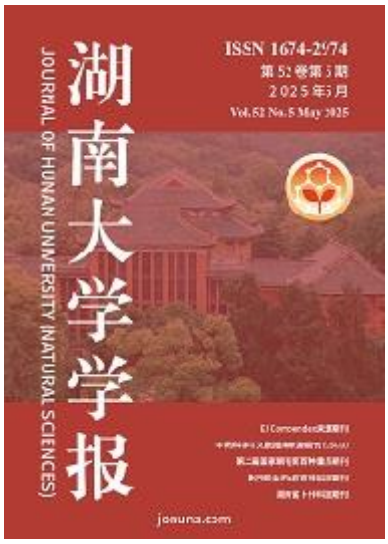

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The Relationship between Home Physical Environment Factors, and Human Demographic Factors with the Incidence of Pneumonia in Toddlers Living in the Working Area of the East Tegal Health Center

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Abstract: Pneumonia is one of the leading death causes of children under five years worldwide, particularly in developing countries. This study aimed to explore the relationship between home physical environmental factors and demographic or individual characteristics observed in the field, with the incidence of pneumonia among under-fives in the Tegal Timur Health Center working area. The factors analyzed included temperature, air humidity, natural lighting, PM2.5, and PM10 particle levels, occupancy density, ventilation area, wall and floor types, age and gender of toddlers, and occupation and education of parents. The method used a cross-sectional design, with data collected through direct observation and interviews with the parents. Results: A total of 155 under-fives participated, of whom 12 were diagnosed with pneumonia. Common symptoms of pneumonia in children under five years of age included cough, fever, and shortness of breath, with some experiencing nausea. Most under-fives did not undergo full diagnostic tests. Significant associations were found between pneumonia and symptoms (cough, fever, shortness of breath, and nausea), diagnostic tests (sputum, blood, and X-ray), and floor type. Physical house factors such as temperature, humidity, and natural lighting were not significant. The demographic factors found in the field were also insignificant for the incidence of pneumonia in under-five. Conclusion: The study found that floor type significantly affected the incidence of pneumonia. Improving home

environmental conditions and health behaviors is crucial for reducing pneumonia among toddlers in the Tegal Timur Health Center area. Thus, holistic interventions are required.

Keywords: Pneumonia, Children, Environmental Factors, Human Demographic Factors, Cross-Sectional, Tegal Timur Public Health Center.

家庭物理环境因素与人类人口因素与居住在 East Tegal 健康中心工作区的幼儿肺炎发病率之间的关系

摘要：肺炎是全世界 5 岁以下儿童死亡的主要原因之一，尤其是在发展中国家。本研究旨在探讨家庭物理环境因素与现场观察到的人口统计学或个体特征与 Tegal Timur 健康中心工作区 5 岁以下儿童肺炎发病率之间的关系。分析的因素包括温度、 空气湿度、自然光、PM2.5 和 PM10 颗粒物水平、 占用密度、通风面积、墙壁和地板类型、幼儿的年龄和性别、父母的职业和教育程度。该方法使用横断面设计，通过直接观察和与父母的访谈收集数据。结果 共有 155 名 5 岁以下儿童参加，其中 12 名被诊断患有肺炎。五岁以下儿童肺炎的常见症状包括咳嗽、 发烧和呼吸急促，有些人会出现恶心。大多数 5 岁以下的孩子没有接受全面的诊断测试。 发现肺炎与症状 （咳嗽、发热、呼吸急促、恶心）、诊断性检查（痰液、血液、X 线检查） 和地板类型之间存在显著关联。温度、湿度和自然采光等物理房屋因素并不重要。在田间发现的人口因素对五岁以下儿童肺炎的发病率也微不足道。结论 研究发现, 楼层型显著影响肺炎的发生。改善家庭环境条件和健康行为对于减少 Tegal Timur 健康中心地区幼儿的肺炎至关重要。非常需要整体干预。

关键词：肺炎、儿童、环境因素、人类人口因素、横断面、Tegal Timur 公共卫生中心。

1. Introduction

Pneumonia is a form of acute respiratory tract infection most often caused by viruses or bacteria. This disease can cause mild to life-threatening diseases in people of all ages, but is the leading cause of infectious death in toddlers worldwide [1].

Pneumonia is the leading cause of death in children under five years of age worldwide, outpacing AIDS, malaria, and measles. As many as 19% of the total deaths of toddlers are caused by pneumonia, followed by diarrhea (17%). Every year, more than 2 million children under five are estimated to die from pneumonia, equivalent to one death every 20 seconds, out of a total of 9 million deaths of children under five. Although one in five toddler deaths is caused by pneumonia, the disease often does not receive adequate attention; therefore, it is referred to as the killer of forgotten toddlers.

The number of cases of pneumonia in toddlers in Indonesia based on the health profile in 2022 is 386,724 toddlers with pneumonia, or 38.78% of the number of toddlers throughout Indonesia. The coverage of pneumonia discovery in toddlers over the last 10 years from 2012 to 2022 on the graph looks quite volatile, and in 2022, it has increased by 7.38% from the previous year, and when compared to 2012, the increase was 15.38% (Ministry of Health of the Republic of Indonesia, 2022).

Central Java Province is the 3rd largest national province after West Java and East Java, with 101,967 cases and 92,118 cases, respectively. The number of pneumonia cases in toddlers in Central Java Province was 38,348 (2). The discovery and treatment of pneumonia in patients under five in Central Java in 2022 was 43.5%, a decrease compared to 49.5% detected in 2021. Tegal City has the second smallest number of pneumonia cases after Kudus Regency, with 34 cases, while Tegal City has 42 cases. However, the number of coughs not due to pneumonia in the city of Tegal is quite high, with 51,585 cases (3). Although the

city of Tegal is included in the city where the number of pneumonia cases is small and not as large as that in other cities, such as Kudus Regency, a significant number of cough cases (51,585 cases) indicate that there is a large respiratory health problem in the city. This indicates that there is high potential for the development of more serious respiratory diseases, such as pneumonia. Thus, conducting research on pneumonia in Tegal City can help identify a possible relationship related to the increase in cough cases and prevent the potential for greater pneumonia outbreaks in the future. In addition, this study can also help design more effective interventions to address respiratory health problems in the city and improve the overall quality of life of the community. The coverage of toddler pneumonia patients found and treated at the East Tegal Health Center in 2021 was two cases, and in 2022, 35 out of 194 pneumonia cases were targeted. This coverage has increased compared to the coverage in 2021 (18%), but is still far from the National SPM target of 100% (East Tegal Health Center, 2022).

Risk factors for pneumonia cases in research conducted by Susi Hartati stated that risk factors for pneumonia include indoor air pollution, house density, parents who smoke, maternal education, childcare, air humidity, and outdoor air pollution (Hartati et al., 2012). Meanwhile, based on research conducted by Rigustia et al., it was found that toddlers with pneumonia were aged 12-48 months (76.7%), male sex (60%), working mothers (60%), higher and secondary education (40%), and smoking habits of non-maternal members (90%). Bivariate results showed a significant relationship between pneumonia and maternal occupation (p =0.020). Multivariate analysis showed a meaningful relationship between maternal occupation and pneumonia incidence of pneumonia (Rigustia et al., 2019). Based on other research conducted by Fauziyah, it was found that there was a relationship between humidity, housing density, and the incidence of pneumonia among toddlers in Bandarharjo and Tanjung Mas Villages, North Semarang District, with p-values of <0.001 and 0.005, respectively [2] .

Based on other research conducted by Juni et al. in the Working Area of the Banjarmangu 1 Health Center, Banjarnegara Regency, it was found that the existence of house walls is related to the high incidence rate of pneumonia in that place [3]

This is reinforced by other research conducted by Ludfi that the incidence of pneumonia in children under five in Indonesia is influenced by various factors, including gender, type of residence, maternal education level, economic conditions, housing density, PM2.5, kitchen location, use of mosquito repellents, bedroom windows and ventilation habits, floor type, humidity level, house temperature, smoking habits in the house, and fuel consumption. This shows that social, demographic, economic, and home environment aspects together affect the incidence of pneumonia in children under five years of age in Indonesia [4].

Based on the description above, this study discusses the Relationship between the Incidence of Pneumonia in People Living in the Working Area of the East Tegal Health Center. This is important because it can provide an overview of what is related to the high number of pneumonia cases in the region as well as be the basis for the development of more effective policies and intervention programs for controlling pneumonia.

2. Method

This study is an observational type with a cross-sectional approach. Cross-sectional research can be used to determine whether the physical environment of the home and the demographics of the respondents have a relationship that results in the appearance of symptoms and incidence of pneumonia in toddlers living in the working area of the East Tegal Health Center.

The sampling carried out in this study was 155 people or toddlers spread across three villages in Panggung, Mangkusuman, and Mintaragen villages, Tegal City.

3. Result and Discussion

3.1. Geographical Situation

The East Tegal Health Center is located in the Jalan Flores No. 35, East Tegal District, Tegal City 52122. The boundaries of the work area of the East Tegal Health Center include the following points.

a. The south is bordered by the Slerok Health Center area in East Tegal District.
b. To the west, it borders the West Tegal Health Centre.
c. The East borders the Tegal Regency.
d. The north is bordered by the Java Sea.
e. The work area of the East Tegal Health Center includes three villages: Panggung, Mintaragen, and Mangkukusuman Village (East Tegal Health Center, 2022).

3.2. Topographic Conditions

The East Tegal Health Center, located in East Tegal District, is a coastal area, which is an area with an altitude of 2.5 meters above sea level and is located in the eastern part of the Tegal City area (East Tegal Health Center, 2022).

Panggung Village, which is divided into 14 RWs, is the center of the Tegal City government. The area is at the heart of the city with relatively dense and regular housing conditions, and there are many government buildings and public facilities. In certain areas adjacent to the center of the government, houses tend to be wider or larger, and there are some that have yards. The northern part of Panggung Village is adjacent to the North Sea, where there are several factories and small industrial estates. Houses tend to be denser and closer to industries and factories.

Mintaragen Village, which is divided into 11 RWs, is a coastal area directly adjacent to the North Sea. The area is famous as an industrial area, with many factories dominating it. Housing conditions in Mintaragen tend to be mixed between simple houses owned by industrial workers and some medium houses that are close to factory facilities, so that this area is dense.

Mangkukusuman Village, which is divided into four RWs, is located in the middle of the city. The area has denser and more diverse housing, with houses that tend to be older and some modern buildings. Housing conditions here are generally more diverse in terms of architecture and conditions, reflecting the diversity of people living in the middle of the city. This area does not have direct access to the sea, and serves as a small settlement and trade area.

The East Tegal Health Center is located in a strategic area that serves areas with significant topographic differences and housing characteristics, including government centers, coastal industrial estates, and residential areas in the middle of the city.

3.3. Demographic Situation

Based on data from the Statistics of East Tegal District, the number of residents in the working area of the East Tegal Health Center in 2023 will be 54,407. For the area with the highest population, there were 32,283 people in Panggung Village and the lowest in Mangkukusuman Village, with 5,483 people.

3.4. Overview of Pneumonia

a. Number of Cases

Respondents who had conducted a doctor's examination and had been treated at a hospital who had been diagnosed by a doctor for Pneumonia or Bronchopneumonia in the last three months, namely from January 1 to March 31, 2024, based on report data from the East Tegal Health Center. Based on the data obtained from the East Tegal Health Center on the report on the number of toddlers affected by pneumonia in all hospitals in the city of Tegal, it was found that there were 29 toddlers who had bronchopneumonia and had been treated.

However, when I was in the field, I only found 12 toddlers who had symptoms of pneumonia and all the toddlers who had been treated in the hospital. Seven toddlers still had symptoms of pneumonia, and the others had recovered and no longer had symptoms.

b. Symptom

There are several symptoms found in the field and can be said to be symptoms of pneumonia, which can be said to be the case in toddlers as follows:

Table 1 Symptoms of Pneumonia

Symptom	Category	Case	Non Cases
Cough	No	0	102
	Yes	12	41
Nausea/vomiting	No	7	135
	Yes	5	8
Fever	No	0	108
	Yes	12	35
Shortness of breath	No	0	140
	Yes	12	3
Phlegm Test	No	10	143
	Yes	2	0
Blood Tests	No	7	138
	Yes	5	5
X-ray Test	No	4	138
	Yes	8	5
Health Screening	No	0	2
	Yes	12	141
Chronic History	No	4	137
	Yes	8	6

c. Environmental Factors

Several environmental factors can affect the incidence of pneumonia in toddlers.

Table 2 Environmental Factors

Variable	Category	Case	Non Cases
Temperature	TMS	7	58
	MS	5	85
Humidity	TMS	12	131
	MS	0	12
Lighting	TMS	0	1
	MS	12	142
$PM_{2,5}$	TMS	0	9
	MS	12	134
PM_{10}	TMS	0	2
	MS	12	141
Ventilation Area	TMS	0	8
	MS	12	135
Wall Type	TMS	0	2
	MS	12	141
Ventilation Area	TMS	1	1
	MS	11	142
Residential Density	TMS	5	48
	MS	7	95

d. Demographic Factors or Human Characteristics.

Several demographic factors or human characteristics can affect the incidence of pneumonia.

Table 3 Demographic Factors and Human Characteristics

Variable	Category	Case	Non Case
Toddler Age	0 – 2 Years	4	63
	3 – 5 Years	8	80
Gender of	Male	8	75

Variable	Category	Case	Non Case
Toddlers	Woman	4	68
Mother's Work	Outside the Home	3	26
	Inside the House	9	117
Father's Work	Informal	6	56
	Formal	6	87
Parent Education	Completion of Elementary School	0	17
	Completion of Junior High School/Junior High School	3	23
	Graduated from high school	6	82
	Graduated from College	3	21

e. Bivariate Analysis

Table 4 Bivariate Analysis

Symptom				
Variable	**OR**	**95% CI**	**p-Value**	**Results of Analysis**
Cough	-	-	<0.001	There is a relationship
Nausea and or vomiting	0.083	0.21 – 0.320	<0.001	There is a relationship
Fever	-	-	<0.001	There is a relationship
Shortness of breath	-	-	<0.001	There is a relationship
Phlegm Test	-	-	<0.001	There is a relationship
Blood Tests	0.051	0.012 – 0.217	<0.001	There is a relationship
X-ray Tests	0.018	0.004 – 0.081	<0.001	There is a relationship
Health Screening	-	-	0.68	There is a relationship
Chronic History	0.022	0.005 – 0.094	<0.001	There is a relationship
Milieu				
Variable	**OR**	**95% CI**	**p-Value**	**Results of Analysis**
Temperature	2.052	0.621 – 6.779	0.231	No relationship
Humidity	-	-	0.296	No relationship
Natural Lighting	-	-	0.771	No relationship
PM 2.5	-	-	0.371	No relationship
PM 10	-	-	0.68	No relationship
Ventilation Area	-	-	0.4	No relationship
Wall Type	-	-	0.68	No relationship
Floor Type	12.909	0.755 – 220.7	0.024	There is a relationship
Residential Density	1.414	0.426 – 4.689	0.57	No relationship
Human Demographics or Characteristics				
Variable	**OR**	**95% CI**	**p-Value**	**Results of Analysis**
Toddler Age	0.635	0.183 – 2.205	0.471	No relationship
Gender of Toddlers	1.813	0.523 – 6.293	0.343	No relationship
Mother's Work	1.5	0.380 – 5.927	0.561	No relationship
Father's Work	1.554	0.477 – 5.058	0.463	No relationship
Parent Education	-	-	0.421	No relationship

The most common symptoms of pneumonia in toddlers are cough, shortness of breath, and fever. All toddlers diagnosed with pneumonia had a cough. However, not all toddlers who cough suffer from pneumonia, because coughing can also be a symptom of other respiratory diseases. Cough is a common symptom that is often an early sign of respiratory tract infections. Therefore, it is important for medical personnel to conduct further evaluations to ensure proper diagnosis, considering that coughing can be caused by a variety of conditions.

Cough symptoms were observed in all toddlers diagnosed with pneumonia. Of the 155 toddlers observed, 53 had cough and 12 were positive for pneumonia. The results of the statistical test showed a $p < 0.001$ and an Odds Ratio (OR) value of 1.293. This means that toddlers who cough are 1,293 times more likely to develop pneumonia than those who do not.

Furthermore, the symptoms of nausea and vomiting were analyzed. Of the 155 toddlers, 13 experienced this symptom, of which 5 were positive for pneumonia. This symptom also showed a significant relationship with pneumonia ($p < 0.001$ and an OR value of 0.083). This showed that toddlers who did not experience nausea or vomiting had a 0.083 times lower chance of developing pneumonia than those who experienced these symptoms.

Symptoms such as fever and chills have also been observed in toddlers with pneumonia. Of the 155 toddlers, 47 had fever and 12 were positive for pneumonia. All toddlers with pneumonia had fever, showing a significant relationship between fever and pneumonia ($p < 0.001$).

The analysis also included diagnostic tests such as blood tests and X-rays. Only 10 of 155 toddlers underwent blood tests, and five of them were positive for pneumonia. The $p<0.001$ and OR of 0.051 showed that toddlers who did not undergo a blood test had a 0.051 times lower chance of developing pneumonia

than those who did a blood test. Thirteen toddlers underwent the X-ray test, with 8 of them positive for pneumonia. The p-value of 0.001 and the OR of 0.018 showed that toddlers who did not undergo an X-ray test had a 0.018 times less chance of developing pneumonia than those who did. These results are in line with what has been explained at the beginning by the director general of health which is known that the most common symptoms experienced by pneumonia sufferers are cough, shortness of breath and fever. Symptoms of nausea or vomiting are some of the symptoms, but cannot be categorized into symptoms of pneumonia.

Overall, the above results underscore the importance of cough, nausea, vomiting, and fever as early indicators of pneumonia in toddlers. In addition, diagnostic tests, such as blood tests and X-rays, are also important for confirming the diagnosis and proper treatment of pneumonia. Early detection and appropriate treatment can help reduce the incidence and complications of pneumonia in toddlers.

Based on Permenkes No. 2 of 2023, the Threshold Value (NAV) of the air temperature in healthy homes is 18–30°C. The Bacteria that cause Pneumonia and Bronchopneumonia have an optimal temperature range for rapid growth between 31°C and 37°C. From the univariate analysis, it was found that 10.8% (seven toddlers) who suffered from pneumonia were in an environment with an air temperature of <18°C or >30°C, while 89.2% (58 toddlers) did not suffer from pneumonia under the same temperature conditions. In contrast, in the temperature range of 18–30°C, only 5.6% (5 toddlers) suffered from pneumonia, while 94.4% (85 toddlers) did not suffer from the disease. Overall, the total number of toddlers whose homes had air temperatures outside the normal range (<18°C or >30°C) was 65, and 90 children had normal temperatures (18–30°C).

Bivariate analysis showed that there was no significant relationship between air temperature and the incidence of pneumonia in toddlers. This is indicated by a p-value of 0.231, which is greater than 0.05, indicating that the difference in air temperature did not significantly affect the incidence of pneumonia. However, an Odds Ratio (OR) value of 2.052 indicates that toddlers living in homes with temperatures outside the normal range (<18°C or >30°C) are 2.052 times more likely to develop pneumonia than those living in homes with normal temperatures (18–30°C).

Thus, although no statistically significant association was found, extreme air temperatures may increase the risk of pneumonia in toddlers. Temperatures that are too low or too high can affect the immune system of toddlers, making them more susceptible to respiratory infections. Extreme temperatures can cause stress in the body, reducing the effectiveness of the body's defense mechanisms against pathogens.

Humidity is the level of water content in the air in the respondent's house, with % Rh. In this study, the humidity measured was the indoor humidity, particularly in the house. Based on Permenkes No. 2 of 2023, the Threshold Value (NAV) of healthy home humidity ranges from 40% to 60%Rh. Bacteria that cause Pneumonia and Bronchopneumonia have a preferred and optimal humidity range to grow rapidly, between <25% and >80%. Based on the analysis of data on air humidity variables, it is known that there is a significant difference in the number of toddlers suffering from pneumonia between houses with qualified and unqualified humidity. Homes with humidity below 40% or above 60% included 12 toddlers with pneumonia (8.4%) and 131 toddlers without pneumonia (91.6%). In contrast, a house with a humidity of 40%–60% had no toddlers suffering from pneumonia (0%) while another 12 toddlers did not suffer from pneumonia (100%). However, bivariate analysis showed no significant relationship between air humidity and the incidence of pneumonia, with a p-value of 0.296, which was greater than 0.05.

Air humidity that is either too high or too low can affect the respiratory health of toddlers. Low humidity (<40%) can cause air to dry out and irritate the respiratory tract, whereas too high humidity (>60%) can create an environment that supports the growth of mold and dust mites that can trigger allergies and respiratory infections. Therefore, maintaining air humidity in the ideal range (40–60%) is essential to reduce the risk of pneumonia and maintain the respiratory health of toddlers. Efforts such as the use of a dehumidifier or humidifier can help maintain air humidity within a healthy range at home.

In addition, homes with unqualified air humidity showed increased health risks. Inappropriate humidity can worsen medical conditions such as asthma, bronchitis, and pneumonia and can also affect general comfort indoors. Therefore, it is important for parents to monitor and regulate the humidity of the air in their homes as part of health precautionary measures for their toddlers.

Natural lighting is lighting whose source is sunlight entering the house. The presence or absence of natural light sources or lighting entering a house can inhibit the development of bacteria and viruses that cause pneumonia.

Based on the results of the analysis of natural lighting variables, there was a difference in the incidence of pneumonia among toddlers who lived at home with and without natural sunlight. In houses that did not receive sunlight, no cases of pneumonia were found (0%), and out of 1 toddler living in this environment, all (100%) did not suffer from pneumonia. In contrast, in homes that received natural sunlight, there were 12 toddlers who suffered from

pneumonia (7.8%) and 142 toddlers who did not suffer from pneumonia (92.2%). Thus, the total number of toddlers whose homes receive natural lighting from sunlight is 154, while there is only one child whose homes do not receive natural lighting.

Although these data showed differences in the incidence of pneumonia based on the presence of natural lighting, the results of the bivariate analysis showed that this association was not statistically significant ($p = 0.771$) and was greater than the significance threshold of 0.05. This suggests that natural sunlight does not have a statistically significant effect on the incidence of pneumonia in toddlers.

Natural lighting has many important health benefits, particularly in the home environment. Direct sun exposure can help kill harmful microorganisms that can lead to respiratory infections, such as pneumonia. Sunlight also plays an important role in the production of vitamin D, which is essential for a strong immune system and bone health. A lack of natural lighting can create a humid and dark environment, which is conducive to the growth of disease-causing fungi and bacteria.

To improve respiratory health and prevent infections, such as pneumonia in toddlers, it is important to ensure that the home receives sufficient natural lighting. Opening windows and curtains during the day to allow sunlight exposure is a simple but effective step. In addition, considering a home design that allows for more optimal sunlight entry, such as using large windows or skylights, can help improve the natural lighting in the house.

In areas with cloudy weather or in the winter, where sunlight is less available, parents can consider using UV lamps as an alternative. UV lamps can mimic the effects of sunlight in killing harmful microorganisms at home. Additionally, ensuring that the room is bright and not humid can also reduce the risk of mold and bacterial growth.

Overall, maintaining good natural lighting not only plays a role in disease prevention but also improves the overall quality of life. A well-lit room with sufficient sunlight can improve mood, productivity, and comfort. Therefore, paying attention to natural lighting is an important step in creating a healthy and comfortable home environment for toddlers and their family members.

PM2.5 is air particles that are 2.5 micrometers or smaller, which can come from various sources such as fossil fuel burning, vehicle smoke, and industrial activities. These particles can be inhaled into the lungs and cause serious health problems, especially in toddlers and elderly individuals. Number of measurements of particulate matter (PM) concentrations with a diameter of ≤ 2.5 micrometers in the residences of the respondents was performed. PM2.5 levels were measured using a special device that was able to identify these particles in the air.

In the univariate analysis, it was found that among the 146 toddlers studied, there was a difference in the incidence of pneumonia based on PM2.5 levels in their neighborhood. No cases of pneumonia were found in houses with PM2.5 levels of >25μg/m³, no cases of pneumonia were found (0 toddlers, 0%). On the other hand, in homes with PM2.5, levels of <25μg/m³, 12 toddlers were found to suffer from pneumonia (8.2%), while another 134 toddlers did not suffer from pneumonia (91.8%).

These results show that even if toddlers live in environments with low PM2.5, they can still suffer from pneumonia. Overall, the total number of children under five whose homes had PM2.5 levels <25μg/m³ was 146, and of these, 12 children suffered from pneumonia while the other 134 children did not.

Although these data showed cases of pneumonia in environments with low PM2.5, the results of bivariate analysis showed that there was no significant association between PM2.5 levels and the incidence of pneumonia in toddlers. This was indicated by the value of $p = 0.371$, which was greater than the threshold of 0.05. In other words, the difference in the distribution of PM2.5 levels between toddlers who suffered from and did not suffer from pneumonia was not statistically strong enough to conclude a significant relationship between these two variables.

In the context of public health, it is important to pay attention to PM2.5 levels because long-term exposure to these small particles can cause a variety of respiratory health problems. PM2.5, can penetrate deep into the respiratory system and enter the bloodstream, causing inflammation, exacerbating existing respiratory conditions such as asthma and bronchitis, and increasing the risk of respiratory infections such as pneumonia.

Although this study did not find a significant relationship between PM2.5 levels and the incidence of pneumonia in toddlers, it is still recommended to maintain indoor air quality. Some steps that can be taken include the use of air purifiers with HEPA filters, reducing the use of fossil fuels in the house such as firewood or kerosene stoves, and ensuring good ventilation to reduce the concentration of air pollutants in the room. Reducing exposure to air pollutants not only helps prevent pneumonia, but also benefits overall respiratory health, improves quality of life, and reduces the risk of other health problems.

PM10 is a type of air particulate matter with an aerodynamic diameter less than or equal to 10 μm. These particles belong to the category of "fine particles," which can stay in the air for a long time and can be inhaled into the human respiratory system. Due to its small size, PM10 can penetrate the bronchi and reach the lungs, causing a variety of health problems such as chronic respiratory diseases, lung cancer, and

heart disease. The main sources of PM10 include motor vehicle emissions, industrial activities, burning of fossil fuels, and the construction and demolition of buildings. Based on Permenkes No. 2 of 2023, the maximum threshold value (NAV) of PM10 levels for healthy homes is <70 μg/m3.

Based on the results of the study, univariate analysis showed that there was a difference in the number of children under five living at home with PM10 levels that were ineligible (>70 μg/m3) and those who were eligible (<70 μg/m3). From Table 4, it can be seen that there were two toddlers living at home with PM10 levels that did not meet the requirements, and the two toddlers did not suffer from pneumonia. In contrast, all toddlers who suffered from pneumonia stayed at home with eligible PM10 levels below 70 μg/m3. Of the 155 patients studied, 12 had pneumonia, and all lived in environments with PM10 levels below the safe limit (70 μg/m3). In other words, of the 153 cases whose PM10 levels were eligible, 12 were toddlers with pneumonia, which means that the percentage of toddlers with pneumonia in this category was 7.8%.

Further bivariate analysis revealed no significant association between PM10 levels and the incidence of pneumonia in toddlers. This is indicated by a p-value of 0.680, which is greater than 0.05, indicating that there is no statistically significant correlation between PM10 level variables and the incidence of pneumonia in toddlers. Therefore, the results of this study indicate that in the samples studied, PM10 levels do not directly affect the incidence of pneumonia in toddlers.

Although PM10 is known to be a harmful air pollutant and can cause a variety of health problems, the results of this study show that at the level of PM10 levels found in this study, there is no increased risk of pneumonia in toddlers. All toddlers with pneumonia live at home, with PM10 levels below 70 μg/m3. This may be caused by various other factors that affect the respiratory health of toddlers, such as indoor air quality, nutritional status, cigarette smoke exposure, environmental cleanliness, and access to health services.

This study provides important insights but also underscores the need for further research with larger samples and more comprehensive control variables to confirm these findings. Long-term monitoring and more in-depth studies can help understand the complex interactions between air pollutants, such as PM10, and the health of toddlers. In addition, this study highlights the importance of focusing on various other environmental factors that may contribute to the respiratory health of toddlers. Although PM10 levels were not found to be a significant risk factor in this study, efforts to reduce air pollution remain important to public health.

The area of ventilation is an important variable that affects the air quality in a house and has an impact on the health of its residents, especially toddlers. Ventilation is the process of exchanging air indoors and outdoors, which aims to reduce the concentration of indoor pollutants such as dust, smoke, and microorganisms, as well as keeping the air fresh and healthy. Good ventilation is essential for preventing pollutant buildup and maintaining air humidity at a healthy level. Based on Permenkes No. 2 of 2023, a healthy house is one with a ventilation area of >10% of the floor area.

In this study, qualified ventilation was defined as a ventilation area that was sufficient to allow effective air circulation and had an area of >10% of the floor area of the house. Based on the data analyzed, it was found that all toddlers with pneumonia lived in houses with qualified ventilation. Specifically, out of a total of 12 toddlers with pneumonia, 100% lived in homes with qualified ventilation areas. In contrast, of the 143 toddlers who did not suffer from pneumonia, 135 (94.4%) lived in a house with qualified ventilation, whereas eight toddlers (5.6%) lived in a house with unqualified ventilation.

Bivariate analysis showed that there was no significant relationship between the ventilation area and the incidence of pneumonia in toddlers ($p = 0.400$). This means that the difference in ventilation area between the homes of toddlers who have pneumonia and those who do not is not statistically strong enough to be inferred as a factor influencing the incidence of pneumonia. However, although not statistically significant, it is important to recognize that good ventilation remains an important aspect of creating a healthy living environment.

Good ventilation has various health benefits. In addition to reducing pollutant concentrations, adequate ventilation also helps to control indoor air humidity, which can prevent the growth of mold and moss, which can be a source of allergens and respiratory irritants. Fresh and clean air also helps reduce the risk of other respiratory diseases such as asthma, bronchitis, and upper respiratory tract infections. Therefore, ensuring that the house has adequate ventilation is an important step in maintaining the health of residents, especially toddlers, whose immune systems are still developing.

There are several steps to improve the indoor air quality for families living in homes with unqualified ventilation. Installing additional vents, such as cross vents that allow airflow from one side of the house to the other, can be highly effective. Additionally, using an air purifier with an HEPA filter can help reduce small particles and other pollutants from the air. Regular cleaning of the vents is also important to prevent the buildup of dust and dirt that can impede airflow.

In addition to technical improvements, education and increasing public awareness of the importance of

good ventilation are also necessary. Public health programs that emphasize the importance of ventilation and simple ways to improve it can help maintain the health of people in their households. Governments and healthcare providers can play a role in providing the information and resources needed to improve ventilation conditions in homes, especially in areas at a high risk of respiratory diseases.

The type of wall in the house is an important variable that affects the health of residents, especially toddlers. In this study, the type of wall that qualifies is defined as a wall made of concrete or brick and is waterproof. Meanwhile, unqualified walls are made of woven bamboo or wood, and are not waterproof. Waterproof walls made of strong materials such as concrete or bricks can provide better protection against extreme weather, moisture, and pollutants from the outside.

Based on the data analyzed, it was found that toddlers who lived in homes with eligible wall types tended to have better respiratory health than those who lived in homes with unqualified wall types. Of the total toddlers studied, 9 out of 60 toddlers living in houses with ineligible walls developed pneumonia (15.0%), while 3 out of 86 toddlers living in homes with ineligible walls suffered from pneumonia (3.5%). This suggests that toddlers living in homes with unqualified wall types have a higher risk of developing pneumonia.

Bivariate statistical analysis showed a significant relationship between wall type and the incidence of pneumonia in toddlers, with a p-value of 0.005, which was smaller than the significance threshold of 0.05. This shows that the type of house wall is an important factor influencing the incidence of pneumonia in toddlers. Homes with walls that are not waterproof and are made of less sturdy materials are more susceptible to moisture and the development of microorganisms that can lead to respiratory infections.

In the context of environmental health, it is important to consider efforts to improve the environmental conditions of homes, especially in terms of wall types, to reduce the risk of respiratory diseases in toddlers. Governments and healthcare providers can provide assistance and support for home improvements, such as home renovation programs that replace walls made of woven bamboo or wood with waterproof concrete or brick walls. In addition, public education about the importance of waterproofing and strong house walls is very important.

If possible, it is best to replace the walls of the house from a non-waterproof material to a sturdier and waterproof material that not only improves the respiratory health of the occupants, but also provides additional protection against various environmental factors. Sturdy and waterproof walls can reduce the risk of water leakage when it rains, maintain a stable indoor temperature, and reduce the impact of air pollution from the outside. This is particularly important in areas with humid climates and high rainfall.

Overall, ensuring that the home has qualified walls is an important step in creating a healthy living environment for toddlers and the rest of their families. These measures are also part of a broader strategy to improve people's quality of life and well-being as well as reduce the burden of preventable respiratory diseases by improving home environmental conditions. Appropriate and sustainable interventions can have a long-term positive impact on public health.

The type of floor is an important variable in determining the quality of the home environment, which can affect the health of its residents, especially toddlers. Qualified flooring is defined as flooring that uses plaster, tiles, ceramics, and waterproofing. On the other hand, an unqualified floor is a floor that does not use plaster, tiles, or ceramics, and is not waterproof. Waterproof floors made of easy-to-clean materials can help prevent excess moisture and the growth of harmful microorganisms, which can lead to respiratory diseases.

Based on the data in this study, it was found that of the 68 toddlers who lived in houses with unqualified floor types, 10 (14.7%) suffered from pneumonia, while 58 (85.3%) did not suffer from pneumonia. In contrast, of the 78 toddlers living in houses with eligible floor types, only two (2.6%) suffered from pneumonia, while 76 (97.4%) did not suffer from pneumonia. This suggests that toddlers who live in homes with unqualified floors have a higher risk of developing pneumonia than those who live in homes with qualified floors.

The results of bivariate analysis showed that there was a significant relationship between floor type and the incidence of pneumonia in toddlers, with a value of $p = 0.005$, which was smaller than the significant threshold of 0.05. This shows that the type of floor of the house is an important factor affecting the incidence of pneumonia in toddlers in this study. Homes with floors that are not waterproof and are made of less hygienic materials are more susceptible to the buildup of dirt, dust, and moisture, which can serve as breeding grounds for microorganisms that cause respiratory infections.

In the context of public health, it is important to consider efforts to improve the condition of the house floor to reduce the risk of respiratory diseases in toddlers. Governments and healthcare providers can provide assistance and support for home improvements, such as home renovation programs that replace unqualified floors with waterproof plaster, tile, or ceramic floors. In addition, public education about the importance of having a hygienic and easy-to-clean house floor is very important.

If possible, it is best to change the floor of the house from a non-waterproof material to a more

hygienic and waterproof material that not only improves the respiratory health of residents but also provides additional protection against various environmental factors. Floors that are waterproof and easy to clean can reduce the risk of water leakage when they rain, keep the house clean, and reduce the impact of pollution from the outside. This is particularly important in areas with humid climates or high rainfall, where impermeable floors can easily become damp and support the growth of fungi and bacteria.

Housing density refers to the number of people living in a given space, and is usually measured in square meters per person (m^2/person). The general standard used to determine healthy residential density is a minimum of 8 m^2 per person. High residential density can have a negative impact on the health of residents, including increasing the risk of infectious diseases, mental disorders, and other health problems. Limited space can worsen indoor air quality, increase stress, and reduce sleep quality, all of which contribute to poor health.

Based on the results of the analysis in the table above, it is known that univariate analysis shows that there is a variation in housing density between toddlers who suffer from pneumonia and those who do not. From the table above, it is known that out of 53 toddlers living in houses with unqualified housing density (less than 8 m^2 per person), there are 5 toddlers suffering from pneumonia, which means 9.4% of all toddlers in this category. Meanwhile, of the 102 toddlers living in homes with an eligible occupancy density (more than 8 m^2 per person), seven toddlers suffered from pneumonia, which means 6.9% of all toddlers in this category. The total number of cases studied was 155, with 12 suffering from pneumonia. In percentage terms, 41.7% of toddlers suffering from pneumonia lived in homes with unqualified housing density, while another 58.3% lived in homes with eligible housing density.

Further, bivariate analysis showed that housing density did not have a significant relationship with the incidence of pneumonia in toddlers. This is shown by an Odds Ratio (OR) value of 1.414 with a confidence interval of 95% (0.426 – 4.689) and a p-value of 0.570. A p-value > 0.05 indicates that statistically, there is no significant correlation between the occupancy density variable and the incidence of pneumonia in toddlers. Although the OR was greater than 1, which theoretically indicates an increased risk of pneumonia in toddlers living in dense housing, because the p-value is not significant, it cannot be considered a statistically valid association.

From the results of the analysis, it can be concluded that housing density does not directly affect the incidence of pneumonia in toddlers. Toddlers living in low- and high-density housing showed a significant increase in the incidence of pneumonia. This suggests that other factors may have a greater influence on the incidence of pneumonia in toddlers in the context of this study. Factors such as ventilation quality, environmental cleanliness, exposure to indoor pollutants, and the general health conditions of home occupants can play a more dominant role.

The age of toddlers is one of the most important demographic variables in child-health studies. Toddlers are defined as toddlers in the age range of 0–5 years. During this period, toddlers experienced rapid growth and development, both physically and cognitively. Data on the age of toddlers are used in various studies to measure the prevalence of disease, nutritional development, and effectiveness of health interventions.

In this study, the age of the toddlers varied from a few weeks to five years. The age distribution of toddlers and the number of cases of the disease observed varied greatly. In 1-year-old children, there were six cases; in 2-year-old children, there were 16 cases, and the highest number of 21 cases was found in 4-year-old children. 3-year-olds had a total of 19 cases with a disease prevalence of 12.3%, while 2-year-olds had a total of 16 cases with a disease prevalence of 10.3%. This shows that the ages of 2 and 3 years were quite susceptible to disease in the population studied. Among 4-year-olds, although the most numerous in the toddler population studied, only a small percentage suffered from the disease.

To make it easier to analyze the age of toddlers, age grouping was carried out, namely 0 – 2 years and 3 – 5 years. Based on the analysis, 33.3% (4 people) of toddlers who suffer from pneumonia are 3 years old and 25% (3 people) of toddlers who suffer from pneumonia are 2 years old. Most respondents were toddlers with an age range of 3–5 years, which amounted to 88 people, and eight of them suffered from pneumonia. There were 67 children under five years with an age range of 0 – 2 years, and four of them had pneumonia.

Bivariate analysis showed the relationship between the age of toddlers and disease risk using the p value and Odds Ratio (OR). The p-value is used to determine whether the age variable in toddlers is related to the case of pneumonia in toddlers. Based on the results of bivariate analysis, it is known that there is no significant relationship between the age of toddlers and the incidence of pneumonia, which can be seen from the value of $p = 0.471$ or $p > 0.05$.

The results of the analysis in table 4.64 show that the odds ratio (OR) value was 0.635 with a 95% confidence interval (CI) between 0.183 and 2.205. This OR shows that toddlers aged 0 – 2 years have a 0.635 times lower risk of developing pneumonia than toddlers aged 3 – 5 years.

The age distribution of toddlers provides important insights into how age affects their susceptibility to certain diseases. This information is important for

designing more effective and targeted health interventions for different age groups. This study provided an overview of the age distribution of toddlers, which is associated with the prevalence of certain diseases. 3-year-old toddlers showed a high prevalence of the disease compared to other age groups (33.3% in the pneumonia group). Meanwhile, 2-year-old toddlers showed a prevalence of 25% for the same disease.

In addition, the age distribution also affects the interpretation of research results related to the prevalence of diseases in toddlers. 4-year-olds, although they number the most in the population studied. This shows that although there are many 4-year-olds, they are not as many as the 2- and 3-year-olds who suffer from certain diseases. This age distribution helps in identifying age groups that are more susceptible to certain diseases so that health interventions can be more focused on the age groups that need it most.

Overall, the toddler age variable provides a clear picture of how age may affect susceptibility to the disease. This study provides useful data for health practitioners in designing targeted health programs. The results of this study can be used to develop vaccination programs or health campaigns specifically targeting the most vulnerable age groups. Thus, this research will help in the development of more focused and efficient health strategies to improve the health of toddlers.

The gender of toddlers is one of the most important demographic variables in child-health studies. Gender refers to the biological categories of males and females, which are determined from birth based on physical characteristics. This variable is often used in various studies to measure differences in disease prevalence, growth patterns, and responses to health interventions between boys and girls under five.

In this study, the gender distribution of toddlers included the number of male and female toddlers who experienced certain diseases. There were 86 male and 58 female toddlers involved in this study. From the univariate table presented, it can be seen that 52 male toddlers suffered from certain diseases with a prevalence of 34.0%, while 30 female toddlers suffered from the same disease with a prevalence of 19.6%.

Bivariate analysis showed the relationship between the sex of toddlers and the prevalence of the disease using the p-value and Odds Ratio (OR). The p-value is used to determine whether the gender variable in toddlers is related to the case of pneumonia in toddlers. Based on the results of bivariate analysis, it is known that there is no significant relationship between sex and the incidence of pneumonia, which can be seen from the value of $p = 0.343$ or $p > 0.05$.

The OR was used to measure the strength of the relationship between sex and disease incidence. The results showed that male toddlers had an OR of 1,733, with a 95% confidence interval from 1,032 to 2,912. This means that male toddlers have a 1,733 times higher risk of developing certain diseases than female toddlers do. In addition, female toddlers had a lower OR (0.577) with a 95% confidence interval from 0.343 to 0.968, indicating a lower risk than male toddlers.

The distribution of sexes provides important insights into how biological differences affect susceptibility to certain diseases. A more detailed analysis showed that male toddlers are more susceptible to disease than female toddlers. Of the total cases observed, 63.1% were male toddlers and 36.9% were female toddlers. These data show that sex differences play an important role in the prevalence of the disease among toddlers.

The study also showed that male toddlers tended to have a higher prevalence of certain diseases. In this study of pneumonia, there were 32 male and 18 female toddlers. This shows that male toddlers are more susceptible to pneumonia than female toddlers.

Overall, the sex variables of toddlers provide a clear picture of how biological differences may affect their susceptibility to disease. This study provides useful data for health practitioners in designing targeted health programs. For example, the results of this study can be used to develop prevention and treatment strategies that consider sex differences. By knowing the distribution of sex and the prevalence of the disease in toddlers, health practitioners can design interventions that are more effective and according to the needs of each group.

This study shows the importance of understanding gender variables in the context of toddler health so that health programs can provide maximum benefits for toddlers. With the data obtained, health practitioners can easily identify the most vulnerable groups that require special attention. For example, vaccination programs and health campaigns can be designed by considering gender differences to ensure that both groups receive optimal protection.

Thus, the gender variables in this study will help in the development of more focused and efficient health strategies to improve the health of toddlers. This study shows that sex differences are not only biological factors but also factors that have a significant influence on the prevalence of diseases in toddlers. This emphasizes the importance of developing inclusive and gender-sensitive health policies to achieve optimal health for toddlers.

The type of parental work is an important demographic variable in the study of children's health. The type of work refers to the activities or professions in which parents live to earn income. These variables are often used in various studies to measure the socioeconomic impact on children's health, including access to health services, nutritional quality, and the

risk of disease.

The type of work of the mother is also an important factor affecting the health of the child. In this study, the observed mothers' occupations included categories such as housewives, laborers, private employees, and the self-employed. There are 82 mothers who worked as housewives, 13 as laborers, 22 as private employees, and 27 as self-employed. This distribution shows variations in domestic and economic responsibilities among the mothers.

Toddlers from mothers who work as housewives have a disease prevalence of 29.3%, which is 24 of 82 children. Toddlers of mothers who work as laborers have a prevalence of 15.4%, which is 2 out of 13 children. Toddlers of mothers who work as private employees have a prevalence of 18.2%, which is four out of 22 children. Toddlers of self-employed mothers had a disease prevalence of 37.0% (10 out of 27 children).

To make it easier to analyze, the mother's work in this study was categorized into two based on the location of work, namely working inside the home and working outside the home. In-home jobs for mothers include housewives, home-based entrepreneurs, and home-based trades. Meanwhile, jobs outside the home included private employees, teachers, and canteen traders.

Based on the results of the chi-squared test, there was no statistically significant association between maternal work and pneumonia. The results show that the values of $p = 0.561$ or $p > 0.05$. This means that, in the context of existing data, mothers' work does not have a significant influence on the incidence of pneumonia in toddlers.

Bivariate analysis for the type of mother's occupation showed that an odds ratio (OR) value of 1,500 with a 95% confidence interval (CI) between 0.380 and 5,927 showed that toddlers whose mothers worked outside the home had a 1.5 times greater risk of developing pneumonia than toddlers whose mothers worked inside the home. However, these differences were not statistically significant.

The distribution of maternal occupational types provided important insights into how economic and domestic roles and responsibilities affect children's health. Toddlers whose mothers work outside the home show a higher prevalence of the disease than those whose mothers work indoors. This may be due to a variety of factors, including difficult working conditions, unstable incomes, and limited access to healthcare.

The types of fathers' jobs observed include various categories: farmers, laborers, private employees, and the self-employed. From the data obtained, 49 fathers worked as farmers, 19 as laborers, 14 as private employees, and 62 as self-employed. This distribution reflects the wide socioeconomic variation in the studied population.

Univariate analysis showed the prevalence of the disease in toddlers based on the father's occupation. Toddlers with fathers who work as farmers have a disease prevalence of 36.0%, which is 24 of 49 toddlers. Meanwhile, toddlers with fathers who work as laborers had a prevalence of 22.7%, which is 6 out of 19 toddlers. Toddlers of fathers who work as private employees have a disease prevalence of 14.3% (2 out of 14 children), and toddlers of fathers who work as self-employed have a disease prevalence of 27.4% (17 out of 62 children).

To make it easier to analyze, the father's work in this study was categorized into two employment relationships or sectors, namely formal and informal jobs. Formal jobs for fathers include private employees, teachers, and corporate employees. Informal work includes daily laborers, traders, and fishermen.

The results of the bivariate test showed that there was no significant relationship between the type of father's occupation and the incidence of pneumonia in toddlers, with a value of $p = 0.462$. An odds ratio (OR) of 1.554 with a 95% confidence interval (CI) between 0.477 and 5.058 showed that toddlers whose fathers worked in the informal sector had a 1.554 times greater risk of developing pneumonia than toddlers whose fathers worked in the formal sector. However, these differences were not statistically significant.

The distribution of fathers' job types provides important insights into how socioeconomic factors affect children’s health. Toddlers whose fathers work in the informal sector show higher disease prevalence than children whose fathers work in the formal sector. This shows that socioeconomic factors, such as income level and access to health facilities, can have a significant impact on children's health.

Parents' educational level is an important demographic variable in various social and health studies. This variable refers to the highest level of education that has been completed by the father or mother and is often used as an indicator to assess the socioeconomic status of the family and its potential impact on the development and health of the toddler. The definition of parental education level can include several levels of education, ranging from non-school, elementary school (SD), junior high school (SMP), high school (SMA), to higher education (diploma, bachelor's degree, and so on).

In this study, it is known that the distribution of education levels of under-fives’ parents show significant variations. The majority of the parents of toddlers who were respondents in this study had an education level of high school/vocational/high school graduates, with a total of 88 people or around 56.8% of the total respondents. This reflects that most parents have upper secondary education, which is usually

considered to be an adequate level of education to understand and access information regarding child health and care.

On the other hand, parents who only completed education up to the elementary/middle school level numbered the least, at 17 people or 11% of all respondents. This suggests that there is a small proportion of the population whose education levels are still low, which may have implications for access to information and health services. The number of junior high school/junior high school and higher education graduates was 26 (16.8%) and 24 (15.5%), respectively. This distribution of education levels is important because parental education is often associated with various aspects of a child's well-being, including health, nutrition, and cognitive development.

Univariate analysis in this study showed a correlation between the level of parental education and the incidence of pneumonia in toddlers. Most parents who did not encounter a toddler's pneumonia tended to have a higher level of education. For example, of all respondents with SMA/SMK/SLTA education, 93.2% did not have cases of pneumonia in toddlers. Similarly, among respondents with tertiary education, 87.5% had no cases of pneumonia in their toddlers. These data indicate that higher levels of education may contribute to increased knowledge about prevention and healthcare, which in turn may lower the risk of disease in children.

However, bivariate analysis revealed no significant relationship between parental education level and the incidence of pneumonia in toddlers. This was indicated by a p-value of 0.421, which was greater than the significance limit of 0.05. This means that, although there is a tendency for higher education to be associated with a decrease in the incidence of pneumonia, this difference is not strong enough to be considered statistically significant. In other words, other variables may be more influential than the level of parental education in determining the incidence of pneumonia in toddlers.

However, parental education level remains an important indicator in social and health research. Parental education can provide an overview of the family's socioeconomic background, which affects various aspects of life, including the health and welfare of children. Higher levels of education are usually associated with a better ability to access information, health services, and other resources essential for supporting children's growth and development. Therefore, although the results of this study did not find a statistically significant relationship, parental education level remains an important factor to consider in efforts to improve overall child health and wellbeing. Parents' education levels are not just numbers but reflect the family's capacity to provide optimal care for their toddlers.

4. Conclusion

This study found that all toddlers who tested positive for pneumonia (as many as 12 children) experienced the same symptoms: coughing, fever, and shortness of breath. In addition, some (5 children) also experienced nausea or vomiting.

Only a small number of toddlers underwent complete examinations, including health checks and diagnostic tests. Of the 12 toddlers, only two had undergone sputum tests, five had blood tests, and eight had X-rays. However, all toddlers checked themselves at the healthcare facilities.

The home environmental factors studied showed that all houses of toddlers with pneumonia had natural lighting, PM2.5, PM10 levels, appropriate types of ventilation, and house walls. However, only some houses met the temperature standards (five houses), appropriate types of floors (11 houses), and reasonable housing density (five houses). No house had an ideal humidity level.

In terms of demographic characteristics, toddlers with pneumonia were mostly aged 3 years (33.3%) or 2 years (25%). Most of the patients were male (66.7%). The majority of parents' education was high school graduates, and the majority of mothers worked as housewives, while fathers' jobs varied, with 25% working as daily laborers.

The results showed that symptoms such as coughing, fever, shortness of breath, and nausea/vomiting were significantly associated with the incidence of pneumonia ($p < 0.001$). Examination of sputum and blood and X-ray tests were also strongly correlated with the incidence of pneumonia. However, visits to healthcare facilities alone did not show a significant relationship ($p = 0.680$).

Of the home environmental factors, only floor type was shown to be related to the incidence of pneumonia ($p = 0.024$). Other factors, such as temperature, humidity, lighting, and air quality (PM2.5/PM10), did not show a significant relationship.

Likewise, demographic factors such as age, sex, parental occupation, and education level were not shown to have a significant effect on the incidence of pneumonia in toddlers.

The public is expected to maintain good health behaviors, such as washing hands with soap (CTPS), opening and closing windows regularly, and avoiding smoking. In addition, it is important to clean the house regularly, a maximum of once a month, to maintain the cleanliness and health of the home environment so that it is comfortable to live in and avoid potential diseases. If possible, the community is also advised to improve the condition of the house to make it a healthier and more comfortable place to live. If a toddler experiences symptoms of the disease, even if it is considered mild, it should be immediately examined by a doctor to get the right treatment and prevent the risk of developing a

more serious disease. To support this effort, the East Tegal Health Center is expected to increase health counseling activities for the community, especially for parents who have toddlers, related to Pneumonia and Bronchopneumonia and their preventive measures.

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