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Correlation of Knowledge and Beliefs to Adherence with Antibiotic Use in Adult Patients at a Private Hospital in Sidoarjo

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Abstract

Infectious diseases are one of the top ten causes of death in the world. Antibiotic therapy is administered for infectious diseases, but if bacteria are exposed to antibiotics continuously, then the bacteria are able to adapt to the medication, thereby resulting in antibiotic resistance. This condition results in an increase in mortality, long hospitalization period, and increased cost of antibiotic therapy and health services. Adherence to using antibiotics may be influenced by knowledge and beliefs about them. This study aimed to understand correlation between knowledge and belief with adherence to antibiotic use at a private hospital in Sidoarjo. This cross-sectional study, the data collected in three months period, was conducted with a questionnaire for assessment knowledge and belief. A pill count method was applied for assessment adherence to using antibiotics prescribed by doctors. The study results show that knowledge of the respondents was adequate for 76 people (69.7%), belief was adequate for 74 people (67.9%), and adherence to antibiotic use for 79 people (72%). Regression analysis showed that the variable that significantly influenced the adherence of patients in using antibiotics was perceived threat (p-value = 0,029). Sex, age, education, income, occupation, and marital status have no contribution to antibiotic knowledge, belief, and adherence.

Keywords: adherence, antibiotic, belief, knowledge, resistance

Introduction

Infectious diseases are the world's leading cause of death, with 3.2 million mortality rate for lower respiratory tract infection and 1.4 million mortality rate for tuberculosis infection. Antibiotics are a therapy provided to treat infectious diseases.[1] However, the bacteria exposed to antibiotics continuously adapt to this type of medication, thereby resulting in antibiotic resistance.

Antibiotic resistance can lead to an increase in mortality rate, long and costly hospital stay, and increased costs of antibiotic therapy and healthcare. Data from the World Health Organization (WHO) in 2014 in Thailand indicates an increase in the treatment cost of *E. coli* resistance to cephalosporine and quinolones from USD 108 to USD 528. An increase in the length of hospital stay to 4.65 days was also observed due to infections caused by methicillin-resistant *Staphylococcus aureus*.[2]

Strategies to reduce the incidence of antibiotic resistance, based on the WHO 2015 strategy, are improving awareness and knowledge of antibiotic resistance, strengthening knowledge through surveillance and research, reducing infection transmission, using antibiotics optimally, as well as investing in new drug discovery, diagnostic tools, and vaccines to fight antibiotic resistance.[3,4] Conducting inter-sector coordination among healthcare practitioners, financial departments, governments, and patients is necessary to achieve optimal results.[3] The implementation of the WHO strategy aims to perform an Antibiotic Stewardship Program. In hospitals, policies and guidelines on the rational use of antibiotics are needed to prevent antibiotic resistance.[4]

The Health Belief Model (HBM) suggests that a person's health behavior is influenced by factors that can be modified (age, sex, ethnicity, level of education, and knowledge), beliefs, actions triggered by the media, and other factors.[5,6] Previous studies conducted in Lithuania showed that 1,005 adult patients (61% of survey respondents) had low levels of knowledge about antibiotics.[7] A study in Maryland explains that patients' beliefs are shaped through several perceptions, such as perceived severity, perceived susceptibility, perceived benefit, and perceived barriers and cues to action, which in turn affect

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patients decision making on treatment.[8]

Interview results with 32 female and 14 male showed six types of patients' behavioral patterns in the community, including use of antibiotics in accordance with prescriptions, not taking drugs due to being busy at work, taking care of children or social activities, forgetting to take antibiotics, stopping the antibiotic intake when feeling better, reducing the use of antibiotics because they can damage the body, and stopping the consumption of antibiotics immediately to be stored for reuse, thereby eliminating the need to go to a doctor or a hospital.[8] This study aimed to determine the correlation of patients' knowledge and beliefs in adherence to using antibiotics at a Private Hospital in Sidoarjo, East Java.

Method

This cross-sectional study used a purposive sampling technique in which respondents who met the inclusion criteria were chosen by chance. This study was conducted at Sidoarjo Private Hospital from November 2017 to February 2018. The population consisted of patients who use antibiotics and the inclusion criteria were patients aged 18 - 60 years and did not work in the healthcare field. Exclusion criteria were patients with jobs as healthcare workers. Respondents who were willing to participate in the study signed an informed consent form.

A questionnaire was distributed to patients in the private hospital. Data collection conducted over three-month period from November 2017 to February 2018. A questionnaire was developed to assess the patients' knowledge, beliefs, and adherence to antibiotic use.[9-15] The independent variable in this study are knowledge and belief, and the dependent variable is adherence. The knowledge questionnaire used a Guttman scale and consisted of the following items: provision of drug information by health workers (two questions), antibiotic resistance prevention (three questions), guidelines on antibiotic use (four questions) and explanation for antibiotic resistance (one question). Correct answers were given a score of 1 and wrong answers were given a score of 0. The beliefs questionnaire was based on HBM using a Likert scale from disagree (1 - 3) and agree (4 - 5). Items in the beliefs questionnaire consisted of perceived barrier (eight questions), perceived benefit (eight questions), perceived threat (nine questions), and perceived self-efficacy (eight questions).[16,17]

Before data analysis, knowledge and beliefs were divided into three categories (low, moderate, and high) by calculating the mean of the respondents' total scores. Knowledge low score was below 4, moderate score ranged from 4 to 8, and high score was 8. Belief low score was below 93, moderate score was between 93 and 112, and high score was above 112. Patients' adherence to antibiotic use was divided into three categories, namely high (the respondent completed the course of antibiotics prescribed), moderate (the respondent missed one tablet / capsule of antibiotics), and low (the respondent missed more than one tablet / capsule of antibiotics).

Processing the collected data was conducted and explained to provide a description of the frequency distribution of demographic characteristics, categories of respondents' knowledge, and beliefs and adherence to using antibiotics. The statistical test used were independent sample t-test for sex groups and one-way Anova for age, education, employment, and marital status groups to determine differences in knowledge and beliefs in each demographic group with a confidence level of 95%. If the value of p-value < 0.05, a difference exists in the score of knowledge and belief in the demographic group.

Bivariable analysis was performed to determine the relationship between knowledge and beliefs (perceived benefit, perceived barrier, perceived benefit threat, and self-efficacy) with adherence to using antibiotics (p-value < 0.05) using Pearson's correlation analysis. Multivariate analysis was used to determine the knowledge and belief that contributed most to patients' adherence with antibiotics. The statistical test used was logistic regression by entering all the independent variables, namely knowledge and beliefs consisting of perceived benefits was one's belief in the effectiveness of various measures available in reducing the threat of disease, or the benefits felt in taking these health efforts, perceived barrier is a barrier that is felt to change, or if an individual faced an obstacle in taking the action, the perceived threat was a feeling about the seriousness of an illness, including evaluating clinical and medical consequences (for example, death, disability, and illness) and social consequences that may occur (such as effects on work, family life, and social relations), and self-efficacy is a person's belief in his/her ability to produce something that is desired. The dependent variable, which is adherence, had a confidence level of 95%. This study fulfilled ethical approval No. 025/S/KEPK/V/2017.

Results

The knowledge validity test was conducted on 30 patients using the "biserial point correlation coefficient" on 10 questions with a score of 0 and 1. The belief validity test was carried out on 32 questions with a 1 - 4 Likert scale using the "corrected item-total correlation" validity test. The results of the validity test of knowledge and belief show that the calculated r value is greater than r table ranging from 0.399 to 0.902 with r table 0.361 such that the questionnaire is valid.

Test of reliability of knowledge and belief used the Cronbach's alpha formula provided that a question has reliability if the Cronbach's alpha value is equal to or greater than 0.7. The reliability test showed that the value

of Cronbach's alpha obtained for knowledge of antibiotic use was 0.704 and the belief in antibiotic use was 0.713 so that the instrument was declared reliable.

Based on data collected from patients who had antibiotic prescriptions in the hospital, 109 respondents met the inclusion criteria and were willing to participate in the study. Table 1 shows that 52% of the respondents are female, 42.2% are in the 32 - 45 age group, 57.8% have a higher secondary education level, 45% work as employees, and 90% are married.

Based on Table 2, knowledge and beliefs in using antibiotics are divided into three categories, namely high, moderate, and low based on mean. Most respondents have moderate levels of knowledge of antibiotics (69.7 %) and majority of the respondents' beliefs about antibiotics are in the moderate category (67.9%). Respondents' adherence to using antibiotics is in the high category (72%).

Bivariable analysis shows that knowledge has a significant relationship to compliance using antibiotics with a correlation coefficient of 0.289 (p-value < 0.05). Table 4 shows that the more obstacles for patients taking antibiotics, the lower is the adherence to antibiotic use with a correlation coefficient of –0.030.

Table 5 shows the results of the logistic regression between knowledge and belief (perceived barrier, perceived benefit, and self-efficacy) with adherence to using antibiotics. The results indicated that knowledge, perceived barrier, perceived benefit, and self-efficacy did not have a significant relation to respondents' adherence to antibiotic use (p-value > 0.05). The variable that was significantly related to respondents' adherence to using antibiotics was perceived threat (p-value = 0.014). The higher the perceived threat felt by the respondents, the greater was their commitment to using antibiotics (β = 0.129, OR = 1.138, 95% CI = 1.026 - 1.262).

Table 1. Demographic of Respondents

Characteristic	Category	Total	
		n	%
Sex	Female	57	52.0
	Male	52	48.0
Age (years)	46 - 60	26	23.9
	32 - 45	46	42.2
	18 - 31	37	33.9
Education	Primary	14	12.8
	Secondary	14	12.8
	Higher secondary	63	57.8
	Diploma 3 / Bachelor / Master	18	16.5
Income	< IDR 2 million	35	32.1
	IDR 2 - 3 million	38	34.9
	> IDR 3 million	36	33.0
Occupation	Employee	60	45.0
	Unemployed	26	23.9
	Entrepreneur	17	15.6
	Student	6	5.5
Marital status	Married	90	82.6
	Single	18	16.5
	Divorced	1	0.9

Table 2. Level of Knowledge, Beliefs and Adherence to Use Antibiotics

Category	Knowledge		Beliefs		Adherence	
	n	%	n	%	n	%
Low	11	10.1	20	18.3	25	23
Moderate	76	69.7	74	67.9	5	5
High	22	20.2	15	13.8	79	72

Discussion

Antibiotics must be used rationally because using them in a manner that is not in accordance with the guidelines can cause antibiotic resistance. Evaluating the use of antibiotics in the community is useful to provide information that can help optimize the use of antibiotics in the community. As reported by Gasson, *et al.*,[18] as

Table 3. Relsults on Different Tests of Knowledge and Belief Based on Demographic Groups

Characteristic	Category	Knowledge	Belief
		p-value	p-value
Sex[a]		0.716	0.394
	Female		
	Male		
Age (years)[b]		0.582	0.421
	46 - 60		
	32 - 45		
	18 - 31		
Education[b]		0.168	0.094
	Primary		
	Secondary		
	Higher secondary		
	Diploma 3 / Bachelor / Master		
Income[b]		0.333	0.110
	< IDR 2 million		
	IDR 2 - 3 million		
	> IDR 3 million		
Occupation[b]		0.724	0.612
	Employee		
	Unemployed		
	Entrepreneur		
	Student		
Marital status[b]		0.175	0.329
	Married		
	Single		
	Divorced		

Notes: [a] t-test, [b] One-way Anova

Table 4. Correlation between Knowledge, Perceived Benefits, Perceived Barriers, Perceived Threats, and Self-efficacy with Compliance Using Antibiotics

Category	Coef. Correlation (r)	p-value
Knowledge	0.289	0.002
Perceived benefit	0.123	0.202
Perceived barrier	–0.030	0.755
Perceived threat	0.076	0.432
Self-efficacy	0.223	0.020

Table 5. Relation of Knowledge and Belief with Adherence to Antibiotic Use

Variable	Coefficient Non-standard		p-value	OR	95% CI for OR
	β	SE			
Knowledge	–0.032	0.122	0.793	0.968	0.762 - 1.230
Perceived benefit	0.066	0.053	0.317	1.068	0.939 - 1.215
Perceived barrier	–0.067	0.053	0.206	0.935	0.843 - 1.038
Perceived threat	0.129	0.047	0.014	1.138	1.026 - 1.262
Self-efficacy	0.049	0.066	0.306	1.050	0.956 - 1.152

Notes: SE: Standard Error, OR: Odd Ratio, CI: Confidence Interval

much as 68.7% obtain a prescription of one or more types of antibiotic drugs.

In term of knowledge, the majority of the respondents did not understand antibiotic resistance. Study conducted in Kuwait shows that public knowledge about antibiotic resistance was still relatively low. In this case, 51% (95% CI = 47.2 - 54.8) of respondents agreed that terminating the use of antibiotics leads to resistance. Knowledge of this antibiotic resistance in the study was still low at 52.5% (95% CI = 48.7 - 56.3).[15] A survey in the United Kingdom on the adult population showed that a lack of awareness of antibiotic resistance was strongly associated with self-medication antibiotics for influenza disease.[19]

Knowledge of antibiotics is influenced by various factors. A study conducted in Norway on adult subjects showed that the level of knowledge of patients using antibiotics was influenced by information provided by health workers, education levels, and a positive view on the value of medications in general.[20]

In terms of belief, patients' beliefs in this study consisted of perceived benefit, perceived barrier, perceived threat, and perceived self-efficacy.[5] The results of this study are in accordance with Jose J' study,[21] which showed no significant differences between demographic groups and patients' beliefs in using antibiotics. Study conducted on the adult population in the United Kingdom showed that belief in antibiotics for influenza-like illnesses and low awareness of antimicrobial resistance (AMR) significantly affected the use of antibiotics. In the study, 39% of groups with low AMR awareness would often ask doctors about antibiotics compared with groups with high AMR awareness (p-value < 0.001).[19]

Adherence of patients in using antibiotics was in the high category in which patients completed the course of antibiotics prescribed by doctors at Sidoarjo's Private Hospital. This study's results are consistent with Omani's study in Hong Kong that measured adherence with antibiotics using pill count method; the study found that adherence to using antibiotics did not differ among groups based on age, sex, and education level.[16,22] Other studies that used questionnaires as an instrument to measure patients' adherence to using antibiotics generated similar results in which no significant differences were found between groups based on age, sex, education level, income, and marital status on adherence with antibiotics.[21,22]

This study is in accordance with research conducted in the Saudi Arabia and Oman where knowledge of antibiotics was correlated with demographic characteristics such as sex, age, occupation, education level, and marital status.[18,21,23] However, previous research suggests that different age groups had significant differences in the knowledge of antibiotics used. The older the respondents, the lower the level of knowledge with regard to using antibiotics.[21] Different levels of education also showed significant differences in the knowledge of antibiotics in which respondents with higher education level had better knowledge about antibiotics.[21]

Patients' adherence may be influenced by age, sex, education level, knowledge, and beliefs in antibiotics.[6,15,24,25] Unwise use of antibiotics and incompliance with prescriptions could result in antibiotic resistance.[9] Antibiotic resistance then increases mortality rates, length of hospital stay, and costs of antibiotic therapy and health services.[2]

Regression analysis and HBM showed that perceived threats correlated significantly with patient compliance with antibiotic use.[5] In this study, no significant correlation was found between knowledge and adherence to using antibiotics, but previous study suggests that knowledge had a significant correlation with adherence to antibiotic use.[16,17,22] Thus, to improve patients' adherence to the use of antibiotics at the hospital, intervention is necessary with regard to patients' knowledge of antibiotics. The HBM showed significant differences between knowledge, perceived benefit, perceived barrier, and perceived threat in the two intervention groups: before and after being provided with education (p-value (0.001) < 0.05). However, the control group that was not provided with education showed no significant differences among the variables examined (p-value > 0.05).[26]

In addition to patients who must understand the antibiotics used, doctors and pharmacists play an important role in increasing knowledge of antibiotics. Doctors and

pharmacists should be good models to increase rational use of antibiotics in society and improve antibiotic use behavior. In addition, all health education institutions must pay close attention to providing rational antibiotic therapy knowledge and effective patient consultation skills.[24,27]

The strength of this study is that limited research has been conducted on knowledge, beliefs, and adherence to using antibiotics in the Sidoarjo, East Java Province. Hence, the results of this study can be used as a basis for policy making in hospitals in Sidoarjo or East Java. The limitation of the study is that most of the respondents used the Javanese language. Further study is needed to illustrate the use of antibiotics, so that steps can be taken to reduce antibiotic resistance in Indonesia.

Conclusion

The respondents' knowledge and beliefs about the antibiotics used in this study are in the moderate category, while adherence levels in antibiotic use are in the high category. No significant difference is observed in knowledge and beliefs in adherence to using antibiotics among groups based on sex, age, education, income, occupation, and marital status. Respondents' adherence to using antibiotics is not influenced by knowledge of antibiotics but by perceived threat of antibiotic use. Respondents' adherence to the use of antibiotics can be improved through education about any threat to antibiotic use. This study improves patient compliance in using antibiotics, namely, by increasing the knowledge of patients. In addition to doctors and pharmacists who play an important role in providing information to patients, health institutions must also provide knowledge of rational antibiotic therapy.

Abbreviations

WHO: World Health Organization; HBM: Health Belief Model; AMR: Antimicrobial Resistance

Ethics Approval and Consent to Participate

This study fulfilled ethical approval No. 025/S/KEPK/V/2017. Respondents who were willing to participate in the study signed an informed consent form.

Competing Interest

Author declares that there are no significant competing financial, professional, or personal interests that might have affected the performance or presentation of the work described in this manuscript.

Availability of Data and Materials

The data that support the findings of this study are available from the first author (Muhammad Hasan Wattiheluw) and are not publicly available for the confidentiality of study participants.

Authors' Contribution

Muhammad Hasan Wattiheluw, Fauna Herawati, Setiasih, and Rika Yuli were designing and conceptualizing the study. Muhammad Hasan Wattiheluw was collecting data. Muhammad Hasan Wattiheluw and Fauna Herawati were analyzing data. Muhammad Hasan Wattiheluw, Fauna Herawati, Setiasih, and Rika Yuli discussed and interpreted the final results. Fauna Herawati wrote the first draft of the manuscript. Muhammad Hasan Wattiheluw, Fauna Herawati, Setiasih, and Rika Yuli revised and contributed to the final manuscript.

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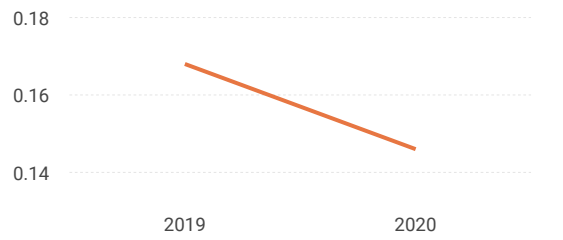

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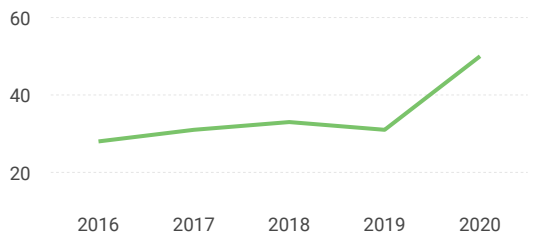

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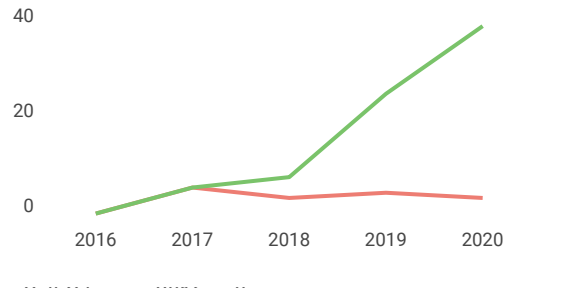

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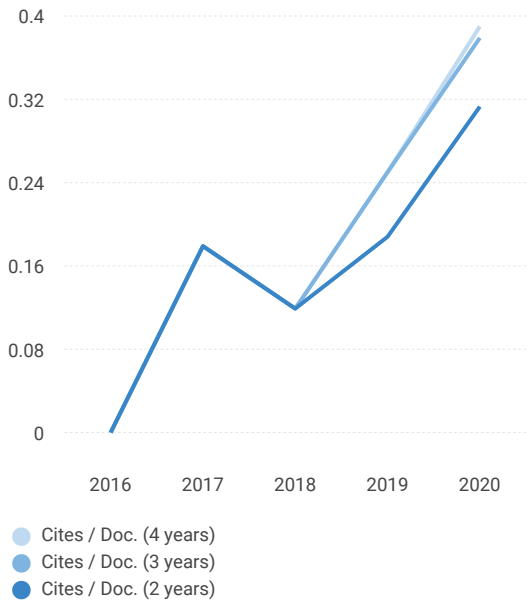

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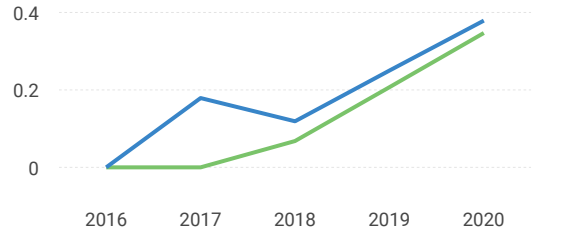

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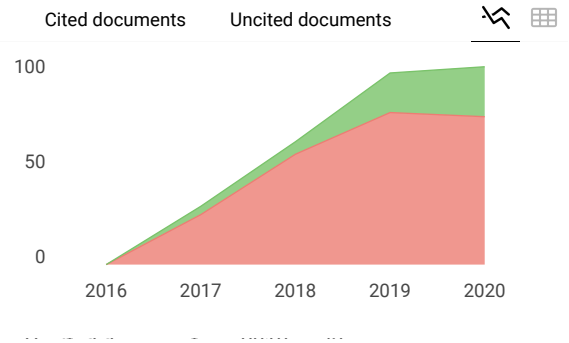

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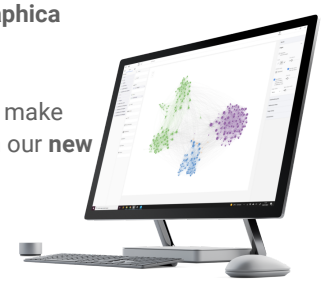

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I have one question. The Scopus coverage years of this journal are from 2016 to the Present but in Scimago the coverage only for 2016-2019. Could you give a reason, because I have many questions from the writers concerning this case?

Thank You.
Regards,
Dewi Susanna

reply

SCImago Team

Melanie Ortiz 8 months ago

Dear Dewi,

Thank you for contacting us. SJR is a portal with scientometric indicators of journals indexed in Scopus. All the metadata (Title, ISSN, Publisher, Coverage, Country, etc.) have been provided by Scopus /Elsevier in their latest update (April 2020) and SCImago doesn ´t have the authority over these data which are property of Scopus/Elsevier. Keep also in mind that the SJR is a static image of Scopus, the update is made only one time per year and changes regarding the coverage can not be done until the following update. Sometimes there is inconsistency between the data observed in the Scopus database and the data that they sent to us. Despite the inconsistency we can not make changes concerning some metadata as the coverage.

Best Regards, SCImago Team

M **Mohammad Nazmul Hoq** 8 months ago

Dear Dewi Susanna
Thanks for raising the concern regarding coverage of the years.

I **I Wayan Santiyasa** 9 months ago

will publish articles focusing on occupational health and safety, how much it costs to publish

reply

SCImago Team

Melanie Ortiz 9 months ago

Dear Wayan,
thank you for contacting us.
We suggest you visit the journal's homepage (See submission/author guidelines) or contact the journal’s editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

H **Hamdah** 10 months ago

what is the correct abbreviation of this journal

reply

SCImago Team

Melanie Ortiz 10 months ago

Dear Hamdah,
thank you for contacting us.
Unfortunately, we cannot help you with your request, we suggest you visit the journal's homepage or contact the journal’s editorial staff , so they could inform you more deeply.
Best Regards, SCImago Team

N **Nazmul Hoq** 10 months ago

Dear Melanie Ortiz

Is Kesmas: National Public Health Journal index in scopus?

Is Scimago consider the journal for ranking which indexed in scopus?

Thanks

reply

SCImago Team

Melanie Ortiz 10 months ago

Dear Nazmul,
Thank you very much for your comment.
All the metadata have been provided by Scopus /Elsevier in their last update sent to SCImago, including the Coverage's period data. The SJR for 2019 was released on 11 June 2020. We suggest you consult the Scopus database directly to see the current index status as SJR is a static image of Scopus, which is changing every day.
Best Regards, SCImago Team

F **fitriani kahar** 1 year ago

how to publis in this journal. thanks

reply

SCImago Team

Melanie Ortiz 1 year ago

Dear Fitriani, thank you very much for your comment, we suggest you look for author's instructions/submission guidelines in the journal's website. Best Regards, SCImago Team

Leave a comment

Name

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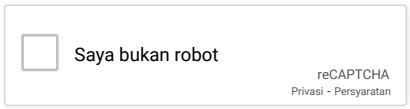

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The users of Scimago Journal & Country Rank have the possibility to dialogue through comments linked to a specific journal. The purpose is to have a forum in which general doubts about the processes of publication in the journal, experiences and other issues derived from the publication of papers are resolved. For topics on particular articles, maintain the dialogue through the usual channels with your editor.

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Source details

Kesmas

Open Access

Scopus coverage years: from 2016 to Present

Publisher: Universitas Indonesia, Faculty of public health

ISSN: 1907-7505 E-ISSN: 2460-0601

Subject area: Medicine: Health Policy | Medicine: Epidemiology | Medicine: Public Health, Environmental and Occupational Health

Source type: Journal

CiteScore 2020
0.4

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Calculated on 05 May, 2021

CiteScoreTracker 2021

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Last updated on 04 July, 2021 • Updated monthly

CiteScore rank 2020

Category	Rank	Percentile
Medicine — Health Policy	#208/242	14th
Medicine — Epidemiology	#88/99	11th
Medicine — Public Health,	#469/526	10th

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