

# Implementing Fire Emergency Response and Health Behaviour Modules to Elevate Islamic Student Knowledge in Boarding Schools

## Menerapkan Modul Tanggap Darurat Kebakaran dan Perilaku Sehat untuk Meningkatkan Pengetahuan Siswa Islam di Sekolah Berasrama

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### Abstract

The persistent risks of accidents and occupational diseases in educational settings, including Islamic boarding schools in Indonesia, highlight the need for research on the impact of implementing Health and Safety modules on student knowledge, as evidenced by the high incidence of accidents and inadequate safety measures. The purpose of this study was to analyze the effect of the application of the Fire Emergency Response Modules module on increasing student knowledge. The design of this research is experimental with the form of Pre-Experimental Designs, namely One Group Pre and Post-test Design. The study took place at Athirah Bukit Baruga boarding school, with a population of junior and high school students. The sample used was purposive sampling with 38 respondents. The results of this study showed a significant effect on increasing student knowledge after being given a fire emergency response module using the Paired Samples T-Test test. Meanwhile, the provision of PHBS module shows that there is a significant effect on increasing safety and health knowledge ( $p=0.000$ ). The application of the fire emergency response module and PHBS is an effort or mitigation so that students are protected from hazards and diseases in the school environment.

### Abstrak

Risiko kecelakaan dan penyakit akibat kerja yang masih tinggi di lingkungan pendidikan, termasuk pondok pesantren di Indonesia, menyoroti perlunya penelitian tentang dampak penerapan modul Kesehatan dan Keselamatan Kerja terhadap pengetahuan santri, yang dibuktikan dengan tingginya angka kecelakaan dan tindakan keselamatan yang tidak memadai. Tujuan dari penelitian ini adalah untuk menganalisis pengaruh penerapan modul Tanggap Darurat Kebakaran terhadap peningkatan pengetahuan siswa. Desain penelitian ini adalah eksperimental dengan bentuk Pre-Experimental Designs, yaitu One Group Pre and Post-test Design. Penelitian mengambil lokasi di pondok pesantren Athirah Bukit Baruga, dengan populasi siswa SMP dan SMA. Sampel yang digunakan adalah purposive sampling dengan jumlah 38 responden. Hasil penelitian ini menunjukkan adanya pengaruh yang signifikan terhadap peningkatan pengetahuan santri setelah diberikan modul tanggap darurat kebakaran dengan menggunakan uji Paired Samples T-Test. Sedangkan pemberian modul PHBS menunjukkan adanya pengaruh yang signifikan terhadap peningkatan pengetahuan keselamatan dan kesehatan kerja ( $p=0,000$ ). Penerapan modul tanggap darurat kebakaran dan PHBS merupakan salah satu upaya atau mitigasi agar siswa terlindungi dari bahaya dan penyakit di lingkungan sekolah.

### Graphica | Abstract



### Keyword

accidents; emergency responders; health behavior; occupational diseases, students

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## INTRODUCTION

The incidence of fire cases in schools across Indonesia is a pressing concern that reflects broader issues related to fire safety and emergency preparedness in educational institutions. While specific data on school fires in Indonesia may not be extensively documented, the context of fire hazards in the country, particularly in relation to forest and land fires, provides a relevant backdrop for understanding the risks faced by schools. Indonesia has been grappling with significant fire outbreaks, particularly in regions like Riau and Kalimantan, where peatland and forest fires are prevalent. These fires not only pose a direct threat to the environment but also create hazardous conditions that can affect nearby schools and communities (Taufik et al. 2023; Muhima et al., 2023).

The frequency of fires in Indonesia is exacerbated by climatic factors, particularly during the El Niño phenomenon, which leads to drier conditions conducive to fire outbreaks. For instance, during the 2015 fire season, Indonesia experienced some of the worst fires in recent history, resulting in extensive damage and health impacts due to smoke and haze (Huijnen et al., 2016; Lohberger et al., 2017). The fires during this period were not limited to forests but also affected agricultural lands and, by extension, nearby educational facilities. The smoke from these fires can lead to poor air quality, which poses health risks to students and staff in schools, particularly in regions where fires are recurrent (Uda et al., 2019).

The health impacts of fire incidents in Indonesia are profound, particularly for vulnerable populations such as children. Exposure to smoke from forest fires has been linked to respiratory issues and other health problems, which can affect students' ability to learn and thrive in school environments (Uda et al., 2019). The cumulative effects of repeated exposure to poor air quality can lead to long-term health consequences, underscoring the urgent need for comprehensive fire management strategies that include schools as critical stakeholders (Uda et al., 2019).

The implementation of safety and health is the responsibility of all parties involved, who are obliged to play an active role according to their functions and authority to undertake various efforts in the field of safety and health continuously, making it an integral part of the work culture in every activity and workplace (Osei-Asibey et al., 2021). This is essential to prevent accidents and occupational diseases in the workplace and in other institutions, such as educational facilities or boarding schools in Indonesia. Accidents and diseases due to work or daily activities can occur to anyone and anywhere, including students while at school, home, or in the boarding school (pesantren) environment. Accidents and diseases resulting from work or activities are challenges that can be mitigated early if

workers or students are aware of the potential hazards or diseases present in their surroundings (Gurdasani et al., 2021).

The implementation of fire emergency response protocols in schools is of paramount importance due to the inherent risks associated with fire incidents in educational settings. Schools are often densely populated environments where children and staff may not possess the necessary skills or knowledge to respond effectively in the event of a fire. According to Heidari et al. (2019), the design and construction of schools must prioritize fire safety principles to mitigate risks and ensure the safety of students and staff. This proactive approach involves not only the physical infrastructure but also the cultivation of a safety culture among all school stakeholders, including staff, students, and parents.

Moreover, the effectiveness of fire safety measures is often hampered by resource constraints, particularly in special needs schools, as highlighted by Raphela (2024). Limited funding and access to specialized training can significantly impact the implementation of comprehensive fire safety programs. This underscores the necessity for schools to seek partnerships with local fire departments and community organizations to enhance their fire safety training and resources (Raphela, 2024).

Training programs tailored for educators and students are critical in fostering a culture of preparedness. demonstrated that implementing training programs significantly improved teachers' performance regarding disaster management, including fire response and evacuation procedures (Abozeed et al., 2019). Regular drills and simulations can enhance the readiness of both staff and students, ensuring that they are familiar with emergency protocols and can act swiftly during an actual fire incident (Abozeed et al., 2019).

Boarding schools are educational institutions that carry inherent risks because their activities frequently involve the use of tools, materials, and energy sources that can pose hazards. Energy sources such as electricity, LPG gas, and chemicals, if not properly managed, can present significant fire risks (Zam et al., 2022). According to data from the Directorate General of Land Transportation of the Republic of Indonesia, an analysis of accident victims in Indonesia in 2020 based on education level reveals that the largest number of accident victims were students with a high school education level, totaling 80,641 individuals, followed by junior high school students (17,699 individuals), and elementary school students (12,557 individuals). Meanwhile, at the D3 education level, there were 770 victims, at the S1 level, 3,751 victims, and

Table 1  
*Characteristics Respondents*

Characteristics	Frequency	Percentage
Gender		
Male	38	100
Age		
13	11	28.9
14	3	7.9
16	18	47.4
17	6	15.8
Class		
Junior High School	14	36.8
Senior High School	24	63.2

at the S2 level, 136 victims. Furthermore, data from the Fire Service of Makassar city indicates that since the beginning of 2023, there have been 359 fire incidents in Makassar, resulting in estimated losses of IDR 19.23 billion. Most of these fires occurred in residential houses, with 192 incidents recorded. This was followed by rubbish or reed fires with 191 cases. Other cases involved various objects, such as kiosk shops with 46 incidents, industrial companies with 28 cases, warehouse fires with 16 cases, educational buildings or schools with 3 cases, and vehicle fires with a total of 11 cases.

Based on this background, the researcher is interested in conducting research related to analyzing the effect of the application of the health and safety module on student knowledge at the Athirah Bukit Baruga Junior-Senior High School Boarding School in Makassar.

## METHODS

This research is a type of experimental research with the form of Pre-Experimental Designs. The research design is One Group Pretest-Posttest Design. In this design there is a pretest before treatment and a posttest after treatment. This study was conducted from December 2023 to May 2024. The population of this study was all male students of Boarding School SMP-SMA Athirah Bukit Baruga Makassar as many as 96 people. The sample in this study were VII and X grade students totaling 38 students. By fulfilling the following characteristics with inclusion criteria: registered as students, physically and mentally healthy; permanent residents of the dormitory; willing to be respondents and actively invited to communication. Measurement of fire emergency response knowledge and clean and healthy living behavior was carried out by providing questionnaires. Intervention was carried out by providing Health and safety modules for students.

Primary data were obtained through direct observation of the object of research, namely through direct observation, discussing and making training with students regarding OSH knowledge in the dormitory environment.

Data processing was carried out using a computer and analyzed using the SPSS 22.0 program. To determine whether there is an effect of the K3 module on the influence of student knowledge and Independent Test (T- Test) to determine the differences before and after intervening in the case group and control group. Normality test was initially conducted by looking at the Shapiro-Wilk value before the data was analyzed. This study has passed the ethical clearance test by the Faculty of Medicine, UIN Alauddin Makassar.

## RESULTS

This study is about the Effect of Implementation of Safety and Health Module on Students' Knowledge in Boarding School SMP-SMA Athirah Bukit Baruga Makassar. Respondents in this study were 7th and 10th grade students as many as 38 students. This type of research is quantitative research with the results of research data obtained in the form of numbers then the research design used is quasi experiment.

Table 1 shows that there are 38 respondents, all of whom are male as many as 38 respondents (100%), and the most respondents in the category at the age of 16 as many as 18 (47.4%) and it can be seen that most of the respondents in the high school class category are 24 respondents (63.2).

Table 2 shows that safety and health on students' knowledge of fire emergency response before and after being given the module, based on the results of the Paired Samples T-Test test obtained p value =0.000 ( $p < 0.05$ ). This shows that there is a significant effect on increasing students' fire emergency response safety and health knowledge at Athirah Bukit Baruga Junior-SMA Boarding School. Table 2 shows also that safety and health on students' knowledge of PHBS before and after being given the module, based on the results of the Paired Samples T-Test test obtained p value =0.000 ( $p < 0.05$ ). This shows

Table 2

Paired Samples T-Test Results of the Effect of Implementing the Safety and Health Module

Variables	Mean	Std. Deviation	Std. Error Mean	t	Df	Sig. (2-tailed)
Tanggap darurat kebakaran						
Pre test						
Post test	-7.684	4.872	0.79	-9.723	37	0.000*
PHBS						
Pre test						
Post test	-6.816	4.248	0.689	-9.89	37	0.000*

Note : \* significant (p<0.000), analyzed using paired t-sample test

that there is a significant effect on increasing safety and health knowledge after being given a PHBS module at Athirah Bukit Baruga Junior-SMA Boarding School.

## DISCUSSION

### Effect of Fire Emergency Response Implementation on Student Knowledge

The results of study on the fire emergency response module given to students is a very important thing to learn for every student who lives in boarding or dormitory status. Fire disasters can occur anytime and anywhere, including in boarding. The results of this study are consistent with the research conducted by Uhm et al. (2019), which stated that there is a relationship between knowledge and preparedness for fire emergency response before and after training. In addition to training, knowledge enhancement can also be achieved through the addition or provision of materials on fire emergency response.

The implementation of fire emergency response protocols in educational institutions is crucial for safeguarding the health and safety of students. Fire incidents in schools can lead to devastating consequences, including physical injuries, psychological trauma, and even fatalities. Therefore, establishing effective fire emergency response systems is essential for mitigating these risks and ensuring a safe learning environment (Shah et al., 2020).

First and foremost, the immediate physical health impacts of fire incidents can be severe. According to Heidari et al. (2019), schools must prioritize fire safety measures to reduce the risk of injuries during fire emergencies. This includes having well-defined evacuation routes, accessible fire extinguishers, and regular fire drills to familiarize students and staff with emergency procedures. The lack of preparedness can lead to chaos during an actual fire, increasing the likelihood of injuries as students attempt to evacuate. Regular training and drills can significantly enhance the readiness of both students and staff, ensuring that they know how to respond effectively in the event of a fire.

Moreover, the psychological effects of fire incidents on students cannot be overlooked. Exposure to traumatic events such as fires can lead to long-term mental health issues, including post-traumatic stress disorder (PTSD), anxiety, and depression. emphasizes the importance of fire disaster preparedness in educational settings, noting that a lack of preparedness can exacerbate the psychological impact of fire incidents on students (Kihila, 2017). Implementing comprehensive fire safety education and response training can help alleviate some of these psychological burdens by equipping students with the knowledge and skills necessary to respond calmly and effectively during emergencies.

In addition to immediate physical and psychological impacts, the long-term health consequences of fire incidents can be significant. Smoke inhalation and exposure to toxic substances released during a fire can lead to chronic respiratory issues and other health complications. highlight the importance of evaluating fire disaster emergency response capacity to minimize health risks associated with fire incidents (Ahmadu et al., 2021). Schools must not only focus on immediate response but also consider the long-term health implications of fire exposure, ensuring that students receive appropriate medical attention if needed.

Furthermore, the role of school leadership in implementing fire emergency response protocols is critical. Effective management and training of school leaders can significantly influence the overall safety culture within educational institutions. argue that having a written Emergency Preparedness Plan (EPP) is essential for guiding schools in their response to fire emergencies (Ilori & Sawa, 2020). Such plans should be regularly reviewed and updated to reflect changes in school infrastructure, staffing, and student demographics. By fostering a culture of safety and preparedness, school leaders can enhance the effectiveness of fire emergency response measures.

The health impacts of fire incidents on students are multifaceted and can have both immediate and long-term consequences (Hamideh et al., 2022). Fires in educational settings pose significant risks not only to physical safety but

also to mental health and overall well-being. The immediate physical health effects of fire incidents can include burns, smoke inhalation, and injuries sustained during evacuation. According to [Heidari et al. \(2019\)](#), schools play a crucial role in mitigating the effects of fire incidents through proper planning and preparedness, which can significantly reduce the suffering of those involved in such emergencies. This underscores the importance of having robust fire safety protocols in place to protect students from the physical dangers associated with fires.

In addition to physical injuries, the psychological impact of fire incidents on students can be profound. Exposure to traumatic events, such as experiencing a fire, can lead to various mental health issues, including post-traumatic stress disorder (PTSD), anxiety, and depression. Research indicates that children and adolescents are particularly vulnerable to the psychological effects of trauma, which can manifest as behavioral problems, academic difficulties, and social withdrawal ([Loades et al., 2020](#)). The emotional toll of experiencing a fire can disrupt a student's educational experience and hinder their ability to engage fully in school activities. Schools must therefore not only focus on physical safety but also provide mental health support to students affected by fire incidents ([Schulze et al., 2020](#)).

Furthermore, the health implications of fire incidents extend beyond the immediate aftermath of a fire. Long-term exposure to smoke and hazardous materials released during a fire can lead to chronic respiratory issues and other health complications. For instance, studies have shown that children exposed to smoke from fires are at an increased risk of developing asthma and other respiratory conditions ([Henry et al., 2021](#)). The cumulative effects of such exposure can have lasting impacts on a child's health, potentially affecting their academic performance and quality of life ([Noah et al., 2023](#)).

The importance of implementing fire emergency response protocols in educational institutions is not only a matter of safeguarding physical health but also a critical element of fulfilling Islamic teachings on the preservation of life and the environment. The Qur'an explicitly emphasizes the need for preparedness and the prohibition of causing harm to the earth, as reflected in QS Al-A'raf/7:56, which states:

*" And do not cause corruption on the earth after its reformation. And invoke Him with fear and aspiration. Indeed, the mercy of Allah is close to those who do good"*

This verse underlines the obligation to protect the environment and prevent actions that could lead to disasters, including fires.

The integration of Islamic teachings into disaster preparedness and mitigation efforts, particularly in the context of fire safety, is essential. The Qur'an offers guidance on disaster mitigation, advocating for both structural and non-structural approaches, as well as the improvement of moral qualities and a closer relationship with Allah SWT. While disasters may be seen as willing of Allah SWT, they often result from human negligence or misconduct. Therefore, it is our responsibility to implement effective disaster mitigation strategies to protect ourselves and others.

### **Effect of Implementation of Clean and Healthy Living Behavior Modules on Students' Knowledge**

The results of the study on the implementation of the PHBS module highlight its importance as an investment in creating a healthy, clean, and comfortable learning environment. This module not only has a positive impact on physical health by preventing various infectious diseases such as diarrhea, respiratory infections, and skin diseases that often arise in boarding environments but also supports the development of good character among students. Additionally, it enhances the quality of clean and healthy living habits and helps improve students' immunity, making them less likely to fall ill while staying in the boarding school.

The implementation of clean and healthy living behavior (PHBS) aims to improve knowledge, attitudes, and behavior to enable the practice of clean and healthy living habits, thereby maintaining, preserving, and enhancing health ([Tao et al., 2024](#)). Awareness of clean and healthy living behavior (PHBS) is key to creating a healthy environment. By maintaining personal hygiene, disposing of waste properly, and taking care of both mental and physical health, each student can contribute to creating a healthy boarding school environment for all residents. As a result, a healthy and productive life in learning can be achieved ([Alam et al., 2022](#)).

Implementing clean and healthy behaviors among students is of paramount importance for fostering a conducive learning environment and promoting overall well-being. The significance of hygiene practices, including handwashing, oral hygiene, and maintaining cleanliness in school settings, cannot be overstated, as these behaviors directly impact students' health, academic performance, and social interactions ([Jatrana et al., 2021](#); [Pengpid & Peltzer, 2020](#); [Sharma et al., 2024](#)).

One of the most critical aspects of promoting clean and healthy behaviors is hand hygiene. [Mohamed et al. \(2020\)](#) conducted a quasi-experimental study that demonstrated the positive effects of hand hygiene interventions on reducing absenteeism among preschool



children. The study highlighted that providing access to hand hygiene materials, such as antiseptic cleansers and tissue paper, significantly improved students' hand hygiene practices. This finding underscores the importance of creating an environment that encourages good hygiene habits, particularly in schools where children are in close contact with one another. By instilling proper hand hygiene practices, schools can reduce the transmission of infectious diseases, thereby enhancing students' health and attendance.

In addition to hand hygiene, oral hygiene is another critical area that requires attention in schools. [Sarayuthpitak et al. \(2021\)](#) evaluated an oral hygiene promotion program for elementary school students and found that it effectively improved students' knowledge, attitudes, and practices regarding oral health. The study emphasized the importance of educating students about proper oral hygiene to prevent dental issues, which can lead to discomfort and absenteeism. By integrating oral health education into the school curriculum, educators can promote lifelong healthy habits that contribute to students' overall well-being.

Furthermore, the physical environment of schools plays a significant role in promoting clean and healthy behaviors. [Wami et al., \(2022\)](#) highlighted the importance of water, sanitation, and hygiene (WaSH) facilities in schools, particularly in low socio-economic regions. The study found that schools with adequate WaSH facilities were more likely to promote hygiene practices among students. This suggests that investing in clean and functional facilities is essential for encouraging students to adopt healthy behaviors. Cleanliness in the school environment not only fosters a sense of pride among students but also reduces the risk of illness and enhances their ability to focus on learning.

Moreover, the role of school leadership in promoting clean and healthy behaviors is crucial. Islamic teachings provide a framework for this, as cleanliness is not only a matter of personal hygiene but also of social responsibility. As emphasized by [Khalid et al. \(2023\)](#), the implementation of PHBS is not just a health initiative but also a practice recommended in Islam. Despite this, many communities have yet to fully adopt these practices, leading to the spread of various diseases. This indicates a gap between religious knowledge and its practical application in daily life, particularly in maintaining cleanliness and health, as guided by the Qur'an and Hadith.

The Qur'an and Hadith serve as comprehensive guides for Muslims to avoid harmful actions and promote beneficial practices that safeguard health. For example, the Qur'an encourages the consumption of halal and healthy food, maintaining physical purity, and engaging in regular

exercise—all of which are aspects of PHBS. In QS Al-Baqarah/2:222, Allah SWT commands believers to keep themselves pure, which is a fundamental principle in Islamic jurisprudence that extends to all aspects of life, including health and cleanliness.

Furthermore, the psychosocial aspects of cleanliness and its impact on mental health, particularly in the context of the COVID-19 pandemic, highlight the need for a holistic approach to health in Islamic boarding schools. The anxiety associated with cleanliness standards, if unmet, can affect students' mental health and social interactions ([Mofatteh et al., 2021](#)). In response, Islamic teachings offer not only the guidelines for maintaining physical cleanliness but also for cultivating inner peace through faith and trust in Allah SWT, even in challenging circumstances.

By integrating Islamic principles into the implementation of PHBS, schools can create a learning environment that aligns with the spiritual and moral values of Islam. This not only enhances the physical health of students but also fosters a sense of responsibility and community, as cleanliness is a shared duty among all Muslims. The commitment to maintaining cleanliness, as an act of faith, ensures that students not only thrive in their educational pursuits but also grow into individuals who uphold the principles of Islam in all aspects of life.

Limitations of this study include the One Group Pre and Post-test design that did not have a control group, making it difficult to ensure that the increase in knowledge was entirely due to the intervention of the OSH and PHBS modules. The limited sample of 38 male students from one school also limits the generalizability of the results. In addition, the short duration of the study did not allow for observing long-term effects, and the use of questionnaires as the only measurement tool may have resulted in response bias. This study also did not evaluate the application of knowledge in real-life situations and did not cover other relevant aspects of health and safety, nor did it measure the long-term sustainability of knowledge. However, this study also makes an important contribution by focusing on the boarding school environment, which often faces special challenges in terms of health and safety, and identifying the positive impact of specially designed health and safety interventions.

## CONCLUSIONS

The study concluded that the implementation of the fire emergency response module plays a vital role in minimizing both losses and casualties. Key components such as early detection systems, well-defined evacuation plans, sufficient fire extinguishing equipment, and strong

coordination with fire services significantly reduce the risks associated with fires. The training module has effectively enhanced preparedness for emergency situations, as evidenced by the improved calmness and organization of students and staff during fire drills, indicating their readiness for real-life emergencies. The fire emergency response module's implementation, which includes a clear evacuation plan, designated assembly points, specific task assignments for teachers and staff, and the provision of fire extinguishers along with proper training, is essential for effective fire prevention and response in the dormitory setting. Additionally, the study highlighted the effectiveness of the PHBS (Clean and Healthy Living Behaviour) program in increasing students' awareness and knowledge about the importance of cleanliness and health. Participants in this program demonstrated a deeper understanding of clean and healthy living practices, underscoring the program's success in promoting health-conscious behaviors within the boarding school environment.

This study recommends that students should actively engage in all safety drills and PHBS activities to reinforce their knowledge and preparedness. The school administration should continue to prioritize safety and health programs, ensuring that all fire safety equipment is regularly maintained and that evacuation plans are periodically reviewed and practiced. It is also recommended that the PHBS program be expanded to include regular workshops or seminars on health-related topics, fostering a culture of health and safety within the school. Subsequent research could explore the long-term impacts of these safety and health programs on students' behaviors and outcomes. Additionally, studies could investigate the effectiveness of similar modules in different types of educational institutions or explore the integration of technology to further enhance safety measures in boarding schools.

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#### AUTHORS' CONTRIBUTIONS

Irwan Duhung wrote the manuscript, revised manuscript, enrolled participants, collected, acquired and analyzed the data. Hasbi Ibrahim and Darsul S. Puyu reviewed the manuscript and performed the field work. All authors designed the study, formulated the concept and read and approved the final manuscript.

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#### COMPETING INTERESTS

The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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