Effects of Motivation, Knowledge, and Skills of Lung Tuberculosis Officers on Case Detection Rate of Health Centers

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ABSTRACT

Background: One of the main indicators of tuberculosis prevention is the Case Detection Rate (CDR). The CDR of health centers in East Lampung Regency in 2017 was 24.8% which is still below the national standard. Case finding was still being done passively and suspect screening in several health centers was found lacking attention to the patient's medical history. Accordingly, increasing CDR needs improvement efforts to be strongly influenced by tuberculosis officers. **Objectives**: This study aimed to determine the effects of motivation, knowledge and skills of tuberculosis Officers on CDRs of community health centers in East Lampung Regency. **Methods**: This study is a cross-sectional quantitative study with total sampling. Data were obtained from questionnaires, checklists and secondary data from community health centers and East Lampung District Health Office. Respondents are 34 community health centers in Lampung Timur represented by 89 officers. Dependent variable was CDR while motivation, knowledge, and skills were the independent variables. The data were analyzed by Rank Spearman tests and multiple linear regression methods. **Results**: Respondents showed they were lacking in motivation, good knowledge and skills. Rank Spearman correlation coefficient ranged between 0.665 to 0.696 with sig.=0,000. Regression sig values were 0.000 for motivation, 0.0962 for knowledge and 0.001 for skills. Adjusted R square was 0.703, while regression coefficient was 2.872 for motivation and 1.196 for skills. **Conclusion**: There were significant correlations between motivation, knowledge and skills with CSRs of community health centers in East Lampung Regency. Knowledge had no effect on CSR but motivation and skills have a significant effect partially and simultaneously. Motivation contributed the biggest effect.

Keywords: case detection rate; knowledge; motivation; skill

BACKGROUND

Tuberculosis (TB) is a serious epidemic disease for all people in the world. It is estimated that about one third of the world's population has been infected by *Mycobacterium tuberculosis*. The World Health Organization (WHO) declared a global emergency against pulmonary tuberculosis (TB) since 1993 and in 1995 the WHO recommended a Direct Observed Treatment Shortcourse (DOTS) strategy in controlling pulmonary TB[1]. In 2000 DOTS was conducted thoroughly in all health care facilities in Indonesia, especially Community Health Center, although the 2018 WHO report stated that the incidence of TB disease in Indonesia was still high at 842,000 cases or 319 per 100,000 population. The high incidence of TB makes Indonesia the third highest country with the most TB cases after India (30%) and China (15%)[2].

Data and information on Indonesian Health Profiles released by the Ministry of Health in 2018 explained that in 2017 in Indonesia there were 360,770 TB cases of all types and 168,412 new cases with positive smear findings[3].

Lampung Province in that year had 7,627 TB cases of all types with 4,195 new cases with positive smear findings[3]. East Lampung Regency itself in 2017 had 995 TB cases where the number of patients with smear positive was 616[4].

The magnitude of the ratio between the number of new smear positive patients found and treated to the estimated number of new smear positive patients in a region in one year is known as the Case Detection Rate (CDR), where the national target for CDR is 70%[1]. Based on this definition, CDR coverage is mainly determined by the number of new patients with smear positive.

The CDR coverage of East Lampung Regency in 2017 was 24.8% of the estimated 2,617 new smear positive patients. This achievement was not only below the national target of 70% but had also drastically decreased compared to the average of the previous 5 years, which was 45.9%[4]. East Lampung Regency has 34 Community Health Centers, of which the only Community Health Center that achieved the national target was the LBM Community Health Center,

which was 73.4%, while the CDR coverage of the other 33 Community Health Center is still below the national target, with 11 Community Health Center having CDR coverage below 10%[5].

The decline in the coverage of CDR TB in East Lampung Regency 2017 was due to the lack of maximum case detection efforts by officers and the discovery of suspects was still passive[6]. The suspect screening rate in 2017 was 595 per 100,000 population, or if expressed as a percentage, the suspect screening rate was 0.60% and the proportion of patients with smear positive for suspected at 10% had decreased compared to 2016 which was 11%[5]. Efforts to screen suspects from several health centers often find medical clinic officers not paying attention to the patient's history of how long they have suffered from acute respiratory infection (ARI), while sometimes the results of the examination of patients are not based on data from previous medical records. This results in patients with ARI for 2 weeks or more not being screened for sputum examination in the morning[6].

Increasing the coverage of CDR TB requires quality improvement in the screening of suspects and examination of sputum in the laboratory. This activity requires officers who have good knowledge and skills, therefore human resource development is needed. Supervision must also be increased in order to maintain the motivation of TB officers, who of course will still experience obstacles and problems in their duties[1]. The motivation, knowledge, and skills of TB officers therefore determine the success of efforts to increase the CDR coverage. This study aimed to determine the effect of motivation, knowledge, and skills of TB officers on the CDR coverage of community health centers in East Lampung Regency and the results are expected to add references in the management of TB in Community Health Centers nationwide.

METHODS

This study used a quantitative cross-sectional method[7]. The population in this study were all health centers in East Lampung district as many as 34 health centers represented by TB officers. Each Community Health Center should have a TB team consisting of 1 doctor, 1 program manager, and 1 laboratory officer, but not every Community Health Center has a laboratory officer so that the available TB officers were 34 doctors, 34 program managers and 27 laboratory workers totaling 95 people.

The minimum number of samples calculated using the Slovin formula was obtained at 31 Community Health Center consisting of 77 TB officers, while the sample size in this study was a total sampling of 34 Community Health Center consisting of 95 TB officers. The inclusion criteria were all 34 Community Health Centers in East Lampung Regency consisting of 34 doctors, 34 program managers and 27 laboratory officers who were willing to be respondents. The exclusion criteria were any Community Health Center and TB officers who were unable to attend when this survey was conducted, namely in July-August 2019. This research received ethical approval from the Padjajaran University Research Ethics Commission number 1062/UN6.KEP/ EC/2019.

The measuring instrument in this study was a questionnaire to measure the independent variables of motivation and knowledge, while the independent variable skills were measured using an observation sheet, where the medical record was one of the observed variables in the skills. The questionnaire used was tested for validity with the smallest Pearson correlation value of 0.569 and reliability test with the smallest Cronbach's Alpha value of 0.753. This means that it has met the minimum requirements for the Pearson correlation value of 0.44 and the minimum Cronbach's Alpha value of 0.600. The coverage of CDR in each Community Health Center in East Lampung Regency was obtained by observing secondary data from the East Lampung District Health Office. The criteria for whether or not the respondent's motivation, knowledge, or skills are good or less than good are based on a comparison to the mean or median value[8].

The method of data analysis in this study was gradual from univariate analysis, bivariate analysis, and multivariate analysis. Univariate analysis was performed by displaying the frequency distribution of each variable studied. Bivariate analysis was done using Spearman's Rank technique to test the significance of the correlation between each independent variable on the dependent variable, while multiple linear regression analysis was used to determine the ranking of the independent variables and the simultaneous effect of the independent variables on the dependent variable[9].

RESULTS

The coverage of CDR Community Health Center in East Lampung Regency in 2017 is shown in the graph below.
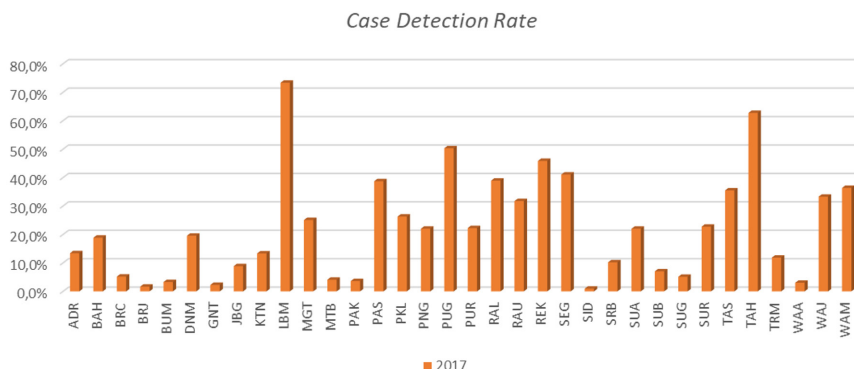

Figure 1. Coverage of CDR East Lampung Regency 2017.

The highest CDR coverage was LBM Community Health Center at 73.4%, followed by TAH Community Health Center at 62.8% and the lowest was SID Community Health Center at 1%. The average CDR coverage of Community Health Center in East Lampung Regency in 2017 was 24.8%.

Research was conducted on 34 Community Health Centers represented by 89 respondents only because 2 people performed the Hajj and 4 people were not willing to be respondents. The distribution of respondent characteristics based on the data provided by TB officers is presented in the following table.

Table 1. Characteristics of Respondents

No	Characteristics	Frequency	%
1	Age		
	19 – < 30 years old	14	15.7
	30 – <40 years old	44	49.4
	40 – <50 years old	26	29.2
	50 – <60 years old	5	5.6
2	Gender		
	Man	39	43.8
	Woman	50	56.2
3	Years of Service		
	< 6 years old	36	40.4
	6 -10 years old	18	20.2
	> 10 years old	35	39.3
4	Education		
	SMA	3	3.4
	D3	33	37.1
	S1/D4	53	59.6
	Total	89	100

Table 1 shows that most TB officers are in the age range of 30 - 39 years as much as 49.4%, where overall officers aged 40 years and under are 65.1%, and most of them are female 56.2%, while the years of service of respondents varied between officers who have served less than 6 years as much as 40.4% and over 10 years as much as 39.3%, and the majority have S1/D4 education at 59.6%.

Good or bad categories of motivation, knowledge, and skills are based on the median value because the data were not normally distributed. The respondent's motivation was considered good if the value was ≥ 0.575, the respondent's knowledge was good if the value is ≥ 0.800, while the respondent's skills were good if the value is ≥ 0.400.

Table 2 shows that the majority of respondents' motivation is lacking, respondents' knowledge is good, and respondents' skills are lacking. The data obtained in this study were ordinal data so that the Spearman Rank test was chosen for bivariate analysis, but the data were converted to interval data by the Successive Interval Method for further statistical tests.

The value of Sig. (2-tailed) for all variables was 0.000 < 0.01, meaning that the relationship between motivation, knowledge, and skills and CDR coverage is significant. The correlation coefficient in the range of 0.665 to 0.696 indicates the relationship between motivation, knowledge, and skills and CDR coverage is strong and positive.

The multiple linear regression test has several assumptions

Table 2. Overview of Independent Variables

Community Health Center	Motivation		Knowledge		Skills	
ADR	0.61	B	0.85	B	0.35	K
BAH	0.56	K	0.83	B	0.30	K
BRC	0.6	B	0.8	B	0.25	K
BRJ	0.49	K	0.6	K	0.30	K
BUM	0.46	K	0.73	K	0.37	K
DNM	0.57	K	0.75	K	0.40	B
GNT	0.45	K	0.63	K	0.27	K
JBG	0.59	B	0.8	B		
KTN	0.52	K	0.8	B	0.27	K
LBM	0.65	B	0.8	B	0.47	B
MGT	0.57	K	0.77	K	0.50	B
MTB	0.47	K	0.7	K	0.40	B
PAK	0.49	K	0.67	K	0.47	B
PAS	0.58	B	0.87	B	0.37	K
PKL	0.56	K	0.75	K	0.37	K
PNG	0.61	B	0.95	B	0.40	B
PUG	0.67	B	0.87	B	0.45	B
PUR	0.52	K	0.65	K	0.37	K
RAL	0.56	K	0.77	K	0.50	B
RAU	0.57	K	0.8	B	0.40	B
REK	0.62	B	0.83	B	0.43	B
SEG	0.6	B	0.9	B	0.57	B
SID	0.46	K	0.6	K	0.30	K
SRB	0.56	K	0.8	B	0.30	K
SUA	0.53	K	0.8	B	0.40	B
SUB	0.54	K	0.73	K	0.30	K
SUG	0.46	K	0.8	B	0.27	K
SUR	0.59	B	0.77	K	0.40	B
TAS	0.52	K	0.8	B	0.60	B
TAH	0.63	B	0.9	B	0.43	B
TRM	0.51	K	0.77	K	0.47	B
WAA	0.53	K	0.65	K	0.25	K
WAJ	0.5	K	0.87	B		
WAM	0.6	B	0.8	B		

Table 3. Summary of Spearman Rank Test

CDR variable against	N	Sig (2-tailed)	Correlation coefficient
Motivation	34	0.000	0.696
Knowledge	34	0.000	0.670
Skills	31	0.000	0.665

that must be met, namely normality and linearity of the data, and there are no multicollinearity and heteroscedasticity, nor autocorrelation[9].

Table 4 displays the test results on the prerequisites whether the multiple linear regression test can be performed or not. First, the Asymp value. Sig. (2-tailed) for motivation, knowledge, and skills are all greater than 0.05, meaning that the data normality assumption is fulfilled. Second, the value of sig. deviations to linearity for motivation, knowledge, and skills are all greater than 0.05, meaning that the assumption of data linearity is fulfilled. Third, the tolerance value on the motivation, knowledge, and skill

Table 4. Summary of Multiple Linear Regression Test Prerequisites

Variable	Normality Test Asymp. Sig. (2-tailed)	Linearity Test Deviation from Linearity Sig.	Multicollinearity Tests		Heteroscedasticity Test Sig.	Autocorrelation Test		
			Tolerance	VIF		DW	du (3;89)	dL (3;89)
Motivation	0.200	0.139	0.470	2.129	0.126			
Knowledge	0.200	0.829	0.460	2.175	0.795	2.249	1.725	1.586
Skills	0.084	0.494	0.862	1.160	0.594			

variables as shown in the table is greater than 0.1 and the VIF value is less than 10, so it can be concluded that there is no multicollinearity between variables. Fourth, the heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residual value on the observed variables. The Glesjer heteroscedasticity test gives the value of Sig., all of which are greater than 0.05 so there is no heteroscedasticity. Fifth, the last assumption that must be met in order for a good linear regression model to occur is that there should be no autocorrelation. The Durbin-Watson (DW) test was done and resulted in a DW number of 2.249, while the values of dU=1.725 and dL=1.586 were obtained from the table for the criteria of 3 independent variables and the number of respondents was 89 people. The DW number is greater than dL and dU or 1.586 < 2.249 > 1.725 and 1.586 < (4–2.249 = 1.751) > 1.725, which means that there is no autocorrelation.

The test results for the multiple linear regression prerequisites above show that all the assumptions required were met. Multiple linear regression test was done twice because in the first test it was found that the knowledge variable had a value of sig.0.962 > 0.05, meaning that there was no significant effect between the knowledge variable and the CDR coverage. The knowledge variable was removed from the model for further multiple linear regression. The results of the first and second multiple linear regression test results are shown in a concise form in the following table.

Table 5. Multiple Linear Regression Test Results

Model	Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	F-Reg	Sig.	R^2	Adjusted R^2	Std. Error
		B	Std. Error	Beta							
1	Constant	-1.726	0.255		-6.777	0.000	36.46	0.000	0.723	0.703	0.148
	Motivation (X1)	2.872	0.483	0.626	5.941	0.000					
	Skills (X2)	1.196	0.312	0.404	3.836	0.000					

The regression equation that is formed based on the value of the regression coefficient in the table above with X1 motivation and X2 skills is as follows:

Y= -1.726 +2.872 X1 + 1.196 X2

The value of sig. motivation = 0.000 < 0.05 and sig. skills = 0.001 <0.05, meaning that the motivation and skills variables have a significant influence on the CDR coverage. The condition = 0.05, the number of independent variables = 3 so that the degrees of freedom df = 89-3 = 86 and the test in one direction gives a value of table = 1.66277. The values of t1=5.941 and t2=3.836 are both greater than the table so that partially both motivation and skills have a significant influence on the coverage of CDR.

Fregression value = 36.461 while the value of Ftable = 2.71 for probability 0.05 independent variable = 2 and the number of respondents = 89, obtained Fregression > Ftable meaning that there is a significant influence of the motivation and the skills variables simultaneously on the CDR coverage variable. The amount of adjusted R square is 0.703 indicating the magnitude of the simultaneous effect is 70.3%, while the remaining 29.7% comes from other variables outside the study.

DISCUSSION

Comparison of the CDR coverage of Community Health Center in East Lampung Regency experienced a significant change between 2010 and 2017. In 2010 there were 2 Community Health Center that met the 70% CDR target, namely SUG Community Health Center 110% and SEG Community Health Center 76%, while LBM Community Health Center 24%. In 2017 the coverage of CDR for SUG Community Health Center was 5.1%, SEG Community Health Center was 41.1% and LBM Community Health Center was 73.4%. Herlindawati's research (2012) stated that the low coverage of CDR at the East Lampung District Health Centers in 2010 was due to passive case finding and it was found that several Community Health Centers did not pay attention to patient history records in screening TB suspects[6]. The results of this study are in line with the results of research conducted by Aditama (2013) which stated that the low coverage of CDR in Boyolali Regency is partly because only 34.50% of Community Health Centers in Boyolali Regency have implemented active case finding[10]. The active case finding method means that TB officers proactively reach out to TB suspects in the community. This method requires a combination of greater community participation, especially within the cadres and

the application of reliable rapid test technology to suspects. The active role of cadres can increase the number of TB cases detected and increase the number of TB patients who complete the treatment[11]. Active case finding is an important complementary strategy to Passive Case Finding, in order to diagnose and treat patients earlier[12].

The results of the Bivariate Rank Spearman test stated that the motivation, knowledge, and skills variables had a correlation to the CDR coverage, but the multiple linear regression test results showed that not all of the independent variables had an effect on the CDR coverage. Knowledge is stated to have no effect, but motivation and skills have a significant effect either partially or simultaneously on the coverage of CDR.

The influence of the motivational variable on the CDR coverage is significant and positive, while the univariate analysis states that respondents have less motivation. This finding shows that TB officers need increased motivation considering that the CDR coverage has not yet reached the target.

Motivation is the stimulation of desire and the provision of driving force that create one's work enthusiasm so that they are willing to work together, work effectively and be integrated with all their efforts to achieve satisfaction. This stimulus can be a material incentive or non-material incentive[13]. The results of Nurwanto's research (2015) support this where there is a significant relationship between motivation and case finding of pulmonary TB[14]. Damayanti's research (2014) stated that there is a significant relationship between responsibility, opportunity to advance, the work itself, working conditions, interpersonal relationships, supervision, salary, and security on employee work motivation[15]. The above research results support the motivation theory given by Suhardi and Sutrysno that work motivation is influenced by intrinsic motivation in the form of salary to fulfill necessities of life and to gain recognition or respect, while interpersonal relationships, working conditions, incentives, job security, career development and supervision represent extrinsic motivation. McClelland's theory of the need for achievement, the need for power and the need for affiliation is also evident in these studies.

The multiple linear regression equation shows that motivation has a coefficient of 2.872 or 2.4 times the influence of the skill variable. The East Lampung District Health Office should manage and motivate TB officers in order to achieve the national target of 70% CDR. The provision of incentives and supervisory functions should be done regularly and systematically. Nurwanto (2014) stated that there is a significant relationship between the provision of incentives and the discovery of new TB cases[14]. The research of Khan et al. (2017) indicated that religious concern, social recognition and financial incentives can be used to increase the involvement of officers in TB case finding[16]. Aditama (2013) found that supervision of recording and reporting had been done 100% in Boyolali as one of the factors supporting the achievement of 70% CDR[10]. Implementation of the supervisory functions therefore needs to be applied to recording and reporting activities.

Adejumo et al. (2017) conducted a comprehensive research proving that supportive supervision is one of the keys to increase TB detection[17].

Multiple linear regression analysis stated that the relationship between knowledge variables and CDR was not significant. The results of this study are not in line with the results of Wahyudi's research (2010) where there was a significant relationship between knowledge and TB case finding[18]. Research by Awusi et al. (2009) on the other hand stated that there was no significant relationship between knowledge and CDR coverage[19]. Respondents in this study had good knowledge which was motivated by the level of education of the officers, the majority of whom were D3 to S1. The knowledge of TB officers is actually the basic capital to conduct their duties as pulmonary TB officers. Saomi's research (2015) stated that good knowledge will trigger good actions to conduct programs more directed and effectively[20]. This good knowledge of the officers turned out to result in CDR coverage that did not reach the national target. The question that arises and needs to be proven is whether this knowledge is ultimately not applied in practice in the field.

The third hypothesis is proven in the Spearman Rank analysis and multiple linear regression analysis. The results also showed that most of the respondents were less skilled in finding pulmonary TB patients. This finding is concluded by observing the checklist obtained from the document review. The checklist checks the conformity of the observation results to the completeness of medical record data, recording and reporting, and the conformity of laboratory procedures. The results of this study are in line with the results of Wahyudi's research (2016) which showed the low case finding by TB officers is influenced by inadequate staff skills[21].

Skills are the ability to carry out tasks or carry out a range of functions well. Skills have a productivity aspect, can be developed and defined socially. A person's skills can be developed by increasing repetition and practice[22]. Training is one way to improve skills. This is in line with the results of research by Ayulestari (2014) which showed that the training variable had a significant relationship with the findings of TB patients[23]. Research by Awusi et al. (2014) further stated that the variables that influence the CDR rate are screening for TB suspects and DOTS training[19]. Irani et al. (2015), in their research, suggested planning for continuous training for Health Care Workers is needed to overcome the low practice regarding TB[24].

The integrated patient development record (CPPT) which is expected to be an effective communication medium between professions has not been implemented properly, even though good recording is very important because it will minimize communication errors and improve patient safety which has an impact on service quality[25]. CPPT is not only useful for communication between professions but is also a tool for TB officers at the Community Health Centers in screening TB cases.

The Community Health Center is an ideal place to

implement TB control by being patient-centered because of geographic access to patients and at the same time recognizing various health conditions in the community. The Community Health Center driven by primary care physicians are encouraged to make three efforts in the integrated TB treatment, namely creating holistic health records and managing comorbidities during TB treatment, increasing TB case notification through careful diagnosis, and empowering patients in TB treatment adherence. The success of the TB control program also requires successful management in implementing a multidisciplinary approach. The multidisciplinary team consists of professionals with various skills to meet the needs of patients, especially those who require additional clinical and psycho-emotional support. Psycho-emotional support will be more felt if the patient's family is involved[26]. Primary care physicians in this case have a role to provide services to individuals, families and communities in a sustainable and comprehensive manner by taking into account environmental, economic and socio-cultural factors.

CONCLUSIONS AND SUGGESTIONS

A. Conclusions
The conclusions that can be drawn from this research are as follows:
1. There is a significant, positive and strong relationship between each variable of motivation, knowledge, and skills of TB officers and CDR coverage of Community Health Centers in East Lampung Regency (correlation coefficient between 0.665 to 0.696; Sig. = 0.000).
2. There is no significant effect between the knowledge variable and the coverage of CDR Community Health Centers in East Lampung Regency (Sig. = 0.962).
3. There is a significant partial effect between each of the motivation and skill variables with the coverage of CDR at the Community Health Centers in East Lampung Regency (t > t table; Sig. = 0.000).
4. Motivation and skill variables have a simultaneous influence on the coverage of CDR (Sig.=0.000; R square = 0.703).
5. The variable with the greatest influence on the coverage of CDR TB Community Health Centers in East Lampung Regency is motivation.

B. Suggestions
Suggestions that can be submitted to the East Lampung District Health Office are as follows:
1. The Health Office is expected to run a program to increase the motivation of TB officers, which includes the provision of incentives. Incentives can be material or non-material.
2. The Health Office is expected to improve the skills of TB officers by conducting DOTS training for TB officers and cadres and post-training evaluation and monitoring for at least 4 months.
3. The Department of Health is expected to conduct its function in monitoring and coaching TB officers on a regular basis.
4. Community Health Centers should conduct an integrated patient development record (CPPT) in a disciplined manner according to procedures to improve inter-

professional communication in patient management.

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