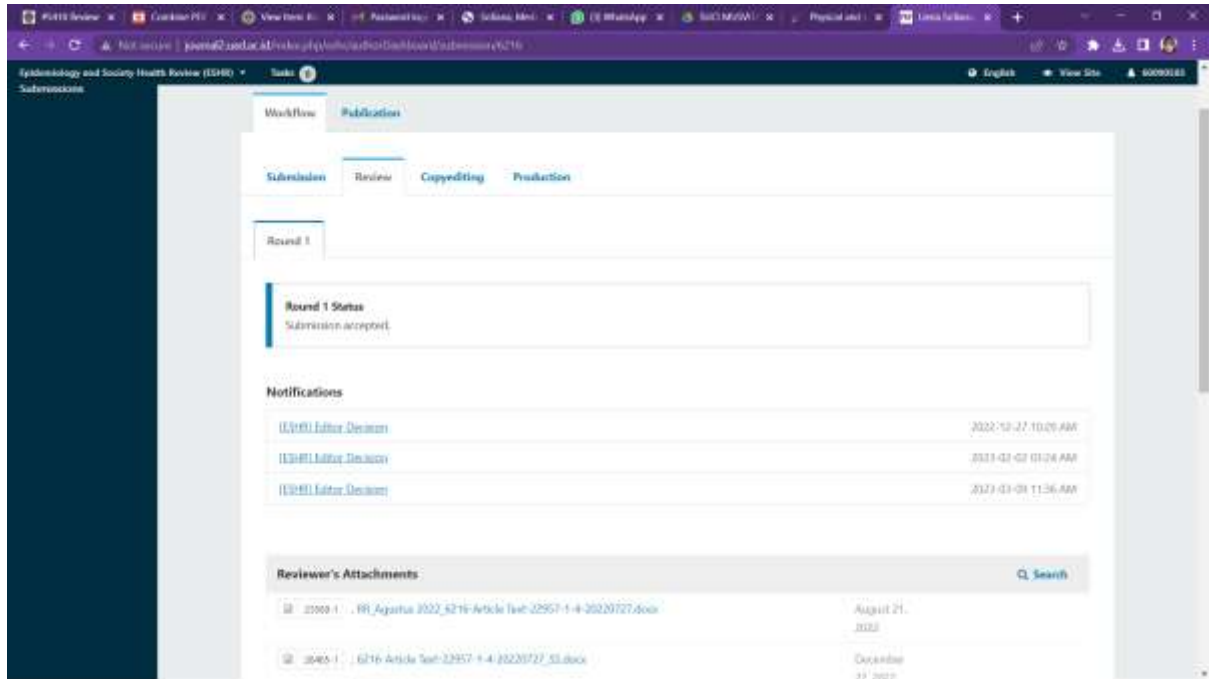


## BUKTI KORESPONDENSI

“Association between close contact history and the risk of COVID-19 in Purwakarta District, Indonesia”



Review dari reviewer terlampir:

## Research Article

**CLOSE CONTACT INCREASES THE RISK OF COVID-19 IN PURWAKARTA DISTRICT**

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Cek kembali

Received 05 February 2021; Accepted 04 March 2021; Published 05 March 2021: editor to enter

**ABSTRACT**

**Background:** COVID-19 pandemic is a global problem. One of the risk factors for COVID-19 is close contact, which have a greater risk of being confirmed because virus transmission generally occurs directly through droplets. Based on regional risk zoning mapping, Purwakarta Regency is included in the moderate risk zone and most of the confirmed cases are caused by a history of close contacts, but people with a history of close contacts do not always become confirmed patients. The purpose of this study was to determine the relationship between close contact status and the incidence of COVID-19 in Purwakarta district in 2020.

**Method:** This research applied observational analytic with a cross sectional study design. The research data is secondary data from the Health Office of Purwakarta Regency. The research sample was 2,650 people using purposive sampling. Analysis of the data used is chi square.

**Results:** Based on the characteristics of the respondents, most of them are in the early adult age group (26.8%) and male (52.3%). Based on bivariate analysis, it is known that there is a relationship between close contact status and the incidence of COVID-19 with p value = 0.002, PR value = 1.040 which means people with close contact status are 1.040 times more likely to get COVID-19 than people who do not have close contact status. (95% CI = 1.013-1.069).

**Conclusion:** Close contact status is a risk factor for COVID-19 transmission in Purwakarta Regency in 2020.

**Keywords:** COVID-19; close contact; risk factor

**INTRODUCTION**

~~Corona virus~~ **Coronavirus** disease 2019 (COVID-19) is an infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2).<sup>1</sup> Symptoms that arise due to COVID-19 infection include fever, cough, and shortness of breath. The average incubation period is about 5-6 days with the longest incubation period being 14 days.<sup>2</sup> The emergence of this disease is marked by the emergence of extraordinary events in Wuhan, Hubei province, China. The first report received by WHO explained that the case came from Wuhan, China with 44 patients diagnosed with severe pneumonia.<sup>3</sup>

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~~Corona-virus~~ **Coronavirus** is a family of viruses that can cause mild to severe symptoms. In severe cases, COVID-19 can cause pneumonia, kidney failure, acute respiratory syndrome, and even death.<sup>2</sup> Several types of ~~corona-virus~~ **Coronavirus** are known to have severe symptoms, namely Middle East Respiratory Syndrome (MERS) and ~~Sever~~ **Severe** Acute Respiratory Syndrome (SARS). The problems caused by COVID-19 are not only local problems for residents of Wuhan, China. But, it is also a very serious problem all over the world. This is due to an increase in cases that continue to increase every day.<sup>4</sup> The urgency of the COVID-19 disease was marked by the WHO's determination of pandemic status on March 12, 2020.<sup>1</sup>

In 2020, there were 83,060,276 confirmed cases of COVID-19 with the death toll reaching 1,812,046 worldwide. The increase in COVID-19 cases is relatively fast, this is evidenced by the spike in cases that occur from time to time. Based on the WHO report, the United States is one of the regions with the largest number of confirmed cases, namely 20,216,991 cases with 350,778 deaths. Meanwhile, in the Asian region, the countries with the highest number of confirmed cases are India, Turkey, Iran and Indonesia.<sup>5</sup> The first 5 cases in Indonesia were confirmed on March 2, 2020. The increase in COVID-19 cases is still increasing every day. Based on a report from the Indonesian Ministry of Health, as of August 30, 2020 there were 172,053 confirmed cases with a higher mortality rate than global data, which was 4.3% or 7,343 deaths. The province with the highest confirmed cases is DKI Jakarta with a total of 39,037 cases. Meanwhile, the province with the lowest number of cases was in East Nusa Tenggara with a total of 177 cases.<sup>6</sup>

According to the National Disaster Management Agency (BNPB), based on daily data on COVID-19 cases per province in Indonesia, it is known that the 5 provinces with the highest number of cases include: DKI Jakarta, East Java, Central Java, South Sulawesi and West Java which counted up to September 5, 2020.<sup>7</sup> The number of confirmed cases in Indonesia recorded throughout 2020 was 743,198 cases. This number continues to increase in cases every day. There are 25 provinces that experienced an increase in cases, one of which is West Java Province with a total of 83,579 cases. Based on the national COVID-19 case fatality rate, there has also been an increase of 22,138 people who died.<sup>8</sup>

Risk factors for COVID-19 infection include comorbid conditions in patients such as comorbid hypertension and diabetes mellitus. In addition, close contact factors, age, gender, and smoking habits also have their own risks for the incidence of COVID-19. Close contacts are suspected to have a greater risk of being confirmed, this is because exposure to confirmed cases that are carried out continuously for a period of more than 15 minutes will result in people with close contact status being more susceptible to contracting the virus.<sup>9</sup> People who have a history of close contact with confirmed cases is at high risk for exposure to the virus through droplet transmission. This generally occurs in cases of close household contacts. Where droplets from respiratory fluids can occur when a person is within 1 meter of an infected person. While contact transmission that occurs indirectly can be through transmission of contaminated object surfaces or is called fomite transmission.<sup>10</sup>

Based on the case reports received, it shows that the confirmed cases are related to transmission from COVID-19 patients and generally have a history of close contact with confirmed COVID-19 patients.<sup>11</sup> Transmission occurs through droplets. Thus, people who have close contact with COVID-19 patients are considered to be most at risk for contracting the SARS-CoV-2 virus. The same goes for people who care for patients, both from medical

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Pada KMK tertulis dan syarat epidemiologis. Mohon cek kembali...

personnel and family members.<sup>12</sup> The latest research results show that the SARS-CoV-2 virus has a transmission rate of 5% to 6% in people who have a history of close contact with patients with confirmed COVID-19. The rate of transmission is higher if close contacts are in the family environment, reaching 10%.<sup>13</sup>

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The urgency of this close contact is also evidenced by the large number of medical personnel who have confirmed COVID-19 as a result of close contact with confirmed patients. Medical personnel are one of the close contact groups who are at high risk of being exposed to the virus. 9% of medical personnel in Italy were exposed to COVID-19 after treating confirmed patients as well as 3,300 medical personnel in China exposed to COVID-19 with a mortality rate of 0.6%. Previous research stated that 61.8% of people who had a history of close contact were confirmed positive for COVID-19. So statistically, there is a significant effect between a history of close contact with confirmed cases of COVID-19 in Makassar city, where people who have close contacts have a 6.802 times greater risk of being confirmed COVID-19 than people who do not have a history of close contacts.<sup>11</sup>

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Confirmed cases of COVID-19 in West Java continued to increase every day until December 20, 2021, there were 73,948 confirmed cases of COVID-19 with a cumulative incidence of 163.49 per 100,000 population. The number of deaths in West Java due to COVID-19 infection was 1,095 people. Based on the regional risk zoning mapping, Purwakarta Regency is included in the moderate risk zone.<sup>8</sup> Purwakarta Regency is one of the regencies included in the province of West Java. During the pandemic, Purwakarta district was not spared from confirmed cases of COVID-19. The first confirmed case occurred on March 15, 2020 with an increase in cases that continues to occur every week. However, the incidence of COVID-19 in Purwakarta Regency is quite volatile, this is because in June 2020 Purwakarta Regency had reached zero cases which also coincided with the implementation of Large-Scale Social Restrictions (PSBB) in a number of areas in Purwakarta Regency.<sup>14</sup>

Based on a preliminary study, the number of confirmed COVID-19 cases in Purwakarta Regency as of December 31, 2020 was recorded as 2,451 cases, with a death toll of 95 people. Based on data obtained from the Purwakarta District Health Office, most of the confirmed cases that occurred were also caused by a history of close contact with positive patients. It is suspected that apart from the high frequency of interaction between company employees, the transmission occurred when they returned home without realizing that the COVID-19 virus had entered their bodies. So that the interactions carried out in the surrounding environment become free and uncontrolled. According to the Purwakarta District Health Office, interactions that are carried out continuously and for a relatively long time, between confirmed patients (especially asymptomatic), both with family members and work friends will increase the risk of transmission of COVID-19 cases caused by a history of close contact. This causes the number of confirmed cases that occur due to a history of close contact with positive patients mostly from household and company clusters. However, some people with a history of close contacts are not always confirmed patients. This can be seen from the COVID-19 surveillance report of the Purwakarta District Health Office, that a small number of close contact cases do not necessarily become confirmed cases. Based on the above background, the researcher is interested in conducting research on "The Relationship of Close Contact Status with the Incidence of Covid-19 in Purwakarta Regency in 2020".

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## METHOD

This research is an analytic observational with a cross sectional research design. The data used in this study is secondary data obtained from the Health Office of Purwakarta Regency. The population in this study were residents of Purwakarta Regency who conducted screening in March–December 2020 which was recorded in the surveillance data of the Purwakarta District Health Office until December 31, 2020 with a total population of 4986 people. The sampling technique used in this research is purposive sampling, ~~ie the i.e. the~~ sampling is based on the consideration of the researcher. The inclusion criteria taken into consideration in this study were residents of Purwakarta district who screened for COVID-19 in 2020 by carrying out a PCR swab test and domiciled in Purwakarta Regency for at least 3 months. While the exclusion criteria for the study were residents of Purwakarta district who screened for COVID-19 in 2020 by conducting rapid antibody and antigen tests, and case data was not recorded completely in the epidemiological surveillance report of the Purwakarta District Health Office. Based on the inclusion and exclusion criteria, the number of samples obtained was 2,650 people. Data analysis in this study was carried out using the chi square test.

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## RESULTS

Characteristics of research respondents based on close contact showed that most of the cases of close contact belonged to the early adult age group of 28.9% and male sex of 53.1% (table 1).

Table 1. Frequency Distribution of Respondents with Close Contact Status by Age and Gender in Purwakarta Regency in 2020 (n=...).

Characteristics	Close contact status			
	Yes		No	
	n	%	n	%
Age				
a. Toddler	33	1,8	14	1,7
b. Children	33	1,8	13	1,6
c. Early teenager	45	2,5	12	1,5
d. Late teenager	227	12,4	108	13,3
e. Early adult	531	28,9	179	22,0
f. Late adult	430	23,4	136	16,7
g. Early elderly	326	17,8	165	20,2
h. Late elderly	167	9,1	114	14,0
i. Elderly	43	2,3	74	9,1
Gender				
a. Male	974	53,1	412	50,6
b. Female	861	46,9	403	49,4
Total	1835	100	815	100

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The description of respondents based on the confirmed status of COVID-19, it is known that most of the confirmed cases of COVID-19 also belong to the early adult age group of 27.0% and male at 52.7% (table 2).

Table 2. Frequency distribution of respondents with confirmed COVID-19 status by age and gender in Purwakarta Regency in 2020 (n=...)

Characteristics	COVID-19 confirmation status			
	Yes		No	
	n	%	n	%
Age				
a. Toddler	39	1,6	8	3,6
b. Children	39	1,6	7	3,2
c. Early teenager	53	2,2	4	1,8
d. Late teenager	302	12,4	33	15,0
e. Early adult	657	27,0	53	24,1
f. Late adult	519	21,4	47	21,4
g. Early elderly	449	18,5	42	19,1
h. Late elderly	260	10,7	21	9,5
i. Elderly	112	4,6	5	2,3
Gender				
a. Male	1280	52,7	106	48,2
a. Female	1150	47,3	114	51,8
Total	2430	100	220	100

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The contact status variable was closely related to the incidence of COVID-19 with a value of sig = 0.002. The Prevalence Ratio (PR) = 1.040 (95% CI = 1.013-1.069) which means that people with close contact status have a 1.040 times greater risk of contracting COVID-19 than people without close contact status (table 3).

Table 3. The results of the bivariate test of the relationship between close contact status and the incidence of COVID-19 in Purwakarta Regency in 2020.

Close contact status	Status of Covid-19				Total	sig	PR (C1 95%)
	Yes		No				
	n	%	n	%			
Yes	1704	70,1	132	69,2	1835	100	0,002 1,040 (1,013-1,069)
No	727	29,9	88	30,8	815	100	
Total	2430	100	220	100	2650	100	

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## DISCUSSION

The relationship between close contact and the incidence of COVID-19 in Purwakarta Regency is influenced by the lack of public awareness in implementing health protocols, especially keeping a distance from each other. Moreover, the spread of the COVID-19 virus is generally transmitted directly through droplets. Therefore, ~~that~~ the lack of public awareness in maintaining distance and implementing health protocols will increase the risk of being exposed to COVID-19. Public awareness of maintaining distance and implementing health protocols is the main key in breaking the chain of transmission of COVID-19, especially COVID-19 can be transmitted through close contact and droplets. So that people who are vulnerable to infection are those who have close contact with COVID-19 patients.<sup>15</sup> The low level of public awareness in accessing health services will also exacerbate the situation, causing a high number of COVID-19 cases.<sup>16</sup>

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Transmission of COVID-19 is transmitted from human to human who have close relationships with family members, friends, relatives or direct contact with patients who are confirmed to be

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COVID-19.<sup>17</sup> Especially for those in close contact with confirmed cases. So that this can increase the risk of transmitting COVID-19 in the community. This is confirmed by the WHO statement which states that the transmission of the SARS-CoV-2 virus occurs through droplets and close contact with asymptomatic infected cases.<sup>10</sup>

The main transmission or transmission occurs through droplets originating from the respiratory tract. In addition, transmission also occurs due to close contact with COVID-19 sufferers. Thus, people with a history of close contact have a high risk of being exposed to the SARS-CoV-2 virus.<sup>18</sup> People who are most at risk of contracting COVID-19 are people who have close contact with COVID-19 patients, including those who care for patients.<sup>19</sup>

In the process of direct close contact, indicating that a healthy person accidentally touched a person infected with the SARS-CoV-2 virus, or the person touched the surface of an object that was touched by a person with confirmed COVID-19 (fomite transmission). In general, the surface of these objects has been contaminated with droplets containing the SARS-CoV-2 virus from COVID-19 patients. The virus can remain stable for a certain period of time. Therefore, it can support the entry of the virus into the body of healthy people and the infection process will continue.<sup>20</sup>

Based on the results of the study, it was also known that most of the confirmed cases of COVID-19 in Purwakarta Regency came from clusters of households and companies. Households account for the largest proportion of the risk of exposure to COVID-19. The results of the analysis carried out in China also found that 78-85% of the clusters occurred within the scope of the household. This proves that the transmission occurred in long close contact.<sup>21</sup> Confirmation cases originating from the company cluster occurred due to close contact with the same activity in a closed room for an hour or more with confirmation cases, so this can pose a high risk for infected.<sup>10</sup> 70% of the cases identified were from close household contacts. Close household contact is also considered to be one of the most dangerous contacts.<sup>22</sup> This is due to the relatively small scope of the household, which allows very fast person-to-person transmission.

In addition, most of the confirmed cases in Purwakarta Regency are asymptomatic cases. Therefore, it is more difficult to do early detection. The proportion of close contacts diagnosed with COVID-19 of 44.2% were an asymptomatic group. This is considered more worrying, because the risk of transmitting the virus to others is higher and uncontrollable. According to WHO, the level of asymptomatic infection that occurs in the community is still not known with certainty. The proportion of asymptomatic cases may vary according to age and the presence of coexisting conditions.<sup>22</sup> However, efforts made to trace contacts and epidemiological investigations of cases and close contacts can provide information for disease management planning. Information obtained from contact tracing efforts indicates that asymptomatic people are less likely to transmit the virus than symptomatic people.<sup>10</sup>

Based on the results of the study, confirmed asymptomatic/asymptomatic patients are recommended to self-isolate at home. On the other hand, the implementation of self-isolation for exposed family members actually allows for a much greater exposure and risk for other family members which causes close contact status, especially for families who have not been able to provide a special room for patients to isolate properly. This is evidenced by the large number of household clusters in Purwakarta district. ~~people~~ People living with confirmed patients have a higher risk of infection than other people who do not live in the same

environment as confirmed patients. The SARS-CoV-2 virus is more likely to be transmitted between household members through droplets or direct contact with surfaces contaminated with the virus.<sup>21</sup>

Based on the results of the study, it is also known that the majority of confirmed and close contact cases in Purwakarta Regency are dominated by early adulthood. According to the Health Office of Purwakarta Regency, this is most likely caused by transmission due to close contact in the work environment. Exposure to viruses in the workplace can occur anytime and anywhere, whether on business trips or while working in a room. Close contact in the work environment is related to age and can be exacerbated by the presence of comorbid diseases in patients. According to WHO, the risk of occupational exposure to COVID-19 depends on the likelihood of close contact (distance between people of less than 1 meter) or on the frequency of contact with an infected person. Transmission can also occur through contact with surfaces contaminated with the SARS-CoV-2 virus.<sup>23</sup> Respiratory tract secretions released from infected persons can contaminate objects in the surrounding environment, causing the formation of fomites (contaminated surfaces). People who come into contact with contaminated surfaces often have close contact with infectious people, so that droplet transmission and fomite transmission are difficult to distinguish.<sup>10</sup>

The importance of making efforts to slow the spread of the COVID-19 virus can be done by complying with existing health protocols as a preventive measure in the spread of COVID-19. Efforts that can be taken by all parties include social distancing, using masks when outside the home, washing hands with soap, and immediately cleaning up after activities outside the home.<sup>24</sup> Social distancing has an important role in efforts to minimize interactions and crowds with many people. Social distancing is also one way to prevent the spread of the SARS-CoV-2 virus in a social group. This is because social distancing behavior will limit the reproduction rate in the spread of the virus among communities. In maintaining social distancing, people are strongly advised to postpone/avoid traveling to densely populated areas because they have a high risk of exposure.<sup>20</sup>

Another thing that can be done is regional quarantine which is also stated in the health emergency regulations. Regional quarantine is a restriction on the population in an area including the entrance area and its contents suspected of being infected with a disease in order to prevent the possibility of a more massive spread of COVID-19.<sup>19</sup>

## CONCLUSION

Based on the results and the discussion, it can be concluded that close contact is associated with COVID-19 and is a risk factor. Success in controlling COVID-19 requires cross-sectoral collaboration in monitoring and supervising the implementation of health protocols in public places, particularly the application of social and physical distancing. In addition, the public is expected to have awareness to apply health protocols properly, especially in implementing the 3M program (washing hands with soap, using masks and maintaining distance) as one of the efforts to prevent the transmission of COVID-19.

## Authors' contribution

First and second author contributed to research design, data collection, analysis and manuscript.

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Sehingga lebih real dengan penelitian yang dilakukan ini.



## Funding

This research has not received external funding

## Conflict of interest

There is no conflict of interest in this research.

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## Research Article



## CLOSE CONTACT INCREASES THE RISK OF COVID-19 IN PURWAKARTA DISTRICT

Received 05 February 2021; Accepted 04 March 2021; Published 05 March 2021; editor to enter

### ABSTRACT

**Background:** COVID-19 pandemic is a global worldwide problem issue. Close contact is one of the risk factors for COVID-19, which has a higher chance of being confirmed because virus transmission typically occurs directly through droplets. One of the risk factors for COVID-19 is close contact, which have a greater risk of being confirmed because virus transmission generally occurs directly through droplets. Purwakarta Regency is in the moderate risk zone, according to regional risk zoning mapping, and the majority of confirmed cases are caused by a history of close contact. Based on regional risk zoning mapping, Purwakarta Regency is included in the moderate risk zone and most of the confirmed cases are caused by a history of close. Even so, people who have had close contact do not always become confirmed patients. The purpose of this study was to see if there was a link between close contact status and the occurrence of COVID-19 in the Purwakarta district in 2020. contacts, but people with a history of close contacts do not always become confirmed patients. The purpose of this study was to determine the relationship between close contact status and the incidence of COVID-19 in Purwakarta district in 2020.

**Method:** This research applied observational ~~analysis analytic~~ with a ~~cross-sectional~~ ~~cross sectional~~ study design. The research data ~~was~~ secondary data from the Health Office of Purwakarta Regency District with sample. The research sample was 2,650 that was selected using ~~people using~~ purposive sampling. ~~Chi-square was used to~~ Analysis analysis of the data. ~~used is~~ chi square.

**Results:** ~~Based on the characteristics of the respondents, m~~ Most of ~~them respondent~~ ~~were~~ ~~are~~ in the early adult age group (26.8%) and male (52.3%). Based on bivariate analysis, it ~~was~~ known that there ~~was~~ a relationship between close contact status and the incidence of COVID-19 with ~~a p-value~~ ~~p-value~~ = 0.002. ~~PR, PR~~ value = 1.040 ~~which~~ means people with close contact status are 1.040 times more likely to get COVID-19 than people who ~~were not~~ ~~do not have close contact status.~~ (95% CI = 1.013-1.069).

**Conclusion:** Close contact status is a risk factor for COVID-19 transmission in Purwakarta Regency in 2020.

**Keywords:** COVID-19; close contact; risk factor

### INTRODUCTION

~~Coronavirus~~ ~~Corona virus~~ disease 2019 (COVID-19) is an infectious disease caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2) ~~-(1)~~. ~~Symptom~~ ~~Symptoms~~ that ~~arises~~ ~~arise~~ due to COVID-19 infection include fever, cough and shortness of breath. The average incubation period is about 5-6 days, with the ~~most prolonged~~ ~~longest~~ incubation period being 14 days (2). The emergence of this disease is marked by the emergence of extraordinary events in Wuhan, Hubei province, China. The first report received by WHO explained that the case came from Wuhan, China, with 44 patients diagnosed with severe pneumonia(3).

~~Coronavirus~~ ~~Corona virus~~ is a family of viruses that can cause mild to severe symptoms. In ~~extreme~~ ~~severe~~ cases, COVID-19 can cause pneumonia, kidney failure, acute respiratory syndrome and even death (2). Several types of ~~coronavirus~~ ~~corona virus~~ are known to have severe symptoms, namely Middle East Respiratory Syndrome (MERS) and Sever Acute Respiratory Syndrome (SARS). The problems caused by COVID-19 are not only local problems for residents of Wuhan, China. But, it is also ~~a severe~~ ~~a very serious~~ problem all over the world. This is due to an increase in cases that continue to increase every day (4). The urgency of the COVID-19 disease was marked by the WHO's ~~stated~~ of pandemic status on March 12, 2020 (1).

In 2020, there were 83,060,276 confirmed cases of COVID-19, with the death toll reaching 1,812,046 ~~worldwide~~. The increase in COVID-19 cases is relatively fast, ~~this is~~ evidenced by the spike in cases that ~~continues~~ ~~occurred from time to time~~. Based on the WHO report, the United States is one of the regions with the ~~most significant~~ ~~largest~~ number of confirmed cases, namely 20,216,991 cases with 350,778 deaths. Meanwhile, in the Asian ~~region~~ ~~country~~, the countries with the highest number of confirmed cases are India, Turkey, Iran and Indonesia ~~-(5)~~. The first 5 cases in Indonesia were confirmed on March 2, 2020. The increase in COVID-19 cases is still increasing every day ~~after that time~~. Based on a report from the Indonesian Ministry of Health, as of August 30, 2020, there were 172,053 confirmed cases with a higher mortality rate than global data, which was 4.3% or 7,343 deaths. The province with the highest ~~number of~~ confirmed cases is DKI Jakarta, with a total of 39,037 cases. Meanwhile, the province with the lowest number of cases was ~~in~~ East Nusa Tenggara, with a total of 177 cases ~~-(6)~~.

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According to the National Disaster Management Agency (BNPB), based on daily data on COVID-19 cases per province in Indonesia, it is known that the ~~five~~ ~~5~~ provinces with the highest number of cases include: DKI Jakarta, East Java, Central Java, South Sulawesi and West Java which counted up to September 5, 2020 ~~-(7)~~. The number of confirmed cases in Indonesia recorded throughout 2020 was 743,198 cases. This number continues to increase in cases every day. ~~Twenty-five provinces experienced~~ ~~There are 25 provinces that experienced~~ an increase in cases, one of which is West Java Province, with a total of 83,579 cases. Based on the national COVID-19 case fatality rate, there has also been an increase of 22,138 people who died ~~-(8)~~.

Risk factors for COVID-19 infection include comorbid conditions in patients, such as comorbid hypertension and diabetes mellitus. In addition, close contact factors, age, gender, and smoking habits also have ~~risks for their own risks for the incidence of~~ COVID-19. Close contacts are suspected ~~of~~ ~~having~~ ~~have~~ a greater ~~risk~~ ~~risk~~ of being confirmed, ~~this is~~ because exposure to confirmed cases ~~that are~~ carried out continuously for ~~a period of~~ more than 15 minutes will result in people with close contact status being more susceptible to contracting

the virus<sub>-(9)</sub>. People ~~with who have~~ a history of close contact with confirmed cases ~~are is~~ at high risk for exposure to the virus through droplet transmission. This generally occurs in cases of close household ~~contactecontacts~~. ~~DropletsWhere droplets~~ from respiratory fluids can ~~happeneoccur~~ when a person is within 1 meter of an infected person. While contact transmission that occurs indirectly can be through ~~the~~ transmission of contaminated object surfaces or is called fomite transmission<sub>-(10)</sub>.

~~TheBased on the~~ case reports ~~showreceived, it shows~~ that the confirmed cases ~~are related~~ to transmission from COVID-19 patients and generally have a history of close contact with confirmed COVID-19 patients<sub>-(11)</sub>. Transmission occurs through droplets. Thus, people who have close contact with COVID-19 patients are considered to be most at risk for contracting the SARS-CoV-2 virus. The same goes for people who care for patients, both ~~from~~ medical personnel and family members<sub>-(12)</sub>. The latest research results show that the SARS-CoV-2 virus has a transmission rate of 5% to 6% in people who have a history of close contact with patients with confirmed COVID-19. The rate of transmission is higher if close contacts are in the family environment, reaching 10%<sub>-(13)</sub>.

Commented [SS3]: apakah benar ini case report?

The urgency of this close contact is also evidenced by ~~manythe large number of~~ medical personnel who have confirmed COVID-19 ~~due to as a result of~~ close contact with confirmed patients. Medical personnel are one of the close contact groups who are at high risk of being exposed to the virus. 9% of medical personnel in Italy were exposed to COVID-19 after treating confirmed patients, ~~and as well as~~ 3,300 medical personnel in China ~~were~~ exposed to COVID-19<sub>2</sub> with a mortality rate of 0.6%. Previous research stated that 61.8% of people ~~with who had~~ a history of close contact were confirmed positive for COVID-19. So statistically, there is a significant effect between a history of close contact with confirmed cases of COVID-19 in Makassar city, where people who have close ~~contactecontacts~~ have a 6.802 times greater risk of being ~~approvedconfirmed~~ COVID-19 than people who do not have a history of close contacts<sub>-(11)</sub>.

Confirmed cases of COVID-19 in West Java continued to increase every day until December 20, 2021, there were 73,948 confirmed cases of COVID-19 with a cumulative incidence of 163.49 per 100,000 population. The number of deaths in West Java due to COVID-19 infection was 1,095 people. Based on the regional risk zoning mapping, Purwakarta Regency is included in the moderate risk zone<sub>-(8)</sub>. Purwakarta Regency is one of the regencies included in the province of West Java. During the pandemic, ~~the~~ Purwakarta district was not spared from confirmed cases of COVID-19. The first confirmed case occurred on March 15, 2020<sub>1</sub> with an increase in cases ~~occurringthat continues to occur weeklyevery week~~. However, the incidence of COVID-19 in Purwakarta Regency is quite volatile; ~~this, this~~ is because<sub>1</sub> in June 2020<sub>1</sub> Purwakarta Regency had reached zero cases which also coincided with the implementation of Large-Scale Social Restrictions (PSBB) in ~~several a number of~~ areas in Purwakarta Regency<sub>-(14)</sub>.

Based on a preliminary study, the number of confirmed COVID-19 cases in Purwakarta Regency as of December 31, 2020<sub>1</sub> was recorded as 2,451 cases, with a death toll of 95 people. Based on data obtained from the Purwakarta District Health Office, most ~~confirmed cases of the confirmed cases that occurred~~ were also caused by a history of close contact with positive patients. It is suspected that apart from the high frequency of interaction between company employees, the transmission occurred when they returned home without realizing that the COVID-19 virus had entered their bodies. So that the ~~exchangesinteractions~~ carried

out in the surrounding environment become free and uncontrolled. According to the Purwakarta District Health Office, interactions ~~that are~~ carried out continuously ~~A and for a~~ relatively long time, between confirmed patients (~~predominantly~~ especially asymptomatic), both with family members and work friends, will increase the risk of transmission of COVID-19 cases caused by a history of close contact. This causes the number of confirmed cases ~~that occur~~ due to a history of close contact with positive patients, ~~primarily~~ mostly from household and company clusters. However, some people with a history of close ~~contact~~ contacts are not always confirmed patients. This can be seen from the COVID-19 surveillance report of the Purwakarta District Health Office, that a small number of close contact cases do not necessarily become confirmed cases. ~~Considering the mentioned~~ Based on the above background, ~~this is important to see the~~ the researcher is interested in conducting research on "The Relationship ~~between~~ of Close Contact ~~contact~~ s Status with the ~~COVID-19~~ incidence of Covid-19 in Purwakarta ~~Re~~ District ~~gency~~. This study contributes to provide evidence that will assist the health authorities in developing prevention measures in 2020".

## METHOD

This research is an analytic observational with a ~~cross-sectional~~ cross-sectional research design. The data used in this study is secondary data obtained from the Health Office of Purwakarta Regency. The population in this study were residents of Purwakarta Regency who conducted screening in March–December 2020, which was recorded in the surveillance data of the Purwakarta District Health Office until December 31, 2020, with a total population of 4,986 people. The sampling technique used in this research is purposive sampling, ~~meaning~~ that the sampling is based on the ~~researcher's consideration~~ consideration of the researcher. The inclusion criteria ~~considered~~ taken into consideration in this study were residents of the Purwakarta district who screened for COVID-19 in 2020 by carrying out a PCR swab test and ~~were~~ domiciled in Purwakarta Regency for at least ~~three~~ 3 months. While the exclusion criteria for the study were residents of the Purwakarta district who screened for COVID-19 in 2020 by conducting rapid antibody and antigen tests, and case data ~~were~~ was not ~~recorded~~ entirely recorded completely in the epidemiological surveillance report of the Purwakarta District Health Office. Based on the inclusion and exclusion criteria, the number of samples obtained was 2,650 people. Data analysis in this study was carried out using the ~~chi-square~~ chi-square test.

## RESULTS

Characteristics of research respondents based on close contact showed that most of the cases of close contact belonged to the early adult age group of 28.9% and ~~the~~ male sex of 53.1% (table 1).

Table 1. Frequency Distribution of Respondents with Close Contact Status by Age and Gender in Purwakarta Regency in 2020.

Characteristics	Close contact status			
	Yes		No	
	n	%	n	%

Age				
a. Toddler	33	1,8	14	1,7
b. Children	33	1,8	13	1,6
c. Early teenager	45	2,5	12	1,5
d. Late teenager	227	12,4	108	13,3
e. Early adult	531	28,9	179	22,0
f. Late adult	430	23,4	136	16,7
g. Early elderly	326	17,8	165	20,2
h. Late elderly	167	9,1	114	14,0
i. Elderly	43	2,3	74	9,1
Gender				
a. Male	974	53,1	412	50,6
b. Female	861	46,9	403	49,4
Total	1835	100	815	100

Commented [SS4]: disini juga tambahkan usia

The description of respondents based on the confirmed status of COVID-19 ~~shows, it is known~~ that most of the confirmed cases of COVID-19 also belong to the early adult age group of 27.0% and ~~males~~ male at 52.7% (table 2).

Table 2. Frequency distribution of respondents with confirmed COVID-19 status by age and gender in Purwakarta Regency in 2020

Characteristics	COVID-19 confirmation status			
	Yes		No	
	n	%	n	%
Age				
a. Toddler	39	1,6	8	3,6
b. Children	39	1,6	7	3,2
c. Early teenager	53	2,2	4	1,8
d. Late teenager	302	12,4	33	15,0
e. Early adult	657	27,0	53	24,1
f. Late adult	519	21,4	47	21,4
g. Early elderly	449	18,5	42	19,1
h. Late elderly	260	10,7	21	9,5
i. Elderly	112	4,6	5	2,3
Gender				
a. Male	1280	52,7	106	48,2
a. Female	1150	47,3	114	51,8
Total	2430	100	220	100

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The contact status variable was closely related to the incidence of COVID-19 with a value of sig = 0.002. The Prevalence Ratio (PR) = 1.040 (95% CI = 1.013-1.069), which means that people with close contact status have a 1.040 times greater risk of contracting COVID-19 than people without close contact status (table 3).

Table 3. The results of the bivariate test of the relationship between close contact status and the incidence of COVID-19 in Purwakarta Regency in 2020.

Close contact status	Status of Covid-19				Total	sig	PR (C1 95%)	
	Yes		No					
	n	%	n	%				
Yes	1704	70,1	132	69,2	1835	100	0,002	1,040

No	727	29,9	88	30,8	815	100	(1,013-1,069)
Total	2430	100	220	100	2650	100	

## DISCUSSION

The relationship between close contact and the incidence of COVID-19 in Purwakarta Regency is influenced by the lack of public awareness in implementing health protocols, especially keeping a distance from each other. Moreover, the spread of the COVID-19 virus is generally transmitted directly through droplets. Therefore, ~~that~~ the lack of public awareness in maintaining distance and implementing health protocols will increase the risk of being exposed to COVID-19; ~~public~~ Public awareness of ~~preserving~~ maintaining distance and implementing health protocols is the ~~primary~~ main key ~~to~~ breaking the chain of transmission of COVID-19, especially COVID-19 can be transmitted through close contact and droplets. So ~~that~~ people who are vulnerable to infection are those who have close contact with COVID-19 patients.(15) The low level of public awareness in accessing health services will also exacerbate the situation, causing a high number of COVID-19 cases.(16)

~~The transmission~~ Transmission of COVID-19 is transmitted from human to human who ~~has~~ have close relationships with family members, friends, relatives or direct contact with patients who are confirmed to be COVID-19.(17) Especially for those in close contact with confirmed cases. So that this can increase the risk of transmitting COVID-19 in the community; ~~this~~ This is confirmed by the WHO statement, which states that the transmission of the SARS-CoV-2 virus occurs through droplets and close contact with asymptomatic infected cases.(10)

The main transmission or transmission occurs through droplets originating from the respiratory tract. In addition, ~~the~~ transmission also occurs due to close contact with COVID-19 sufferers. Thus, people with a history of close contact have a high risk of ~~exposure~~ being exposed to the SARS-CoV-2 virus.(18) People who are most at risk of contracting COVID-19 are people who have close contact with COVID-19 patients, including those who care for patients.(19)

In the process of direct close contact, indicating that a healthy person accidentally touched a person infected with the SARS-CoV-2 virus, or the person touched the surface of an object that ~~a person connected~~ was touched by a person with confirmed COVID-19 (~~vomit~~ fomite transmission). In general, the surface of these objects has been contaminated with droplets containing the SARS-CoV-2 virus from COVID-19 patients. The virus can remain stable for a certain ~~period~~ period of time. Therefore, it can support the entry of the virus into the body of healthy people, and the infection process will continue.(20)

Based on the ~~study results~~ results of the study, it was also known that most of the confirmed cases of COVID-19 in Purwakarta Regency came from clusters of households and companies. ~~Households~~ households account for the ~~most significant~~ largest proportion of the risk of exposure to COVID-19. The ~~analysis results~~ results of the analysis carried out in China also found that 78-85% of the clusters occurred within the scope of the household. This proves that the transmission occurred in long close contact.(21) Confirmation cases originating from the company cluster occurred due to close contact with the same activity in a closed room for an hour or more with confirmation cases, so this can pose a high risk for ~~the~~ infected.(10) 70% of the cases identified were from close household contacts. Close household contact is also



considered ~~to be~~ one of the most dangerous ~~contacts~~. (22) This is due to the relatively small scope of the household, which allows ~~high-speed~~~~very fast~~ person-to-person transmission.

In addition, most of the confirmed cases in Purwakarta Regency are asymptomatic cases. Therefore, it is more difficult to do early detection. ~~Of the~~~~The~~ proportion of close contacts diagnosed with COVID-19 ~~of~~, 44.2% were asymptomatic ~~group~~. This is considered more worrying, because the risk of transmitting the virus to others is higher and uncontrollable. According to WHO, the level of asymptomatic infection ~~that occurs~~ in the community is still ~~uncertain~~~~not known with certainty~~. The proportion of asymptomatic cases may vary according to age and the presence of coexisting conditions. (22) However, efforts made to trace contacts and epidemiological investigations of cases and close contacts can provide information for disease management planning. Information obtained from contact tracing efforts indicates that asymptomatic people are less likely to transmit the virus than symptomatic people. (10)

Based on the ~~study's results~~~~results of the study~~, confirmed asymptomatic/asymptomatic patients are recommended to self-isolate at home. On the other hand, the implementation of self-isolation for exposed family members ~~actually~~ allows for a much greater exposure and risk for other family members, which causes close contact status, especially for families who have not been able to provide a ~~particular~~~~special~~ room for patients to isolate properly. ~~A large number of household clusters in the Purwakarta district evidences~~~~thieving~~~~This is evidenced by the large number of household clusters in Purwakarta district.~~ ~~people living~~ with confirmed patients have a higher risk of infection than ~~those~~~~other people~~ who do not live in the same environment as confirmed patients. The SARS-CoV-2 virus is more likely to be transmitted between household members through droplets or direct contact with surfaces contaminated with the virus. (21)

Based on the ~~study's results~~~~results of the study~~, it is also known that ~~most~~~~the majority of~~ confirmed, and close contact cases in Purwakarta Regency are dominated by early adulthood. According to the Health Office of Purwakarta Regency, this is most likely caused by transmission due to close contact in the work environment. Exposure to viruses in the workplace can occur anytime and anywhere, whether on business trips or while working in a room. Close contact in the work environment is related to age and can be exacerbated by ~~the presence of~~ comorbid diseases in patients. According to WHO, the risk of occupational exposure to COVID-19 depends on the likelihood of close contact (distance between people of less than 1 meter) or ~~on~~ the frequency of contact with an infected person. Transmission can also occur through contact with surfaces contaminated with the SARS-CoV-2 virus. (23) Respiratory tract secretions released from infected persons can contaminate objects in the surrounding environment, causing the formation of fomites (contaminated surfaces). People who come into contact with contaminated surfaces often have close contact with infectious people, so ~~that~~ droplet ~~transmission~~ and fomite transmission are difficult to distinguish. (10)

The importance of making efforts to slow the spread of the COVID-19 virus can be done by complying with existing health protocols as a preventive measure in the spread of COVID-19. Efforts that ~~all parties can take~~~~can be taken by all parties~~ include social distancing, using masks ~~when~~ outside the home, washing hands with soap, and immediately cleaning up after activities outside the home. (24) Social distancing has ~~a vital~~~~an important~~ role in efforts to minimize interactions and crowds with many people. Social distancing is also one way to prevent the spread of the SARS-CoV-2 virus in a social group. This is because social distancing ~~behaviour~~~~behavior~~ will limit the reproduction rate in the ~~spaces~~~~spread~~ of the virus

among communities. In maintaining social distancing, people are strongly advised to postpone/avoid ~~travelling~~traveling to densely populated areas because they have a high risk of exposure.(20)

Another thing that can be done is a regional quarantine, ~~also which is also~~ stated in the health emergency regulations. Regional quarantine is a restriction on the population in an area, including the entrance area and its contents suspected of being infected with a disease, ~~to in~~ ~~order to~~ prevent the possibility of a more massive spread of COVID-19.(19)

## CONCLUSION

Based on the results and the discussion, it can be concluded that close contact is associated with COVID-19 and is a risk factor. Success in controlling COVID-19 requires cross-sectoral collaboration in monitoring and supervising the implementation of health protocols in public places, particularly the application of social and physical distancing. In addition, the public is expected to ~~be aware of applying~~have awareness to apply health protocols ~~correctly~~properly, especially in implementing the 3M program (washing hands with soap, using masks and maintaining distance) as one of the efforts to prevent the transmission of COVID-19.

## Authors' contribution

~~The first~~First and second ~~authors~~author contributed to ~~the~~ research design, data collection, analysis and manuscript.

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## Conflict of interest

There is no conflict of interest in this research.

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