TB Active Case-Finding Before and During the Covid-19 Pandemic

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Abstract. Tuberculosis is a significant infectious disease problem in Indonesia. According to the Indonesia Tuberculosis Prevalence Survey 2013–2014, the prevalence of TB with bacteriological confirmation was 759 per 100,000 population from 15 years old and above. The purpose of the study is to compare active case findings before and after the Covid-19 pandemic. This study was conducted in Bogor, Indonesia, in 2021. The study design was cross-sectional, with stratified random sampling. The number of sample was 49 out of 50 Puskesmas (public health centers) were included in this study. The active TB case findings observed in this study were TB contact investigations, special sreening, and mass TB screening. This study used Google Forms questionnaires distributed to the respondents (each Puskesmas' TB program coordinator). This study found that before the Covid-19 pandemic, only 2% of Puskesmas never performed TB contact investigations. Furthermore, Puskesmas, which always conducts contact investigations, was reduced from 36.7% to 24.5% before and during the pandemic. The Puskesmas' percentage of screening increased from 77.6% to 87.8%. Despite this, the Puskesmas that did not conduct mass screening for TB suspects increased from 77.6% to 87.8% during the pandemic. The reasons for not conducting mass screenings were the Puskemas' policy (33.3%) and the Puskesmas' overburden condition during the pandemic (25%). Furthermore, the reasons for not conducting special screening were lack of budget (31.5%) and overburden (29%). The percentage of TB contact investigations decreased during the Covid-19 pandemic. Due to the Head of the Puskemas policy and the overburden condition, most of the Puskesmas did not conduct either mass- or screening during the pandemics.

Keywords: tuberculosis · active case-finding · Puskesmas

1 Introduction

Tuberculosis (TB) disease is a major infectious disease problem in Indonesia. The Tuberculosis Prevalence Survey 2013–2014 in Indonesia showed that the prevalence of TB with bacteriological confirmation was 759 per 100,000 population aged 15 years and over [1]. Every year, more than 10 million people suffer, and 1.5 million people die from

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TB. The *End TB Strategy* outlines the global commitment to end or eradicate TB in 2050. WHO targets that by 2030, TB mortality should be reduced by 90% in addition to the reduction of TB incidence by 80%, and no household should experience catastrophic costs [2].

Increasing the coverage and treatment of TB patients can reduce cases and deaths due to TB. Implementing TB active case-finding interventions improves TB case detection in high-risk groups [3]. The 2020 *Joint External TBC Monitoring Mission* (JEMM) recommends increasing and strengthen cost-effective active case-finding (ACF) through household contact screening. An aggressive tracking model should be performed to find patients who suffered from TB but have not been reported [4]. To eliminate TB in 2035, the government has issued a decree regarding the TB control program by implementing active case-findings involving TB contact investigation, special screening and mass screening [5, 6].

Many factors have influenced the achievement of TB case-finding targets. Especially during the Covid-19 pandemic, it is not easy to conduct program activities in a completely restricted situation. The Covid-19 pandemic situation limits everyone's movement, especially TB program officers, to conduct active case-finding (ACF) for TB. This study aims to investigate the implementation of active case-finding (ACF) for tuberculosis before and during the Covid-19 pandemic.

2 Material and Methods

This quantitative study incorporates a cross-sectional design performed at the Puskesmas in Bogor District from April to November 2021. This study also incorporates a probability sampling technique with a stratified random sampling method using the Slovin formula [7]. The study population includes the Puskesmas in Bogor District. The study sample was from 49 selected Puskesmas meeting the inclusion and exclusion criteria. The inclusion criteria were Puskesmas were in the working area of the district health office in Bogor. Moreover, the exclusion criteria involved all Puskesmas who did not want to complete the google form questionnaire within the stipulated time. This study's respondents involved officers who manage the TB program or were responsible for and coordinating all activities from planning, implementing and evaluating the TB program at the Puskesmas.

Data collection was conducted through self-filling questionnaires through google forms and in-depth interviews. The data collected in this study was the number of patients and treatment of TB cases, the implementation of contact investigations, special- and mass-TB screening, and reasons for not performing ACF before or during the Covid-19 pandemic. Before completing the questionnaire, the respondent first agreed and signed the informed consent. In-depth interviews were conducted both offline and online. The informant of in-depth interview were the TB program supervisor, TB program manager, and cadre. Data sent via the google form link has recapitulated and transferred to the SPSS 21 program. Before data analysis, data cleaning and editing were performed. Also, univariate data analysis was performed.

This study has received ethical approval from the Health Research Ethics Commission of the Health Research and Development Agency with letter number HK.02.04/1/3238/2021, dated June 2nd, 2021.

3 Result

The respondents of this study were the TB program managers in puskesmas. The TB program managers are responsible for and coordinates all activities from planning, implementing and evaluating the TB program at the Puskesmas. Table 1 shows characteristics of TB program managers in Puskesmas at Bogor District. Most of the TB program managers at the Puskesmas were age more than 40 years old (65.3%), women (71.4%), had diploma education (D3) in health (67.4%), were civil servants (69.4%), married (87.8%) and has been working as a TB program manager for <5 years (49.0%).

Table 1. Characteristics of Responden in Puskesmas at Bogor District

Characteristics	n = 49	%
Age group		
<30 years	2	4.1
30–40 years	15	30.6
>40 years	32	65.3
Sex		
Male	14	28.6
Female	35	71.4
Level of education		
Senior high school	1	2.0
Health Diploma 3	33	67.4
Bachelor of Health	14	28.6
Others	1	2.0
Job Status		
Civil servants	34	69.4
Others	15	30.6
Marital status		
Single	3	6.1
Widow/widower	3	6.1
Married	43	87.8
Length of time in this position		
<5 years	24	49.0
5–10 years	10	20.4
>10 years	15	30.6

Implementation of ACF Before and During the Covid-19 Pandemic in Puskesmas at Bogor District (Table 2)

Active case fingding is a TB case finding activity through contact investigation (CI), mass screening (MS) and special screening (SS). Contact Investigation (CI) is an activity carried out to improve TB case finding by early and systematic detection of people who are in contact with the source of TB infection in the working area of the Puskesmas. Mass screening active discovery activities carried out to increase TB patient detection in areas where case finding is still very low. Special screening an active TB case finding activity that is carried out in an environment that is prone to TB transmission, such as: in prisons/remand centers, psychiatric hospitals, workplaces, dormitories, Islamic boarding schools, schools, nursing homes in puskesmas areas. Table 2 shows the implementation of ACF before and during the the Covid-19 pandemic in Puskesmas at Bogor District.

Implementation of ACF Before the Covid-19 Pandemic (2019)

Most of the Puskesmas in Bogor Regency (61.3%) did not always or sometimes carry out TB contact investigations before the C19 pandemic. Only 36.7% of the puskesmas always carry out contact investigations. Puskesmas did not conduct special and mass TB screening in the pre-pandemic period 77%. Moreover, the rest is only about 18–20% of puskesmas that do special TB screening before the pandemic.

Implementation of ACF During the Covid-19 Pandemic (2020)

During the Covid-19 pandemic (2020), only 51% of puskesmas did not always or sometimes carry out TB contact investigations; the remaining 24.5% of puskesmas always carried out contact investigations, and 22.4% did not. Meanwhile, for the implementation of special and mass TB screening, on average, most (87.8%) puskesmas did not carry out special and mass TB screening during the pandemic. Only about 10–12% of puskesmas carry out special and mass TB screening during the pandemic.

The Reasons for Not Implementing Pulmonary TB ACF Before the Covid-19 Pandemic (2019)

Before the Covid-19 pandemic, almost all puskesmas in Bogor district conducted contact investigations. Only one puskesmas did not conduct contact investigations due to the many activities. Puskesmas that did not do special screening were 77.5% of the 49 health centers. The reason the puskesmas did not carry out special screening before the Covid-19 pandemic was mostly because many health activities (29%), no environment is easy to transmit TB (26,3%), and understaffed (23,7%). Health centers that did not carry out mass screening before the pandemic amounted to 77.5% of the 49 puskesmas. The reason the puskesmas did not do mass TB screening before the Covid-19 pandemic was mailny because they were Understaffed and there was no operating budget for TB mass screening each 31%, then many health activities 23,6%

The Reasons for Not Implementing Pulmonary TB ACF During the Covid-19 Pandemic (2020)

Public Health centers (puskesmas) that did not conduct contact investigations during the Covid-19 pandemic were 24.5% of the 49 puskesmas. The reason for not doing a contact investigation was mostly because of the head of the puskesmas policy (33,3%)

Table 2. Implementation of ACF before and during the Covid-19 pandemic in Puskesmas at Bogor District

Implementation ACF	Before The Covid-19 pandemic (2019)		During The Covid-19 pandemic (2020)	
	(n = 49)	%	(n = 49)	%
Contact investigation activities				
Never	1	2.0	11	22.4
Not always/some time	30	61.3	25	51.0
Yes, always	18	36.7	12	24.5
Do not know	–	–	1	2.0
Special screening activities				
Never	38	77.6	43	87.8
Do not know	2	4.1	1	2.0
Yes, ever	9	18.4	5	10.2
Mass screening activities				
Never	38	77.6	43	87.8
Do not know	1	2.0	–	–
Yes, ever	10	20.4	6	12.2

and many health activities (25,0%). Meanwhile, 87.7% of the 49 puskesmas did not carry out special screening during the pandemic. The puskesmas did not carry out special screening during the Covid-19 pandemic because of many health activities (28,6%), no environment is easy to transmit TB (14,3%), dan there is no operating budget for TB-specific screening masing-masing 14,3%. Puskesmas that did not carry out mass screening before the pandemic amounted to 77.5% of the 49 health centers. The reason the puskesmas did not do mass TB screening during the Covid-19 pandemic was mostly that the working area of puskesmas is in the moderate to high TB cases (34%) and the puskesmas covering the red zone (22%) (Table 3).

Figure 1 shows number of TB cases found and treaded at Puskesmas. The total coverage of TB cases and treatment in the Puskesmas area before and during the pandemic. The average number of TB cases found and treated in each public health center was higher in 2019 than in 2020 For example: The highest number of TB coverage and treatment in 2019 was at the Puskesmas Cimandala (265 cases) and in 2020 at the Puskesmas Cangkurawak (177 cases).

In-Depth Interview Results

Our study showed that most of the Puskesmas did not perform special and mass screening before the pandemic, and the percentage increased during the pandemic. According to one informant, between 2019 and 2020, there was no special and mass screening in Puskesmas at Bogor District.

Table 3. Reasons for not implementing pulmonary TB ACF before and during the Covid-19 pandemic in Puskesmas at Bogor District

Reason	**Before The Covid-19 pandemic (2019)**		**During The Covid-19 pandemic (2020)**	
Reason for never doing contact investigation	**(n = 1)**	**%**	**(n = 12)**	**%**
Understaffed	0	0	2	16.7
Many health activities	1	100	3	25.0
No operational cost for contact investigation	0	0	1	8.3
Head of the Puskesmas policy	0	0	4	33.3
Fear of contracting Covid-19	–	–	2	16.7
Reasons for never doing a special TB screening	**(n = 38)**	**%**	**(n = 43)**	**%**
Understaffed	9	23,7	6	12.2
Many health activities	11	29	14	28.6
No environment is easy to transmit TB	10	26,3	7	14.3
There is no operating budget for TB-specific screening	7	18,4	7	14.3
Fear of contracting Covid-19	0	0	6	10.2
Lack of human resources, TB officers concurrently with other programs	1	2,6	1	2.0
The Puskesmas covering the red zone	0	0	1	2.0
Reasons for never doing a mass TB screening	**(n = 38)**	**%**	**(n = 41)**	**%**
Understaffed	12	31,6	5	12.0
Many health activities	9	23,6		
The working area of Puskesmas is in the moderate to high TB case	5	13,3	14	34.0
There is no operating budget for TB mass screening	12	31,5	3	7.3
Afraid of contracting Covid-19			8	19.5
The Puskesmas covering the red zone			9	22.0

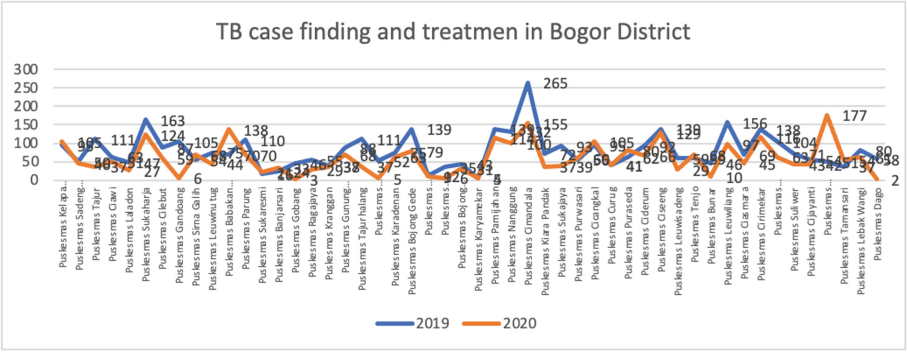

Fig. 1. Number of TB cases found and treated at Puskesmas. Source: Bogor District SITT data

"In 2019 and 2020, there were no special and mass screenings, no reports from the Puskesmas. It is impossible to perform this activity without the permission of the District Health Office because it requires facilities, infrastructure, permits etc." (Informant at Bogor District Health Office)

Furthermore, the results of in-depth interviews with informants were stated as follows:

"We have never conducted any mass and special screening; until now, we haven't done it either, due to the limited human resources and budget, lack of encouragement, motivation and coordination". (Informant who were responsible for the TB program at Puskesmas Klapanunggal and Puskesmas Tajur)

The results of the informant interview stated that:

"If there is a patient, the ACF was conducted for those in household contact. For the mass screening, I haven't conducted it yet. The problem is that I did not submit the activity budget". (Person-in-charge of the TB program at Puskesmas)

The results of in-depth interviews with TB program supervisors at Puskesmas stated that a Puskesmas is categorized as good if each program supervisor holds only one program. The lack of human resources or staff greatly affects the program's success.

"I see that other Puskesmas are good, but it turns out that one supervisor only holds one program. It means they are only responsible for the TB program" (TB program at Puskesmas Tajur Halang)

The results of an in-depth interview with one of the cadres said that contact investigation activities were performed by:

"The dissemination of TB case data from the Puskesmas stated that we have to visit suspected TB patients, we recorded them, we reported them, those who were reported to be close contacts, those who were not at home, one index was 20 people. The neighbours included were right and left neighbours". (Health cadre Informant)

4 Discussion

Bogor is the largest District in West Java Province, with an area of 3,416,155.00 km consisting of 40 sub-districts, with a population of 5,965,410 people (https://diskes.jabarprov.go.id). This district has the highest number of Puskesmas for one district (N = 101). The results of our study showed that the officers in charge of TB management at the Puskesmas were dominated by women, with an average age of > 40 years, civil servants, have a Diploma 3 education in health and a bachelor's degree in health, married, and had been in charge in TB program for less than five years. The TB program management officer is the person who is responsible for and coordinates all TB program activities at the Puskesmas working area.

The coverage of TB cases inding in Bogor District were higher in 2019 than in 2020. In 2018, two years before the Covid-19 pandemic, the coverage of cases inding in Bogor District reached 104.2%, then during the pandemic (in 2020), decreased to 67.98%. The number of coverages for finding and treating TB cases reached 16,332 cases in 2019 and decreased to 10,354 cases in 2020 (SITT Dinkes Bogor District).

The average number (73,5%) of TB findings and treatments in each Puskesmas was higher in 2019 than in 2020. Active pulmonary tuberculosis is relatively common among Covid-19 patients and increases the risk of severe Covid-19 and Covid-19-related mortality [8]. During the pandemic, the government issued a policy through a circular from the ministry of health addressed to all local governments regarding social distancing, postponing the implementation of mass gathering activities. The government also involves large numbers of communities, such as contact investigations, case tracking, and TB raids, along with others. Furthermore, changing the means of campaigning through communication channels that are safe and do not gather mass, for example, through radio, billboards, social media, and print media. (surat edaran kemenkes, 30 Maret 2020).

The Covid-19 pandemic complicates active detection of tuberculosis and increases mortality. In the Southeast Asia Region (SEA Region) indicated a decrease of 20–40% in the detection of tuberculosis cases during 2020 due to the Covid-19 outbreak [8]. Improving the findings and treatment of TB cases in the community can be performed through active TB case-finding (ACF). ACF activities consist of contact investigation and special and mass screening [5, 6]. The results of our study showed that before the Covid-19 pandemic, almost all Puskesmas conducted contact investigations (61.3% not always or sometimes and 36.7% always carrying out TB contact investigations).

Only 2% of the Puskesmas did not conduct contact investigations. This showed that before the Covid-19 pandemic, the investigation of TB contacts in Puskesmas at Bogor District had been properly implemented. Entering the 2020 Covid-19 pandemic, the percentage of Puskesmas that had never conducted contact investigations increased by 20%

compared to the previous year. The percentage of Puskesmas that always and occasionally conducts TB contact investigations decreased in 2020. Our study showed that most of the Puskesmas did not perform special and mass screening before the pandemic, and the percentage increased during the pandemic. According to one informant, between 2019 and 2020, there was no special and mass screening in Puskesmas at Bogor District.he Covid-19 pandemic affects the implementation of the ACF and indirectly affects the finding of TB cases in the community. Based on the results of SITT data Bogor District Service at Puskesmas Cimandala, the finding and treatment of TB cases in 2019 reached 265 cases, decreasing to 155 cases in 2020. The impact of the Covid-19 pandemic could reduce 20–40% of tuberculosis case detection during 2020 [9].

In the study result in India, the authors compared testing and diagnoses of TB in a single hospital in Haryana, Northern India (March to December 2019), compared to data from January to October 2020. A 25% reduction in the number of tests conducted (2019:644; 2020:484) was reported. However, the authors reported a higher positivity rate in 2020 as compared to 2019 (2019:19.7%; 2020: 30.1%, 127 cases in 2019 and 146 cases in 2020). The authors postulated that the forced lockdown across the state had increased close contact in enclosed spaces among family members, increasing the risk of transmission [10]. The other study's results in India showed a decrease in case findings between 2019 and 2020. Paediatric TB notifications were 32% higher in the pre-lockdown period compared to 2019 (2019 = 5539; 2020 = 7334), these drastically reduced to 24% lower (2019 = 3888; 2020 = 2953) during lockdown and 36% lower post lockdown (2019 = 9821; 2020 = 6251) compared to the same months in the previous year [11].

The results of our study found various reasons why Puskesmas did not perform ACF before and during the Covid-19 pandemic. One reason the Puskesmas did not perform CI during the pandemic was mostly due to Head of the Puskesmas policies and the burden of Puskesmas activities. Furthermore, the rest of the informants said: understaffed, afraid of contracting Covid-19, and had no budgets for contact investigations. Based on the information obtained from an in-depth interview with one informant, it is said that ACF activities — especially contact investigations, were performed if there were activity budgets provided by the BOK.

Tracking and investigation activities are aimed at people who are in contact with TB patients (index cases), at least 10–15 people who have close contact with TB patients [12]. Active Case Finding (ACF) in TB disease can substantially reduce the incidence number in the community [13].

Regarding the Head of the Puskesmas policies, during the Covid-19 pandemic, almost all institutions have policies to limit movement/mobilization to prevent the transmission chain of Covid-19 in the community. Another result was that 46% of Puskesmas reduced service hours and several types of services due to the pandemic. Moreover, only 1% of Puskesmas conducted scheduled opening and closing services. (https://data.tempo.co/data/1246/survei-cisdi-masyarakat-enggan-ke-faskes-karena-takut-tertular-covid-19).

In addition to policy issues, the number of activities and the lack of personnel are also reasons why the Puskesmas do not implement contact investigation. Most of those in charge of the TB program at the Puskesmas hold two or more programs [14]. The

results of in-depth interviews with TB program supervisors at Puskesmas stated that a Puskesmas is categorized as good if each program supervisor holds only one program. The lack of human resources or staff greatly affects the program's success [15].

The study results in Tegal City found that TB cases with contact investigations were never performed because of the large number of TB officers working at the Puskesmas [16]. Moreover, improving the implementation of ACF TB through contact finding by TB cadres needs substantial support from health workers in Puskesmas. Furthermore, the transfer of resources towards controlling the Covid-19 pandemic also affects planning and monitoring activities for other programs at Puskesmas [9]. The results of an in-depth interview with one of the cadres said that contact investigation activities were performed by: "*The dissemination of TB case data from the Puskesmas stated that we have to visit suspected TB patients, we recorded them, we reported them, those who were reported to be close contacts, those who were not at home, one index was 20 people. The neighbours included were right and left neighbours"*. (Healthcare Informant).

The participation of health cadres in conducting ACF of TB in the community for eight months helped increase the number of TB case findings, thereby increasing CDR [17]. The higher the number of cadre's participation, the higher the findings of TB suspects [18]. Some obstacles often experienced when investigating TB contacts include the awareness/willingness of cadres, existing stigma, geographical conditions that are difficult to reach, public awareness, and availability of funds.

The results of our study showed that there were several reasons why the Puskesmas did not perform special and mass screening before and during the pandemic; the burden of the Puskesmas' activities, no environment that was easy to transmit TB (e.g. prisons, psychiatric hospitals, dormitories, Islamic boarding schools and nursing homes), lack of human resources, and there was no operating budget provided for TB screening. In addition, there were also Puskesmas who said that they had o operational budget for special TB screening, lack of human resources (12%), fear of contracting COVID-19 (10%) and Puskesmas covering the red zone (2%). Furthermore, the results of in-depth interviews with informants were stated as follows: "We have never conducted any mass and special screening; until now, we haven't done it either, due to the limited human resources and budget, lack of encouragement, motivation and coordination". (Informant who were responsible for the TB program at Puskesmas Klapanunggal and Puskesmas Tajur).

TB screening/finding is an active case-finding activity usually performed in a TB-prone environment, such as prisons/detention centres, psychiatric hospitals, workplaces, dormitories, Islamic boarding schools, and nursing homes. In addition, TB screening is needed for patients with symptoms (active TB) or with certain conditions that can increase the risk of TB. Active finding activities in special places can be conducted by implementing annual mass screening, health screening of new residents, contact screening and routine cough monitoring. The percentage of Puskesmas that did not conduct mass screening was greater than those who did. In addition, it was found that there was a difference in mass screening activity before and during the 2020 Covid-19 pandemic. The results of the informant interview stated that:

"If there is a patient, the ACF was conducted for those in household contact. For the mass screening, I haven't conducted it yet. The problem is that I did not submit the activity budget". (Person-in-charge of the TB program at Puskesmas)

Mass screening is usually conducted once a year to improve TB patient detection and is usually performed in areas where case-finding is still very low. The Puskesmas will work together with village officials, health cadres and community personnel to screen TB symptoms on a massive scale and report the finding to the Puskesmas. The study's results in Myanmar showed that 56,709 people were mass screened and 1,076 people were found to be suspected of TB, and 74 patients treated for active TB. ACF contributed 5% and 18% to additional TB case-finding in 2014 and 2016 [19]. Active case finding (ACF) of TB using a community-based approach is a potential strategy to overcome the reduction in TB detection by eliminating the need for patients to seek care in health facilities [13].

Active case finding (ACF) of TB has gained considerable interest and investment in the Southeast Asian region, and it is becoming more and more important to find people with TB who were missed due to the Covid-19 pandemic. As a result, many countries in the Southeast Asia region have incorporated ACF activities into their national strategic plans. ACF can reach people with TB earlier than routine approaches, lead to increased numbers of people being diagnosed, and is often needed for certain key populations who face stigma and social and economic barriers.

From the result above it can be seen that there is an effect of ACF on the number of TB case finding in the community. After the end of the C19 pandemic, it is hoped that all puskesmas TB officers, cadres, and the community can carry out ACF TB, especially in dealing with TB elimination in 2030 and TB eradication in 2050. The person in charge of the TB puskesmas program is to disseminate information to the community about the importance of checking family members or neighbors if they are infected with TB for sputum examination if there are cough symptoms for two weeks or more. If new TB cases are found and treated quickly, it can reduce the prevalence of TB in Indonesia, especially in Bogor Regency.Our study has limitations; among others, data collection is still based on a questionnaire completed with a google form, which is individually completed by the person in charge of the TB program so that answers can be subjective. Therefore, omissions may occur during data collection and transcription. In addition, the research team is limited in conducting field supervision due to the Covid-19 pandemic.

5 Conclusion

The Covid 19 pandemic affected the implementation of active case-finding at Puskesmas in Bogor and affected the finding and treatment of TB cases. The percentage of Puskesmas that always conduct contact investigations during the pandemic has decreased compared to before the pandemic. The main reason the Puskesmas did not perform contact investigation activities during the pandemic (2020) was due to the Head of the Puskesmas policies and the burden of the activities conducted at Puskesmas. The lack of human resources was the main reason for not performing mass screening before the pandemic. Moreover, The reason for not performing mass screening during the pandemic

was because there were too many activities, fear of contracting Covid-19 and no budget available for conducting the program.

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