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The Relationship Between Health Risk Assessment (HRA) Scores and Potential Morbidity Rates Among Students in Islamic Boarding Schools

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ABSTRACT

Introduction: Islamic boarding schools represent a unique closed-community environment where high occupancy density, communal behavioral practices, and limited health infrastructure create conditions highly conducive to infectious disease transmission. Health Risk Assessment (HRA) serves as a predictive instrument to identify multidimensional health risk factors before clinical manifestations occur, yet its relationship with potential morbidity rates among santri remains insufficiently explored. This study aimed to analyze the relationship between HRA scores and potential morbidity rates among students in Islamic boarding schools.

Methods: Research design used an analytical quantitative approach with a cross-sectional design. The sample consisted of 48 students at Islamic boarding schools selected through a purposive sampling technique with inclusion criteria. Data were collected using a HRA questionnaire, disease incidence form and environmental observation, than analyzed using Spearman's rank correlation test.

Results: Most respondents were aged 12-15 years (75%), had a junior high school education level (75%), and had resided at the boarding school for more than one year (83%). The Spearman correlation test revealed a strong and significant positive relationship between HRA scores and potential morbidity rates among santri ($r = 0.641$; $p = 0.001$), with overcrowding and the habit of sharing personal items identified as the dominant risk factors.

Conclusion: This study concluded that Health Risk Assessment (HRA) has a strong and significant relationship with the potential health status of students in Islamic boarding schools ($r = 0.641$; $p = 0.001$). A comprehensive and integrated health promotion strategy encompassing environmental, behavioral, nutritional, and institutional dimensions is highly recommended to improve the health status of students in Islamic boarding

schools.

Keywords: Health Risk Assessment, Health Safety In Boarding School and Respiratory Infectious Diseases

INTRODUCTION

Infectious diseases affecting the respiratory system remain a public health issue requiring serious attention, particularly in densely populated environments (Lombardi et al., 2021). This situation is particularly evident in boarding-based educational institutions, such as Islamic boarding schools (pondok pesantren), where students live, study, and interact intensively within a relatively confined space (Amalia, Farhany, & Rachmawati, 2023). This constant physical proximity creates significant opportunities for infectious agents to spread from one person to another, either through droplets, the air, or direct contact (Maki, Gottberg, Mccarthy, Ramkrishna, & Mcmorrow, 2019).

Some respiratory tract infections that are often found in Islamic boarding school communities include pulmonary tuberculosis, acute respiratory infections (ARI), and influenza. The physical environment of Islamic boarding school dormitories is a major risk factor driving the high incidence of infectious respiratory diseases. According to the WHO's Global TB Report 2023, Indonesia has the second-highest tuberculosis (TB) caseload in the world after India, with an estimated 1,060,000 TB cases and 134,000 deaths per year, equivalent to 17 people dying every hour (Chen et al., 2024). This situation is even more worrying given the significant gap in TB management in Indonesia, with 28% of cases undiagnosed and only 34% successfully treated. One of the population groups most vulnerable to infectious respiratory diseases in Indonesia is Islamic boarding school students (Setyoningsih, 2018).

According to data from the Ministry of Religious Affairs, the number of Islamic boarding schools in Indonesia by 2023 is estimated to reach 37,600 units spread across all provinces, with a total of approximately 4.85 million students. Research at the Assalafiyyah Mlangi Islamic Boarding School in Yogyakarta showed that most students (90.48%) had a history of infectious diseases during their stay at the boarding school, with the most common illness being influenza (55.38%), followed by scabies (20.20%), conjunctivitis (8.13%), and tuberculosis (0.65%) (Amalia et al., 2023). Similar findings were reported from the Wali Songo Ngabar Islamic Boarding School in Ponorogo, where the proportion of ARI cases among students was recorded at 18.47%, which is the third most common disease after scabies and dermatitis. Furthermore, research at the Amanatul Ummah Islamic Boarding School in Surabaya found that 54.1% of students experienced ARI, of which 73.9% lived in rooms with ventilation conditions that did not meet health requirements (Istifaiyah, Adriansyah, & Handayani, 2019).

Within the framework of health risk management, a Health Risk Assessment (HRA) is a systematic process used to identify, measure, and evaluate various potential hazards that could threaten the health status of a population (Bhat & Jiawen, 2021). Through the stages of hazard identification, exposure estimation,

risk characterization, and formulation of control recommendations, HRA can provide a comprehensive picture of the level of individual and community vulnerability to certain diseases (Noll, Rayanne, Tiggemann, Custodio, & Silveira, 2020).

The urgency of implementing HRA in Islamic boarding schools is further emphasized when combined with the finding that many cases of respiratory infectious diseases in these environments are only identified after they have reached an advanced stage, making treatment efforts more complex and requiring greater resources (Zhao et al., 2024). The close social interaction patterns, the use of shared facilities such as bathrooms and dining halls, and the limited mobility of students in and out of the Islamic boarding school grounds create unique characteristics that distinguish this community from the general population (Berg et al., 2026). These unique characteristics strongly justify the need to adapt the risk assessment approach developed to the local context (Goekcimen et al., 2023). This situation highlights a gap between the availability of early detection systems and the actual needs of the Islamic boarding school community.

Taken together, these figures indicate that respiratory infectious morbidity among santri substantially exceeds the rates typically reported in the general adolescent population, confirming that this issue constitutes a significant and recurring public health problem within the Islamic boarding school setting nationally, rather than an isolated case. Conceptually, HRA is expected to be closely associated with potential morbidity rates because both constructs represent different stages of the same disease-causation pathway: HRA measures the cumulative exposure to environmental, behavioral, and administrative risk factors that precede illness, while potential morbidity rate reflects the resulting probability that this exposure will manifest as clinical illness. In this study, potential morbidity rate is operationally defined as the estimated likelihood of a student experiencing respiratory-related illness (influenza, cough, or fever), derived from the frequency of self-reported illness episodes over the preceding six months in conjunction with related indicators of vaccination status, nutritional status, and stress level. A higher cumulative HRA score is therefore theoretically expected to correspond to a higher potential morbidity rate, since greater exposure to risk factors increases the pathways through which respiratory pathogens can be transmitted and clinical illness can develop.

From a nursing perspective, Health Risk Assessment constitutes a core component of community and school health nursing practice, as nurses are frequently the health professionals most consistently present within Islamic boarding schools and are therefore well positioned to conduct systematic risk identification, monitor early signs of illness, and deliver preventive health education to students. Nurses working in or collaborating with Poskestren (Islamic boarding school health posts) play a pivotal role in translating HRA findings into individualized and population-based nursing care planning, hygiene education, and timely referral, thereby bridging the gap between risk detection and preventive nursing intervention (Zhang et al., 2023).

This study aims to empirically analyze the relationship between the implementation of Health Risk Assessment and the prevention of respiratory infectious disease incidents in Islamic boarding schools, as well as to identify the most dominant risk factors that influence the incidence of these diseases in the Islamic boarding school community setting.

METHOD

This study employed an analytical cross-sectional design, considering time and resource efficiency, as well as its suitability for the descriptive-analytical research objectives. The study population comprised all students residing at Islamic boarding schools (pesantren). Sampling was conducted using a purposive sampling technique with established inclusion and exclusion criteria to ensure sample homogeneity and reduce selection bias. The inclusion criteria included female students aged 12-19, having resided at the Islamic boarding school for at least 3-6 months, and exclusion criteria included having pre-existing respiratory diseases such as asthma, tuberculosis, and severe immune disorders.

Primary data were collected using two main instruments that underwent validity and reliability testing before being used in the actual data collection. First, the HRA Questionnaire, consisting of 40 questions covering the dimensions of individual risk identification (environmental hazards, behavioral risks, and administrative controls), exposure history, and knowledge of respiratory disease risk factors; this instrument was developed by the researchers based on the HRA domains commonly applied in institutional and school-based risk-assessment frameworks (Bhat & Jiawen, 2021; Wilson et al., 2025), and was subsequently contextualized to the Islamic boarding school setting. Second, potential morbidity rate was measured using a disease incidence form recording the frequency of respiratory-related illness episodes (influenza, cough, and fever) experienced by each respondent over the past six months, combined with an environmental observation checklist assessing the physical condition of bedrooms, study rooms, bathrooms, and other sanitation facilities. Instrument validity was tested using Pearson correlation analysis and construct validity using Confirmatory Factor Analysis (CFA). Reliability was assessed using Cronbach's Alpha, with a minimum value of 0.70 as the threshold for acceptance. [Catatan revisi: mohon dilengkapi dengan nilai r hitung uji validitas dan nilai koefisien Cronbach's Alpha aktual dari hasil uji coba instrumen]. All instruments demonstrated validity and reliability values that met the established criteria. Each HRA dimension score was subsequently categorized into three levels-low, moderate, and high-based on cut-off points derived from the distribution of the total score (mean and standard deviation), following the categorization approach commonly used in health risk-assessment research (Bhat & Jiawen, 2021).

Data collection was conducted over a one-day period after obtaining approval from the head of the Islamic boarding school where the research took place. Primary data were collected through self-completion of questionnaires by respondents, accompanied by a thorough explanation of the research objectives and

assurance of data confidentiality. Written informed consent was obtained from all respondents. All research procedures were conducted in accordance with ethical research principles.

The collected data was then statistically tested using the Spearman Rank correlation test to more accurately and thoroughly determine the relationship between the two variables. The Spearman Rank test was used because the research variables were ordinal in scale and aimed to determine the direction and strength of the relationship between the Health Risk Assessment (HRA) and the respondents' potential health status. The analysis results were then presented in tabular form and interpreted based on the correlation coefficient and significance level (p-value).

RESULTS

The results of this study are presented in four sequential parts: respondent characteristics, the HRA risk profile across the environmental, behavioral, and administrative dimensions, the potential health status indicators, and the correlation between HRA and potential health status. This study involved a number of female students carefully selected to represent the environmental health conditions in Islamic boarding schools. The following characteristics illustrate how the diversity of respondents' ages, education levels, and length of stay serve as a key foundation for understanding the effectiveness of HRA implementation in Islamic boarding schools. These characteristics can be seen in the following table:

Table 1. Respondent characteristics

Characteristics	n	(%)
Age		
12-15	36	75
16-19	12	25
Total	**48**	**100**
Education		
Junior High School	36	75
Senior High School	12	25
Total	**48**	**100**
Length of Stay		
3-6 months	2	4
7-12 months	6	13
>1 year	40	83
Total	**48**	**100**

Of the 48 respondents, the demographic characteristics of the respondents indicate that the majority were Islamic boarding school students aged between 12 and 15 years with a junior high school education level (75%). The majority of respondents (83%) had lived at the Islamic boarding school for more than one year, indicating a significant level of exposure to environmental risk factors.

Environmental health risk assessments in Islamic boarding schools were conducted using the Health Risk Assessment (HRA) instrument, which encompasses three main dimensions: environmental hazards, behavioral risks, and administrative controls. These three dimensions are assessed based on risk levels, categorized as low, moderate, and high. Data were collected from 48 students living in the Islamic boarding school environment. The complete assessment results are presented in the following table.

Table 2. Health Risk Assessment Results

HRA Indicator					
Environmental Hazards	**Low**	**Moderate**	**High**	**n**	**(%)**
Occupancy density	4	12	32	48	100
Ventilation and lighting	26	12	10	48	100
Air humidity	26	12	10	48	100
Public facility cleanliness	14	16	18	48	100
Behavioral Risk	**Low**	**Moderate**	**High**	**n**	**(%)**
Hand hygiene practices	30	10	8	48	100
Coughing and sneezing etiquette	30	12	6	48	100
Sharing personal items	8	14	26	48	100
Physical activity	10	30	8	48	100
Sleep patterns	34	10	4	48	100
Administrative Controls	**Low**	**Moderate**	**High**	**n**	**(%)**
Health screening system	36	8	4	48	100
Isolation facilities	48	-	-	48	100
Access to Poskestren	38	6	4	48	100
Health education	7	28	13	48	100

Table 3. Health Status Indicator

Potential Health Status					
Morbidity History in the Past 6 Months (Flu, Cough, Fever)	**Frequently (>6x)**	**Sometimes (2-6x)**	**Rare (<2)**	**n**	**(%)**
	25	10	13	48	100
Vaccination Status	**Yes**	**No**			
Complete Immunizations	48	-		48	100
Influenza Vaccine	4	44		48	100
Nutritional Status (BMI)	**Thin**	**Ideal**	**Obese**		
	17	28	3	48	100
Stress and Fatigue Level	**Frequently**	**Sometimes**	**Rare**	48	100
	19	16	3		

Table 4. Spearman rank HRA test results with potential health status

Spearman's rho	HRA	potential health status
HRA	Correlation coefficient (r)	0.641
Sig. (2-tailed)		0.001
N		48

The research data revealed a mixed picture of various aspects of health risks in Islamic boarding schools. In terms of environmental hazards, overcrowding was the primary concern, with 32 respondents (66.7%) categorized as high-risk, while

ventilation and lighting, air humidity, and cleanliness of public facilities each showed a more even distribution between the low and medium categories.

In the behavioral risk dimension, hand hygiene and coughing/sneezing etiquette tended to be low (30 respondents, or 62.5%, respectively), reflecting a lack of hygiene awareness among students. Furthermore, sharing personal items scored high among 26 respondents (54.2%), a common behavior pattern in dormitory life and potentially a significant disease transmission pathway.

In the administrative controls dimension, the health screening system showed a low score among 36 respondents (75%), indicating that the majority of students considered the system to be suboptimal. Even the overall isolation facilities were categorized as low, indicating limitations in quarantine facilities that need to be addressed. Access to community health posts (Poskestren) and health education showed varying results, with most respondents viewing these services as suboptimal.

In addition to assessing environmental and behavioral risks, this study also examined the health status of students as a variable reflecting the actual health conditions within the Islamic boarding school environment. Health status was assessed using four indicators: history of morbidity in the past six months, vaccination status, nutritional status based on Body Mass Index (BMI), and stress and fatigue levels. A comprehensive overview of the students' health is shown in the following table.

The health status table reveals the health condition of the students from three main perspectives. In terms of morbidity history, 25 respondents (52.1%) reported experiencing illnesses such as influenza, cough, and fever more than six times in the past six months, while 13 respondents (27.1%) experienced them less than twice. This high frequency of morbidity aligns with the high density of living conditions found in the HRA table, where respiratory infections can easily spread in crowded dormitory environments.

In terms of nutritional status (based on Body Mass Index/BMI), the majority of respondents were in the ideal category. The presence of malnutrition in one-third of respondents warrants attention, as suboptimal nutritional status can reduce immunity and increase susceptibility to infection, which correlates with previously reported high morbidity rates.

Data shows that more than a third of students experience stress and fatigue at a relatively high frequency. This condition may be influenced by several factors previously identified in the HRA assessment, including high occupancy density, suboptimal sleep patterns, and the high daily activity levels required of students. It can be concluded that the potential health status of Islamic boarding school students is in the poor category.

Statistical analysis was conducted to determine the relationship between the Health Risk Assessment (HRA) and the potential health status of students. The results of the statistical tests are presented in the following table.

The research results show a significant relationship between the Health Risk Assessment (HRA) and the potential health status of students. A positive correlation indicates that the higher the level of health risk a student experiences,

the higher the potential for health problems.

DISCUSSION

This study aimed to analyze the relationship between Health Risk Assessment (HRA) scores and potential morbidity rates among students in Islamic boarding schools. In line with this objective, the majority of respondents were adolescents aged 12-15 years (75%) who had resided at the boarding school for more than one year (83%), and the findings confirmed a strong, significant positive correlation between HRA scores and potential morbidity rate ($r = 0.641$; $p = 0.001$). This indicates that greater cumulative exposure to environmental, behavioral, and administrative risk factors was associated with a higher potential for illness among santri. The following discussion elaborates on the key risk domains contributing to this relationship and their implications for nursing practice.

Environmental Hazards and Overcrowding as Key Risk Factors

This study's findings reveal that overcrowding is the most critical environmental hazard in Islamic boarding schools. This finding aligns with previous research showing that overcrowded dormitory environments significantly accelerate the transmission of airborne and droplet-borne diseases, particularly influenza, coughs, and fever (Maki et al., 2019). Inadequate ventilation and lighting, combined with high humidity levels, further exacerbate these risks by creating conditions conducive to the survival and proliferation of pathogens (Zhao et al., 2024).

These environmental conditions are structurally inherent in many Islamic boarding school facilities in Indonesia, where physical infrastructure development often lags behind student population growth, perpetuating a cycle of environmental health risks that is difficult to address without systematic institutional intervention.

Behavioral Risk Patterns Among Islamic Boarding School Students

The majority of respondents indicated poor hand hygiene and coughing and sneezing etiquette, coupled with the habit of sharing personal items, as a significant behavioral risk. This pattern is deeply embedded in the communal culture of Islamic boarding school life, where sharing personal items such as towels, eating utensils, and clothing is considered a norm of solidarity and brotherhood (ukhuwah) (Mayang Phuspa, Harwi Muhammad, Rosanti, & Rahmania, 2025). However, from a public health perspective, this behavior constitutes a direct route for the transmission of infectious diseases (Amalia et al., 2023). Furthermore, suboptimal sleep patterns were identified through the busy daily schedule of Islamic boarding school life, which begins before dawn and continues until late at night, leaving insufficient time for adequate rest and physical recovery.

Administrative Controls and Health Service Gaps

The administrative control assessment revealed the absence of isolation facilities, indicating the low capacity of Islamic boarding schools to prevent infectious disease outbreaks given the high frequency

of morbidity documented in this study. Access to Poskestren (Islamic boarding school health posts) and health education programs also showed suboptimal utilization, indicating that existing health services have not been fully integrated into the daily lives of Islamic boarding school communities. Therefore, strengthening administrative health controls including mandatory health checks, dedicated isolation rooms, and routine health education is crucial to reducing institutional vulnerability to disease transmission (Zhong, Feng, & Xu, 2024).

Morbidity Burden and Vaccination Coverage

More than half of respondents reported experiencing flu, cough, or fever more than six times in the past six months, reflecting a substantial morbidity burden directly attributable to the convergence of risky environmental factors and health behaviors described above. This finding reinforces evidence from previous studies of closed community settings, which consistently identify high morbidity rates as a consequence of overcrowding, poor coverage, and communal behavior practices (Wicahyo, Wahyurianto, & Puspitasari, 2025). It is noteworthy that although 48 respondents had completed routine immunizations, only 4 (8.3%) had received the influenza vaccine. Given the predominance of influenza in reported morbidity data, low influenza vaccine coverage represents a missed opportunity for disease prevention that requires urgent policy attention at both the institutional and government levels (Zhang et al., 2023).

Nutritional Status, Stress, and Immune Vulnerability

The nutritional profile of respondents indicates that 35.4% were underweight, while only 6.3% were obese, and the remaining 58.3% maintained a healthy weight. Malnutrition among a large proportion of Islamic boarding school students (santri) is a significant concern, as it is known to impair immune function and increase susceptibility to infectious diseases (Ammar et al., 2020).

These findings, combined with data on stress and fatigue, indicate a complex vulnerability among the Islamic boarding school population. Chronic stress and fatigue are known to suppress the immune response through dysregulation of cortisol and pro-inflammatory cytokines, thereby increasing the frequency and severity of infectious episodes (Colburn, Kremer, & Jackson, 2021). The convergence of malnutrition, psychosocial stress, and a high-risk physical environment creates a syndemic condition that cannot be effectively addressed through interventions in a single domain (Ramadany, 2021) .

Relationship between HRA and potential health status

The results of the Spearman correlation test indicate a significant relationship between the Health Risk Assessment (HRA) and the potential health status of students. Based on the correlation strength interpretation criteria, the r value of 0.641 is categorized as a strong correlation with a positive direction, meaning that the higher the level of health risk identified through the HRA assessment, the worse the potential health status of students in the Islamic boarding school environment.

This finding aligns with the basic concept of the Health Risk Assessment as a predictive instrument capable of identifying health threats before clinical manifestations occur (Wilson et al., 2025). The HRA is designed to detect risk factors from environmental, behavioral, and administrative control systems dimensions that cumulatively contribute to the health status of individuals and communities (Bhat & Jiawen, 2021). In the context of Islamic boarding schools, these risk factors do not exist in isolation but interact and reinforce each other, making their impact on students' health status more complex and significant (Wicahyo et al., 2025).

The closed and dense environment of Islamic boarding schools (closed communities) is one of the main determinants underlying the strong correlation found in this study. High residential density, suboptimal air circulation, and the habit of sharing personal belongings among students create conditions highly conducive to the transmission of infectious diseases, particularly respiratory tract infections (Erdl et al., 2023). This is supported by previous research, which found that the level of residential density in Islamic boarding school dormitories is significantly positively correlated with the incidence of infectious diseases, particularly Upper Respiratory Tract Infections (URTIs) and contagious skin diseases, the frequency of which increases with the number of occupants per unit space (Mayang Phuspa et al., 2025).

From a behavioral risk perspective, the habit of sharing personal belongings, still prevalent in Islamic boarding school communal life, has proven to be a disease transmission pathway that is difficult to control without structured educational interventions (Sugiyana, Ningrum, & Istighfaara, 2025). This behavior is rooted in the values of solidarity and togetherness that are part of Islamic boarding school culture, but from an epidemiological perspective, it directly increases exposure to infectious agents (Ramadani & Ibrahim, 2024).

The World Health Organization confirms that changing hygiene behavior in densely populated communities is the most cost-effective intervention in breaking the chain of infectious disease transmission in closed institutional environments, and that community-based health education programs have been shown to reduce disease incidence by 30–40% when implemented consistently and sustainably (Aminah, Mahmudiono, & Nadhiroh, 2024).

Weak administrative controls, particularly the lack of adequate isolation facilities and the suboptimal utilization of community health posts (Poskestren), further strengthen the association between HRA and health status found in this study. The lack of isolation facilities means that sick students continue to interact with healthy students, thus perpetuating the risk of transmission without significant institutional barriers. In line with this, the Indonesian Ministry of Health states that optimally functioning Poskestren are at the forefront of early detection and disease control in Islamic boarding schools (pesantren) (Arrochman, Rhomadhoni, & Wibisono, 2023). Islamic boarding schools with active Poskestren show significantly lower morbidity rates than those without such health services (Damayanti et al., 2024).

Furthermore, the suboptimal nutritional status of one-third of respondents and the high levels of stress and fatigue reported by students further strengthen this strong correlation. This situation reflects what modern epidemiology calls a syndemic, a situation in which two or more health conditions interact and exacerbate each other's impact within a specific social context (Bai et al., 2022). In the context of Islamic boarding schools, this syndemic stems from the convergence of physical environmental stressors, communal behavioral risks, psychosocial burdens, and limited healthcare services, collectively generating a strong correlation, as reflected in this study.

Thus, the results of this Spearman correlation test statistically reinforce the urgency of a comprehensive approach to Islamic boarding school health management that focuses not only on curative disease management but also encompasses improvements in environmental risk factors, transformations in healthy lifestyles, and strengthening administrative control systems.

Implications for Nursing Practice

These findings carry significant implications for nursing practice, particularly within school and community health nursing settings. As the health professionals most consistently present in day-to-day contact with students, nurses are uniquely positioned to operationalize the HRA framework into routine nursing assessment, using environmental, behavioral, and administrative risk indicators to identify students at greatest risk of morbidity and to prioritize nursing care planning accordingly (Zhang et al., 2023). The strong correlation between HRA scores and potential morbidity observed in this study supports the integration of structured, HRA-based screening into the nursing assessment process at Poskestren and school health units, enabling early identification of students who require closer monitoring, referral, or targeted intervention.

Beyond assessment, nurses have a central role in translating these risk findings into evidence-based preventive interventions, including hygiene promotion programs to reduce the transmission risk associated with sharing personal items, structured health education on respiratory infection prevention, and advocacy for improved influenza vaccination coverage among students. Nurses are also well placed to lead efforts to strengthen the administrative health controls identified as weak in this study, such as establishing functional isolation protocols, coordinating routine health screening schedules, and reinforcing the operational capacity of Poskestren as a nurse-supported first point of care. Given the syndemic interaction between nutritional status, psychosocial stress, and infectious disease risk identified in this study, nursing care planning in Islamic boarding schools should further adopt a holistic approach that integrates nutritional counseling and stress-management support alongside infection-prevention education, rather than addressing these domains separately. Embedding HRA into routine nursing practice in this setting may therefore serve as a practical, low-cost strategy for reducing morbidity risk and strengthening the overall health resilience of students in Islamic boarding school communities.

CONCLUSION

The results of this study indicate that Health Risk Assessment (HRA) has a strong and significant relationship with the potential health status of students in Islamic boarding schools (pesantren). The positive correlation indicates that the accumulation of health risk factors, including environmental hazards, behavioral risks, and weaknesses in administrative control, collectively contribute to the health status of students as a closed community population.

The Islamic boarding school environment, characterized by high occupancy rates, communal behavioral practices, and limited institutional health infrastructure, creates conditions of convergent risk that cannot be addressed through single-domain interventions. Suboptimal utilization of community health posts (Poskestren), the lack of adequate isolation facilities, poor nutritional status among a large proportion of students, and high levels of stress and fatigue further exacerbate these vulnerabilities, forming a syndemic pattern that amplifies the overall burden of disease within the institution.

For nursing practice, these findings highlight the value of incorporating Health Risk Assessment as a routine component of nursing assessment and care planning in Islamic boarding school settings. By using HRA indicators to guide individualized and population-level care planning, nurses can strengthen early identification of health risks, deliver targeted health education, and implement evidence-based preventive interventions to reduce the morbidity burden among students in this closed-community population.

These findings underscore the importance of implementing comprehensive, multi-level health management strategies in Islamic boarding schools, with nursing playing a central coordinating role in their implementation, that integrate environmental improvements, behavior change education, nutritional support, and strengthened administrative health control as an integrated and sustainable health promotion system.

The findings of this study contribute both theoretically and practically: theoretically, they reinforce the utility of HRA as a valid predictive instrument for potential morbidity in closed-community settings, while practically, they provide an evidence base for Islamic boarding school administrators and Poskestren cadres to prioritize interventions addressing overcrowding, hygiene behavior, and administrative health controls. Future research is recommended to employ a longitudinal design to confirm the predictive and causal role of HRA scores in actual morbidity incidence over time, to expand the sample across multiple Islamic boarding schools with more diverse characteristics to improve generalizability, and to evaluate the effectiveness of HRA-based nursing interventions in reducing the morbidity burden among santri.

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