We calculated tuberculosis case notification rate.

Ethical considerations

We got the permission of the Nasarawa State Tuberculosis control program of the State Ministry of Health to conduct the evaluation. All participating stakeholders were informed before they were interviewed, and we obtained informed verbal consent from the stakeholders before we administered questionnaires to them. Confidentiality was assured throughout the study. We did not use names or address of participants in our study and all participants willingly participated in the study without being coerced.

Tuberculosis case definitions

Presumptive case: Any person with a cough of 2 weeks or more with or without the above symptoms.

A bacteriologically confirmed TB case: is a presumptive TB case from which Mycobacterium tuberculosis complex is identified from a clinical specimen, either by smear microscopy, culture or WHO-approved rapid diagnostics (WRD) such as GeneXpert MTB/RIF.

A clinically diagnosed TB case: is a presumptive TB case who does not fulfill the criteria to be considered bacteriologically confirmed but has been diagnosed with active TB by a health care worker (clinician or other medical practitioner) who has decided to treat the patient with a full course of TB treatment. This includes:

- Cases diagnosed on the basis of X-ray abnormalities that are consistent with active TB
- Suggestive histology and clinical picture suggestive of PTB or EPTB extra pulmonary cases without a laboratory confirmation.
- Histological and biochemical tests suggestive of TB

Results and discussions

The surveillance evaluation measures the key attributes of the tuberculosis surveillance. The attributes help to evaluate effectiveness and efficiency of tuberculosis surveillance system. The results and discussion were presented into the following thematic areas;

Level of Usefulness

The data from 2012 to 2014 from the surveillance system showed that age groups 15–54years constitute about 81% of all forms of TB cases in the state. This shows that the State TB Control Program should to target the young age groups in improving case finding and interrupting transmission of TB. The STBLCP Surveillance system data are useful for planning, monitoring treatment outcome and trends in TB disease and latent TB infection (LTBI) in populations at high risk, in order to detect new patterns of disease and possible outbreaks. It is also useful to identify populations at high risk that can be targeted for active surveillance and prevention, including targeted testing and treatment of Latent TB Infection. TB surveillance system is essential in providing the epidemiologic profile of TB in given local government, State and National. TB Notification rate among men was higher than that among women. Data from the system is used by Government agency and Partners to institute appropriate public health measures aimed at controlling the infection. IDSR data are also useful for planning and monitoring but are less useful for detecting TB outbreaks, whereas proper analysis of the data could have detected and allow a response to outbreaks. TB data collected by IDSR are poorly linked to action, while STBLCP data are used by state, national and international stakeholders.

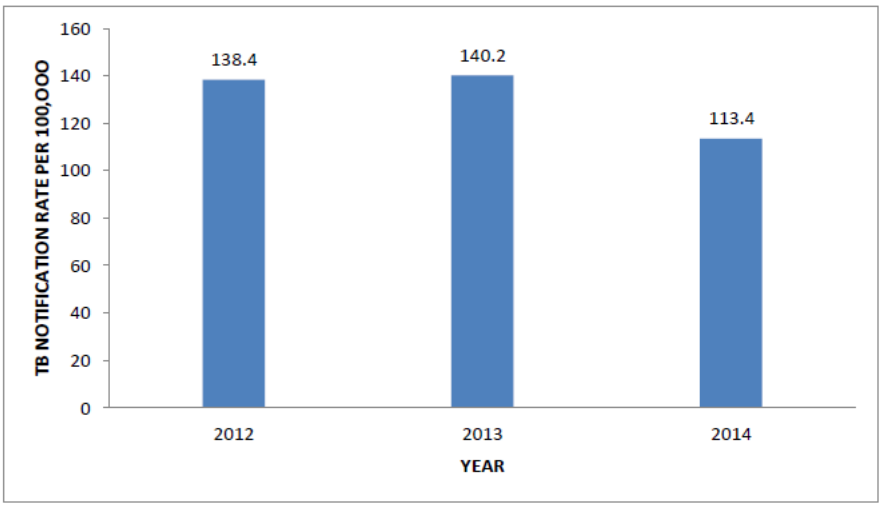

Figure 3a. Trend of TB Notification Rate per 100,000 from 2012 to 2014

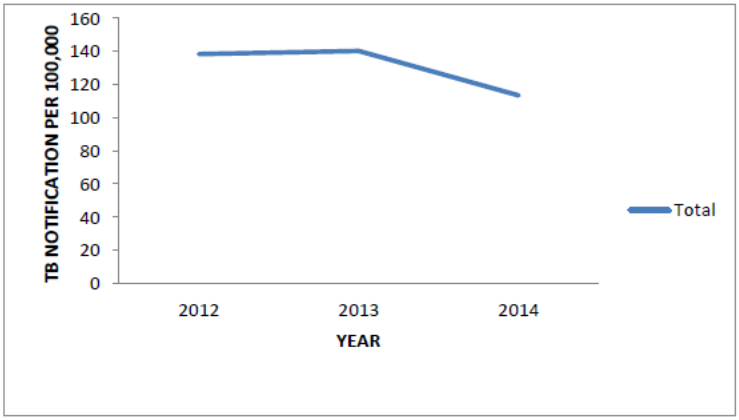

Figure 3b. Line Graph of TB Notification Rate per 100,000 from 2012 to 2014

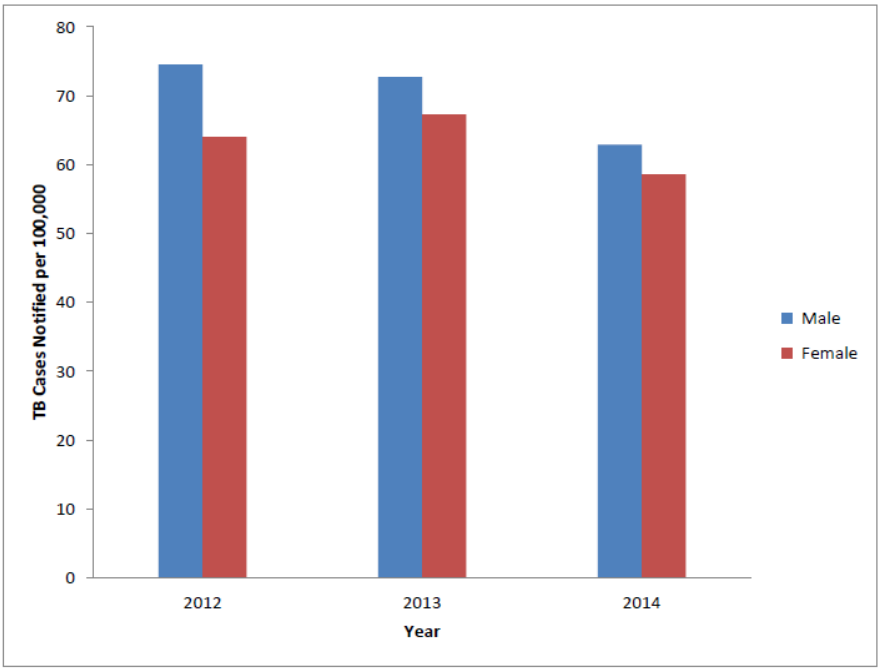

Figure 4a. Trend of TB Notification Rate among Sex from 2012 to 2014

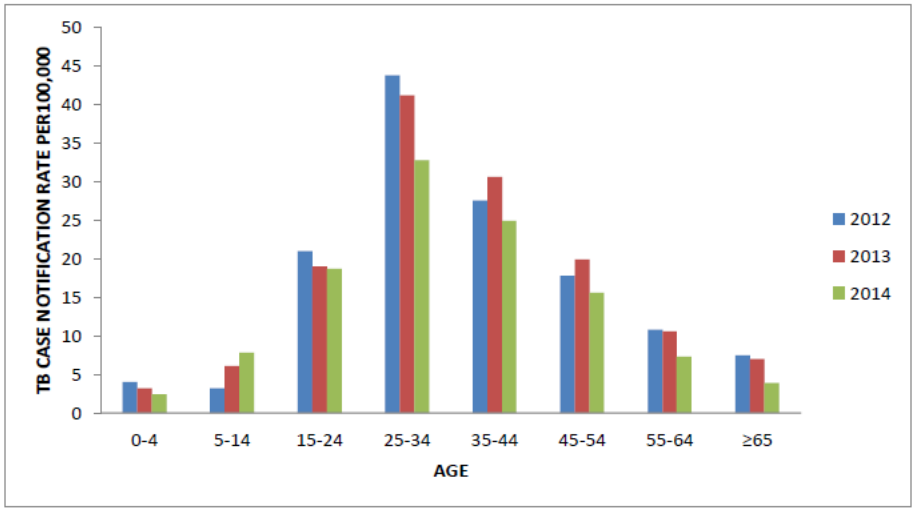

Figure 5a. Trends of TB Notification Rate among Age groups from 2012 to 2014

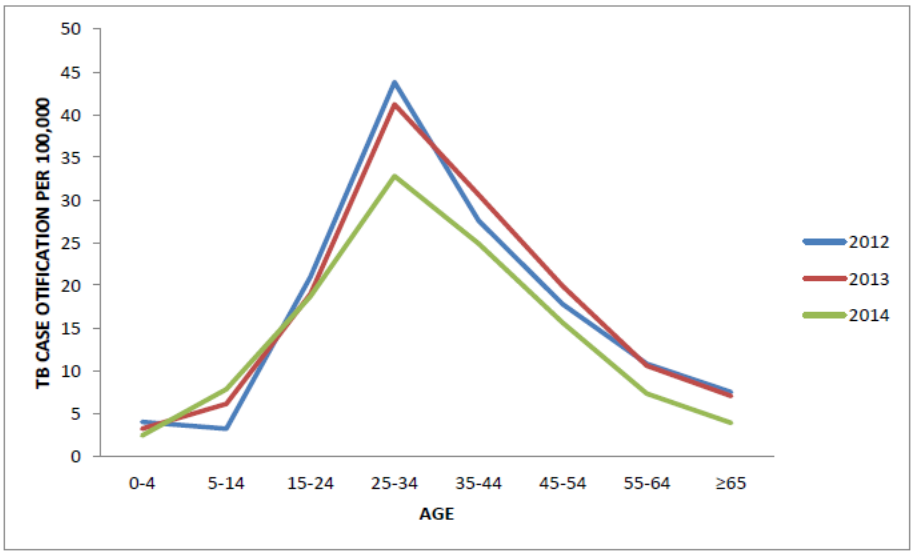

Figure 5b. Line graph of TB Notification among Age groups from 2012 to 2014

Simplicity

The TB surveillance system is simple. Both systems have the advantage of a clear case definition including confirmed diagnosis with the gold standard, microscopy. The standard case definitions are well-utilized and standard facility level forms are the source of data. The IDSR allows for ease of reporting through electronic submission at all levels and is the least time consuming but collects no disease-specific data. IDSR collects few variables whereas STBLCP uses consistent, standard forms to collect more variables regarding morbidity and mortality of TB including age, sex, geography, treatment outcome etc. However, using multiple forms for data collection makes the STBLCP system a bit complex both in its structure and mode of operation. Data are sent as hard copies from the facility level to the LGA level and from the LGA to the State where the Data is analyzed and forward to the federal level. Vital TB indicators such as case notification rate, case detection rate, TB conversion rate and treatment success rate are calculated using the available data in STBLCP. Outbreak detection and investigation throughout the State is not recorded either by STBLC or IDSR. Overall, both systems are simple, quick and easy to enter and analyze the data. Majority of the staff at the state level are familiar with the Microsoft excel database.

Acceptability

TBLCP and IDSR are both long-established systems with good acceptability to reporting parties. During the interview of various stakeholders in this evaluation process, about 97.5% showed wiliness to continue in the program. However, 48% of the stakeholders complained of incurring personal cost on tracing and calling defaulters and this was mostly observed at the facilities level. STBLCP is not fully acceptable by few health workers due to the multitude reporting forms and high workload in their health facility. There was less private sector participation in tuberculosis surveillance system.

Flexibility

Several changes have been made in TB surveillance system especially in the case report forms which has been revised and updated severally to reflect new diagnostic methods and changing chemoprophylaxis and treatment regimens. The surveillance system is able to adapt and accommodate changes when there is need for additional information or reporting in TB forms. About 85% of the stakeholders interviewed were able to adapt to changes but still accept that they needed training. This may be attributed to the use of trained/qualified personnel and regular quarterly meetings were personnel received more orientation on recent changes. Involvement of the community volunteers into the surveillance systems also shows the flexibility of the system. On the other hand, IDSR has a generalized format that is limited by its need to accommodate many different diseases. IDSR has also been designed to increase flexibility by increasing the number of priority diseases reported by the system over the years from the initial 21 priority diseases to the present 40 priorities diseases including non-communicable diseases.

Data quality

In data quality, completeness, blank cells, alteration and illegal values were checked and the proportion of the completeness of a quarter data was calculated. About 80% of the data reported were free from blank cells, alteration and illegal values. This level of data completeness may be as a result of regular visit by the Local Government TB supervisors and checks done at the state level during quarterly review meetings and the use of trained. About 85% percent of the TB staff has received training in their designated duties. There is poor TB reporting by IDSR hence data collected by IDSR is incomplete. Feedback of data to all relevant stakeholders is poor especially at LGA levels.

Sensitivity

The STBLCP system collects epidemiological and laboratory data from all facilities covered by DOTS. Sensitivity can be calculated at the level of all TB cases or at the level of sputum smear-positive cases. The sensitivity was calculated using the National prevalence of Smear positive cases from the 2012 National TB Survey.

Using data from smear-positive cases:

- Total TB sputum smear-positive cases estimated in 2012: 6,488.
- Total TB sputum smear-positive cases detected in 2014: 1142.
- Sensitivity (1142/6488) x 100 = 17.60%.

IDSR data - Based on IDSR case definitions for TB, the patient is recorded as suspect and he or she is sent for sputum examination, but the IDSR is not able to capture the laboratory data. Hence the sensitivity could not be calculated at the level of sputum smear-positive cases.

Predictive value Positive

In TB surveillance system, laboratory confirmation of diagnosis is a component of the case definition and most cases are confirmed before being reported. The PVP was calculated based on the proportion of AFB slides that were positive out of all slides examined for AFB. For each TB suspect a sputum sample is collected and 2 AFB slides are examined both for diagnosis and follow up. The following 2014 data from the STBLCP were identified:

Total AFB slides examined in 2014: 6405.

Total AFB slides positive in 2014: 1304.

PPV (1304/6405) ×100 = 20.3%.

The positive predictive value of Nasarawa TB surveillance system is 20.3%.

Representativeness

The STBLCP has expanded its DOTS coverage exponentially in line with the NTBLCP policy and is now collecting data from 61 health facilities offering DOTS services and 41 microscopy Centre including both public and very few private facilities and covering all the LGAs in the state. The system lacks representativeness due to few private sectors involvement and most of the private health are not functional this may be as a result of lack of commitment due over worked workforce. However, the system collects sufficient information regarding age, sex and treatment outcome of cases along with their residential areas.

IDSR covers largely public facilities and very few private facilities. The system is not collecting sufficient information about the demographic and socioeconomic status of the population. It therefore cannot be said that the system is representative of the whole population with regard to TB data.

Timeliness

Timeliness is defined by the delay between any two (or more) steps in a public health surveillance system. For STBLCP Surveillance system, timeliness was quantified as delays more than 3 months. It involves collection of information quarterly using laboratory and facility quarterly formats. It is also reporting treatment outcome and conversion of sputum-smear positive cases. The information collected was useful by the State and National TB program for the estimation and trend in burden of disease and identify distribution of the disease in the term of person, place and time. About 72% of the cases were reported on time. The process of TB surveillance system in the state and the expected time lag between one event and another is illustrated in figure 1. The quarterly reports expected from facilities were not usually sent on time to the LGA level. However, the LGA data are usually sent on time to the state due to the regular quarterly review meeting that created opportunity for the data to be submitted. Also, there was no delay in the submission of state level data every quarter to national level. Delay in reporting is therefore a concern at health facility level. Furthermore, feedback is not provided timely at both LGA and State levels. Data are sent as hard copies only from the Health facility level to the LGA.

In IDSR, data are expected to be sent every month from health facilities to the LGA DSNO who collates all the data and then forward LGA summary to the State. At the State level data are analyzed and shared with all stakeholders and after cleaning data are also forwarded monthly as soft copies to the national level. More than 50% of public facilities are sending their reports timely to the LGA regularly. But there is delay in reporting at LGA level and data are sent at hard copies at both the facility and LGA levels. Also, the feedback provided at the State and LGA levels is irregular and untimely

Stability

Both systems are well established with dedicated resources and are thus quite reliable. The GLRA/ILEP invested huge financial and material resources in the STBLCP surveillance system in the State while WHO is the partner that supported IDSR right from its onset Additionally, there are dedicated Government officers (Supervisor, Focal persons, DNSO, Epidemiologists and Laboratory Scientists) at the LGA, and State who discharge their duties effectively to ensure that the TB surveillance system meets its set objectives however TB program is donor dependence, donor withdrawn will adversely affect the TB surveillance System although the STBLCP Surveillance System has enjoyed relative stability since 2003, when it was established, up till date. However, there has been no disruption in the program.

Conclusion

The Nasarawa State TB Surveillance System is still meeting its objective. Both systems provide State estimates and detect trends in TB cases over time. They also provide timely information through the monthly and quarterly reporting. However, reporting at LGA level and feedback are delayed. STBLCP is collecting comprehensive information regarding TB, which has guided public health interventions such as improve care, assessing prevention measures, or generate research questions. The STBLCP surveillance system is less acceptable due to its complexity, attitude of the worker due to motivation in term of fund and multitude of forms

compare to IDSR system. The IDSR system has a high degree of acceptability among stakeholders because it is collecting fewer variables regarding TB compared with the NTBLCP. IDSR is less useful in outbreak detection. There is a poor co-ordination or information sharing between the two surveillance systems regarding TB and this causes duplication of effort, wastage of resources and incomplete information. Both systems are collecting data from almost all public health facilities and both are missing data from private sector facilities where many cases come and are managed. The system with low sensitive would be as a result of poor contact tracing and little private hospitals or facilities participation in TB surveillance system. However, there is community volunteer in Nasarawa TB surveillance system but there is lack of motivation.

Generally, the TB Surveillance System in Nasarawa State is simple, flexible, acceptable to stakeholders, generates quality data but less representative to the general population. However, the system has low sensitivity, low positive predictive value and also majorly donor driven.

Recommendations

1. Both systems should strengthen capacity to improve the recording and reporting system at health facility and LGA levels and improve feedback of data analysis and interpretation to TB staff and other health care workers at in the peripheral level;
2. There should greater involvement of community volunteer; this will enhance active TB surveillance in the community.
3. There should be dedicated staff for TB program especially at facility level to avoid multitasking.
4. Refresher training and retraining of health workers at the lower levels on guidelines and case definitions of TB will increase their skills and improve the quality of data reported.
5. The State TB Control Program should strengthen capacity to improve on collection of information on contacts and contact tracing by providing resources (Funds) calls and logistic to enhance follow up especially at the facility level.
6. Both systems should strengthen public–private partnerships and incorporate private sector the systems in order to increase the utilization and representativeness of findings.
7. Conduct strong and persistent advocacy to the State government so as to promote, implement, scale-up and allocate resources in order to achieve the objectives of the TB control program.
8. There should be increase in advocacy through media, traditional rulers and community leader for early detection of cases that meet the TB case definition for further diagnosis and confirmation using the laborato.

Reference

[1]. Ndadilnasiya Endie Waziri, Simeon Cadmus, Patrick Nguku, Olufunmilayo Fawole,Olajide Adewale Owolodun, Hyelshilni Waziri, Luka Ibrahim, Oladayo Biya, Saheed Gidado,Samuel Badung, Peterside Kumbish, Peter Nsubugan., 2014, Factors associated with tuberculosis among patients attending a treatment center in Zaria, North-west Nigeria, Pan Afr Med J. 18(Suppl 1)

[2]. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4199345/.

[3]. Coker R, McKee M, Atun R, Dimitrova B, Dodonova E, Kuznetsov S, Drobniewski F., 2006, Risk factors for pulmonary tuberculosis in Russia: a case-control study. British Medical Journal 322:85–87. [PMC free article][PubMed].

[4]. Clark M, Riben P, Nowgesic E.,2002, The association of housing density, isolation and tuberculosis in Canadian First Nations communities. International Epidemiological Association. 31(5):940–945. [PubMed].

[5]. Wanyeki I, Olson S, Brassard P, Menzies D, Ross N, Behr M, Schwartzman K., 2006, Dwellings, crowding, and tuberculosis in Montreal. Social science and medicine. 63(2):501–511. [PubMed].

[6]. Shrikrishna D, de la Rua-Domenech R, Smith NH, Colloff A, Coutts I. Humanand canine pulmonary *Mycobacterium bovis* infection in the same household: re-emergence of an old zoonotic threat? Thorax. 2009; 64(1):89–91. [PubMed].

[7]. World Health Organization (WHO). TB - a global emergency. WHO Report on 20 Tuberculosis epidemic Geneva, Switzerland: World Health Organization, 2012. https://www.who.int/tb/publications/global_report/gtbr12_main.pdf.

[8]. Tuberculosis WHO Fact sheet N°104 reviewed March 2015.
[9]. Global tuberculosis report 2014 WHO Library Cataloguing-in-Publication Data Global tuberculosis report 2014.
https://www.who.int/tb/publications/global_report/gtbr14_main_text.pdf.
[10]. World Health Organization (WHO) - Africa Region. Strategic plan for TB control for the African region: 2009 – 2013;
https://www.afro.who.int/sites/default/files/sessions/documents/9789290232926.pdf.
[11]. George W. Rutherford, *Principles and Practices of Public Health Surveillance, Second Edition, American Journal of Epidemiology*, Volume 154, Issue 4, 15 August 2001, Pages 385–386, https://doi.org/10.1093/aje/154.4.385-a.
[12]. Teutsch SM, Thacker SB. Planning a public health surveillance system. Epidemiological Bulletin: Pan American Health Organization 1995; 16:1–6. 17. https://pubmed.ncbi.nlm.nih.gov/7794696/.
[13]. Updated guidelines for Evaluating Public Health Surveillance Systems: Recommendations from the guidelines Working Group CDC MMWR July 27, 2001/Vol. 50 / No. RR-1
https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5013a1.htm.
[14]. National Tuberculosis, Leprosy and Buruli ulcer Management and control Guideline Sixth Edition 2014 Department of Public Health National Tuberculosis and Leprosy Control Programme. https://www.who.int/hiv/pub/guidelines/nigeria_tb.pdf.
[15]. Technical Guidelines for Integrated Disease Surveillance and Response in Nigeria, 2nd Edition, 2013.
https://www.ncdc.gov.ng/themes/common/docs/protocols/4_1476085948.pdf.