

Combating infectious diseases threat among students in Islamic boarding schools (*pondok pesantren*) in Yogyakarta, Indonesia



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ABSTRACT

Pondok Pesantren or Islamic Boarding Schools (IBS), as one of the major boarding-based education systems in Indonesia, face significant challenges in preventing and controlling infectious disease transmission. Huge numbers of students, crowded dormitories, shared lavatories, limited healthcare facilities, and intense social interactions increase the risk of transmitting infectious diseases within the facilities. This study aimed to provide an initial assessment of the history of infectious diseases and the spread of infectious diseases among students living in IBS before conducting training and intervention related to infectious diseases prevention and control programs. This quantitative study was conducted using a descriptive analysis approach in July-August 2022 at Assalafiyah Mlangi II Terpadu IBS. A non-probability sampling with total sampling of 841 students was used. The data were collected using self-administered questionnaires developed on Google Form and imported to Microsoft Excel for further data analysis. The results indicate that the majority of the students have a history of infectious diseases (90.48%) during their time living in IBS. The most common infectious diseases found were influenza (55.38%), scabies (20.20%), conjunctivitis (8.13%), varicella (4.54%), herpes simplex (2.08%), tuberculosis (0.65%), and measles (0.13%). During the COVID-19 pandemic, a total of 21.16% of the students had been exposed to COVID-19. Considering these findings, it is essential for the staff and students living in IBS to understand the steps to prevent the occurrence of infectious diseases and be able to identify and provide initial treatment to stop the transmission of the disease. The development of digital health intervention using a website or application can be implemented to help the students report and consult case findings to medical experts.

Keywords: Boarding schools; clean and healthy living behavior; congregate settings; infectious diseases; prevention; Indonesia.

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INTRODUCTION

Pondok Pesantren or Islamic Boarding School (IBS) is one of the biggest boarding-based education systems in Indonesia where students (commonly known as *santri*) live together in one location to study under the guidance of a teacher called *Kyai*.¹ According to the data released by the Indonesian Ministry of Religion Affairs in 2022, there are approximately 27,722 IBS spread over 34 provinces in Indonesia with the total number of students reaching 4,175,531. There are 319 IBS located in the 5 cities/regencies of the Special Region of Yogyakarta (DIY) Province with 35,211 students living in IBS and 14,281 regular

or non-resident students.² Most IBS in DIY Province require their students to live in dormitories.³ One of these IBS is Assalafiyah Mlangi II Terpadu IBS. It has approximately 942 students who live in the facilities. Along with that regulation, one of the main concerns is the provision of ideal room size in the dormitories, which mostly were not proportional to the number of students who occupied them. Dense housing causes humid room conditions and close contact between students will increase the risk of transmitting infectious diseases.⁴

Infectious disease is a type of disease that can be transmitted from one individual

to another through direct or indirect contact.⁵ The most common infectious diseases reported in boarding schools are scabies, cough, shortness of breath, influenza, and acute respiratory infections (ARI).^{6,7} Those diseases can be transmitted rapidly through the air, water, or direct and indirect contact. Thus, environmental factors, especially adequate ventilation, are needed to prevent disease transmission.⁸ Constantly practicing clean and healthy living behaviors (CHLB) and providing facilities, infrastructure, and culture in IBS are crucial factors in determining the risk of students against diseases.⁹

Poor sanitation is one of the possible

causes of infectious disease exposure among students in IBS. Some students who have been able to adapt to the poor sanitary environment in IBS will help them become immune to some particular infectious diseases, like scabies. However, this is not supposed to be interpreted by the IBS staff that they could ignore the poor sanitation system. However, it should be their concern to provide a good and proper sanitation system so that the students will gain more protection from some of the health problems, especially infectious diseases.¹⁰ One of the factors that worsened the transmission of an infectious disease in IBS is the students' beliefs and perceptions of a particular disease, such as scabies. For students living in IBS, exposure to scabies is considered a form of validity in receiving knowledge in IBS.¹¹ While scabies can reduce students' quality of life by affecting their focus on study, social interactions, and school attendance.

According to *Pondok Pesantren Health Post (Poskestren)* Guidelines No. 1 of 2013, it is necessary to involve students in dealing with health problems within IBS. One-third of the total number of students should contribute to maintaining the health of all residents in IBS.¹² Those students will then be divided into two types of cadres, health cadres, and disaster preparedness cadres. With the *Poskestren* program, the governments hope that student cadres can provide counseling and training on promotive and preventive measures in IBS.¹³ This is in line with one of the targets of the national development agency in the health sector, which states that IBS has the potential to become a development agent because they can produce many educated young generations.^{14,15}

The use of digital health intervention has proven effective in reducing the gap in healthcare access through telemedicine, as well as helping healthcare workers or volunteers in reporting disease surveillance. Assalafiyah Mlangi II Terpadu IBS has developed an application for parents to monitor their children's activities. This application has the potential to be developed and help improve the healthcare system in IBS by creating a system to record the incidence of infectious diseases among the students

and report the cases to the medical experts through telemedicine. Therefore, this study aimed to identify the prevalence of infectious diseases among students living in Assalafiyah Mlangi II Terpadu IBS as the basis of training and education for the student cadres related to health promotion and prevention.

METHODS

This quantitative descriptive study was conducted at the Assalafiyah Mlangi II Terpadu Islamic Boarding School. It has received approval from the Medical and Health Research Ethics Committee of the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada in Yogyakarta Indonesia, with approval number KE/1012/08/2022. Target population in this study included 841 students of the Assalafiyah Mlangi II Terpadu Islamic Boarding School. Sampling was done using a non-probability sampling method, namely the total sampling technique. Total sampling is a sampling technique where the number of samples is the same as the population.¹⁶ We included all students who agreed to participate in this study and excluded any questionnaires with missing data.

The data collection was conducted through self-administered questionnaires developed on Google forms questionnaires accompanied by mentoring the students in answering the questionnaire questions. We divided the data collection into five different times within July-August 2022. Followed by in-depth interview and direct observation for data triangulation.

The questionnaires included demographic characteristics and questions related to infectious diseases. The questions only consist of two personal questions about the history of infectious diseases and COVID-19 during their study in Assalafiyah Mlangi II Terpadu IBS and one open question about the type of infectious disease. We did not conduct validity and reliability testing. The data obtained were then transferred and tabulated to Microsoft Excel, then the results were summarized using descriptive analysis. The results obtained were then presented to the health division of Assalafiyah Mlangi II Terpadu IBS to find out more about the health training

cadre needed to answer the challenges and opportunities to develop access and health facilities in the face of the digitalization era.

RESULTS

Two dormitories were provided for the female and male students living in Assalafiyah Mlangi II Terpadu IBS. Each dormitory had many bedrooms of different sizes, which could accommodate 20-30 male students and 30-35 female students. They slept on the floor mattresses during the night and the mattresses would be stacked up during the day (see [Figure 1](#)). There was no obligation to use the same mattress for the same student, so every night there was a high probability that the mattress would be used randomly.

Due to limited space in the bedrooms, the placement of personal items such as towels, clothes, pillow, and blankets were collected in the same place for all students living in the same room. They would hang their towels, uniforms, and other clothes in one place, usually very close to one another (see [Figure 2](#) and [3](#)). Since they had lived together for an extended time, some students might borrow other students' personal belongings without hesitation out of a sense of togetherness.

We recruited 841 students from Assalafiyah Mlangi II Terpadu IBS to fill a self-assessment questionnaire. The gender distribution of students shows similar percentages between male and female, 50.05 and 49.94, respectively. Meanwhile, the mean age for male respondents was 13 years and 15 years for female respondents (See details in [Table 1](#)).

Among all students who lived in Assalafiyah Mlangi II Terpadu IBS, 90.48% of them had a history of infectious diseases. This finding means that almost all students have experienced infectious diseases with a ratio of 9:1. The most common infectious diseases reported were influenza (55.38%), scabies (20.20%), conjunctivitis (8.13%), varicella (4.54%), herpes simplex (2.08%), tuberculosis (0.65%), and measles (0.13%).

The results showed that the prevalence of male and female students who have a history of infectious diseases were 89.78% and 91.19%, respectively. The most common diseases found in male students



Figure 1. One of the rooms in the female dormitory during the day (Courtesy of: <https://www.youtube.com/watch?v=58KZ27VYnxc>).



Figure 2. One of the sides in the bedroom of the female dormitory used as a place to hang towels, uniforms, and other clothes. (Courtesy of: <https://www.youtube.com/watch?v=58KZ27VYnxc>).

were dominated by influenza (45.76%) and scabies (36.77%). While in female students, the history of infectious disease was dominated by influenza (65.01%). During the COVID-19 pandemic, a total of 21.16% of the students had been exposed to COVID-19.

We confirmed the self-assessment results through an in-depth interview with the head of the health division of Assalafiyah Mlangi II Terpadu IBS. She stated that the most frequent infectious diseases reported were influenza, scabies, and varicella. Students who complained of having symptoms of illness would report to AKSA (a student organization responsible

for students' health in the dormitories). They would conduct an initial assessment and treatment before reporting to the on-duty nurse in the health clinic or directly accompanying the students to the nearest public healthcare center (*Puskesmas*) or hospital.

The health division organized routine health programs for preventive measures, including vitamin distribution, promoting health education, and aerobic activities. If an infectious disease case was identified, for example scabies or varicella, they would isolate the infected student to another room, with different access to the bathroom and dining facilities.

DISCUSSION

Students living in Assalafiyah Mlangi II Terpadu IBS are mainly middle-school aged, with a mean age of 13 years old. Living in a boarding school is considered to be the ideal location to influence students' health-related behaviors because of the amount of time that students spend there. Therefore, schools play significant roles to improve children's understanding towards clean and healthy living behaviors (CHLB).¹⁷ These CHIBs in school-aged children are essential, since they are prone to health problems, including infectious diseases.¹⁸ The high frequency of social interaction, along with age-related behavioral, and environmental factors, can promote the spread of infectious diseases within Islamic Boarding Schools, which can then spread to homes and the larger community.¹⁹

The findings show that the most common infectious diseases can be categorized into skin infections, respiratory diseases, and eye infection. This finding is similar to a study in a boarding school in Sudan.²⁰ Students living in boarding schools are prone to infectious diseases, including skin, respiratory, eye, and gastrointestinal infections. Additionally, most of the students in that boarding school were also confirmed positive with blood tests for Malaria due to their living environments being one of the Malaria-endemic countries.

Scabies are among the most well-known skin diseases related to people living in congregate settings. Scabies is a skin infection that can infect everyone at all ages, races, genders and social economic levels. Some studies showed that gender, personal hygiene, and population density in the dormitories are the main risk factors of scabies transmission.²¹ Male students tend to have higher risk of scabies infestations due to their activities and habits that are less concerned in maintaining personal hygiene and clean-living behavior.²²

Varicella was the second highest skin infection found in this study. The varicella-zoster virus (VZV) initially infects people with varicella and then lays dormant in the ganglia until it is reactivated and causes herpes zoster. The case of herpes zoster is predicted to rise among younger

people, thus varicella immunization in young adults should also be taken into consideration.²³ According to a study, there is a correlation between personal hygiene of high school students and the incidence of herpes zoster in high schools.²⁴

Higher rates of infection were also found among Islamic Boarding School students during both the influenza season and COVID-19 pandemic due to high frequency of interaction. Since influenza and COVID-19 are viral diseases that mainly spread by droplets when people cough, sneeze, or talk, the disease is easily transmitted between people who are in close contact with each other.^{25,26} Controlling the transmission of COVID-19 within the facility should consider the contribution of asymptomatic and pre-symptomatic persons. Therefore, in a situation where COVID-19 cases were high in the community, active case finding

and contact tracing is recommended to reduce the probability of transmission within the facility.²⁷

The third most commonly reported infectious disease in Assalafiyah Mlangi II Terpadu IBS was conjunctivitis. Conjunctivitis (pink eye) is an inflammation of the outer membrane of the eye (conjunctiva) that viral or bacterial infection, allergies, and irritation can cause. Some of which are very contagious and can easily spread from person to person especially in congregate settings.²⁸ It is transmitted through close personal contact or touching an object with germs on it then touching the eyes without washing hands beforehand.²⁹

Islamic Boarding Schools, as a congregate facility, should plan for and be prepared to respond to outbreaks of any infectious diseases that may occur within their facility.³⁰ A highly dense population

in one room, sleeping arrangements, bed hygiene, and the placement of personal belongings are some of the most prominent factors for infectious disease transmission, especially skin diseases like scabies.³¹

Outbreaks of infectious diseases in particular settings, such as Islamic Boarding Schools, could seriously interfere with children’s education and cause a delay in school activities.²⁰ It is essential for the staff and students living in Islamic Boarding Schools to understand the steps to prevent the incidence of infectious diseases, including maintaining clean and healthy living behavior practices and promoting immunization for vaccine-preventable diseases. They should be able to identify and provide mitigation guidelines to stop the transmission of the disease, which includes screening and active case finding, cohorting sick students from healthy students, and providing the proper initial treatment needed. Isolating students with infectious diseases may also need adequate monitoring and implementation. Other recommendations are limiting the number of residents in one room, assigning specific places for individual belongings placement, and implementing regular health education awareness programs.³¹

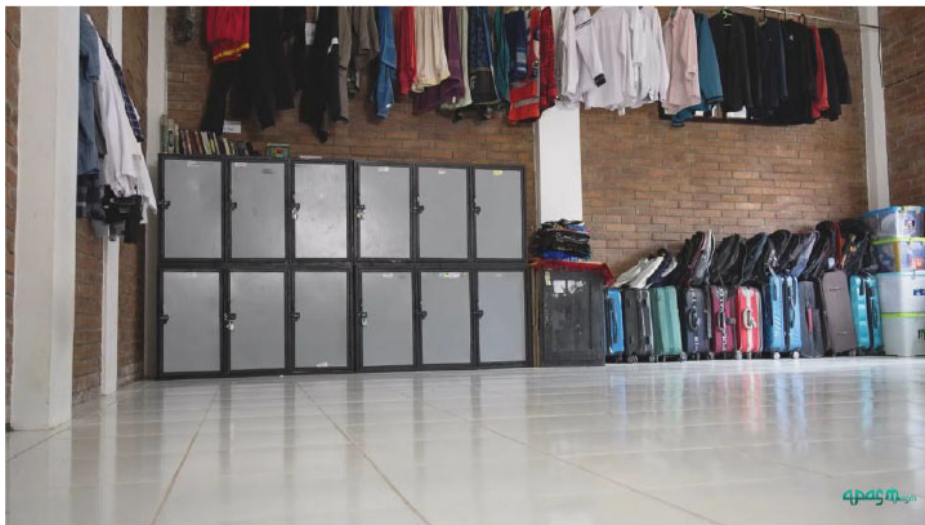


Figure 3. One of the sides in the bedroom of the male dormitory (Courtesy of: <https://www.youtube.com/watch?v=58KZ27VYnxc>).

Table 1. Characteristics of subjects.

Subject Characteristics	Male (421, 50.05%)		Female (420, 49.94%)		Total (841, 100%)	
	n	%	n	%	n	%
Age						
11 y.o.	6	1.40	5	1.19	11	1.30
12 y.o.	59	14.01	61	14.52	120	14.26
13 y.o.	82	19.47	90	21.42	172	20.45
14 y.o.	80	19.00	59	14.04	139	16.52
15 y.o.	75	17.81	95	22.61	170	20.21
16 y.o.	64	14.95	63	15	127	15.10
17 y.o.	51	15.20	38	9.04	89	10.58
18 y.o.	9	2.13	4	0.95	13	1.54
History of having infectious disease	378	89.78	383	91.19	761	90.48

CONCLUSIONS

According to this study, the most common infectious diseases found in Islamic Boarding Schools were skin infections (e.g., scabies, varicella, herpes, and measles), respiratory infections (e.g., influenza, COVID-19, and tuberculosis), and eye infection (e.g., conjunctivitis). Therefore, due to the rapid transmission

Table 2. Distribution of history of infectious diseases based on gender.

Disease	Male (378, 89.78%)		Female (383, 91.19%)	
	n	%	n	%
Influenza	173	45.76	249	65.01
Conjunctivitis	37	9.78	25	6.49
Varicella	6	1.82	28	7.27
Herpes Simplex	0	0.00	16	4.16
Scabies	139	36.77	14	3.64
Measles	0	0.00	1	0.26
Tuberculosis	1	0.26	4	1.04

of infectious diseases in Islamic Boarding Schools, it is highly important to spread knowledge about prevalent and serious infectious diseases and assist in managing and preventing infectious disease transmission in such educational settings. This pilot assessment will be used as the basis to encourage appropriate disease prevention measures through training for health student cadres and developing digital health intervention to help them report and consult with the health experts.

Further study is also needed to determine the accurate prevalence of infectious diseases in IBS by conducting a clinical examination of the students. We are also aware of the possibility of recall bias. Thus, we suggest the health division of Asslafiyyah 2 Mlangi start developing a basic medical record for the students. Since we used only three questions related to the history of infectious diseases, the future research agenda can also elaborate more using detailed questionnaires, including the possible risk factors, knowledge, behavior, and other related items.

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CONFLICT OF INTERESTS

No conflict of interest to declare.

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