

## Tracing management and epidemiological characteristics of close contact COVID-19 in primary health care



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### ABSTRACT

**Introduction:** Several countries, including Indonesia, have made tracing efforts to control the spread of infectious diseases such as COVID-19. In carrying out this tracing, it is not only about tracing close contacts but also about digging up some information related to the epidemiological characteristics of COVID-19. So this information can be useful in analyzing the future incidence of disease or health problems. This paper aims to analyze the management of tracing and epidemiological characteristics of close contacts with COVID-19 in Primary Health Care (Puskesmas). Especially Primary Health Care in Pengasih I, Pengasih II, Sentolo I, and Sentolo II.

**Methods:** The design of this study is a type of descriptive epidemiological research with retrospective data. Retrospective data were analyzed descriptively regarding the epidemiological characteristics of close contact with COVID-19. They then tested the formulation of the hypothesis with univariate, bivariate, and multivariate data analysis. Total sampling was utilized for the study from February 1<sup>st</sup> to March 3<sup>rd</sup>, 2022.

**Results:** Contact tracing was carried out by following the guidelines for tracing implementation issued by the government. Close contact data is 1,450 and dominated by women aged 16-54. The frequency of asymptomatic is more than that of symptomatic. There are 535 close contacts whose status changed to confirmed cases.

**Conclusion:** Close contacts have the risk of undetected infection, so early control of close contact can control the spread of the COVID-19 outbreak. Therefore, tracing efforts by health workers aimed at early detection of close contacts and quarantine measures for close household contacts are appropriate to break the chain of transmission of COVID-19 so that this tracing can be achieved.

**Keywords:** *Close Contact; Contact tracing; COVID-19; Epidemiology.*

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### INTRODUCTION

The spread of COVID-19 is very fast and can result in death. Various efforts were made to control the transmission rate and speed up the recovery process. The Indonesian government's policy through the task force for the acceleration of handling COVID-19 in dealing with the COVID-19 pandemic is to focus on four strategies: using masks policy, tracing contacts (tracing), education and preparation for self-isolation, and isolation in hospitals.<sup>1</sup>

Several countries, including Indonesia, have made tracing efforts to control the spread of infectious diseases such as COVID-19. In carrying out this tracing, it is not only about tracing close contacts but also about digging up some

information related to the epidemiological characteristics of COVID-19. So this information can be useful in analyzing the future incidence of disease or health problems. In addition, this information can also be used to test a hypothesis and assess its effectiveness. Information related to epidemiological characteristics is obtained from infected individuals, family members, health workers, close contacts, etc. The report includes basic demographic data, detailed life traces and close contact history, clinical characteristics, exposure history, etc.<sup>2</sup>

Based on the instructions of the Minister of Home Affairs (Inmendagri) number 13 of 2021 regarding the augmentation of the utilization of limitations on micro-based local area exercises (PPKM Mikro) and optimizing the COVID-19 handling post at

the village and sub-district level to control the spread of COVID-19. In the PPKM Micro expansion, the Primary Health Care (Puskesmas) job is progressively focal. As a well-being administration office that sorts out first-level public and individual well-being endeavors by focusing on promotive and preventive endeavors to accomplish the most extensive level of general well-being, Primary Health Care is engaged with endeavors to forestall the transmission of COVID-19 locally. As instructed by the Minister of Home Affairs in point thirteen, letter (a) number (3), which reads "Optimizing Primary Health Care (Puskesmas) in handling COVID-19, especially in prevention, testing, and tracing".

Tracing efforts carried out by health workers at the Puskesmas include

identifying, assessing, and managing people in close contact with confirmed or probable cases to prevent further transmission. The contact in the mean is a person who has direct contact or is within 1 meter for 15 minutes with someone who may be contaminated with COVID-19.<sup>3</sup> At the Puskesmas, close contact tracing of confirmed cases reported by the Health Office focused on family members living in the same house. Close contacts that have been identified can change the status of confirmed cases if the PCR or antigen test results show a positive result.<sup>4</sup>

In Indonesia, tracing efforts are carried out by Puskesmas by following the guidelines the 5th Revision COVID-19 Prevention and Control Guidelines issued by the Ministry of Health of the Republic of Indonesia in 2020 and the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/MENKES/4641/2021 concerning Guidelines for the Implementation of Examinations, Tracing, Quarantine, and Isolation in the Context of Accelerating the Prevention and Control of COVID-19. The Minister of Health of the Republic of Indonesia, Budi Gunadi Sadikin, stated that Indonesia's close contact tracing capabilities are still below standard. It is due to delays in obtaining close contact information data from tracer officers.<sup>5</sup> As for other obstacles, such as close contacts identified when contacted by telephone or uncooperative home visits, non-compliance with close contacts undergoing quarantine or self-isolation at home.<sup>6</sup>

In China, information related to the epidemiological characteristics of close contacts among people isolated due to COVID-19 includes basic information on close contacts, relationships with original cases, how to observe isolation, contact methods, contact locations, and presence of clinical symptoms.<sup>7</sup> In Japan, information regarding epidemiological close contact tracing includes gender, age, specimen sampling (Nasopharyngeal swab or saliva), type of contact (Household contact, eating together, talk together, etc.) and subject of symptoms.<sup>8</sup> In Indonesia, information regarding the epidemiological characteristics of close contacts is obtained through interviews

by tracer officers at the Puskesmas and their networks. The data include primary demographic data such as gender and age, symptoms, the relationship of close contact with confirmed cases, treatment, and changes in the status of close contacts into confirmed cases. The information follows a daily monitoring format based on guidelines issued by the Ministry of Health of the Republic of Indonesia.

Epidemiological characteristics of COVID-19 provide essential insight into prevention efforts and health care system planning. Most studies suggest that the incubation period of the SARS-Cov-2 virus is less than 11 days, and the lag between the onset of symptoms and diagnosis is five days, which is longer than for other respiratory cases such as MERS or SARS. Implementing a quarantine policy for 14 days is mandatory for all people who have the potential to be exposed to this virus, and a long quarantine period is needed for severe symptoms.<sup>9</sup> Examining the epidemiological characteristics of COVID-19 connected with foreseeing the course of the scourge in every nation helps arrange, illuminate, or adjust preventive measures against COVID-19.<sup>10</sup>

Kulon Progo is one of the regencies in the Special Region of Yogyakarta that was included in the red zone during the third wave of COVID-19 cases. Based on the release of data from the Kulon Progo Regency COVID-19 task force through its official website, it shows that Kulon Progo Regency had experienced a surge in COVID-19 confirmed cases of up to 300 cases per day, of which the most confirmed cases were in Pengasih Subdistrict and Sentolo District. The spike in cases will impact tracing efforts at the Primary Health Care located at the Kulon Progo District Health Office. So from this tracing effort, some information related to tracing management and the epidemiological characteristics of close contacts COVID-19 was obtained at the Puskesmas, especially at the Puskesmas Pengasih I, Pengasih II, Sentolo I and Sentolo II. Then describe whether there is a relationship between gender, age, symptoms, and the relationship of close contacts with confirmed cases to the change in status of close contacts in confirmed cases, which can be used in

policy making and developing community health interventions by identifying, determining, and managing interventions target.

This paper aims to analyze the management of tracing and epidemiological characteristics of close contacts with COVID-19 in Primary Health Care (Puskesmas) Pengasih I, Pengasih II, Sentolo I, and Sentolo II.

## METHODS

The study is an epidemiological study with retrospective data. The research data are retrospective data that were analyzed descriptively regarding the description of the epidemiological characteristics of close contacts of COVID-19 and then tested the formulation of the hypothesis.

The population in this study was all close contacts traced and monitored by health workers at the Primary Health Care in Pengasih and Sentolo sub-districts for the period February 1<sup>st</sup> to March 3<sup>rd</sup>, 2022. The sample in this study used total sampling, which took all members of the population as a sample study. Data were obtained from surveillance officers at the Primary Health Care (Puskesmas) Pengasih I, Pengasih II, Sentolo I, and Sentolo II.

The variables studied were the epidemiological characteristics of close contacts from tracing that had been carried out by tracers, including basic information on close contacts such as gender and age, treatment, the onset of symptoms in close contacts, close contacts with confirmed cases and close contacts who changed status to cases COVID-19 confirmation.

In this study, the measuring instrument/instrument used was in the form of data from a data collection format in accordance with the 2020 "COVID-19 Prevention and Control Guidelines for the 5th Revision" published by the Ministry of Health of the Republic of Indonesia. While conducting this research, the authors did not encounter any ethical problems because the authors did not intervene, and the authors kept the names of close contacts secret.

This study used univariate data analysis to describe the frequency distribution of the epidemiological characteristics of close contacts with COVID-19. The bivariate

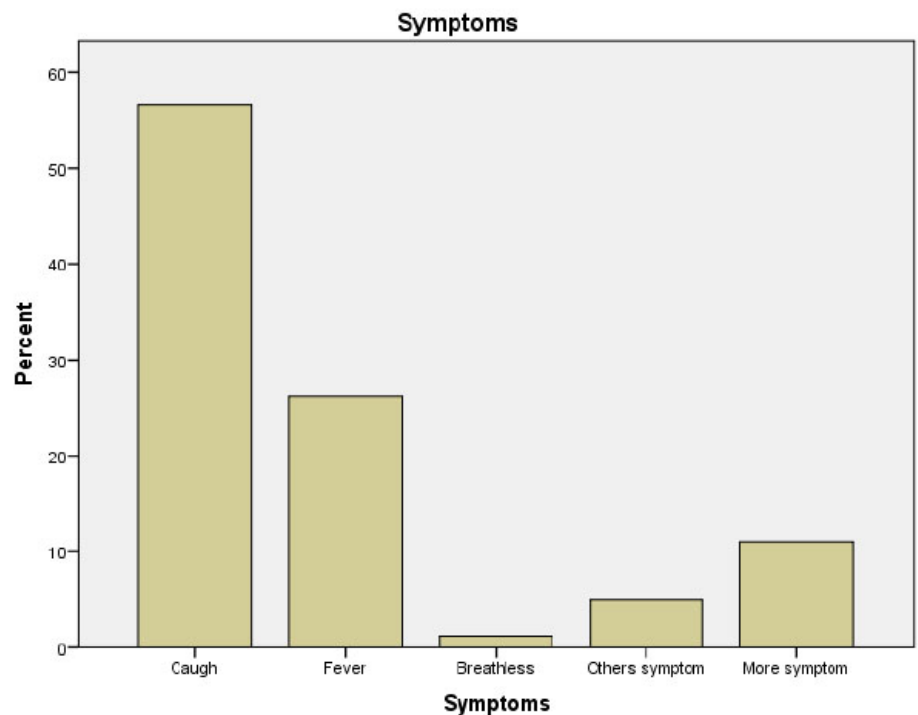
descriptive analysis uses the chi-square test to describe the relationship between variables. Then the multivariate analysis is used to analyze what factors influence the dependent variable; in this case, the dependent variable is the change in the status of close contacts to confirm cases, then a logistic regression test is carried out with a high level of significance selected by researchers by 5%.

## RESULTS

The total of all close contacts is 1,450 close contacts of the initial confirmed cases reported by the Kulon Progo Health Office. Contact tracing was carried out by health workers at the Puskesmas in the Kulonprogo District Health Office and its network by following the 5th Revision COVID-19 Prevention and Control Guidelines issued by the Ministry of Health of the Republic of Indonesia in 2020 and the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/MENKES/4641/2021 concerning Guidelines for the Implementation of Examinations, Tracing, Quarantine, and Isolation in the Context of Accelerating the Prevention and Control of COVID-19. This contact tracing process begins with interviewing confirmed cases of COVID-19 either via mobile phones or in-person interviews to identify people who have been in contact with him in the previous 14 days. The confirmed cases are residents who live in Pengasih and Sentolo sub-districts by conducting contact tracing focused on close contacts at home and the neighborhood around the house by the local Puskesmas tracer. Close contacts who have been identified are then interviewed regarding demographic and symptom data and are advised to quarantine and carry out a NAAT (Nucleic Acid Amplification Test) or RDT-Ag (Rapid Antigen) laboratory examination with an entry and exit test approach according to the criteria for the access area. The interviews with local Puskesmas surveillance officers show that the access area criteria for Kulon Progo are criterion B, namely the entry test criteria using RDT-Ag followed by NAAT/PCR examination as an exit test in close contact with negative RDT-Ag results. Meanwhile, close contacts with positive RDT-Ag results are designated

**Table 1.** Frequency Distribution of The Epidemiological Characteristics of Close Contacts of COVID-19.

Characteristics	Frequency	Percent
Gender		
Male	681	47.0 %
Female	769	53.0 %
Age		
< 16 year	340	23.4 %
16 – < 35 year	394	27.2 %
35 – < 55 year	465	32.1 %
55 – < 65 year	157	10.8 %
≥ 65 year	94	6.5 %
Symptom status		
Symptom	244	16.8 %
No Symptom	1206	83.2 %
Close contact changed status to confirmation case		
Yes	535	36.9 %
No	915	63.1 %
Treatment		
Quarantine	1305	90.0 %
No Quarantine	145	10.0 %
Relationship with case		
Family	1395	96.2 %
No Family	55	3.8 %



**Figure 1.** Symptoms that arise in close contact with COVID-19.

as confirmed cases of COVID-19 and do not have to be followed up with NAAT/PCR examinations. The next process is to monitor close contacts for 14 days to identify the onset of symptoms and follow-up examination with NAAT/PCR so that more effective examination results can be known and also identify the presence or absence of close contacts who change

status to confirmed cases.

The data were analyzed using the SPSS software program. The following table shows the results of univariate descriptive data analysis.

Table 1 is a univariate analysis; in the table, it can be seen that close contact with the female sex is more than with males, with a ratio of female to male, 13:1. Where

**Table 2. Relationship of sex, age, symptoms, relationship cases, and treatment with status changes in close contacts of COVID-19.**

Characteristics	Status change		Total	$\chi^2$
	Yes	No		
Gender				0.053
Male	233	448	681	
Female	302	467	769	
Age				0.004
< 16 year	116	224	340	
16 – < 35 year	174	220	394	
35 – < 55 year	149	316	465	
55 – < 65 year	58	99	157	
≥ 65 year	38	56	94	
Symptom status				0.000
Symptom	195	49	244	
No Symptom	340	866	1206	
Treatment				0.000
Quarantine	533	772	1305	
No Quarantine	2	143	145	
Relationship with cases				0.231
Family	510	885	1395	
No Family	25	30	55	

**Table 3. Effect of age, symptoms, relationship with cases, and treatment with status changes in close contacts of COVID-19.**

Model	R Square	-2 log-likelihood	Sig
Predictors	0.280		
Regression		1576.466	0.000
Gender			0.048
Symptom status			0.000
Treatment			0.000
Relationship with case			0.002

most are at the age of 35 to <55 years. Then in the second order, most close contacts are aged 16 to 34 years, and next are close contacts aged children and adolescents (<16) years which are also not small in number. While the number of elderly (> 65) years is the least. Based on the table, the mean (mean) age for close contacts is 1.5.

In Table 1, it can also be seen that the identified close contacts caused more symptoms than those with symptoms, with an average value of 0.83. For management, monitoring officers urge residents identified as close to quarantine, especially close contacts in the same house with confirmed cases. So it can be seen in table 3 that the number of those who were quarantined was more than those who were not quarantined. Some close contacts are not quarantined because the test results show negative COVID-19 and are not at home with the confirmed case. From these

results, the majority of close contacts are families of confirmed cases living in the same house. Those who are not relatives are neighbors and friends of confirmed cases. In addition, the number of close contacts who changed their status to confirmed cases was not small. These results were obtained from daily monitoring carried out by local health workers, and after tests for both rapid antigen and PCR, the results showed positive for COVID-19.

Figure 1 shows the symptoms that generally arise in close contact are cough and fever. However, there are also close contacts who have multiple symptoms, for example, cough, fever, shortness of breath, flu and anosmia. The percentage of close contacts who show shortness of breath and other symptoms such as loss of sense of smell or flu is less than 5%.

Table 2 shows that the asymp.sig value between age, symptoms, and treatment for close contacts who change status to

confirmed cases is <0.05. It can be assumed that there is a relationship between the independent variables (age, symptoms, and treatment) and the dependent variable (changes in the status of close contacts of COVID-19 to confirmed cases). While the value of asymp.sig variable gender and the relationship with confirmed cases > 0.05. So it can be concluded that there is no relationship between the independent variable (gender and the relationship with confirmed cases) to the dependent variable (change in the status of close contacts of COVID-19 to confirmed cases). Table 2 shows that there is no variable with a value > 0.25; thus, it can be continued to analyze all variables using multivariate analysis.

Then in Table 3 is a multivariate analysis with a logistic regression test. In this logistic regression test, the forward (wald) method is used to get the best model with the Hosmer & Lemeshow test value of 0.373 (> 0.05) so that this model is feasible to use where it is seen that the variables of gender, symptom status, treatment, and the relationship with cases have a significance value of <0.05. At the same time, the age variable was excluded from the model because its significant value was > 0.05. It can be said that the variables of gender, symptom status, treatment, and the relationship with confirmed cases have a significant effect on changes in the status of close contacts of COVID-19. In comparison, the age variable has no significant effect on changes in the status of close contacts with COVID-19. The table shows the likelihood test results with a regression significance value of 0.000 and an R square value of 0.280. It can be assumed that the independent variables (age, symptom status, treatment, and relationship with confirmed cases) simultaneously (together) affect the dependent variable (change in status in close contacts) with a percentage of 28%.

## DISCUSSION

The study identified that the frequency of close contact is more female than male. It is the same with the research conducted by Areekal et al. in 2021. However, this does not directly prove that women are more susceptible to COVID-19 than men. Other studies found that there are more male than female close contacts. Likewise,

age characteristics indicate that the risk of being exposed to COVID-19 can occur in all age groups so that it is not concentrated in one particular age group. Children are at high risk of contracting COVID-19.<sup>11,12</sup> However, in this study, the 35-55 year age group has a high risk of being exposed to COVID-19. It is because the productive age has high mobility and social activities.<sup>13</sup> The age group 60-69 years has the highest attack rate of being infected with COVID-19.<sup>14</sup> Thus, everyone needs to be aware of the spread of COVID-19.<sup>15</sup>

Most close contacts do not show symptoms of COVID-19 because the incubation period of the virus is around 3-14 days. At that time, the blood levels of lymphocytes and leukocytes were still relatively normal, so a person did not show symptoms.<sup>16</sup> The average time between the occurrence of transmission before the onset of symptoms from the onset of exposure to the onset of symptoms was 3.83 days, with a higher secondary attack rate of 4-10 days after the onset of symptoms.<sup>17</sup> Primary cases are more likely to show severe symptoms than secondary cases, which are more likely asymptomatic.<sup>18</sup> This shows that the household secondary attack rate in symptomatic primary cases is higher than in asymptomatic cases.<sup>19</sup> Close contacts have the risk of undetected infection, so early control of close contacts can control the spread of the COVID-19 outbreak.<sup>7</sup> Moreover, from the results of this study, symptoms greatly affect the change in the status of close contacts in confirmed cases. Therefore, tracing efforts by health workers aimed at early detection of close contacts and quarantine measures for close household contacts are appropriate to break the chain of transmission of COVID-19.<sup>20</sup>

Quarantine of close contacts is carried out as soon as a person is identified as a close contact. Quarantine is carried out on all close contacts, symptomatic and asymptomatic, before further testing. Close contact in tracing activities at the Puskesmas is based on family members living in the same house with confirmed cases which are the main transmission and are at risk of transmitting the virus in the family. In conducting contact tracing (contact tracing), health workers at the

Puskesmas cooperate with village officials, residents, TNI and Polri. Tracer officers from health and non-health workers conduct interviews with close contacts and COVID-19 checks.

The COVID-19 examination in Kulon Progo is included in criteria B so that RDT-Ag is used in the entry test, followed by NAAT/PCR examinations for the exit test. Close contacts who show a positive entry test (RDT-Ag) are declared as confirmed cases. Meanwhile, close contact with a negative entry test (RDT-Ag) result was followed by a NAAT/PCR examination as an exit test.<sup>21</sup> For COVID-19 variants such as the omicron test, the antigen is considered less effective for detection because the test's sensitivity is very dependent on the examiner's ability, so it is still necessary to carry out a PCR examination to detect the omicron variant.<sup>22</sup> If the close contact on the exit test (NAAT/PCR) results shows a positive result, the close contact status changes to a confirmed case. Meanwhile, close contacts with negative exit test (NAAT/PCR) results on the fifth day are declared complete quarantine and will continue to report to health workers if symptoms arise. However, for close contacts who are unwilling to carry out further NAAT/PCR tests, they must undergo quarantine for 14 days and continue to report if there are symptoms.

In this study, quarantine efforts changed the status of close contacts into confirmed cases. As explained above, all close contacts must be quarantined immediately, and in the Kulon Progo area, an entry and exit test is carried out. For this reason, those who were quarantined initially showed negative results from the RDT-Ag examination, which was less effective than the NAAT/PCR examination. After proceeding with the NAAT/PCR examination, several close contacts showed positive results, so the status changed to a confirmed case. Likewise, those who are quarantined are generally relatives of confirmed cases who live in the same house. It can affect the change in status of close contacts into confirmed cases because the family is the main contagion in transmitting to other family members. Intense interactions between family members, such as eating

together, sleeping together, and doing activities together, indicate a possible risk of being exposed to COVID-19. From this research, the tracing efforts carried out by the Puskesmas and their networks in the Kulon Progo Regency area are in accordance with the guidelines. However, there are several inhibiting factors in the COVID-19 tracing effort, such as trust and community involvement in identifying close contacts, COVID-19 examination, quarantine and isolation.<sup>23</sup> In addition, the delay in finding secondary cases from the main case and unknown contacts can also hamper the effectiveness of breaking the COVID-19 transmission chain.<sup>24</sup>

The study has limitations. First, the reality in the field is that someone with symptoms and a history of contact with confirmed cases do not report to health workers because they are worried about being examined and quarantined. It affects the effectiveness of tracing efforts to control the rate of transmission of COVID-19 and reduce the number of deaths due to COVID-19. Therefore, policymakers and tracer officers in the field are expected to overcome this problem.

## CONCLUSION

The risk of being exposed to COVID-19 can occur in all groups and genders. The frequency of asymptomatic is more than those who show symptoms. These close contacts generally have family relationships and live in the same house as the initial confirmed cases reported by the Kulon Progo Health Office. There is a relationship between the independent variables (age, symptoms, and treatment) and the dependent variable (changes in the status of close contacts of COVID-19 to confirmed cases). The independent variables (age, symptom status, treatment, and relationship with confirmed cases) simultaneously (together) affect the dependent variable (change in status in close contacts) with a percentage of 28%.

Close contacts have the risk of undetected infection, so early control of close contacts can control the spread of the COVID-19 outbreak. Moreover, from the results of this study, symptoms greatly affect the change in the status of close contacts in confirmed cases. Therefore, tracing efforts by health workers aimed

at early detection of close contacts and quarantine measures for close household contacts are appropriate to break the chain of transmission of COVID-19 so that the purpose of this tracing can be achieved.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in the writing and publication of this paper. This paper can be accounted for by the authors.

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## ETHICS APPROVAL

This study has received ethical approval from the Health Research Ethics Committee of the University of Aisyiyah Yogyakarta with the number 1445/KEP-UNISA/III/2022 and has complied with the principles of research ethics.

## AUTHOR CONTRIBUTION

The first author is responsible for writing the concept, designing, drafting the paper, and obtaining and analyzing data. The second author contributed to the research design and writing concept and revision.

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