

ORIGINAL RESEARCH

The risk of COVID-19 transmission in a university setting: Undergraduate students' perceptions.

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Abstract

The Covid-19 pandemic that occurred in various parts of the world has caused changes in the order of life. The purpose of this study is to examine students' perceptions regarding the potential transmission of Covid-19 in a university setting. **Methods:** This study is an online survey study with a cross-sectional design. The population of this study is all students domiciled in Medan, Province of North Sumatra, Indonesia. Next, the sample of respondents stratified according to age, gender, and kind of university. The research employed multivariate analysis (Multiple Logistic Regression). **Results:** Female students are more inclined to believe that Covid-19 cases can spread through activity (P-Value; 0.044 (<0.05), AOR; 0.916, 95% CI: 0.451-1.860). Most respondents enthusiastically supported establishing health protocols on campus. In comparison to students who are confident about implementing health protocols, those who are unsure about compliance may be three times less prepared to begin activities at the university.

Keywords: University, Covid-19, Student Perception, Transmission.

Introduction

The world is currently facing a threat in the form of a Covid-19 (Coronavirus) pandemic. The Covid-19 pandemic is known to have spread for the first time in the city of Wuhan, China (1). Following that, on January 3rd, 2020, it became known to the public and spread around the world. The Covid-19 virus infects humans and other

animals (2). Based on data from the WHO at the end of September 2021, there were 33,441,919 cases and 1,003,497 deaths due to Covid-19 (3).

Indonesia is one of the countries affected by this epidemic. In Indonesia alone there are 282,724 cases, with a death rate of 10,601 (3). Social distancing is an effective way to stop the Covid-19 virus from spreading. The very large - and growing - number of daily cases has prompted the Indonesian government to issue policies that aim to reduce the spread of the Covid-19 virus (4). To stop the spread of the virus, there is a need for government action, as well as widespread public knowledge that includes university students.

The irruption of Covid-19 in the higher education system (5) was reported in March 2020, when schools and universities were closed for education activities (6). The study in Japan found that there were nine Covid-19 cases reported among university students, which were infected during extracurricular activities and then quarantined for 14 days exposure (7). A study in Thailand also reported that 12 students (1,45%) were detected as Covid-19 cases (8). Covid-19 transmission might be related to university activities, including teaching, lab-based research, examinations, sports, recreational and conference activities (9). To anticipate the spread of the COVID-19 virus, the Indonesian government issued a policy to postpone and cancel university activities temporarily (10).

There is no denying that the Covid-19 pandemic has had a significant impact on daily activities, especially educational activities. In facing the current “new normal” era, both schools and universities must meet the requirements and checklists determined by the Ministry of Education and Culture. The colleges that have passed the standards and can enforce health protocols rigidly have the authorization to implement face-to-face learning. The checklist includes the availability of sanitation and hygiene facilities such as handwashing facilities and hand sanitizers, access to health services, and readiness to apply the mandatory use of masks (11).

One variation of this protocol calls for maintaining hygiene and avoiding close contact with those who have the virus (12), as well as using a protective face mask when traveling or being outside the home (13). Furthermore, maintaining cleanliness by washing hands or using

a hand sanitizer is stressed (14). One last requirement involves maintaining a 1-meter distance and using your arm to cover your mouth when you cough or sneeze (15). Almost all participants (95.4%) thought that covering their mouths when coughing and sneezing was important (16). This is because the spread of the Corona virus can occur through direct contact, inhalation, and droplets (16).

While high numbers of Covid-19 cases have been reported, a limited number of studies assess students’ perceptions of Covid-19 transmission in university settings. A previous study found that the low acceptance of the Covid-19 vaccine among students might exacerbate and trigger Covid-19 transmission in the university (17). This study examines how students perceive the potential for Covid-19 transmission within university activities, with the aim of interrupt Covid-19 transmission in university settings.

Method

Study setting

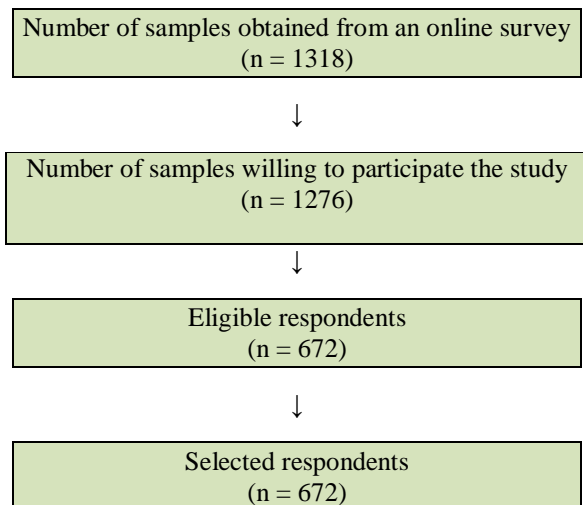
This cross-sectional study was designed to assess university students’ perceptions about Covid-19 transmission in university settings. The study setting were the universities at Medan, The Province of North Sumatera, Indonesia. Medan city had the highest number of universities in the Province of North Sumatera, Indonesia (219 universities - including private and public universities - with 282.211 students and 10.745 academic staff (18)). The study was conducted between August and December of 2020, a period in the middle of the Covid-19 pandemic in which movement restrictions had been implemented in the university.

Population and sample

The population of this research is all students who study in the universities of Medan, Province of North Sumatera, Indonesia. The inclusion criteria of the sample is that the students live in the study location and are willing to respond to the questionnaire. The minimum sample size, calculated with one proportion sample size formulation with a 1.96 confidence interval and precision of 5%, was 610 respondents. A total of 1318 responses were received for this

survey. We excluded samples when the sample either wasn't living in the study location, declined to participate, or when missing information during filling the online questionnaire (figure 1).

Figure 1. Data procedure



Data Collection (*Data collection*)

This study used the snowball sampling technique. Data was collected through an online questionnaire which was distributed among undergraduate students through social media. Respondents can only fill out the online questionnaire once and the respondents agreed to fill out the form by filling out the approval menu.

The questionnaire consists of 4 sections. The first section covered the respondents' sociodemographic characteristics, such as age, sex, religion, and university type. The second section was focused on student perceptions of potential places for Covid-19 transmission in the universities, including classes, research activities, thesis consulting, extracurricular activities, and other activities inside of universities. The third section consisted of student perceptions on the obedience of health protocols within university activities, and student perceptions on obedience to Covid-19 health protocols. The last section had to do with the student perceptions of universities' readiness to re-open.

Data analysis (*Data analysis*)

Simple logistic regression was used to analyze the data. with the goal of determining the link between the two variables that are indicated by the odds ratio value. This study obtained ethical approval from the Faculty of Medicine, University Islam Sumatera Utara with reference #262/EC/KEPK.UISU

Results

This study involved as many as 672 respondents. In this study, women under the age of twenty make up the majority (404 samples, 83.1%) of respondents. (Table 1). Among the groups that were not sure, very unsure, sure, and very sure based on gender, no difference was found between genders regarding beliefs around adherence to the implementation of health protocols at the institution.

The study found that students perceive a strong potential for COVID-19 to be transmitted in university settings (table 2). Female students are more prone to believe that cases of COVID-19 can spread easily among students, instructors, and other supporting personnel. The perception of female students is that organizational activities, group learning, classroom learning, and thesis supervision are contagious, whereas male students' activity indicators on campus do not guarantee that transmission will happen.

Table 3 demonstrates that health protocols need to be applied in places of study, lecturer rooms, organizations, places of worship, and other public facilities on campus. Most respondents, both male and female, strongly agreed on the importance of implementing health protocols on campus.

Table 4 shows that there is a potential violation of health protocols in some academic and non-academic activities within the university. Most respondents thought that significant places, like lecturers' offices for the completion of final tasks and places of worship, where there is a chance for face-to-face activities to take place, were potential hotspots for health protocol violations, and perceived universities' lack of readiness to implement the protocols.

Table 1. Demographic Characteristics of Respondents who filled out the online survey

Variables	Male		Female		P Value	OR (95%CI)
	N	%	N	%		
Age						
< 20 Year	82	16.9	404	83.1	0.000	0.336 (0.230-0.492)
> 20 Year	70	37.6	116	62.4		
Religion						
Muslim	141	22.2	494	77.8	1	Ref
Christian	10	31.3	22	68.8	1.000	0
Catholic	1	25.0	3	75.0	1	0
Buddhist	0	0.0	1	100.0	1	0
University Type						
Public	92	19,2	388	80,8	0,001	0,522 (0.357-0,763)
Private	60	31,3	132	68,8		
Hand Washing Compliance						
Very Unsure	5	21,7	18	78,3	1	Ref
Not Sure	46	19,5	190	80,5	0.224	0.312(0.048-2.043)
Sure	81	24,3	253	75,7	0,924	1,026 (0,601-1.753)
Very Sure	20	25,3	59	74,7	0,850	0,932 (0,448-1.939)
Compliance With Wearing a Mask						
Very Unsure	6	40,0	9	60,0	1	Ref
Not Sure	46	21,1	172	78,9	0,607	1,776 (0,199-15,852)
Sure	78	22,7	266	77,3	0,336	1,405 (0,703-2,801)
Very Sure	22	23,2	73	76,8	0,301	2,038 (1,068-3,890)
Obedience Keep Distance						
Very Unsure	21	22,8	71	77,2	1	Ref
Not Sure	70	19,2	294	80,8	0,903	0,931 (0,298-2,912)
Sure	53	28,2	135	71,8	0,139	1,732 (0,837-3,456)
Very Sure	8	28,6	20	71,8	0428	0,502 (0,091-2,758)
Obedience Avoid Crowd						
Very Unsure	17	20,5	66	79,5	1	Ref
Not Sure	74	20,5	287	79,5	0,939	1,051 (0,293-3,775)
Sure	53	26,6	146	73,4	0,591	0,820 (0,397-1,693)
Very Sure	8	1,2	21	3,1	0,739	1,311 (0,267-6,435)
Sneeze Etiquette Compliance						
Very Unsure	4	26,7	11	73,3	1	Ref
Not Sure	42	17,4	200	82,6	0,827	0,821 (0,140-4,812)
Sure	85	24,7	259	75,3	0,383	1,322 (0,706-2,475)
Very Sure	21	29,6	50	70,4	0,637	1,285 (0,454-3,636)

Table 2. University Activities with Potential for COVID-19 Transmission

Variables	Male		Female		P Value	OR (95%CI)
	N	%	N	%		
In Class Study						
Very Unsure	13	81,3	3	18,8	1	Ref
Not Sure	42	23,5	137	76,5	0,342	0,376 (0,050-2,825)
Very Sure	71	18,4	314	81,6	0,631	0,854 (0,449-0-1,625)
Sure	26	28,3	66	71,7	0,224	0,624 (0,292-1,334)
Study group						
Very Unsure	15	78,9	4	21,1	1	Ref
Not Sure	42	22,8	142	77,2	0,138	0,256 (0,042-1,549)
Very Sure	77	18,9	330	81,1	0,044	0,916 (0,451-1,860)
Sure	18	29,0	44	71,0	0,872	0,823 (0,309-2,193)
Thesis report						
Very Unsure	16	76,2	5	23,8	1	Ref
Not Sure	48	21,5	175	78,5	0,044	0,200 (0,042-0,956)
Very Sure	72	19,4	299	80,6	0,620	1,177 (0,618-2,243)
Sure	72	28,1	41	71,9	0,833	0,901 (0,342-2,375)
Extracurricular						
Very Unsure	12	70,6	5	29,4	1	Ref
Not Sure	39	25,0	117	75,0	0,759	1,351 (0,197-9,276)
Very Sure	81	19,2	341	80,8	0,541	0,809 (0,410-1,596)
Sure	20	26,0	57	74,0	0,741	1,158 (0,485-2,763)

Table 3. Places of Implementation of COVID-19 Health Protocol

Variables	Male		Female		P Value	OR (95%CI)
	N	%	N	%		
Study Room						
Very Unnecessary	5	0,7	7	1,0	1	Ref
No Need	10	1,5	4	0,6	0,998	0,000
Very Necessary	62	9,2	302	44,9	0,549	0,457 (0,035-5,901)
Need	75	17,0	207	30,8	0,031	2,478 (1,085-5,659)
Lecturer Room						
Very Unnecessary	6	66,7	3	33,3	1	Ref
No Need	8	66,7	4	33,3	0,998	0,000
Very Necessary	61	25,3	227	74,7	0,196	15,708 (0,241-10,939)
Need	77	17,6	286	82,4	0,156	1,945 (0,776-4,875)
Organizational Space						
Very Unnecessary	6	60,0	4	40,0	1	Ref
No Need	9	75,0	3	25,0	0,909	1,172 (0,077-17,852)
Very Necessary	71	24,7	216	75,3	0,289	0,273 (0,025-3,013)
Need	66	18,2	297	81,8	0,913	0,945 (0,343-2,602)
Worship Place						
Very Unnecessary	9	64,3	5	35,7	1	Ref
No Need	16	26,2	45	73,8	0,667	0,706 (0,145-3,437)
Very Necessary	67	23,6	217	76,4	0,035	2,676 (1,073-6,673)
Need	60	19,2	253	80,8	0,694	0,874 (0,446-1,711)
Canteen						
Very Unnecessary	4	80,0	1	20,0	1	Ref

No Need	9	60,0	6	40,0	0,998	0,000
Very Necessary	70	26,2	197	73,8	0,673	0,622 (0,069-5,619)
Need	69	17,9	316	82,1	0,029	2,563 (1,103-5,953)
Laboratory						
Very Unnecessary	6	100	0	0,0	1	Ref
No Need	8	66,7	4	33,3	1,000	0,000
Very Necessary	71	23,7	229	76,3	0,069	0,039 (0,001-1,281)
Need	67	18,9	287	81,1	0,586	0,767 (0,295-1,995)
Library						
Very Unnecessary	5	100	0	0,0	1	Ref
No Need	8	53,3	7	46,7	1,000	0,949
Very Necessary	70	23,0	235	77,0	0,408	2,468 (0,291-20,960)
Need	69	19,9	278	80,1	0,007	0,225 (0,076-0,664)
Toilet						
Very Unnecessary	8	80,0	2	20,0	1	Ref
No Need	31	34,4	59	65,6	0,041	0,141 (0,22-0,920)
Very Necessary	62	20,8	236	79,2	0,005	0,411 (0,221-0,767)
Need	51	18,6	223	81,4	0,525	0,819 (0,443-1,516)

Table 4. Violation of Health Protocols and University Readiness

Variables	Not Ready		Ready		P Value	OR (95%CI)
	N	%	N	%		
Study Room					0,100	0,461 (0,172-1,239)
Not Sure	5	19,2	21	80,8		
Sure	220	34,1	426	65,9		
Lecturer Room					0,009	0,202 (0,047-0,875)
Not Sure	2	9,5	19	90,5		
Sure	223	34,3	428	65,7		
Organization Space					0,104	0,431 (0,144-1,290)
Not Sure	4	18,2	18	81,8		
Sure	221	34,0	429	66,0		
Worship Place					0,030	0,548 (0,311-0,966)
Not Sure	17	22,7	58	77,3		
Sure	208	34,8	389	65,2		
Canteen					0,057	0,342 (0,099-1,179)
Not Sure	3	15,0	17	85,0		
Sure	222	34,0	430	66,0		
Laboratories					0,288	0,560 (0,182-1,721)
Not Sure	4	22,2	14	77,8		
Sure	221	33,8	433	66,2		
Library					0,735	0,847 (0,321-2,235)
Not Sure	6	30,0	14	70,0		
Sure	219	33,6	433	66,4		
Toilet					0,202	0,740 (0,463-1,184)
Not Sure	28	28,0	72	72,0		
Sure	197	34,4	375	65,6		

Table 5. Implementation of Health Protocols and University Readiness

Variables	Not Ready		Ready		P Value	OR (95%CI)
	N	%	N	%		
Age						
< 20 Year	72	35,5	131	64,5	0,473	1,135 (0,803-1,605)
> 20 Year	153	32,6	316	67,4		
Religion						
Islam	204	32,1	431	67,9	0,002	0
Christian	16	50,0	16	50,0		0
Catholic	4	100,0	0	0,0		0
Buddha	1	100,0	0	0,0		0
University Type						
Country	156	32,5	324	67,5	0,394	0,858 (0,604-1,220)
Private	225	35,9	447	64,1		
Hand Washing Compliance						
Not Sure	132	51,0	127	49,0	0,039	3,576 (2,557-5,003)
Sure	93	22,5	320	47,6		
Compliance With Wearing a Mask						
Not Sure	116	17,3	117	17,4	0,000	3,002 (2,145-4,200)
Sure	109	16,2	330	49,1		
Obedience Keep Distance						
Not Sure	194	28,9	262	39,0	0,000	3,873 (2,672-5,613)
Sure	31	4,6	185	27,5		
Obedience Avoid Crowd						
Not Sure	189	28,1	255	37,9	0,000	3,953 (2,643-5,913)
Sure	36	5,4	192	28,6		
Sneeze Etiquette Compliance						
Not Sure	97	14,4	84	12,5	0,000	3,349 (2,397-4,679)
Sure	128	19,0	363	54,0		
Hand Washing Belief						
Not Sure	98	14,6	132	19,6	0,000	1,841 (1,320-2,569)
Sure	127	18,9	315	46,9		
Belief in Wearing a Mask						
Not Sure	65	9,7	43	6,4	0,000	3,817 (2,491-5,847)
Sure	160	23,8	404	60,1		
Faith Keep Your Distance						
Not Sure	178	26,5	221	32,9	0,000	3,873 (2,672-6,613)
Sure	47	7,0	226	33,6		
Belief Avoid Crowd						
Not Sure	177	26,3	222	33,0	0,000	3,737 (2,584-5,405)
Sure	48	7,1	225	33,5		
Sneeze Etiquette Belief						
Not Sure	97	14,4	84	12,5	0,000	3,275 (2,297-4,670)
Sure	225	33,5	447	66,5		

Students who are unsure about compliance and beliefs about the implementation of health protocols, such as washing hands, wearing masks, keeping their distance, avoiding crowds, and sneezing ethics, are at risk of being unsure at the start of academic activities, compared to those who are confident (table 5). Students who are unsure of the application of remote learning are three times less prepared to begin activities at the university than those who are

Discussion

At the university setting, our findings show that there are no significant differences in terms of the need for implementing health protocols within various places and activities in university settings. Significant differences only occurred for toilet facilities and thesis guidance activities, where there were differences in the perceptions of needs and complaints between male students and female students. Other studies have also stated that women are more policy-abiding. For instance, Nuqul's study found that women have a higher intensity of regulatory compliance compared to men (19). In Augustine's research on drug compliance, it is known that women are more obedient in terms of taking prescribed drugs than men. Even in the context of traffic regulations, based on Kurniasari's research results, women are more compliant with rules than men. Thus, from some of these studies it can be concluded that women tend to be more compliant with existing regulations (20). Students should apply health protocols in various educational institutions based on the current pandemic circumstances. Although lecture activities may be online or through distance learning, they must still conduct activities in the administration and laboratory areas.

As a result, the university must comply with the Ministry of Education and Culture's policy, which states that each institution must provide facilities for meeting health standards, both indoors and outdoors (21). All public facilities at universities which allow for interaction between individuals, including one-on-one thesis consultation activities and toilet facilities, must implement Covid-19 prevention regulations. This is because the readiness of adequate supporting facilities is part of the risk assessment that must be done if the university is to hold face-to-face

activities again (22). In addition to the readiness of supporting facilities and related activities, if positive cases and close contact clusters were found, risk assessment also includes adequate risk communication and information sharing, as well as preparedness to respond with mitigation protocols.

The findings of this study indicate that most respondents do not have an adequate perception of the need for implementing health protocols in facilities/locations where there is the possibility of crowding, which has an impact on the high chance of transmission of Covid-19. This is relevant to previous research in which students with inadequate perceptions of needs can be a drawback to implementing face-to-face learning because students do not feel there is a threat of transmission in various facilities at the university when face-to-face learning is implemented (23). This is also relevant to the findings of this research, where there is a relationship between face-to-face learning readiness and potential violations in several places, including lecturer rooms and places of worship. This is in line with research that showed that 82.4%, or as many as 286 respondents, answered that in order to reduce the possibility of Covid-19 transmission within the university, the application of the protocol in the lecturer's room is necessary, with an OR value of 1,945 and is at CI 95% (0.776-4,875) (24).

Places of interaction that involve many individuals tend to have a greater potential for violations of health protocols. This is in accordance with one of the risk assessment recommendations, in which institutions must plan learning activities in an inclusive manner by forming smaller groups or shifting systems and class divisions (25). This aims to reduce potential violations of health protocols within massive activities. Some activities have varying levels of risk of transmission. For example, indoor activities such as studying in class, shopping at malls and eating at restaurants have a relatively high risk of transmission from moderate to moderate-high (26).

The findings of this study indicate that there is a significant relationship between adherence to health protocols (washing hands, social distancing, wearing masks, avoiding crowds, and good cough etiquette) and perceptions of preparation for face-to-face learning at

universities. Based on data from articles published by Behavioral Science and Policy, New York University and Yale University in 2020 showed that women pay more attention to their health, so they tend to be more compliant with health protocols in the prevention of COVID-19. Women are more obedient in using masks, maintaining hygiene, and maintaining distance (27). This is relevant with the results of the study which showed that 76.8% or as many as seventy-three female respondents were more likely to be sure to use masks, arguing that COVID-19 cases can be transmitted among students, faculty, and other supporting staff. With an OR value of 2,038, and is at CI 95% (1,068-3,890) (28). This result is in line with the research conducted by Annisa in Indonesia, which found that the implementation of health protocol activities did not run optimally because, among 150 respondents, 20 respondents did not maintain a crowding distance (29). The challenges in implementation stem from respondents' levels of self-awareness—such as continued lack of a sense of accountability—as well as occasional external events.

The impact of the Covid-19 pandemic in the provision of education through distance learning (online) varies according to the socio-demographic characteristics of students. Research has found that online learning perceived to be more difficult by students than offline learning. In addition, 55% of students in the study indicated that there was a delay in graduation because of online learning during the Covid-19 pandemic. Based on this, students' comfort with offline learning motivates students to show obedience and adherence to health protocols. The high compliance with health protocols by students must, of course, be complemented with the readiness of infrastructure facilities and services that prevent the transmission of Covid-19 by supporting the enforcement of health protocols within the university environment (30).

Covid-19 spreads quickly, is exceedingly unpredictable, and cannot be prevented. Social interaction is the primary mode of transmission. The spread of the Covid-19 virus has had a significant impact on the world of education. Government policies implemented by many countries, including Indonesia, dissolve all educational activities, not allowing for crowded activities and face-to-face learning, to avoid the

spread of Covid-19. This is in line with research that shows that 71%, or as many as forty-four respondents, are confident that group learning activities can potentially lead to the transmission of covid-19. With an OR value of 0.916 and is at CI 95% (0.451-1,860) (31).

The Covid-19 pandemic has adversely impacted all countries, including Indonesia, leading to critical psychological, social, educational, and economic situations. In Indonesia, it is evident that the population suffers from a mental weight that induces worry, and a dread of being sick and dying (32).

Conclusion

The behavior and compliance of students with health protocols influence the risk of Covid-19 transmission. No difference was found between genders in terms of the belief in adherence to the implementation of health protocols at the University. Students who are unsure about compliance and confidence in implementing health protocols are three times more likely to be unprepared to start activities at the university, compared to those who believe in implementing them. Therefore, students must improve their perceptions regarding the potential for Covid-19 transmission in the University, so that the number of daily cases can be minimized. The need for education extends beyond the community; it also affects educated individuals, such as students, who are in a prime position to inform the public about the value of following health protocols established by health professionals.

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