

Gender Differences Associated with Knowledge, Attitude, and Behavior About Cough Etiquette in Primary Health Care

Rahmat Bakhtiar¹, Krispinus Duma¹, Hilda Hilda², Romi Hendra³, Anwar Mallongi⁴

¹Department of Community Medicine, Faculty of Medicine Mulawarman University, Samarinda Indonesia

²Nursing Study Programme, Poltekkes Kemenkes Kalimantan Timur Samarinda, Indonesia

³Tuberculosis Programme, East Kalimantan Provincial Health Office, Samarinda, Indonesia

⁴Faculty of Public Health, Hasanuddin University, Makassar, Indonesia

email: r.bakhtiar@fk.unmul.ac.id

ABSTRACT

Introduction: Cough Etiquette is a non-pharmacological intervention in preventing respiratory infections caused by viruses or bacteria in health care facilities. This study aimed to analyze the relationship between gender with knowledge, attitude, and behavior about cough etiquette in TB patients.

Methods: A cross-sectional study with 55 new TB cases aged > 18 years taken purposively from the TB 03 register of six Samarinda Health Centers who received treatment from July 2021 to April 2022. We used a questionnaire to measure knowledge, attitudes, and behavior toward cough etiquette. The knowledge variable consists of 13 questions, the attitude variables comprised ~~of~~ 6 statements, and the practice variables comprised ~~of~~ 6 statements using a Likert scale. Data analysis used the chi-square test with a significance level of < 0,05. **Result:** Most TB patients covered their mouth with their hands (56,2%) or did not cover at all (16,6%). As ~~many ueh~~ as 34% of TB patients used ~~their~~ sleeve arm, elbow, or tissue. There was an association between knowledge of cough etiquette in TB patients at primary health care (p=0.008), attitude (p=0.004), but not significant with behavior (p=0.691). Knowledge and attitudes about cough etiquette have a relationship with ~~male~~.

Conclusion: Men with TB who seek treatment at the primary health care tend to understand ~~clearly the required and well an~~ attitude towards practicing cough etiquette. In places ~~s~~ with a high risk of transmission, people with TB disease ~~r~~ are advised ~~ee~~ to consistently apply cough etiquette to reduce ~~the~~ transmission of *M. tuberculosis* to ~~other visitors to people visiting~~ health care facilities.

Keywords: cough etiquette, knowledge, behavior, gender, tuberculosis

INTRODUCTION

According to the Global TB Report 2020, there were 10 million new TB cases, of which 56% ~~were lived~~ in India, China, Indonesia, Philippines, and Pakistan (World Health Organization, 2020). Meanwhile, Indonesia has the 3rd highest burden of TB in the world, behind India and China. Based on the Indonesia Ministry of Health data in 2020 ~~that~~ there were 854.000 new cases per year or 319 per 100,000 population and 93.000 deaths (Kementerian Kesehatan, 2020). The number of TB cases in East Kalimantan province ~~has~~ increased from 2635 people in 2019 to 4358 people in 2020. However, the Joint External Monitoring Mission (JEMM) report that the TB program is detecting only about 40% of estimated TB cases (Kementerian Kesehatan Republik Indonesia, 2020).

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TB prevention and control consists of a combination of measures designed to minimize the risk of *M. tuberculosis* transmission within populations (Alisjahbana et al., 2021). A three-level hierarchy of controls comprising administrative controls, environmental controls and respiratory protection has been shown to reduce and prevent the risk of transmission and exposure to *M. Tuberculosis* (PAHO, 2021; WHO, 2019). Patient-centered outpatient and community-based care should be strongly preferred to reduce opportunities for transmission (Alisjahbana et al., 2021). Preventive respiratory protection measures, could have contributed to lower transmission of TB and other respiratory infections at the community level (Hafez et al., 2020).

Some experts recommended Infection Control (IC) as one of the key strategies for TB control. The World Health Organization (WHO) recommended Cough Etiquette (CE) in people with presumed or confirmed TB to reduce *M. Tuberculosis* transmission to health workers and persons visiting health care facilities or other persons in settings with a high risk of transmission. Cough Etiquette is a non-pharmacological intervention in preventing respiratory infections caused by viruses or bacteria in health care facilities and ~~dictates~~ ~~has~~ a series of actions to take if someone is coughing or sneezing, which is designed to reduce the spread of respiratory illness to others. The effectiveness of CE in preventing or blocking the release of infectious droplets into the surrounding environment was proven in some studies (Centers for Disease Control and Prevention (CDC), 2018).

The Ministry of Health has instructed the application of CE to all visitors to health facilities who have complaints of coughing to prevent transmission of respiratory infections (Hafez et al., 2020). Improving CE behavior can be carried out effectively through education, ~~and~~ placing leaflets or posters in the waiting room accompanied by the provision of facilities such as washstands or masks (Barry et al., 2011; Kim & Oh, 2021). To minimize the spread of droplet nuclei, any coughing patient, ~~particularly those~~ -with a respiratory infection ~~particularly~~, those with or suspected of having TB, should be educated in CE and respiratory hygiene. It includes ~~preventive actions such as~~ ~~by~~ covering their nose and mouth when sneezing and/or coughing with a physical barrier, such as a piece of cloth, tissue, or surgical mask. If such physical barriers are not available, the best practice is for the mouth and nose to be covered with the bend of the elbow or the hands, which must then be cleaned immediately. Most researchers agree that knowledge and behavior play a very important role in implementing cough etiquette, ~~and that does~~ gender plays a significant role in high-risk environments such as primary healthcare (Barry et al., 2011; Chavis & Ganesh, 2020; Engelbrecht et al., 2016; Prihanti et al., 2021; Yani et al., 2020). Engelbrecht in South Africa found that positive attitudes and good levels of knowledge regarding TB infection control were the main factors associated with good infection control practices (Engelbrecht et al., 2016). Shrivastava and colleague in Tamil Nadu said that knowledge and practice of cough etiquette were not found to be satisfactory (Shrivastava & RamBiharilal Shrivastava, 2019). Meanwhile, Prihanti et al found that there is a change in knowledge, behavior, and awareness in confirmed and suspected TB patients after cough etiquette counseling (Prihanti et al., 2021). This study was conducted to investigate the level of knowledge, attitude and practice of education among ~~the~~ TB patients in ~~a~~ pandemic situation.

METHODS

This research was a cross-sectional study. This research was conducted at six public health centers, Samarinda City. The data on TB patients ~~in~~ were obtained from the Integrated Information Tuberculosis System (SITT) of the East Kalimantan province and were cross-checked with ~~the~~ TB 03 public health center report. The number of samples ~~comprised was~~ 55 TB patients seeking treatment from July 2021 to April 2022 ~~while with~~ ~~the~~ number of cases ~~at~~

of every primary health care center was as follows: Sempaja Health Center 9 cases, Lempake Health Center 10 cases, Palaran Health Center 11 cases, Temindung Health Center 10 cases, Juanda Health Center 8 cases, and Wonorejo Health Center 7 cases. TB data sources were the primary data obtained from direct interviews by telephone using questionnaires. The researcher looked for the patient's telephone number information from the TB status card (TB form 01), the family or supervisor swallows TB drugs, and made sure they could communicate with the patient. In designing the questionnaire, the researcher involved the expert, and the researcher asked each question directly to each respondent. The independent variables in this study were knowledge, attitude and practice, while the dependent variable was TB cases by gender. Cough etiquette is a series of activities to cover nose and mouth when sneezing and/or coughing using a physical barrier, such as a piece of cloth, tissue, or surgical mask. If such physical barriers are not available, the best practice is for the mouth and nose to be covered with the bend of the elbow or the hands. The application of cough etiquette is good if, when someone sneezes and/or coughs, they automatically cover their nose and mouth.

The measurement of knowledge about CE include awareness of what symptoms of TB are, how TB is transmitted, which TB is infectious, as well as the ability of the patient and their family ability to prevent TB infection. The knowledge variable consists of 13 questions posed directly by the researcher. The assessment of the correctness of each answer given by the respondent was based on the theory contained in the tuberculosis guidebook from the Ministry of Health. The attitude variables comprised of 6 statements with response categories using a Likert scale (1-3) ranging from 1-disagree, to 2-neutral, and 3-agree. Meanwhile, the practice variables comprised of 6 statements with response categories of never, sometimes and always. The independent variable was classified into two groups, knowledge (good/not good), attitude (positive/negative) and practice (good/not good). The validity test was conducted on 15 respondents and the result of the validity test was 0.523 - 0.826. The reliability test was conducted using the internal consistency approach aiming at knowing the consistency between items or parts of the test. This study would use Cronbach's alpha formula (Cronbach's coefficient α) and it resulted in (r) of 0.72. The knowledge, attitude and practice level were tested for association with gender characteristic at significance level of 0,05. All variables were measured using a cut-off point in the median score. The data analysis described the respondents' characteristics, univariate analysis, and bivariate analysis using a Chi-square test (χ^2).

RESULTS

A total of 8 out of 63 respondent (4,04%) had TB extrapulmonal as exclusion criteria so that the number of total respondents involved in this study totaled were 55 respondents. While enquiring about their practice after seeing a coughing patient in the health facility, 21,8% replied that they asked the patient to cover his/her mouth while 29,1% of them stated that they did nothing. Among them, 36,4% stated that they practice cough etiquette and respiratory hygiene daily.

Table 1 The Respondents' characteristics for TB cases by gender

Characteristic	Male		Female		p	
	N=29	%	N=26	%		
Age	< 20 y.o	3	10,3	1	3,9	0,755
	21 - 30 y.o	4	13,8	3	11,6	
	31 - 40 y.o	6	20,7	5	19,2	
	40 - 50 y.o	10	34,5	8	30,7	
	>50 y.o	6	20,7	9	34,6	
Mean: 42,8 y (\pm 14,2 y) min-max=17 - 67 y.o						
Education	Primary/Secondary School	10	34,5	12	46,2	0,676
	High School	12	41,4	9	34,6	

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Job status	Graduated/Postgraduate	7	24,1	5	19,2	0,908
	Working	8	27,5	7	26,9	
	Not Working	21	72,5	19	73,1	
Treatment Phase	Intensive	16	55,2	17	65,4	0,620
	Intermittent	13	44,8	9	34,6	
TB Case	Bacteriologically confirmed	19	65,5	16	61,5	0,980
	Diagnosed clinically	10	34,5	10	38,5	

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Table 1 presents demographic characteristics for individual TB cases by gender. The proportion of cases that are bacteriologically confirmed were 56,4%, while intensive phase of treatment was 50,9%. The majority of respondents were male (n = 35, 63,6 %), the average age of TB sufferers was 42,9 years (± 14.3 y.o) and they had been not working (72,7%).

Table 2. Knowledge of cough etiquette among TB patients in Primary Health Center

Knowledge questions on TB CE	Correct response (%)
What are symptoms of TB?	
Cough for 2 weeks or more	33 (60)
Weight loss	30 (54,5)
Fever	34 (61,8)
Loss of appetite	21 (38,2)
Chest pain	24 (43,6)
Blood in sputum	26 (47,3)
How is TB transmitted?	40 (88,9)
Which TB is infectious?	36 (65,5)
In what ways, can patient prevent TB infection?	
Cover mouth and nose when cough or sneeze	28 (50,9)
Washing hands	30 (54,5)
Use of masks by patients	21 (38,2)
What are CE measures in health facilities?	
Administrative controls	24 (43,6)
Personal respiratory protection	26 (47,3)
Average	53,4%

Table 2 presents knowledge of patient TB on CE. The correct answer for questions about TB transmission (88,9%) and TB is infectious (65,5%) but questions about preventing TB infection were between 38,2% - 50,9%.

Table 3. Attitude of cough etiquette in TB patients in Primary Health Center

Statement	Disagree	Neutral	Agree
There is a need for posters regarding TB CE in a health care facility	13(23,6)	15(27,3)	27(49,1)
Cover your mouth and nose with a tissue when you cough or sneeze	12(21,9)	20(36,4)	23(41,7)
Use mask when you get respiratory symptoms	10(18,2)	20(36,4)	25(35,4)
Dispose the used tissue in a garbage can	10(18,2)	17(30,9)	28(40,9)
Use hand hygiene after having contact with respiratory secretions	10(18,2)	16(29,1)	29(42,7)
I am worried that I am the infection source of TB	9(16,4)	20(36,4)	26(46,2)

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Table 3 presents attitude of patient toward TB CE. This revealed that ~~obtaining~~ only 4% of patients used a mask when getting respiratory symptoms and 23% of them wanted to read or see posters about CE. Among them, 46,2% stated that they informed TB patients or suspects of cough etiquette and respiratory hygiene on a daily basis. Twenty-seven percent of them covered their mouth and nose with a tissue when coughing or sneezing consistently, and only 41,8% of patients used their elbow to cover their mouth and nose.

Table 4. Practice of cough etiquette in TB patients in Primary Health Center

Cough Etiquette Practice	Never	Sometimes	Always
Proportion of use of mask when coughing or sneezing	14(25,5)	17 (30,9)	24(42,6)
Cover mouth and nose with a tissue when cough or sneeze	21(38,1)	19(34,5)	15(27,3)
Use elbow when there is no tissue	6(10,9)	26(47,3)	23 (41,8)
Dispose the used tissue in a garbage can	11(20,1)	23(41,8)	21(38,1)
Practiced of cough etiquette & respiratory hygiene on a daily basis	9(16,3)	26(47,3)	20(36,4)

Remind the patients who did not practice cough etiquette when sneezing or coughing	16(29,1)	27(49,1)	12(21,8)
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While enquiring about their practice after seeing a coughing patient in the health facility, 21,8% replied that they asked the patient to cover his/her mouth while 29,1% of them stated that they did nothing. Among them, 36,4% stated that they [were](#) informed practice of cough etiquette and respiratory hygiene on daily basis (table 4).

Table 5. The analysis of the relation of the knowledge, attitudes, and practices of cough etiquette in TB patients.

Variable Independent	Male		Women		P-Value	OR	95% CI		
	N=29	%	N=26	%			Lower	Upper	
Knowledge	Not Good	18	62,1	6	23,1	0,008*	5,455	1,674	17,770
	Good	11	37,9	20	76,9				
Attitudes	Positive	20	68,9	7	26,9	0,004*	6,032	1,871	19,442
	Negative	9	32,1	19	73,1				
Practices	Not Good	13	44,8	14	53,8	0,691		0,241	2,016
	Good	16	55,2	12	46,2				

*Sig p < 0,05

Results from the bivariate analysis are shown in table 5 indicating a relationship between male TB patient and the knowledge of CE (OR 5,455, $p=0.008$) and attitude about CE (OR 6,032, $p=0.004$). Male TB patients understood more about TB 5.5 times than women and the positive attitude of male TB patients was 6 times better than women.

DISCUSSION

WHO's policy for administrative TB control in health care facilities includes prompt identification of people with TB symptoms, separation of infectious patients, control of the spread of the pathogen, and minimizing the time spent in health care facilities (World Health Organization, 2014). The best method of avoiding the spread of respiratory infections is to avoid contact with others while a person is having symptoms. Although Zayas and colleagues indicated that all CE maneuvers assessed did not block droplets expelled as aerosol when coughing (Zayas et al., 2012), [but](#) Scano (2014) found that CE can help reduce and infective droplets at their source (Stop TB Partnership, 2020).

The research showed that the percentage of patients [scoring](#) correct knowledge was 53,4%. Previous research in Indonesia in people with suspected and confirmed TB showed that knowledge about CE increased after receiving counseling (Prihanti et al., 2021). This result was relatively the same as reported in Korea but higher than other research in Indonesia (Choi & Kim, 2016; Nasreen et al., 2010; Prihanti et al., 2021; Ramdan et al., 2020). Based on the TB treatment protocol, health education including the prevention of transmission must be carried out at every visit to pick up the drug (Ministry of health, 2021). Although most TB patients know TB is infectious and know TB transmission, [but](#) knowledge about symptoms and how [patients](#) can [prevent](#) TB infection [prevention](#) is relatively low (Prihanti et al., 2021). Previous studies in Indonesia have shown that knowledge after counseling health education about cough etiquette was lacking (Yani et al., 2020). We argued that old age and low levels of education are the predictors of the low knowledge of TB sufferers about symptoms and TB transmission. People who have TB with bacteriologically confirmed cough, sneeze or expectorate them [and](#) produce micro droplets of phlegm containing *M. Tuberculosis*. Microdroplets can remain suspended in the air [for](#) up to 8 hours depending upon [the](#) droplets' size and environmental conditions including airflow (World Health Organization, 2009).

Most [of the](#) respondents covered their mouth and nose when they were sneezing or coughing (67,3%) [but and nevertheless there were still](#) 32.7% of respondents [who](#) did not cover their

mouth or nose or both when they were sneezing or coughing. The percentage of patients scoring good attitude level was 58.6, relatively higher than research conducted by Ramdan in Bandung where the good attitude level was only 46% (Ramdan et al., 2020). This result is possibly the impact of the Samarinda Health office's policy which requires education before starting treatment for TB patients, which is actually the aim of ensuring adherence to treatment. Meanwhile, Nasreen in Bangladesh found that 81% of respondents did not cover their mouth or nose when coughing or sneezing, 11% of respondents covered with their hands and 7% covered with their clothes (Nasreen et al., 2010). In contrast, by 47.8 high speed cough air flow coming out of the respiratory system encounters a physical barrier (Zayas et al., 2012). The habit of only covering one's mouth without covering one's nose has high potential to spread droplets containing the bacteria that are released into the air. Individuals with respiratory infection should be educated to cover their mouth and nose with tissues when coughing and sneezing and dispose of used tissues in waste containers.

This study showed the knowledge and attitude of CE in TB patients was quite high. This is due to the continuous education of TB patients, especially in the intensive phase. Cough etiquette is to be formally introduced and practiced in TB patients according to protocol, counseling on cough etiquette is delivered to TB patients before being given the first treatment and when taking medication regularly to health care facilities (Zayas et al., 2012). Public health consensus supports the use of TB control measures such as CE and hand washing (Giuffré & Kilpatrick, 2016), although the evidence regarding based for the effectiveness of such interventions against respiratory infection is still not definitive. Healthcare facilities should ensure the availability of materials for adhering to CE in waiting areas for patients and visitors. Health workers must be able to provide adequate education about the importance of carrying out CE to patients to reduce transmission. Hand hygiene is perhaps the most critical element in preventing the transfer of microorganisms to the environment or to other people. Barry and colleagues found that 77% of students failed to comply when compliance with ethical cough standards (Barry et al., 2011). Meanwhile, students comply with CE standards more often when sneezing than coughing.

Our findings showed that men were more likely to apply CE than female TB patients. Gender analysis revealed women were more likely than men to have a chronic cough and use hand coverings, while men were twice as likely to sneeze or cough into the air. Men compared with women were twice as likely as women to cough or sneeze into the air. In Bangladesh, twenty-two per cent of women covered their coughs and sneezes compared to 13% of men (Nasreen et al., 2010). Kim in South Korea found a that positive correlation between mothers' cough etiquette and their children's cough etiquette practice level (Kim & Oh, 2021). Health professionals need to work towards engaging people with TB, particularly women in increasing knowledge about the prevention of preventive transmission, especially in the initial treatment of TB.

The Ministry of Health recommends that individuals with TB confirmed bacteriologically should have to do undertake contact surveys and CE education to prevent its the transmission. WHO stated that the level of knowledge and the level of good attitude does not automatically guarantee that the patient will take preventive measures (World Health Organization, 2009). This research was in line with Jong in Korea whose data showed that the mean of the correct answer rate for knowledge of respiratory hygiene or CE was 56.1% (Choi & Kim, 2016). Efforts to control TB transmission are carried out by providing health education to the public about TB, how it is transmitted, and the complications it causes (Nasreen et al., 2010; Shrivastava & RamBihariLal Shrivastava, 2019; World Health Organization, 2009).

Predictors of respiratory CE practice were carrying a handkerchief or tissues, prior education on CE, the awareness level of CE, the daily frequency of handwashing, and the knowledge level of CE (Choi & Kim, 2016). Less than one-half of respondents used sleeve arm,

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elbow, or tissue as advised by the Ministry of Health (Kemenkes RI, 2018). We agreed with Ramdan to improve education delivery so that it is more focused on attitudes and conduct in preventing TB transmission to TB patients and families so that they understand and apply, and can prevent TB transmission at from its source (Ramdan et al., 2020). As Greenhalgh and Papoutsi have argued, the complexity lies in the interaction between an intervention and the pre-existing organization of health care, and not necessarily in the intervention on its own (Greenhalgh & Papoutsi, 2018). Since the Covid 19 pandemic, coughing has become a community problem that causes pollution anxiety in nearby communities (Brown et al., 2021). There are limitations to our study. This study was conducted among in a small number of TB cases, so limiting the generalization of findings. Among the further limitations of the study are that include attitudes and practices in the study are self-reported based on the anonymous questionnaires rather than on observation.

CONCLUSION

Knowledge and attitudes about CE have a relationship with male patients with TB at the primary health center. Our study also highlights the need for TB health workers to work with women with TB, particularly with those with low education in the process to assist them in understanding TB transmission. We believe that the consistent application of CE will minimize bacterial load or droplets, so the risk of transmission is low. The triage of people with TB signs and symptoms, or with TB disease, is recommended to reduce M. tuberculosis transmission to health workers, persons attending health care facilities, or other persons in settings with a high risk of transmission such as primary health care facilities.

Conflict of Interest

There is no conflict of interest.

Authors' Contributions

RB and AM carried out the conception, design, statistical analysis of this article, KD conducted the analysis and interpretation of the data. Data collection and assembly were completed by RH, HH. The article was drafted by RB, HH and KD. Final approval of the article was confirmed by RB, AM and KD.

Funding

This study was funded by personal expenses.

Acknowledgment

The authors would like to express gratitude to the Dean of Faculty of Medicine, Universitas Mulawarman University, and the Head of six public health center of Samarinda City that had given access and data clarification in ethical cough procedure in primary health care.

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REFERENCES

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- Alisjahbana, B., Koesoemadinata, R. C., Hadisoemarto, P. F., Lestari, B. W., Hartati, S., Chaidir, L., Huang, C. C., Murray, M., Hill, P. C., & McAllister, S. M. (2021). Are neighbourhoods of tuberculosis cases a high-risk population for active intervention? A protocol for tuberculosis active case finding. *PLoS ONE*, *16*(8 August), 1–9.
<https://doi.org/10.1371/journal.pone.0256043>
- Barry, T., Manning, S., Lee, M. S., Eggleton, R., Hampton, S., Kaur, J., Baker, M. G., & Wilson, N. (2011). Respiratory hygiene practices by the public during the 2009 influenza pandemic: An observational study. *Influenza and Other Respiratory Viruses*, *5*(5), 317–320.
<https://doi.org/10.1111/j.1750-2659.2011.00228.x>
- Brown, N., Nettleton, S., Buse, C., Lewis, A., & Martin, D. (2021). The coughing body: etiquettes, techniques, sonographies and spaces. *BioSocieties*, *16*(2), 270–288.
<https://doi.org/10.1057/s41292-020-00196-3>
- Centers for Disease Control and Prevention (CDC). (2018).
<https://www.cdc.gov/disasters/disease/respiratoryic.html>. WHO.
<https://www.cdc.gov/disasters/disease/respiratoryic.html> Accessed 20 December 2021
- Chavis, S., & Ganesh, N. (2020). Respiratory Hygiene and Cough Etiquette. In L. G. DePaola & L. E. Grant (Eds.), *Infection Control in the Dental Office* (pp. 91–103). Springer Nature Switzerland. https://doi.org/10.1007/978-3-030-30085-2_7
- Choi, J. S., & Kim, K. M. (2016). Predictors of respiratory hygiene/cough etiquette in a large community in Korea: A descriptive study. *American Journal of Infection Control*.
<https://doi.org/10.1016/j.ajic.2016.04.226>
- Engelbrecht, M., Janse van Rensburg, A., Kigozi, G., & van Rensburg, H. C. J. D. (2016). Factors associated with good TB infection control practices among primary healthcare workers in the Free State Province, South Africa. *BMC Infectious Diseases*, *16*(1), 1–10.
<https://doi.org/10.1186/s12879-016-1984-2>
- Giuffré, C., & Kilpatrick, C. (2016). Hand Hygiene. In *Basic concepts of infection control*. (3rd ed., pp. 1–13). International Federation of Infection Control.
<https://doi.org/10.1002/aorn.13340>
- Greenhalgh, T., & Papoutsi, C. (2018). Studying complexity in health services research: desperately seeking an overdue paradigm shift. *BMC Medicine*, *16*(95).
<https://doi.org/10.1186/s12916-018-1089-4>

- Hafez, R., Harimurti, P., & Martin-Hughes, R. (2020). *Tuberculosis in Indonesia: Epidemic Projection and Opportunities to Accelerate Control. Findings from an Optima TB analysis*. <https://openknowledge.worldbank.org/handle/10986/35370>
- Kemenkes RI. (2018). Tuberkulosis (TB). *Tuberkulosis*, 1(april), 2018.
- Kementerian Kesehatan. (2020). *Tuberculosis Situation in 2020*.
- Kementerian Kesehatan Republik Indonesia. (2020). *The Republic of Indonesia Joint External Monitoring Mission for Tuberculosis*.
- Kim, J., & Oh, S. (2021). The relationship between mothers' knowledge and practice level of cough etiquette and their children's practice level in South Korea. *Child Health Nurs Res*, 27(4), 385–394. <https://doi.org/https://doi.org/10.4094/chnr.2021.27.4.385>
- Ministry of health. (2021). *Protokol Tata Laksana Pasien TBC Dalam Masa Pandemi COVID 19*. <https://covid19.kemkes.go.id/protokol-covid-19/protokol-tentang-pelayanan-tbc-selama-masa-pandemi-covid-19>. Accessed 02 January 2022
- Nasreen, S., Azziz-Baumgartner, E., Gurley, E. S., Winch, P. J., Unicomb, L., Sharker, M. A. Y., Southern, D., & Luby, S. P. (2010). Prevalent high-risk respiratory hygiene practices in urban and rural Bangladesh. *Tropical Med Int Health*.
- PAHO. (2021). *Diagnosis of new TB cases in the Americas reduced by 15-20% during 2020 due to the pandemic*.
- Prihanti, G. S., Julianto, N. R., Sasmita, A. H., Nurfahmi, A., Setyautami, A., Rosyida, D., Muslimawaty, T., & Fatmawati, N. (2021). The Effectiveness of Cough Etiquette Counseling Among Presumptive and Confirmed Tuberculosis. *Jurnal Berkala Epidemiologi*, 9(1), 26–35. <https://doi.org/10.20473/jbe.v9i12021.26>
- Ramdan, M., Lukman, M., & Platini, H. (2020). Pengetahuan, sikap dan etika batuk pada penderita tuberkulosis paru. *Holistik Jurnal Kesehatan*, 14(2), 232–239. <https://doi.org/10.33024/hjk.v14i2.2395>
- Shrivastava, P. S., & RamBihariLal Shrivastava, S. (2019). A cross sectional study to assess the awareness and practice about cough etiquettes among respiratory symptomatic patients in Tamil Nadu. *International Journal Of Community Medicine And Public Health*, 6(10), 4248. <https://doi.org/10.18203/2394-6040.ijcmph20194165>
- Stop TB Partnership. (2020). The Potential Impact of the Covid-19 Response on Tuberculosis in High-Burden Countries: a Modelling Analysis. *Developed by Stop TB Partnership in Collaboration with Imperial College, Avenir Health, Johns Hopkins University and USAID.*, 1–7.
- WHO. (2019). *WHO guidelines on tuberculosis infection prevention and control 2019 update*.
- World Health Organization. (2009). WHO Policy on TB Infection Control in Health-Care Facilities, Congregate Settings and Households. *Infection Control*.
- World Health Organization. (2014). *INTERNATIONAL STANDARDS FOR Tuberculosis Care*.
- World Health Organization (WHO). (2020). *Global Tuberculosis Reports 2020*.

Yani, D. I., Hidayat, Y. F., & Amrullah, A. A. (2020). Erratum To: Knowledge, Attitude, and Practice of Cough Etiquette in Patients With Tuberculosis in the Community Health Centers. *Belitung Nursing Journal*, 6(5), 186. <https://doi.org/10.33546/bnj.1153>

Zayas, G., Chiang, M. C., Wong, E., MacDonald, F., Lange, C. F., Senthilselvan, A., & King, M. (2012). Cough aerosol in healthy participants: Fundamental knowledge to optimize droplet-spread infectious respiratory disease management. *BMC Pulmonary Medicine*, 12(March). <https://doi.org/10.1186/1471-2466-12-11>