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Analysis of the Level of Occupational Health and Safety Knowledge of Madrasah Aliyah Negeri 2 Makassar City Students in Indonesia

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ABSTRACT:

Introduction: Throughout 2018, there were 157,313 cases of work accidents, or an increase compared to the 123 thousand cases of work accidents that occurred in 2017. The main cause of work accidents is the low awareness of the importance of implementing Occupational Health and Safety in industry and society. The earlier puberty period makes adolescents more vulnerable to the negative impact of health problems, such as sexual and reproductive health, lack of understanding of nutrition, unclean and healthy living behavior and the dangers of smoking.

Objectives: The research was conducted with the aim to: (1) Analyze teenagers' knowledge about electrical OHS; (2) Analyze teenagers' knowledge about traffic hazard OHS; (3) Analyze teenagers' knowledge about fire hazard OHS; (4) Analyze teenagers' knowledge about nutrition; (5) Analyze teenagers' knowledge about smoking; (6) Analyze teenagers' knowledge about clean and healthy living behavior (PHBS); (7) Analyze teenagers' knowledge about reproductive health.

Methods: This research is a quantitative research, Quasi-Experiment: One-Group Pretest-Posttest Design. The population was class XII IPA students totaling 301 students while the sample was obtained as many as 75 students. The data collection method was carried out using a questionnaire. Furthermore, editing, coding, entry, cleaning, and tabulating data were carried out. Then the data was processed using a computer on the IBM SPSS Statistic 21 program.

Results: The results showed that the p-value of the OHS electrical research was 0.00. OSH traffic hazard 0.000. OHS fire hazard 0.000. Nutrition 0.000. Smoking 0.000. PHBS 0.000. Reproductive health 0.000.

Conclusions: Conclusion There is an effect of knowledge of OHS electricity, OHS traffic hazards, OHS fire hazards, nutrition, smoking, healthy living behavior / PHBS, reproductive health in teenagers.

1. Introduction

Early childhood education largely determines a child's development and further future direction. This indicates that all parties need to understand the importance of early childhood for optimization of growth and development, so that children have readiness to enter further education (1). Along with the development of industrialization and globalization as well as advances in science and technology, occupational safety and health are also growing. Law Number 1 of 1970 concerning Safety as the legal basis for the implementation of OHS in Indonesia has been strengthened by the issuance of Law Number 36 of 2009 concerning health where in Articles 164-165 concerning Occupational Health it is stated that

all workplaces are required to implement health efforts both formal and informal sectors including the State Civil Apparatus, TNI and Police. The use of newer science and technology can indeed increase company productivity. But in addition, risks to the safety and health of workers are increasing (2,3).

The number of work accidents in Indonesia is still considered high. This is supported by data from the Ministry of Manpower which notes an upward trend in the number of work accidents in Indonesia which continues to increase in recent years. According to the Minister of Manpower (Menaker), Hanif Dhakiri, throughout 2018 there have been 157,313 cases of work accidents, or an increase compared to work accident

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cases that occurred in 2017 of 123 thousand cases. The main cause of work accidents is still low awareness of the importance of implementing Occupational Health and Safety among industry and society. So far, the implementation of Occupational Health and Safety is often considered as a cost burden, not as an investment to prevent work accidents (2).

High student knowledge about healthy living behaviors will make it easier for students to apply them in everyday life. If students' knowledge of healthy living behavior is low, it is not impossible that students cannot apply healthy living behavior correctly or even do not apply it in daily life, so that it will affect the degree of low body health (4). Children, especially teenagers, are one of the vulnerable groups at risk of dangerous impacts such as riding at high speed and driving recklessly which can cause accidents in traffic, as well as the use of electricity that is not up to standard both in terms of installation and materials that can cause shock to fire.

The importance of providing Occupational Health and Safety knowledge is intended so that adolescents can understand and slowly apply Occupational Health and Safety information in everyday life both at home and at school. With the presence of this research, it is hoped that it can become new knowledge while reducing the negative impact in the application of Occupational Health and Safety. One way used to improve Occupational Health and Safety knowledge is by providing learning using the Occupational Health and Safety module.

2. Objectives

Based on this background, with various knowledge problems and the importance of student knowledge today, the author considers it necessary to conduct research on "Analysis of the Level of Occupational Health and Safety Knowledge of Madrasah Aliyah Negeri 2 Makassar City Students in 2023.

3. Methods

The research uses quasi-experimental research methods or pseudo-experiments. The *quasi-experiment* used in this study is *Quasi-Experiment: One-Group Pretest-Posttest Design*. In *One-Group Pretest-Posttest Design*, the dependent variable is measured as a group before (*pretest*) and after (*posttest*) a treatment is given. After a treatment was given to the group, the values before and after the treatment were compared. This research was

conducted at Madrasah Aliyah Negeri 2 Makassar City in 2023 with research time starting from June-July 2023. The source of the data was obtained from primary data, namely data on the results of student knowledge answers collected by conducting *pretests* and *posttests* to analyze OHS knowledge in students using questionnaires and secondary data from student data in the student section of Madrasah Aliyah Negeri 2 Makassar.

The research tools used were *pretest* and *posttest* questionnaires and basic OHS modules compiled by Suharni et al. The population in this study was grade XII science students totaling 301 students in Madrasah Aliyah Negeri 2 Makassar with a sample of 75 respondents. The sampling technique is *by purposive sampling* then the data is analyzed by univariate and bivariate analysis using the SPSS program.

4. Results

Table 1. Distribution of Respondents Based on Age and Gender of Students of Madrasah Aliyah Negeri 2 Makassar

	N	(%)
Age		
16	5	6.7
17	23	30.7
18	33	44.0
19	14	18.7
Gender		
Man	33	44.0
Woman	42	56.0

Based on **table 1**, it shows that the characteristics of respondents based on age are dominated by 18 years old as many as 33 students (44.0%). The characteristics of respondents based on gender were dominated by women as many as 42 students (56.0%).

Table 2. Distribution of Respondents Based on Knowledge of Madrasah Aliyah Negeri 2 Makassar Students About OHS Electricity, OHS Traffic Accidents, OHS Fire, Nutrition, Smoking, PHBS, and Reproductive Health in Madrasah Aliyah Negeri 2 Makassar Students

Knowledge	Pre Test		Post Test	
	N	%	N	%
Electrical OHS Module				
Less	56	74.7	10	13.3
Enough	19	25.3	65	86.7
Traffic Accident OHS Module				
Less	54	72.0	26	34.7
Enough	21	28.0	49	65.3
Fire OHS Module				
Less	46	61.3	29	38.7
Enough	29	38.7	46	61.3
Nutrition Module				
Less	52	69.3	17	22.7
Enough	23	30.7	58	77.3
Smoking Module				
Less	42	56.0	27	36.0
Enough	33	44.0	48	64.0
PHBS Module				
Less	43	57.3	30	40.0
Enough	32	42.7	45	60.0
Reproductive Health Module				
Less	47	62.7	31	41.3
Enough	28	37.3	44	58.7

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Based on **table 2** shows that providing interventions using modules can change the knowledge of OHS Electricity, OHS Traffic accidents, OHS fire, nutrition, smoking, PHBS, and reproductive health of Madrasah Aliyah Negeri 2 Makassar students.

Table 3. Measurement of Knowledge Level Before and After Module Given OHS Electricity, OHS Traffic Accidents, OHS Fire, Nutrition, Smoking, PHBS, and Reproductive Health in Madrasah Aliyah Negeri 2 Makassar Students

Intervention	Pretest		Posttest		P-Value
	Mean ±	SD	Mean ±	SD	
OHS Electrical Knowledge					
Module	2.3467	.90782	3.7867	.96273	0,000
Knowledge of OHS Traffic Accidents					
Module	2.0667	.99095	3.2133	1.06914	0,000
OHS Fire Knowledge					
Module	2.2667	.92024	3.0800	1.01022	0,000
Knowledge of Nutrition					
Module	2.2533	.98767	3.8000	1.20808	0,000
Knowledge About Smoking					
Module	2.3733	1.06255	3.5467	1.27654	0,000
Knowledge About PHBS					
Module	2.3067	.91494	3.4000	1.25203	0,000
Knowledge About Reproductive Health					
Module	2.2133	.84299	3.2800	1.26875	0,000

Based on **table 3** shows that the p-value is 0.000 which means that there is an influence on the level of knowledge before and after being given the electrical OHS module, traffic accident OHS module, fire OHS module, nutrition module, smoking module, PHBS module, and reproductive health module in Madrasah Aliyah Negeri 2 Makassar students.

5. Discussion

Analysis of Adolescent Children's Knowledge About OHS Electricity

Electrical work safety is the duty and obligation of, by and for every person who provides, serves and uses electrical power. Law no. 1 of 1970 is a work safety law, in which articles on work safety for electrical workers have been regulated. The background of electrical work safety cannot be separated from the level of life of the community, both education, socio-economic and habits will be factors that have a lot to do with work safety. The purpose of electrical work safety is to protect workers or people in carrying out tasks or the presence of electrical voltage around it, both in the form of installations and networks (5).

Based on the frequency distribution of adolescent knowledge about electricity, it showed that students who had less knowledge before being given intervention were 56 students 74.7%. This is because students do not know and understand what electrical OHS is, the impact of electrical hazards for adolescents and how to control electrical hazards so that many pretest answers are wrong. Some students who have not experienced an increase in knowledge after being given intervention because during counseling students lack concentration and there are some found talking to deskmates, and not a few who answer carelessly where only answer questions as quickly as possible in order to go home.

Student knowledge is a form of behavior that has been shown to change. So the provision of modules as one means to provide information about OHS Electricity. This research is in accordance with Rahman's (2022) research on OHS electricity in the pretest, namely sufficient knowledge of 21.1% and less knowledge of 78.9%, this is due to the lack of teaching about electricity in schools. While the posttest has increased, namely sufficient knowledge as much as 84.2% and less knowledge as much as 15.8%, this is due to the electrical OHS material in the module is quite understandable and enthusiastic students in receiving lessons are quite good (6). Based on this research, elementary school students can find out about what electrical energy is, how electrical energy is produced by several tools, the use of electrical energy, how to use it, its impact on the body, prevention methods and others.

Health education media is basically a tool used in the educational process, the tool is used to facilitate the acceptance and delivery of health messages both for individuals and target groups (7). In this study, the educational media used was a module. Modules are presented in a form that is *self-instructional*. Each student can determine the speed and intensity of their learning. According to the researcher's assumption there is a significant influence on the provision of electrical OHS modules on students' knowledge because safety from electrical hazards is important to understand as a novelty of science, electrical OHS learning has never been obtained by students so that it affects students' interest in learning.

Analysis of Adolescent Knowledge About OHS Traffic Hazards

A traffic accident is an unexpected and unexpected event and there is a cause. Because the things that cause

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accidents must be found and analyzed, so that corrective action can be taken on the causes and with further preventive efforts accidents can be avoided and prevented. The human factor becomes the most dominant in the event of traffic accidents. Most of these accidents are preceded by violating traffic signs. This violation can occur due to accidentally violating the rules, ignorance or unawareness of the meaning of the applicable rules or not paying attention to the provisions imposed in driving. Students who had less knowledge before being given intervention as many as 54 students 72.0%. This is because childhood still receives full attention from parents, so telling the problem of accidents early for parents is wrong, so many children do not know the good and bad information about traffic accidents. The results showed that there were some students who had enough knowledge as many as 21 students 28.0%. This is because information about traffic accidents has been received by children both from peer stories in the environment, social media and parents.

The results showed that after being given an intervention with the OHS module, traffic accidents were obtained by students who had less knowledge as many as 26 students 34.7%. This is because not all children are able to capture the source of information from the module because the educational background of parents also does not support providing information about the dangers of traffic accidents. The results showed that students who had sufficient knowledge as many as 49 students 65.3%. This is due to curiosity, and the enthusiasm to understand the OHS module is so great that most students have good OHS knowledge. Thus students will more easily minimize the occurrence of traffic accidents after understanding what OHS traffic accidents are, causes, impacts and how to overcome or solutions to avoid accidents.

From these results, it can be concluded that this study has proven the effect of giving traffic accident modules on the knowledge of Madrasah Aliyah Negeri 2 Makassar students. Student knowledge is a form of behavior that has been shown to change. So the provision of modules as one of the means to provide information about OHS traffic accidents

This research is in accordance with the research of Muhammad Ikhtiar, Andi Multazam, Fadhilatul (2020) shows that the number of P3K officers in the company is in accordance with the predetermined requirements, but in carrying out the duties of P3K officers there is less

monitoring than the person in charge, P3K officers have no identification marks, P3K officers do not have P3K activity books. Some P3K officers in the company have attended training on P3K, but do not have a P3K certificate. Facilities and infrastructure do not yet have a P3K room but already have a polyclinic, the distance from the production department to the polyclinic is quite far. The contents of the P3K box have not been in accordance with applicable standards and the filling of the P3K box is not evenly distributed between production parts. Lack of maintenance of evacuation equipment and transportation equipment, and there are still no additional facilities in the form of showers and eye rinses (8).

According to the assumption of the researcher there is a significant effect after being given the learning module due to lack of awareness of safety from traffic hazards. Students who experience changes in knowledge due to having received new information and education that answers the number of accidents that occur among adolescents so as to make students aware that the use of personal safety equipment on motorists can affect the incidence of traffic accidents on the road. So that when drivers always use safety equipment, drivers will be awake from traffic dangers.

Analysis of Adolescent Knowledge About OHS Fire Hazard

Non-natural disasters such as fires at this time are still very frequent and cause losses in various factors of life such as economic and social factors. According to Ramli, fire is the emergence of uncontrolled fire which can be interpreted as the power of fire that arises beyond human ability and desire (9). The results showed that students who had less knowledge before being given intervention as many as 46 students 61.3%. This is because students do not know the dangers of fire, and sources of information both from parents and social media are lacking, so most have poor knowledge about OHS fire.

The results showed sufficient knowledge as much as 29 students 38.7%. This is because students have received information from social media such as those that often air on television about fire incidents, this information does not directly provide education to children. The results showed that after being given intervention with the OHS fire module, students who had less knowledge were found as many as 29 students 38.7%. This is because students do not understand the content of the module so that the results show good answers.

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The results showed that students who had sufficient knowledge as many as 46 students 61.3%. This is because students are able to understand the content of the module. The contents of the module contain important items and are easy to understand by readers, with many students who have sufficient knowledge, it means that many students already understand what a fire is, what causes fire, the impact of fire and how to deal with fire. The results showed that students' knowledge increased after giving modules to students with a percentage of 38.7% having sufficient knowledge on the pretest to 61.3% of students who had enough knowledge after the posttest. Student knowledge is a form of behavior that has been shown to change. So the provision of modules as one of the means to provide information about OHS Fire.

The results of this study are in accordance with Apriyadi and Amelia's (2021) research on students at SMKN 1 Sragi South Lampung, that disaster knowledge in students in general is still in the sufficient category, this is because most students claim to have never received information counseling about tsunami disaster risk management from schools or related agencies regarding disasters, so that students' knowledge is still in the sufficient category (10). This research is in line with Ayu and Ratriwardhani's (2021) research on students at Surabaya Islamic boarding schools, that knowledge about fire disasters in students is still in the sufficient category, this is because the pesantren management has never provided socialization or education about fire disasters to students at the Islamic boarding school, therefore the knowledge of students in the Islamic boarding school is still in the sufficient category (11).

According to the researcher's assumption, there is an influence of giving the OHS fire module on students' knowledge because students have the knowledge they gain from the information they learn from the module, even though they have never attended socialization or training, but they have the awareness to add insight into disasters through learning that they can access at any time. Therefore, there is a significant influence between students' knowledge in dealing with fire disasters.

Analysis of Adolescent Knowledge About Nutrition

Nutritional knowledge is knowledge about food and nutrients, sources of nutrients in food, foods that are safe for consumption so as not to cause disease and how to process good food so that nutrients in food are not lost and how to live healthy (Notoatmodjo, 2003). A person's

level of knowledge affects attitudes and behavior in food selection which ultimately affects the nutritional state concerned.

The results showed that students who had less knowledge before being given intervention as many as 52 students 69.3%. This is due to the economic situation of parents who do not support the nutritional needs of children. Most students do not understand good nutrition, so many of the students answer incorrectly. And enough knowledge as much as 23 students 30.7%, This is due to the good economic situation of the parents of students. Knowledge does not only come from books or modules, real experience is also good knowledge, parents who often provide food with good nutritional intake unwittingly help understanding related to good nutrition knowledge.

The results showed that after being given an intervention with the nutrition module, students who had less knowledge were found to be 17 students, 22.7%. This is due to the provision of information, be it through modules or any media, if it has never been seen and experienced directly, it will be an obstacle in understanding. The results showed that students who had sufficient knowledge as many as 58 students 77.3%. This is because the contents of the module easily provide information that is easy to understand, understanding nutrition, nutritional benefits. Knowledge about nutritious food must be of particular interest to students related to school elders always providing nutritious food education or nutritious snacks, the more information sources received, the more knowledge students will increase about nutritious food.

The results showed that students' knowledge increased after giving modules to students with a percentage of 30.7% having sufficient knowledge on the pretest to 77.3% of students who had enough knowledge after the posttest. From these results, it can be concluded that this study has proven the influence of the provision of the Nutrition module on the knowledge of Madrasah Aliyah Negeri 2 Makassar students. Student knowledge is a form of behavior that has been shown to change. So the provision of modules as one of the means to provide information about nutrition.

This research is supported by Irawati research (2016), the level of nutritional knowledge of a person affects attitudes and behavior in food selection which will ultimately affect the nutritional state of the individual concerned. The higher the level of nutritional knowledge

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a person is expected to be, the better the nutritional condition. However, a person's nutritional knowledge may not necessarily be able to change their eating habits, where they have an understanding of the intake of nutrients needed by the body but do not apply the nutritional knowledge in their daily lives.

According to the researchers' assumptions, nutritional knowledge in adolescents is very important because everyone will be well nourished if the food they eat is able to provide the nutrients needed for optimal body growth, because nutritional knowledge provides information related to nutrition, food and its relationship with health. The depth and breadth of knowledge about nutrition will guide someone in choosing the type of food to be consumed both in terms of quality, variety, and how to present food that is aligned with the concept of food. Regular weight monitoring will be a preventive measure against obesity and SEZ (Chronic Energy Deficiency).

Analysis of Adolescent Knowledge About Smoking

Smoking is sucking substances that are harmful to the body (12). Smoking behavior is mostly carried out in adolescence. Smoking has many negative effects that are harmful to human health, and smoking habits not only harm smokers themselves, but also threaten the surrounding community. Improper selection of smoking cessation methods will only be futile, both those that rely solely on behavior change and with outside help. Information about ways to quit smoking is very important to know for those who want to quit smoking. But not all methods that have been done can succeed (13).

The results showed that students who had less knowledge before being given intervention as many as 42 students 56.0%. This is due to the regulations made by the parents of students and Madrasah Aliyah Negeri 2 Makassar, namely no smoking, making students not understand about smoking. The results showed sufficient knowledge as much as 33 students 44.0%. This is because students receive additional education from teachers if they make violations such as smoking at school. Also information from social media and peers even though they don't know the impact on body health. The results showed that after the intervention with the smoking module, students who had less knowledge were found to be 27 students, 26.0%. This is because the content of the module is too dense with information on smoking prohibitions so that for some students who are smokers are lazy and do not answer well.

The results showed that students who had sufficient knowledge as many as 48 students 64.0%. This is because students understand well the contents of modules such as the understanding of smoking, the impact of smoking and solutions to reduce and even stop smoking because the age of students is very productive to grow and develop. The results showed that students' knowledge increased after giving modules to students with a percentage of 44.0% having sufficient knowledge on the pretest to 64.0% of students who had enough knowledge after the posttest. From these results, it can be concluded that this study has proven the effect of providing reproductive health modules on the knowledge of Madrasah Aliyah Negeri 2 Makassar students. Student knowledge is a form of behavior that has been shown to change. So the provision of modules as a means to provide information about reproductive health.

This research is in accordance with the research of Mitayani Purwoko, et al (2021) the increase in post-counseling posttest scores shows that counseling is able to increase one's knowledge. The results of this activity are in line with the results of similar activities carried out on residents of Garung Lor Village, Kudus. After receiving training by means of lectures, demonstrations and role plays on exclusive breastfeeding, the participants experienced an increase in knowledge from initially there was only 1 person with good knowledge to 11 people with good knowledge. This increase in knowledge may be influenced by subject characteristics such as age, recent education, ethnicity, and religion. In addition, factors that can affect knowledge include sources of information, socio-cultural, economic, and environmental (14).

According to the researcher's assumption there is a significant influence after being given a learning module on students' smoking knowledge where with the health education provided to adolescents, it will increase knowledge to adolescents about the dangers of smoking, thus providing awareness for behavior change to adolescents not to consume cigarettes anymore. And it can be seen where health education about the dangers of smoking that has been carried out to adolescents, shows that adolescents are committed to changing their behavior to no longer consume cigarettes.

Analysis of Adolescent Knowledge About Clean and Healthy Living Behavior (PHBS)

PHBS in schools is a set of behaviors practiced by students, teachers and the school environment

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community on the basis of awareness as a result of learning, so that they are independently able to prevent disease, improve their health, and play an active role in realizing a healthy environment. There are several indicators used as a measure to assess PHBS in schools, namely: Washing hands with running water and using soap, consuming healthy snacks at school, using clean and healthy latrines, regular and measurable exercise, eradicating mosquito larvae, not smoking at school, weighing and measuring height every 6 months, disposing of garbage in its place.

The results showed that students who had less knowledge before being given the intervention as many as 43 students 57.3%. This is because PHBS rarely gets attention in high school, and students' poor habits to maintain the environment and themselves to be healthy are very minimal. The results showed sufficient knowledge as much as 32 students 42.7%. This is because students always carry out clean and healthy living behaviors that have started from primary education, namely parents and in elementary school, habits that are often carried out make students continue to do PHBS within the scope of high school. The results showed that after being given an intervention with a clean and healthy living behavior module, students who had less knowledge were found as many as 30 students 40.0%. This is because students are less aware of the importance of the contents of the PHBS module, with the origin of answering so that it shows less conclusions, in addition to the factor of the existence of parents in PHBS support at home.

The results showed that students who had sufficient knowledge as many as 45 students 60.0%. This is because PHBS indicators have a lot of positional values to do, so that students' comprehension to achieve understanding is very good. Interesting module content can provide good capture for students. The results showed that students' knowledge increased after giving modules to students with a percentage of 42.7% having sufficient knowledge on the pretest to 60.0% of students who had enough knowledge after the posttest. From these results, it can be concluded that this study has proven the effect of giving clean and healthy living behavior modules on the knowledge of Madrasah Aliyah Negeri 2 Makassar students. Student knowledge is a form of behavior that has been shown to change. So the provision of modules as a means to provide information about clean and healthy living behavior.

The results of this study are in accordance with the research of Kartini et al., (2020) that healthy board innovations in general have had a positive impact in improving the health level of the community, school residents, especially students. The use of healthy classroom control boards is increasingly visible in the implementation of clean and healthy living behaviors for students in Takalar Regency in fact, this healthy board has become a hallmark in realizing clean and healthy schools in Takalar Regency.

According to the researcher's assumption, there is a significant influence after being given a learning module on student knowledge because of how important health is and if PHBS is not implemented properly it can have a negative impact on health such as some students throwing garbage in the desk drawer due to external factors so that they are lazy to stand or go out throwing garbage outside the classroom and can cause mosquitoes to nest so that it can cause mosquito nests that have an impact on exposure DHF. In addition, the learning atmosphere is not supportive because the school environment is dirty and can reduce student enthusiasm and achievement as well as the teaching process for teachers.

Analysis of Adolescent Knowledge About Reproductive Health

Reproductive health is a state of complete physical, mental and social well-being not only free from disease or disability in all aspects related to the reproductive system, its reproductive functions and processes. Adolescent reproductive health aims to prevent and protect adolescents from risky sexual behaviors and risky behaviors that can affect reproductive health and prepare adolescents to lead healthy and responsible reproductive lives (15). The results showed that students who had less knowledge before being given intervention as many as 47 students 62.7%. This is due to the lack of information received by students due to the assumption of the community regarding the taboo of reproductive information. The results showed that students who had sufficient knowledge as many as 28 students 37.3%. This is because most students get a lot of information and look for information related to reproductive health.

The results showed that after being given an intervention with the reproductive health module, students who had less knowledge were found to be 31 students, 41.3%. This is because students still do not understand and accept the reasons for the development of the unusual

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