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Assessing students' 'clean and healthy living behavior' in an intervention program

Henny Endah Anggraeni[1], Yudith Vega Paramitadevi[2], Fany Apriliani[3], Ika Resmeiliana[4]
[1]Veterinary Paramedic Program, The Vocational Studies of Bogor Agricultural University, Bogor, Indonesia
[2]Environmental Engineering and Management Program, The Vocational Studies of Bogor Agricultural University, Bogor, Indonesia
[3]Industrial Management Program, The Vocational Studies of Bogor Agricultural University, Bogor, Indonesia
[4]Chemical Analysis Program, The Vocational Studies of Bogor Agricultural University, Bogor, Indonesia

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ABSTRACT

The Indonesian government manages the health and environment of students through the post-Islamic boarding school program. However, it has not run optimally due to students' lack of knowledge and literacy on personal and environmental sanitation. This study identified the knowledge about an environmental-based sanitation approach among students at boarding schools. The study was conducted in October 2021 using the principle of the pre-post test method based on an intervention study. The students who participated in this study were 70 female students of Junior and Senior High School levels. The students were given practical training regarding the concept and benefits of 'clean and healthy living behavior' (CHLB), infectious skin diseases, the status of waste management, and health and environmental issues resulting from burning waste. The statistical analysis uses Chi-square descriptive analysis. There was an increase in the post-test results compared to the pre-test by 5% for students' understanding of the definition of CHLB and 60% for students' understanding of air pollution reduction efforts from the students' point of view. The students understand learning environment-based sanitation through practical intervention.

Corresponding Author:

Yudith Vega Paramitadevi
Environmental Engineering and Management, ProgramThe Vocational Studies of Bogor Agricultural University
Kumbang Street No 14th, Bogor, Indonesia
Email: yudith.vega@apps.ipb.ac.id

1. INTRODUCTION

The target for the sustainable development goals (SDGs) in the sanitation sector in Indonesia for 2020-2024, as stated in the national action plan (NAP), is to reduce the number of people who defecate openly, ensuring 90% of households have access to sanitation in 2024 [1]. This ambitious target can be achieved through sanitation programs, including the implementation of clean and healthy living behavior (CHLB) and a collaborative program with UNICEF, called water sanitation and hygiene (WASH). Until 2016, based on the results of the analysis of the Indonesian basic health survey by the ministry of health of the Republic of Indonesia [2], [3] the number of Indonesians who could access clean water optimally was 46.5%, who disposed of feces openly was 33.5%, who had difficulty accessing facilities health was 60.8%, and who burnt waste was 49.5%. Community groups that need attention include those living in special needs rural areas, in orphanages, nursing homes, and student dormitories [4].

In Indonesia, Islamic boarding schools (called *pesantren*) are community-based and established to study Islam in an intensive environment, in which students (called santri) also get general education

according to their age level [4], [5]. The Indonesian government, through the Ministry of Religion, manages the health and environment of students through the post-Islamic boarding school program, but the program has not run optimally due to the lack of knowledge and literacy of students on personal and environmental sanitation [6], [7]. One-bedroom in the *pesantren* is occupied by 10 to 12 female students with many kinds of stuff [4]. As a result, from 2014 to 2015, 70% of students suffered from infectious diseases such as respiratory diseases and skin infections. Other common diseases related to the center's life include diarrhea, scabies, genital disease, toothache, and malnutrition [4], [6], [8].

Boarding schools for students from primary to secondary education should naturally act as a place for health promotion; the healthier the students, the more productive and accomplished they will be [9]. The health promotion materials commonly delivered for adolescents aged 15-24 years are related to personal hygiene, nutrition, sexual violence and bullying, and HIV/AIDS [8], [9]. The sanitation topic is often separated from environmental management, even though the two topics overlap. Sanitation is a cleaning effort to provide health and comfort, which ultimately aims to improve the quality of human life [10]. Environmental management at schools consists of integrative efforts regarding the status of water, waste, energy consumption, and landscaping into extra-curricular activities; realized through the school's strategic vision [11], [12]. An environmental-based sanitation approach can be applied through eco-*pesantren* in waste bank activities (reduce, reuse, recycle), water purification installations, reforestation around Islamic boarding schools, and most importantly, holistic environmental education [2]. Both can increase individual and group immunity, leading to the formation of community [13]. Materials developed through an environmental-based sanitation approach are rarely applied in Islamic boarding schools. Thus, they are the focus of this research.

The intervention of the experts accompanied by student contributions is a common form of health promotion efforts, although the process ignores collaborative processes between students, which can reduce focus on the material presented [9]. Submission of material is given using practical training techniques. The students are taught to know and practice sanitation and environmental management directly. This technique is commonly applied in nursing and occupational safety, but it can also be applied in education and the environment [13], [14]. The purpose of this study is to identify the knowledge about an environmental-based sanitation approach among students at the women boarding school Thoyyibah Al Islami, Bogor city, Indonesia.

2. RESEARCH METHOD

2.1. Research design

The selection of pesantren was carried out based on a purposive sampling method according to the professional justification that the At Thoyyibah Al Islami Islamic boarding school was the leading boarding school out of ten pesantren in West Bogor District, Bogor City, Wes Java, Indonesia. The assumption is those female students have a better interest in learning and lifestyle than male students, so this research is limited to being applied only to female students. An environment-based sanitation approach or a combination of personal hygiene and eco-*pesantren* was given to the participants involving all female students at the junior and senior secondary education levels. After obtaining research approval from the ethics committee at the institutional level and local authorities, 70 students participated and obtained permission from their parents.

The research was carried out using an intervention study in October 2021 following the studies by [15], [16]. During the first week, initial observations and interviews were conducted with one owner of the foundation. The results of the initial observations and interviews include essential health and environmental issues such as the management of the students' rooms, the infectious skin disease scabies, and the practice of burning waste. These issues were used to construct the pre-post test questions.

The instruments in this research include initiation, pre-test, and post-test. The initiation instrument was done to determine the status of the implementation of CHLB in the *pesantren* environment. The initiation instrument model consists of eight points (no=0, yes=1), referring to the research of Susanto [8]. The parameters of the initiation instrument include proper handwashing (P1), consumption of nutritious food (P2), clean water used (P3), use of toilets for defecation (P4), waste disposal inappropriate place (P5), cleaning of rooms, and the surrounding environment (P6), use of cigarettes (P7), and eradication of mosquito larvae (P8). The higher the total points (maximum 8), the higher the students' initial knowledge of CHLB. The highest and lowest knowledge values were analyzed based on the average knowledge value obtained after the initiation instrument was taken at the end of the first week.

The students administered a pre-test in the second week before the material and practical training. The purpose of the pre-test and the workshop planned for the third week was explained to the students. The pre-test consists of 15 questions for each student (scores of 1-4 and 7 are 6 points; the rest of the questions are 7 points). Questions numbered 1 to 4, followed by number 7, have a score of 6. According to the stages in Bloom's revised taxonomy, these questions have a cognitive thinking level of remembering or C1. Other questions with a score of 7 have a group of cognitive thinking understanding or C2. The instruments used are multiple validated

choices, questions dealing with the extent of the student's knowledge on the concept of CHLB, the benefits of CHLB, infectious skin diseases, waste management status, and health and environmental issues arising from the practice of burning waste as shown in Figure 1.

Practical training consisting of four materials was administered in the third week. The first material deals with CHLB culture and the application of good housekeeping. The second material discusses the prevention of the transmission of scabies infectious disease. Afterward, the practice of good housekeeping was carried out in each of the students' bedrooms. As a responsibility, each group of students in the same bedroom is assigned a cleaning schedule. Leaflets about good housekeeping and personal hygiene standards are posted at strategic places. Boarding school administrators conduct self-checks once a week through a checklist that has been prepared together. The third and fourth materials are related to environmental management, especially the issue of daily waste burning. The basic concept of waste sorting was delivered in the third material, while the fourth material deals with identifying the dangers of burning waste for humans and the surrounding environment. Afterward, the students carried out sorting waste, composting organic waste, and making bio pores. The results of the sorted inorganic waste were then weighed and recorded in a daily logbook by the students on duty. Organic waste processed using a household composter and put into a bio pores hole is monitored every month. In the fourth week, the post-test with the same questions was distributed to the students through the *pesantren* administrator.

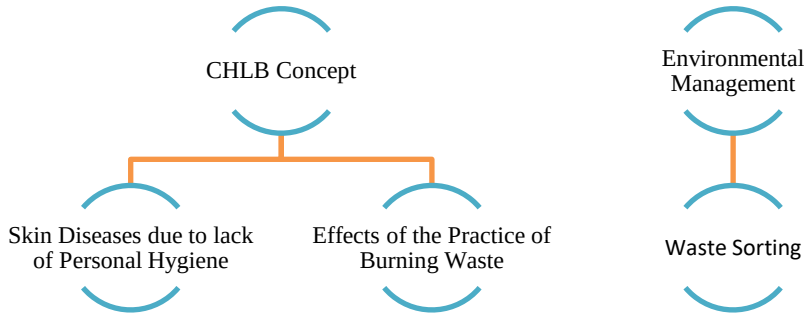

Figure 1. Question construction in the form of an environmental-based sanitation approach framework

2.2. Statistical analysis

Data on initiation, pre-test and post-test instruments were statistically analyzed using SPSS 22 software. Chi-square descriptive analysis was determined to measure the proportion of students' prior knowledge in each CHLB parameter by class group (grade 7-9 and grade 10-12) and duration of stay in *pesantren* (0-18 months and >18 months) separately. The proportion of prior knowledge is significant if the p-alpha value is less than 0.05. The answers to the pre-posttest were grouped according to the number of correct and incorrect numbers. Data normalization was carried out through the Kolmogorov-Smirnov test (n >50); each group of pre-test and post-test answers were then compared using paired t-test (if expected) or non-parametric (if not standard) to determine the increase in students' knowledge about environmental-based sanitation approaches.

3. RESULTS AND DISCUSSION

3.1. Results

The students who participated in this study were 70 female students with an average of 13.37 years old. The proportion of students aged 11-13 years or attending school equivalent to grades 7-9 is 52.86%, almost equivalent to students aged 14-17 years as presented in Table 1. The same condition occurred for the group who stayed in the *pesantren* longer or >18 months by 48.57%.

Furthermore, the Chi-square value as shown in Table 2 for the indicators of washing hands with soap and smoking habits is zero because all students have implemented the habit of washing hands with soap and not smoking. Significant values (p-value <0.05) are found only in indicators of using clean water and length of stay at *pesantren*. There are 20.51% of new students (grade 7-9) living in Islamic boarding schools (0-18 months) have a low adherence level to clean water. Furthermore, 96.77% of senior students with a length of stay >18 months who have a high understanding of using clean water are in all class groups.

Table 1. Characteristics of the respondent

Variable	n	%
Average age	13.37 ± 1.22	
Age group		
11-13 years old (Grade 7-9)	37	52.86
14-17 years old (Grade 10-12)	33	47.14
Length of stay at *pesantren*		
0-18 months	36	51.43
>18 months	34	48.57

Table 2. Prior knowledge of the students by class group and length of stay at *pesantren*

Indicator of knowledge	Total	Class Group			Length of stay (months)		
		$\frac{7-9}{n(\%)}$	$\frac{10-12}{n(\%)}$	$x^2(P)$	$\frac{0-18}{n(\%)}$	$\frac{>18}{n(\%)}$	$x^2(P)$
Washing hands with soap							
No	0 (0.00)	0 (0.00)	0 (0.00)	-	0 (0.00)	0 (0.00)	-
Yes	70 (100)	37 (100)	33 (100)		36 (100)	34 (100)	
Consuming nutritious meals							
No	37 (52.86)	20 (54.10)	17 (51.52)	0.045 (0.832)	21 (53.85)	16 (51.61)	0.035 (0.853)
Yes	33 (47.14)	17 (45.90)	16 (48.48)		18 (46.15)	15 (48.39)	
Having clean water							
No	9 (12.86)	7 (18.90)	2 (6.06)	2.574 (0.109)	8 (20.51)	1 (3.23)	4.607 (0.032)
Yes	61 (87.14)	30 (81.10)	31 (93.94)		31 (79.49)	30 (96.77)	
Using appropriate bathroom							
No	12 (17.14)	8 (21.60)	4 (12.12)	1.108 (0.292)	9 (23.08)	3 (9.68)	2.183 (0.140)
Yes	58 (82.86)	29 (78.40)	29 (87.88)		30 (76.92)	28 (90.32)	
Throwing trashes to the inappropriate place							
No	22 (31.43)	13 (35.10)	9 (27.27)	0.500 (0.479)	13 (33.33)	9 (29.03)	0.148 (0.700)
Yes	48 (68.57)	24 (64.90)	24 (72.73)		26 (66.67)	22 (70.97)	
Cleaning the rooms							
No	15 (21.43)	10 (27.00)	5 (15.15)	1.461 (0.227)	11 (28.21)	4 (12.9)	2.402 (0.121)
Yes	55 (78.57)	27 (73.00)	28 (84.85)		28 (71.79)	27 (87.1)	
Smoking and drug							
No	70 (100)	37 (100)	33 (100)	-	39 (100)	31 (100)	-
Yes	0 (0.00)	0 (0.00)	0 (0.00)		0 (0.00)	0 (0.00)	
Eradicating the mosquito larvae							
No	39 (55.71)	21 (56.80)	18 (54.55)	0.035 (0.853)	24 (61.54)	15 (48.39)	1.211 (0.271)
Yes	31 (44.29)	16 (43.20)	15 (45.45)		15 (38.46)	16 (51.61)	

The total number of students who participated in the practical training and answered the pre-posttest was the same from beginning to end, namely 70 students. The grouping of questions into four topics was carried out on 15 pre-post test questions so that it was easier to analyze the students' level of knowledge on environmental-based sanitation as shown in Table 3. Based on the post-test results, 99% of the students understood the definition of CHLB, 97% of the students understood the symptoms of scabies, the mechanism of transmission and prevention of scabies, then 94% of the students understood the efforts to reduce air pollution from the student's perspective. Furthermore, the post-test results show that the impact of polluters from waste burning activities was 63%, and identification of processed organic waste products was 69%.

The results in Table 3 were grouped and normalized using Kolmogorov-Smirnov statistical analysis. Both pre-post tests for all groups were not normally distributed because $p<0.05$ as presented in Table 4. Thus, a non-parametric test was used, namely the Wilcoxon Signed-rank test. The CHLB concept group, skin diseases due to neglecting personal hygiene, environmental management through waste sorting, and the consequences resulting from the practice of burning waste were significantly different ($p>0.05$) between the results of the pre-post test as shown in Table 4. Furthermore, from a total of 100 question scores, a positive response from the students was obtained after attending practical training (mean of pre-test was 44.61±21.30, while the mean of post-test was 81.70±8.95).

3.2. Prior Knowledge of CHLB among students

The implementation of practical training for the students according to the issues that arose during the initial observations and interviews with the owner of the foundation in the first week of the study could accommodate the students' increasing knowledge on sanitation issues and the surrounding environment. Alumni generally promote new student admission. They will go home to their hometown and promote testimonials about life in the *pesantren.* This model has been carried out for generations and is considered adequate [5]. Therefore, groups of students often come from the same area. Students from the same area usually have the same habits and perspectives on personal sanitation. Mchenga in Malawi [17] stated if the students' home area has poor access to sanitation facilities, students will understand personal sanitation.

The students' prior knowledge of CHLB related to the length of stay at pesantren is clean water in daily domestic activities. The students with a length of stay of 0-18 months are not used to using clean water in their daily lives as shown in Table 2. The longer the students stay at pesantren, the better the understanding of the use of clean water will be. The condition is similar to research by Damayanti [9] in Bali, Indonesia, which states that the average stay in a dormitory for 2-3 years affects the students' exposure to personal sanitation and the surrounding environment. The programs promoted by the At-Thoyyibah Islamic boarding school every semester can increase students' exposure to the importance of CHLB. Weaknesses of internal programs in educational institutions include not carrying out program evaluations [6], the program is not supported by appropriate resources [16], and the program is not integrated with the school curriculum [18]. As a result, the students received cursory material without being supported by the opportunity to implement these programs. The practical intervention of environmental-based sanitation training carried out by experts is essential for the students.

Table 3. Questions and answers before and after practical training

Question and respondents' answers	Question grouping	Correct answers (70)	
		Pre-test	Post-test
Is it true that the definition of CHLB is a form of embodiment of a healthy life orientation in the culture of individuals, families, and communities, which aims to maintain and protect their health both physically, mentally, spiritually, and socially? (Right)	CHLB concept	66 (94%)	69 (99%)
Good housekeeping is included as an easy-to-implement CHLB. Among the following 5 Rs of good housekeeping, which one is not one of them? (Re-use)		55 (79%)	60 (86%)
What causes scabies disease? (Mite)	Skin diseases due to lack of Personal Hygiene	10 (14%)	58 (83%)
What are the symptoms of scabies pain? (Itching, especially at night)		68 (97%)	68 (97%)
What is the mechanism of transmission of scabies? (Direct contact and clothes from scabies sufferers)		53 (76%)	68 (97%)
What can be done to prevent transmission of scabies? (Bathing at least twice a day with soap)		68 (97%)	68 (97%)
What is organic waste? (Food waste, fruit peel, and dried leaves)	Environmental Management through Waste Sorting	35 (50%)	57 (81%)
What is the largest composition of waste in Indonesia? (Organic trash)		0 (0%)	53 (76%)
How should waste around us be processed? (Sorted and processed)		41 (59%)	53 (76%)
Here are the products processed from organic waste, except… (Handicraft)		34 (49%)	48 (69%)
Here are the advantages of Bio pores, except… (Temporary organic waste storage)		11 (16%)	60 (86%)
What are the effects of incomplete combustion? (CO gas arises which binds to Hb to form COHb)	Effects of the Practice of Burning Waste	6 (9%)	44 (63%)
What are the effects of the release of emissions on humans who are continuously exposed? (Chronic ARI disease)		8 (11%)	51 (73%)
What are the appropriate measures to reduce air pollution from the student's point of view? (Participate in keeping the environment clean by collecting and managing wastes)		24 (34%)	66 (94%)
What is the type of pollutants from burning waste that can damage buildings during acid rain? (Sulfur dioxide)		10 (14%)	55 (79%)

Table 4. The average value of questions grouping before and after practical training

Questions grouping	Correct answer	Analysis of pre-post test				
		Pre-test (Mean±SD)	Post-est (Mean±SD)	Normality test p-value pre-test	Normality test p-value post-test	Wilcoxon signed rank-test p-value
CHLB concept	12	10.37±3.05	11.06±2.42	0.000	0.000	0.000
Skin diseases due to lack of personal hygiene	26	17.93±5.64	23.46±4.64	0.000	0.000	0.000
Environmental management through waste sorting	34	11.51±9.74	26.29±8.43	0.000	0.000	0.000
Effects of the practice of burning waste	28	4.80±8.56	20.90±6.02	0.000	0.000	0.000
Total score	100	44.61±21.30	81.70±8.95	0.199	0.000	0.000

3.3. Knowledge of the students towards environmental-based sanitation

The students easily understand the fundamental questions regarding the CHLB concept so that the final post-test score is high (99%). It is followed by the post-test results regarding symptoms, mechanisms of spread, and prevention of scabies skin disease (97%). Based on the information obtained from the questionnaire of the initiation instrument, approximately 63% of students have suffered from scabies disease, but currently, no students are found to be suffering from scabies disease. In almost all dormitories that have not implemented sanitation management, their students are exposed to scabies, as stated by Handari and Yamin [19] where 65.3% of students at *Pesantren* An-Nur Ciseeng Bogor, Indonesia, had suffered from scabies. Furthermore, the lack of understanding of personal hygiene, environmental humidity, ventilation systems, and room population density are the main factors causing it [19]–[21]. Those who suffer from scabies suffer from skin disorders that impact decreasing enthusiasm for learning and achievement. The excellent housekeeping (GHK) intervention that has been practiced with a team of experts, boarding school administrators, and students is a good practice that has been implemented. The result is cleaner rooms and scheduled cleaning management called *'khidmat'*; it is the starting point for forming communal sanitation awareness. Implementing GHK in the educational environment is the reduction of risk of harm and efficiency of resources [22]. Meanwhile, at the At-Thoyyibah Islamic boarding school, there is a belief that GHK that is carried out continuously for a long time can create healthy learning conditions, so that student achievement increases. The information conveyed to the students related to good waste management practices received a much higher post-test response than the theoretical topic regarding the impact of burning waste. The involvement of students during practical training is one of the factors that students can answer more practical questions. The direct involvement of the students during practical training and sharing experiences with a team of experts gave a deep impression to the students. The condition is in line with Nousheen [23], stating that most students have a high level of understanding after being involved in the waste recycling program at their school. Furthermore, Debrah [24] stated that efforts to increase students' awareness in developing countries of school waste management programs would be successful if there is a cooperation between teachers, students, and other stakeholders. The At-Thoyyibah Islamic boarding school board is committed to deepening knowledge about the environment, conveying this knowledge to students, and resolving priority issues related to burning waste. The commitment that comes from the management of the *pesantren*/educational institution will impact sustainable environmental education. However, it is not necessarily the knowledge gained that is significantly correlated with environmental attitudes as expressed [25]–[27]. The future opportunity is the integration of environmental-based sanitation into internal or external-curricular activities in Islamic boarding schools so that environmental issues can be managed based on available resources.

Students' response to participating in practical training was positive, as seen in the different results of pre-tests and post-tests after attending practical training. The series of practical training involves media (leaflets, presentation of material, learning videos) and equipment (composter and bio pores) to provide personal and group experiences for the students. This study is consistent with other studies with students sitting in the middle class [4], [28]. Students who get non-formal information about environmental awareness through the example of teachers/parents at home are more embedded than those who have not received this information [28]. Furthermore, students' exposure to media in the form of audio, visual, and print also affects students' initial awareness and level of participation [29]. Other factors such as sanitation and environmental programs implemented based on the curriculum [30] and multi-stakeholder involvement in compulsory school programs (called '*fardhu*') [31] can positively impact if carried out sustainably. Moreover, systematic practical training efforts accompanied by commitment and supervision will create a sustainable environmental-based sanitation program for the students.

4. CONCLUSION

Practical intervention training by a team of experts carried out on the students had an excellent response to the results of the pre-post tests. The environmental-based sanitation approach, GHK practices, and waste management practices using two different mediums significantly increase students' knowledge. Furthermore, the commitment of the pesantren management, the active participation of the students, and the integration of the program into the curriculum are the keys to the success of the sustainability of the environmental-based sanitation program at the pesantren. This cross-sectional research with a case study in one Islamic boarding school has limitations on casual relationships. In this case, the level of knowledge measured against the students is also temporary, so the study results will also be different if applied in other pesantren. The implications of knowledge can be developed into behavior and points of view with a more extended research time. Likewise, regarding the medium of delivery, in developing countries, in particular, exploration of equipment for environmental-based sanitation practices is still rarely carried out.

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BIOGRAPHIES OF AUTHORS

Henny Endah Anggraeni is a lecturer and veterinarian working on the The Vocational Studies of Bogor Agricultural University. She is interested in controlling veterinary public health. She can be contacted at email: hennyendahanggraeni@apps.ipb.ac.id.

Yudith Vega Paramitadevi is a lecturer and environmental specialist on the The Vocational Studies of Bogor Agricultural University. She is interested in air quality modelling and educating sanitation for children. She can be contacted at email: yudith.vega@apps.ipb.ac.id.

Fany Apriliani is a lecturer and industrial management specialist on the The Vocational Studies of Bogor Agricultural University. She is interested in maintenance management, quality improvement, and educating good housekeeping for children. She can be contacted at email: fany.apriliani@apps.ipb.ac.id.

Ika Resmeiliana is a lecturer and specialist in chemical analysis working on the The Vocational Studies of Bogor Agricultural University. She is interested in natural chemical, metabolomics and environmental management, especially waste dan waste water. She can be contacted at email: ikaankim@apps.ipb.ac.id.