

Awareness, Attitudes and Practices of Senior High School Students Concerning Air Quality Management and Air Pollution Control: Basis for Strategy Development about Environmental Education in Indonesia

Muhammad Dicky Darmawan¹, Aekkaroj Sunawong², Siti Syahra³ and Nikki Heherson A. Dagamac⁴

¹Advanced Educational Program, Thai Nguyen University of Agriculture and Forestry, Thái Nguyên, Vietnam

²Business and Technology, Stamford International University, Bangkok, Thailand

³PT. Aneka Bumi Pratama Company, Processing and Export of Crumb Rubber, Palembang, South Sumatra, Indonesia

⁴Institute of Botany and Landscape Ecology, University of Greifswald, Soldmannstrasse 15, D-17489 Greifswald, Germany

Abstract: Air pollution has been a serious environmental problem that troubles many developing countries in Southeast Asia for the last decades. This study was conducted to evaluate the level of perception of senior high-school students about air quality management and air pollution control strategies in Palembang City, Indonesia. This cross-sectional study randomly distributed a validated 35 items questionnaire among 872 respondents coming from 6 public schools. This comprehensive survey have showed that (i) majority (62.2%) identified poor air quality for the city but very low knowledge on topics related to air pollution, (ii) students identified digital platforms especially social media (88.0%) as a major source of information, (iii) the inconsistency between students attitude towards better air quality management with their personal practices. Policies that involve improvement on the curriculum of environmental education in Indonesia are recommended to increase the proactivity of the younger generation towards a more sustainable mitigation of air pollution problem in the country.

Keywords: atmospheric pollution, ASEAN, educational policies, public health, quality education, SDGs

INTRODUCTION

As an important prerequisite for a more sustainable environment and safer public health, clean air has become a scarce good in many metropolitan cities in the world particularly in developing Asian nations. Besides being considered as a major health problem (Greenstone *et al.*, 2019) that leads to increasing global death caused by chronic respiratory diseases (Khaltaev *et al.*, 2019), the ambient air pollution is also known to create burdening environmental impacts i.e. formation of acid rain, and ozone depletion (Manisalidis *et al.*, 2020). From thick smog that hangs over the urban cities to the smokes build from indoor activities (Kelly *et al.*, 2019), the air pollution problem is certainly becoming a major threat that affects the lives of people thriving in poor nations.

As proof, reports from the World Health Organization (WHO) have showed that ca. 91% of the global population lives in places where air quality levels already exceed the limits WHO have set. These places are characterized from low- to middle income countries such as those that are positioned in the Western Pacific and South East Asian region including Indonesia (Basri *et al.*, 2020). Alarmingly, over the last period of years (1990 – 2017), Indonesia has contributed an average of 7.79% shares of global death rates from air pollution alone. This figure shows a clear trade-off between economic growth and environmental sustainability for Indonesia. In fact there were a lot

of industrial companies that have been rapidly building (Nurlis, 2019; Suryati *et al.*, 2018) and even many private vehicles powered by fossil fuels have been increasing in sales just during the last decades (Liebman *et al.*, 2019). Air pollution in the city of Palembang which is caused by forest and land fires. Thus, causing thick smog, and in addition to reducing visibility, this also produces a distinctive smoke odor, sore in the eyes, shortness of breath and the sun will look reddish orange in the afternoon.

To at least alleviate the air pollution problem caused by many outdoor or indoor activities of the Indonesian populace, policies and regulations even at a local level should be implemented. Nevertheless, educating the younger generation, especially the digitally inclined 21st century learners about their vital role in improving air quality is seen as a “win-win” tactic for both the climate and health problems (Galan-Martin *et al.*, 2018; Martinez *et al.*, 2019), teaching them how they can decrease the amount of diseases attributable to air pollution and at the same time teaching them how they can contribute on climate change mitigation.

Increasing the level of awareness about major environmental problems is expected to at least change the environmental apathy and irresponsible human practices towards nature. These knowledge and awareness most especially on pressing issues

about air quality and air pollution control can be integrated in environmental education curriculum of many high schools in the ASEAN region. Since this generation of students are considered to be the next educated workforce for a developing country that would combat the current plight against air pollution, baseline information regarding their perceptions about the problem should be urgently documented. As of now, there is an absence of research in this topic where students' environmental understanding in Southeast Asia is tackled.

METHODOLOGY

Preparation, selection of respondents and ethical considerations

For this cross-sectional study, a questionnaire that was adapted from Liao *et al.* (2015) was modified and was face validated by independent senior ASEAN high-school science teachers. Based on the suggestions of the five validators, the questionnaire was valid and reliable for the purpose of the study and was administered on a sample of 20 respondents for an initial pilot study. The result of the pilot study was then use to modify some questions in the questionnaire. A probability based stratified random sampling was employed for this study (Fig. 1).



Figure 1: Data Collection Process

A total of at least 872 students were then sampled from 5 randomly selected public schools and 1 private high school in Palembang from 3 – 14 of February 2020 after acquiring an official academic consent from the head of the Palembang municipal education ministry. The study was then endorsed on the respective schools and arrangement with the school directors limited only to the senior high-

school students who were enrolled as Grade 10, 11, or 12 students at the time of the data collection. Students that were chosen to participate in the survey were then oriented about the goals of the study and the process of data gathering. Before the start of the actual survey, students were also guaranteed about the confidentiality of information that they will share for the study. During the data

collection process, the researchers were physically present to answer questions that were raised by students or for clarification purposes.

SURVEY INSTRUMENT

The validated survey questionnaire that is composed of 35 items was divided into four different sections. The first section is about the demographic background of the respondent which includes its gender, age, current senior high school level, travel experience, and transportation means to go to the campus. The second part tackled about student's awareness and their demand of information about air quality management and air pollution in Palembang wherein they answered multiple choice responses. The third part of the questionnaire involves the attitude of the student participant where they answered a 4 point Likert's scale that was ranked from 1 (being strongly disagree) to 4 (being strongly agree). The last section of the questionnaire contains questions regarding the participants' practices to mitigate air pollution problem. The responses are again in an ordinal scale that is composed of 1 (never), 2 (sometimes), 3 (often), and 4 (always).

CONTENT ANALYSIS

During data collection process, all participants were given an explanation the purpose of this study. Data collected from student participants was carefully coded in spreadsheet MS Excel files. Moreover, the data was systematically categorized, compared, and summarized to explicitly derive the perceptual context of the student participants reported in this study. Likert scale and descriptive graph are then built based on the analyzed data set.

RESULTS AND DISCUSSION

Characteristics of the Participants

A total of 872 questionnaires were distributed for the whole study with a 100% response rate. The demographic profiles (Table. 1) of the survey respondents showed higher number of females (58.26%) than males (41.74%). The highest age brackets are from ages 16 – 17 (64.45%). The distribution of students showed that 38.76%, 30.16%, 31.08% came from senior high school levels Grade 10, 11, and 12 respectively. In terms of travel experience majority of the students have been able to have a national travel experience within the Indonesian archipelago (58.60%) and utilizes private car vehicles as a means of transportation (73.05%) to go from their houses to the schools.

Table 1: Demographics of the sample

Variable/category	Frequency	Percentage
Gender		
Male	364	41,74
Female	508	58,26
Age		
14-15	267	30,62
16-17	562	64,45
18-19	43	4,93
Grade level		
Grade 10	338	38,76
Grade 11	263	30,16
Grade 12	271	31,08
Travel Experience		
Local	265	30,39
National	511	58,60
International	96	11,01
Transportation Means		
By foot	43	4,93
By bicycle	10	1,15
By public vehicle	182	20,87
By private vehicle	637	73,05

Awareness

From the 872 respondents, 62.2 % agreed that the air quality in Palembang city is bad during the last three years. The students’ response regarding their knowledge about fine particulate matter in the air (PM 2.5) and on how air quality is measured have showed that 77.1% and 74.4%, respectively, have no idea on such topics related to air pollution. Nonetheless, the respondents identified natural sources (28.3%), such as the recent forest fire events, to be the major source of air pollution in the study area. The students identified that people’s health (45.0%), environmental visibility (27.5%), and natural ecology (19.7%) will get the most impact on the current situation of air quality in Palembang. In terms of information demands, students identified digital platforms (88.0%) as a major source where to get information regarding air pollution. Meanwhile, students either do not know (69.4%) or they are uncertain (27.1%) about air pollution control projects or policies implemented by the local government unit of Palembang. Looking at how schools play as an agent of information about air quality and air pollution, majority (61.9%) of the student respondents thought that it should be given more emphasis in their lessons at school. This is further affirmed when 56.4% agreed to the idea that this should be added as a separate subject in their current curriculum.

Attitudes

In terms of students’ attitude towards the air quality in Palembang (Fig. 2), a very low

satisfaction (10.4%, mean Likert score = 1.88) among the respondents has been noted during the last years. Majority of the students (93.1%, mean Likert score = 3.05) expressed their level of agreement to describe the air quality as poor. This situation showed that 83.9% (mean Likert score = 2.93) are worried for the possible aggravation of air quality in Palembang. In terms of identifying the responsibilities of stakeholders, students conveyed that local government units should take responsibilities in controlling the air pollution problem (98.5% showed level of agreement, mean Likert score = 3.58), schools should incorporate topics of air pollution in their classroom discussions (90.2% showed level of agreement, mean Likert score = 3.06), and they should themselves start their individual efforts to reduce the impacts of air pollution (94.4% showed level of agreement, mean Likert score = 3.27). Students expressed optimistic attitude towards the improvement of air quality in Palembang as 93.3% (mean Likert score = 1.71) answered a level of disagreement in the item that states “air quality in Palembang will never improve”. This hopeful attitude among the student respondents are ascertained by their certain level of agreement to be proactive in spreading awareness about air quality (89.0%, mean Likert scale = 2.99), participating in school activities or projects that would control air pollution (90.0%, mean Likert scale = 3.04), and supporting initiatives to integrate air quality as a topic in their science curriculum (68.6%, mean Likert score = 2.73).

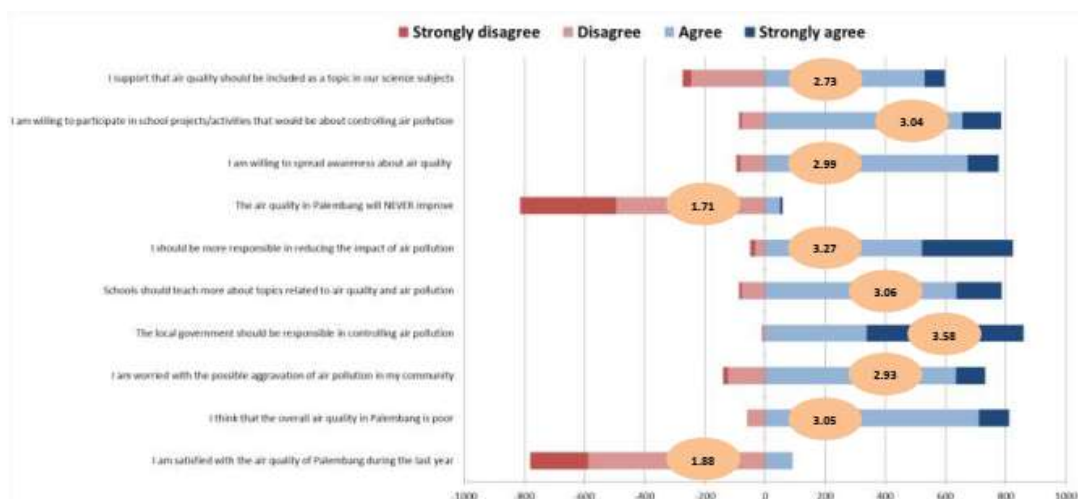


Figure 2: Display the student’s attitudes towards air pollution. These statements were distributed to the students in the form of a likert-scale test. The orange circles in the graph indicate the average score of the students per statements

Practices

The current practices of the student respondents (Fig. 3) seems to show differences on the

frequency of certain actions or habits that are associated with air quality management and air pollution control. In terms of practices in their own

homes, majority of the students expressed low frequency (sometimes-never responses) of putting air purifiers (74.4%), taking care of natural plants at home (60.2%), and burning waste materials (90.8%). In terms of the utilization of transportation vehicles, majority of the students expresses low frequency of using public transports over private vehicles (73.7%) and cutting down personal commuting during weekends (64.6%) but noticed that they prefer to walk or use bicycles in

going to short distance itineraries either often or always (53%). In terms of other personal practices, although majority of the students at that time responded to rarely wear masks to protect themselves on smokes or smogs (80.3%), majority of the students rarely practiced using deodorant or sprays that contains aerosols that harms the air (68.6%) and make it as common (often-always) habit to make themselves aware of the daily air quality situation in Palembang (56.3%).

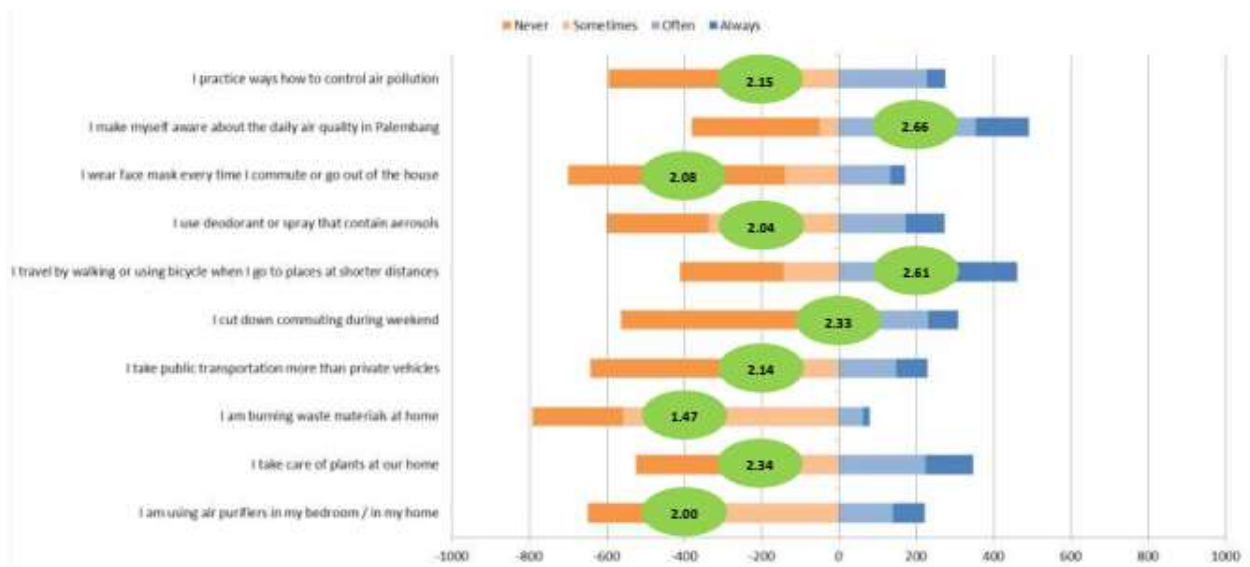


Figure 3: Student’s practices towards air pollution displays the likert-scale results of how the student’s act in controlling air pollution. The green circles in the graph showed the average score of the students per statements

DISCUSSION

At present, air pollution has become a major environmental problem in Indonesia and the world. Indonesia's economic development has brought about a complex set of social and environmental problems. Unfortunately, a gap on how the youth sectors in the country perceive such pressing environmental issues like air pollution is still deficient up to this date. This study now utilized a survey to find out the awareness, attitudes, and practices (AAP) of senior high school students on air quality management and air pollution control in Palembang. Information for this study can be used for possible policy recommendations that will urge the local government unit of Palembang, Indonesia to improve the situation of poor air quality haunting the country during the last decades.

The Level of Awareness among Student Respondents

The awareness of most students regarding the air pollution problem in Indonesia seems to be selective. This is seen from the result when 62.2 % students agreed with the poor air quality in Palembang during the last three years but 77.1% and 74.4% have expressed the lack of idea regarding fine particulate matter in the air (PM 2.5) and air quality measurements, respectively. Perhaps, the students have observed the rampant smog event that consistently transpired in Palembang for the last years and associate it with the poor air quality in the city. Recognizing the poor air quality in Palembang is based on experience, which happens every year, with what they see and feel. Unfortunately, it is not accompanied by the availability of information about air quality or related to this in their schools, so that students do not really know about particulate matter (PM 2.5) or how to measure air quality.

Most of them clearly identified certain causes of the smog problem in Palembang over the last decade. Forest fires that had transpired over the last years in the city of Palembang seem to be the main source of air pollution identified by most student participants. According to Ramdhan, *et al.*, (2018) who conducted a research in Palembang, found that more than two-thirds of children and adults experience sneezing, nasal congestion, influenza, dry cough, and even respiratory symptoms during episodes of wildfires. In conclusion, particle pollution in the city of Palembang caused by forest fires is dangerous to human health. This is followed by anthropogenic activities such as motor vehicles and waste burning activities. The dry season is an opportunity for large companies and farmers to burn forests / peatlands to open new land. Fires caused by human activities in the utilization of natural resources, such as the burning of vegetation or the deliberate burning of shrubs, to prepare agricultural land but are not controlled. So that their negligence in putting out fires can cause forest and peatland fires. This practice of burning is mainly done by poor farmers who do not have cost effective alternatives to open land for agriculture.

Interestingly, the students' responses from our study showed that 88.0% of students identified digital platforms as the main source of information about air pollution. Based on research conducted by Machmud, (2018) in Gorontalo, Indonesia, the results showed that easy to get information, most students believe that the use of smartphones must be integrated into the teaching and learning process. Therefore social media has been identified as an easy source of information among Indonesian high school students regarding reports on environmental issues. Nevertheless, as what have shown in our findings that students have either have no idea (69.4%) or uncertain (27.1%) about local government policies implemented in the city proves that in spite of acquiring information through social media platforms is much easier, students' knowledge on important government policies regarding air pollution control is still considerably lacking. Like for an instance the government policy that has ratified Law Number 32 of 2009 concerning environmental management, which in the field of air pollution control whose operations still refer as the

Government Regulation of the Republic of Indonesia Number 41 of 1999 concerning Air Pollution Control, and Decree of the Minister of the Environment Number 15 of 1996 about the Program Langit Biru (*Blue Sky Program*) as an air pollution control program in Indonesia, by limiting the maximum emissions allowed to be discharged into the environment. This is a government policy that is related to one another, which focuses on protecting the environment. Therefore it would be better if the existing policies were socialized through the school program. So students can better know the existing policies regarding environmental problems, and later students are expected to be able to contribute in reducing and overcoming existing environmental problems.

Furthermore, the supposition of policy unawareness have been also demonstrated in the semi-structured interviews conducted among selected students of Palembang regarding their perceptions on getting necessary information about air pollution inside their classrooms opting them to rely heavily on filtering their own information they obtain in many social media platforms (Darmawan, Syahra & Dagamac 2020, *manuscript in review*). In the study of Darmawan & Dagamac, (2020) many Indonesian teachers highlighted that Environmental Education (EE) nowadays is very urgently needed to address the issue of making many Indonesian students to be more environmentally aware on pertinent environmental issues such as air pollution. Another study in Indonesia by Wekke, *et al.*, (2019), explained that teaching students to live based on experiential learning approach, through activities and a series of environmental agendas will be more effective, so that students will be able to explore opportunities to participate in sustainable growth. Their studies have showed that such intervention program successfully enables students to show their passion and strength in building a better environment. Nonetheless, the responsibility of several stakeholders such as government, schools, and personal self must be also prioritized. Because the government is the policy maker (Maheswari, *et al.*, 2018), the school is the place to deliver the policy through existing programs (Hafiar, *et al.*, 2019; La Fua, *et al.*, 2018), while the personal self is the one who runs the policy (Pane, *et al.*, 2016).

The Disconnect between Students Attitudes and Practices

Interestingly, in this study it was found that the attitudes and certain practices of the students seemed to be incompatible. This means that what the majority thought about was not what the majority really practiced. Seen from their actions that are not in accordance with what they think, our results have noted that majority of the student respondents believe that they need to (i) be proactive in spreading awareness about air quality and (ii) participate in school activities or projects that would control air pollution but does not frequently practiced of taking natural plants at home or using air purifier. Additionally, majority of the students have been dissatisfied with the poor air quality in Palembang brought by factors like forest fires or motor vehicle activities but still does not always practice wearing face masks to protect them from smogs or even cutting the possibility of commuting during weekends. Majority of student respondents know the causes of increased air pollution, and most of them agreed that the air quality in the city of Palembang is in poor condition, even agreeing to have the worries that the poor air quality will affect their health. However, due to the high level of student lifestyle in Palembang, which behaves with a practical life in the modern era like today. Similar with the Hedonist lifestyle, majority of the youth spends excessively and lives a luxurious life (Alexander & Sysko, 2013). This can cause them not to care about things that could potentially endanger them. This can be seen from how student respondents preferred to use their private vehicles as a means of transport within the urban city of Palembang.

A study conducted by Nurmansyah, *et al.*, (2019) in Depok Indonesia, found that attitudes can cause smoking behavior, in many cases. Because, the majority of students are aware that smoking causes health problems. However, their behavioral perceptions state that smoking can make someone more confident, cool, make it easier to make friends, can eliminate stress, symbolize manhood and virility, and this is statistically significant with smoking behavior. And another study conducted by Koch, *et al.*, (2013) indicated that Indonesia strives to include environmental education in its school curricula, the results highlight that future educators themselves are not well equipped to address pressing issues of resource and biodiversity loss. According to Jackson, (2005), reported on a sustainable development strategy,

there are some obstacles to change in behavior. This is a social context, external conditions, personal norms and habits. Similarly related to the research conducted by Sengupta, *et al.*, (2010) explain that there is a barrier between awareness and actions involving other important independent variables. This study also found a moderate correlation between the two variables. According to Aminrad, *et al.*, (2013), the results showed that the low level of relationship between awareness and practices of students about environmental problems. Another research was conducted by Oruonye, (2011) in Jalingo, Nigeria, which showed that 81.8% of respondents have heard about climate change.

However, 89% of the students interviewed said they did not know what climate change was, their cause, its effects, and the possibility of adaptive or mitigating actions, and even 18.2% of them had never heard about climate change before. This inconsistency between students' attitudes and practices have been demonstrated on other related studies: Ulhasanah, *et al.*, (2018) have conducted a study in Padang, Indonesia, regarding Solid Waste Management (SWM), wherein residents' understanding regarding SWM is also inconsistent with how such implementation should be delivered among residents who are characterized to be "least environmentally concerned" citizens. Another study conducted in the Philippines explained that a higher rating of attitudes (71.0%) on matters related to SWM, but less than half (43.1%) indicating the level of practice related to SWM (Barloa, *et al.*, 2016). While in Malaysia it is totally different, where most students are aware of the risks of harm to the environment, by showing their practice that is environmentally friendly and has a very supportive pro-environment attitude (Tiong, *et al.*, 2020). Nonetheless, the optimistic attitude of the 93.3% of the student respondents as shown on their disagreement in the item that states "air quality in Palembang will never improve" implicates that with proper information on the right practices that they can do to at least minimize the growing effect of air pollution in the country coupled with environmental motivation that they can get from their schools, Indonesian students can be harbinger of change in the next years.

Implications Towards the Improvement of Environmental Education in Indonesia

On the basis of students' response regarding their perception on different stakeholders' responsibilities, a lion share of the students respondents identified the role of one's self, the government and especially the education system to control air pollution problems. In particular, the 68.6% of students that agreed to supporting initiatives that would integrate air quality as a topic in their science curriculum elicits the demand for better environmental education within the four corners of most Indonesian classrooms. As the country with the most Muslim population in the world, Indonesian classroom instructions have been characterized of having religion-based objectives and religion-based pedagogies (Parker, 2017). In fact, many religious activities are connected with environmental conservation, as noted in the study of Mangunjaya, (2011) that reported that the Ulemas (*religious leaders*) in Indonesia were very supportive in mobilizing Muslims to participate in natural and environmental conservation efforts. This is because the ulemas already understood how severe the environmental damage and religion have the responsibility for stopping and reversing it. Integrating religion in education can also influence behavior change of most students in the environment. Many verses in the Qur'an (*Islamic guidebook*) mention about protecting the environment. One of them is Surah Ar-Rahman which explains that human beings are trusted as khalifah (*caliphs*), means as a representative of Allah SWT on this earth, human beings have the spiritual duty to protect the earth. According to study by Yaacob, *et al.*, (2017) conducted in Malaysia, which focuses on 3 aspects (*practiced, experienced, and motivated by the values advocated by Islam*), the results showed that (a) Pre-cycling, reusing and recycling are the common types of practiced by Muslims in Malaysia; (b) The transformation process of experienced by Muslims in Malaysia is not accelerating at the speed that we hoped for; and (c) The transformation of Muslims in Malaysia is motivated more by economic and social factors as well as level of education and regulation enforcement to the values advocated by Islam. Another study conducted by Khan, *et al.*, (2018) among muslims students in India, the findings suggest that religiosity significantly and positively affects collectivism values of consumers. While in Iran, a study conducted by Ameri, *et al.*, (2017),

the findings of the study indicate that the different dimensions of religiousness are related to students' tendency to avoid risky behavior. Thus, it appears that religion may have a role to play in preventing risky taking behavior in Iran.

Seen from what is obtained in this study, where there is a mismatch between the attitudes and practices of high school students towards air pollution control. For this reason, implementing environmentally friendly programs in schools is urgently needed, both in theory and practices, because this will help increase student interest in environmental issues. On the other hand, it would be better if the implementation of the program is based on religious values, which religion can influence student behavior, we know that all religions teach us to protect the environment. So that the program is expected to help in increasing student awareness about existing environmental problems, especially regarding air pollution that occurs every year in Palembang. In this case, it is clear that religion will plays an important role in efforts to protect the environment, especially in Indonesia.

CONCLUSION

Based on what has been found, the level of high school students' perceptions about air quality management and air pollution control strategies in Palembang, which are influenced by various factors; gender, age and education level. Nevertheless, the lack of application of environmental education in schools has contributed to the low level of student practices in controlling air pollution. However, the role of government in the application of environmental education is urgently needed at this time. Because, it can be seen from the mismatch between the attitudes and practices of students towards air pollution control. For this reason, innovative application of environmental education through school programs, both theoretically and more interactive activities based on religious values, would be better in the process of changing student behavior in overcoming environmental problems, in this case *air pollution*.

ACKNOWLEDGEMENTS

Thanks to The Headmaster of Senior High Schools: SMAN1, SMAN2, SMAN3, SMAN10, SMAN12, & SMKPGRI1, to all students and teachers in Palembang who involved in this

research. Especially to the Head of the Ministry of Education in Palembang (provincial level).

REFERENCES

- Alexander, C. S. & Sysko, J. M. "I'm Gen Y, I love feeling entitled, and it shows." *Academy of Educational Leadership Journal* 17.4 (2013): 127.
- Ameri, Z., Mirzakhani, F., Nabipour, A. R., Khanjani, N. & Sullman, M. J. "The relationship between religion and risky behaviors among Iranian university students." *Journal of religion and health* 56.6 (2017): 2010-2022.
- Aminrad, Z., Zakariya, S. Z. B. S., Hadi, A. S. & Sakari, M. "Relationship between awareness, knowledge and attitudes towards environmental education among secondary school students in Malaysia." *World Applied Sciences Journal* 22.9 (2013): 1326-1333.
- Barloa, E. P., Lapie, L. P. & de la Cruz, C. P. P. "Knowledge, attitudes, and practices on solid waste management among undergraduate students in a Philippine State University." *Journal of Environment and Earth Science* 6.6 (2016): 146-153.
- Basri, M. C. & Hill, H. "The Southeast Asian economies in the age of discontent." *Asian Economic Policy Review* (2020).
- Darmawan, M. D. & Dagamac, N. H. A. "Situation of environmental education in senior high-school programs in Indonesia: Perspectives from the teachers of Palembang." *Interdisciplinary Journal of Environmental and Science Education* 17.3 (2021): e2241.
- Darmawan, M. D. & Dagamac, N. H. A. "Students' insights on teaching air pollution in Indonesian classroom: A report based from semi-structured interviews." *Journal of STEAM Education* 4.1 (2020): 82-92.
- Galan-Martin, A., Pozo, C., Azapagic, A., Grossmann, I. E., Mac Dowell, N. & Guillén-Gosálbez, G. "Time for global action: an optimised cooperative approach towards effective climate change mitigation." *Energy & Environmental Science* 11.3 (2018): 572-581.
- Greenstone, M. & Fan, Q. C. "Indonesia's worsening air quality and its impact on life expectancy." *Air Quality Life Index* (2019): 1-10.
- Hafiar, H., Harding, D., Kadiyono, A. L., Nugraha, Y., Ma'mun, T. N., Siswadi, A. G. P. & Wibowo, H. "Source of Information About Environmental Awareness in Growing Green Ethos For Junior High School Students in Bandung, Indonesia." *Journal of Physics: Conference Series* 1175.1 (2019): 012170.
- Jackson, T. "Motivating sustainable consumption." *Sustainable Development Research Network* 29.1 (2005): 30-40.
- Kelly, F. J. & Fussell, J. C. "Improving indoor air quality, health and performance within environments where people live, travel, learn and work." *Atmospheric environment* 200 (2019): 90-109.
- Khaltaev, N. & Axelrod, S. "Chronic respiratory diseases global mortality trends, treatment guidelines, life style modifications, and air pollution: preliminary analysis." *Journal of thoracic disease* 11.6 2643 (2019).
- Khan, M. N. & Kirmani, M. D. "Role of religiosity in purchase of green products by Muslim students." *Journal of Islamic Marketing* (2018).
- La Fua, J., Nurlila, R. U. & Wekke, I. S. "Strategy of Islamic Education in Developing Character Building of Environmental Students in Indonesia." In *IOP Conference Series: Earth and Environmental Science* 175.1 (2018): 012149.
- Liao X, Tu H, Maddock, J.E., Fan S., Lan G., Wu, Y., Yuan, Z.K., Lu, Y. "Residents' perception of air quality, pollution sources, and air pollution control in Nanchang, China." *Atmospheric Pollution Research* 6 (2015): 835-841.
- Liebman, A., Reynolds, A., Robertson, D., Nolan, S., Argyriou, M. & Sargent, B. "Green Finance in Indonesia." (2019).
- Machmud, K. "The smartphone use in Indonesian schools: the high school students' perspectives." *Journal of Arts and Humanities* 7.3 (2018): 33-40.
- Maheswari, H., Yudoko, G. & Adhiutama, A. "Theory building of quattro bottom line approach for sustainable reverse logistics from government perspective: The Indonesia evidence." *Advance in Science, Technology and Engineering Systems Journal* 3.3 (2018): 83-98.
- Manisalidis, I., Stavropoulou, E., Stavropoulos, A. & Bezirtzoglou, E.

- “Environmental and Health Impacts of Air Pollution: A Review.” *Frontiers in Public Health* 8 (2020).
21. Mangunjaya, F. M. “Developing environmental awareness and conservation through Islamic teaching.” *Journal of Islamic Studies* 22.1 (2011): 36-49.
 22. Martinez, F., Peattie, K. & Vazquez-Brust, D. “Beyond win-win: A syncretic theory on corporate stakeholder engagement in sustainable development.” *Business Strategy and the Environment*, 28.5 (2019): 896-908.
 23. Nurlis, N. “Carbon Emission Disclosure in the Proper Rating Company's Annual Financial Statements in Indonesia Stock Exchange.” *Carbon* 10.12 (2019).
 24. Nurmansyah, M. I., Umniyatun, Y., Jannah, M., Syiroj, A. T. & Hidayat, D. N. “Knowledge, attitude and practice of cigarette smoking among senior secondary school students in Depok, Indonesia.” *International journal of adolescent medicine and health* (2019).
 25. Oruonye, E. D. “An assessment of the level of awareness of the effects of climate change among students of tertiary institutions in Jalingo Metropolis, Taraba State Nigeria.” *Journal of Geography and Regional planning* 4.9 (2011): 513-517.
 26. Pane, M. M. & Patriana, R. “The Significance of environmental contents in character education for quality of life.” *Procedia-Social and Behavioral Sciences* 222 (2016): 244-252.
 27. Parker, L. “Religious environmental education? The new school curriculum in Indonesia.” *Environmental Education Research* 23.9 (2017): 1249–1272.
 28. Ramdhan, D. H., Rizky, Z. P., Atmajaya, H. & Kurniati, A. “Particulate Matter and Subjective Respiratory Health Effect Measurements in Palembang during Forest Fire Episode in October 2015.” *KnE Life Sciences* (2018): 355-361.
 29. Sengupta, M., Das, J. & Maji, P. K. “Environmental awareness and environment related behaviour of twelfth grade students in Kolkata: Effects of stream and gender.” *Anwesa* 5.1 (2010): 1-8.
 30. Suryati, I., Khair, H. & Gusrianti, D. “Analysis of Air Quality Index Distribution of PM 10 and O 3 Concentrations in Ambient Air of Medan City, Indonesia.” *Journal of Physical Science* (2018): 29.
 31. Tiong, C. S., Lean, Q. Y., Ming, L. C., Abdullah, A. H. B., Mahalingam, S. R., Arshad, K. & Hock, L. S. “Knowledge, perceptions of risks, attitudes and practices of environmental health among university students in northern Malaysia.” *International Journal of Health Promotion and Education* (2020): 1-12.
 32. Ulhasanah, N. & Goto, N. “Assessment of citizens’ environmental behavior toward municipal solid waste management for a better and appropriate system in Indonesia: a case study of Padang City.” *Journal of Material Cycles and Waste Management* 20.2 (2018): 1257-1272.
 33. Wekke, I. S., Desi, N. & Lubis, M. A. “Islamic Students, Environmental Development and Partnership: Study on Association of Islamic Students in Indonesia.” (2019).
 34. Yaacob, M., Nasir, Z. M., Petera, W. S. H. W., Basri, H., Ibrahim, I. A., Othman, M. Y. & Mokhtar, M. “Transformation of Muslim Behaviour towards Sustainable Environment: Perspectives of Non-Governmental Organisations in Klang Valley (Transformasi Tingkah Laku Muslim ke arah Kelestarian Alam Sekitar: Perspektif Pertubuhan Bukan Kerajaan di Lembah Klang).” *Akademika* 87.2 (2017).

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:

Darmawan, M.D., Sunawong, A., Syahra, S. and Dagamac, N.H.A. "Awareness, Attitudes and Practices of Senior High School Students Concerning Air Quality Management and Air Pollution Control: Basis for Strategy Development about Environmental Education in Indonesia." *Sarcouncil journal of Arts humanities and social sciences* 2.2 (2023): pp 16-25