

## Active Tuberculosis Case Discovery Using the Adaptation Model in the City of Yogyakarta

Setyogati Candra Dewi<sup>1\*</sup>, Sunarti<sup>2</sup>, Dyah Suryani<sup>3</sup>, Rokhmayanti<sup>4</sup>

<sup>1,2,3,4</sup> Prodi Magister Kesehatan Masyarakat, Fakultas Kesehatan Masyarakat, Universitas Ahmad Dahlan Yogyakarta

*How to cite:* Dewi, S. C., Sunarti, Suryani, D., & Rokhmayanti. Active Tuberculosis Case Discovery Using the Adaptation Model in the City of Yogyakarta. *Jurnal Kesehatan*, 17(1), 1-10. <https://doi.org/10.23917/jk.v17i1.2394>

---

### Article Information

#### *Article history:*

Submission: 31 July 2023

Acceptance: 16 August 2023

---

**Keywords:** Active case finding, tuberculosis, adaptation models

---

### ABSTRAK

**Introduction:** Indonesia is one of the countries with the second highest TB burden globally. Towards TB elimination by 2030, the government prepared a framework for accelerating the TB program, including active case finding (ACF), as an active effort to find people at risk and with symptoms of TB through contact tracing and screening activities. Screening using chest X-rays (CXR) is considered more sensitive than the symptom approach, considering that most TB patients do not have typical TB symptoms. In 2023, ACF activities in the City of Yogyakarta will be developed using an adaptation model. **Method:** Quantitative descriptive research describing the results of ACF activities consists of the characteristics of ACF participants, types of target groups, CXR screening, TCM examination, and ACF's contribution to the TB control program. **Results:** With the adaptation model, the role of Puskesmas and cross-sectors was prioritized in ACF. ACF was carried out 88 times with 7,423 participants; 1,403 people were suspected of having TB (18.90%), and 83 new TB cases were found. Most participants were women (54.41%), age group 55 - ≤65 years (23.19%), and came from the general public (56.31%). The highest percentage of suspected discoveries and TB cases came from the Pakualaman Health Center. **Conclusion:** With the adaptation model in Yogyakarta City, ACF contributed to finding 22.92% of suspected TB and 5.28% of TB cases of the target that had to be found. Collaborative efforts between sectors need to be made to mobilize the right target groups for ACF locations, such as PLHIV, household contacts, DM patients, toddlers with nutritional problems, groups of male smokers, and alcohol users.

---

#### *Corresponding Authors: (\*)*

Prodi Magister Kesehatan Masyarakat, Fakultas Kesehatan Masyarakat, Universitas Ahmad Dahlan Yogyakarta Jl. Prof. Dr. Soepomo, Janturan Warung boto, Yogyakarta

Email: [irap2m@gmail.com](mailto:irap2m@gmail.com)

---

## INTRODUCTION

Tuberculosis (TB) is a direct infectious disease caused by *Mycobacterium tuberculosis*. Until now, TB is still a problem at the global level; according to the World Health Organization (WHO), TB is one of the infectious diseases that causes the most deaths after Covid-19. WHO data states that there will be 1.6 million deaths due to TB in 2021 (WHO., 2023). Indonesia is one of the countries with the highest TB burden in the world, with the second highest number of TB cases after India (WHO, 2022). The high burden of TB problems at the global level has encouraged the formation of an agreement at the world level, which is outlined in the Sustainable Development Goals (SDGs) targets, one of the targets of which is to end the TB epidemic by 2030 by reducing the global TB incidence by up to 80% and reducing the number of deaths due to TB throughout the world. It is up to 90% compared to 2015 (StopTB Partnership., 2022).

Yogyakarta City is one of the districts/cities in D.I.Yogyakarta with the highest estimated TB caseload after Sleman and Bantul Regencies (D.I.Yogyakarta, 2023). The COVID-19 pandemic in 2020-2021 greatly affected the achievements of the TB program globally and nationally. This condition is also experienced by almost all districts/cities in Indonesia, including Yogyakarta. Data on TB case detection reported in the Yogyakarta City Tuberculosis Information System (SITB) in 2020 and 2021 decreased by 22% compared to 2019, and in 2022 it increased by 23.49%. 1,355 TB cases were discovered and treated in 2022 (Dinas Kesehatan Kota Yogyakarta., 2023).

By the mandate in Presidential Regulation Number 67 of 2021 concerning Tuberculosis Control, the Indonesian Government has established strategies and interventions to accelerate the elimination of TB by 2030. The Indonesian Ministry of Health has developed a framework for accelerating the TB program in the form of active case finding (ACF), strengthening surveillance, and expanding the delivery of tuberculosis prevention therapy (TPT) (Kementrian Kesehatan RI., 2022). The Yogyakarta City Government's commitment to supporting the achievement of TB elimination by 2030 through collaboration of all sectors in TB control is stated in Yogyakarta Mayor Regulation Number 7 of 2023 concerning the Yogyakarta City TB Control Regional Action Plan (Dinkes Kota Yogyakarta, 2023).

ACF activities in Yogyakarta City are one of the efforts to eliminate TB by finding TB cases as early as possible and providing complete treatment. ACF has been carried out since 2020 with support from Zero TB (ZTB) Yogyakarta with a screening model for at-risk groups using chest X-rays or mobile chest X-rays (CXR). In 2020, ACF activities in Yogyakarta City took the form of a pilot project in the Gondomanan Kemantren area, then in 2021 to 2022, ACF activities began to be developed in 14 Yogyakarta City areas using a scale-up modeling approach. In 2023, ACF activities with CXR will be developed as an adaptation model. This research was conducted to obtain an overview of the results of ACF activities in Yogyakarta City using an adaptation model to be used as evaluation material for implementing the TB control program in Yogyakarta City.

## LITERATURE REVIEW

ACF is an accelerated program to increase the discovery of undetected TB cases through active efforts to look for people who are at risk, have symptoms, and carry out detection (Mulya, 2023). Active TB case finding can be done through contact tracing (contact investigation) to identify people with a history of close contact with TB patients and examine them to determine whether they may have been infected with TB germs. Another effort to actively find TB cases is with a screening model that aims to identify individuals who are at high risk of being infected with TB.

ACF is essential to carry out considering that based on studies analyzing the course of TB patients, not everyone who has experienced TB disease will immediately seek treatment; this is because the patient has not felt any symptoms of illness. Another reason why TB suspects do not go to health service facilities is due to a lack of knowledge and difficult access in urban areas with easy access to health facilities and guaranteed funding. Mismatches in service times can also be the cause of people who are sick with TB not wanting to go to health facilities (JDIH Pemerintah Kota Yogyakarta., 2023). ACF activities in high-risk populations can increase TB detection in the early phase, where TB symptoms are not yet felt, as well as reduce the problem of difficulties in access and service times at health facilities (JDIH Pemerintah Kota Yogyakarta., 2023).

ACF using CXR screening has been recommended to find TB early during the disease. The presence of radiological abnormalities suggestive of TB as a result of CXR can be immediately identified even before it becomes active TB (Mac et al., 2020). It is hoped that ACF with CXR screening will increase TB case detection. CXR screening results that show lung abnormalities suggestive of TB will be followed up with laboratory supporting examinations to confirm the diagnosis of TB (Murakami et al., 2016).

With an adapted model, ACF combines TB symptom screening and CXR screening in high-risk populations by strengthening the role of Community Health Centers and cross-sectors. The flow of ACF activities in the adapted model begins when participants come to the ACF location. After registering, participants will undergo screening for TB symptoms and screening with CXR. Based on the results of symptom screening and CXR, participants who are diagnosed with suspected TB will be initiated to collect sputum samples for TCM examination in the laboratory. The results of the TCM and CXR examinations will be the basis for consideration by the Puskesmas Doctor in determining a TB diagnosis. TCM inspections follow the referral flow for TCM inspections according to the zoning that is in effect in the City of Yogyakarta. According to TB treatment management at the community health center, ACF participants diagnosed with TB will be followed up.

## METHOD

The method used in this research is quantitative descriptive. The variables studied included ACF participants' characteristics, target group type, CXR screening, Rapid Molecular Test (TCM) examination, and the contribution of ACF activities in the TB control program. The data used in this research is secondary data in the P2M and Immunization section of the Yogyakarta City Health Service in the form of reports on the results of ACF TBC Puskesmas activities to the Yogyakarta City Health Service from January to June 2023. The collected data was analyzed descriptively to describe the implementation of ACF TBC using the adaptation model; the results of the analysis are presented in tables and narratives. This research has received ethical approval number 012308163, granted by the Ahmad Dahlan University Yogyakarta Research Ethics Committee (KEP UAD).

## RESULT AND DISCUSSION

In 2023, the implementation of ACF activities in the City of Yogyakarta will change from a scale-up model to an adaptation model. Several changes to the adaptation model in implementing ACF activities are described in Table 1.

In the ACF with the adaptation model, the role of community health centers and cross-sectors in the Ministry of Education and Culture is prioritized. The Community Health Center is responsible for the overall implementation of ACF activities, starting from the preparation stage (determining the schedule, location, and target group), implementation stage, and follow-up to ACF activities, including sending sputum samples

to the TCM Laboratory, reading Tuberculin Skin Test (TST) results, preparing case discussion materials, determination of diagnosis and initiation of TPT administration. Human resource support from the Yogyakarta ZTB Team is the ACF Team, which consists of district coordinators, doctors, screening nurses, registration officers, and radiographers. Financing for ACF activities in the adaptation model is supported by Yogyakarta City APBD funds for 2023 and Zero TB Yogyakarta. Logistics to support ACF activities, such as sputum pots, Mantoux test reagents, and other consumable materials, are provided by the P2TB Program of the Yogyakarta City Health Service with a distribution mechanism through each ACF Organizing Community Health Center. Management of medical waste resulting from ACF activities follows the medical waste management mechanism at each ACF Organizing Community Health Center. Adaptation model ACF activities were held 88 times with a total of 7,423 ACF participants.

Table 1. ACF Model in Yogyakarta City 2021-2023

	<b>ACF scale-up model</b>	<b>ACF Adaptation Model</b>
<b>Organization</b>	ZTB and Primary Health Care	Primary Health Care
<b>Participant mobilizer</b>	ZTB district coordinator, primary health care and cross-sectors	Primary health center and cross-sectors
<b>Choice of place</b>	ZTB district coordinator, primary health care and cross-sectors	Primary health care and cross-sectors
<b>ACF Schedule</b>	1-2 weeks for 1 primary health care area	1 primary health care for 1-time ACF per month
<b>Conducting contact investigations</b>	ZTB nurse, primary health care TB programmer, community cadre	primary health care TB programmer, community cadre (monitored by IK technical assistant)
<b>ACF Executor</b>	1. ACF Team 2. Primary Health Center Team (tentative)	1. ACF Team 2. Primary Health Center Team (2-3 people)
<b>Collaboration of Activities</b>	None	1. Non-Communicable Disease (NCD) Screening 2. TB HIV collaboration
<b>Sputum sample sender</b>	ACF team	Primary Health Center Team
<b>Reading of TST results</b>	ACF and Primary Health Center Team	Primary Health Center Team
<b>Preparation for case discussion</b>	1. ACF doctor 2. Online 3. Once a month	1. Primary Health Center doctor 2. Offline and online 3. Once a week
<b>TPT Implementer</b>	ACF and Primary Health Center Team	Primary Health Center Team (monitored by TPT technical assistant)
<b>Budget</b>	ZTB Yogyakarta	APBD Yogyakarta City ZTB Yogyakarta

An overview of the results of the ACF adaptation model activities based on participant characteristics, target groups, CXR examinations, TCM examinations, and the contribution of ACF activities in the TB Control Program is detailed as follows:

## 1. Participant Characteristics

The distribution of ACF participants based on the detailed characteristics in Table 2.

Table 2. Proportion of ACF Participants based on gender and age (N= 7.432)

Characteristics	Total	Percentage (%)
<b>Gender</b>		
Male	3,405	46.11
Female	4,018	54.41

Table 2. Proportion of ACF Participants based on gender and age (continue) (N= 7.432)

Characteristics	Total	Percentage (%)
<b>Age</b>		
≤5	302	4.09
5 - ≤15	361	4.89
15 - ≤25	818	11.08
25 - ≤35	836	11.32
35 - ≤45	796	10.78
45 - ≤55	1,112	15.06
55 - ≤65	1.712	23.19
>65	1.486	20.12

Based on gender, more than half of ACF participants are women-dominated. Meanwhile, based on age, almost a quarter of the most prominent participants were in the age group 55-≤65 years, and the fewest participants were in the age group less than five years.

## 2. Target group of ACF participants

Based on the ACF target group, more than half of the participants came from the community around the location of the ACF, namely 4,180 people.

Table 3. ACF participants by target group (N= 7.432)

Target Group	Total	Percentage (%)
School	126	1.70
Health worker	106	1.43
Household Contact	819	11.03
Close Contact	380	5.12
Primary health care visitors	289	3.89
ODHIV	79	1.06
DM patient	708	9.54
Residents in prisons/ detention centers	736	9.92
Community at the ACF location	4,180	56.31

## 3. CXR examination of ACF participants

In Table 4, it is known that most of the participants took part in screening with CXR to determine the radiological appearance of the lungs, and only 3.26% of participants did not undergo a chest X-ray examination for various reasons, including having had a CXR examination within the last six months.

Table 4. Proportion of ACF participants based on CXR examination (N= 7.432)

CXR Check	Member	Percentage (%)
CXR	7,181	96.74
Non-CXR	242	3.26

#### 4. TCM examination on suspected TB

After ACF participants undergo screening with CXR, the results of radiological readings of chest X-rays that suggest suspected TB will be followed up by examining sputum samples with TCM examination. The number of TB suspects found in ACF activities was 1,403; however, 22.24% of participants had not undergone a TCM examination (Table 5) because they could not produce phlegm at that time.

Table 5. Proportion of suspected TB based on TCM examination (N= 7.432)

TCM Check	Member	Percentage (%)
TCM	1,091	77.76
Non-TCM	312	22.24

#### 5. Discovery of new TB cases based on TCM examination results

Based on the results of the TCM examination and reading of the CXR results, diagnosed TB cases are divided into bacteriologically confirmed if the TCM results show that *Mycobacterium tuberculosis* (MTB) was detected and clinically confirmed if the TCM results show that MTB was not detected. The CXR reading results show that the lungs are positive for TB.

Table 6. Discovery of TB cases resulting from ACF activities (N= 7.432)

TB cases by type	Member	Percentage (%)
Bacteriologically confirmed	27	32.53
Clinically Confirmed	56	67.47

Most TB cases found were clinically confirmed; one of the objectives of screening with CXR is to find TB cases early or in the early phase (sub-clinical) of TB disease.

#### 6. Discovery of TB cases based on the target group of ACF activities

Table 7 shows that most participants in ACF activities are in the community around the location where ACF activities are held. However, unexpected findings and TB cases from this target group are relatively small (0.74%). In contrast, for PLHIV, the number of participants taking part in the ACF was only 79 people, with the discovery of suspected TB and TB cases in the PLHIV group being relatively high (7.59%).

Table 7. Results of TB case discovery based on target groups (N= 7,432)

Target Group	Member	Percentage (%)	CXR	Suspected TB	TCM	TB All Cases	Yield All Cases (%)
School	126	1.70	122	12	10	0	0.00
Health worker	106	1.43	104	5	4	0	0.00
Household Contact	819	11.03	804	216	165	23	2.81
Close Contact	380	5.12	374	52	41	0	0.00
Primary health care visitors	289	3.89	280	203	94	8	2.77
ODHIV	79	1.06	77	41	34	6	7.59

Table 7. Results of TB case discovery based on target groups (N= 7,432) (continued)

Target Group	Member	Percentage (%)	CXR	Suspected TB	TCM	TB All Cases	Yield All Cases (%)
ODHIV	79	1.06	77	41	34	6	7.59
DM patient	708	9.54	698	134	127	8	1.13
Residents in prisons/detention centers	736	9.92	736	38	37	7	0.95
Community at the ACF location	4,180	56.31	3,986	717	606	31	0.74

## 7. Case and target discovery

Suspected findings and TB cases from the implementation of the ACF adaptation model compared with the target of alleged findings and TB cases that each Community Health Center has determined are presented in Table 8.

Table 8. Proportion of suspected findings and TB cases targeted by each Community Health Center

ACF Organizing Primary Health Care	Total Population	Number of ACF Participants	Percentage (%)	TB Suspected Targets receive services	Number of suspected TB found in ACF	Percentage (%)	Target TB case detection	Number of TB cases found in ACF	Percentage (%)
Danurejan I	9,165	397	4.33	136	72	52.94	35	5	14.29
Danurejan II	12,009	515	4.29	178	81	45.51	46	2	4.35
Gedongtengen	19,258	334	1.73	285	71	24.91	73	3	4.11
Gondokusuman I	30,496	435	1.43	451	76	16.85	116	5	4.31
Gondokusuman II	12,367	165	1.33	183	22	12.02	47	0	0.00
Gondomanan	14,751	232	1.57	218	52	23.85	56	1	1.79
Jetis	27,038	408	1.51	400	84	21.00	103	13	12.62
Kotagede I	22,028	278	1.26	326	72	22.09	84	4	4.76
Kotagede II	13,011	291	2.24	193	48	24.87	49	2	4.08
Kraton	21,561	440	2.04	319	110	34.48	82	5	6.10
Mantrijeron	35,339	310	0.88	523	74	14.15	134	2	1.49
Mergangsan	31,690	292	0.92	469	59	12.58	120	5	4.17
Ngampilan	18,137	321	1.77	268	79	29.48	69	7	10.14
Pakualaman	10,565	295	2.79	156	108	69.23	40	13	32.50
Tegalrejo	37,243	445	1.19	551	59	10.71	141	2	1.42
Umbulharjo I	45,568	521	1.14	674	147	21.81	173	6	3.47
Umbulharjo II	25,428	541	2.13	376	81	21.54	97	4	4.12
Wirobrajan	27,969	467	1.67	414	108	26.09	106	4	3.77
<b>Total</b>	<b>41,3623</b>	<b>6,687</b>	<b>1.62</b>	<b>6,120</b>	<b>1,403</b>	<b>22.92</b>	<b>1,571</b>	<b>83</b>	<b>5.28</b>

The ACF adaptation model activity found 22.92% of TB suspects and 5.28% of TB cases from the target set in Yogyakarta City in 2023. ACF participants were dominated by women aged 55-≤ 65 years. One of the risk factors for TB disease shows that men are more at risk than women, but the number of men who take part in ACF is smaller. Data on TB cases in Yogyakarta City shows that TB cases in men are higher than in women (Dinas Kesehatan Kota Yogyakarta., 2023). In ACF TBC activities in Yogyakarta City, mobilizing male participants tends to be more difficult than mobilizing women. This condition could be because ACF activities are carried out during working hours, so more women who are not working have time to attend ACF TBC activities. This result is different from the results of ACF activities carried out in Myanmar, which showed that there were more male participants (61.3%) than female participants (38.7%) (Myint et al., 2017).

The timing of the ACF also influences the age group of participants. ACF is held Monday to Friday, starting at 08.00 WIB to 14.00 WIB, which is the time used by productive age groups for work or school/college, so they cannot come to the ACF location. In contrast to ACF activities in Myanmar, ACF participants are attended mainly by participants of productive age (aged 15-54 years) (Myint et al., 2017).

One of ACF's goals with the adaptation model is to bring CXR screening services closer to the community. For groups of people who are reluctant to come to health facilities, taking part in ACF activities can be an option to get a beneficial health check because in ACF with the adapted model, apart from checking TB symptoms and CXR examinations, Non-Communicable Disease (PTM) screening checks are also carried out such as blood pressure and sugar checks. Determining the target group of ACF participants is an important thing that must be prepared so that ACF activities are suitable on target (Murakami et al., 2016). Apart from that, ACF activities are also integrated with TB patient contact investigation activities. Household contacts are one of the target groups in ACF activities. In household contacts of TB patients, visits to the location where the ACF is held, apart from the CXR examination, TST examination is also carried out as a consideration for the Puskesmas Doctor to determine the provision of TPT (Zero TB Yogyakarta., 2022).

The use of CXR for TB screening activities is considered more sensitive than screening using a symptomatic approach because the majority of diagnosed TB patients are known not to have typical TB symptoms (Ho et al., 2016). The research results in Uganda show that screening results with CXR have a sensitivity of 93% and a specificity of 65% compared to the results of culture of sputum samples (Nalunjogi et al., 2021). According to Dina Bisara, in her Inauguration Oration for Research Professors in the Health Sector (2022), Thorax Photos and TCM are technologies that can be used to increase the discovery of TB cases (Dina Bisara Lolong, 2022). In ACF activities with the adapted model, apart from CXR examinations, screening by asking about TB symptoms such as coughing, fever, night sweats, weight loss, and TB risk factors is still carried out. The combination of these screening results will be considered by health center doctors in diagnosing TB (Basem Abbas Al, 2018).

TCM examination is recommended as a laboratory test to confirm the diagnosis of TB (Ritonga et al., 2023). ACF participants with symptom screening and CXR results that suggest TB is suspected will be followed by an examination of sputum samples to confirm the diagnosis of TB. Some TB suspects have not had a TCM examination during the ACF activity due to difficulty expelling phlegm, even though they have been motivated and educated by officers at the ACF location about how to cough effectively. The ACF organizers have provided sweet tea to stimulate coughing so that phlegm can be expelled; however, for some participants, coughing up phlegm is still an obstacle. This condition is similar to the results of research conducted in Semarang in 2019, showing that several TB patients could not collect sputum samples because they could not produce phlegm (Masitah, 2022).

In research conducted in Yunnan Province, China, it was concluded that massive ACF activities in the community were ineffective ACF activities (Chen et al., 2019); this condition also happened in ACF activities with an adaptation model in Yogyakarta City, coverage of TB case discovery those from the surrounding community are still low (0.74%). The highest TB case detection coverage from the results of ACF activities came from the PLHIV target group (7.59%), followed by household contacts (2.81%), health center visitors (2.77%), and DM patients (1.13%). This data is the results of research conducted by Jenifer Ho et al. (2016) selecting the right population as the target group for screening on ACF, such as household contacts and risk groups such as PLHIV, DM patients, malnutrition,

smoking history, alcohol dependence are groups who are at high risk of contracting TB disease, so ACF activities are prioritized targeting this group to obtain significant results (Ho et al., 2016).

When compared with the target for finding TB suspects (11th SPM in the health sector) and the target for finding TB cases in each ACF Organizing Community Health Center, which are listed in Table 8, the highest number of TB suspects found came from the Umbulharjo I Community Health Center as many as 147 people and the cases discovered. The most TB came from the Jetis and Pakualaman Community Health Centers, each finding 13 TB cases. However, compared with the SPM target and the target for finding TB cases at each community health center, the highest percentage of suspected TB cases and discoveries was at the Pakualaman Community Health Center, namely 69.23% for finding suspected TB and 32.50% for finding TB cases. Pakualaman Community Health Center held TB ACF in the working area of the community health center three times. It held TB ACF in prisons and detention centers, which are included in the working area of Pakualaman Community Health Center 7 times. The achievement of finding suspected TB and TB cases at the Pakualaman Community Health Center from ACF TBC activities cannot yet reflect the high number of TB cases in the Pakualaman Community Health Center area, considering that most of the TB cases found came from prisons and detention centers which are closed populations. There needs to be more interaction with the outside community in the Pakualaman area. The research results by Gupta (2018) concluded that vulnerable groups, including prisoners, were the main priority in controlling TB (Gupta et al., 2018).

## CONCLUSION

With an adaptation model in the City of Yogyakarta, ACF contributed to finding 22.92% of the target for finding TB suspects and 5.28% of the target for finding TB cases in the City of Yogyakarta in 2023. Collaborative efforts between sectors need to be made to mobilize the right target groups to ACF locations so that they can increase TB cases, such as PLHIV, household contacts, DM patients, toddlers with nutritional problems, groups of male smokers, and alcohol users.

## ACKNOWLEDGEMENT

We want to express our thanks to all parties who have assisted in the research and publication of this article, especially to the P2TB Community Health Center Team throughout Yogyakarta City, the Yogyakarta City Health Service, and the Yogyakarta ZTB Team, who have organized ACF activities in Yogyakarta City.

## REFERENCES

- Basem Abbas Al, U. (2018). The Radiological Diagnosis of Pulmonary Tuberculosis (TB) in Primary Care. *Journal of Family Medicine and Disease Prevention*, 4(1), 1-7. <https://doi.org/10.23937/2469-5793/1510073>
- Chen, J. O., Qiu, Y. B., Rueda, Z. V., Hou, J. L., Lu, K. Y., Chen, L. P., Su, W. W., Huang, L., Zhao, F., Li, T., & Xu, L. (2019). Role of community-based active case finding in screening tuberculosis in Yunnan province of China. *Infectious Diseases of Poverty*, 8(1), 1-12. <https://doi.org/10.1186/s40249-019-0602-0>
- D.I.Yogyakarta, D. K. (2023). *Profil Kesehatan D.I.Yogyakarta tahun 2022*. <https://dinkes.jogjapro.go.id/download/view/1#>
- Dina Bisara Lolong. (2022). Meningkatkan Penemuan Kasus Tuberkulosis di Masyarakat dengan Foto Toraks dan Tes Cepat Molekuler. In *Meningkatkan Penemuan Kasus Tuberkulosis di Masyarakat dengan Foto Toraks dan Tes Cepat Molekuler* (Issue September).

- <https://doi.org/10.55981/brin.658>
- Dinas Kesehatan Kota Yogyakarta. (2023). Profil Kesehatan 2023. *Website Dinas Kesehatan Kota Yogyakarta*. [https://kesehatan.jogjakota.go.id/pages/profil/profil\\_kesehatan/](https://kesehatan.jogjakota.go.id/pages/profil/profil_kesehatan/)
- Dinkes Kota Yogyakarta. (2023). *Sekda: Kolaborasi Lintas Sektor Kunci Keberhasilan Penanggulangan TBC di Kota Yogyakarta*. Website Dinas Kesehatan Kota Yogyakarta. <https://kesehatan.jogjakota.go.id/berita/id/480/sekda-kolaborasi-lintas-sektor-kunci-keberhasilan-penanggulangan-tbc-di-kota-yogyakarta/>
- Gupta, R. K., Lipman, M., Story, A., Hayward, A., De Vries, G., Van Hest, R., Erkens, C., Rangaka, M. X., & Abubakar, I. (2018). Active case finding and treatment adherence in risk groups in the tuberculosis pre-elimination era. *International Journal of Tuberculosis and Lung Disease*, 22(5), 479–487. <https://doi.org/10.5588/ijtld.17.0767>
- Ho, J., Fox, G. J., & Marais, B. J. (2016). Passive case finding for tuberculosis is not enough. *International Journal of Mycobacteriology*, 5(4), 374–378. <https://doi.org/10.1016/j.ijmyco.2016.09.023>
- JDIH Pemerintah Kota Yogyakarta. (2023). Rencana Aksi Daerah Penanggulangan Tuberkulosis 2023-2026. *Database Peraturan*. <https://jdih.jogjakota.go.id/result/index?key=tuberkulosis&jenis=9&subjek=&nomor=7&tahun=2023&submit=Cari>
- Kementrian Kesehatan RI. (2022). Pada High Level Meeting Tuberkulosis 2022, Menkes Minta Penemuan Kasus TBC Ditargetkan 60 Ribu Per Bulan Mulai Januari 2023. *Direktorat Jendral P2P*. <http://p2p.kemkes.go.id/pada-high-level-meeting-tuberkulosis-2022-menkes-minta-penemuan-kasus-tbc-ditargetkan-60-ribu-per-bulan-mulai-januari-2023/>
- Mac, T. H., Phan, T. H., Nguyen, V. Van, Dong, T. T. T., Le, H. Van, Nguyen, Q. D., Nguyen, T. D., Codlin, A. J., Mai, T. D. T., Forse, R. J., Nguyen, L. P., Luu, T. H. T., Nguyen, H. B., Nguyen, N. V., Pham, X. T., Tran, P. N., Khan, A., Vo, L. N. Q., & Creswell, J. (2020). Optimizing Active Tuberculosis Case Finding: Evaluating the Impact of Community Referral for Chest X-ray Screening and Xpert Testing on Case Notifications in Two Cities in Viet Nam. *Tropical Medicine and Infectious Disease*, 5(4), 1–15. <https://doi.org/10.3390/tropicalmed5040181>
- Masitah, I. N. (2022). *Profil Mikroskopis BTA pada Sputum Keluarga Pasien Terdiagnosa BTA Positif Fase Lanjutan Microscopic Profile of AFB in the Sputum of a Patient ' s Family Diagnosed with Positive AFB in the Advanced Phase* IMANIA NUR MASITAH Abstrak. 04(01), 31–36.
- Mulya, F. (2023). *Analisis Program Penanggulangan TBC di Indonesia dalam Upaya Pencapaian Target Eliminasi TBC Tahun 2030 Analisis Program Penanggulangan TBC di Indonesia dalam Upaya Pencapaian Target Eliminasi TBC Tahun 2030* Faradisa Mulya Fakultas Kesehatan Masyarakat Un. January, 0–22.
- Murakami, E., Shionoya, T., Komenoi, S., Suzuki, Y., & Sakane, F. (2016). RESEARCH ARTICLE Bringing state-of-the-art diagnostics to vulnerable populations: The use of a mobile screening unit in active case finding for tuberculosis in Palawan, the Philippines Fukushi. *PLoS ONE*, 11(9). <https://doi.org/10.1371/journal.pone>
- Myint, O., Saw, S., Isaakidis, P., Khogali, M., Reid, A., Hoa, N. B., Kyaw, T. T., Zaw, K. K., Khaing, T. M. M., & Aung, S. T. (2017). Active case-finding for tuberculosis by mobile teams in Myanmar: Yield and treatment outcomes. *Infectious Diseases of Poverty*, 6(1), 1–8. <https://doi.org/10.1186/s40249-017-0291-5>
- Nalunjogi, J., Mugabe, F., Najjingo, I., Lusiba, P., Olweny, F., Mubiru, J., Kayongo, E., Sekibira, R., Katamba, A., & Kirenga, B. (2021). Accuracy and Incremental Yield of the Chest X-Ray in Screening for Tuberculosis in Uganda: A Cross-Sectional Study.

- Tuberculosis Research and Treatment*, 2021, 1–6. <https://doi.org/10.1155/2021/6622809>
- Ritonga, I. L., Setyowati, S., Handiyani, H., & Nursasi, A. Y. (2023). Exploring the tuberculosis medication program in Indonesia as perceived by patients and their families: A qualitative study. *Belitung Nursing Journal*, 9(2), 124–131. <https://doi.org/10.33546/bnj.2484>
- StopTB Partnership. (2022). *The Global plan to End TB 2023-2030*. <https://omnibook.com/embedview/dc664b3a-14b4-4cc0-8042-ea8f27e902a6/en#z-129e>
- WHO. (2022). *Global Tuberculosis Report 2022*. <https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022>
- WHO. (2023). *Tuberculosis*. <https://www.who.int/news-room/fact-sheets/detail/tuberculosis>
- Zero TB Yogyakarta. (2022). *Alur Skrining ACF ZTB Yogyakarta*. <https://zerotbyogyakarta.org/>