

The Public Knowledge and Quality of Life Among Indonesian Students During The COVID-19 Pandemic

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ABSTRACT

The increasing of online COVID-19 information-sharing in digital media can contribute to the emergence of misinformation in public. Much insufficient knowledge will confuse public understanding and affect their quality of life. Our study purposed to assess the knowledge and its influence on Indonesian students' quality of life during the COVID-19 crisis. A cross-sectional study was performed between October and December 2020 by distributing online questionnaires. The data analysis was run through the Spearman correlation method by using SPSS version 21.0. A total of 200 respondents aged over 17 years were recruited using a snowball sampling technique. Most study participants had insufficient knowledge about COVID-19. 23% of them had moderate knowledge, and only 17.5% had high knowledge. They obtained primary sources of COVID-19 information from social media platforms. The results showed that health science students have a better understanding than social science students ($p < 0.001$). This present study found that the level of knowledge has a significant associated with psychological domain ($p = 0.020$), environmental domain ($p = 0.046$), and overall quality of life ($p = 0.047$). Thus, the media control center is vital to encounter valid information in providing better knowledge and quality of life during a pandemic.

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1. INTRODUCTION

Corona Virus Disease-2019 (COVID-19) has become a global health issue highlighted in the local and international media [1]. The virus has spread very widely in nearly every country globally since it was first published in Wuhan, Hubei, China in December 2019. The number of new COVID-19 infections has increased every day [2]. According to WHO data, 71,051,805 confirmed cases of COVID-19, including 1,608,648 deaths in 216 countries worldwide, have been documented worldwide since December 14, 2020 [3]. The US, India, and Brazil are in the top 3 COVID-19 rankings worldwide. Meanwhile, Indonesia moved from 3rd to 2nd, with COVID-19 being the most confirmed cases in Southeast Asia after India [4].

Severe Acute Respiratory Syndrome Coronavirus type 2 (SARS-CoV-2) is responsible for COVID-19 infection [5]. Although its level of virulence is lower, COVID-19 seems to have a higher transmission level

than other members of the coronavirus families, such as SARS-CoV and MERS-CoV. A few numbers of awareness of COVID-19 prevention plays a role in uncontrolled coronavirus spread. The absence of a potential vaccine and specific antiviral for COVID-19 is another major challenge in controlling the pandemic [6].

In COVID-19 pandemic control efforts, knowledge is an important factor to be considered. Lack of knowledge can affect the behavior of individuals adversely, leading to indifference to their health. In fact, the existence of unproven information related to COVID-19 could also stimulate various misunderstandings. Data from the Indonesian Ministry of Communication and Information shows that there are 800,000 hoaxes throughout Indonesia, 554 associated with the causes, distribution, prevention, and treatment of COVID-19. It extends to over 1209 Facebook, Instagram, Twitter, or youtube platforms [7,8]. Deviation from spreading news, whether intentionally or unintentionally, can have a negative public impact. The knowledge gained from invalid sources can influence people's inappropriate behavior facing the COVID-19 pandemic [9]. Furthermore, it will trigger negative emotions, stress, and depression, leading to decreased life quality [10].

Several studies examining COVID-19 related knowledge have been conducted among Indonesian populations. However, the respondents of those studies were non-health students [11,12] and the general public [13,14]. To the best of our knowledge, research showed the relationship between knowledge and quality of life in health and non-health students has not been carried out before. Nevertheless, our previous study examined the COVID-19-related knowledge before outbreaks in Indonesia, which found 83.8% of respondents had a high level [15]. In the meantime, Eduarda et al. reported that there was a deterioration in the quality of life (QOL) of populations in countries with COVID-19 cases [16]. To date, few studies have demonstrated the knowledge and quality of life level in Indonesian students during the pandemic. Many quality of life research in Indonesia is limited to patients with chronic diseases such as diabetes mellitus, tuberculosis, cancer, etc [16,17]. Continuous dissemination, strict isolation measures in the pandemic will affect student's learning process. It also does not rule out their possibility of depression, distress, and influencing their quality of life. Hence, our study examines the relationship between students' knowledge and quality of life during the COVID-19 pandemic.

2. RESEARCH METHOD

2.1 Study Design and Data Collection

The research design was an observational study with a cross-sectional survey approach and conducted with GoogleForm Platform online questionnaire from October to December 2020. The sample size was calculated online by Select Statistical Services. The minimum required sample size for a 99% confidence level with a margin error of 10% was 166. A total of 200 respondents were taken by using the snowball sampling technique. Participants were identified with eligible criteria: 1) college students aged over 17 years; 2) living in Central Java, Indonesia during the COVID-19 pandemic; and 3) willing to give informed consent. Participants who did not complete respond to one or more items in the online survey were excluded. In our study, respondents were classified into health science and social science students. The student group clustering was intended to facilitate statistic analysis in comparing the obtained data. The online questionnaire was distributed through social media platforms with the attached consent form. This study has been approved by the Aisyiyah University Ethics Committee (No 1305/KEP-UNISA/IV/2020).

2.2 Research Instrument

The questionnaire consists of three segments. In the first section, we collected the participants' socio-demographic profile based on age, sex, student type, education level, university type, history of chronic disease, the use of supplement, and health condition. The second section is COVID-19 knowledge measurement, and the third section is quality of life measurement. A structure knowledge questionnaire was adapted and modified from previous research conducted by Zhong et al. [17] and Bhagavathula et al. [18]. We modified the 13 questionnaire items to involve diagnosis, symptom, transmission, cause, prevention, treatment, and risk factor towards COVID-19. Participants who answered "Yes" were given 1 point while "No/I don't know" was given 0 points. The score of the total answer is calculated from 0-13 points. If the total right answer is < 55%, the respondent is categorized as having low knowledge. The participant who scored between 56% to 75% defined that they have moderate knowledge. A high level of knowledge if their correct response answer is $\geq 76\%$. The reliability of the knowledge questionnaire has been measured using a Cronbach Alpha Coefficient with the value of 0.831.

The quality of life questionnaire was adopted from the World Health Organization Quality of Life (WHOQOL)-BREF Indonesian version [19]. This questionnaire consists of 4 domains, including the physical domain, psychological domain, social domain, and environmental domain, covered in 26 QOL question items. All of the domains in the Indonesian version of WHOQOL-BREF met the reliability criteria, with the value of Cronbach's alpha was 0.983. There are two additional general questions for overall QOL, and health satisfaction in WHOQOL-BREF include "how would you rate your quality of life?" and "how satisfied are you

with your health?". Respondents answered the questionnaire by choosing answers using a five-point rating scale, favourable (positive) and unfavourable (negative) assessment categories. The reliability assessment in this QOL questionnaire obtained a Cronbach alpha value of 0.983.

2.3 Data Analysis

Descriptive analysis was used to analyze the frequency of data on socio-demographic characteristics, the level of student knowledge, and the student's quality of life during the COVID-19 pandemic. The Kolmogorov-Smirnov test was used to determine the data normality. Our study found that the whole variables data have not normal distribution. Therefore, Spearman correlation test was performed to determine the association between the level of knowledge and each domain on quality of life. The independent t-test was also performed to determine the significant difference between the mean scores of knowledge in health science and social science students. The difference between two variables is said to be statistically significant if the calculated p -value less than 0.05. Data were analyzed using SPSS version 21.0.

3. RESULTS AND DISCUSSIONS

A total of 200 participants completed all survey questions and were recruited into the analysis. The main socio-demographic participant characteristics are described in Table 1. The majority of the study population was female, 78.5%, aged between 17-25 years (98.5%), health science students (62.5%), bachelor education level (85%), and study in private universities (88.5%). Based on Table 1, although most respondents did not have any efforts to prevent COVID-19 by consuming supplements or vitamins, they stated that their health status during the COVID-19 pandemic was healthy (92.5%) and had no chronic history (98.6%).

Table 1. Demographic characteristic of the participants

Variables	Total (Percentage) n (%)
Sex	
Male	43 (21.5)
Female	157 (78.5)
Age (years)	
17-25	197 (98.5)
26-35	1 (0.5)
36-45	2 (1.0)
Student Type	
Health Science	125 (62.5)
Social Science	75 (37.5)
Educational Level	
Diploma Degree	26 (13.0)
Bachelor Degree	170 (85.0)
Postgraduate	1 (0.5)
Profession	3 (1.5)
University Type	
State University	18 (9.0)
Private University	177 (88.5)
Open University	2 (1.0)
Others	3 (1.5)
History of Chronic Illness	
Yes	3 (1.5)
No	197 (98.5)
The Use of Supplements / Vitamins	
Yes	55 (27.5)
No	145 (72.5)
Health Status	
Healthy	185 (92.5)
Doubtful	4 (2.0)
Do not know	10 (5.0)
Suspect of COVID-19	1 (0.5)

Regarding student's knowledge levels, 59.5% of participants had "low" knowledge, 23% had "moderate" knowledge, and 17.5% had "high" knowledge (Table 2). This study concluded that most participants had "low" knowledge about COVID-19 from the aspects of symptoms, diagnosis, transmission, causes, prevention, treatment, and risk factor.

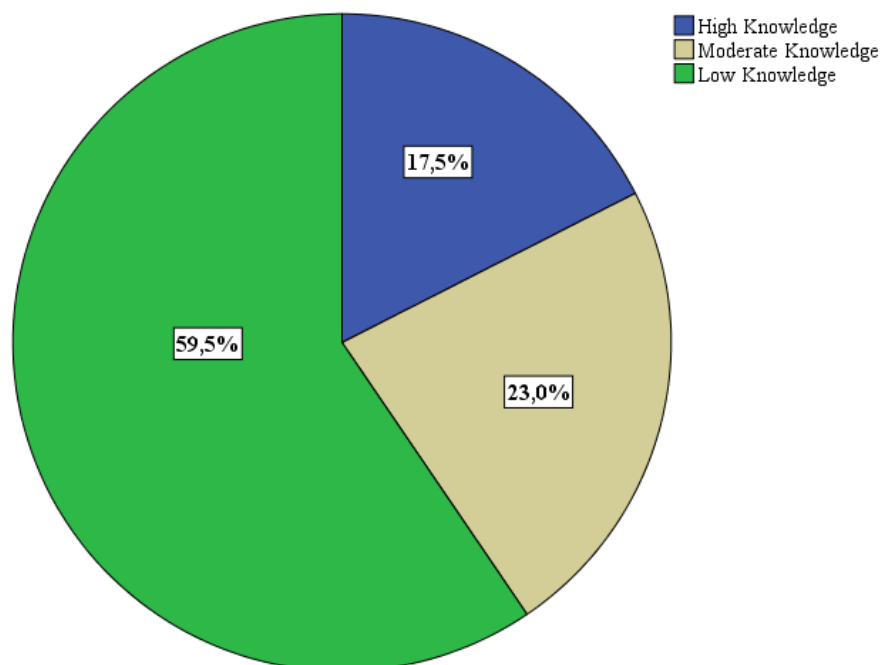


Figure 1. Student's level of knowledge

Based on Table 2, we found that the health science student's overall mean score of knowledge was 7.57 ± 2.33 , while the social science students were 6.07 ± 2.36 . Based on the independent T test result, we can conclude that health students have significantly higher scores of COVID-19 knowledge than social students ($p < 0.001$). This finding is in line with a study conducted by Kistan et al. and Sahar et al., which stated that health students' knowledge about the prevention of COVID-19 in Indonesia was classified as good [20,21]. A study was done by Alzoubi et al. also reported that health science students had a high knowledge of COVID-19, while social science students had low knowledge [22]. Previous studies have also reported the level of knowledge of Indonesian students based on majors of education. A study found that public health science students had higher knowledge scores compared to technology, socials, humanities students [11]. A possible explanation might be that health science students rely more on a self-learning, science, and social networks [23]. Our present study reported that health science students had better knowledge of treatment, mode of transmission, and diagnosis about COVID-19. They responded correctly to questions that antibiotics, tea, and betel leaf are not effective in treating the infection with COVID-19. Social sciences students still believe that COVID-19 can be treated with antibiotics, tea, and betel leaves.

Table 2. The mean score of knowledge of health and social science students with independent t-test analysis

Students Type	Mean \pm SD	p-value
Health science	7.57 ± 2.33	< 0.001
Social science	6.07 ± 2.36	

Figure 2 showed the various sources of information obtained by respondents regarding knowledge about COVID-19. Social media is the most common source (61.5%), followed by television (18%), websites (11.5%), health workers (7.5%), others (1%) and friends/family/colleagues (0.5%). These results were in line with those reported that the main sources of knowledge were social media, the internet, and television [22]. In addition, a specific study related to COVID-19 knowledge has been conducted among Indonesian

undergraduate students. Those studies indicated that as many as 38% of respondents frequently use social media platforms to obtain COVID-19 update information. It concluded that social media has become the most popular source of COVID-19 information [24].

As a source of information, the media has an important role in public perceptions and responses about COVID-19 [25]. Integrating social media into COVID-19 preparedness community activities could build their resilience [26]. However, several misinformation and hoaxes regarding COVID-19 had emerged and repeated in social media [27]. To date, society still has some non-uniform knowledge of COVID-19's origin, transmission, and prevention. Our current study found that most respondents, both students of health and social sciences, responded incorrectly to the spraying of disinfectants on the body. One emerging public misinformation was spraying disinfectants across the body could kill the novel coronavirus [28]. WHO, though, said it could burn mucous membranes of the body [29]. Nevertheless, most respondents understood that masks and washing hands could prevent COVID-19 transmission. As an effort to prevent COVID-19 [30], there has been a significant relationship between public knowledge and compliance with the use of masks [31].

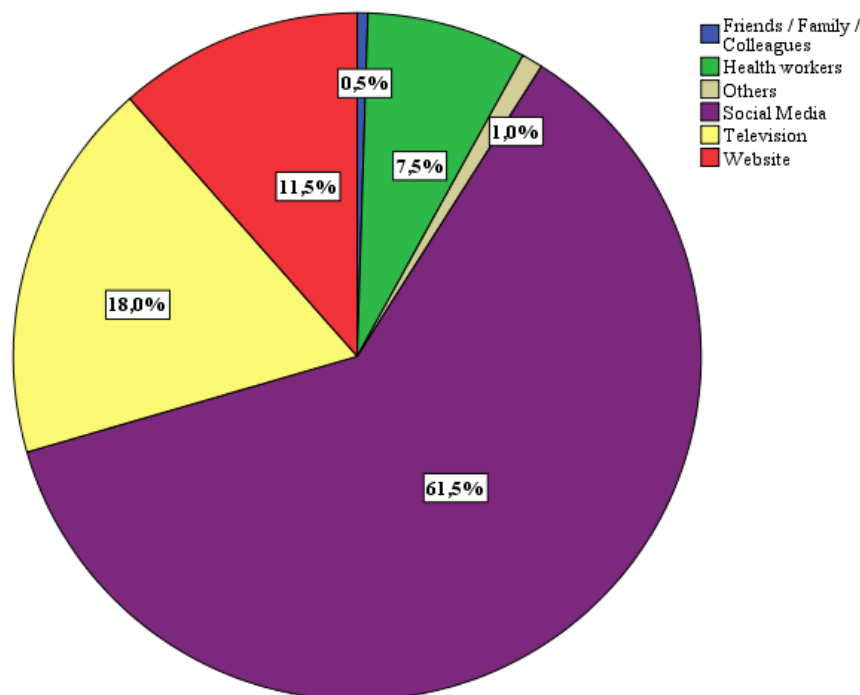


Figure 2. Reported source of knowledge about COVID-19

Based on Table 3, we can found that most of the respondents considered that the quality of life was good in the quality of life domain as follows: physical (48%), psychological (47.5%), and environmental (47.5%). However, most respondents rated their quality of life as moderate in the social domain (38%).

Table 3. Student's Quality of Life Domain

Quality of Life's Domain	n (%)				
	Very Bad	Bad	Moderate	Good	Very Good
Physical	0 (0)	4 (2)	32 (16)	96 (48)	68 (34)
Psychological	1 (0.5)	7 (3.5)	35 (17.5)	95 (47.5)	62 (31)
Social	3 (1.5)	12 (6)	76 (38)	63 (31.5)	46 (23)
Environmental	1 (0.5)	7 (3.5)	35 (17.5)	95 (47.5)	62 (31)

Regarding on the Spearman correlation test, our study stated that there was a significant relationship between the level of knowledge towards the psychological domain, environmental domain, and general quality of life ($\rho = 0.020$; $\rho = -0.164$; $\rho = 0.046$; $\rho = -0.141$; $\rho = 0.047$; $\rho = -0.141$; respectively). It means that the higher student's knowledge level, the lower their overall quality of life in a psychological and environmental domain. It suggested that in the pandemic, the student's psychological conditions are more worried and depressed about

their depth understanding of COVID-19. A study conducted by Ma et al. [10] suggested that quality of life significantly correlates with depression. A person who is depressed will have a lower quality of life than those who are not depressed. This result is also supported by Qasim et al. reported that psychological conditions have a relationship with knowledge level [32]. Psychological health was associated with mental and emotional health to influence positive-negative balance, thinking, learning, memory concentration, body imaging, and self-respect. Furthermore, the person who has good knowledge about COVID-19 will have more protective behavior as an effective response in the pandemic face. Excessive self-care should lead a person to think about the potential dangers that trigger stress response [33]. Other findings stated that stress could reduce a person's concentration. This study explained that a disease pandemic could psychologically affect a person by thinking more about the risk and health status, which impact their emotional and social behavior changes [34]. This protective behavior can be demonstrated when a person complies with government policies in controlling COVID-19 [35].

COVID-19 has influenced the environmental domain of quality of life, such as the public access to supporting health services, financial facilities, infrastructure, and recreation opportunities [36]. Considering these current studies, "high" knowledge respondents may not be surprised to give lower scores in environmental, leisure, and financial aspects of the quality of life domain. To prevent COVID-19 transmission, a knowledgeable student will comply with the university regulation about the learning online strategy. Low-income students also must strictly manage their internet quota budget to be able to participate in online learning. They also should maintain social distancing by avoiding to spend their leisure time in the crowded recreation areas. The implementation of those kinds of policies will influence their quality of life [36,37,38]. Furthermore, life quality will likely improve when the pandemic is lifted under controlled [37].

Table 4. The correlation between knowledge of COVID-19 and student's quality of life

Independent Variable	Dependent Variable	Rank Spearman Correlation Test	
		Coefficient correlation	p-value
Level of Knowledge	Physical Domain	-0,038	0,589
	Psychological Domain	-0,164	0,020*
	Social Domain	-0,120	0,091
	Environmental Domain	-0,141	0,046*
	General Quality of Life	-0,141	0,047*
	Satisfaction with health	-0,114	0,108

Public understanding of COVID-19 during the pandemic in Indonesia has been widely studied. A study conducted by Devina et al. concluded that the participants had a fairly good initial understanding of COVID-19 during the initial outbreak in Indonesia [36]. However, another study conducted by Maria stated that the population's quality of life in terms of COVID-19 was worsened [16]. It can be caused by the people's awareness of the potential dangers of COVID-19, thus making them judge that their quality of health is inadequate to control the pandemic. A relationship between knowledge and community perceptions will also lead an efforts to prevent COVID-19 from affecting the quality of life [37]. Finally, self-control is needed to mediate perception and quality of life during the COVID-19 pandemic.

This study has several limitations, including the sample that was taken is less representative for Indonesian population. Considering the online questionnaire distribution, it is difficult to determine the exclusion criteria for paid leave students. Therefore, further research needs to consider the larger sample with other specific criteria regarding knowledge and quality of life in obtaining more comprehensive research data.

4. CONCLUSION

The majority of respondents received information regarding COVID-19 from social media platforms. However, health science students have better knowledge than social science students. This study reports a significant relationship between student knowledge and several domains of quality of life, including psychological domain, environmental domain, and quality of life in general. Our study can be used as preliminary research for the development of subsequent research models. It can also be a suggestion for the higher education authorities to pay more attention and identify policies to control the COVID-19 pandemic.

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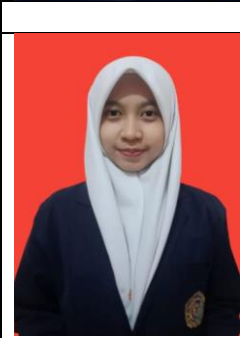



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	Aziz Iksanudin, is a lecturer in Faculty of Pharmacy, Ahmad Dahlan University, Yogyakarta Indonesia. Now, he is a Ph.D candidate in China Pharmaceutical University. His research interests

Knowledge and Quality of Life Among The Indonesian Students During The COVID-19 Pandemic... (Prasojo Pribadi)



	<p>are in the field of pharmaceutical technology, natural product, biomaterial, and drug delivery. He has many experience in conduct a researched granted from Higher Education of Indonesia and published some articles in Indonesian and International Journal</p>
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Editor/Author Correspondence

Ed [DELETE](#)

ito Subject: [IJPHS] Editor Decision

r The following message is being delivered on behalf of International Journal of Public Health
20 Science (IJPHS).

21-

02- Dear Prof/Dr/Mr/Mrs: Mrs Lolita Lolita,
08

12:

19 We have reached a decision regarding your submission entitled "The Public Knowledge and
PM Quality of Life Among Indonesian Students During The COVID-19 Pandemic" to
International Journal of Public Health Science (IJPHS), a peer-reviewed and an OPEN
ACCESS journal that makes significant contributions to major areas of public health
science.

Our decision is to ACCEPT with revisions

The goal of your revised paper is to describe novel technical results.

A high quality paper MUST has:

(1) a clear statement of the problem the paper is addressing --> explain in "Introduction"
section

(2) the proposed solution(s)/method(s)/approach(es)/framework(s)/

(3) results achieved. It describes clearly what has been done before on the problem, and
what is new.

In preparing your revised paper, you should pay attention to:

1. Please ensure that: all references have been cited in your text; Each citation should be
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numbering and CITATION ORDER is SEQUENTIAL [1], [2], [3], [4],

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2 An Introduction should contain the following three (3) parts:

- Background: Authors have to make clear what the context is. Ideally, authors should give
an idea of the state-of-the art of the field the report is about.

- The Problem: If there was no problem, there would be no reason for writing a manuscript,
and definitely no reason for reading it. So, please tell readers why they should proceed
reading. Experience shows that for this part a few lines are often sufficient.

- The Proposed Solution: Now and only now! - authors may outline the contribution of the
manuscript. Here authors have to make sure readers point out what are the novel aspects of
authors work. Authors should place the paper in proper context by citing relevant papers. At
least, 5 references (recently journal articles) are used in this section.

3. Results and discussion section: The presentation of results should be simple and straightforward in style. This section report the most important findings, including results of statistical analyses as appropriate. You should present the comparison between performance of your approach and other researches. Results given in figures should not be repeated in tables. It is very important to prove that your manuscript has a significant value and not trivial.

Please submit your revised paper within 6 weeks.

I look forward for hearing from you

Thank you

Best Regards,
Dr. Lina Handayani

Update your metadata in our online system when you submit your revised paper through our online system, included:

- Authors name are presented without salutation
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Reviewer A:

Does the paper contain an original contribution to the field?:

Yes

Is the paper technically sound?:

Yes

Does the title of the paper accurately reflect the major focus contribution of this paper?:

Yes

Please suggest change of the title as appropriate within 10 words:

none

Is the abstract a clear description of the paper?

:

Yes

Please suggest change of the abstract

:

p-value is never equal to 0, so don't report $p = 0.000$, but $p < 0.001$.

Correlation does not imply causation.

Statistical symbols should be written in italic.

Is the paper well written (clear, concise, and well organized)?:

Yes

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Yes

Please score the paper on a scale of 0 - 10 as per the directions below:

9-10 Excellent - Outstanding

7-8 Good

5-6 Average

3-4 Poor

0-2 Very Poor

:

7

Comments to the Authors (how to improve this paper)::

Introduction:

The novelty of your research needs to be strengthened. You have informed novelty regarding QOL, but novelty related to knowledge toward COVID-19 is still not strong. To strengthen the novelty of your research, you must compare your research with researchers who examine knowledge toward COVID-19 in Indonesia whose research is also published in a reputable journal (please check the example of the narrative I wrote in the comments in the file).

Methods:

Convey the reliability of your instrument (if any).

You haven't described the data analysis technique you used.

Is the instrument subsection stand alone and separate from the research method?

Results and Discussion:

Please transform Table 2 to pie graph.

Compare your findings to several other reports that have examined the level of knowledge related to COVID-19 among students in Indonesia and research that also report the variety of COVID-19 information source obtained by Indonesian undergraduate students.

p-value of what analysis?

You have not clearly explained the inferencing statistics that you use in your research

method.
Statistical symbols should be written in italics.
Add a paragraph discussing the limitations of your research.
Please check all of my comments in your file.

Conclusion:
Also add recommendations for further research

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Dear Prof/Dr/Mr/Mrs: Mrs Lolita Lolita,

It is my great pleasure to inform you that your paper entitled "The Public Knowledge and Quality of Life Among Indonesian Students During The COVID-19 Pandemic" is ACCEPTED and will be published on the International Journal of Public Health Science (IJPHS). This journal is accredited SINTA 1 by Ministry of Research and Technology/National Research and Innovation Agency, Republic of Indonesia (RISTEK-BRIN) and has ACCEPTED for inclusion (indexing) in Scopus (<https://suggestor.step.scopus.com/progressTracker/?trackingID=D331D503BA1584BF>) since 2020 issues

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Thank you

Best Regards,
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This theory was first put forward in 1970 [9]."

Bloom [10] has argued that...

Several recent studies [7], [9], [11-15] have suggested that....

...end of the line for my research [16].....

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February 22th, 2020

Dear Editor-in-Chief

International Journal of Public Health Science (IJPHS)

We would like to appreciate the time and effort that the editor dedicated to providing feedback on our manuscript and are grateful for the insightful comments on and valuable improvements to our paper. We have attached a revised manuscript of “**The Public Knowledge and Quality of Life Among Indonesian Students During The COVID-19 Pandemic**” with Reference ID Number: 20819. We have also made some corrections and promoted our manuscript according to these comments, which are shown as follows :

Editor#1 comment :

Please mind the chart, make sure that the writing the decimal is in ENGLISH version.

Author’s reply :

Thank you for the details suggestion. We have revised all the writing decimals in the chart with the ENGLISH version The change is highlight in yellow color within the manuscript.

We sincerely hope that our revised manuscript could be suitable for publication in International Journal of Public Health Science (IJPHS).

If you have any queries, please don’t hesitate to contact us at the address below.

Yours Sincerely,

Corresponding author:

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Assistant Professor, Department of Clinical Pharmacy,

Ahmad Dahlan University

Prof Dr Soepomo Warungboto Umbulharjo, Yogyakarta, Indonesia

Email: lolita_ur@yahoo.com , lolita@pharm.uad.ac.id

Telp: +62 89506685859

The Public Knowledge and Quality of Life Among Indonesian Students During The COVID-19 Pandemic

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ABSTRACT

The increasing of online COVID-19 information-sharing in digital media can contribute to the emergence of misinformation in public. Much insufficient knowledge will confuse public understanding and affect their quality of life. Our study purposed to assess the knowledge and its influence on Indonesian students' quality of life during the COVID-19 crisis. A cross-sectional study was performed between October and December 2020 by distributing online questionnaires. The data analysis was run through the Spearman correlation method by using SPSS version 21.0. A total of 200 respondents aged over 17 years were recruited using a snowball sampling technique. Most study participants had insufficient knowledge about COVID-19. 23% of them had moderate knowledge, and only 17.5% had high knowledge. They obtained primary sources of COVID-19 information from social media platforms. The results showed that health science students have a better understanding than social science students ($P=0.000$). This present study found that the level of knowledge is significant statistically influences psychological domain ($P=0.020$), environmental domain ($P=0.046$), and overall quality of life ($P=0.047$). Thus, the media control center is vital to encounter valid information to provide better knowledge and quality of life during a pandemic.

Commented [WU1]: p-value is never equal to 0, so don't report $p = 0.000$, but $p < 0.001$

Commented [WU2]: Correlation does not imply causation

Commented [WU3]: Statistical symbols should be written in italic

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1. INTRODUCTION

Corona Virus Disease-2019 (COVID-19) has become a global health issue highlighted in the local and international media [1]. The virus has spread very widely in nearly every country globally since it was first published in Wuhan, Hubei, China in December 2019. The number of new COVID-19 infections has increased every day [2]. According to WHO data, 71,051,805 confirmed cases of COVID-19, including 1,608,648 deaths in 216 countries worldwide, have been documented worldwide since December 14, 2020 [3]. The US, India,

and Brazil are in the top 3 COVID-19 rankings worldwide. Meanwhile, Indonesia moved from 3rd to 2nd, with COVID-19 being the most confirmed cases in Southeast Asia after India [4].

Severe Acute Respiratory Syndrome Coronavirus type 2 (SARS-CoV-2) is responsible for COVID-19 infection [5]. Although its level of virulence is lower, COVID-19 seems to have a higher transmission level than other members of the coronavirus families, such as SARS-CoV and MERS-CoV. A few numbers of awareness of COVID-19 prevention plays a role in uncontrolled coronavirus spread. The absence of a potential vaccine and specific antivirus for COVID-19 is another major challenge in controlling the pandemic [6].

In COVID-19 pandemic control efforts, knowledge is an important factor to be considered. Lack of knowledge can affect the behavior of individuals adversely, leading to indifference to their health. In fact, the existence of unproven information related to COVID-19 could also stimulate various misunderstandings. Data from the Indonesian Ministry of Communication and Information shows that there are 800,000 hoaxes throughout Indonesia, 554 associated with the causes, distribution, prevention, and treatment of COVID-19. It extends to over 1209 Facebook, Instagram, Twitter, or youtube platforms [7,8]. Deviation from spreading news, whether intentionally or unintentionally, can have a negative public impact. The knowledge gained from invalid sources can influence people's inappropriate behavior facing the COVID-19 pandemic [9]. Furthermore, it will trigger negative emotions, stress, and depression, leading to decreased life quality [10].

Our previous study examined the COVID-19-related knowledge before outbreaks in Indonesia, which found 83.8% of respondents had a high level [11]. In the meantime, Eduarda et al. reported that there was a deterioration in the quality of life (QOL) of populations in countries with COVID-19 cases [12]. To date, few studies have demonstrated the knowledge and quality of life level in Indonesian students during the pandemic. Many quality of life research in Indonesia is limited to patients with chronic diseases such as diabetes mellitus, tuberculosis, cancer, etc [12,13]. Continuous dissemination, strict isolation measures in the pandemic will affect student's learning process. It also does not rule out their possibility of depression, distress, and influencing their quality of life. Hence, our study examines the relationship between students' knowledge and quality of life during the COVID-19 pandemic.

2. RESEARCH METHOD

The research design is an observational study with a cross-sectional survey approach and conducted with GoogleForm Platform online questionnaire from October to December 2020. The sample size was calculated online by Select Statistical Services. The minimum required sample size for a 99% confidence level with a margin error of 10% was 166. A total of 200 respondents were taken by using the snowball sampling technique. Participants were identified with eligible criteria: 1) college students aged over 17 years; 2) living in Central Java, Indonesia during the COVID-19 pandemic; and 3) willing to give informed consent. Participants who did not complete respond to one or more items in the online survey were excluded. The online questionnaire was distributed through social media platforms with the attached consent form. This study has been approved by the Aisyiyah University Ethics Committee (No 1305/KEP-UNISA/IV/2020).

3. INSTRUMENTS

The questionnaire consists of three segments. In the first section, we collected the participants' socio-demographic profile based on age, sex, student type, education level, university type, history of chronic disease, the use of supplement, and health condition. The second section is COVID-19 knowledge measurement, and the third section is quality of life measurement. A structure knowledge questionnaire was adapted and modified from previous research conducted by Zhong et al. [14] and Bhagavathula et al. [15]. We modified the 13 questionnaire items to involve diagnosis, symptom, transmission, cause, prevention, treatment, and risk factor towards COVID-19. Participants who answered "Yes" were given 1 point while "No/I don't know" was given 0 points. The score of the total answer is calculated from 0-13 points. If the total right answer is < 55%, the respondent is categorized as having low knowledge. The participant who scored between 56% to 75% defined that they have moderate knowledge. A high level of knowledge if their correct response answer is $\geq 76\%$.

The quality of life questionnaire was adopted from the World Health Organization Quality of Life (WHOQOL)-BREF Indonesian version [16]. This questionnaire consists of 4 domains, including the physical domain, psychological domain, social domain, and environmental domain, covered in 26 QOL question items. All of the domains in the Indonesian version of WHOQOL-BREF met the reliability criteria, with the value of Cronbach's alpha was 0.983. There are two additional general questions for overall QOL, and health satisfaction in WHOQOL-BREF include "how would you rate your quality of life?" and "how satisfied are you with your health?". Respondents answered the questionnaire by choosing answers using a five-point rating scale, favorable (positive) and unfavorable (negative) assessment categories.

Commented [WU4]: The novelty of your research needs to be strengthened. You have informed novelty regarding QOL, but novelty related to knowledge toward COVID-19 is still not strong. To strengthen the novelty of your research, you must compare your research with researchers who examine knowledge toward COVID-19 in Indonesia whose research is also published in a reputable journal.

Narrative example:

Several studies examining COVID-19 have analyzed the level of knowledge of in Indonesia. However, the respondents of some of these studies were non-health students [1], [2] and the general public [3], [4]. Research that examines knowledge in medical students and relates it to QOL has never been conducted. On the other hand, our previous study examined the COVID-19.... (your sentences)

References

- 1.M. Saefi et al., "Survey data of COVID-19-related knowledge, attitude, and practices among Indonesian undergraduate students," Data Br., vol. 31, p. 105855, Aug. 2020, doi: 10.1016/j.dib.2020.105855.
- 2.M. Saefi et al., "Validating of Knowledge, Attitudes, and Practices Questionnaire for Prevention of COVID-19 infections among Undergraduate Students: A RASCH and Factor Analysis," Eurasia J. Math. Sci. Technol. Educ., vol. 16, no. 12, p. em1926, Dec. 2020, doi: 10.29333/ejmste/9352.
- 3.Y. A. Rias et al., "Effects of spirituality, knowledge, attitudes, and practices toward anxiety regarding COVID-19 among the general population in Indonesia: A cross-sectional study," J. Clin. Med., vol. 9, no. 12, p. 3798, 2020, doi: 10.3390/jcm9123798.
- 4.S. Sulistyawati et al., "Knowledge, attitudes, practices and information needs during the COVID-19 pandemic in Indonesia," Risk Manag. Healthc. Policy, vol. Volume 14, pp. 163–175, 2021, doi: 10.2147/rmhp.s288579.

Commented [WU5]: In your results, there is an analysis that compares the two groups of respondents. However, in your method, you have not explained that the respondents were grouped into two groups (health science and social science)

Commented [WU6]: Past tense

Commented [WU7]: Is the instrument subsection stand alone and separate from the research method?

Commented [WU8]: Convey the reliability of your instrument (if any)

Commented [WU9]: You haven't described the data analysis technique you used

4. RESULTS AND DISCUSSIONS

A total of 200 participants completed all survey questions and were recruited into the analysis. The main socio-demographic participant characteristics are described in Table 1. The majority of the study population was female, 78.5%, aged between 17-25 years (98.5%), health science students (62.5%), bachelor education level (85%), and study in private universities (88.5%). Based on table 1, although most respondents did not have any efforts to prevent COVID-19 by consuming supplements or vitamins, they stated that their health status during the COVID-19 pandemic was healthy (92.5%) and had no chronic history (98.6%).

Table 1. Demographic characteristic of the participants

Variables	Total (Percentage) n (%)
Sex	
Male	43 (21.5)
Female	157 (78.5)
Age (years)	
17-25	197 (98.5)
26-35	1 (0.5)
36-45	2 (1.0)
Student Type	
Health Science	125 (62.5)
Social Science	75 (37.5)
Educational Level	
Diploma Degree	26 (13.0)
Bachelor Degree	170 (85.0)
Postgraduate	1 (0.5)
Profession	3 (1.5)
University Type	
State University	18 (9.0)
Private University	177 (88.5)
Open University	2 (1.0)
Others	3 (1.5)
History of Chronic Illness	
Yes	3 (1.5)
No	197 (98.5)
The Use of Supplements / Vitamins	
Yes	55 (27.5)
No	145 (72.5)
Health Status	
Healthy	185 (92.5)
Doubtful	4 (2.0)
Do not know	10 (5.0)
Suspect of COVID-19	1 (0.5)

Regarding student's knowledge levels, 59.5% of participants had "low" knowledge, 23% had "moderate" knowledge, and 17.5% had "high" knowledge (Table 2). This study concluded that most participants had "low" knowledge about COVID-19 from the aspects of symptoms, diagnosis, transmission, causes, prevention, treatment, and risk factor.

Table 2. Student's level of knowledge

Level of Knowledge	n	%
Low Knowledge	119	59.5
Moderate Knowledge	46	23
High Knowledge	35	17.5

Commented [WU10]: Visualize your data using a pie graph

Based on table 3, we found that the health science student's overall mean score of knowledge was 7.57 ± 2.33 , while the social science students were 6.07 ± 2.36 . We can conclude that health students have significantly higher scores of COVID-19 knowledge than social students ($P=0.000$). [This finding is in line with a study conducted by Kistan et al. and Sahar et al., which stated that health students' knowledge about the prevention of COVID-19 in Indonesia was classified as good [17,18]]. A study was done by Alzoubi et al. also reported that health science students had a high knowledge of COVID-19, while social science students had low knowledge [19]. A possible explanation might be that health science students rely more on a self-learning, science, and social networks [20]. Our present study reported that health science students had better knowledge of treatment, mode of transmission, and diagnosis about COVID-19. They responded correctly to questions that antibiotics, tea, and betel leaf are not effective in treating the infection with COVID-19. Social sciences students still believe that COVID-19 can be treated with antibiotics, tea, and betel leaves.

Table 3. The mean score of knowledge of health and social science students

Students Type	Mean \pm SD	p-value
Health science	7.57 ± 2.33	0.000
Social science	6.07 ± 2.36	

Figure 1 showed the various sources of information obtained by respondents regarding knowledge about COVID-19. Social media is the most common source (61.5%), followed by television (18%), websites (11.5%), health workers (7.5%), others (1%) and friends/family/colleagues (0.5%). These results were in line with those reported that the main sources of knowledge were social media, the internet, and television [19]. As a source of information, the media has an important role in public perceptions and responses about COVID-19 [21]. Integrating social media into COVID-19 preparedness community activities could build their resilience [22]. However, several misinformation and hoaxes regarding COVID-19 had emerged and repeated in social media [23]. To date, society still has some non-uniform knowledge of COVID-19's origin, transmission, and prevention. Our current study found that most respondents, both students of health and social sciences, responded incorrectly to the spraying of disinfectants on the body. One emerging public misinformation was spraying disinfectants across the body could kill the novel coronavirus [24]. WHO, though, said it could burn mucous membranes of the body [25]. Nevertheless, most respondents understood that masks and washing hands could prevent COVID-19 transmission. As an effort to prevent COVID-19 [26], there has been a significant relationship between public knowledge and compliance with the use of masks [27].

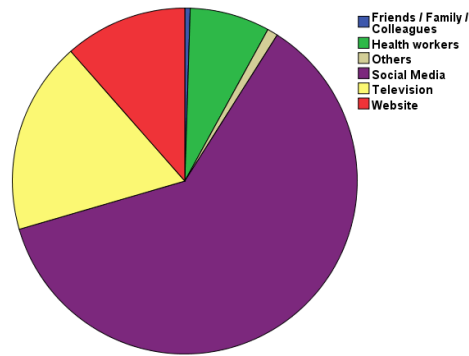


Figure 1. Reported source of knowledge about COVID-19

Based on table 4, we can see that most of the respondents considered that the quality of life was good in the quality of life domain as follows: physical (48%), psychological (47.5%), and environmental (47.5%). However, most respondents rated their quality of life as moderate in the social domain (38%).

Commented [WU11]: Capital letter

Commented [WU12]: p-value of what analysis? Your research method does not clearly convey the inferential statistical analysis you chose

Commented [WU13]: Also compare it to several other reports that have examined the level of knowledge related to COVID-19 among students in Indonesia (such as the research I recommended at the end of your introduction)

Commented [WU14]: p-value of what analysis?

Commented [WU15]: The p-value is never equal to 0. Therefore, report this p-value by writing the $p < 0.001$.

Commented [WU16]: Reference no.19 is research in Jordan. Since you are researching in Indonesia, compare these findings to previous studies conducted in Indonesia. You can compare it with the following research: Fauzi, A., Husamah, H., Miharja, F. J., Fatmawati, D., Permana, T. I., & Hudha, A. M. (2020). Exploring COVID-19 literacy level among biology teacher candidates. Eurasia Journal of Mathematics, Science and Technology Education, 16(7), em1864. <https://doi.org/10.29333/ejmste/8270>. In this study, the authors also reported the variety and percentage of information sources related to COVID-19 received by undergraduate students in Indonesia.

Commented [WU17]: Add data labels to your charts

Commented [WU18]: Capital letter

Table 4. Student's Quality of Life Domain

Quality of Life's Domain	n (%)				
	Very Bad	Bad	Moderate	Good	Very Good
Physical	0 (0)	4 (2)	32 (16)	96 (48)	68 (34)
Psychological	1 (0.5)	7 (3.5)	35 (17.5)	95 (47.5)	62 (31)
Social	3 (1.5)	12 (6)	76 (38)	63 (31.5)	46 (23)
Environmental	1 (0.5)	7 (3.5)	35 (17.5)	95 (47.5)	62 (31)

This present study found that there was a significant relationship between the level of knowledge towards the psychological domain, environmental domain, and general quality of life ($P=0.020$, $\rho = -0.164$; $P= 0.046$, $\rho = -0.141$; $P=0,047$, $\rho = -0,141$, respectively). It means that the higher student's knowledge level, the lower their overall quality of life in a psychological and environmental domain. It suggested that in the pandemic, the student's psychological conditions are more worried and depressed about their depth understanding of COVID-19. A study conducted by Ma et al. [10] suggested that quality of life significantly correlates with depression. A person who is depressed will have a lower quality of life than those who are not depressed. This result is also supported by Qasim et al. reported that psychological conditions have a relationship with knowledge level [28]. Psychological health was associated with mental and emotional health to influence positive-negative balance, thinking, learning, memory concentration, body imaging, and self-respect. Furthermore, the person who has good knowledge about COVID-19 will have more protective behavior as an effective response in the pandemic face. Excessive self-care should lead a person to think about the potential dangers that trigger stress response [29]. Other findings stated that stress could reduce a person's concentration. This study explained that a disease pandemic could psychologically affect a person by thinking more about the risk and health status, which impact their emotional and social behavior changes [30]. This protective behavior can be demonstrated when a person complies with government policies in controlling COVID-19 [31].

COVID-19 has influenced the environmental domain of quality of life, such as the public access to supporting health services, financial facilities, infrastructure, and recreation opportunities [32]. Considering these current studies, "high" knowledge respondents may not be surprised to give lower scores in environmental, leisure, and financial aspects of the quality of life domain. To prevent COVID-19 transmission, a knowledgeable student will comply with the university regulation about the learning online strategy. Low-income students also must strictly manage their internet quota budget to be able to participate in online learning. They also should maintain social distancing by avoiding to spend their leisure time in the crowded recreation areas. The implementation of those kinds of policies will influence their quality of life [33,34,35]. Furthermore, life quality will likely improve when the pandemic is lifted under controlled [33].

Table 5. The correlation between knowledge of COVID-19 and student's quality of life

Independent Variable	Dependent Variable	Rank Spearman Correlation Test	
		Coefficient correlation	p-value
Level of Knowledge	Physical Domain	-0,038	0,589
	Psychological Domain	-0,164	0,020*
	Social Domain	-0,120	0,091
	Environmental Domain	-0,141	0,046*
	General Quality of Life	-0,141	0,047*
	Satisfaction with health	-0,114	0,108

Public understanding of COVID-19 during the pandemic in Indonesia has been widely studied. A study conducted by Devina et al. concluded that the participants had a fairly good initial understanding of COVID-19 during the initial outbreak in Indonesia [32]. However, another study conducted by Maria stated that the population's quality of life in terms of COVID-19 was worsened [12]. It can be caused by the people's awareness of the potential dangers of COVID-19, thus making them judge that their quality of health is inadequate to control the pandemic. A relationship between knowledge and community perceptions will also lead an efforts to prevent COVID-19 from affecting the quality of life [33]. Finally, self-control is needed to mediate perception and quality of life during the COVID-19 pandemic.

The Public Knowledge and Quality of Life Among The Indonesian Students During The COVID-19 Pandemic... (Prasojo Pribadi)

Commented [WU19]: Statistical symbols should be written in italics

Commented [WU20]: p-value of what analysis? You have not clearly explained the inferring statistics that you use in your research method

Commented [WU21]: Add a paragraph discussing the limitations of your research

5. CONCLUSION

The majority of respondents received information regarding COVID-19 from social media platforms. However, health science students have better knowledge than social science students. This study reports a significant relationship between student knowledge and several domains of quality of life, including psychological domain, environmental domain, and quality of life in general. Our study can be used as preliminary research for the development of subsequent research models. It can also be a suggestion for the higher education authorities to pay more attention and identify policies to control the COVID-19 pandemic.

Commented [WU22]: Also add recommendations for further research

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The Public Knowledge and Quality of Life Among Indonesian Students During The COVID-19 Pandemic

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ABSTRACT

The increasing of online COVID-19 information-sharing in digital media can contribute to the emergence of misinformation in the public. Much insufficient knowledge will confuse public understanding and affect their quality of life. Our study purposed to assess the knowledge and its influence on Indonesian students' quality of life during the COVID-19 crisis. A cross-sectional study was performed between October and December 2020 by distributing online questionnaires. The data analysis was run through the Spearman correlation method by using SPSS version 21.0. A total of 200 respondents aged over 17 years were recruited using a snowball sampling technique. Most study participants had insufficient knowledge about COVID-19. 23% of them had moderate knowledge, and only 17.5% had high knowledge. They obtained primary sources of COVID-19 information from social media platforms. The results showed that health science students have a better understanding than social science students ($p < 0.001$). This present study found that the level of knowledge has a significant associated with the psychological domain ($p = 0.020$), environmental domain ($p = 0.046$), and overall quality of life ($p = 0.047$). Thus, the media control centre is vital to encounter valid information in providing better knowledge and quality of life during a pandemic.

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1. INTRODUCTION

Corona Virus Disease-2019 (COVID-19) has become a global health issue highlighted in the local and international media [1]. The virus has spread very widely in nearly every country globally since it was first published in Wuhan, Hubei, China, in December 2019. The number of new COVID-19 infections has increased every day [2]. According to WHO data, 71,051,805 confirmed cases of COVID-19, including 1,608,648 deaths in 216 countries worldwide, have been documented worldwide since December 14, 2020 [3]. The US, India, and Brazil are in the top 3 COVID-19 rankings worldwide. Meanwhile, Indonesia moved from 3rd to 2nd, with COVID-19 being the most confirmed cases in Southeast Asia after India [4].

Severe Acute Respiratory Syndrome Coronavirus type 2 (SARS-CoV-2) is responsible for COVID-19 infection [5]. Although its level of virulence was low, COVID-19 seems to have a higher transmission level

than other members of the coronavirus families, such as SARS-CoV and MERS-CoV. A few numbers of awareness of COVID-19 prevention plays a role in uncontrolled coronavirus spread. The absence of a potential vaccine and specific antiviral for COVID-19 is another major challenge in controlling the pandemic [6].

In COVID-19 pandemic control efforts, knowledge is an important factor to be considered. Lack of knowledge can affect the behaviour of individuals adversely, leading to indifference to their health. The existence of unproven information related to COVID-19 could also stimulate various misunderstandings. Data from the Indonesian Ministry of Communication and Information shows that there are 800,000 hoaxes throughout Indonesia, 554 associated with the causes, distribution, prevention, and treatment of COVID-19. It extends to over 1209 Facebook, Instagram, Twitter, or youtube platforms [7,8]. Deviation from spreading news, whether intentionally or unintentionally, can have a negative public impact. The knowledge gained from invalid sources can influence people's inappropriate behaviour facing the COVID-19 pandemic [9]. Furthermore, it will trigger negative emotions, stress, and depression, leading to decreased life quality [10].

Several studies examining COVID-19 related knowledge have been conducted among Indonesian populations. However, those studies' respondents were non-health [11,12] and the general public [13,14]. To the best of our knowledge, research showed the relationship between knowledge and quality of life in health and non-health students had not been carried out before. Nevertheless, our previous study examined COVID-19-related knowledge before outbreaks in Indonesia, which found 83.8% of respondents had a high level [15]. In the meantime, Eduarda et al.[16] reported that there was a deterioration in the quality of life (QOL) of populations in countries with COVID-19 cases. To date, few studies have demonstrated the knowledge and quality of life level in Indonesian students during the pandemic. Many quality of life research in Indonesia is limited to patients with chronic diseases such as diabetes mellitus, tuberculosis, and cancer [16,17]. Continuous dissemination, strict isolation measures in the pandemic will affect the student's learning process. It also does not rule out the possibility of depression, distress, and influencing their quality of life. Hence, our study examines the relationship between students' knowledge and quality of life during the COVID-19 pandemic.

2. RESEARCH METHOD

2.1 Study Design and Data Collection

The research design was an observational study with a cross-sectional survey approach and conducted with a google platform online questionnaire from October to December 2020. The sample size was calculated online by Select Statistical Services. The minimum required sample size for a 99% confidence level with a margin error of 10% was 166. A total of 200 respondents were taken by using the snowball sampling technique. Participants were identified with eligible criteria: 1) college students aged over 17 years; 2) living in Central Java, Indonesia, during the COVID-19 pandemic; and 3) willing to give informed consent. Participants who did not completely respond to one or more items in the online survey were excluded. In our study, respondents were classified into health science and social science students. The student group clustering was intended to facilitate statistic analysis in comparing the obtained data. The online questionnaire was distributed through social media platforms with the attached consent form. This study has been approved by the Aisyiyah University Ethics Committee (No 1305/KEP-UNISA/IV/2020).

2.2 Research Instrument

The questionnaire consists of three segments. In the first section, we collected the participants' socio-demographic profile based on age, sex, student type, education level, university type, history of chronic disease, supplement, and health condition. The second section is COVID-19 knowledge measurement, and the third section is quality of life measurement. A structure knowledge questionnaire was adapted and modified from previous research conducted by Zhong et al. [17] and Bhagavathula et al. [18]. We modified the 13 questionnaire items to involve diagnosis, symptom, transmission, cause, prevention, treatment, and risk factor towards COVID-19. Participants who answered "Yes" were given 1 point while "No/I do not know" was given 0 points. The score of the total answer is calculated from 0-13 points. If the total right answer is < 55%, the respondent is categorized as having low knowledge. The participant who scored between 56% to 75% defined that they have moderate knowledge. A high level of knowledge if their correct response answer is $\geq 76\%$. The knowledge questionnaire's reliability has been measured using a Cronbach Alpha Coefficient with a value of 0.831.

The quality of life questionnaire was adopted from the World Health Organization Quality of Life (WHOQOL)-BREF Indonesian version [19]. This questionnaire consists of 4 domains, including the physical domain, psychological domain, social domain, and environmental domain, covered in 26 QOL question items. All of the domains in the Indonesian version of WHOQOL-BREF met the reliability criteria, with the value of Cronbach's alpha was 0.983. There are two additional general questions for overall QOL and health satisfaction in WHOQOL-BREF include "how would you rate your quality of life?" and "how satisfied are you with your

health?". Respondents answered the questionnaire by choosing answers using a five-point rating scale, favourable (positive) and unfavourable (negative) assessment categories.

2.3 Data Analysis

Descriptive analysis was used to analyze the frequency of data on socio-demographic characteristics, student knowledge level, and the student's quality of life during the COVID-19 pandemic. The Kolmogorov-Smirnov test was used to determine the data normality. Our study found that the whole variables data have not normal distribution. Therefore, the Spearman correlation test was performed to determine the association between knowledge level and each quality of life domain. The independent t-test was also performed to determine the significant difference between the mean scores of knowledge in health science and social science students. The difference between the two variables is statistically significant if the calculated p -value less than 0.05. Data were analyzed using SPSS version 21.0.

3. RESULTS AND DISCUSSIONS

A total of 200 participants completed all survey questions and were recruited into the analysis. The main socio-demographic participant characteristics are described in Table 1. The majority of the study population was female, 78.5%, aged between 17-25 years (98.5%), health science students (62.5%), bachelor education level (85%), and study in private universities (88.5%). Based on Table 1, although most respondents did not have any efforts to prevent COVID-19 by consuming supplements or vitamins, they stated that their health status during the COVID-19 pandemic was healthy (92.5%) and had no chronic history (98.6%).

Table 1. Demographic characteristic of the participants

Variables	Total (Percentage) n (%)
Sex	
Male	43 (21.5)
Female	157 (78.5)
Age (years)	
17-25	197 (98.5)
26-35	1 (0.5)
36-45	2 (1.0)
Student Type	
Health Science	125 (62.5)
Social Science	75 (37.5)
Educational Level	
Diploma Degree	26 (13.0)
Bachelor Degree	170 (85.0)
Postgraduate	1 (0.5)
Profession	3 (1.5)
University Type	
State University	18 (9.0)
Private University	177 (88.5)
Open University	2 (1.0)
Others	3 (1.5)
History of Chronic Illness	
Yes	3 (1.5)
No	197 (98.5)
The Use of Supplements / Vitamins	
Yes	55 (27.5)
No	145 (72.5)
Health Status	
Healthy	185 (92.5)
Doubtful	4 (2.0)
Do not know	10 (5.0)
Suspect of COVID-19	1 (0.5)

Regarding student's knowledge levels, 59.5% of participants had "low" knowledge, 23% had "moderate" knowledge, and 17.5% had "high" knowledge (Table 2). This study concluded that most participants had "low" knowledge about COVID-19 from the aspects of symptoms, diagnosis, transmission, causes, prevention, treatment, and risk factor.

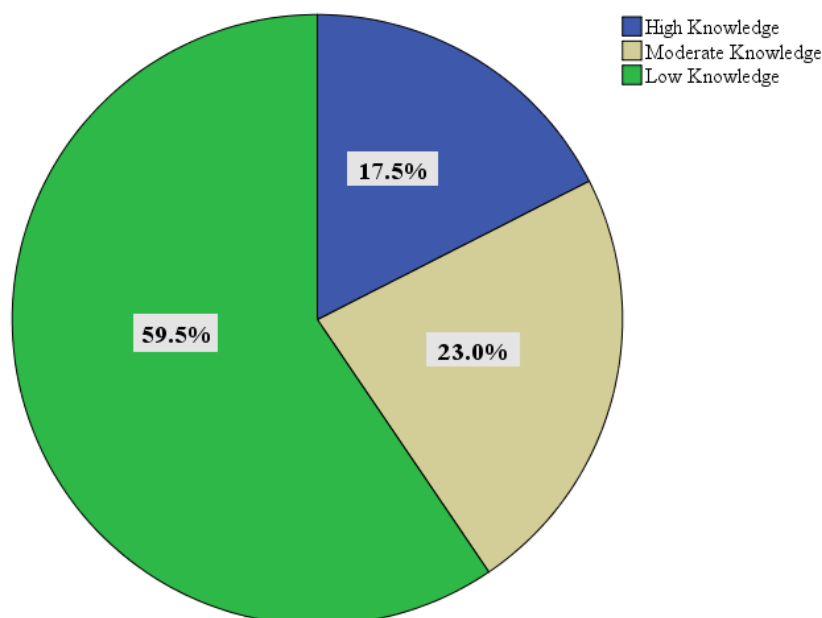


Figure 1. Student's level of knowledge

Based on Table 2, we found that the health science student's overall mean score of knowledge was 7.57 ± 2.33 , while the social science students were 6.07 ± 2.36 . Based on the independent T-test result, we can conclude that health students have significantly higher scores of COVID-19 knowledge than social students ($p < 0.001$). This finding is in line with a study conducted by Kistan et al. and Sahar et al., which stated that health students' knowledge about the prevention of COVID-19 in Indonesia was classified as good [20,21]. A study was done by Alzoubi et al. [22] also reported that health science students had a high knowledge of COVID-19, while social science students had low knowledge. Previous studies have also reported the level of knowledge of Indonesian students based on education majors. A study found that public health science students had higher knowledge scores than technology, socials, humanities students [11]. A possible explanation might be that health science students rely more on self-learning, science, and social networks [23]. Our present study reported that health science students had better knowledge of treatment, mode of transmission, and diagnosis of COVID-19. They responded correctly to questions that antibiotics, tea, and betel leaf are not effective in treating the infection with COVID-19. Social sciences students still believe that COVID-19 can be treated with antibiotics, tea, and betel leaves.

Table 2. The mean score of knowledge of health and social science students with independent t-test analysis

Students Type	Mean \pm SD	p -value
Health science	7.57 ± 2.33	< 0.001
Social science	6.07 ± 2.36	

Figure 2 showed the various sources of information obtained by respondents regarding knowledge about COVID-19. Social media is the most common source (61.5%), followed by television (18%), websites (11.5%), health workers (7.5%), others (1%) and friends/family/colleagues (0.5%). These results were in line with those reported that the main sources of knowledge were social media, the internet, and television [22]. Besides, a specific study related to COVID-19 knowledge has been conducted among Indonesian undergraduate students. Those studies indicated that as many as 38% of respondents frequently use social media platforms to obtain COVID-19 update information. It concluded that social media had become the most popular source of COVID-19 information [24].

As a source of information, the media has an vital role in public perceptions and responses about COVID-19 [25]. Integrating social media into COVID-19 preparedness community activities could build their resilience [26]. However, several misinformation and hoaxes regarding COVID-19 had emerged and repeated on social media [27]. To date, society still has some non-uniform knowledge of COVID-19's origin, transmission, and prevention. Our current study found that most respondents, both students of health and social sciences, responded incorrectly to the disinfectants' spraying on the body. One emerging public misinformation was spraying disinfectants across the body could kill the novel coronavirus [28]. Evidence proved that spraying disinfectants could burn mucous membranes of the body [29]. Nevertheless, most respondents understood that masks and washing hands could prevent COVID-19 transmission. There has been a significant relationship between public knowledge and compliance with masks regarding preventing COVID-19 [30,31].

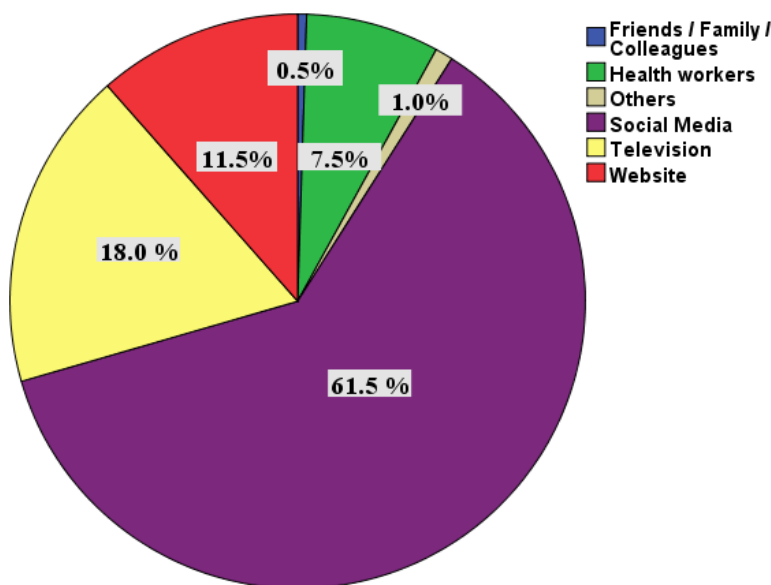


Figure 2. Reported source of knowledge about COVID-19

Based on Table 3, we can found that most of the respondents considered that the quality of life was good in the quality of life domain as follows: physical (48%), psychological (47.5%), and environmental (47.5%). However, most respondents rated their quality of life as moderate in the social domain (38%).

Table 3. Student's Quality of Life Domain

Quality of Life's Domain	n (%)				
	Very Bad	Bad	Moderate	Good	Very Good
Physical	0 (0)	4 (2)	32 (16)	96 (48)	68 (34)
Psychological	1 (0.5)	7 (3.5)	35 (17.5)	95 (47.5)	62 (31)
Social	3 (1.5)	12 (6)	76 (38)	63 (31.5)	46 (23)
Environmental	1 (0.5)	7 (3.5)	35 (17.5)	95 (47.5)	62 (31)

Regarding the Spearman correlation test, our study stated that there was a significant relationship between the level of knowledge towards the psychological domain, environmental domain, and general quality of life ($\rho = 0.020$; $\rho = -0.164$; $\rho = 0.046$; $\rho = -0.141$; $\rho = 0.047$; $\rho = -0.141$; respectively). It means that the higher student's knowledge level, the lower their overall quality of life in a psychological and environmental domain. It suggested that in the pandemic, the student's psychological conditions are more worried and depressed about their depth understanding of COVID-19. A study conducted by Ma et al. [10] suggested that quality of life significantly correlates with depression. A person who is depressed will have a lower quality of life than those who are not depressed. This result is also supported by Qasim et al. [32] reported that psychological conditions correlate with knowledge level. Psychological health was associated with mental and emotional health to influence positive-negative balance, thinking, learning, memory concentration, body imaging, and self-respect. Furthermore, the person who has good knowledge of COVID-19 will have more protective behaviour as an effective response in the pandemic face. Extreme self-care should lead a person to think about the stress response's potential dangers [33]. Other findings stated that stress could reduce a person's concentration. This

study explained that a disease pandemic could psychologically affect a person by thinking more about the risk and health status, which impact their emotional and social behaviour changes [34]. This protective behaviour can be demonstrated when a person complies with government policies in controlling COVID-19 [35].

COVID-19 has influenced the environmental domain of quality of life, such as public access to supporting health services, financial facilities, infrastructure, and recreation opportunities [36]. Considering these current studies, "high" knowledge respondents may not be surprised to give lower scores in environmental, leisure, and financial aspects of the quality of life domain. To prevent COVID-19 transmission, a knowledgeable student will comply with the university regulation about the online learning strategy. Low-income students also must strictly manage their internet quota budget to be able to participate in online learning. They also should maintain social distancing by avoiding to spend their leisure time in crowded recreation areas. The implementation of those kinds of policies will influence their quality of life [37,38,39]. Furthermore, life quality will likely improve when the pandemic is lifted under controlled [37].

Table 4. The correlation between knowledge of COVID-19 and student's quality of life

Independent Variable	Dependent Variable	Rank Spearman Correlation Test	
		Coefficient correlation	<i>p-value</i> (* significant correlation)
Level of Knowledge	Physical Domain	-0.038	0.589
	Psychological Domain	-0.164	0.020*
	Social Domain	-0.120	0.091
	Environmental Domain	-0.141	0.046*
	General Quality of Life	-0.141	0.047*
	Satisfaction with health	-0.114	0.108

Public understanding of COVID-19 during the pandemic in Indonesia has been widely studied. A study conducted by Devina et al. [36] concluded that the participants had a relatively good initial understanding of COVID-19 during the initial outbreak in Indonesia. However, another study conducted by Maria [16] stated that the population's quality of life of COVID-19 was worsened. It can be caused by the people's awareness of the potential dangers of COVID-19, thus making them judge that their quality of health is inadequate to control the pandemic. A relationship between knowledge and community perceptions will also lead to preventing COVID-19, ultimately affecting the quality of life [37]. Finally, self-control is needed to mediate perception and quality of life during the COVID-19 pandemic.

This study has several limitations, including the sample taken, which is less representative of the Indonesian population. It is also challenging to determine the exclusion criteria for paid leave students in the online questionnaire distribution. Therefore, further research needs to consider the larger sample with other specific criteria regarding knowledge and quality of life in obtaining more comprehensive research data.

4. CONCLUSION

The majority of respondents received information regarding COVID-19 from social media platforms. However, health science students have better knowledge than social science students. This study reports a significant relationship between student knowledge and life quality domains, including the psychological domain, environmental domain, and overall quality of life. Our study can be used as preliminary research for the development of subsequent research models. It can also be a suggestion for the higher education authorities to pay more attention and identify policies to control the COVID-19 pandemic.

ACKNOWLEDGEMENTS

The authors thank all of the participants who contributed to this study. We are also grateful to Universitas Muhammadiyah Magelang and Grant of RisetMu by Muhammadiyah Higher Education, Research and Development Council, Central Leadership PP Muhammadiyah for the support in this study.

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February 18th, 2020

Dear Editor-in-Chief

International Journal of Public Health Science (IJPHS)

We would like to appreciate the time and effort that the reviewers dedicated to providing feedback on our manuscript and are grateful for the insightful comments on and valuable improvements to our paper. We have attached a revised manuscript of **“The Public Knowledge and Quality of Life Among Indonesian Students During The COVID-19 Pandemic”** with Reference ID Number: 20819.

No conflict of interest exists in the submission of this manuscript, and manuscript is approved by all authors for publication. We would like to declare on behalf of my co-authors that the work described was original research which has not been published previously, and not under considerations for publication elsewhere, in whole or in part. All the authors listed have approved the manuscript that is enclosed.

In this work, we have revised our final manuscript according to the reviewer's suggestions. The change is highlighted in green color within the manuscript. We hope this revision is suitable for “International Journal of Public Health Science”.

We deeply appreciate your consideration of our manuscript. If you have any queries, please don't hesitate to contact us at the address below.

Yours Sincerely,

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Response to reviewers

Reviewer #1 comment:

ABSTRACT

1. The results showed that health science students have a better understanding than social science students ($P=0.000$).

Reviewer's comment: p-value is never equal to 0, so don't report $p = 0.000$, but $p < 0.001$

Author's reply:

We have improved according to the suggestions of reviewers

The revision statement is:

The results showed that health science students have a better understanding than social science students ($\rho < 0.001$).

2. This present study found that the level of knowledge is significant statistically influences psychological domain ($P = 0.020$), environmental domain ($P = 0.046$), and overall quality of life ($P = 0.047$).

Reviewer's comment: Correlation does not imply causation

Author's reply:

We agree and have revised the "statistically significant influences" sentence, change into "has a significant associated".

The revision statement is:

This present study found that the level of knowledge has a significant associated with psychological domain.

3. This present study found that the level of knowledge is significant statistically influences psychological domain ($P = 0.020$), environmental domain ($P = 0.046$), and overall quality of life ($P = 0.047$).

Reviewer's comment: Statistical symbols should be written in italic

Author's reply:

Thank you for pointing this out. We agree and have revised the statement.

The revision statement is:

The results showed that health science students have a better understanding than social science students ($\rho = 0.001$). This present study found that the level of knowledge has a significant association with psychological domain ($\rho = 0.020$), environmental domain ($\rho = 0.046$), and overall quality of life ($\rho = 0.047$).

Reviewer #1 comment:

INTRODUCTION

Our previous study examined the COVID-19-related knowledge before outbreaks in Indonesia, which found 83.8% of respondents had a high level [11]. In the meantime, Eduarda et al. reported that there was a deterioration in the quality of life (QOL) of populations in countries with COVID-19 cases [12]. To date, few studies have demonstrated the knowledge and quality of life level in Indonesian students during the pandemic. Many quality of life research in Indonesia is limited to patients with chronic diseases such as diabetes mellitus, tuberculosis, cancer, etc [12,13]. Continuous dissemination, strict isolation measures in the pandemic will affect student's learning process. It also does not rule out their possibility of depression, distress, and influencing their quality of life. Hence, our study examines the relationship between students' knowledge and quality of life during the COVID-19 pandemic.

Reviewer's comment: The novelty of your research needs to be strengthened. You have informed novelty regarding QOL, but novelty related to knowledge toward COVID-19 is still not strong. To strengthen the novelty of your research, you must compare your research with researchers who examine knowledge toward COVID-19 in Indonesia whose research is also published in a reputable journal.

Author's Response:

We have improved and added references according to the suggestions of reviewers.

Several studies examining COVID-19 related knowledge have been conducted among Indonesian populations. However, the respondents of those studies were non-health students [11,12] and the general public [13,14]. To the best of our knowledge, research showed the relationship between knowledge and quality of life in health and non-health students has not been carried out before. Nevertheless, our previous study examined the COVID-19-related knowledge before outbreaks in Indonesia, which found 83.8% of respondents had a high level [15]. In the meantime, Eduarda et al. reported that there was a deterioration in the quality of life (QOL) of populations in countries with COVID-19 cases [16]. To date, few studies have demonstrated the knowledge and quality of life level in Indonesian students during the pandemic. Many quality of life research in Indonesia is limited to patients with chronic diseases such as diabetes mellitus, tuberculosis, cancer, etc [16,17] Continuous dissemination, strict isolation measures in the pandemic will affect student's learning process. It also does not rule out their possibility of depression, distress, and influencing their quality of life. Hence, our study examines the relationship between students' knowledge and quality of life during the COVID-19 pandemic.

RESEARCH METHOD

1. RESEARCH METHOD .

Reviewer's comment: In your results, there is an analysis that compares the two groups of respondents. However, in your method, you have not explained that the respondents were grouped into two groups (health science and social science)

Author's Response:

We accepted the reviewer comment and added this statement in this part "Participants who did not complete respond to one or more items in the online survey were excluded. In our study, respondents were classified into health science and social science students. The student group clustering was intended to facilitate statistic analysis in comparing the obtained data."

2. INSTRUMENTS

Reviewer's comment: Is the instrument subsection stand alone and separate from the research method?

Author's Response:

Thank you for pointing this out. We agree and have improved according to the reviewer 's suggestion regarding incorporating the instrument into part of the method.

3. *Research Instrument*

Reviewer's comment: Convey the reliability of your instrument (if any)

Author's Response:

We have revised it to add the results of the instrument reliability test in this study.

The revision statement is:

"The reliability of the questionnaire has been measured using a Cronbach Alpha Coefficient with the value of 0.831"

4. RESEARCH METHOD

Reviewer's comment: You haven't described the data analysis technique you used

Author's Response

We agree and have improved the addition of data analysis in the sub-section of research methods.

"2.3 Data Analysis

Descriptive analysis was used to analyze the frequency of data on socio-demographic characteristics, the level of student knowledge, and the student's quality of life during the COVID-19 pandemic. The Kolmogorov-Smirnov test was used to determine the data normality. Our study found that the whole variables data have not normal distribution. Therefore, Spearman correlation test was performed to determine the association between the level of knowledge and each domain on quality of life. The independent t-test was also performed to determine the significant difference between the mean scores of knowledge in health science and social science students. The difference

between two variables is said to be statistically significant if the calculated p -value less than 0.05. Data were analyzed using SPSS version 21.0.

RESULTS

1.

Table 2. Student's level of knowledge

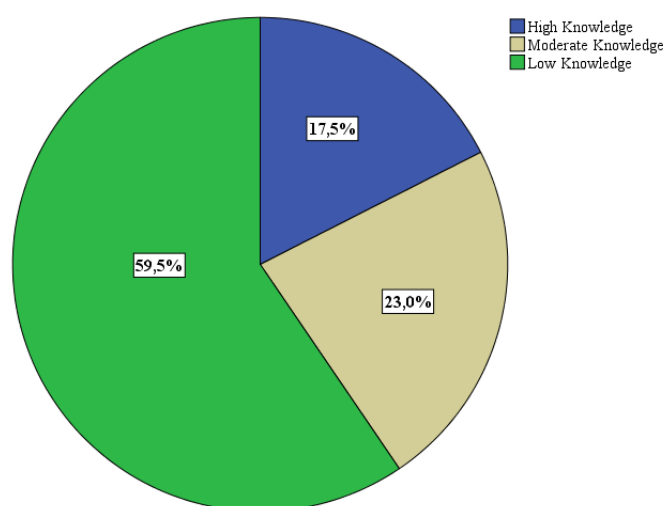
Level of Knowledge	n	%
Low Knowledge	119	59.5
Moderate Knowledge	46	23
High Knowledge	35	17.5

Comment [WU10]: Visualize your data using a pie graph

Reviewer's comment: Visualize your data using a pie graph

Author's response:

We agree and change it into pie graph



2. ($P=0.000$).

Reviewer's comment: p -value of what analysis? Your research method does not clearly convey the inferential statistical analysis your chose

Author's Response:

We revised and added this confirmation statement:

Based on the independent T test result, we can conclude that health students have significantly higher scores of COVID-19 knowledge than social students ($p =0.001$).

3. This finding is in line with a study conducted by Kistan et al. and Sahar et al., which stated that health students' knowledge about the prevention of COVID-19 in Indonesia was classified as good [17,18].

Reviewer's comment: Also compare it to several other reports that have examined the level of knowledge related to COVID-19 among students in Indonesia (such as the research I recommended at the end of your introduction)

Author's Response:

We have improved and added references according to the suggestions of reviewers.

“Previous studies have also reported the level of knowledge of Indonesian students based on majors of education. A study found that public health science students had higher knowledge scores compared to technology, socials, humanities students [11].

4.

Table 3. The mean score of knowledge of health and social science students

Students Type	Mean ± SD	p-value
Health science	7.57 ± 2.33	0.000
Social science	6.07 ± 2.36	

Comment [WU14]: p-value of what analysis?

Comment [WU15]: The p-value is

P-value (P=0.000).

Reviewer’s comment: p-value of what analysis?

Author’s Response:

Thank you for pointing this out. We revised and added this confirmation statement :

Table 2. The mean score of knowledge of health and social science students with independent t-test analysis

5. P-value (P=0.000).

Reviewer’s comment: The p-value is never equal to 0. Therefore, report this p-value by writing the $p < 0.001$.

Author’s Response:

We revised and added this confirmation statement:

Based on the independent T test result, we can conclude that health students have significantly higher scores of COVID-19 knowledge than social students ($p < 0.001$).

6. Social media is the most common source (61.5%), followed by television (18%), websites (11.5%), health workers (7.5%), others (1%) and friends/family/colleagues (0.5%). These results were in line with those reported that the main sources of knowledge were social media, the internet, and television [22].

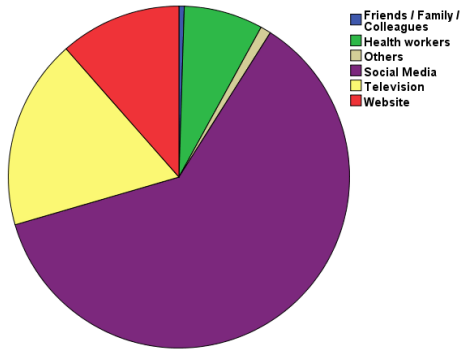
Reviewer’s comment: Reference no.19 is research in Jordan. Since you are researching in Indonesia, compare these findings to previous studies conducted in Indonesia. You can compare it with the following research:Fauzi, A., Husamah, H., Miharja, F. J., Fatmawati, D., Permana, T. I., & Hudha, A. M. (2020)

Author’s Response:

Thank you for pointing this out. We have improved and added references according to the suggestions of reviewers.

“In addition, a specific study related to COVID-19 knowledge has been conducted among Indonesian undergraduate students. Those studies indicated that as many as 38% of respondents frequently use social media platforms to obtain COVID-19 update information. It concluded that social media has become the most popular source of COVID-19 information [24].”

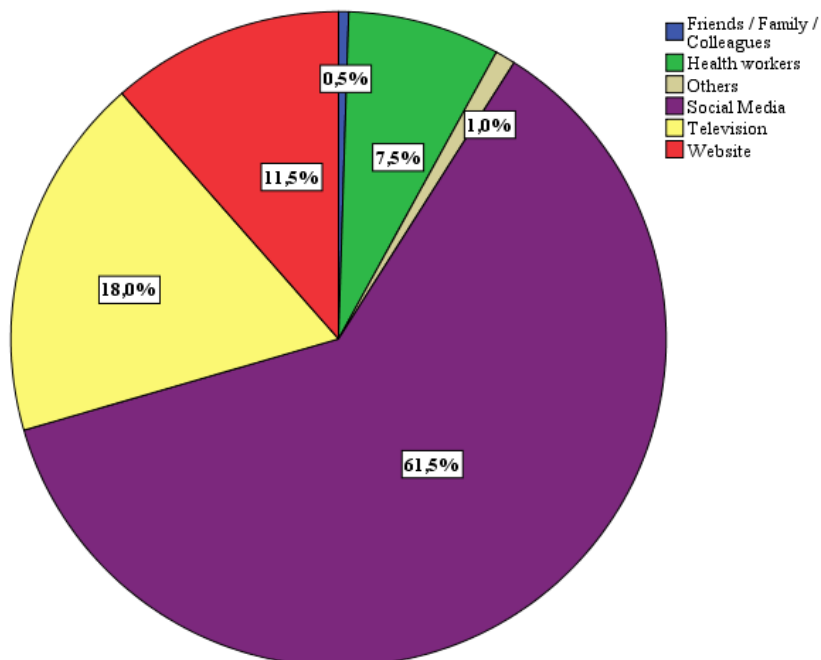
7.



Reviewer's comment: Add data labels to your charts

Author's Response:

Thank you for pointing this out. We agree and have add data labels in our charts.



8. This present study found that there was a significant relationship between the level of knowledge towards the psychological domain, environmental domain, and general quality of life ($P=0.020$, $\rho = -0.164$; $P= 0.046$, $\rho = -0.141$; $P=0,047$, $\rho = -0,141$, respectively).

Reviewer's comment: Statistical symbols should be written in italics, p-value of what analysis?

You have not clearly explained the inferencing statistics that you use in your research method

Author's Response:

We accepted the reviewer comment and added this statement to explain the analysis used in this study as described in the methods section.

“Regarding on the Spearman correlation test, our study stated that there was a significant relationship between the level of knowledge towards the psychological domain, environmental domain, and general quality of life ($\rho=0.020$; $\rho=-0.164$; $\rho=0.046$; $\rho=-0.141$; $\rho=0,047$; $\rho=-0,141$; respectively).

9. Finally, self-control is needed to mediate perception and quality of life during the COVID-19 pandemic.

Reviewer’s comment: Add a paragraph discussing the limitations of your research

Author’s Response:

Thank you for pointing this out. We accepted this reviewer’s comment. We would like to add the limitation in this study into these statements below:

“This study has several limitations, including the sample that was taken is less representative for Indonesian population. Considering the online questionnaire distribution, it is difficult to determine the exclusion criteria for paid leave students.”

10. **Reviewer’s comment:** Also add recommendations for further research

Author’s Response:

We have improved according to the suggestions of reviewers. The revision statement is at the end of the results section paragraph after an explanation of the limitations in the study.

The revision statement is:

“Therefore, further research needs to consider the larger sample with other specific criteria regarding knowledge and quality of life in obtaining more comprehensive research data.”