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ORIGINAL ARTICLE

TUBERCULOSIS SURVEILLANCE SYSTEM EVALUATION IN BLITAR DISTRICT: STUDY OF SYSTEM APPROACH AND ATTRIBUTES

Evaluasi Sistem Surveilans Tuberkulosis di Kabupaten Blitar: Studi Pendekatan Sistem dan Atribut

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ABSTRACT

Background: Blitar district was in the last second position in East Java Province, achieving low Tuberculosis recovery and treatment of the national target by 2022. Therefore, it is necessary to support surveillance systems as a prerequisite for providing information as decision-making material. **Purpose:** to describe the quality of the tuberculosis surveillance system based on its approach and attributes. **Methods:** This research was an evaluation study design on the tuberculosis surveillance system in 2022. Respondents totaled 19 people. Data was collected by interview using a questionnaire and document study using a checklist. Data was analyzed by comparing the system approach and surveillance attributes to existing guidelines. The data was presented in tables and narratives. **Results:** Evaluation of tuberculosis surveillance systems based on input, process, and output was available by surveillance guidelines. Evaluation of the surveillance attributes showed that the flexible system has high data quality, high sensitivity, timeliness, and high stability. However, the system is not simple in operation, has low acceptability of the network, and has low positive predictive value because the suspect detection is too loose and not representative. **Conclusion:** The implementation of the tuberculosis surveillance system has largely been carried out well, supported by several complete surveillance attributes. It is necessary to provide standard operational procedures for recording and reporting, improve coordination with the network to manually and electronically report suspected tuberculosis, and optimize the Mantoux test in children.

ABSTRAK

Latar Belakang: *Kabupaten Blitar menduduki urutan kedua terakhir di*

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Jawa Timur dengan capaian penemuan dan pengobatan Tuberkulosis yang sangat rendah dari target nasional pada tahun 2022. Oleh karena itu diperlukan dukungan melalui sistem surveilans dalam menyediakan informasi sebagai pedoman untuk pengambilan keputusan. ***Tujuan:*** *Menggambarkan kualitas sistem surveilans tuberkulosis berdasarkan pendekatan sistem dan atribut sistem surveilans.* ***Metode:*** *Penelitian studi evaluasi pada sistem surveilans tuberkulosis tahun 2022 di Dinas Kesehatan Kabupaten Blitar. Responden berjumlah 19 orang. Pengumpulan data dengan wawancara dan studi dokumen menggunakan kuesioner dan lembar chek list. Analisis data dengan menggambarkan aspek pendekatan sistem dan atribut sistem surveilans yang dibandingkan dengan pedoman surveilans. Penyajian data dalam bentuk tabel dan narasi.* ***Hasil:*** *Evaluasi sistem surveilans tuberkulosis berdasarkan input, proses dan output sudah tersedia dan sesuai dengan pedoman surveilans. Sedangkan penilaian atribut surveilans menunjukan bahwa sistem surveilans tuberkulosis fleksibel, kualitas data tinggi, sensitivitas tinggi, tepat waktu dan stabilitas tinggi. Namun sistem tidak sederhana pada pengoperasian sistem, akseptabilitas rendah dari jejaring, nilai prediksi positif rendah karena penjaringan suspek terlalu longgar dan tidak representatif.* ***Simpulan:*** *Penyelenggaraan sistem surveilans tuberkulosis sebagian besar sudah dilakukan dengan baik didukung dengan kelengkapan beberapa atribut surveilans. Perlu penyediaan standar operasional prosedur pencatatan dan pelaporan, meningkatkan koordinasi dengan jejaring untuk wajib melaporkan terduga tuberkulosis secara manual dan elektonik serta mengoptimalkan tes mantoux pada anak.*

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the mycobacterium bacterium tuberculosis. Tuberculosis disease has become a severe problem globally because it has a significant impact on the problem economy and social welfare. Controlling tuberculosis is an indicator of success in achieving the Sustainable Development Goals (SDGs), namely ending tuberculosis, which is targeted to be reduced by 90%-95% by 2035 (1).

Global The 2022 Tuberculosis Report showed that the achievements in diagnosis, treatment of TB, and the burden of tuberculosis have yet to reach global targets due to the COVID-19 pandemic. New cases of global tuberculosis in 2021 were 6.4 million cases, with deaths amounting to 1.6 million cases. Indonesia ranked second after India, contributing the most Tuberculosis cases from 2019 to 2021. In 2019, the Tuberculosis incidence rate was 312 per 100,000 population. In 2020, it was 301 per 100,000 population; in 2021, it will be 354 per 100,000, with a death rate reaching 52 per 100,000 population. Even if there is a decrease in the number of Tuberculosis discoveries, this is likely to increase the number of undiagnosed and untreated Tuberculosis cases, which can increase the transmission of infection and, as a result, the number of deaths. East Java Province ranks second after West Java Province, which accounts for the highest number of Tuberculosis cases in Indonesia at 44% (2). Blitar District is in second place, achieving a very low Case Detection Rate (CDR) from the national target in 2022 of 31% of the target of 90% (3). The decline in finding and treating tuberculosis cases is due to tuberculosis surveillance, which has yet to be carried out optimally. Therefore, support from a sound tuberculosis surveillance system is needed.

Surveillance Tuberculosis is a program prerequisite for monitoring and analysis and continuous continuously to the data as well as information about incident disease Tuberculosis or problem health and the conditions that affect it for direct action effective and efficient countermeasures and also as a guide in determining strategy, planning, implementation, monitoring, and evaluation of the Tuberculosis program (4).

Evaluation of a surveillance system needs to be carried out to assess the system's quality in support of the achievement of program objectives,

indicators, and targets, which can become base of policies related to health programs (5). This research aims to describe the quality of the Tuberculosis surveillance system implemented at the Blitar District Health Office based on a systems approach and assessment of the surveillance system attributes.

METHODS

This research was an evaluation study conducted at the Blitar District Health Office from April to June 2023. The population is all TB surveillance managers at the Blitar District Health Office and Public Health Centers. The sample of 19 informants was determined using a purposive sampling technique with the criteria of health centers with the furthest and closest distance and representing the highest and lowest Tuberculosis CDR coverage. The informant was the Tuberculosis technical officer at the District Health Office and the Tuberculosis program manager at 18 Public Health Centers (PHC), namely Bacem PHC, Gandusari PHC, Garum PHC, Kademangan PHC, Kanigoro PHC, Kesamben PHC, Panggungrejo PHC, Nglegok PHC, Ponggok PHC, Sanankulon PHC, Selopuro PHC, Slumbung PHC, Srengat PHC, Sutojayan PHC, Talun PHC, Wlingi PHC, Wonodadi PHC and Wonotirto PHC. Data was collected by interviews and document studies using questionnaire instruments and checklist sheets. Descriptive data analysis to describe system components (input, process, and output) was guided by the Republic of Indonesia Minister of Health Regulation (Permenkes) No.45 of 2014 (6), and surveillance system attributes (simplicity, flexibility, data quality, acceptability, sensitivity, Predictive Positive Value, representativeness, timeliness, stability) was guided by Guidelines for Evaluation Public Health Surveillance System from Centers for Disease Control (CDC) of 2001. Data was presented in the form of tables and narratives (7).

This study applied ethical principles, such as expediency, confidentiality, and justice, and obtained an honest clearance letter with number 1428/HRECC.FODM/XII/2023.

RESULTS

The evaluation result of the tuberculosis surveillance system in the Blitar District based on the System approach and assessments attribute surveillance can be seen in Table 1.

Table 1
Evaluation Results of The System TB Surveillance in The District Blitar Based on Approach Systems and Assessment Attribute Surveillance

Component	Evaluation result
System Approach	
1. Inputs	
Man	Available health workers and non-health workers for TB surveillance
Money	Availability of funds from the APBN, APBD and Global Fund, as well as adequate surveillance activities
Material	Available to support surveillance
Method	Available as a surveillance guidelines
2. Process	
Data Collection Data Processing Data Analysis Data Interpretation	According to the guidelines Permenkes No.45 Year 2014
3. Outputs	
Epidemiological information	Available
Dissemination	Disseminate information
Feedback	Provide feedback on the information obtained
Attribute Surveillance	
1. Simplicity	Not Simple
2. Flexibility	Flexible
3. Data Quality	High data quality
4. Acceptability	Low Acceptability
5. Sensitivity	High sensitivity
6. NPP	Low Predictive Positive Value
7. Representativeness	Not Representative
8. Timeliness	Timely
9. Stability	High stability

Description of the Tuberculosis Surveillance based on the System Approach

Input

Input maintenance The Tuberculosis surveillance system consists of four components: man, money, material, and method. The man is the human resources executor of TB surveillance in the health office, consisting of a technical officer and staff from the Global Fund's partner work. In the Public Health Center (Puskesmas) there is a Tuberculosis Directly Observed Treatment Shortcourse (TB DOTS) teams which consist of one doctor, one nurse, one analyst laboratory, one pharmacy, and non-health personnel that is cadre Tuberculosis ± 2 people in each village. Even though these human resources need to be more competent in the field of epidemiology, most have received training in Tuberculosis surveillance activities. Activity surveillance is supported with funds from the State Revenue and Expenditure Budget (APBN), Regional Revenue and Expenditure Budget (APBD), and Global Fund. Available materials in maintenance system TB surveillance in the form of computers/laptops, internet networks, forms surveillance standard manually, System Information Tuberculosis (SITB), System Information HIV/AIDS (SIHA) for recording TB HIV cases, System Information Public Health Center (SIMPUS) and logistics for need laboratory and treatment. However, SIMPUS, SITB, and SIHA software still need to be integrated, so this is what can be done to give rise to differences in TB surveillance data. The method as guidelines for TB surveillance in the Republic of Indonesia Minister of Health Regulation No.45 of 2014 concerning maintenance system surveillance and Minister of Health Regulation Number 67 of 2016 concerning countermeasures tuberculosis.

Process

Internal process maintenance system surveillance Tuberculosis consists of data collection, processing, and analysis. Evaluation results to stages are already by guidelines in maintenance system surveillance (4,6). Data was collected actively and passively but did not reach the CDR target. It happens because implementing staff needs to optimally implement passive, intensive, active, and massive case-finding strategies. Apart from that, due to the COVID-19 pandemic, people are reluctant to be tested when they experience TB symptoms. Social stigma factors still occur in society, and poor socioeconomic conditions are also factors that cause low-case detection. Data processing and analysis were not carried out by the manager of TB surveillance in public health centers because it was already stated in the SITB. However, the manager of TB surveillance at the public health office will be doing data processing and analysis using Tuberculosis program indicators.

Output

The output tuberculosis surveillance system in the health office consists of the availability of information outlined epidemiology in TB reports, which are regularly electronic web-based (SITB). Information will disseminated by the Public Health Center through writing in real time to the District Health Office, and the District Health Office reports to the Provincial Health Office form report quarterly and annually. After dissemination of information, feedback from activity data validation every quarter and recommendations from taker wisdom were made to achieve TB program indicator targets. Achievement of TB indicator targets in 2022, namely coverage of TB CDR (31% of target 90%), percentage of TB SRT/Success Rate of Treatment (86% of target 90%), Coverage of Discovery and Treatment of Drug-Resistant TB (target 83 % of target 80%), Percentage of Drug-Resistant TB Patients who started Treatment (83% of target 95%), Coverage of TB Case Finding in children (27% of target 90%), Coverage of Providing TB Prevention Therapy (4.6% of target 90 %), Percentage of TB patients knowing their HIV status (28% of target 90%).

Simplicity

Simplicity from something system surveillance covers simplicity in matter structure and convenience operation system surveillance. Simplicity system surveillance Tuberculosis at the District Health Office Blitar is rated on data collection, filling forms, data processing, data analysis, and SITB operations. Based on the results, the evaluation system surveillance tuberculosis is not simple. It matters because not all component surveillance is done efficiently, though the system is already designed to use recording and reporting electronically. Data collection was assessed as quickly done, active, or passive. In contrast, charging forms, data processing and analysis, and SITB operations are evaluated as not simple because they need

additional human resources and time to do the activity. Also, SITB applications frequently experience disruption/error, causing data input to be mandatorily delayed.

Flexibility

A flexible surveillance system is if officers can adapt to changes without accompanying money, human resources, and time improvements. In 2022, the Tuberculosis surveillance system will change at SITB by adding a National Identification Number (NIK) in input so that the patient's identity is automatically read completely and officers do not need to input it manually. Thus, the Tuberculosis surveillance system in the Blitar Office was flexible.

Data Quality

Data quality describes the completeness and validity of the data used in the surveillance system. Everything on the SITB recording and reporting form is filled in without any unknowns or blanks because validation has been carried out between the health center and the health service every three months. Therefore, the Tuberculosis Surveillance implemented in the Blitar Office has high data quality.

Acceptability

Acceptability describes an individual or organization's will and ability to participate in surveillance. Reception public in support of TB control is in place. There is already community acceptance in supporting TB control, even though there are still those who refuse treatment. Apart from that, it is also necessary to establish network involvement and work networks. Network involvement consists of Independent Practicing Doctors (DPM), private clinics, Independent Practicing Nurses (PPM), and Independent Practicing Midwives (BPM), while network involvement comes from supporting Public Health Centers or village health posts. It is known that the involvement of DPM, private clinics, PPM, and BPM in the TB surveillance system is not optimal. Therefore, the surveillance system in the Blitar district is considered to have low acceptability.

Sensitivity

Sensitivity can be assessed from the system through possible surveillance describing proportion cases and detecting an outbreak of disease or health problem. In data collection and reporting activities, SITB can detect the proportion of TB cases and monitor Tuberculosis treatment so that it does not become Drug-Resistant Tuberculosis (TB RO) as a threat to public health.

Predictive Positive Value (PPV)

Positive Predictive Value refers to the proportion of positive cases identified by the system according to laboratory examination compared to the total number of suspected cases found. The PPV calculation for Tuberculosis surveillance at the District Office is as follows.

$$= \frac{Number\ of\ BTA(+) Cases\ discovered\ in\ 2022}{Number\ of\ Suspects\ identified\ in\ 2022} \text{ x } 100\%$$

$$= \frac{517}{3{,}817} \text{ x } 100\%$$

= 4.02%

The positive predictive value in tuberculosis surveillance is low because it meets the criteria: tuberculosis cases are <5% of the number of suspects found and examined (8). Low NPP is due to the wrong suspect criteria used in screening Tuberculosis cases, namely continuous coughing without looking at the duration of the cough and other typical symptoms. The symptoms caused by tuberculosis are coughing up phlegm for two weeks.

Representativeness

A representative surveillance system can accurately describe the incidence of health problems at a certain time and the distribution of health problems in society according to place and person. The Tuberculosis surveillance system implemented in the District Health Office is considered unrepresentative because SITB was used to record and report Tuberculosis cases at the district level and already provides information regarding people, places, and times. However, at the PHC level, it is necessary to provide data on the grouping of Tuberculosis cases according to place of residence (Tuberculosis cases per village), which is visualized in the form of graphs and mapping to know precisely where Tuberculosis pockets are to make it easier to monitor the spread of Tuberculosis cases. The results of this research contradict the same research regarding the evaluation of the tuberculosis system in the Blitar district in 2018, which stated that the system was representative (8).

Timeliness

Timeliness assessment is carried out by analyzing the accuracy of reports from the health service unit as the reporter. The time limit for SITB electronic reporting is before data validation activities are carried out at the r District Health Office every quarter. All health service units as reporting sources before participating in Tuberculosis data validation activities have reported Tuberculosis data via SITB in real-time. It is done to provide complete and reliable data obtained quickly that will be used to make the right decision. Thus, it can be concluded that the Tuberculosis surveillance system implemented in the District Health Office y meets the timely criteria.

Stability

System stability can be seen based on the facilities used in managing and the availability of surveillance data, which ensures that data is collected and managed well and is easy to obtain when needed. The facilities used are computers that are not once damaged and SITB, which provides TB data. Even though SITB often experiences network problems during working hours, this problem can be resolved in less than 24 hours. Thus, the Tuberculosis surveillance system in the District Health Office is considered to have high stability.

DISCUSSION

System Approach

System surveillance needs to be evaluated regularly to evaluate achievement objectives, indicators, and targets set to countermeasure disease tuberculosis (9).

Input

Input as an indicator mainly consists of a collection of interrelated elements or parts that support the system's functioning. The information shows the availability of power health and non-health (cadres Tuberculosis), supported with competence such as training and refreshing Tuberculosis cadres (10). However, not all power executors get training because of replacement power.

Training for executor surveillance Tuberculosis is done To increase officers' knowledge, attitudes, and skills to increase competence and performance (11). Several power surveillance Tuberculosis at the health center experience double job constraints, influencing performance in activity surveillance (12). Double jobs are caused by mutated employees and structured organizations that do not need to be more apparent. Implementation of system surveillance supported with sufficient funds available so that the result can answer the need for public will service health (10). However, in matter policy, health centers must record and report the use of SITB in standard operating procedures (SOP). Work is structured in implementing programs to obtain good performance (13).

Process

Activity process surveillance started from active data collection by Public Health Centers through activity investigation contact closely and screening in place, particularly in dormitories, prisons, schools, integrated service post (*Posyandu*) toddlers, posyandu elderly, for group vulnerable and at risk (HIV, DM, Stunting). In contrast, data collection is passive through the inspection of incoming patients to the service unit health and referrals patients from networking DPM, clinic private, PPM, and BPM (4). Likewise, the Health Office collects data regularly and passively. Engagement networking could be optimal in implementing TB surveillance, resulting in a low-scope CDR (14). All facility service health (Government / Private) mandatory report invention cases to SITB/WIFI TB. If not, it causes underreporting issues, requiring data validation (15).

Processing and analysis at the Health Service is carried out in a way that is descriptive of the indicators of the Tuberculosis program implemented monthly and yearly. Health data processing and analysis are essential for identifying the distribution of health problems, estimating prevalence in the group society, and judging possibly related factors (16).

Output

Output from activity surveillance produces information stated epidemiology in the report. This information consists of TB program indicators, namely impact indicators, leading indicators, and operational indicators, which are measuring tools for assessing the progress or success of the TB control program (4).

Dissemination of information at the level Health Center is done in real-time via SITB to the District Health Office. At the same time, the District Health Office disseminates information to

the Provincial Health Service and several agencies that require Tuberculosis data anytime, for example, the Social Service and Regional Revenue Agency (*Bappeda*). Dissemination results information furthermore done bait feedback in the form of data validation and recommendations to the reporting unit as evaluation to the success of the response program Tuberculosis (17).

Surveillance Attributes

Simplicity

The surveillance system must be simple but can reach the objective (18). Unsimplicity in the implementation of a surveillance system hinders fast response to countermeasures of health. Surveillance system If already done in a way electronically, there is no need to record on the form standard manual because this will save time to finish one work. Officer surveillance Public health centers need to do data processing and analysis to identify the pattern distribution of TB cases per work area so that you can locate factor risk (19).

Flexibility

A flexible surveillance system can accept food changes that define cases and variations in recording and reporting. If any surveillance system is simple, it is more flexible when applied to disease or problems in other health, as well as when there are more low changes to the components system (20).

Data Quality

High data quality will be used for planning and decision-making. The quality of data sources is essential in routine reporting activities because if the data quality is low, it can cause information bias, delays, and data manipulation so that the data produced could be more effective and efficient (21). Apart from that, data quality is also assessed from secure data storage (backup). Data that has been input into the system needs to be backed up regularly to avoid the risk of data loss if there is damage or changes to the system (22).

Acceptability

Participation society, parties sub-district/ sub-district/village own role important in countermeasures Tuberculosis carried out through activity surveillance covers invention of suspected TB, support for treatment, prevention, and stigma (23) besides engagement Public Private Mix (PPM) TB networks (Government Hospitals, Private Hospitals, KOPI TB, DPM, Clinics) influence achievements discovery and treatment TB cases (14,24) through recording and reporting TB cases in SITB and Wifi TB (15).

Sensitivity

The sensitivity of tuberculosis surveillance is assessed by finding suspected cases of Tuberculosis with cough symptoms and phlegmy for two weeks or more. The cough can followed by symptoms of sputum mixed blood, cough blood, tightness of breath, body weakness, decreased weight loss, malaise, sweating, Evening days without physical activity, and fever for more than One month. Furthermore, laboratory examination using the Rapid Molecular Test (TCM) with Xpert MTB/RIF as the gold standard and further examination via lung x-ray if the TCM results are negative. The results of laboratory examinations are used as the basis for determining Tuberculosis cases (25). The sensitivity of the surveillance system can find the proportion of Tuberculosis cases used to describe the prevalence of Tuberculosis in a population.

Predictive Positive Value

The predicted value is positively influenced by disease prevalence in the tested population. If any area has a high prevalence, probably a large number of people who tested positive genuinely suffer from the disease compared to if the test was carried out in a population with a low prevalence (28). NPP value < 5% possible networking suspect too loose and or there are false negative results. Suppose>15% is caused by networking being too tight, and there is a positive or false result (11). In that case, a surveillance system with a low NPP can result in false case reporting or detect other diseases not targeted by surveillance and waste resources and funds.

Representativeness

System representative surveillance is assessed from the description of incident problem health based on person, time, and place variables. A surveillance system needs to have the capability to provide a comprehensive epidemiological picture, including the identification of relevant host, agent, and environmental components, taking into account the dimensions of time, place, and individual. The characteristics of the host, disease agent, and environment play a crucial role in determining effective prevention and control

strategies when balance disorders that can lead to disease occur (4). Suppose the surveillance system can provide information on the actual situation in the community being observed, including disease distribution, risk factors, and population characteristics. In that case, it can produce high-quality data characteristic of a representative surveillance system (21). An unrepresentative surveillance system can hurt the effectiveness of disease prevention and control programs (26).

Timeliness

Accuracy time is assessed from the ability of the system to generate data with fast control of disease and long-term program planning (27). Accuracy time support system data quality surveillance (28). Data reporting is carried out as appropriately as possible and can utilize data effectively to control internal decisions. Time reporting case Tuberculosis can be an internal parameter monitoring that continuously aims to achieve targets in the response program Tuberculosis.

Stability

Stability is something a surveillance system shows reliability and availability means in the maintenance surveillance system. Reliability is the ability to collect, organize, and provide data online appropriately without error, whereas availability shows the ability to operate when needed (29). The availability of a power man in the maintenance surveillance system supports high stability.

CONCLUSION

Evaluation of the surveillance system Tuberculosis at the Health Office of Blitar District concluded that all the component surveillance systems (input, process, and output) were available and followed surveillance guidelines. Meanwhile, the assessment of the tuberculosis surveillance system based on attributes showed system flexibility, high data quality, sensitivity, timeliness, and high stability. However, the system is not simple; acceptability was low, and Positive Predictive Values were low and not representative. Therefore, we recommended Standard Operating Procedures (SOP) for recording and reporting TB surveillance, SITB development, networking Tuberculosis must be Mandatory Notification Tuberculosis (WiFi TB), and optimizing the Mantoux test in children.

CONFLICT OF INTEREST

There is no conflict of interest in this research.

AUTHOR CONTRIBUTIONS

FFAB: developing research concepts, analyzing data, and compiling articles. MAI: providing direction and revision. EP: Guiding during research.

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