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COVID-19 Cases and Factors Associated with 11 Indonesian Provinces, 2021

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ABSTRACT

In collaboration with other stakeholders, National Task Force of COVID-19 Control conducted massive detection of the cases, followed by contact tracing. The study aimed to overview COVID-19 cases from 58 districts of 11 provinces in Indonesia and its associated factors. A cross-sectional study design used secondary data from The National Task Force of COVID-19 Control. COVID-19 cases and other variables were collected in 58 districts in 11 provinces of Indonesia year 2021. The study incorporated descriptive, correlation, and multiple linear regression analysis with the district as an analysis unit. The median of COVID-19 cases was 804 per district, traced cases were 70.6% of cases, cases had contact was 2.6% of cases, close contact was 2,188, the ratio of close contact: cases were 2.75, isolation drop out was 8, quarantine drop out was 9, test for close contact was 962, COVID-19 vaccine dose 1 was 147, dose 2 was 205, and no vaccine was 354. Factors significantly correlated with COVID-19 cases were cases traced, cases have epicontact, close contact, and ratio close contact. In multivariate analysis, the percentage of traced cases, cases had epicontact, isolation drop out, COVID-19 vaccine dose-1, and no COVID-19 vaccine associated with COVID-19 cases. Identifying factors related to the incidence of COVID-19 can be used to increase efforts to prevent and control COVID-19 cases in the community as a response to alertness to the emergence of new cases due to new variation mutations.

INTRODUCTION

Coronavirus Disease-19 (COVID-19) is still transmitted in Indonesia since it declared as public health emergency in 2020. By 24 July 2022, there were 6,168,342 cases and 156,902 deaths (Case Fatality Rate/CFR 2.54%), and in the last week, the positivity rate was 9.1%.[1] To prevent and control COVID-19 spread, the Government of Indonesia established the National Task Force of COVID-19 Prevention and Control, stated in Presidential Decree No. 7/2020. The task force had function of coordinating the efforts of COVID-19 prevention and control among all stakeholders.[2]

The Ministry of Health has also issued guidance for COVID-19 prevention and control based on the WHO Interim guideline. The prevention and control including promotion and risk communication, vaccination, case detection, epidemiological investigation, contact tracing, isolation and quarantine, and treatment.[3] These efforts involved the health sector and other sectors, including army, police, and Ministry of Internal Affairs. There are several key efforts to prevent and control the transmission of COVID-19, including contact tracing management. This effort followed by monitoring, quarantine/isolation, and investigation.[4]

The National Task Force of COVID-19 Control, in collaboration with other stakeholders, conducted massive detection of the cases followed by contact tracing. In 2021, these activities were conducted in 58 districts of 11 provinces in Indonesia, namely Jakarta, East Java, West Java, Central Java, Jogjakarta, Banten, Bali, North Sumatera, Jambi, South Kalimantan, and Papua. The tracing was involved Village Post of COVID-19 control which incorporated 1,383 villages and 2,119 tracers. These activities could reduce the number of cases in 5 months from August to December 2021.

Based on the massive tracing, there were several lessons learned that can be taken to understand what determinants are associated with COVID-19 cases. In line with indicators of COVID-19 control, several factors may contribute to the cases, such as cases that can be traced for close contact, case with epicontact, close contact, quarantine, isolation, and vaccination.[3,5] These association may be used as a source of information to develop appropriate program to decrease COVID-19 cases in the future. As an emerging disease, information regarding an overview of COVID-19 instances is vital to know in order to create suitable preventative and control methods for related diseases.

Several studies revealed that tracing could reduce COVID-19 but not halt it under slower, less effective tracing conditions.[6] A study in the US, COVID-19 is disseminated by close contact and communal exposure.[7] The transmission dynamics close contacts are at an increased risk of getting the COVID-19 infection in the household.[8] Another study showed quarantine interventions can help limit the spread of COVID-19, likely to stop outbreaks in the general population.[9] Meanwhile, a study US showed that vaccination is substantially effective in reducing the risk of COVID-19.[10–16]

There is limited research on COVID-19 cases using a big number of cases as well as limited understanding of factors associated with COVID-19 in Indonesia. Thus, we conducted this study to overview COVID-19 cases from 58 districts of 11 provinces in Indonesia and its associated factors.

MATERIAL AND METHOD

This was a cross-sectional study conducted in March - July 2022. Population of the study was all COVID-19 cases in August-December 2021 from 58 districts of 11 provinces in Indonesia recorded in National Task Force of COVID-19 Control. A total of 103,399 became sample of the study which had completed data for all variables (total sampling). The study used secondary data from National Task Force of COVID-19 Control. Variables included in the study were dependent variable (COVID-19 cases) and 12 independent variables which consisted of traced cases, percentage of traced cases, cases have epicontact, percentage of cases have epicontact, close contact, ratio close contact: cases, isolation dropout, quarantine drop out, testing for close contact, COVID-19 vaccine dose 1, COVID-19 vaccine dose 2, and no COVID-19 vaccine.

This study involved descriptive, correlation, and multiple linear regression analysis. Multiple Linear regression was performed through bivariate selection, multivariate modelling, and the development of final model.[17] Final model had complied with all assumptions of multiple linear regression namely existence, independence, linearity, homoscedasticity, normality,

and collinearity.[17,18] The steps of the study consisted of preparation, data collection, data analysis, and paper writing.

RESULTS

COVID-19 cases gradually decreased from 26,080 in week 32 to be 78 cases in week 53 (August – December 2021). A total of 103,399 cases was reported in this period (Figure 1). The biggest cases of this study were 18,608 (18.00%), in Bali province, and the lowest was in Papua, for 292 cases (0,28%) (Table 1).

Figure 2 shows the distribution of cases by district which the highest number was in Bantul regency, Jogjakarta (9171 cases) and the lowest in Rembang Regency, Central java (23 cases).

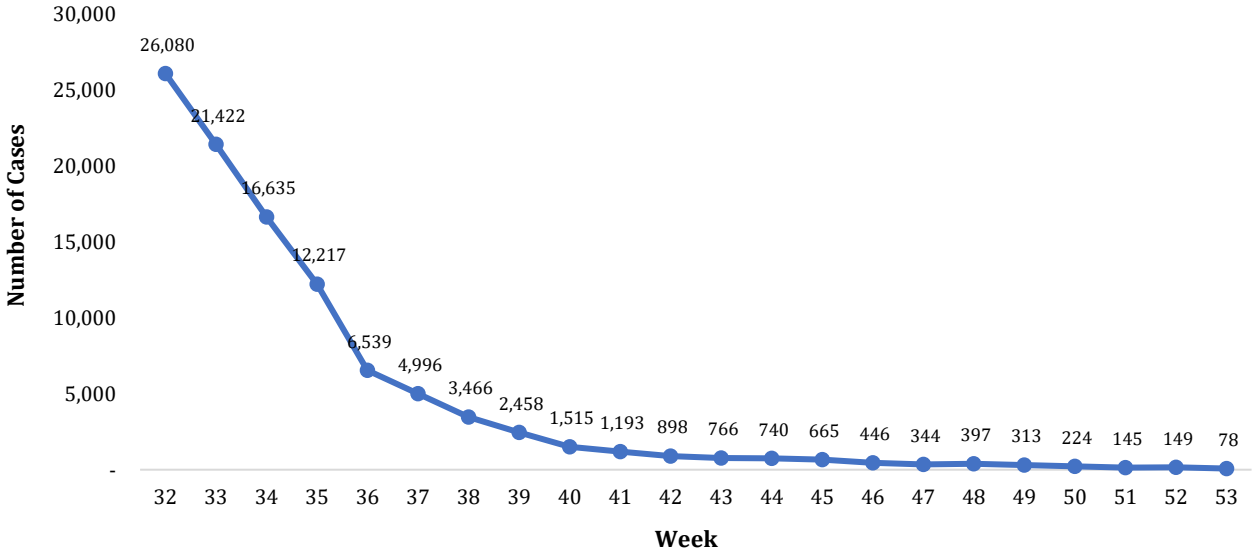
Average (median) of COVID-19 cases was 804 per district, cases traced close contact was 504 or 70.61% from cases, cases had epicontact was 210 or 32.63%, close contact was 2,188, ratio close contact: cases was 2.75, isolation drop out was 8, quarantine drop out was 9, test for close contact was 962, COVID-19 vaccine dose 1 was 147, dose 2 was 205, and no vaccine was 354 (Table 2).

Table 3 shows factors that significantly associated with COVID-19 cases in bivariate analysis were cases traced, cases have epicontact, close contact, ratio close contact: cases, isolation drop out, quarantine drop out, testing for close, vaccine dose-1, vaccine dose-2, no vaccine. Meanwhile, percentage of cases traced close contact and percentage of cases with epicontact were not associated with COVID-19 cases.

Table 1. Distribution of Covid-19 Cases by Province

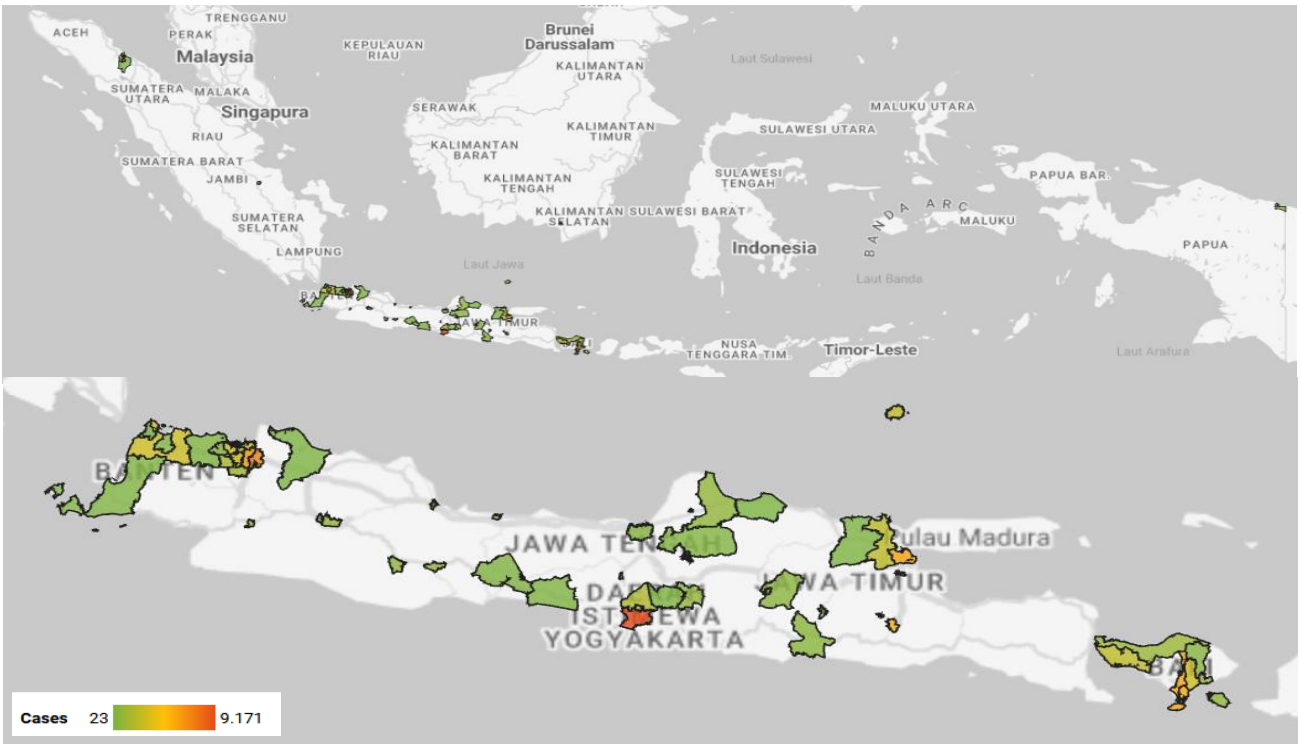
Province	Number of District Selected n = 58	Number of Cases n = 103,399	Cases (%)
North Sumatera	2	9,161	8.86
Jambi	1	3,373	3.26
Banten	7	5,625	5.44
Jakarta	5	15,756	15.24
West Java	8	12,284	11.88
Central Java	12	3,578	3.46
Jogjakarta	3	12,545	12.13
East Java	10	17,216	16.65
Bali	7	18,608	18.00
South Kalimantan	2	4,961	4.80
Papua	1	292	0.28

Source: National Task Force of COVID-19 Control, 2021



Source: National Task Force of COVID-19 Control, 2021

Figure 1. Covid-19 Cases in 58 Districts of 11 Provinces in Indonesia, Week 32-53 2021



Note: Indicates Smaller Number of Cases Means Bigger Number of Cases

Source: National Task Force of COVID-19 Control, 2021

Figure 2. Distribution of COVID-19 Cases by Districts

Table 2. Distribution of Covid-19 Cases and Selected Factors in 58 Districts, 2021

Variable	Median	Min	Max	SD	Range	Sum
Covid-19 Cases	804	23	9,171	2,262	9148	103,399
Traced Cases	504	24	9,057	1,733	9033	71,915
% Traced Cases	70.61	3.6	100	40.9	-	-
Cases Have Epicontact	210	4	3,949	865	3945	34,432
% Cases Have Epicontact	32.63	2.16	100	23.1	-	-
Close Contact	2,188	79	44,417	7,482	44,338	294,819
Ratio Close Contact: Cases	2.75	0	16.6	3.18	16.6	-
Isolation Drop Out	8.5	0	1,332	219	1332	4383
Quarantine Drop Out	9.0	0	1,787	344	1787	8028
Testing For Close Contact	962	0	25,412	3,667	25,412	117,142
COVID-19 Vaccine Dose 1	148	0	4,124	1,102	4124	39,722
COVID-19 Vaccine Dose 2	206	0	4,759	1,133	4759	40,747
No Vaccine	355	0	4,739	1,068	4739	43,656

Source: National Task Force of COVID-19 Control, 2021

Multivariate analysis (Multiple linear regression) result shows that in the final model, there were five variables remained associated with COVID-19 cases (p=0.000; R^2=0.896), namely percentage of traced cases (p=0,030; B= -6.926), cases had epicontact (p=0,000; B= 1.362), isolation drop out (p=0,003; B=2.644), COVID-19 vaccine dose-1 (p=0,024; B=0.380), and No COVID-19 vaccine (p=0,005; B=0.598). Meanwhile, there were three variables became confounders, consisted of close contact (p=0,160; B=-0.052), ratio of close contact: cases (p=0,405; B=-34.825), quarantine drop out (p =0,649; B=0.226) (Table 4).

Table 3. Correlation Between Selected Factors to COVID-19 Cases

Variable	*p*-value	r
Traced Cases	0.000	0.940
% Traced Cases	0.078	-0.233
Cases Have Epicontact	0.000	0.905
% Cases With Epicontact	0.545	-0.081
Close Contact	0.000	0.832
Ratio Close Contact: Cases	0.034	-0.278
Isolation Drop Out	0.000	0.679
Quarantine Drop	0.000	0.639
Testing For Close Contact	0.000	0.718
COVID-19 Vaccine Dose 1	0.000	0.721
COVID-19 Vaccine Dose 2	0.000	0.747
No Vaccine	0.000	0.825

Source: National Task Force of COVID-19 Control, 2021

Table 4. Predictors of COVID-19 Cases Based on Multivariate Linear Regression Modeling

Variable	B	*p value*	R^2
Constant	959.7	0.001	0.896
% Traced Cases	-6.926	0.030	
Cases Had Epicontact	1.362	0.000	
Close Contact	-0.052	0.160	
Ratio Close Contact: Cases	- 34.825	0.405	
Isolation Drop Out	2.644	0.003	
Quarantine Drop	0.226	0.649	
COVID-19 Vaccine Dose 1	0.380	0.024	
No COVID-19 Vaccine	0.598	0.005	

Source: National Task Force of COVID-19 Control, 2021

DISCUSSION

These study findings showed that, on average, there were 804 cases in each district with more than 103,000 total cases, or there were 2 cases a day in one district and 686 cases a day in all 58 districts. This number indicates that the transmission is still there and needs the effort of prevention and control. The central government must take over the handling of Covid-19 cases by involving local governments by forming a task force.[19] COVID-19 is one epidemic disease to be prevented and managed by national and local governments in Indonesia.[20] The government created a COVID-19 pandemic working group to successfully regulate and prevent the epidemic, as the Chinese government has done.[21] The working group then constructed a fever clinic and named a medical facility to oversee and treat COVID-19 patients. To support ongoing research projects and meet the objectives of limiting and preventing COVID-19 infections, this Working Group was created in a hurry. This working group executes the central government's directive and modifies it for local conditions by creating health policies and infection control-related actions. Additionally, this working group improves departmental communication and informs pertinent departments of the COVID-19 infection rate.

There are still people that leave isolation and quarantine, which are things that could cause more transmission. Suggests that cooperation between relevant stakeholders needs to be improved to guarantee that close contacts are quarantined for the proper amount of time and that cases are isolated more effectively. A Chinese study discovered that suspected and quarantined cases are the main factors driving epidemic developments. The total number of isolated and suspected cases has reached the forecasted peak, but the epidemic's inflection points have already been reached.[22] Report on a survey done by the UK's Office of National Statistics, which comprised observations of 895 people who had to isolate themselves after testing positive for COVID-19 between November 29 and December 4, 2021. Demonstrates that around three-quarters (74%) of people fully adhered to the rules throughout the self-isolation period, which is the same percentage as that reported in July (79%), September (78%), and November 2021 (75%). However, one in four people (25%) admitted to having done at least one activity during self-isolation that violated the rules, such as receiving guests and leaving the house.[23]

In term of close contact, there was 2,188 close contact in each district with a ratio to cases was 2.75 on average. This is a quite big number of close contact but the ratio is still low. This indicates that the number of closes contact should be increased to decrease the possibility of disease transmission. Tracers should optimize the effort of contact tracing collaborated with other parties, such as the head of the village, police, and Public Health Centers. Another finding showed that there were a number of cases that have not been vaccinated, indicating that vaccination should be scaled up to get her immunity. Moreover, not all cases had been traced for close contact (70%), and none had

epicontact (32%). This indicates contact tracing, again. Should be strengthened to get close contact with as many as possible. In addition, close contact tracing should also be carried out in correctional institutions. Although according to a study, the implementation of COVID-19 prevention in prisons was carried out well in most prisons in Indonesia.[24]

Contact tracing is a critical method to stop the spread of COVID-19. The endeavor to find close contacts is by the interim WHO guidelines and Ministry of Health recommendations on COVID-19 prevention and control.[4] Four indicators of contact tracing may include contact tracing processes that connect contacts to already-existing community resources to support quarantine, track or trace technology app uptake via the proportion of contact tracing-related apps, and the percentage of trained contact tracers.[25] The scope of indicators may be increased to include data on the population's adoption and use of digital proximity tracing, its ability to identify contacts at risk for infection, and the speed at which digital proximity tracing solutions can notify contacts in comparison to traditional contact tracing mechanisms, and the obstacles to and factors that support the use of digital proximity tracing methods.[26]

Several factors correlate with COVID-19 cases, namely the number of cases traced, cases with epicontacts, close contact, isolation drop out, quarantine drops out, close contact test, vaccine dose-1, vaccine dose-2, no vaccine, and close ratio contact: cases. In multivariate analysis, five factors were significantly associated with COVID-19 cases, namely percentage of traced cases, cases with epicontact, isolation drop out, COVID-19 vaccine dose-1, and No COVID-19 vaccine. A review study describes the evolving role of testing during the COVID-19 pandemic. Includes using genomic monitoring to monitor SARS-CoV-2 transmission globally, contact tracing to control disease outbreaks, and testing for the virus's presence in the environment. Although these initiatives, broad community transmission has established itself in many nations, necessitating population testing to detect and isolate infected people, many of whom are asymptomatic.[27]

According to systematic review research, contact tracing could either end an outbreak or reduce illnesses (by, for example, 24% to 71% using a mobile tracing app) under the assumptions of rapid and complete tracking with no additional transmission. Modeling studies revealed that tracing could reduce COVID-19 but not halt it under slower, less effective tracing conditions.[6] According to a US study, COVID-19 is disseminated by close contact and communal exposure. Being near people who have known COVID-19 or visiting places with on-site food and beverage options were linked to COVID-19 positive.[7] According to a study conducted in China, home interactions posed the most significant risk of contracting COVID-19, with an incidence rate of 10.2%. The incidence of COVID-19 increased along with the aging of close contacts and the severity of the source cases.[28]

Health quarantine of close contacts should be conducted as tight as possible, to decrease the risk of transmission. According to numerical simulations, a dynamic analysis of the model reveals that improved quarantine interventions can help limit the spread of COVID-19, likely to stop outbreaks in the general population.[9] According to a study conducted in India, just 7.43% of children and adolescents complied with all standards, though community protective measures were more frequently followed (17.35%) than household protective measures (10.71%).[29] The place of quarantine may be considered as comfortable as has possible. A study shows that the place had an influence on the quarantine period for nurses exposed to Covid-19.[30] Health quarantine to prevent epidemic is a way to avoid the epidemic prone disease spread. Despite the scant data, quarantine was proven to be crucial in lowering the number of infections and fatalities. Quarantine was most efficient and affordable when it started sooner. However, quarantine alone might not be as effective as quarantine combined with other prevention and control techniques.[31]

The vaccine of COVID-19 as a new vaccination program is an effort to increase immunity against the virus. Several studies in the United States have reported that vaccination is substantially effective in reducing the risk of COVID-19 and is associated with a substantial reduction in hospitalizations, risk of severity/crisis, and COVID-19-related mortal-

ity.[10–16] Vaccination has been linked to decreased non-COVID-19 mortality rates and direct decreases in COVID-19-related morbidity and mortality, proving that doing so does not raise the risk of death.[32] However, several strategies have been used to boost vaccination rates, including broadening the target population and making vaccines more accessible. Although many strategies have been used to boost vaccination rates, such as broadening the target population and making vaccinations more accessible,[33] vaccine hesitancy and rejection require other approaches. Many psychological factors cause vaccine rejection and doubt, such as personality traits,[34] doubts about halal vaccines (religion rules),[35] lack of public trust in health professionals, scientists, and the government, and cognitive reflection.[36,37] The central, provincial, and district/city governments provide guidance and supervision on implementing the COVID-19 Vaccination Technical Guidelines. Despite vaccination, it must maintain public health mitigation efforts: distancing, masks, avoiding indoor congregation, and prioritizing good air ventilation. [38]

CONCLUSION AND RECOMMENDATION

Percentage of traced cases, cases had epicontact, isolation drop out, COVID-19 vaccine dose-1, and no COVID-19 vaccine were significantly associated with COVID-19 cases. Identifying factors related to the incidence of COVID-19 when cases tend to decline is very important to increase efforts to prevent and control COVID-19 cases in the community as a response to the alertness of new cases due to the emergence of new variants. It can also be used to guide the implementation of public health intervention measures aimed at limiting the impact of the pandemic, particularly on vulnerable populations.

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AUTHOR CONTRIBUTIONS

MW drafted this paper with contributions from all authors. MW, WR, DL contributed in data acquisition. MW, WR, and DL contributed to data extraction and analysis. AK and YFW contributed in proofreading. All authors reviewed the findings or contributed to the interpretation and discussion. All authors agreed with the final version of the paper. MW = Mugi Wawan; WR = Wawan Ridwan; DL = Doni Lasut; AK = Aan Kurniawan; YFW = Yurika Fauzia Wardhani.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

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