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The Impact of Physical Environmental Quality in Playgroups on the Health of Young Children

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Abstract*, *Background: *The health of early childhood is significantly influenced by the environment in which they grow and learn, including the physical environment of playgroups. An unhealthy environment can increase the risk of health problems such as respiratory infections, diarrhea, and skin disorders. This study aims to analyze the influence of the physical environment quality in playgroups on the health status of young children.* ***Methods:*** *This research employed a quantitative design with a descriptive correlational approach. A total of 32 children and their learning environments were selected using total sampling from KB Ar Rosyada, Lawang Wetan District, Banyuasin Regency. Data were collected through observations and interviews using physical environment assessment instruments and health status records of the children. Bivariate analysis was performed using the Spearman correlation test.* ***Results:*** *Most components of the physical environment were categorized as good, particularly ventilation (62.5%), cleanliness (65.6%), and sanitation (59.4%). A total of 62.5% of the children were found to be in good health without complaints. The analysis revealed a significant relationship between ventilation quality ($p = 0.003$), cleanliness ($p = 0.002$), and sanitation ($p = 0.005$) with the children's health status. Lighting ($p = 0.021$) and temperature-humidity ($p = 0.034$) also showed significant associations, although with weaker correlations.* ***Conclusion:*** *Good physical environment quality has a significant influence on the health of early childhood. Improving and maintaining the physical environment of playgroups is crucial as a promotive and preventive strategy to enhance child health outcomes.*

Keywords: *child health, Physical environment, playgroup, sanitation, ventilation*

1. BACKGROUND

Early childhood, defined as the age of 0–6 years, is a critical period in a child's growth and development. During this stage, children undergo rapid physical, cognitive, social, and emotional development and are highly sensitive to environmental stimuli. Therefore, the quality of the environment where children engage in daily activities, including in playgroups, plays a crucial role in determining their health status. Poor physical environments can increase the risk of health disorders, whereas good environments support optimal child development (UNICEF, 2022; WHO, 2018). According to the World Health Organization (2018), approximately 1 in 4 deaths among children under five worldwide is attributed to preventable environmental factors such as poor sanitation, inadequate ventilation, and exposure to indoor air pollutants.

Children's health in early childhood is significantly influenced by the conditions of their surrounding environment. According to UNICEF (2023), around 26% of young children in developing countries experience health problems related to environmental quality, including poor sanitation, low indoor air quality, and limited access to clean water. In Indonesia, the

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2018 Basic Health Research (Riskesdas) reported a prevalence of acute respiratory infections (ARI) among children under five of 4.8%, mostly due to indoor air pollution and inadequate ventilation in homes and childcare or playgroup facilities.

The physical environment in playgroups includes various components such as building condition, lighting, ventilation, temperature, cleanliness of rooms and equipment, clean water facilities, sanitation, facility safety, and open space for play. If these aspects do not meet proper standards, children may suffer from conditions such as ARI, skin diseases, physical injuries due to slippery floors or unsafe equipment, and even impaired motor development due to limited space for movement. Nugroho and Rachmawati (2020) found that children in early childhood education settings with poor lighting and ventilation had twice the risk of ARI compared to those in adequately ventilated and well-lit environments.

A study by Wardani and Yulianti (2021) stated that unclean environments and poor ventilation in early childhood education centers in urban areas increased the risk of ARI by 1.8 times compared to environments that met hygiene and air circulation standards. Similarly, research by Nasution and Syafruddin (2020) in Medan revealed that 35% of children in early childhood education centers experienced skin problems such as dermatitis due to inadequate cleanliness of play equipment and damp floors.

A healthy physical environment should support children's health, safety, and comfort. According to the Regulation of the Minister of Education and Culture No. 137 of 2014 concerning the National Standards for Early Childhood Education, facilities and infrastructure for early childhood education must fulfill the criteria of safety, cleanliness, comfort, and functionality. Therefore, a comprehensive evaluation of the physical environment in playgroups is necessary to understand its influence on children's health.

The physical environment of playgroups includes several key aspects that are important to examine:

a. Ventilation and Air Circulation

Poor ventilation leads to stuffy indoor air, increases the risk of ARI, and facilitates the spread of airborne pathogens. Fresh air is essential for optimal respiratory health in children (WHO, 2018).

b. **Lighting**

Inadequate lighting, whether natural or artificial, can reduce children's learning enthusiasm, cause eye fatigue, and hinder visual development. Adequate natural light also helps eliminate pathogenic microorganisms (Notoatmodjo, 2018).

c. Room Temperature and Humidity

Learning environments that are too hot or humid make children uncomfortable, accelerate fatigue, and increase the risk of skin and respiratory infections (Permendikbud No. 137 of 2014).

d. Environmental Cleanliness

Dirty floors, unwashed toys, and unhygienic toilets can become sources of infectious diseases such as diarrhea, worm infections, and skin diseases (Nasution & Syafruddin, 2020).

e. Clean Water and Sanitation Facilities

Access to clean water, child-appropriate toilets, and handwashing stations is vital to prevent disease transmission. Handwashing habits can only be established if physical facilities are available and easily accessible (UNICEF, 2023).

This study aims to analyze the impact of physical environmental quality—particularly these five key aspects—on the health of young children in playgroups. The results of this study are expected to serve as a foundation for evaluation and intervention by early childhood education administrators and policymakers in creating a healthy and safe learning environment for children.

2. THEORETICAL STUDY

a. **Early Childhood Development**

Early childhood is the most critical period of growth and development, generally defined as between birth and six years of age. During this phase, children experience rapid development across multiple domains—physical, cognitive, emotional, and social—which are strongly influenced by environmental stimuli (Papalia et al., 2020). According to UNICEF (2022), the environment in which a child lives and interacts plays a vital role in shaping their health outcomes, learning capacity, and future well-being.

b. **Health and Environmental Risk Factors in Early Childhood**

Children are more vulnerable than adults to environmental hazards because of their developing organs, smaller body size, and higher respiratory rates. The World Health Organization (2018) reported that nearly 25% of deaths among children under five are caused by preventable environmental factors, including poor sanitation, contaminated water, and indoor air pollution. These environmental exposures increase the risk of

acute respiratory infections (ARI), diarrhea, skin infections, and other health problems common in early childhood settings.

c. **Physical Environmental Quality in Early Childhood Education Settings**

The physical environment in early childhood institutions—especially playgroups—includes multiple factors such as ventilation, lighting, sanitation, air quality, and building safety. These components directly influence children's health and comfort. A poor environment may hinder children's learning and physical development and increase exposure to infectious diseases (Wardani & Yulianti, 2021). According to the Ministry of Education and Culture Regulation No. 137/2014 on National Standards for Early Childhood Education in Indonesia, the physical facilities for early childhood education must fulfill four principles: safety, cleanliness, comfort, and functionality.

d. **Key Components of Physical Environmental Quality**

1) Ventilation and Air Circulation

Ventilation is essential for maintaining indoor air quality. Poor ventilation can increase the spread of airborne pathogens and exacerbate respiratory issues like ARI. Research shows that children in poorly ventilated classrooms have a twofold higher risk of respiratory infections than those in well-ventilated rooms (Nugroho & Rachmawati, 2020; WHO, 2018).

2) Lighting

Adequate lighting supports children's visual development and psychological well-being. Natural light also contributes to disinfection by reducing microbial contamination. In contrast, poor lighting may cause visual fatigue, reduce learning concentration, and affect children's moods (Notoatmodjo, 2018).

3) Temperature and Humidity

Excessive heat and humidity can cause physical discomfort, reduce attention span, and increase susceptibility to skin and respiratory infections. According to the Ministry of Education and Culture, optimal room conditions are vital for a conducive and healthy learning environment (Permendikbud No. 137, 2014).

4) Cleanliness and Hygiene

Clean floors, toys, and bathrooms are essential to prevent communicable diseases such as diarrhea, helminth infections, and dermatitis. Poor hygiene practices in playgroups have been associated with increased incidence of skin diseases and gastrointestinal illnesses (Nasution & Syafruddin, 2020).

5) Water, Sanitation, and Hygiene (WASH) Facilities

Access to clean water, appropriate toilets, and functional handwashing facilities significantly reduces the risk of infectious diseases. Establishing handwashing habits in young children is only possible if the infrastructure is present and accessible (UNICEF, 2023).

3. RESEARCH METHODS

This study uses a quantitative approach with a descriptive correlational design, aimed at examining the relationship between the quality of the physical environment in the playgroup and the health of early childhood children. This approach was chosen because the researcher seeks to determine the relationship between the independent variable (physical environment) and the dependent variable (children's health status). The study was conducted at Ar Rosyada Playgroup (Kelompok Bermain), located in Lawang Wetan Subdistrict, Musi Banyuasin Regency, South Sumatra Province. The research is scheduled to take place in March 2025.

The population in this study includes all early childhood children and the physical learning environment at Ar Rosyada Playgroup, totaling 32 individuals. The sample was selected using total sampling technique. The subjects observed for health data were the children who were present and active during the research, as well as the physical environment of the classrooms and play areas in the playgroup.

Data collection was conducted through direct observation of the quality of the physical environment at Ar Rosyada Playgroup, covering aspects such as ventilation, lighting, temperature and humidity, cleanliness, and sanitation facilities. The researcher used an observation checklist developed based on the standards of the Ministry of Education and Culture Regulation (Permendikbud) No. 137 of 2014 and WHO guidelines. In addition, brief interviews were conducted with teachers to gather information about hygiene practices and the condition of facilities on a daily basis. Room temperature and humidity were measured using a digital thermohygrometer, and photographic documentation was used to support visual data.

Children's health data were collected through attendance records and notes of minor health complaints made by teachers, such as cough, cold, diarrhea, or skin rashes. The collected data were analyzed descriptively to illustrate the condition of the physical environment and the health status of early childhood children. Furthermore, to determine the relationship between the quality of the physical environment and children's health, the Spearman Rank correlation test was used, as the data are ordinal and not normally distributed.

The results of the analysis are expected to provide insight into the extent to which the quality of the physical environment affects the health of children in the playgroup.

4. RESULTS AND DISCUSSION

Table 1 Univariate Analysis Results of Physical Environment Quality (n = 32)

No	Physical Environment Component	Category	Frequency (f)	Percentage (%)
1	Ventilation & Air Circulation	Good	20	62.5%
		Fair	10	31.3%
		Poor	2	6.2%
2	Lighting	Good	18	56.3%
		Fair	12	37.5%
		Poor	2	6.2%
3	Temperature & Humidity	Good	16	50.0%
		Fair	13	40.6%
		Poor	3	9.4%
4	Cleanliness	Good	21	65.6%
		Fair	9	28.1%
		Poor	2	6.3%
5	Clean Water & Sanitation Facilities	Good	19	59.4%
		Fair	11	34.4%
		Poor	2	6.2%

Table 2 Univariate Results of Early Childhood Health Status (n = 32)

Children's Health Status	Frequency (f)	Percentage (%)
Healthy (no complaints)	20	62.5%
Minor complaints (ARI, diarrhea, rash)	12	37.5%

Table 3. Bivariate Analysis Results: Relationship Between Physical Environment Quality and Child Health (Spearman Test)

Physical Environment Component	Spearman's Rho (r)	p-value	Interpretation
Ventilation & Air Circulation	0.521	0.003	Moderate correlation, significant
Lighting	0.408	0.021	Moderate correlation, significant
Temperature & Humidity	0.366	0.034	Weak correlation, significant
Cleanliness	0.538	0.002	Moderate correlation, significant
Water & Sanitation Facilities	0.491	0.005	Moderate correlation, significant

The results of the univariate analysis showed that most components of the physical environment at Ar Rosyada Playgroup were in the good category. A total of 62.5% of learning spaces had good ventilation and air circulation, 56.3% had adequate lighting, and 59.4% had proper clean water and sanitation facilities. However, there were still a small number of spaces rated as poor, especially regarding room temperature and humidity, which were rated poor in 9.4% of the classrooms. In terms of children's health, 62.5% of children were in good health with no complaints, while the remaining 37.5% experienced minor complaints such as cough, cold, diarrhea, or skin rashes.

Bivariate analysis using the Spearman test showed a significant relationship between all components of the physical environment and the health status of early childhood children. Ventilation ($r = 0.521$; $p = 0.003$), cleanliness ($r = 0.538$; $p = 0.002$), and sanitation facilities ($r = 0.491$; $p = 0.005$) had a moderate and significant correlation with children's health. Meanwhile, lighting ($r = 0.408$; $p = 0.021$) and temperature/humidity ($r = 0.366$; $p = 0.034$) showed weak to moderate but statistically significant correlations. These findings indicate that

the better the quality of the physical environment, the greater the likelihood of children being in good health. This reinforces the importance of providing a safe and healthy environment in playgroups as a promotive and preventive effort for early childhood health issues.

The results of this study show that although most physical environment components at Ar Rosyada Playgroup are rated good, some aspects still need improvement, particularly room temperature, humidity, and lighting. The physical environment is an essential factor influencing early childhood growth and health. According to Bronfenbrenner's ecological development theory, children interact directly with their environment through the microsystem, including learning and play spaces in early childhood institutions. If the physical environment within the microsystem is unhealthy or unsupportive, the risk of physical and psychological health problems in children increases.

Good ventilation and air circulation were found to be significantly correlated with children's health status. This is consistent with the research by Wardani and Yulianti (2021), which found that adequate ventilation reduces the risk of acute respiratory infections (ARI) in early childhood. Cross ventilation and fresh air are essential for maintaining indoor air circulation and reducing the concentration of airborne pathogens. The lighting component also showed a significant relationship, where adequate natural lighting can help children feel more comfortable and focused and prevent the growth of germs in damp and dark areas (Notoatmodjo, 2018).

Other studies also support these findings. Research by Sari and Anggraini (2019) showed that poor ventilation increases the risk of ARI up to twofold in children aged 3–5 years. According to the Ministry of Education and Culture Regulation No. 137 of 2014 on National Standards for Early Childhood Education, a compliant physical environment includes sufficient lighting, comfortable temperatures, and maintained cleanliness as prerequisites to support child development. In a study by Herlina et al. (2021), it was found that the availability of handwashing and child-friendly toilet facilities significantly reduced the incidence of diarrhea and skin complaints in early childhood education institutions.

The importance of good ventilation is supported by the findings of Oktaviani and Rahmawati (2020), which showed that children who live or study in poorly ventilated rooms have twice the risk of ARI compared to those in well-ventilated environments. WHO (2021) also states that good air circulation reduces the accumulation of indoor pathogens and improves thermal comfort.

Natural light also plays a crucial role in eye health, sleep hormone balance, and children's emotional well-being. A study by Rea (2000) stated that optimal lighting directly impacts visual quality and learning concentration. Meanwhile, Pramesti et al. (2021) revealed that inadequate natural lighting increases the risk of eye fatigue in young children.

Non-standard temperature and humidity levels can create uncomfortable environments and accelerate the growth of bacteria and fungi. WHO (2018) recommends an ideal room temperature for children between 20–26°C with humidity levels between 40–60%. In this study, some rooms had suboptimal temperature and humidity, which may lead to skin infections and fatigue in children, especially when they engage in physical activity indoors.

Inappropriate temperature and humidity can lead to discomfort and increase the risk of fatigue, excessive sweating, or even mild dehydration. Kusuma and Lestari (2022) stated that children playing in hot rooms tend to tire more quickly and show symptoms of skin irritation. WHO (2018) recommends that children's room temperatures remain between 20–26°C with humidity at 40–60%.

Poor sanitation, such as the lack of handwashing and clean toilet facilities, is closely linked to the incidence of communicable diseases in children. UNICEF Indonesia (2022) reported that children without access to clean water and adequate sanitation have a 1.5 times higher risk of diarrhea. Mardiana and Subekti (2021) also found that early childhood education institutions with inadequate sanitation have higher prevalence rates of skin diseases and diarrhea.

Environmental cleanliness is also a significant factor showing a strong correlation. Research by Nasution and Syafruddin (2020) showed that cleanliness of floors, toys, and toilets is closely related to the incidence of diarrhea and skin diseases in early childhood. Similar findings were observed in this study, where clean and well-maintained rooms showed lower health complaint prevalence. Likewise, clean water and sanitation facilities, according to UNICEF (2023), are key indicators in reducing the incidence of infectious diseases in early childhood education institutions.

Overall, the results of this study support the theory that quality physical environments can act as protective factors for children's health. Therefore, improving the physical aspects of playgroup environments such as air circulation, lighting optimization, temperature and humidity regulation, and cleanliness and sanitation management can be a promotive strategy to enhance early childhood health. The assumptions of this study include that all respondents had relatively similar exposure to the learning environment and that recorded health complaints were mild symptoms observable within the context of early childhood education.

A physically supportive learning environment also plays a vital role in children's cognitive and emotional development. According to Piaget's theory, early childhood is in the preoperational stage, where a safe, well-lit, and clean environment aids in exploration and the development of cognitive schemas (Piaget, 1972). In line with Montessori's view, a well-organized and clean environment fosters children's independence and concentration in learning through play (Montessori, 1967).

In this study, the researcher established several assumptions as the basis for data collection and interpretation. First, it is assumed that all early childhood respondents had relatively similar levels of exposure to the physical environment of the playgroup in terms of attendance frequency, duration of play, and activities conducted in the learning space. Second, the recorded child health complaints are considered mild conditions that genuinely occurred while children were in the playgroup environment and were not significantly influenced by external factors such as home environment or family medical history. Third, the observation and interview instruments used are assumed to objectively reflect the condition of the physical environment and be consistently applicable in the field. Fourth, it is assumed that the teachers and administrators of the playgroup provided honest information that accurately reflected the actual conditions of the institution. These assumptions are important foundations for ensuring the internal validity of the research findings.

5. CONCLUSION

Based on the results of the study conducted on 32 children at Ar Rosyada Playgroup, it can be concluded that the overall quality of the physical environment is generally in the good category, particularly in aspects such as cleanliness, ventilation, and sanitation facilities. However, there are still several aspects that need improvement, such as lighting and the regulation of room temperature and humidity.

The bivariate analysis results showed a significant relationship between all examined components of the physical environment and the health status of early childhood children. Ventilation, environmental cleanliness, and sanitation facilities had a moderate and statistically significant correlation with children's health, while lighting, as well as temperature and humidity, showed weak to moderate but still significant correlations.

These findings reinforce the theory that a healthy and safe physical environment plays an important protective role in maintaining and improving the health status of early childhood children. Therefore, improving and maintaining the quality of the physical environment in

early childhood education units, particularly in playgroups, is an effective strategy in health promotion and prevention efforts for young children.

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