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Validity of Pulmonary Tuberculosis Control Success Index (TBCSI) Instrument

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Abstract

The target for reducing the incidence of TB in 2019 was 245/100,000 population. However, the national TB incidence is at 321/100,000 population, implying that mapping the performance of PHC is inevitable to help accelerate control efforts. This study aims to develop an instrument, the "TB control success index" (TBCSI) and measure the TBCSI achievement of all PHC in Semarang City. Quantitative research was conducted to construct the TBCSI instrument, and a validated TBCSI instrument was used to measure the TBCSI of all PHC individuals in Semarang City. The validity test showed Aiken's V coefficient for each TBCSI instrument question item ≥ 0.92. Furthermore, the TBCSI results at the Semarang City showed an average of 0.9332. The average index of the 6 TBCSI dimensions were 0.8959 (program leadership dimension); 0.8495 (TB service access dimension); 0.9667 (risk factor control dimension); 0.9797 (increase in partnership dimension); 0.9240 (increasing community independence dimension); and 0.9874 (management strengthening dimension). The TBCSI instrument was proven valid to measure the success rate of PHC in implementing TB control programs. Therefore, the TBCSI of all PHCs in Semarang City was included in the good category.

INTRODUCTION

Pulmonary tuberculosis (TB) was still a serious public health problem in the world (World Health Organization, 2018). Based on the number of TB patients, Indonesia included in the category of 5 countries with the largest number of sufferers in the world (Kemenkes RI, 2017). In 2017 the incidence of TB in Indonesia reached 1,020,000 new TB cases (399 per 100,000 population). In that year the death rate from TB even reached 41 per 100,000 population. In 2018 the incidence of TB fell to 321/100,000 population. However, this achievement is still very far from the maximum target of TB incidence, which is 245/100,000 population (Kemenkes, 2019).

The magnitude of the TB disease problem has encouraged the government and relevant stakeholders to increase TB control efforts. Since 1969 TB control has been carried out nationally through Primary Health Center (PHC). In 1995, the national TB control program began implementing the "Directly Observed Treatment, Short Course" (DOTS) strategy. The strategy is implemented in the PHC in stages (Kemenkes RI, 2011). Until now, the PHC is the institution that has the most role in reducing the prevalence of TB in Indonesia.

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Some of the advantages possessed by PHC in TB control are: (1). PHC is the only health service facility that reaches all regions of Indonesia to the sub-district level; (2). PHC have implemented the DOTS strategy; (3). PHC have health personnel resources who can carry out promotive and preventive health efforts; and (4). PHC is the only health institution that has direct contact with the community (Orcau et al., 2011; Kemenkes RI, 2017).

Every country around the world has its own strategy in TB control. However, in general the strategies used are almost the same, namely by implementing the DOTS strategy and strengthening promotive and preventive health aspects (Orcau et al., 2011; Choi & Jung, 2014; Huynh et al., 2015). In addition to implementing the DOTS strategy, research also shows that promotive and preventive efforts innovation can reduce the incidence of TB disease (Whang et al., 2011; Lines et al., 2015; Schito et al., 2015; Jeffries et al., 2017; Chadha & Praseeja, 2019).

TB control efforts are essentially a development effort whose results can be observed and measured (Budiono, 2013). For this reason, an instrument is needed to observe and measure the success of the TB control program. Tuberculosis Control Success Index (TBCSI) is an instrument to measure and observe the success of PHC in implementing TB control programs.

TBCSI development research is needed to produce a valid mapping instrument for TB control success. TBCSI is expected to be used by PHC as an evaluation instrument for TB control programs. The use of TBCSI can produce the information needed to optimize TB control efforts in a comprehensive manner.

The objectives of this study are: (1). To formulate indicators and question items that will be used to develop the TBCSI instrument; (2). To construct a valid TBCSI instrument; (3). To measure the TBCSI of all PHCs in Semarang City.

METHOD

The research used qualitative and quantitative approaches. Qualitative research conducted to formulate indicators and question items that will be used to develop the TBCSI instrument. Quantitative research conducted to construct the TBCSI instrument. The TBCSI construction was carried out through the stages of preparing items and instrument formats, expert justification, design revisions, limited-scale trials, evaluations and revisions, and broad-scale trials. The research was conducted from June to September 2020.

Informants in the qualitative research stage are the TB control program manager, the head of the PHC and academics in the field of public health. Test the validity of the TBCSI instrument using expert judgment and calculating the Aiken's V coefficient value. The number of assessors is 5 experts who come from academics in the field of public health.

After a series of construction activities for the TBCSI draft instrument resulted in a valid instrument, a limited-scale trial was conducted in 5 PHC. Limited scale trials are intended to ensure

the instrument's feasibility. The shortcomings of the TBCSI instrument were corrected before being used for large-scale trials. TBCSI measurements were carried out in all PHCs in Semarang City, which were 37 PHCs.

Data collection at the qualitative research stage was carried out through focus group discussions (FGD). Meanwhile, at the quantitative stage for a limited and wide scale trial, it was conducted through interviews with the TBCSI instrument to the health center TB program management officers.

RESULTS AND DISCUSION

Dimensions, Sub Dimensions and Question Items for TBCSI Instruments

The FGD activities succeeded in summarizing 6 dimensions to develop the TBCSI instrument. The six dimensions are: (1). Leadership; (2). Access to services; (3). Controlling risk factors; (4). Increasing partnerships; (5). Increasing community independence; and (6). Strengthening management. At the instrument construction stage, the TBCSI dimensions have been successfully translated into several sub-dimensions and question items. The TBCSI instrument consists of 6 dimensions, 16 sub dimensions and 63 question items. Summary of dimensions, sub-dimensions and the number of question items in the TBCSI instrument can be seen in tabel 1.

The six dimensions, 16 sub dimensions, and 63 question items contained in table 1 are compiled into a closed questionnaire with 3 answer choices. The answer choices are in the form of values ranging from 1 to 3. The calculation of the index for each dimension, TBCSI, and TBCSI category can be seen in the

Table 1. Summary of Dimensions, Sub Dimensions, and Number of Question Items in the TBCSI Instrument

Dimensions	Sub dimensions	Number of Questions
Leadership	Health promotion efforts in TB control carried out by PHC	8
	Program coordination and synergy	2
Access to services	Key performance indicators	7
	Operational indicators	5
Controlling risk factors	Application of infection prevention and control in vulnerable populations	2
	TB Infection Prevention and Infection Control	8
	Administrative control	5
Increasing partnerships	TB coordination forum	3
	Partnership	1
Increasing community independence	Increasing community participation/participation in TB control	6
	The success of efforts to increase community participation/participation in TB control	2
Strengthening management	Human Resources (HR)	2
	TB Logistics	4
	TB financing regulations	5
	Information system	2
	Innovation research and development	1
Total		63

$$\text{Dimension Index} = \frac{\text{Actual Score} - \text{Minimum Score}}{\text{Maximum Score} - \text{Minumum Score}}$$

TBCSI = 1/6 dimensions index I + 1/6 dimensions index II + 1/6 dimensions index III + 1/6 dimensions index IV + 1/6 dimensions index V + 1/ dimensions index VI

Category TBCSI :

0,800 – 1 = The success rate of TB control included in the category **Good**
0,500 – 0,799 = The success rate of TB control included in the category **Moderate**
0 – 0,499 = The success rate of TB control included in the category **Less**

Figure 1. Formula for Calculation of Dimensional Index, TBCSI and Category of TBCSI values

figure 1.

The TBCSI instrument produced in this study has gone through the stages of a limited-scale trial, revision, and expert validation. The results of the validity test on the 63 question items in the TBCSI instrument show the Aiken's V coefficient value for each item 0.92. This shows that the TBCSI instrument is valid to be used to measure the success of the TB control program at the PHC.

Achievement of TBCSI PHCs in Semarang City

After the TBCSI instrument has been successfully compiled, then a large-scale trial is carried out to assess the TBCSI achievements of all PHCs in the Semarang City area. The results of the TBCSI assessment from 37 PHCs in Semarang City can be seen in tabel 2.

The results of the TBCSI assessment of all PHCs in the Semarang City area showed that most (91.9%) were in the good category. A total of 3 PHCs (8.1%) were included in the medium category. Table 2 shows that the achievement of the highest TBCSI score of 0.9871 was obtained by 6 PHCs, namely Kedungmundu Health Center, Tlogosari Wetan, Gunungpati, Central Lamper, Bulu Lor, and Bandarharjo. PHCs with TBCSI success in the moderate category were in 3 PHCs, namely Miroto, Krobokan and Karangayu.

Leadership Dimension Index

The results showed that in terms of leadership dimensions, most of the PHCs were included in the good category. However, the results of the study also showed that there were still 3 PHCs with the index value of the leadership dimension in the medium category. The results showed that of the 10 questions on leadership dimensions, there were 4 items whose achievements were not maximal, namely: (1). Continuity of health promotion efforts; (2). Increasing human resource capacity in the use of electronic and print media in health promotion; (3). Documenting health promotion activities; and (4). Increasing the capacity of human resources in carrying out advocacy to stakeholders. For this reason, there needs to be a coaching effort from the City Health Office so that together all PHCs have a commitment to optimal TB control. This increased commitment to TB control is very important in the framework of supporting the achievement of the global TB control strategy target, namely TB elimination by 2035 (Koh, 2009; Deitchman, 2013; Kemenkes RI, 2017).

Service Access Dimension Index

The service access dimension reflects the existence of a public private mix or the involvement of all health care facilities in an effort to expand TB patient services and the continuity of a comprehensive TB control program. The results of the TBCSI assessment in this study indicate that in terms of the dimensions of access to TB services, there are still Puskesmas with achievements in the moderate category.

Each PHCs should be encouraged to achieve the maximum service dimension index value. The dimension of service access is very much needed to ensure equitable, quality and sustainable TB services for people affected by TB (universal access). This is very important to ensure the recovery of TB patients in the context of TB elimination (Whang et al., 2011; World Health Organization, 2018; Chadha & Praseeja, 2019; López et al., 2020).

Risk factor control dimension index

The risk factor control dimension is

Table 2. Achievement of TBCSI PHCs in Semarang City

PHCs	Achievement TBCSI						
	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5	Dimension 6	Total
Kedungmundu	1.0000	0.9583	0.9667	1.0000	1.0000	1.0000	0.9871
Tlogosari Wetan	1.0000	0.9583	0.9667	1.0000	1.0000	1.0000	0.9871
Gunungpati	1.0000	0.9583	0.9667	1.0000	1.0000	1.0000	0.9871
Lamper Tengah	1.0000	0.9583	0.9667	1.0000	1.0000	1.0000	0.9871
Bulu Lor	1.0000	0.9583	0.9667	1.0000	1.0000	1.0000	0.9871
Bandarharjo	1.0000	0.9583	0.9667	1.0000	1.0000	1.0000	0.9871
Mijen	0.9500	0.9583	0.9667	1.0000	1.0000	0.9643	0.9728
Padangsari	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Pandanaran	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Lebdosari	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Pudakpayung	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Bangetayu	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Ngaliyan	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Poncol	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Pegandan	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9475
Ngesrep	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Purwoyoso	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Karangdoro	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Gayamsari	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Manyaran	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Ngemplak	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Sekaran	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Mangkang	0.9000	0.8750	0.9667	1.0000	0.9375	1.0000	0.9461
Tlogosari Kulon	0.9500	0.8333	0.9667	1.0000	0.9375	1.0000	0.9457
Srondol	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Halmahera	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Bugangan	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Karangmalang	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Candi Lama	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Kagok	0.8500	0,7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Tambak Aji	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Genuk	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Rowosari	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Karanganyar	0.8500	0.7917*	0.9667	1.0000	0.9375	1.0000	0.9239
Miroto	0.6500*	0.7917*	0.9667	0.7500*	0.6250*	0.8571	0.7731*
Krobokan	0.6500*	0.7500*	0.9667	0.7500*	0.6250*	0.8571	0.7662*
Karangayu	0.6500*	0.7083*	0.9667	0.7500*	0.6250*	0.8571	0.7592*
Average	0.8959	0.8495	0.9667	0.9797	0.9240	0.9874	0.9332

Information :
Dimension 1 = TB program leadership
Dimension 2 = TB service access
Dimension 3 = risk factor control
Dimension 4 = partnership increasement
Dimension 5 = community independence increasement
Dimension 6 = management strengthening

* = The index marked with * indicates achievement in the moderate category

intended to measure the success of the PHCs in an effort to prevent, reduce the transmission and incidence of TB disease. This dimension includes 3 aspects of control, namely: (1). Aspects of implementing infection prevention and control in vulnerable populations; (2). Managerial aspects of control; and (3). Administrative aspects of control (World Health Organization, 2018). The results of the assessment of the risk factor control dimensions of all PHCs in the city of Semarang showed results in the good category.

The results of this study indicate that there is good practice from all PHCs in Semarang City in carrying out TB infection control in vulnerable populations as well as controlling from managerial and administrative aspects. Control of risk factors in vulnerable populations has been shown to reduce the incidence of TB and reduce the risk of multidrug-resistant tuberculosis (MDR-TB) (Whang et al., 2011; Go et al., 2018; Feng et al., 2019). Risk factor control in managerial aspects is also very important to protect health workers from the risk of TB (Nishimura et al., 2018).

Partnership enhancement dimension index

Increasing partnerships is one of the national strategies in TB control efforts. The TB program partnership can be implemented through a TB coordination forum and cross-sectoral coordination at the sub-district level. The results of the TBCSI assessment in Semarang City show that most of the Puskesmas have implemented the TB partnership program well.

From the 4 question items related to TB partnerships, there is 1 item whose achievement is not optimal, namely coordination between independent practicing doctors and PHCs. TB is an infectious disease that is mandatory notification (Huynh et al., 2015; Go et al., 2018). Every health facility that provides TB services (including independent practicing doctors) is required to record and report TB cases found and/or treated in accordance with the prescribed recording and reporting format (Kemenkes RI, 2017).

Dimension index of increasing community independence

Increasing community independence in TB control is one of the national strategies in TB control (Patil & Deshpande, 2018; Saini & Garg, 2020). This increase in independence is carried out through several strategies, namely: (1). Increasing the participation of patients, former patients and the community; (2). Involving the community in promotion, case finding, and support for TB treatment; and (3). Community empowerment through family and community-based TB integration (Kemenkes RI, 2017).

The results of the TBCSI study in Semarang City showed that the dimensions of increasing community independence were mostly in the good category. The results of the study showed that 6 PHCs achieved maximum scores on the dimensions of increasing community independence, namely Bandarharjo, Bulu Lor, Gunungpati, Tlogosari Wetan, Mijen and Kedungmundu health centers. The achievement of these 6 PHCs in an effort to increase community independence can be a reference for other PHCs in the Semarang City area.

Management strengthening dimension index

Strengthening management is one of the national strategies in TB control. The strengthening of TB program management includes several aspects related to human resources, logistics, regulation and financing, information systems, as well as research and development of program innovations (Kemenkes RI, 2017).

The results of the TBCSI study in Semarang City showed that the dimensions of strengthening management were in the good category. Although in general the dimensions of strengthening management are good, there is one parameter that is not optimal in most of the PHCs. These parameters are related to research and innovation development. It is very possible for each PHCs to have specific potentials and constraints that are different from other PHCs. Therefore, increasing the capacity of PHC to be able to carry out research and innovation development is very necessary (Patil & Deshpande, 2018).

Semarang City Level TBCSI Achievement

The results of the TBCSI study in

Semarang City showed that most of the PHCs had TB control performance in the good category. Although not all dimensions can be achieved optimally, there are 6 PHCs that can be good examples in TB control, namely Kedungmundu Health Center, Tlogosari Wetan, Gunungpati, Central Lamper, Bulu Lor, and Bandarharjo. The six PHCs can serve as examples for PHCs that have a performance index in the moderate category, namely Miroto, Krobokan and Karangayu (Wang et al., 2007).

The results of the TBCSI assessment in this study, although they have shown good achievements, have not yet reached the maximum value. All dimensions must be strived for optimal improvement. In particular, the dimensions of leadership of the TB program and dimensions of service access need to be given more serious attention because the achievement is still at a value of 0.8.

CONCLUSION

The TBCSI instrument consists of 6 dimensions, 16 sub dimensions, and 63 question items. The TBCSI instrument has been tested for validity so that it can be used to measure the success rate of the Puskesmas in implementing the TB control program.

The average TBCSI of Semarang City is included in the good category (0.9332). The average index of each dimension is also included in the good category, namely the leadership dimension index (0.8959); service access dimension index (0.8495); risk factor control dimension index (0.9667); partnership improvement dimension index (0.9797); dimension index of increasing community independence (0.9240); management strengthening dimension index (0.9874).

Based on the results of the study, it is recommended that the Semarang City Health Office can use TBCSI in a sustainable manner for mapping and increasing the success of Puskesmas in implementing TB control programs.

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REFERENCES

Budiono, I. 2013. Pengembangan Model Indeks Pembangunan Gizi. *KESMAS - Jurnal Kesehatan Masyarakat*, 8 (2): 166–175. https://doi.org/10.15294/kemas.v8i2.2641

Chadha, V.K. & Praseeja, P. 2019. Active Tuberculosis Case Finding in India – the Way Forward. *Indian Journal of Tuberculosis*, 66 (1): 170–177. https://doi.org/10.1016/j.ijtb.2018.05.014

Choi, S. & Jung, E. 2014. Optimal Tuberculosis Prevention and Control Strategy from a Mathematical Model based on Real Data. *Bulletin of Mathematical Biology*, 76 (7): 1566–1589. https://doi.org/10.1007/s11538-014-9962-6

Deitchman, S. 2013. Enhancing Crisis Leadership in Public Health Emergencies. *Disaster Medicine and Public Health Preparedness*, 7 (5): 534–540. https://doi.org/10.1017/dmp.2013.81

Feng et al. 2019. Risk Factors of Multidrug-Resistant Tuberculosis in China: a Meta-Analysis. *Public Health Nursing*, 36 (3): 257–269. http://doi.org/10.1111/phn.12582

Go et al. 2018. Tuberculosis Prevention and Care in Korea: Evolution of Policy and Practice. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, 11: 28–36. https://doi.org/10.1016/j.jctube.2018.04.006

Huynh et al. 2015. Tuberculosis Control Strategies to Reach the 2035 Global Targets in China: the Role of Changing Demographics and Reactivation Disease. *BMC Medicine*, 13 (88): 1–17. https://doi.org/10.1186/s12916-015-0341-4

Jeffries et al. 2017. Role of the Health Department in Tuberculosis Prevention and Control—Legal and Public Health Considerations. *Mycrobiology Spectrum*, 5 (2): 261–282. https://doi.org/10.1128/microbiolspec.tnmi7-0034-2016

Kemenkes. 2019. *Hasil Utama Riset Kesehatan Dasar 2018*. Jakarta: Kementerian Kesehatan RI.

Kemenkes RI. 2011. *Pedoman Nasional Pengendalian Tuberkulosis-Keputusan Menteri Kesehatan Republik Indonesia Nomor 364*. Jakarta: Kementerian Kesehatan RI.

Kemenkes RI. 2017. *Kebijakan Program Penanggulangan Tuberkulosis Indonesia*, *Direktorat Jenderal Pencegahan dan Pengendalian Penyakit Kemenkes*

RI. Jakarta: Kementerian Kesehatan RI.

Koh, H. 2009. Leadership in Public Health. *Journal of Cancer Education*, 24: 11–18. https://doi.org/10.1080/08858190903400385

Lines, G., Hunter, P. & Bleything, S. 2015. Improving Treatment Completion Rates for Latent Tuberculosis Infection: a Review of Two Treatment Regimens at a Community Health Center. *Journal of Health Care for the Poor and Underserved*, 26 (4): 1428–1439. https://doi.org/10.1353/hpu.2015.0126

López et al. 2020. Is Tuberculosis Elimination a Feasible Goal in Colombia by 2050?. *Health Policy and Planning*, 35 (1): 47–57. https://doi.org/10.1093/heapol/czz122

Nishimura et al. 2018. Risk of Tuberculosis Infection among Health Care Workers and Nursing Students in Japan. *Journal of Infection and Chemotherapy*, 24 (11): 921–924. https://doi.org/10.1016/j.jiac.2018.08.006

Orcau, A., Caylà, J.A. & Martínez, J.A. 2011. Present Epidemiology of Tuberculosis (Prevention and Control Programs. *Enfermedades Infecciosas y Microbiologia Clinica*, 29 (1): 2–7. https://doi.org/10.1016/S0213-005X(11)70011-8

Patil, T.S. & Deshpande, A.S. 2018. Innovative Strategies in the Diagnosis and Treatment of Tuberculosis: a Patent Review (2014–2017). *Expert Opinion on Therapeutic Patents*, 28 (8): 615–623. https://doi.org/10.1080/13543776.2018.1508454

Saini, V. & Garg, K. 2020. Case Finding Strategies under National Tuberculosis Elimination Programme (NTEP). *Indian Journal of Tuberculosis*, 67 (4): S101–S106. https://doi.org/10.1016/j.ijtb.2020.09.029

Schito et al. 2015. Perspectives on Advances in Tuberculosis Diagnostics, Drugs, and Vaccines. *Clinical Infectious Diseases*, 61 (3): S102–S118. https://doi.org/10.1093/cid/civ609

Wang, L., Liu, J. & Chin, D.P. 2007. Progress in Tuberculosis Control and the Evolving Public-Health System in China. *The Lancet*, 369 (9562): 691–696. https://doi.org/10.1016/S0140-6736(07)60316-X

Whang, S., Choi, S. & Jung, E. 2011. A Dynamic Model for Tuberculosis Transmission and Optimal Treatment Strategies in South Korea. *Journal of Theoretical Biology*, 279 (1): 120–131. https://doi.org/10.1016/j.jtbi.2011.03.009

World Health Organization. 2018. *Global Tuberculosis Report 2018. World Health Organization. http://www.who.int/iris/handle/10665/274453.*