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Analysis of Extrinsic Factors on the Incidence of Pneumonia in Toddlers in the Working Area of the Batu Aji Community Health Center, Batam City in 2022

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ABSTRACT

Pneumonia is an acute infection that causes the lungs to become inflamed. Pneumonia is the main cause of death of children under five in the world. This disease accounts for 16% of all deaths of children under 5 years, which causes the deaths of 920,136 children under five, or more than 2,500 per day. If prevention is not carried out, there will be around 11 million child deaths worldwide by 2030. Prevention efforts are a component The most strategic way to eradicate pneumonia in toddlers consists of immunization and non-immunization prevention. Actions that are no less important are non-immunization prevention by carrying out preventive efforts such as improving nutrition with healthy nutrition, preventing pollution in the environment, and providing exclusive breastfeeding. This study aims to look at the factors associated with the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022. This research is an analytical study with a cross-sectional design. The respondents in this study were 56 mothers of toddlers. The sampling technique used was non-probability sampling, namely purposive sampling. Data collection techniques were carried out through questionnaires and medical records. The results of statistical tests using Mann Whitney showed that of the 11 variables, 8 variables had a significant relationship with the incidence of pneumonia, while 3 variables, namely maternal age, maternal education, and family economic status, did not have a significant relationship with the incidence of pneumonia. It is hoped that health workers will carry out IMCI examinations to reach targets of diseases suffered by toddlers and provide health education about the factors that cause pneumonia, prevention, and treatment of pneumonia.

Keywords: Extrinsic factors, knowledge, pneumonia, toddler

Introduction

Pneumonia is an acute infection that causes the lungs to become inflamed. The air sacs in the lungs (alveoli) are filled with pus and fluid, so the lungs' ability to absorb oxygen is reduced. The causes can be varied, including bacteria, viruses, microplasma, and fungi or fungi. Pneumonia attacks all ages, from babies to the elderly, including the elderly. Symptoms that appear are fever, shortness of breath, and cough. Physically, phlegm in pneumonia sufferers is yellow, green, or brown/dark red if mixed with blood (Zulfikar, 2020).

Based on Indonesia's health profile in 2018, it is known that there are more than 400 thousand cases of pneumonia in Indonesia, where pneumonia is the number 2 killer of toddlers after diarrhea, while in the world pneumonia is the number 1 killer of toddlers. If prevention is not carried out, there will be around 11 million child deaths worldwide by 2030 (Indonesian Health Profile, 2018).

The impact of pneumonia can cause more than 80% of child deaths. The under-five mortality rate is an indicator especially in determining a child's health status because it is a reflection of the

child's current health status. Recurrent pneumonia incidents that occur in toddlers can cause stunted growth and development of toddlers. Apart from that, it can have a fatal impact, namely death in toddlers. Pneumonia is the highest contributor to toddler deaths in the world (Yesserie, 2015).

The high incidence of pneumonia is influenced by several risk factors which consist of intrinsic and extrinsic factors. Intrinsic factors include the age of the toddler, gender, nutritional status, low birth weight (LBW), immunization status, provision of breast milk (ASI), and administration of vitamin A. Extrinsic factors include housing density, air pollution, ventilation, cigarette smoke, use of fuel, use of 6 mosquito coils, as well as maternal factors such as maternal education, maternal age, and maternal knowledge (Nurjazuli, 2011).

The solution to reducing the death rate of children under five due to pneumonia is the early discovery and management of pneumonia cases in children under five. It is hoped that this can reduce the number of deaths caused by pneumonia. Difficulty breathing that is calculated is the breath or seen TDDK divided by all visits of toddlers with complaints of coughing or difficulty breathing. This can prevent deaths of toddlers due to pneumonia by 40% (Ministry of Health of the Republic of Indonesia, 2019).

Prevention efforts are the most strategic component to eradicate pneumonia in children under five, consisting of immunization and non-immunization prevention. No less action what is important is preventing non-immunization by carrying out preventive efforts such as improving nutrition with healthy nutrition, preventing pollution in the environment, and providing exclusive breastfeeding. From the explanation of the problem and the data that has been obtained, it can be seen that there are still high rates of child morbidity and mortality in infants and toddlers due to pneumonia, along with there are many individual and environmental factors that influence the incidence of pneumonia in toddlers (Sianturi, 2021). The aim of this research is to determine the extrinsic factors that influence the incidence of pneumonia in toddlers in the working area of the Batu Aji Health Center in Batam City in 2022.

Material and Methods

This research is an analytical study with a cross sectional design. Cross sectional research, which is often called transversal research, is the most frequently carried out epidemiological research in the health sector. This approach is in order to study the dynamics of the correlation between risk factors and effects in the form of certain diseases or health status using a point time approach model. This research is to look at the factors related to the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022.

The target population meets the sampling criteria and is the final target of the research. The target population in this study is all toddlers who are estimated to be affected by pneumonia in Batam City in 2021, namely 4,762 people.

An affordable population is a population that meets research criteria and can usually be reached by researchers from their group, where the selected sample will be used as research subjects (Nursalam, 2017). In this study, the reachable population was all toddlers who had pneumonia in the Batu Aji Community Health Center working area, Batam City in 2022, based on data from the Batam City Health Service in 2021, namely 321 toddlers who had pneumonia.

The sampling technique used in this research is non-probability Sampling with the "Purposive sampling" technique, namely purposive sampling is a method of sampling carried out by selecting subjects based on certain characteristics that are considered to have a relationship with previously known population characteristics (Masturoh & Anggita, 2018). The sample size in this study was 56 respondents. This data management is carried out directly after data collection is complete, which is done manually with the aim that the data collected has clear characteristics. Data collection in this research used primary and secondary data. The research instrument used in this research is a research questionnaire "analysis of extrinsic factors on the Incidence of Pneumonia in Toddlers".

Results and Discussion

Based on the results of research analysis regarding Extrinsic Factor Analysis of the Incidence of Pneumonia in Toddlers in the Batu Aji Community Health Center Working Area, Batam City, the following results were obtained:

Table 1. Characteristics of mothers of toddlers based on maternal age in the Batu Aji Community Health Center Working Area, Batam City in 2022

Mother's Agne	Frequency (n)	Percentage (%)
20-40 Years	50	89,3
> 40 Years	6	10,7
Total	56	100

Based on Table 1, it is known that the age of the mothers of toddlers at Batu Aji Health Center is mostly 20-40 years old, namely 50 mothers of toddlers (89.3%).

Table 2. Characteristics of toddler mothers based on the education of toddler mothers in the Batu Aji Community Health Center Working Area, Batam City Year 2022

Mother's Education	Frequency (n)	Percentage (%)
No School	4	7,2
SD	4	7,2
SMP	12	21,4
SMA	25	44,6
University	11	19,6
Total	56	100

Based on Table 2, it is known that the education of mothers of toddlers at Batu Aji Health Center is mostly high school, namely 25 mothers of toddlers (44.6%).

Table 3. Frequency distribution of toddler knowledge in the Batu Aji Community Health Center Working Area, Batam City in 2022

Mother's Knowledge	Frequency (n)	Percentage (n)
Not Good	42	75.0
Good	11	19,6
Very Good	3	5,4
Amount	56	100

Based on Table 3, the results show that of the 56 toddlers, the majority of toddler mothers had a poor level of knowledge, 42 toddler mothers (75.0%).

Table 4. Frequency distribution of economic status of toddler families in the Batu Aji Community Health Center Working Area, Batam City in 2022

Economic Status	Frequency (n)	Percentage (%)
Unable	46	82,1
Capable	10	17,9
Amount	56	100

Based on Table 4, the results showed that of the 56 toddlers, the highest family economic status was economically disadvantaged with 46 toddlers (82.1%).

Table 5. Frequency distribution of fuel use in the home environment for toddlers in the working area of the Batu Aji Community Health Center, Batam City, 2022

Fuel Consumption	Frequency (n)	Percentage (%)
Of	31	55,4
No	25	44,6
Amount	56	100

Based on Table 5, it is found that the majority of mothers with toddlers still use fuel for cooking, totaling 31 mothers with toddlers (55.4%).

Table 6. Frequency distribution of the use of burned mosquito repellent in the home environment for toddlers in the Working Area of the Batu Aji Health Center, Batam City, 2022

Use of Burned Mosquito Repellent	Frequency (n)	Percentage (%)
Of	34	60,7
No	22	39,3
Amount	56	100

Based on Table 6, the results show that the majority of mothers under five's homes still use mosquito coils, and 34 mothers under five (60.7%).

Table 7. Frequency distribution of air pollution in the environment around toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Air pollution	Frequency (n)	Percentage (%)
Of	49	87,5
No	7	12,5
Amount	56	100

Based on Table 7, the majority shows that there are 49 toddlers (87.5%) who are still exposed to air pollution.

Table 8. Frequency distribution of ventilation for toddler houses in the Batu Aji Community Health Center Working Area, Batam City in 2022

Home Ventilation	Frequency (n)	Percentage (%)
Qualify	44	78,6
Did not fulfill the conditions	12	21,4
Amount	56	100

Based on Table 8, the majority of toddler house ventilation that does not meet the requirements is 44 toddlers (78.6%).

Table 9. Frequency distribution of residential density in toddler house environments in the Batu Aji Community Health Center Working Area, Batam City, 2022

Residential Density	Frequency (n)	Percentage (%)
Qualify	28	50,0
Did not fulfill the conditions	28	50,0
Amount	56	100

Based on Table 9, the results show that out of 56 toddlers, the density of housing that does not meet the requirements is comparable to that of those that meet the requirements with the number of 28 toddlers (50.0%).

Table 10. Frequency distribution of exposure to cigarette smoke in the environment around toddlers in the working area of the Batu Aji Community Health Center, Batam City, 2022

Exposure to cigarette smoke	Frequency (n)	Percentage (%)
Of	46	82,1
No	10	17,9
Amount	56	100

Based on Table 10, the majority of toddlers are still exposed to cigarette smoke, 46 toddlers (82.1%).

Table 11. Frequency distribution of toddler pneumonia status in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Toddler Status	Frequency (n)	Percentage (%)
Mild Pneumonia	7	12,5
Moderate Pneumonia	32	57,1
Severe Pneumonia	17	30,4
Amount	56	100

Based on Table 11, the majority of toddlers experienced moderate pneumonia, 32 toddlers (57.1%).

Table 12. Frequency distribution of pneumonia incidents by maternal age in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022.

Pneumonia Occurrence	Mother's age				Total		P Value
	20-40 Years		>40 Years				
	N	%	N	%	N	%	
Mild Pneumonia	7	100%	0	0,0%	7	100%	0,570
Moderate Pneumonia	28	87,5%	4	12,5%	32	100%	
Severe Pneumonia	15	88,2%	2	11,8%	17	100%	
Total	50	89,3%	6	10,7%	56	100%	

Based on Table 12, it shows that of the 56 children under five, the majority of mothers aged 20-40 years experienced mild pneumonia with a percentage of (100%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia and maternal age is not related to the p-value of 0.570 > 0.05.

Table 13. Frequency distribution of pneumonia incidents by mother's education in Toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia	Mother's Knowledge Incident						Total		P-Value
	Not so good		Good		Very Good				
	N	%	N	%	N	%	N	%	0,005
Mild Pneumonia	6	85,7 %	1	14,3%	0	0,0%	7	100%	
To be continued...									

Moderate Pneumonia	28	87,5 %	4	12,5%	0	0,0%	32	100%
Severe Pneumpnia	8	47,1 %	6	35,3%	3	17,6%	17	100%
Total	42	75,0 %	11	19,6%	3	5,4%	56	100%

Based on Table 13, it shows that out of 56 toddlers, the majority of mothers' poor knowledge occurred in moderate pneumonia with a percentage of (87.5%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia with maternal knowledge is associated with a p-value of 0.005 < 0.05.

Table 14. Frequency distribution of pneumonia incidents with family economic status in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	Economic Status				Total		P Value
	Unable		Capable				
	N	%	N	%	N	%	
Mild Pneumonia	7	100%	0	0,0%	7	00,0%	
Moderate Pneumonia	23	71,9%	9	28,1%	32	00,0%	0,538
Severe Pneumpnia	16	94,1%	1	59,1%	17	00,0%	
Total	46	82,1%	10	17,9%	56	00,0%	

Based on Table 14, shows that of the 56 children under five, most of them are economically disadvantaged with mild pneumonia with a percentage of (100%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia and family economic status are not related to the p-value of 0.538 < 0.05.

Table 15. Frequency distribution of pneumonia incidents with fuel use in the environment around toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	Fuel Consumption				Total		P Value
	Of		No				
	N	%	N	%	N	%	
Mild Pneumonia	4	57,1%	3	42,9%	7	100,0%	0,041
Moderate Pneumonia	13	40,6%	19	59,4%	32	100,0%	
Severe Pneumpnia	14	82,4%	3	17,6%	17	100,0%	
Total	31	55,4%	25	44,6%	56	100,0%	

Based on Table 15, it shows that out of 56 children under five, most of the use of cooking fuel using kerosene occurred in severe pneumonia with a percentage of (82.4%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia with fuel use is associated with a p-value of 0.041 < 0.05.

Table 16. Frequency distribution of pneumonia incidents with the use of burned mosquito repellent in the environment around toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	Use of Burned Mosquito Repellent				Total		P-Value
	Yes		No				
	N	%	N	%	N	%	
Mild Pneumonia	5	71,4%	2	28,6%	7	100,0%	
Moderate Pneumonia	15	46,9%	17	53,1%	32	100,0%	0,039
Severe Pneumpnia	14	82,4%	33	17,6%	17	100,0%	
Total	34	60,7%	22	39,3%	56	100,0%	

Based on Table 16, it shows that out of 56 toddlers, the majority of mosquito coil use occurred for severe pneumonia with a percentage of (82.4%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia with the use of burnt mosquito medication is associated with a p-value of 0.039 < 0.05.

Table 17. Frequency distribution of pneumonia incidents with air pollution in the environment around toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	Air pollution				Total		P Value
	Of		No				
	N	%	N	%	N	%	
Mild Pneumonia	3	42,9%	4	57,1%	7	100,0%	
Moderate Pneumonia	29	90,6%	3	9,4%	32	100,0%	0,041
Severe Pneumpnia	17	100,0%	0	0,0%	17	100,0%	
Total	49	87,5%	7	12,5%	56	100,0%	

Based on Table 17, it shows that out of 56 children under five, most of the air pollution occurred in severe pneumonia with a percentage of (100%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia with air pollution is associated with a p-value of 0.002 < 0.05.

Table 18. Frequency distribution of pneumonia incidents with home ventilation for toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	Home Ventilation				Total		P Value
	Did not fulfill the conditions		Qualify				
	N	%	N	%	N	%	
Mild Pneumonia	7	100,0%	0	0%	7	100,0%	0,041
Moderate Pneumonia	27	84,4%	5	15,6%	32	100,0%	
Severe Pneumpnia	10	58,8%	7	41,2%	17	100,0%	
Total	44	78,6%	12	21,4%	56	100,0%	

Based on Table 18, it shows that out of 56 toddlers, the majority of home ventilation occurred in mild pneumonia with a percentage of (100%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia with house ventilation is associated with a p-value of 0.012 < 0.05.

Table 20. Frequency distribution of pneumonia incidents with house density in the environment around toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	House Density				Total		P Value
	Of		No				
	N	%	N	%	N	%	
Mild Pneumonia	2	28,6%	5	71,4%	7	100%	
Moderate Pneumonia	13	37,5%	20	62,5%	32	100%	0,041
Severe Pneumpnia	14	82,4%	3	17,6%	17	100%	
Total	28	50,0%	28	50%	56	100%	

Based on Table 19, it shows that out of 56 children under five, most of the house crowding occurred in severe pneumonia with a percentage of (82.4%). Based on the results of the Mann-

Whitney statistical test analysis, it is known that the incidence of pneumonia with house density is associated with a p-value of 0.002 < 0.05.

Table 20. Frequency distribution of pneumonia incidents with exposure to cigarette smoke in the environment around toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

Pneumonia Occurrence	Smoking Smoke Display				Total		P-Value
	Of		No				
	N	%	N	%	N	%	
Mild Pneumonia	3	42,9%	4	7,1%	7	100,0%	0,041
Moderate Pneumonia	27	84,4%	5	5,6%	32	100,0%	
Severe Pneumonia	16	4,1%	1	5,9%	17	100,0%	
Total	46	2,1%	10	17,9%	56	100,0%	

Based on Table 21, shows that out of 56 toddlers, the majority of exposure to cigarette smoke occurred in severe pneumonia with a percentage of (94.2%). Based on the results of the Mann-Whitney statistical test analysis, it is known that the incidence of pneumonia with exposure to cigarette smoke is associated with a p-value of 0.012 < 0.05.

The relationship between mothers's age and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area showed that most of the mothers of toddlers with toddlers who had pneumonia were on average 20-40 years old, namely 50 mothers (89.3%) and mothers of toddlers aged 20-40 years with toddlers who 7 toddlers (100.0%) experienced mild pneumonia.

Based on the Mann-Whitney test, the p-value was 0.570, where the p-value α > 0.05, thus Hα was rejected and H0 was accepted. So, it was concluded that there was no relationship between maternal age and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

Kurniadi (2013) in El Syani et al. (2015) state that age is related to a person's maturity or maturity. Increasing age will also increase a person's ability to act make decisions, think rationally, control emotions, and be tolerant of other people's views. Based on the research results, the researchers concluded that there was no significant relationship between maternal age and the incidence of pneumonia in the Batu Aji Health Center Working Area, Batam City in 2022, the majority of mothers in the Batu Aji Health Center Working Area were 20-40 years old. Because the age of mothers in the working area of the Batu Aji Community Health Center is mostly 20-40 years old, the mature age of mothers still shows a lack of prevention of the factors that cause pneumonia itself, what's more, the mother's age is < 20 years, which means the mother's reproductive system is mature. and his mindset has stabilized. A mother's age which is considered insufficient will also influence the level of curiosity about how to care for and look after her toddler, thereby influencing prevention to anticipate factors that cause pneumonia such as rarely opening windows/lack of ventilation which results in obstruction of air exchange in the house, then the use of fuel. and the use of mosquito coils, as well as smoking around toddlers which creates smoke from burning or the use of mosquito coils or cigarette smoke itself will result in air pollution so that unhealthy air is inhaled by toddlers and attacks the toddler's respiratory tract.

The relationship between maternal education and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area showed that most of the mothers' last education was junior high school with mild pneumonia with a percentage of (57.1%). Based on the Mann-Whitney test, the p-value was 0.521, where the p-value

α > 0.05, thus Hα was rejected and H0 was accepted. So it was concluded that there was no relationship between maternal education and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

The results of this study are almost the same as research conducted by Leonardus and Anggraeni (2020) titled "Factors Associated with the Incident of Pneumonia in Toddlers at Lewoleba Regional Hospital" showing the results that Based on Table 2 the incidence of pneumonia is highest in toddlers who have people with a higher level of education. low, namely 23 people with a presentation of 71.9%, while the incidence of pneumonia in toddlers who have a high level of education is 8 people with a presentation of 24.2%. From the results of the chi-square test, it was found that the p-value was 0.210 or $P > 0.05$, which means there is no relationship between the level of parental education and the incidence of pneumonia in toddlers. H0 is accepted and Ha is rejected, with the result p-value = 0.210. Where there is no significant relationship between the incidence of pneumonia and maternal education in toddlers.

The level of maternal education is one of the factors that can indirectly influence the incidence of pneumonia in toddlers. Usually the higher the mother's education, the easier it is for her to receive health messages and the higher the level of understanding of preventing pneumonia in toddlers. Mothers who are well-educated will have Sufficient insight into maintaining the health of babies and children is different from a mother's lack of curiosity, if a mother does not have a high level of curiosity then it will be difficult for her to carry out prevention and treatment for toddlers who have pneumonia (Chandra, 2017).

Based on the research results, the researchers concluded that there was no significant relationship between maternal education and the incidence of pneumonia in the Batu Aji Health Center Working Area, Batam City in 2022. Most of the mothers' education in the Batu Aji Health Center Working Area was high school. Where, the level of formal education was closely related to knowledge, although not absolute. This means that someone who has a higher education does not necessarily have a broad level of knowledge. Apart from that, mothers who have a high level of education cannot care for toddlers properly because mothers with a high level of education are too busy with their careers and work so they have a tendency to entrust their children to caregivers or other family members. This matter shows that a mother's high level of education is not accompanied by proper knowledge and how to care for toddlers. Apart from that, the higher a mother's curiosity, the easier it is for her to receive health messages and the higher her level of understanding regarding preventing pneumonia in her toddlers.

The relationship between mother's knowledge and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Community Health Center Working Area showed that the majority of toddlers' mothers' knowledge was poor, namely 42 toddlers' mothers, of which 28 toddlers (87.5%) had poor maternal knowledge.

Based on the Chi-Square test, the p-value was 0.005, where the p-value α < 0.05, thus H0 was rejected and Hα was accepted. So, it was concluded that there was a relationship between maternal knowledge and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

According to Lawrence Green's theory, knowledge is an initial factor in expected behavior and is generally positively correlated with behavior. Based on the level of knowledge, understanding, application, analysis, synthesis, and evaluation which will later influence the health behavior carried out. So, the level of knowledge includes anything what should be done and what should not be done as an effort to prevent recurrence of pneumonia in toddlers (Gunawan, 2017).

Based on the research results, the researchers concluded that there was a significant relationship between maternal knowledge and the incidence of pneumonia in the Batu Aji Health Center Working Area, Batam City in 2022, the majority of mothers' knowledge in the Batu Aji

Health Center Working Area was poor. Where, the level of parental knowledge plays an important role in the incidence of pneumonia in toddlers. Good parental knowledge will have an impact on the role of parents in preventing respiratory infections, both pneumonia and non-pneumonia. Mothers of toddlers who have a low level of knowledge can cause their toddlers to easily get pneumonia again because mothers of toddlers do not understand what is related to it and can prevent the recurrence of pneumonia in their toddlers. With a better level of knowledge, the possibility of recurrence of pneumonia will be smaller. Knowledgeable mothers of toddlers understand better the illnesses their children suffer from and know how to properly treat pneumonia and prevent factors that trigger pneumonia. A good level of knowledge will enable mothers to take precautions and be able to avoid the factors that cause pneumonia itself.

The Relationship between Economic Status and the Incidence of Pneumonia in Toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Community Health Center Working Area showed that most of the economic status of families of underprivileged toddlers was 46 toddlers, whereas the economic status of families who were not well-off was 7 toddlers who experienced mild pneumonia (100.0%). Based on the Mann-Whitney test, the p-value was 0.538, where the p-value $α > 0.05$, with Hα rejected and H0 accepted. So, it was concluded that there was no relationship between family economic status and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

According to Suryati et al. (2018), Economic aspects such as income are the main requirements for data to enjoy health facilities in an effort to improve public health. In line with the research results of Anwar and Dharmayanti (2014), it is explained that the risk of toddler pneumonia in households with a low economic level (middle and bottom) is higher compared to those with a high economic level (upper middle to top).

Based on the research results, it was found that the statistical value of the relationship between economic status and the incidence of pneumonia was a p-value of 0.538, namely the p-value was > 0.05, so the researchers draw the conclusion that there is no significant relationship between family economic status and the incidence of pneumonia in the Batu Aji Community Health Center Working Area, Batam City in 2022. Poor economic status will influence the mother's attitude in caring for her toddler and also meeting the toddler's needs, poor economic status also has an influence. in the residence occupied by the toddler so that the toddler lives in a house with a residential density that does not meet the requirements which results in air exchange in the house not being optimal. The currently underprivileged economic status has led the government to create the Healthy Indonesia Card in order to achieve a level of public health. Income levels are related to the provision of good and healthy housing facilities, health care, and affordability for treatment and adequate child nutrition. so that there are no obstacles for families with poor economic status who are able to enjoy health facilities.

The Relationship between Fuel Use and the Incidence of Pneumonia in Toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area found that the majority of cooking fuel still used kerosene stoves, namely 31 mothers under five (55.4%), where the fuel the cooking method used by the family was a kerosene stove, and those who mostly used oil stoves were 14 toddlers who had severe pneumonia (82.4%).

Based on the Mann-Whitney test, the p-value was 0.041, where the p-value $α < 0.05$, with Hα accepted and H0 rejected. So, it was concluded that there was a relationship between fuel use and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

The research by Indah et al. (2022) was entitled "Analysis of Risk Factors for Pneumonia in Toddlers in the Working Area of the Sidorejo Community Health Center, Pagar Alam City using a

retrospective study research method with a case-control approach. The results of the research show a relationship between the type of cooking fuel and the incidence of pneumonia in toddlers with a statistical test result of p-value = 0.001. So, it was concluded that there was a significant relationship between the type of cooking fuel and the incidence of pneumonia in toddlers.

Based on the research results, researchers concluded that there is a significant relationship between fuel use and the incidence of pneumonia in the Batu Aji Community Health Center Working Area, Batam City in 2022, most of the families of children under five in the use of fuel using kerosene and stoves in the Batu Aji Community Health Center Working Area. Where, the use of fuel has a big impact on the incidence of pneumonia because the effects of burning produce high concentrations which can damage the lung defense mechanism so that it easily causes pneumonia, especially in toddlers. The use of kerosene/stove fuel will produce smoke which will cause air pollution so that the air in the environment around the toddler becomes unhealthy. The bad air quality cannot be changed and only circulates in the environment around the toddler, unhealthy air/poor air quality will be inhaled by the toddler, causing infections in the toddler's respiratory tract. The type of fuel used for cooking is related to pollutants or substances that can cause air pollution in the house, especially around the kitchen. High indoor air pollution from unqualified fuels such as firewood, charcoal, and kerosene can cause respiratory tract irritation and affect the body's specific and non-specific defenses in toddlers' respiratory tracts against disease pathogens.

The Relationship between the Use of Mosquito Coil and the Incidence of Pneumonia in Toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area found that the majority of those using mosquito coils still used mosquito coils such as Baygon, namely 34 mothers of toddlers (60.7%), where the majority of families of toddlers who still used mosquito coils were in There were 14 toddlers who experienced severe pneumonia (82.4%).

The results of this research are in line with and supported by research conducted by Rina (2020) entitled "Analysis of Internal and External Factors with the Incidence of Pneumonia in Toddlers in the Pekauman Community Health Center Working Area, Banjarmasin City in 2020". The independent category of using medication was 57.4% higher than not using mosquito repellent at 42.6%. The results of the Chi-Square statistical test showed that respondents who used mosquito repellent had risk factors that were exposed to (Odds Ratio = 1.128; CI. 95% 0.431 – 2.950) suffered from pneumonia compared to respondents who did not use mosquito repellent with a p-value of 0.047, which means there is a significant relationship between the use of mosquito repellent and the incidence of pneumonia.

Respiratory tract disorders that people suffer from are also caused by germ infections there is smoke from mosquito coils which is used by lower middle class people. Air pollution in the house that comes from the activities of its occupants includes the use of anti-mosquito drugs which contain carcinogenic substances, biomass fuel for cooking or heating, cigarette smoke, use of spray or burnt insecticides, and the use of synthetic building materials such as paint and asbestos (Apte & Salvi, 2016).

Based on the research results, the researchers concluded that there was a significant relationship between the use of mosquito coils and the incidence of pneumonia in the Batu Aji Health Center Working Area, Batam City in 2022, the majority of families under five who used mosquitoes coils still used mosquito coils in the Batu Aji Community Health Center Working Area. Where, the use of mosquito coils has a big impact on the incidence of pneumonia because there are many substances that can cause infections in the respiratory tract of toddlers. The use of mosquito coils as a tool to avoid mosquito bites can cause respiratory tract problems because it produce smoke and unpleasant odors. The presence of air pollution in the home environment will damage the lung's defense mechanism, making it easier for respiratory problems to occur.

The relationship between air pollution and pneumonia incidents in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area found that the majority of toddlers were exposed to air pollution due to polluted air, namely 49 toddlers (87.5%), where the toddler environment with exposure to pollution/unhealthy air was in toddlers who experienced severe pneumonia as many as 17 children under five (100.0%).

Based on the Mann-Whitney test, the p-value was 0.000, where the p-value $\alpha < 0.05$, with Hα accepted and H0 rejected. So, it was concluded that there was a relationship between air pollution and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

The results of this research are almost the same as research conducted by Suryati et al. (2018) entitled "The Relationship between Physical Environmental and Socioeconomic Family Factors on the Incidence of Pneumonia in Toddlers in the Working Area of the Tahtul Yemen Health Center, Jambi City" The results of the research show that the picture obtained from 35 Of the case respondents, 24 respondents (68.6%) had poor physical environments and air quality and only 11 respondents (31.4%) had good physical environments and air quality. Meanwhile, of the 35 respondents, 22 respondents (62.9%) of the control toddlers had a good physical environment and air quality and only 13 respondents (37.1%) had a poor physical environment and air quality. To determine the relationship between physical environmental factors and air quality and the incidence of pneumonia in toddlers in the Tahtul Yemen Community Health Center Working Area, Jambi City, a Chi-Square analysis test was used with a confidence level of 95% ($\alpha = 0.05$), thus obtaining a p-value (0.017) $< \alpha$ (0.05), then there is a relationship between physical environmental factors and the incidence of pneumonia in toddlers. From the analysis, it is also known that the odds ratio (OR) = 3.692, meaning that toddlers with poor physical environments and air quality are at risk of having 3.7 times the chance of experiencing pneumonia compared to toddlers with good physical environments and air quality.

Good air quality in the house is a predisposing factor for pneumonia, so the government regulates room quality standard values as stated in Minister of Health Regulation No. 1077 of 2011. The Minister of Health's Regulation explains that the standard values for indoor air quality are based on chemical, physical and biological parameters. Chemical parameters consist of SO_2, NO_2, CO, CO_2, Pb, asbestos, formaldehyde, volatile organic compounds (VOC) and environmental tobacco smoke. Physical parameters namely temperature, lighting, humidity, ventilation rate, PM10 and PM2.5, while biological parameters are fungi, pathogenic bacteria and germ numbers (Permenkes, 2011). These chemical, biological, and physical parameters are interrelated. This is proven by a study that shows that children aged under five years to 10 years old have a 20% risk of experiencing respiratory tract disorders for every increase in NO_2 of 28.3 μg/m3, and the relationship is very strong ($p < 0.01$) if NO_2 exposure is accompanied by exposure to cigarette smoke above 1.5 μg/m (Fahimah et al., 2018).

Indoor air pollution is a serious health problem because it is the cause of 4.5 million annual deaths globally due to pneumonia (12%), indoor air pollution continues to be a global problem, especially in developing countries. Research studies have shown that approximately 90% of time is spent in indoor environments, 5 times higher than the average time spent in outdoor environments indicating the enormous risk to human health posed by indoor air pollutants. These indoor air pollutants generally come from the surrounding environment (Amoatey et al., 2019).

Based on the research results, the researchers concluded that there was a significant relationship between air pollution in the environment around toddlers and the incidence of pneumonia in the Batu Aji City Health Center Working Area.

In Batam in 2022, most of the air quality in the environment around toddlers will be poor in the Batu Aji Community Health Center Working Area. Where, air pollution has a big impact on the incidence of pneumonia because, particulate dust produced by motorized vehicles, cigarette smoke, smoke from the remaining use of cooking fuel, and smoke from the use of mosquito coils

will enter the lower respiratory system (alveoli) where it can cause respiratory tract irritation so that the mucociliary function in preventing the entry of germs is reduced. Children are especially vulnerable to poor indoor air quality because their lungs are still developing. Their airways are smaller, so inflammation caused by pollution can cause the airways to narrow more easily than in older people. Pollution can also interact with allergens that cause asthma in children.

The relationship between home ventilation and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Community Health Center Working Area showed that the majority of toddlers' house ventilation did not meet the requirements, namely 44 toddlers' houses (78.6%), where the ventilation of toddlers' houses that did not meet the requirements was in toddlers who had mild pneumonia as many as 7 toddlers. (100.0%).

Based on the Mann-Whitney test, the p-value was 0.012, where the p-value α < 0.05, with Hα accepted and H0 rejected. So, it was concluded that there was a relationship between house ventilation and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

The results of this research are almost the same as research conducted by Hasanah (2017) entitled "The Relationship between Physical Sanitation of Homes and Smoking Habits with the Incidence of Pneumonia in Toddlers in Selotinah Village, Ngariboyo District, Magetan Regency." has a statistically significant relationship with the incidence of pneumonia in toddlers (p=0.001). The risk of pneumonia can be seen from the OR value of 6.41, meaning that toddlers who live in homes with inadequate ventilation have a risk of developing pneumonia of 6.4. times greater than toddlers who live in houses with adequate ventilation areas. The ventilation area referred to in this research is the window area (in the living room, family room, and bedroom) divided by the floor area (in the living room, bedroom, family room, and bedroom).

Air ventilation areas that do not meet the requirements can be caused by the small type of house and narrow land ownership. Air ventilation is only available at the front of the house because the side is adjacent to the wall of the neighboring house. Apart from that, it is not uncommon for respondents to not open windows/doors and close air vents so that there is no air exchange process in the house and no sunlight enters which can kill bacteria or viruses. Lack of ventilation will cause a lack of O2 in the house, which means that toxic CO_2 levels will increase. In addition, lack of ventilation will cause indoor air humidity to rise due to the process of evaporation of fluids from the skin and their absorption. This moisture will be a good medium for pathogenic bacteria (Sonia, 2018).

Based on the research results, the researchers concluded that there is a significant relationship between house ventilation in the environment around toddlers and the incidence of pneumonia in the Batu Aji Health Center Working Area, Batam City in 2022, most of the house ventilation in the environment around toddlers does not meet the requirements in the Batu Aji Health Center Working Area Where researchers assume that ventilation is one of the variables causing the incidence of pneumonia in toddlers because the ventilation area of the house does not comply with the requirements. After all, it will risk increasing the incidence of pneumonia, and ventilation that meets the requirements.

Requirements/windows that can be opened and closed and air holes that are usually at the top of each door. This opening is useful for pushing air out of the room and bringing in clean air from outside. Home ventilation is related to home humidity, which supports the survival of viruses and bacteria. Sunlight can kill bacteria or viruses, so adequate lighting will reduce the risk of pneumonia.

The Relationship between House Overcrowding and the Incidence of Pneumonia in Toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area found that the density of houses around toddlers who met the requirements and those who did not meet the requirements was around 28 people (50.0%), where the density of houses around toddlers who did not meet the requirements was for toddlers who did not meet the requirements. 14 people (82.4%) experienced severe pneumonia.

Based on the Mann-Whitney test, the p-value was 0.002, where the p-value α < 0.05, with Hα accepted and H0 rejected. So, it was concluded that there was a relationship between house density and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City in 2022.

The results of this research are almost the same as research conducted by Hendri (2020) entitled "Determinants Associated with the Incidence of Pneumonia in Children Aged 12-59 Months." The results of the research show that from the results of the analysis in his research, p-value = 0.01 (OR=4.71; 95% CI=1.72-12.93). Because the p value (0.01) < α 0.05, H0 is rejected and Ha is accepted, which means there is a significant relationship between house density and the incidence of pneumonia in children aged 12-59 months in the Pandanaran Community Health Center working area in 2018. Value Odds Ratio (OR) Fisher exact test results obtained p = 0.027, RP = 3.33 and CI 95% (0.567 – 19.593). Based on a p-value > 0.05, the result is 4.71, which means that there is a significant relationship between the level of house density and the incidence of toddler pneumonia (Gunawan, 2017).

Adequate air in the house is determined by the area of the room and the number of occupants in the house. Residents in a house that is too crowded will increase the temperature in the house due to the release of body heat (Leonardus & Anggraeni, 2019). As a result of increasing temperatures in the house, bacteria can reproduce and the spread of disease in densely populated houses occurs very quickly (Suryani et al., 2018). If a family member has a respiratory disease, then its spread will easily occur quickly (Hariyanto, 2020).

Based on the results of the research, the researchers concluded that there was a significant relationship between the density of houses in the environment around toddlers and the incidence of pneumonia in the Batu Aji Community Health Center Working Area, Batam City in 2022. Where, the researchers assumed that the density of houses for toddlers could result in the risk of pneumonia due to limited movement space. which is caused by density. Apart from that, residential density can cause high levels of CO_2 in the room, whereas it was previously known that CO_2 is a source of chemical air pollutants. High levels of CO_2 in the house are caused by the absence of air exchange in the house. Residential density that does not meet the requirements will affect the number of germ colonies for diseases, especially diseases of the respiratory tract. Residential density that does not meet the requirements due to the large number of residents with limited living space causes a lack of air exchange in the house which can affect the air quality in the house.

The relationship between exposure to cigarette smoke and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area, Batam City in 2022

The results of research from 56 toddlers in the Batu Aji Health Center Working Area found that 46 toddlers (82.1%) were exposed to cigarette smoke, and the majority of toddlers who were exposed to cigarette smoke were 16 toddlers (94) who experienced severe pneumonia (1%).

Based on the Mann-Whitney test, the p-value was 0.012, where the p-value α < 0.05, with Hα accepted and H0 rejected. So, it was concluded that there was a relationship between exposure to cigarette smoke and the incidence of pneumonia in toddlers at the Batu Aji Community Health Center, Batam City. In 2022, the majority of toddlers in the Batu Aji Community Health Center Working Area were exposed to cigarette smoke.

The risk of developing pneumonia is 4.6 times greater than that of toddlers who live in homes where family members do not smoke. The results of this study show that the risk of toddlers getting pneumonia will increase if they live at home if there are family members who smoke. Toddlers who come from families where family members smoke and get pneumonia are 60.7%, while toddlers whose family members are non-smokers and get pneumonia are 28.6%. The statistical test results show a p-value of 0.003, meaning there is a significant relationship between the smoking status of family members. with pneumonia. In addition, an OR value of 2.124 was obtained, meaning that respondents who had family members who smoke had a 2.124 times risk of developing pneumonia.

The presence of one or more smokers in the house will increase the risk of family members suffering from illnesses, such as respiratory problems, worsening asthma, and aggravating angina pectoris and can increase the risk of having an ARI attack, especially in toddlers. Toddlers whose parents smoke are more susceptible to respiratory diseases such as flu, asthma, pneumonia, and other respiratory diseases. The harmful gases in cigarette smoke stimulate the formation of mucus, dust, and bacteria that accumulate and cannot be expelled, and cause chronic bronchitis, and paralysis of elastin fibers in lung tissue. which results in reduced lung pumping power, air is retained in the lungs, and results in the rupture of the air sacs (McKnight & Burns, 2023).

Based on the research results, the researchers concluded that there was a significant relationship between exposure to cigarette smoke around toddlers and the incidence of pneumonia in the Batu Aji Health Center Working Area, Batam City in 2022. Where, in the Batu Aji Health Center Working Area, the majority of toddlers were exposed to cigarette smoke. Researchers assume that the presence of smoking family members has an impact on diseases in toddlers. Cigarette smoke containing various pollutants can be inhaled by toddlers and can cause respiratory infections such as pneumonia. Parents who smoke close to toddlers can cause pneumonia in toddlers. The presence of family members who smoke can influence the recurrence of pneumonia in toddlers. The air pollution emitted contains dangerous chemicals that can harm the health of people around them. Cigarette smoke is very dangerous for toddlers because toddlers have low immune systems. Cigarette smoke contains more than 4000 chemicals, including 43 substances that can cause cancer (Minister of Health of the Republic of Indonesia, 2009). Cigarette smoke contains substances such as carbon monoxide, tar, and nicotine which enter the body's respiratory system which can reduce lung defense function and irritate the lungs (Morgan et al., 2017).

Conclusion

After conducting research and data processing by researchers entitled "Analysis of Extrinsic Factors on the Incidence of Pneumonia in Toddlers in the Working Area of Batu Aji Health Center, Batam City in 2022", it can be concluded that:

1. The incidence of pneumonia in toddlers in the Batu Aji Health Center Working Area was that most toddlers experienced moderate pneumonia, of which there were 32 toddlers with a percentage (57.1%) experiencing moderate pneumonia.
2. There is no relationship between maternal age and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area with a p-value of 0.570.
3. There is no relationship between maternal education and the incidence of pneumonia in toddlers in the Batu Aji Health Center Working Area with a p-value of 0.521.
4. There is a relationship between mothers' knowledge of the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area with a p-value obtained of 0.005.
5. There is no relationship between economic status and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area with a p-value obtained of 0.538.

6. There is a relationship between fuel use and the incidence of pneumonia in toddlers in the Working Area Batu Aji Community Health Center with a p-value obtained of 0.041.
7. There is a relationship between the use of mosquito coils and the incidence of pneumonia in toddlers in the Batu Aji Health Center Working Area with a p-value of 0.039.
8. There is a relationship between air pollution and the incidence of pneumonia in toddlers in the Batu Aji Health Center Working Area with a p-value obtained of 0.002.
9. There is a relationship between house ventilation and the incidence of pneumonia in toddlers in the Batu Aji Health Center Working Area with a p-value of 0.012.
10. There is a relationship between house density and the incidence of pneumonia in toddlers in the Batu Aji Community Health Center Working Area with a p-value of 0.002.
11. There is a relationship between smoking behavior and the incidence of pneumonia in toddlers in the Batu Aji Health Center Working Area with a p-value of 0.01.

Acknowledgment

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